

**AbSciCon**  
April 16–20, 2012  
Atlanta, Georgia

**12**

Go paperless! Access AbSciCon  
Scientific Program and Abstracts at  
<http://abscicon2012.arc.nasa.gov>



# **Astrobiology Science Conference 2012**

## **Exploring Life: Past, Present, Near and Far**

April 16-20, 2012

Atlanta, Georgia

### **Scientific Program**

Sponsored by:

National Aeronautics and Space Administration  
Astrobiology Program

Hosted by:

Georgia Institute of Technology:  
Ribo Evo, Center for Ribosomal Origins and Evolution



Go paperless! Access AbSciCon  
Scientific Program and Abstracts at  
<http://abscicon2012.arc.nasa.gov>

# Astrobiology Science Conference 2012

## Exploring Life: Past and Present, Near and Far

---

April 16 – 20, 2012

Atlanta, Georgia

Sponsored by:

National Aeronautics and Space Administration Astrobiology Program

Hosted by:

Georgia Institute of Technology: Ribo Evo, Center for Ribosomal Origins and Evolution

Co-Chairs:

Loren Williams, Georgia Institute of Technology

Eric Gaucher, Georgia Institute of Technology

### Science Organizing Committee

Linda Billings, George Washington University

Jason P. Dworkin, NASA Goddard Space Flight Center

Pascale Ehrenfreund, George Washington University

Eric Gaucher, Georgia Institute of Technology

Tori Hoehler, NASA Astrobiology Institute

Clark Johnson, University of Wisconsin-Madison

Victoria Meadows, University of Washington

Nora Noffke, Old Dominion University

John Peters, Montana State University

Daniella Scalice, NASA Astrobiology Institute

Ken Takai, Japanese Agency for Marine-Earth Science and Technology

Mary Voytek, NASA Astrobiology Institute (ex-officio)

Frances Westall, CNRS

Loren Williams, Georgia Institute of Technology

James Wray, Georgia Institute of Technology

### Local Organizing Committee

Loren Williams, Georgia Institute of Technology

Eric Gaucher, Georgia Institute of Technology

Jamila Cola, Georgia Institute of Technology

Megan McDevitt, Georgia Institute of Technology

Sue Winters, Georgia Institute of Technology

Elizabeth Waggoner, Capstone Organization

### Communications Committee

Linda Billings, George Washington University

Betul Arslan, Georgia Institute of Technology

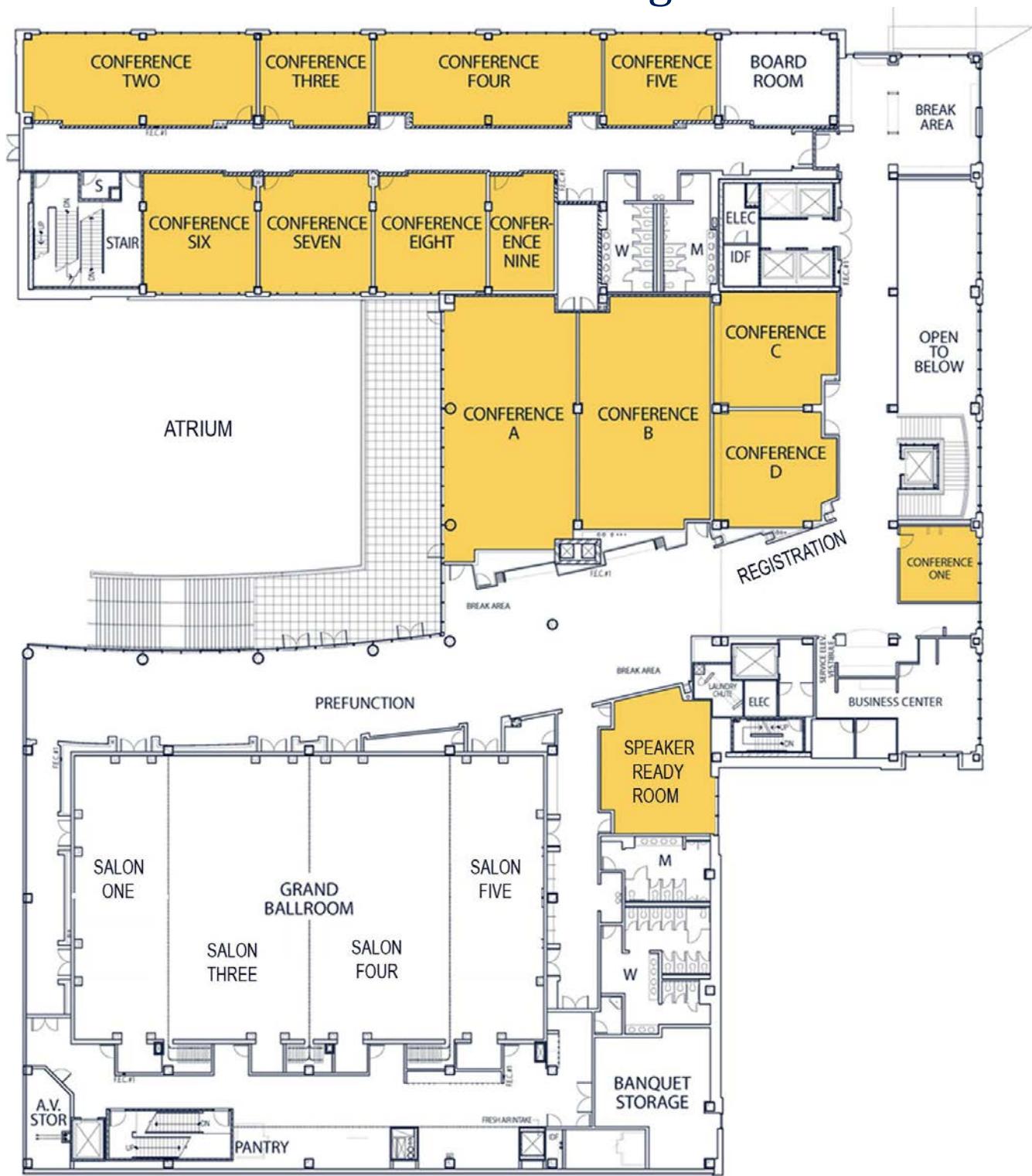
Shawn Domagal-Goldman, NASA Astrobiology Program

Aaron Gronstal, Astrobiology Magazine

Daniella Scalice, NASA Astrobiology Institute

# Georgia Tech Hotel and Conference Center

## Second Floor Meeting Rooms



# Astrobiology Science Conference 2012

## Exploring Life: Past and Present, Near and Far

### Scientific Program

Monday, April 16, 2012

---

#### 8:00 – 10:00 a.m.

Salon One	Understanding the Effects of Space Radiation on Living Organisms and its Implication for Astrobiology	p. 1
Salon Three	Early Evolution of Life I	p. 1
Salon Four	How Quantum Chemical Theory and Computation Assists in the Explanation of Important, Difficult, and Unique Chemical Questions in Astronomy and Astrobiology	p. 2
Salon Five	Titan as a Prebiotic Chemical System	p. 2
Conference Four	Establishing Biogenicity: Systematic Use of Organic and Inorganic Evidence of Ancient Terrestrial and Extraterrestrial Life	p. 3
Conference Two	The Science of Mars Science Laboratory	p. 3

#### 10:15 a.m. – 12:15 p.m.

Salon One	The Role of UV Radiation in Prebiotic Chemistry I	p. 4
Salon Three	Linking Microbial Ecosystem Biosignatures to the Geologic Record of Early Earth and Mars	p. 4
Salon Four	Diversity in Astrobiology Research and Education	p. 5
Salon Five	Prebiotic Chemistry and the Origins of Functional Biopolymers	p. 5
Conference Four	From Genomes to Biomarkers	p. 6
Conference Two	Thermodynamics, Disequilibrium, and Evolution	p. 6

#### 1:30 – 3:30 p.m.

Grand Ballroom	Plenary Session: Mission to Mars: Curiosity Sets Out to Explore Gale Crater	p. 7
----------------	---	------

#### 3:45 – 5:45 p.m.

Grand Ballroom	How Can Astrobiology Help Save the World? A Discussion of Astrobiology and Humanity's Future	p. 7
Conference Four	The History of Earth Surface Oxygenation: Looking to the Modern as a Key to the Past	p. 8
Conference Two	Stability and Survival of Life in Simulated Extraterrestrial Environments	p. 8

*Monday, April 16 continued*

**3:45 – 5:45 p.m.**

## Poster Session I

Conference A	Emerging Technologies and Strategies for Prospecting for the Signs of Life on Other Worlds Posters	p. 9
Conference A	Establishing Biogenicity: Systematic Use of Organic and Inorganic Evidence of Ancient Terrestrial and Extraterrestrial Life Posters	p. 9
Conference A	Early Evolution of Life Posters	p. 9
Conference A	The Nature of the Last Universal Common Ancestor Posters	p. 9
Conference A	Oxygen and Evolution: Looking to the Past Posters	p. 10
Conference A	The Role of Horizontal Gene Transfer in Innovation Posters	p. 10
Conference A	Prebiotic Chemistry and the Origins of Functional Biopolymers Posters	p. 10
Conference A	From Genomes to Biomarkers Posters	p. 10
Conference A	Chemical Evolution and the Transition to Living Matter Posters	p. 11
Conference A	The Role of UV Radiation in Prebiotic Chemistry Posters	p. 11
Conference A	Understanding the Effects of Space Radiation on Living Organisms and its Implication for Astrobiology Posters	p. 11
Conference A	Diversity in Astrobiology Research and Education Posters	p. 12
Conference B	The Organic Continuum from the Interstellar Medium to the Early Earth Posters	p. 12
Conference B	The Extent of Chirality in Cosmochemistry and its Possible Role in the Origins of Life Posters	p. 12
Conference B	Astrobiology of Planetesimals and Biomarkers in Terrestrial and Extraterrestrial Environments Posters	p. 12
Conference B	How Quantum Chemical Theory and Computation Assists in the Explanation of Important, Difficult, and Unique Chemical Questions in Astronomy and Astrobiology Posters	p. 13
Conference B	The Science of Mars Science Laboratory Posters	p. 13
Conference B	Astroecology Posters	p. 13
Conference B	Titan as a Prebiotic Chemical System Posters	p. 13
Conference B	Linking Microbial Ecosystem Biosignatures to the Geologic Record of Early Earth and Mars Posters	p. 14
Conference B	Drivers of Microbial Community Change through Space and Time Posters	p. 14
Conference B	Meta-omics of Microbial Mats: From Molecules to Macrostructure Posters	p. 15
<b>7:00 – 9:00 p.m.</b>		
Grand Ballroom	Public Event: FameLab Astrobiology: The Finals	p. 15

## Tuesday, April 16, 2012

---

**8:00 – 10:00 a.m.**

Salon One	Meta-omics of Microbial Mats: From Molecules to Macrostructure	p. 16
Salon Three	Early Evolution of Life II	p. 16
Salon Four	Drivers of Microbial Community Change through Space and Time	p. 16
Salon Five	The Organic Continuum from the Interstellar Medium to the Early Earth Oxidation: Cellular Stress and Preservation of Organic Biosignatures in Oxidative Planetary Conditions	p. 17 p. 17
Conference Four	Mineral-based Catalysis on the Prebiotic Earth	p. 18

*Tuesday, April 17 continued*

**10:15 a.m. – 12:15 p.m.**

Salon One	The Role of UV Radiation in Prebiotic Chemistry II	p. 18
Salon Three	The Nature of the Last Universal Common Ancestor	p. 19
Salon Four	Oxygen and Evolution: Looking to the Past	p. 19
Salon Five	Chemical Evolution and the Transition to Living Matter	p. 20
Conference Four	The Role of Horizontal Gene Transfer in Innovation	p. 20
Conference Two	Virus Ecology and Evolution and Astrovirology	p. 21

**1:30 – 3:30 p.m.**

Grand Ballroom	Plenary Session: Great Debate: Expanding the Habitable Zone: The Hunt for ExoPlanets Now and Into the Future	p. 21
----------------	--	-------

**3:45 – 5:45 p.m.**

Grand Ballroom	Lightning Talks I	p. 21
Conference Four	Space, Slime, and the Search for Life: Astrobiology Education and Public Outreach	p. 22
Conference Two	Transmission into Space: Scientific, Social, Ethical, and Legal Considerations	p. 22

**3:45 – 5:45 p.m.**

**Poster Session II**

Conference A	Environmental Physics and Life Posters	p. 23
Conference A	Extremoecomics: The Biology and Metabolism of Weird Life Posters	p. 23
Conference A	Microbes in Lithifying Systems Posters	p. 23
Conference A	Stability and Survival of Life in Simulated Extraterrestrial Environments Posters	p. 24
Conference A	Microbiology and Geochemistry of Deserts/ Investigating Mars Analog Environments Posters	p. 24
Conference A	The New Mars: Habitability of a Neighbor Planet Posters	p. 24
Conference A	Icy Worlds: Niches for Biological, Pre-Biological, and Abiological Chemistry Posters	p. 24
Conference A	Asteroids, Comets, and Astrobiology Posters	p. 24
Conference A	So Many Worlds: Quantifying the Frequency of Habitable Planets Posters	p. 25
Conference A	Development of Quantitative Habitability Assessments for Earth, the Solar System, and Exoplanets Posters	p. 26
Conference B	How Can Astrobiology Help Save the World? Astrobiology and Humanity's Future Posters	p. 26
Conference B	Developing and Deploying Digital Media in Astrobiology Education Posters	p. 26
Conference B	The Intersection of Astrobiology and Society Posters	p. 26
Conference B	Societal Impact of Discovering Extraterrestrial Life Posters	p. 26
Conference B	Virus Ecology and Evolution and Astrovirology Posters	p. 27
Conference B	Pattern and Prediction: Integrating Energetics, Geochemistry, and Genetics in the Investigation of Early Earth and Extraterrestrial Analog Environments Posters	p. 27
Conference B	Molecular Tools for Viability Assessment Posters	p. 27
Conference B	Plausible Geochemical Conditions on the Prebiotic Earth Posters	p. 27
Conference B	From Non-Enzymatic Catalysis to Metabolism: Tracing Evolution of Catalysis and its Coupling with Replication at the Origins of Life Posters	p. 27
Conference B	The Origin of Biomolecules in Planetary Environments: From HCN to RNA Posters	p. 28
Conference B	Translation: By Life's Oldest Macromolecules Posters	p. 28
Conference B	The Origin and Early Evolution of Photosynthesis Posters	p. 29

**7:00 – 9:00 p.m.**

Grand Ballroom	Special Event: An Evening with Author Dava Sobel	p. 29
----------------	--	-------

## Wednesday, April 18, 2012

---

### 8:00 – 10:00 a.m.

Salon One	The New Mars: Habitability of a Neighbor Planet	p. 30
Salon Three	Extremeomics: The Biology and Metabolism of Weird Life	p. 30
Salon Four	Developing and Deploying Digital Media in Astrobiology Education	p. 30
Salon Five	Plausible Geochemical Conditions on the Prebiotic Earth	p. 31
Conference Four	Transition to the World of Genetically Encoded Proteins	p. 31
Conference Two	Asteroids, Comets, and Astrobiology	p. 32

### 10:15 a.m. – 12:15 p.m.

Salon One	Translation: By Life's Oldest Macromolecules	p. 32
Salon Three	Icy Worlds: Niches for Biological, Pre-Biological, and Abiological Chemistry	p. 33
Salon Four	The Intersection of Astrobiology and Society From Non-Enzymatic Catalysis to Metabolism: Tracing Evolution of Catalysis and its Coupling with Replication at the Origins of Life	p. 33
Salon Five	Microbiology and Geochemistry of Deserts and Investigating Mars Analog Environments	p. 34
Conference Two	Molecular Tools for Viability Assessment	p. 35

### 1:30 – 3:30 p.m.

Grand Ballroom	Plenary Session: Honoring Those We Have Lost: Science and Reflections	p. 35
----------------	---	-------

## Thursday, April 19, 2012

---

### 8:00 – 10:00 a.m.

Salon One	So Many Worlds: Quantifying the Frequency of Habitable Planets	p. 36
Salon Three	The Origin of Biomolecules in Planetary Environments: From HCN to RNA (Session in Honor of James Ferris)	p. 36
Salon Four	Societal Impact of Discovering Extraterrestrial Life	p. 37
Salon Five	The Taxonomy of Comets: Testing the Origins of Organics and Water, and their Delivery to Young Planets	p. 37
Conference Four	Microbes in Lithifying Systems	p. 38
Conference Two	Pattern and Prediction: Integrating Energetics, Geochemistry, and Genetics in the Investigation of Early Earth and Extraterrestrial Analog Environments	p. 38

### 10:15 a.m. – 12:15 p.m.

Salon One	Oxygen and Evolution: Looking at Ancient Biochemistry	p. 39
Salon Three	Exoplanet Habitability	p. 39
Salon Four	Laboratory Astrochemistry	p. 40
Salon Five	Serpentization in Astrobiology: From Molecular to Cosmic Scales	p. 40
Conference Four	Life and Habitats Within and Under Ice: Glaciers and Ice Sheets, Lakes and Ice Shelves	p. 41
Conference Two	Biological Energy Transduction, Quenching, and Conformation as a Function of the Spectral Radiation Environment	p. 41

*Thursday, April 19 continued*

**1:30 – 3:30 p.m.**

Grand Ballroom	Plenary Session: How Do We Explain Ourselves? Challenges in Communicating about Astrobiology	p. 42
----------------	--	-------

**3:45 – 5:45 p.m.**

Grand Ballroom	Lightning Talks II	p. 42
Conference Four	The Origin and Early Evolution of Photosynthesis	p. 42
Conference Two	Development of Quantitative Habitability Assessments for Earth, the Solar System, and Exoplanets	p. 43

**3:45 – 5:45 p.m.**

**Poster Session III**

Conference A	Experimental Evolution Posters	p. 44
Conference A	Exoplanet Habitability Posters	p. 44
Conference A	Transmission into Space: Scientific, Social, Ethical, and Legal Considerations Posters	p. 44
Conference A	Can a Cross-Disciplinary Approach to Communication Give New Insights in Astrobiology? Posters	p. 44
Conference A	Integrating the Study of Intelligence Within Astrobiology Posters	p. 45
Conference A	Dealing with the Data Deluge and Silo-ed Storage: What Can We Learn from Data Experts and our Colleagues? Posters	p. 45
Conference A	Space, Slime, and the Search for Life: Astrobiology Education and Public Outreach Posters	p. 45
Conference A	Astrobiology in Historical Perspective Posters	p. 46
Conference A	How Do We Explain Ourselves? Challenges in Communicating about Astrobiology Posters	p. 46
Conference B	Laboratory Astrochemistry Posters	p. 47
Conference B	New Frontiers in Stable Isotope Analysis for Astrobiology Posters	p. 47
Conference B	Extraterrestrial Biomolecules in the New Age of Astronomical Instrumentation Posters	p. 47
Conference B	Astrobiology and Robotics Technology Posters	p. 48
Conference B	Astrobiology in Orbit Posters	p. 48
Conference B	Biological Life Support System Posters	p. 48
Conference B	Can Terrestrial Microbes Grow on Mars? Posters	p. 49
Conference B	Mineralogy as an Indicator of Aqueous Processes on Mars Posters	p. 49
Conference B	Serpentinization in Astrobiology: From Molecular to Cosmic Scales Posters	p. 49
Conference B	Life and Habitats Within and Under Ice: Glaciers and Ice Sheets, Lakes and Ice Shelves Posters	p. 50

# Friday, April 20, 2012

---

## 8:00 – 10:00 a.m.

Salon One	Experimental Evolution	p. 51
Salon Three	Mineralogy as an Indicator of Aqueous Processes on Mars	p. 51
Salon Four	New Frontiers in Stable Isotope Analysis for Astrobiology	p. 52
Salon Five	Astrobiology in Orbit	p. 52
Conference Four	Astrobiology and Robotics Technology	p. 53
Conference Two	Can a Cross-Disciplinary Approach to Communication Give New Insights in Astrobiology?	p. 53
Conference A	Subsurface Ecosystems	p. 54
Conference B	Origin of Life: A New Film about Astrobiology	p. 54

## 10:15 a.m. – 12:15 p.m.

Salon One	Minimal and Ancestral Genomes	p. 54
Salon Three	Extraterrestrial Biomolecules in the New Age of Astronomical Instrumentation	p. 55
Salon Four	Integrating the Study of Intelligence Within Astrobiology	p. 55
Salon Five	The Old World and the New: Early Earth as a Proxy for an Extrasolar Planet	p. 56
Conference Four	Can Terrestrial Microbes Grow on Mars?	p. 56
Conference Two	Astrobiology in Historical Perspective	p. 56
Conference A	The Potential for Life and its Detection on Europa	p. 57
Conference B	The Extent of Chirality in Cosmochemistry and its Possible Role in the Origins of Life	p. 57
Print Only Abstracts		p. 58
Author Index		p. 59

**MONDAY, APRIL 16, 2012**

**UNDERSTANDING THE EFFECTS OF SPACE RADIATION ON LIVING ORGANISMS  
AND ITS IMPLICATION FOR ASTROBIOLOGY**

**8:00 a.m.      Salon One**

<b>Chairs:</b>	<b>Shiladitya DasSarma</b>
	<b>Mang Xiao</b>
8:00 a.m.	Mancinelli R.* <i>Halophiles in Space [#1001]</i>
8:15 a.m.	DasSarma S.* DasSarma P. Karan R. Regmi A. Capes M. DasSarma S. L. Gaddamnugu S. <i>Molecular mechanisms of radiation tolerance of Haloarchaea: A case for panspermia? [#1002]</i>
8:30 a.m.	DeVeaux L. C.* Lockhart J. S. Gygli P. E. <i>Mechanisms of radiation resistance: Lessons from our own backyard [#1003]</i>
8:45 a.m.	Horikawa D.* Cumbers J. Rogoffa D. Leuko S. Harnoto R. S. Arakawa K. Katayama T. Toyoda A. Kunieda T. Rothschild L. J. <i>DNA Repair and Protection in the UVC Radiation Tolerant Tardigrade Ramazzottius varieornatus [#1004]</i>
9:00 a.m.	Dadachova E.* Bryan R. A. Jiang Z. Friedman M. Casadevall A. <i>ATP levels in yeast cells exposed to various types of electromagnetic radiation depend on cellular melanization [#1005]</i>
9:15 a.m.	Xiao M.* Li X. H. Ha C. T. Fu D. <i>Mechanisms of Self-Defense on Radiation Injured Human Cells: Role of REDD1, a Novel Survival Factor, in Human Osteoblasts after Gamma Radiation [#1006]</i>
9:30 a.m.	Sowa M. B.* <i>Using a Systems Biology Approach to Understand Space Radiation Induced Signaling and Its Effects on Tissue Integrity [#1007]</i>
9:45 a.m.	Rothschild L. J.* <i>Space radiation and its implications for finding life elsewhere [#1008]</i>

**EARLY EVOLUTION OF LIFE I**

**8:00 a.m.      Salon Three**

<b>Chairs:</b>	<b>S. Blair Hedges</b>
	<b>Fabia Ursula Battistuzzi</b>
8:00 a.m.	Gogarten J.* Fournier G. Andam C. P. <i>The rooted Net of Life and molecular evolution before LUCA [#1011]</i>
8:30 a.m.	Katz L. A.* <i>Genome dynamics across the tree of life [#1012]</i>
9:00 a.m.	Hedges S.* <i>Hot spots in the coevolution of life and Earth [#1013]</i>
9:30 a.m.	Allwood A.* Hickman A. <i>Biosignatures and paleoenvironments in the 3.45 billion yr-old Strelley Pool Formation, Western Australia [#1014]</i>

**HOW QUANTUM CHEMICAL THEORY AND COMPUTATION ASSISTS IN  
THE EXPLANATION OF IMPORTANT, DIFFICULT, AND UNIQUE CHEMICAL QUESTIONS  
IN ASTRONOMY AND ASTROBIOLOGY**

8:00 a.m.      Salon Four

<b>Chairs:</b>	<b>Ryan Fortenberry</b>
	<b>Partha Bera</b>
8:00 a.m.	Francisco J. S.* <i>Structure and Stability of Interstellar Molecular Complexes: New Frontier in Astrochemistry</i> [#1021]
8:15 a.m.	Bowman J.* Wang Y. <i>Rigorous calculations of dissociation energies of water dimer and trimer from first principles calculations</i> [#1022]
8:30 a.m.	Sherrill D.* <i>Energy Component Analysis of Molecular Recognition in Biochemistry</i> [#1023]
8:45 a.m.	Woon D. E.* Chen L. <i>Quantum Chemical Studies of Cation and Anion Prebiotic Chemistry in Interstellar Icy Grain Mantles</i> [#1024]
9:00 a.m.	Gianturco F. A.* <i>Lithium-Containing Molecules and Ions: Role and Evolution in Early Universe Reactions</i> [#1025]
9:15 a.m.	DeYonker N. J.* Allen W. D. <i>Focal Point Coupled-cluster Study on the Low-lying Quartet and Sextet Electronic States of FeH: Spectroscopic Properties</i> [#1026]
9:30 a.m.	Bera P. P.* <i>Mechanism for the abiotic synthesis of uracil via UV-induced oxidation of pyrimidine in pure H<sub>2</sub>O ices under astrophysical conditions</i> [#1027]
9:45 a.m.	Crawford D.* Fortenberry R. C. <i>High-Accuracy Quantum Mechanics and the Identification of New Molecules in the Interstellar Medium</i> [#1028]

**TITAN AS A PREBIOTIC CHEMICAL SYSTEM**

8:00 a.m.      Salon Five

<b>Chairs:</b>	<b>Mark Smith</b>
	<b>Claire Pirim</b>
8:00 a.m.	Coustenis A.* Bampasidis G. Vinatier S. Achterberg R. Lavvas P. Nixon C. A. Jennings D. E. Teanby N. Flasar F. M. Carlson R. Orton G. S. Romani P. Guandique E. <i>Titan's atmospheric organic chemistry evolution within a Titanian year after Voyager</i> [#1031]
8:15 a.m.	West R.* Doose L. R. Tomasko M. G. Gudipati M. Karkoschka E. See C. <i>Shortwave solar flux at Titan's surface</i> [#1032]
8:30 a.m.	Mebel A.* Jamal A. Landera A. Kislov V. V. Kaiser R. I. <i>Reaction Mechanisms of the Growth of Aromatic and Polycyclic Aromatic Hydrocarbons in Titan's Atmosphere: A View from Theoretical Calculations of Potential Energy Surfaces</i> [#1033]
8:45 a.m.	Sebree J.* Stern J. C. Trainer M. G. <i>Stable Isotope Fractionation during Photolysis of Titan Aerosol Analogs</i> [#1034]
9:00 a.m.	Gudipati M. S.* Jacovi R. Couturier-Tamburelli I. Lignell A. Allen M. <i>Photochemistry in Titan's main haze layer</i> [#1035]
9:15 a.m.	Beauchamp J.* Thomas D. A. <i>Prebiotic Chemistry on Cryogenic Worlds: Contribution of Free Radical and Ionic Chemistry to Tribiochemical Reactions of Organics and Water Ice in the Dunes of Titan</i> [#1036]
9:30 a.m.	Pasek M. A.* <i>Does phosphorus participate in chemistry on Titan?</i> [#1037]
9:45 a.m.	Benner S. A.* Kim H. Neveu M. <i>Possible Molecules to Support Genetics on Titan</i> [#1038]

**ESTABLISHING BIOGENICITY: SYSTEMATIC USE OF ORGANIC AND INORGANIC  
EVIDENCE OF ANCIENT TERRESTRIAL AND EXTRATERRESTRIAL LIFE**

8:00 a.m. Conference Room Four

**Chairs:**

**Andrew Czaja**

**Kenneth Williford**

8:00 a.m.

Roden E.\* Wu L. Percak-Dennett E. M. Beard B. Johnson C.

*Stable Fe Isotope Fractionation Between Aqueous Fe(II) and Model Archean Ocean Fe-Si Coprecipitates: Implications for the Origin of Fe Isotope Variations in the Ancient Rock Record* [#1041]

8:15 a.m.

Li Y.\* Fedo C. Konhauser K.

*Evidence of Circadian Metabolism by Photosynthetic Microorganism in Neoarchean and Palaeoproterozoic Banded Iron Formations* [#1042]

8:30 a.m.

Czaja A. D.\* Johnson C. Beard B.

*Meso- and micron-scale Fe isotope analyses of the 3.7-3.8 Ga Isua BIFs reveal Early Archean Fe oxidation* [#1043]

8:45 a.m.

Li W.\* Johnson C. Beard B. Van Kranendonk M. J.

*Fe isotope and U-Th-Pb evidence for anoxygenic Fe(II)-oxidizing photoautotrophic bacteria in 3.4 Ga Archean ocean* [#1044]

9:00 a.m.

Bower D. M.\* Steele A. Fries M. D. Kater L.

*A micro Raman spectroscopy investigation of carbonaceous material in geologic samples for life detection: Unraveling the mysteries of G-and D- band parameters* [#1045]

9:15 a.m.

Oduro H. D.\* Hallmann C. Grabenstatter J. Summons R. E. Ono S.

*Multiple Sulfur Isotope Insights into the Origin of Organic-Sulfur Compounds in Archean Rocks* [#1046]

9:30 a.m.

Williford K. H.\* Ushikubo T. Lepot K. Kitajima K. Hallmann C.

Spicuzza M. J. Eigenbrode J. L. Summons R. Valley J. W.

*In situ carbon and sulfur isotope analysis of Archean organic matter and pyrite* [#1047]

**THE SCIENCE OF MARS SCIENCE LABORATORY**

8:00 a.m. Conference Room Two

**Chairs:**

**Pamela Conrad**

**Dawn Sumner**

8:00 a.m.

Newsom H.\* Anderson R. Conrad P. G. Leshin L. McCubbin F.

*A proposed “Noachian Campaign” in the Mars Science Laboratory landing ellipse* [#1051]

8:30 a.m.

Gomez-Elvira J.\* Genzer M. Harri A. M. Rodriguez-Manfredi J. A. Torres J.

Sebastian E. Zorzano M. P.

*REMS the Environmental Monitoring Station for MSL* [#1052]

8:45 a.m.

Mahaffy P.\*

*Calibration and Sequence Development Status for the Sample Analysis at Mars Investigation on the Mars Science Laboratory* [#1053]

9:00 a.m.

Freissinet C.\* Glavin D. P. Buch A. Stalport F. Dworkin J. P. Eigenbrode J. L. Mahaffy P. R.

*Extraction and identification of organic molecules in Mars analogue soils using the Sample Analysis at Mars (SAM) derivatization experiment* [#1054]

9:15 a.m.

Emry J. R.\* Marshall C. Olcott A.

*Paragenetic Description and Environment of Formation of a Terrestrial Mars Analog* [#1055]

9:30 a.m.

Noe Dobrea E.\* Aubrey A. Glavin D. P. Calef F. Hamersley M. R. McAdam A. C.

Freissinet C. Franz H.

*Detection of organics by the MSL Instrument suite in fluvial deposits* [#1056]

9:45 a.m.

Stern J. C.\* McAdam A. C.

*The Role of  $\delta^{13}\text{C}$  in the Search for Reduced Organics on the Surface of Mars* [#1057]

**THE ROLE OF UV RADIATION IN PREBIOTIC CHEMISTRY I**

**10:15 a.m.      Salon One**

<b>Chairs:</b>	<b>Friedrich Temps</b> <b>Vasilios Stavros</b>
10:15 a.m.	Sutherland J.* <i>Photochemistry and the origin of life</i> [#1061]
10:30 a.m.	Barbatti M.* <i>Mechanistic aspects of ultrafast deactivation of UV-excited nucleobases</i> [#1062]
10:45 a.m.	Mulkidjanian A. Y.* Bychkov A. Y. Dibrova D. V. Galperin M. Y. Koonin E. V. <i>UV Light and the Emergence of the First Life Forms at Anoxic Geothermal Fields</i> [#1063]
11:00 a.m.	Lischka H.* Aquino A. Plasser F. Nachtigallova D. <i>The Photodynamics of DNA Nucleobases- A Nonadiabatic Ab Initio Study</i> [#1064]
11:15 a.m.	Crespo-Hernandez C. E.* Reichardt C. <i>Excited-State Dynamics in Nucleic Acid Analogues</i> [#1065]
11:30 a.m.	Matsika S.* Liang J. <i>UV radiation and the building blocks of DNA/RNA: What theoretical studies can tell us</i> [#1066]
11:45 a.m.	Ullrich S.* Yu H. Evans N. L. <i><math>\sigma^*</math>-Mediated Photoprotection of Ammonia and Heteroaromatics Studied by Time-resolved Photoelectron and Photofragmentation Spectroscopy</i> [#1067]

**LINKING MICROBIAL ECOSYSTEM BIOSIGNATURES TO THE GEOLOGIC RECORD  
OF EARLY EARTH AND MARS**

**10:15 a.m.      Salon Three**

<b>Chairs:</b>	<b>Niki Parenteau</b> <b>Tanja Bosak</b> <b>Linda Jahnke</b>
10:15 a.m.	Schubotz F.* Hays L. Gillespie A. Boyer G. Meyer Dombard D. R. Shock E. L. Summons R. <i>Polar lipid biomarkers of streamer biofilm communities in hot springs of Yellowstone National Park and their preservation potential in adjacent sinters</i> [#1071]
10:30 a.m.	Sánchez-Román M.* Fernandez Remolar D. Sanchez-Navas N. Romanek N. Schmid T. Nieto F. Oggerin M. Rodriguez N. Preston L. Izawa M. R. Southam G. Banerjee N. Osinski G. Dyar D. Gomez-Ortiz D. Prieto-Ballesteros O. Amils R. <i>Carbonate precipitation in acidic environments, a potential biosignature for searching life on Mars</i> [#1072]
10:45 a.m.	Pearson A.* Tsao L. E. Robinson R. S. Higgins M. B. <i>The nitrogen isotopic composition of cyanobacterial chlorophyll is insensitive to pH</i> [#1073]
11:00 a.m.	Sumner D.* Hawes I. Andersen D. A. <i>Growth of Conical Stromatolites Through Microbial Trapping and Binding of Sediment</i> [#1074]
11:15 a.m.	Williford K. H.* Ushikubo T. Schopf J. W. Lepot K. Kitajima K. Valley J. W. <i>In situ carbon isotope analysis of microbial fossils</i> [#1075]
11:30 a.m.	Loiselle L.* King P. L. Dyar M. D. Leveille R. Koujelev A. Lui S. Cloutis E. A. Craig M. A. Shieh S. R. Southam G. <i>Structural and chemical characterisation of 'biogenic' and abiotic jarosite: Implications for the search for life on Mars</i> [#1076]
11:45 a.m.	Marnocha C. L.* Dixon J. C. <i>Bacterial communities of rock coatings from Kärkevagge, Swedish Lapland</i> [#1077]
12:00 p.m.	Sapers H. M.* Banerjee N. R. Osinski G. R. Schumann D. <i>Characterization of putative ichnofossils in impact glass using STXM</i> [#1078]

## DIVERSITY IN ASTROBIOLOGY RESEARCH AND EDUCATION

10:15 a.m.      Salon Four

**Chairs:****B. Bell****Todd Gary**

- 10:15 a.m.      Gary T. P.\*   Bell B. P.   Bradford K. C.   Brown C.   Ceballos M.   Kirven-Brooks M. J.   Kuner S.   Myles E. L.  
*The NASA Astrobiology Institute- Minority Institution Research Support (NAI-MIRS) Program: 10 Years of High Return on NASA's Investment [#1081]*
- 10:30 a.m.      Mendez A.\*  
*The Planetary Habitability Laboratory: Studying the Habitability of Earth, the Solar System, and Exoplanets [#1082]*
- 10:45 a.m.      Melchiorre E.\*   Lopez A.   Velasquez C.  
*Extreme Environments: How Astrobiology Serves and Inspires Hispanic Students during times of Institutional Financial Uncertainty [#1083]*
- 11:00 a.m.      Martinez L. A.\*   Rankin R. L.  
*Augmenting the Exposure of Underrepresented Minorities to Astrobiology-related Research: Leveraging Existing Programs [#1084]*
- 11:15 a.m.      Duke G. I.\*  
*Implementation of Astrobiology Research at a Hispanic Serving Institution (HSI) in Chicago via the NAI-MIRS program [#1085]*
- 11:30 a.m.      Sarmiento Lopez C. A.\*   Jimenez Hernandez M. F.   Sarmiento G.   Mauledoux Monroy M. F.   Carvajal M. S.   Saenz E. G.   Barbosa R. A.   Pinilla L. F.   Tarazona O. Y.   Jerez A. F.   Nieto D. D.   Espitia J. M.  
*Design and Constructions of a Miner Robot of Moon's Regolith [#1086]*
- 11:45 a.m.      Fried B.\*   Dash H. B.  
*John Dewey High School's Space Science Academy: Access to Astrobiology for Underserved Populations [#1087]*
- 12:00 p.m.      Ceballos M.\*  
*The Minority Institute Astrobiology Collaborative (MIAC) and The University of Montana Native American Research Laboratories (NARL): Future Directions for Astrobiology and Minority Science Education [#1088]*

## PREBIOTIC CHEMISTRY AND THE ORIGINS OF FUNCTIONAL BIOPOLYMERS

10:15 a.m.      Salon Five

**Chair:****Nicholas Hud**

- 10:15 a.m.      Stich M.\*   Manrubia S. C.  
*Evolutionary search times in RNA populations [#1091]*
- 10:30 a.m.      Brangwynne C. P.\*  
*Self-assembling RNA droplets and the origin of life [#1092]*
- 10:45 a.m.      Mehta A. K.\*   Childers W. S.   Ni R.   Li S.   Anthony N. R.   Lynn D. G.  
*Remodeling Cross-β Surfaces with Peptide/Lipid Chimeras [#1093]*
- 11:00 a.m.      Vaidya N.\*   Walker S. I.   Lehman N.  
*Recycling of oligonucleotides in autocatalytic assembly of RNA recombinase ribozymes through dynamic transesterification chemistry [#1094]*
- 11:15 a.m.      Engelhart A.\*   Powner M. W.   Szostak J. W.  
*2',5' substitution in catalytic and functional RNAs [#1095]*
- 11:30 a.m.      Biondi E.\*   Sawyer A. W.   Maxwell A. W.   Burke D. H.  
*A small kinase ribozyme with unusual pH, Cu<sup>2+</sup> dependent dual site activity [#1096]*
- 11:45 a.m.      Weber A. L.\*   Bennett R.   Keelor J. D.   Fernandez F.  
*Sugar-driven Synthesis of Potential Replicating Molecules: Prebiotic Synthesis of Pyrazinone Monomers from Sugars (or Sugar Precursors) and Alanine Amide [#1097]*

**FROM GENOMES TO BIOMARKERS**  
**10:15 a.m. Conference Room Four**

<b>Chairs:</b>	<b>Ann Pearson</b>
	<b>Roger Summons</b>
10:15 a.m.	Collins E.* Wing B. <i>Unraveling the Genetic Basis of an Ancient Geochemical Biomarker [#1101]</i>
10:30 a.m.	Field E.* McClellan D. A. Stepanauskas R. Emerson D. <i>Insights into the Evolution of Microbial Iron Oxidation through Comparative Genomics [#1102]</i>
10:45 a.m.	Tweedt S.* Erwin D. H. Laflamme M. Sperling E. A. Pisani D. Peterson K. J. <i>The Cambrian Conundrum: Early Divergence and Later Ecological Success in the Early History of Animals [#1103]</i>
11:00 a.m.	Hays L.* Pearson A. Macdonald F. Summons R. <i>Evaluating Biomarker Contents In Ancient Rocks: Quantifying Internal Signal Versus External Contamination [#1104]</i>
11:15 a.m.	Waldbauer J. R.* Newman D. K. Summons R. <i>Microaerobic steroid biosynthesis and the molecular fossil record of Archean life [#1105]</i>
11:30 a.m.	Garby T.* Walter M. R. Larkum A. W. Neilan B. A. <i>Diversity of cyanobacterial biomarker genes from the stromatolites of Shark Bay, Western Australia [#1106]</i>
11:45 a.m.	Coleman M.* Newman D. K. <i>Towards the genomic basis and evolutionary history of hopanoid structural diversity [#1107]</i>
12:00 p.m.	Welander P. V.* Summons R. <i>Discovery of a C-3 hopanoid methylase in the obligate methanotroph <i>Methylococcus capsulatus</i> Bath [#1108]</i>

**THERMODYNAMICS, DISEQUILIBRIUM, AND EVOLUTION**

**10:15 a.m. Conference Room Two**

<b>Chair:</b>	<b>F. Javier Martin-Torres</b>
10:15 a.m.	Simoncini E.* Martin-Torres F. J. <i>A methodology to characterize atmospheric chemical disequilibrium and its relationship to habitability [#1111]</i>
10:30 a.m.	Delgado-Bonal A.* Simoncini E. Martin-Torres F. J. <i>Chemical and Thermodynamic disequilibrium in Martian subsurface and lava tubes [#1112]</i>
10:45 a.m.	Delgado-Bonal A.* Simoncini E. Martin-Torres F. J. <i>Thermodynamical and chemical disequilibrium of a martian cave [#1113]</i>
11:00 a.m.	Segre D.* <i>From genome-scale to ecosystem-level metabolic network models [#1114]</i>
11:15 a.m.	Lineweaver C. H.* <i>A more universal definition of life suggests that we have already detected extraterrestrial life [#1115]</i>
11:30 a.m.	Pérez-Mercader J.* <i>Some basic features of Information and their Application to the Genomes of Extant Life [#1116]</i>
11:45 a.m.	Jones C.* <i>Understanding the Dynamic Relationship of Electromagnetism and Life as an Evolutionary Process, and as a Baseline for Supporting Life in an Extra-Terrestrial Environment [#1117]</i>

**PLENARY SESSION:  
MISSION TO MARS: CURIOSITY SETS OUT TO EXPLORE GALE CRATER  
1:30 p.m.      Grand Ballroom**

**Chair:** **Mary Voytek**

*The Mars Science Laboratory mission will land in Gale Crater on August 5, 2012, just a little past 10:00 p.m. PDT. In this session, a panel will discuss the mission in terms of its goals and objectives, its field site, its measurement capabilities and its importance to astrobiology. Panelists include Project Scientist John Grotzinger, Sample Analysis at Mars deputy principal investigator Pamela Conrad, and Dawn Sumner, who is both a co-investigator on the MSL cameras and co-chair of the MSL Landing Site Working Group.*

**HOW CAN ASTROBIOLOGY HELP SAVE THE WORLD?  
A DISCUSSION OF ASTROBIOLOGY AND HUMANITY'S FUTURE  
3:45 p.m.      Grand Ballroom**

**Chairs:** **Katherine Wright**

**Marina Resendes de Sousa Antonio**

3:45 p.m. Ehrenfreund P.\* Rummel J. McKay C.

*International Earth-based research program: Earth-X [#1131]*

4:00 p.m. Bonaccorsi R. M.\* Kyriazis S. Coe L. McKay C.

*Astrobiology Field Analog Research, Education, and Conservation at the Ubehebe Volcanic Field (Death Valley National Park, California): Discovery and Awareness for a possible tomorrow [#1132]*

4:15 p.m. Illangkoon H.\*

*Teaching English in East Africa through Astrobiology [#1133]*

4:30 p.m. Vermeulen A.\*

*The Merapi Terraforming Project: Bringing Life and Art back to a Volcanic Disaster Zone [#1134]*

4:45 p.m. Kanja P.\* Banda T. S. Daka O. Syombua B. Murabona S. Ngolyia E. Smith D. Lo C. Hand K.

*Cosmos Education: Science Education for a Developing World [#1135]*

5:00 p.m. Lynch K.\* DeMarines J. Illangkoon H.

*Developing scientific and technological capability in African countries through collaborative astrobiology research [#1136]*

5:15 p.m. Domagal-Goldman S.\* Arslan B. K. Anbar A. Atri D. Grinspoon D.  
*Astrobiology Blogging FTW [#1137]*

5:30 p.m. DeMarines J.\* Arslan B. K. Illangkoon H. Som S. Walker S. I.  
*S.A.G.A.N. to the Rescue: Promoting a Social Action for a Grassroots Astrobiology Network in America and Beyond [#1138]*

**THE HISTORY OF EARTH SURFACE OXYGENATION: LOOKING TO THE MODERN  
AS A KEY TO THE PAST**

**3:45 p.m. Conference Room Four**

<b>Chairs:</b>	<b>T. Lyons</b> <b>Noah Planavsky</b> <b>Ariel Anbar</b> <b>Christopher Reinhard</b>
3:45 p.m.	Helz G. R.* <i>What does rhenium enrichment in black shales imply about ancient environments? [#1141]</i>
4:15 p.m.	Chappaz A.* Lyons T. W. <i>Experimental approaches to assessing the role of organic matter and the controls on molybdenum isotope fractionation under sulfidic conditions [#1142]</i>
4:30 p.m.	Romaniello S. J.* Herrmann A. D. Anbar A. D. <i>Incorporation and early diagenesis of Mo and U isotope records in Bahamian carbonate sediments [#1143]</i>
4:45 p.m.	Hunter S. E.* Kump L. R. Macalady J. Freeman K. H. Fulton J. M. <i>Spatio-temporal variability in the chemocline community at Fayetteville Green Lake [#1144]</i>
5:00 p.m.	Planavsky N.* Busigny V. Jezequel D. Lyons T. W. <i>Iron isotope cycling in anoxic and ferruginous Lake Pavin (France)- From water column to sediment [#1145]</i>
5:15 p.m.	Emerson D.* Fleming E. Krebski S. T. Chan C. S. Hredzak-Showalter P. L. Luther G. W. <i>What can microbial iron oxidation in modern environments tell us about oxygenation events in the past [#1146]</i>
5:30 p.m.	Bains W.* Seager S. <i>Biomass building as a central role for redox in life [#1147]</i>

**STABILITY AND SURVIVAL OF LIFE IN SIMULATED EXTRATERRESTRIAL ENVIRONMENTS**

**3:45 p.m. Conference Room Two**

<b>Chairs:</b>	<b>Zita Martins</b> <b>Manish Patel</b>
3:45 p.m.	Martins Z.* Kotler J. M. Direito S. O. Sephton M. A. Röling W. F. Stoker C. Foing B. H. Ehrenfreund P. <i>Analysis of the Organic, Mineral, and Biota Content of Mars Soil Analogs: Implications for Future Mars Life Detection Missions [#1151]</i>
4:00 p.m.	Fisher T. M.* <i>A Preliminary Model of a Subglacial Martian Ecosystem [#1152]</i>
4:15 p.m.	Monaghan E. P.* Patel M. Olsson-Francis K. Cockell C. <i>Characterising the growth of methanogens under simulated Mars subsurface conditions [#1153]</i>
4:30 p.m.	Patel M.* Merrison J. P. Monaghan E. P. <i>Dusty Martian Microbes [#1154]</i>
4:45 p.m.	Pavlov A. K.* Pavlov A. Vasilyev G. I. Ostryakov V. M. <i>Degradation of the organic molecules in the shallow subsurface of Mars due to irradiation by cosmic rays [#1155]</i>
5:00 p.m.	Archer P. D.* Lauer H. V. Sutter B. Ming D. W. Niles P. B. Boynton W. V. <i>Organic Combustion in the Presence of Ca-Carbonate and Mg-Perchlorate: A Possible Source for the Low Temperature CO<sub>2</sub> release seen in Mars Phoenix Thermal and Evolved Gas Analyzer Data [#1156]</i>
5:15 p.m.	Dartnell L.* Patel M. Storrie-Lombardi M. C. Ward J. M. Muller J. P. <i>Photostability and fluorescence-based detection of PAHs on the Martian surface [#1157]</i>
5:30 p.m.	Rolfe S. M.* Patel M. Gilmour I. Olsson-Francis K. Ringrose T. J. Cockell C. <i>Raman spectroscopy of biologically relevant amino acids under martian conditions [#1158]</i>

**MONDAY, APRIL 16, 2012**  
**POSTER SESSION I**  
**3:45 – 5:45 p.m. Conference Rooms A and B**

**EMERGING TECHNOLOGIES AND STRATEGIES FOR PROSPECTING FOR THE SIGNS OF LIFE  
ON OTHER WORLDS POSTERS**

Allwood A.\* Hodyss R. P. Wade L.

*Micro-XRF: High spatial resolution elemental analysis for in situ astrobiological exploration* [#1201]

Johnson P. V.\* Hodyss R. Beauchamp J. L.

*Mars Atmospheric Pressure Ionization of Biomarkers for Mass Spectrometry* [#1202]

Rouillard M.\*

*Kepler 22-b and Universal Life* [#1203]

von Kiparski G. R.\* Parker D. R. Tsapin A. I.

*Removal of perchlorate from Martian analog soil samples* [#1204]

Willis P. A.\* Stockton A. M. Mora M. F. Cable M. L. Jiao H. Jensen E.

*Complete Automation and Packaging of Lab-on-a-Chip Instruments for in situ Astrobiology Investigations* [#1205]

Zacny K.\* Beegle L. W. Bar-Cohen Y. Paulsen G. Badescu M. Sherrit S. Bao X. Corsetti F.

*Development and Testing of the Planetary Wireline Rotary-Percussive Coring Drill* [#1206]

**ESTABLISHING BIOGENICITY: SYSTEMATIC USE OF ORGANIC AND INORGANIC EVIDENCE OF ANCIENT  
TERRESTRIAL AND EXTRATERRESTRIAL LIFE POSTERS**

Hinman N.\* Gonsior M. Schmitt-Kopplin P. Cooper W. J. Hertkorn N.

*Natural Dissolved Organic Matter in Yellowstone National Park (WY) Hot Springs* [#1211]

Huang Y.\* Aponte J. C. Tarozo R. Hallmann C. Summons R.

*Racemic branched-chiral meteoritic monocarboxylic acids suggest the origin of chirality during parent body alteration processes* [#1212]

Knowles E. J.\* Wirth R. Templeton A.

*A Comparative Analysis of Tubular Alteration Features in Basalt Glass by FIB/TEM* [#1213]

Zhang F.\* Xu H. Konishi H. Shelobolina E. S. Roden E.

*Polysaccharides-catalyzed nucleation and growth of disordered dolomite- A potential precursor of sedimentary dolomite* [#1214]

**EARLY EVOLUTION OF LIFE POSTERS**

Adam Z. R.\* Skidmore M. Mogk D. W.

*Investigating a Caudosphaera-like acritarch from the Mesoproterozoic Belt Supergroup, Montana* [#1221]

Anderson E. J.\* Schneider D. M. Hsiao C. Bowman J. Williams L.

*In Vivo Recapitulation of Ribosomal Assembly with Model Ancestral rRNA* [#1222]

Arslan B. Tran L. Gaucher E.

*Exploring the Origins of Bacterial Cytoskeleton Organization* [#1222.1]

Goldman A. D.\* Landweber L.

*Oxytricha as a model to study early genetic systems* [#1223]

Laflamme M.\* Darroch S. A. Tweedt S. M. Peterson K. J. Erwin D. H.

*Extinction of the Ediacara biota* [#1224]

Matys E.\* Bosak T. Pruss S. Macdonald F. Lahr D.

*Silicified tests of Cryogenian eukaryotes from the Tsagaan Oloom Formation, Mongolia* [#1225]

Sugitani K.\*

*Morphologically diverse microfossils from the 3.4 Ga Strelley Pool Formation, Western Australia: Its significance for the early evolution of life* [#1226]

**THE NATURE OF THE LAST UNIVERSAL COMMON ANCESTOR POSTER**

Chopra A.\* Lineweaver C. H.

*Can Elemental Abundances be Used to Identify the Most Likely Site for the Origin of Life?* [#1231]

## OXYGEN AND EVOLUTION: LOOKING TO THE PAST POSTERS

Brainard J.\* Choney A. P. Ohmoto H.

*Evidence in Volcanogenic Massive Sulfide Deposits for the Sulfate-Rich Archean Oceans [#1241]*

French K. L.\* Sepúlveda J. Trabucho-Alexandre J. Gröcke D. R. Summons R.

*Organic geochemical evidence for environmental changes during the early Toarcian oceanic anoxic event [#1242]*

Hanger R.\* LaVine R. J.

*Response to deoxygenation in Permian microgastropod faunas from the Western North American accreted terranes [#1243]*

Mills D.\* Ward L. M. Canfield D. E.

*Oxygen constraints on the origin of metazoans [#1244]*

Olson S. L.\* Kump L. R. Kasting J. F.

*Quantifying the Areal Extent and Dissolved Oxygen Concentrations of Archean Oxygen Oases [#1245]*

## THE ROLE OF HORIZONTAL GENE TRANSFER IN INNOVATION POSTERS

Swithers K.\* Gogarten J.

*The Chimera Hypothesis for the Thermotogae Phylum [#1251]*

Yue J.\* Huang J.

*Widespread and significant impacts of horizontal gene transfer on land plant evolution [#1252]*

Zhou C.\* Mao F. Xu Y. Gogarten J.

*Algorithms design for detecting horizontal gene transfer [#1253]*

## PREBIOTIC CHEMISTRY AND THE ORIGINS OF FUNCTIONAL BIOPOLYMERS POSTERS

Andrulis E. D.\*

*Theory of the Origin, Evolution, and Nature of Life [#1261]*

Cafferty B.\* Engelhart A. E. Okafor C. D. Chen M. Williams L. Lynn D. G. Hud N.

*Equilibrium Controlled Non-Enzymatic Ligation Chemistry with a Final Linkage that is PCR Compatible [#1262]*

Furukawa Y.\* Horiuchi M. Kakegawa T.

*Effects of borate on the stability of individual pentoses [#1263]*

Goldman N.\*

*Long Time-Scale Formation of Pre-biotic Molecules in Shocked Astrophysical Ices [#1264]*

Gupta V. K.\*

*Photosynergistic collaboration of nonlinear processes at nanoscale in the laboratory simulated possible prebiotic atmosphere and emergence of supramolecular self-sustaining protocell-like assemblies, "Jeewanu" [#1265]*

Mahar H. D.\*

*Application of nutritional microbes in the astrobiology programs [#1266]*

Mamajanov I.\* Lannan F. M. Laughlin B. P. Gallego I. Hud N.

*Life Without Water: Nucleic Acids in Anhydrous Media [#1267]*

Zins E.\* Krim L.

*Reactions involving radicals for prebiotic chemistry [#1268]*

## FROM GENOMES TO BIOMARKERS POSTER

Grabenstatter J.\* de Mendoza A. Ruiz-Trillo I. Summons R.

*Sterol Patterns In Opisthokont Protists and Basal Metazoa [#1271]*

## CHEMICAL EVOLUTION AND THE TRANSITION TO LIVING MATTER POSTERS

Goodwin J.\* Chen C. Mehta A. K.

*Dynamic linkages for supramolecular assemblies [#1281]*

Johnson S. J.\* Childers W. S. Mehta A. K. Liang Y. Lynn D. G.

*Conformational Evolution: Generating Structural Diversity With Peptide Microphases [#1282]*

Morneau B. N.\* Kubala J. M. Schwartz P. Barratt C.

*Evolution of Homochirality in a Chemical Model System [#1283]*

Summers D. P.\* Noveron J. Basa R. C. Rodoni D.

*Energy Transduction in Vesicles, Reduction of Important REDOX Carriers Such as Quinones and NAD+ [#1284]*

Tan J.\* Chen C. Goodwin J. Zhang L. Mehta A. K. Lynn D. G.

*Diversity and Evolution of Peptide Dynamic Combinatorial Library [#1285]*

Zhang L.\* Goodwin J. Lynn D. G.

*Non-enzymatic information transfer of backbone-modified nucleic acid [#1286]*

## THE ROLE OF UV RADIATION IN PREBIOTIC CHEMISTRY POSTERS

Bhattacharya A.\*

*Influence of Hydrogen Bonding and Local Charge in the Fragmentation of small biomolecules (amino acids, peptides, etc.) Following Single Photon VUV (118.22 nm) Ionization: Effect on Ionizing Radiation on Bioactive Systems [#1291]*

Buckley R.\* Pino S. Khanam J. Di Mauro E. Orlando T. M.

*Synergetic Effects of Pyrite, UV Irradiation, and Atmospheric Gases on the Generation of Nitrogen Heterocycles from Formamide Solutions [#1292]*

Chen J.\*

*Subpicosecond Excited State Lifetimes of Xanthine Nucleobases [#1293]*

Evans N. L.\* Yu H. Roberts G. M. Stavros V. Ullrich S.

*Ultrafast relaxation of NH<sub>3</sub>( $\tilde{\text{A}}$ ) using a combination of time-resolved photoelectron spectroscopy and photoproduct detection [#1294]*

Gardner N.\* Magers D. Hill G. A.

*Theoretical Calculations of the Ionization Potentials and Electron Affinities of Guanine, Cytosine, Adenine and their Methyl Derivatives [#1295]*

Goldschmidt G.\* Kovaliczky É. Rontó G. Bérces A. Szabó J.

*Astrobiologically inspired in situ biodosimetric experiment for space applications [#1296]*

Imanaka H.\* Smith M. A. McKay C.

*Laboratory investigation of possible EUV-VUV photochemistry in the early Earth atmosphere [#1297]*

Laas J. C.\* Widicus Weaver S. L. Garrod R. Herbst E.

*Methanol Photodissociation as a Case Study for Probing Prebiotic Interstellar Chemistry [#1298]*

Svadlenak N.\* Ligare M. R. Gulian L. de Vries M. S.

*Spectroscopy of Isolated Prebiotic Nucleobases [#1299]*

Yu H.\* Evans N. L. Ullrich S.

*Excited state dynamics in imidazole and pyrazole studied by time-resolved photofragmentation [#1300]*

## UNDERSTANDING THE EFFECTS OF SPACE RADIATION ON LIVING ORGANISMS AND ITS IMPLICATION FOR ASTROBIOLOGY POSTERS

Atri D.\* Melott A. L.

*Radiation and Planetary Life: From UV to Subatomic Particles [#1311]*

Bayramova K. H.\* Suleymanov S. Y. Huseynova I. M.

*The Study of Photosynthetic Pigments and Antioxidant Enzymes in Different Plants Under Conditions of Ionizing Radiation [#1312]*

## DIVERSITY IN ASTROBIOLOGY RESEARCH AND EDUCATION POSTERS

Berthelson M.\* Ceballos M.

*Astrobiology in the Native American Classroom* [#1321]

Brelsford M.\* Swanson E. Grimberg I. Peters J. W.

*SILC- A Model for Long Distance Education* [#1322]

Kelly S. B.\* Hand K. Priscu J. C.

*Crow Education Partnership: Science in a Cultural Context* [#1323]

O'Hara S.\* Herrera Y. Duke G. I.

*Constraints on Carbon and Oxygen Isotope Fractionation in Carbonatites: Tracking Evolution of CO<sub>2</sub>* [#1324]

Segura A.\* Ramirez S. Lozada-Chávez I. Montoya L.

*The Mexican Society of Astrobiology (SOMA)* [#1325]

## THE ORGANIC CONTINUUM FROM THE INTERSTELLAR MEDIUM TO THE EARLY EARTH POSTERS

Brown L.\* Gibb E. Troutman M. R.

*Where is the Water? Spectro-Astrometry of H<sub>2</sub>O in a Protoplanetary Disk* [#1401]

Burton A. S.\* Elsila J. E. Callahan M. P. Martin M. G. Glavin D. P.

Johnson N. M. Dworkin J. P.

*A propensity for n-ω-amino acids in thermally-altered Antarctic meteorites* [#1402]

Gasda P.\* Taylor G. J.

*The distribution of insoluble organic material in CR2 carbonaceous chondrite EET 92161* [#1403]

Peeters Z.\* Changela H. Stroud R. Alexander C. Nittler L.

*Coordinated analysis of in situ organic material in CR chondrites* [#1404]

Vasyunin A. I.\* Herbst E.

*A Detailed Monte Carlo Study of Gaseous and Grain-surface Chemistry in Star Formation Regions* [#1405]

## THE EXTENT OF CHIRALITY IN COSMOCHEMISTRY AND ITS POSSIBLE ROLE IN THE ORIGINS OF LIFE POSTER

Takahashi J.\*

*Asymmetric Reactions of Organic Molecules by Polarized Quantum Beams* [#1411]

## ASTROBIOLOGY OF PLANETESIMALS AND BIOMARKERS IN TERRESTRIAL AND EXTRATERRESTRIAL ENVIRONMENTS POSTERS

Neish C.\* Robinson C. Kinahan S. Marziali A. DiRuggiero J. Bradburne C.

*A New Approach for DNA Detection in Mars Analogue Soils using SCODA* [#1421]

Palle E.\* Sterzik M. F. Bagnulo S.

*The Earth as a benchmark: Spectropolarimetry unveils strong bio-signatures* [#1422]

Preston L. J.\* Barber S. J. Grady M. M.

*Introducing a new on-line resource for planning scientific field investigations in planetary analogue environments: CAFE* [#1423]

Sarid G.\*

*Early aqueous alteration in small icy bodies: Implications for mineral hydration and organic volatile retention* [#1424]

## HOW QUANTUM CHEMICAL THEORY AND COMPUTATION ASSISTS IN THE EXPLANATION OF IMPORTANT, DIFFICULT, AND UNIQUE CHEMICAL QUESTIONS IN ASTRONOMY AND ASTROBIOLOGY POSTERS

Carelli F.\* Gianturco F. A.

*Role of negative ions of small hydrocarbons in PAHs' circumstellar formation [#1431]*

da Silva J. P.\* Merz K. M.

*Mechanism of Carbodiimide Formation from Simple Interstellar Precursor Species [#1432]*

Huang X.\* Lee T. J.

*Spectroscopic Constants of Cyclic And Linear  $C_3H_3^+$  Isotopologues [#1433]*

Trindle C.\*

*Watsonian Parameters and Thermochemistry of Isomers of Glycolaldehyde [#1434]*

## THE SCIENCE OF MARS SCIENCE LABORATORY POSTERS

Chen Y.\* Lehmann K. K. Onstott T. C.

*NIR Cavity Ringdown spectrometer for Martian methane stable isotope analysis [#1441]*

Gomez F.\* Rodriguez-Manfredi J. A. Amils R. Gomez-Elvira J.

*Martian Habitability Index Studies in Four Field Earth Analogues and Laboratory Simulation Facilities [#1442]*

Gomez-Elvira J.\* Genzer M. Navarro S. Kahanpää H. Rodriguez-Manfredi J. A. Sebastian E. Zorzano M. P. REMS instrument calibration [#1443]

Martin-Torres F.\* Zorzano M. P. Lepinette A. Martínez-Frías J. Gómez F. Verdasca J. Navarro S.

Rodríguez-Manfredi J. A. de La Torre Juárez M. Haberle R. M. Harri A. M. Ramos M. Renno N.O.

Richardson M. Gomez-Elvira J.

*Environmental Measurements on Mars by the Rover Environmental Monitoring Station (REMS)/ Mars Science Laboratory [#1444]*

Misra P.\* Garcia R. Mahaffy P. R.

*Organic Compounds Library and Contamination Standard for the Mars Science Laboratory [#1445]*

ten Kate I. L.\* Malespin C. A. Franz H. B. McAdam A. C. Glavin D. P.

*The effects of pressure on volatilization temperatures and implications for the SAM instrument on MSL [#1446]*

## ASTROECOLOGY POSTERS

Burnier A. M.\* Palmer J. Clark E. Ho J. Kent R. E. Ma L. Moss E. Song M. Yu J.

Fujishima K. Wessel G. Rothschild L. J.

*Synthetic Biology Solutions Inspired by Astrobiology and Space Exploration [#1451]*

Elser J.\* Corman J. Lee Z. Siefert J. Bastidas M. Cuassolo F. Laspoumaderes C. Souza M. S.

Modenutti B. Balseiro E.

*Life on floating pumice [#1452]*

## TITAN AS A PREBIOTIC CHEMICAL SYSTEM POSTERS

Cable M. L.\* Stockton A. M. Mora M. F. Willis P. A.

*Non-aqueous microchip capillary electrophoresis ( $\mu$ NACE) of primary amines and applications to in situ analysis on Titan [#1461]*

Hodyss R. P.\*

*The Solubility of Organics in Titan's Lakes [#1462]*

Kawai J.\* Jagota S. Cater M. D. Kobayashi K. Deamer D. W. Khare B. N. McKay C. P.

*The possibility of synthesizing primitive membranes on Titan environment [#1463]*

Nixon C. A.\* Teanby N. Irwin P. G. Horst S.

*A Search For Phosphorus and Sulfur Molecules in Titan's Stratosphere [#1464]*

Pirim C.\* McLain J. L. Grieves G. A. Abbott H. L. Dawley M. Smith M. A. Orlando T. M.

*Investigation of ion chemistry on tholin surfaces under simulated Titan conditions [#1465]*

## Monday Poster Sessions

Smith M. A.\* He C. Lin G.

*NMR Identification of Hexamethylenetetramine and Its Precursor in Titan Tholins: Implications for Titan Prebiotic Chemistry* [#1466]

Solomonidou A.\* Hirtzig M. Bratsolis E. Bampasidis G. Coustenis A. Kyriakopoulos K. Le Mouélic S. Stephan K. Jaumann R. Drossart P. Sotin C. Seymour K. S. Rodriguez S. Moussas X.

*Titan: The astrobiological potential through its surface investigation* [#1467]

Turse C.\* Khan A. Leitner J. J. Firneis M. Schulze-Makuch D.

*Miller-Urey Experiments to Assess the Production of Amino Acids under Impact Conditions on early Titan* [#1468]

### LINKING MICROBIAL ECOSYSTEM BIOSIGNATURES TO THE GEOLOGIC RECORD OF EARLY EARTH AND MARS POSTERS

Dolas K.\* Chimileski S. Naor A. Gophna U. Papke R. T.

*The Role of Hvo\_1477 in Natural Competence of Haloferax volcanii* [#1471]

Elbaz C.\* Pratt L. M.

*Sulfur Cycling in Sediments Associated with a Mesothermal Spring on the Margin of a Saline Alkaline Lake in South Central Oregon* [#1472]

Hinman N.\* Henneberger R. M. Kotler J. M. Richardson C. D. MacKenzie L. A. Bergquist P.

Walter M. R. Anitori R. P. Scott J. R.

*Biosignatures of Microbial Processes and Biogeochemical Cycling in an Acidic Thermal Area of Yellowstone National Park* [#1474]

Kyle J. E.\* Stedman K. Jahnke L.

*Lipid profile of a saline, alkaline lake (with a viral twist?)* [#1475]

Marroquin N. A.\* Ceballos M.

*Sulfolobus salvadorensis sp. nov. and Sulfolobus costariquensis sp. nov., two new members of the genus Sulfolobus from Central America* [#1476]

Percak-Dennett E. M.\* Loizeau J. L. Beard B. Johnson C. Roden E. E.

*Iron isotope geochemistry of amorphous iron oxide-enriched sediments from the Bay of Vidy, Lake Geneva* [#1477]

Smith R. W.\* Sánchez E. J.

*Environmental NanoBiology: The Structure of Metallic, Mixed-Valent Surface Films Reveals Both Habitat and Habitability In The Dynamic Of Aquatic Surface Film Environments* [#1478]

Stromberg J.\* Banerjee N. R. Southam G. Cloutis E. A. Slater G. Barr E.

*Characterization of a Late Archean Gold Bearing Sub-Seafloor Hydrothermal Biosphere, Dome Mine, Timmins, Ontario, Canada* [#1479]

Sumner D.\* Crutchfield J. Dumit J. Hamann B. Kellogg L. Kreylos O. Makey T. Stevens E.

*Collaborative Visual Interpretation of Large Datasets* [#1480]

### DRIVERS OF MICROBIAL COMMUNITY CHANGE THROUGH SPACE AND TIME POSTERS

Avitia M.\* Souza V. Eguiarte L. E.

*Population genetics of Bacillus sp nov from Cuatro Cienegas Coahuila, Mexico* [#1491]

Bailey B.\* Staudigel H.

*Basalt-hosted Bacterial Community Structure in Submarine Volcanoes* [#1492]

Campbell K.\* Kouris A. McCleskey R. B. Nordstrom D. K. Whitaker R. J.

*Effect of varying geochemical conditions on diversity of archaea and bacteria in Yellowstone National Park, WY* [#1493]

Gentry D.\* Grace J. M. Rothschild L. J.

*Aerobiological Diversity and Environment Type in São Paulo State, Brazil* [#1494]

Krebs J. E.\* Schrader M. Rabbow E. Rettberg P. Vaishampayan P. Venkateswaran K.

*Astrobiological Significance of Exosporium-forming spores for UV resistance* [#1495]

Krause D. Cadillo-Quiroz H. Whitaker R. J.

*Patterns of genome variation are defined by the balance between selection and recombination in 'Sulfolobus islandicus'*

Stedman K. M.\* Siering P. L. Wilson M. S. Wolfe G. S. Tuiasosopo B. Diemer G. S.

*Macrohomogeneity and Microheterogeneity in an Acidic Hot Lake* [#1496]

Tirumalai M. R.\* Fox G. E.

*Long-term evolution of bacteria under LOW SHEAR STRESS- A model study [#1497]*

Wang Y.\* Cody G. Griffin P.

*Tracing Bacterial Metabolism Using Multi-Nuclear Solid State NMR and GC/MS: Life in High-Deuterium Environment [#1498]*

Yesavage T. A.\* Liermann L. J. Albert I. Hausrath E. M. Brantley S. L.

*Community composition and biogeochemical element cycling in basaltic rocks at an Arctic Mars Analog Site [#1499]*

### META-OMICS OF MICROBIAL MATS: FROM MOLECULES TO MACROSTRUCTURE POSTERS

Brown I.\* Tringe S. G. Garrison D. H. Sarkisova S. A.

*Studying Prokaryotic Communities in Iron Depositing Hot Springs: Patterns for the Development of Siderophilic Life Biosignatures [#1511]*

Edgcomb V. P.\* Bernhard J. M. Visscher P. T. McIntyre-Wressnig A. Summons R. Beaudoin D.

*Diversity of microbial eukaryotes in stromatolites and thrombolites of Highborne Cay, Bahamas [#1512]*

Gulecal Y.\* Temel M.

*Characterization and Spatial Distribution of Microorganisms and Their Biosignature in Hypersaline Microbial Mats of Tuz Lake [#1513]*

Huang J.\* Swain A. Ravindra R. Andersen D. Bej A.

*Microbial diversity in a newly formed East Antarctic freshwater Lake Tawani and surrounding lakes using next-generation deep sequencing and bioinformatics [#1514]*

Kalkan O.\* Cetinel Aksoy S. Ozcan K. Uzel A.

*Determination of Bacterial Diversity and PKS-NRPS genes from a Marine Sediment Sample from Aegean Sea by Using Metagenomic Methods [#1515]*

### PUBLIC EVENT: FAMELAB ASTROBIOLOGY: THE FINALS

7:00 p.m. Grand Ballroom

*FameLab Astrobiology is a science communication extravaganza. Over the past few months, more than 70 early career astrobiologists have gathered at sites across the USA (and on YouTube) to compete in FameLab Astrobiology preliminaries. Ten have emerged as finalists. Each finalist will have just three minutes to convey a science topic to a general public audience. No slides, no charts- just the power of words and one prop of their choice that will fit in their hands. Through the competitions and workshops embedded in each event, the heart of FameLab is to provide experience and training in science communication to the next generation of astrobiologists. These 10 finalists have gone through two rounds of elimination to get to the highly-anticipated finals. The winner will compete in the FameLab International final in the UK this summer. Show your support for your favorite presenter!*

**TUESDAY, APRIL 17, 2012**

**META-OMICS OF MICROBIAL MATS: FROM MOLECULES TO MACROSTRUCTURE**

**8:00 a.m.      Salon One**

**Chairs:**

**Jamie Foster  
Pieter Visscher**

- 8:00 a.m. Visscher P. T.\* Dupraz C. Gallagher K. L. Braissant O. Burns B. P. Foster J. Jahnert R. Collins L. Casillas-Martinez L. Rios-Velazquez C. Marvasti M. *Microbial Mat Omics- Where did we come from, where are we going? [#2001]*
- 8:30 a.m. Huang J.\* Mojib N. Andersen D. Bej A. *Using next-generation deep sequencing and bioinformatics to elucidate the microbial diversity found in calcified mats from a perennially ice covered Lake Joyce in McMurdo Dry Valley, Antarctica [#2002]*
- 8:45 a.m. Foster J.\* Khodadad C. L. *Differences in nutrient utilization between nonlithifying and lithifying stromatolitic mats using metagenomic and metabolic profiling [#2003]*
- 9:00 a.m. Souza V.\* Peimbert M. Bonilla Rosso G. Olmedo G. Eguiarte L. E. *Metagenomics in Cuatro Ciénegas Basin: A window to an analogue to early earth and to Crater Gale in Mars [#2004]*
- 9:15 a.m. Mobberley J.\* Khodadad C. Visscher P. T. Foster J. *Exploring the metagenome and metatranscriptome of modern thrombolitic mats [#2005]*
- 9:30 a.m. Konstantinidis K.\* DeLeon-Rodriguez N. Lathem T. Bergin M. Nenes A. Anderson B. *Assessing the importance of airborne bacteria for cloud formation using metagenomics [#2006]*

**EARLY EVOLUTION OF LIFE II**

**8:00 a.m.      Salon Three**

**Chairs:**

**Fabia Ursula Battistuzzi  
S. Blair Hedges**

- 8:00 a.m. Wegener Parfrey L.\* Lahr D. Knoll A. H. Katz L. A. *Estimating the timing of eukaryotic diversification [#2011]*
- 8:30 a.m. Battistuzzi F.\* Tamura K. Billing-Ross P. Kumar S. *A calibration-free molecular clock method to estimate relative divergence times among organisms and test the influence of calibrations on absolute times [#2012]*
- 9:00 a.m. Xiao S.\* *The Ediacaran Oxygenation Event and Rise of Animals [#2013]*
- 9:30 a.m. Okie J.\* *Metabolism, Scaling, and the Major Ecological and Evolutionary Transitions of Life [#2014]*

**DRIVERS OF MICROBIAL COMMUNITY CHANGE THROUGH SPACE AND TIME**

**8:00 a.m.      Salon Four**

**Chairs:**

**Rachel Whitaker  
Kate Campbell**

- 8:00 a.m. Wiegel J.\* Wagner I. D. *Intraspecies heterogeneity of Thermoanaerobacter uzonensis and related isolates from the Uzon Caldera and Geyser Valley (Kamchatka) [#2021]*
- 8:15 a.m. Miller S.\* Wall C. *Population genomics of the thermophilic cyanobacterium Mastigocladus laminosus: Identifying the targets of spatially-varying selection along an environmental gradient [#2022]*
- 8:30 a.m. Havig J. R.\* Hamilton T. Boyd E. Meyer-Dombard D. R. Peters J. W. Shock E. *Effects of geochemical environmental drivers on microbial community size and structure in a hot spring ecosystem [#2023]*
- 8:45 a.m. Rebollar E. A.\* Eguiarte L. E. Souza V. *Water-sediment niche differentiation in ancient marine lineages of Exiguobacterium endemic to the Cuatro Cienegas Basin [#2024]*

9:00 a.m.	Rhodes M. E.* Oren A. House C. H. <i>The Evolution of Haloarchaeal Blooms in the Dead Sea [#2025]</i>
9:15 a.m.	Glass J. B.* Adkins J. F. Orphan V. J. <i>Trace metal bioavailability in methane seep porewaters at Hydrate Ridge: Comparisons between clam beds, microbial mats, and inactive habitats [#2026]</i>
9:30 a.m.	Jungbluth S.* Grote J. Lin H. Cowen J. P. Rappé M. S. <i>Annual variation in microbial community structure within ridge flank crustal fluids [#2027]</i>
9:45 a.m.	Schutte C.* Wilson A. M. Anderson J. L. Moore W. S. Joye S. B. <i>Tidally-driven hotspots of nitrogen cycling in shallow coastal aquifers [#2028]</i>

**THE ORGANIC CONTINUUM FROM THE INTERSTELLAR MEDIUM TO THE EARLY EARTH****8:00 a.m.      Salon Five**

<b>Chairs:</b>	<b>George Cody</b> <b>Doug Whittet</b>
8:00 a.m.	Ziurys L. M.* Edwards J. L. Woolf N. J. Zack L. N. <i>Organic Molecules in Planetary Nebulae: Linking Circumstellar Ejecta to the ISM [#2031]</i>
8:15 a.m.	Cordiner M.* Charnley S. Buckle J. V. Walsh C. Millar T. J. <i>Observations of carbon chain chemistry in the envelopes of low-mass protostars [#2032]</i>
8:30 a.m.	DiSanti M. A.* Bonev B. P. Villanueva G. L. Paganini L. Gibb E. Radeva Y. L. Magee-Sauer K. Mumma M. J. <i>Primary Volatile Abundances in Comets from Infrared Spectroscopy: Implications for Reactions on Grain Surfaces in the Interstellar/Nebular Environment [#2033]</i>
8:45 a.m.	Pendleton Y.* Dalle Ore C. M. Cruikshank D. P. Clark R. M. <i>Organic Molecules on Saturn's Satellites: Relationship to Interstellar Dust and the Solar Nebula [#2034]</i>
9:00 a.m.	Cody G.* Wang Y. Kebukawa Y. Fogel M. Alexander C. <i>Towards a Self-Consistent Understanding of D/H Content in Extraterrestrial Organic Solids [#2035]</i>
9:15 a.m.	Glavin D. P.* Burton A. S. Elsila J. E. Callahan M. P. Dworkin J. P. Herd C. D. <i>Formation of Amino Acids in the Tagish Lake Meteorite During Parent Body Aqueous Alteration [#2036]</i>
9:30 a.m.	Pudritz R. E.* Fernandes D. Emberson J. <i>Computing the Amino Acid Frequencies in Meteorite Parent Bodies- Implications for Astrobiology [#2037]</i>
9:45 a.m.	Yabuta H.* Sakaiya T. Kondo T. Ohno S. Nakabayashi M. Kadono T. Shigemori K. Hironaka Y. Yamanaka T. <i>High power laser-shock experiment of carbonaceous chondrite at 400 GPa: Contribution of impacts to the early Earth atmospheric chemistry [#2038]</i>

**OXIDATION: CELLULAR STRESS AND PRESERVATION OF ORGANIC BIOSIGNATURES IN OXIDATIVE PLANETARY CONDITIONS****8:00 a.m.      Conference Room Four**

<b>Chairs:</b>	<b>Oana Marcu</b> <b>Richard Quinn</b>
8:00 a.m.	Quinn R. C.* Martucci H. F. Miller S. R. Bryson C. E. Grunthaner F. J. Grunthaner P. J. <i>The Formation and Distribution of Oxychlorine Species on Mars: Implications for the Preservation of Organic Biosignatures [#2041]</i>
8:15 a.m.	DiRuggiero J.* Webb K. Robinson C. K. Yu J. <i>Molecular Basis for Protection Against Radiation and Oxidative Stress in Extremophiles [#2042]</i>
8:30 a.m.	Hansel C.* <i>Biological Production of Reactive Oxygen Species: Implications for Mn oxide formation [#2043]</i>
8:45 a.m.	Zinser E.* Morris J. J. Lenski R. E. <i>Inter-species cross-protection from oxidative stress in a nutrient-limited environment: The open ocean [#2044]</i>

*Tuesday Oral Sessions*

9:00 a.m.	Fu Q.* Niles P. B. Socki R. A. <i>Carbon Isotopes of Evolved CO<sub>2</sub> During Oxidation of Carboxylic Acids by Hydrogen Peroxide</i> [#2045]
9:15 a.m.	Horne A. J.* Lessner D. J. Karr E. A. <i>Genetic analysis of the role of the transcriptional regulator MsvR in the stress response of methanogens</i> [#2046]
9:30 a.m.	Marcu O.* Lera M. Allen C. M. <i>Cellular adaptations to oxidative stress during transient environmental fluctuations</i> [#2047]
9:45 a.m.	Lai B.* <i>Study of local redox chemistry and biosignature using x-ray fluorescence microscopy</i> [#2048]

**MINERAL-BASED CATALYSIS ON THE PREBIOTIC EARTH**

**8:00 a.m. Conference Room Two**

<b>Chairs:</b>	<b>Martin Schoonen</b>
	<b>Andrew Pohorille</b>
	<b>Daniel Strongin</b>
8:00 a.m.	Schoonen M. A.* <i>The Availability of Metal Sulfides on the Hadean Earth and its Limitation on Mineral-Based Catalysis</i> [#2051]
8:15 a.m.	White L. M.* Russell M. J. Mielke R. E. Kanik I. Bhartia R. Stockton A. M. Stucky G. D. <i>Hydrothermal Fabrication of Iron Sulfide Chimneys and Organic Molecules</i> [#2052]
8:30 a.m.	Ohara S.* Boctor N. Z. Cody G. <i>Prebiotic Iron–Sulfur Clusters Synthesized from Amino Acid Aqueous Solutions with Pyrrhotite</i> [#2053]
8:45 a.m.	Russell M. J.* Nitschke W. <i>42: The must-have element to get life started</i> [#2054]
9:15 a.m.	Shumlas S. L.* Bhandari N. Gordon A. D. Smirnov A. Schoonen M. A. Strongin D. <i>Ammonia Formation on Molybdenum-Modified Iron Sulfide Surfaces</i> [#2055]
9:30 a.m.	Barge L. M.* Doloboff I. J. Kanik I. Russell M. J. <i>Inorganic Precipitates as Electrochemical Energy Traps at Alkaline Vents on the Early Earth</i> [#2056]
9:45 a.m.	Cornish J.* <i>Explaining the Origin of Life: Making a film for cable television</i> [#2057]

**THE ROLE OF UV RADIATION IN PREBIOTIC CHEMISTRY II**

**10:15 a.m. Salon One**

<b>Chairs:</b>	<b>John Sutherland</b>
	<b>Mario Barbatti</b>
10:15 a.m.	Temps F.* Röttger K. Stuhldreier M. C. Öksüz N. <i>The free nucleobases are highly photostable, but how did oligonucleotides with long-lived excited electronic states survive UV radiation under prebiotic conditions</i> [#2061]
10:30 a.m.	Stavros V.* Roberts G. M. Williams C. A. <i>Comparing the ultraviolet photostability of azole chromophores</i> [#2062]
10:45 a.m.	Banyasz A.* Vayá I. Changenet-Barret P. Gustavsson T. Douki T. Markovitsi D. <i>Excited states and reactivity of DNA double helices in the UVA spectral domain</i> [#2063]
11:00 a.m.	Benner S. A.* Karalkar N. B. Kim H. <i>Alternative Nucleobases in Alien Genetic Systems</i> [#2064]
11:15 a.m.	Herbert J.* <i>Nailing down the energetics of the hydrated electron</i> [#2065]
11:30 a.m.	Sevilla M. D.* Adhikary A. Kumar A. <i>Sugar Radical Formation on Photo-excitation of One-electron Oxidized and Reduced DNA-radicals</i> [#2066]

11:45 a.m.	Shukla M.* Hill F. C. <i>Theoretical Modeling of Effect of UV-Radiation on Molecules of Genetic Importance</i> [#2067]
12:00 p.m.	Orlando T. M.* Dawley M. Buckley R. Hud N. Michalkova Scott A. Leszczynski J. Nguyen V. S. Nguyen M. <i>Experimental and theoretical studies of UV photochemistry and mineral mediated formation of nucleobases from formamide</i> [#2068]

**THE NATURE OF THE LAST UNIVERSAL COMMON ANCESTOR****10:15 a.m.      Salon Three**

<b>Chairs:</b>	<b>George Fox</b> <b>Antonio Lazcano</b>
10:15 a.m.	Lazcano A.* <i>The last common ancestor: Past imperfect?</i> [#2071]
10:30 a.m.	Caetano-Anolles G.* Kim K. M. <i>The evolutionary history of protein domain structures and proteomes defines the functional make up of the last universal cellular ancestor and confirms the very early appearance of Archaea</i> [#2072]
10:45 a.m.	Goldman A. D.* Landweber L. <i>A machine learning, systems-biological approach to the metabolism of the last universal ancestor</i> [#2073]
11:00 a.m.	Fox G. E.* <i>Why does LUCA Have the Level of Complexity It Does?</i> [#2074]
11:15 a.m.	Hartman H.* <i>Ribosomal Proteins and the evolution of the Genetic Code</i> [#2075]
11:30 a.m.	Robinson J.* Busby B. <i>The deep ancestry of the DExD/H-helicases: A novel method for inferring the early evolutionary origins of large protein families</i> [#2076]
11:45 a.m.	Spitzer J.* <i>Can a Living System Self-construct from a ‘Biotic Soup’?</i> [#2077]
12:00 p.m.	Hansma H. G.* <i>A Home for the Progenote</i> [#2078]

**OXYGEN AND EVOLUTION: LOOKING TO THE PAST****10:15 a.m.      Salon Four**

<b>Chairs:</b>	<b>Brian Kendall</b> <b>Noah Planavsky</b>
10:15 a.m.	Yamaguchi K. E.* Kobayashi Y. Kobayashi D. Nakamura T. Sakamoto R. Naraoka H. Ikehara M. Ito T. Kiyokawa S. <i>Biogeochemical cycling of C, N, P, S, Fe, and Mo and origin of organic matter in the 3.2 Ga old black shales recovered by DXCL-DP in Pilbara, Western Australia</i> [#2081]
10:30 a.m.	Ohmoto H.* Watanabe Y. Yamaguchi K. E. Brainard J. Choney A. P. <i>Evidence in the isotopic records of C, N, S, Fe, Mo, Cr and Pb in Archean rocks for the early development of the fully-oxygenated atmosphere and oceans</i> [#2082]
10:45 a.m.	Ono S.* Whitehill A. Thomas K. Tahata M. Oduro H. D. Guy B. Beukes N. <i>Sulfur-36 insights into Archean S-MIF source reactions and Atmospheric chemistry</i> [#2083]
11:00 a.m.	Van Kranendonk M. J.* Schopf J. W. Grice K. Walter M. R. Pages A. Kudryavtsev A. Gallardo V. Espinoza C. Lepland A. Melendez I. <i>A 2.3 Ga sulfuretum at the GOE: Microfossil and organic geochemistry evidence from the Turee Creek Group, Western Australia</i> [#2084]
11:15 a.m.	Kendall B.* Anbar A. D. Creaser R. A. Lyons T. W. Bekker A. Poulton S. W. <i>Widespread Ferruginous Proterozoic Deep Oceans Confirmed by Rhenium Abundances in Black Shales</i> [#2085]
11:30 a.m.	Reinhard C.* Planavsky N. Robbins J. Konhauser K. O. Bekker A. Lyons T. W. <i>Exploring the biological effects of Proterozoic seafloor redox</i> [#2086]

11:45 a.m.	Rothman D. H.* Bosak T. <i>Mechanism for an abrupt permanent increase in Neoproterozoic oxygen levels</i> [#2087]
12:00 p.m.	Brennecke G.* Herrmann A. D. Algeo T. J. Anbar A. <i>Rapid Expansion of oceanic anoxia immediately before the end-Permian mass extinction</i> [#2088]

### CHEMICAL EVOLUTION AND THE TRANSITION TO LIVING MATTER

10:15 a.m.      Salon Five

<b>Chairs:</b>	<b>Jay Goodwin</b>
	<b>Anil Mehta</b>
10:15 a.m.	Walker S. I.* Davies P. C. <i>The Rise of Information in the Origins of Life</i> [#2091]
10:45 a.m.	Lynn D. G.* Childers W. S. Omosun T. Das D. Mehta A. K. Chen C. Tan J. Johnson S. J. Grover M. Anthony N. R. Berland K. M. <i>Towards Intelligent Materials</i> [#2092]
11:00 a.m.	Chen C.* Tan J. Goodwin J. Mehta A. K. Lynn D. G. <i>Exploring Chemical Evolution with Self-assembling Dynamic Systems</i> [#2093]
11:15 a.m.	Grover M.* Walker S. I. Hud N. <i>Sequence Independent Replication and the Emergence of the First Functional Polymers</i> [#2094]
11:30 a.m.	Stockton A. M.* White L. M. Mora M. F. Cable M. L. Mielke R. E. Russell M. J. Willis P. A. <i>Detection and Analysis of Amino Acids and Dipeptides Produced in an Alkaline Hydrothermal Vent Reactor</i> [#2095]
11:45 a.m.	Kolb V. M.* Menger F. M. <i>On the Applicability of Oparin's Coacervates to Modern Prebiotic Chemistry</i> [#2096]

### THE ROLE OF HORIZONTAL GENE TRANSFER IN INNOVATION

10:15 a.m.      Conference Room Four

<b>Chairs:</b>	<b>J. Peter Gogarten</b>
	<b>Jinling Huang</b>
10:15 a.m.	Gogarten J. P. <i>Introduction, Recent Discoveries, and Overview</i>
10:30 a.m.	Huang J.* <i>Horizontal gene transfer and eukaryotic innovation</i> [#2101]
11:00 a.m.	Lebedev N.* Spano A. <i>Rhodobacter capsulatus Gene Transfer Agent: Expression, Assembly, and Transfer out of the Cell</i> [#2102]
11:30 a.m.	Fournier G.* <i>Ancient Horizontal Gene Transfer and Recombination: Complex Histories Reveal Mechanisms of Selection</i> [#2103]
11:45 a.m.	Swithers K.* Butzin N. C. Petrus A. K. Noll K. M. Gogarten J. <i>Ancestral states and origins of Vitamin B12 synthesis and Cobinamide Salvaging in the Thermotogae phylum</i> [#2104]
12:00 p.m.	Siefert J.* Fox G. E. Yerrapragada S. Tran Q. Tirumalai M. R. Rampersand J. Souza V. Eguiarte L. E. Rebollar E. Avietia M. Olmedo G. Gomez Z. Rodriguez-Torres M. <i>Bacillus coahuilensis: does HGT an endemic bacterium make?</i> [#2105]

**VIRUS ECOLOGY AND EVOLUTION AND ASTROVIROLOGY****10:15 a.m. Conference Room Two****Chairs:****Kenneth Stedman****Mark Young**

- 10:15 a.m. Anderson R.\* Brazelton W. J. Baross J. A.  
*Microbial survival and adaptation in the deep biosphere: What is the viral role? [#2111]*
- 10:30 a.m. Bolduc B.\* Koonin E. Wolf Y. Young M.  
*Evidence for Archaeal RNA Viruses [#2112]*
- 10:45 a.m. Diemer G. S.\* Stedman K.  
*A novel virus discovered in an extreme environment may provide a window into an ancient epoch of genomic evolution [#2113]*
- 11:00 a.m. Marceau J. O.\* Marceau C. D. Clore A. J. Stedman K. Ceballos M.  
*Differential Virus Host-Ranges of the Fuselloviridae of Hyperthermophilic Archaea [#2114]*
- 11:15 a.m. Dellas N.\* Young M.  
*Characterization of a viral ATPase and its implications as an ancient molecular machine [#2115]*
- 11:30 a.m. Snyder J.\* Young M.  
*Insights into a viral lytic pathway from an archaeal virus-host system [#2116]*
- 11:45 a.m. Kyle J. E.\* Stedman K. Jahnke L.  
*Changes in virus infectivity and virus and host lipids under silicifying conditions: Implications for virus biosignatures [#2117]*
- 12:00 p.m. Stedman K. M.\* Laidler J. R. Cady S. L.  
*Differential Deactivation, Reactivation and Desiccation Tolerance of Silicified Viruses [#2118]*

**PLENARY SESSION: GREAT DEBATE:****EXPANDING THE HABITABLE ZONE: THE HUNT FOR EXOPLANETS NOW AND INTO THE FUTURE****1:30 p.m. Grand Ballroom****Chairs:****Leslie Mullen****David Grinspoon**

*Astrobiology Magazine hosts a panel of experts to discuss the following questions: What should the priorities be in the search for planets in the galaxy? How accurate can we be in identifying habitable, Earthlike worlds around distant stars using current technology? Rather than focusing solely on Earth-like planets, should the discussion be expanded to ask where we can find habitable planets? Earth-size planets in Earth-like habitable zones being only one possibility? The Decadal Survey's recommendations for planetary missions upset many, but can the astrobiology community come to an agreement about what missions our priorities should be in the next decade to find and characterize habitable planets? What is the future of our search for habitable, alien worlds in light of current budget restraints and mission planning? With the cancellation of numerous orbiting telescopes, and with current telescopes like Hubble coming to the end of their lifetime, it is an optimum time for members of the exoplanet community to discuss the limitations of current technology and how these limitations can be addressed in the years to come.*

**LIGHTNING TALKS I****3:45 p.m. Grand Ballroom****Chair:****Sanjoy Som**

*A series of five-minute presentations on a variety of subjects.*

**SPACE, SLIME, AND THE SEARCH FOR LIFE: ASTROBIOLOGY EDUCATION AND PUBLIC OUTREACH**

**3:45 p.m. Conference Room Four**

<b>Chairs:</b>	<b>Heather Nelson Brooke Norsted Jorge Bueno</b>
3:45 p.m.	Harman P. K.* DeVore E. K. <i>Astrobiology Adventure: Exploring the Solar System, A Workshop for Junior Girl Scouts</i> [#2141]
4:00 p.m.	Odenwald S. F.* Scalice D. <i>Exploring Astrobiology through Mathematics</i> [#2142]
4:15 p.m.	Archibald J. C.* Campana J. <i>Kepler Exoplanet Voyage: A Journey to Engage Students &amp; Debunk Misconceptions</i> [#2143]
4:30 p.m.	Dueck S.* <i>Astrobiology Student Intern Program at Lassen Volcanic National Park</i> [#2144]
4:45 p.m.	Cohen P. A.* Porro I. <i>A Temporary, Portable, Astrobiology Exhibit: Combining Youth Engagement with Public Outreach</i> [#2145]
5:00 p.m.	Norsted B.* Sullivan-Fowler M. Jacobsen K. Lee Van Dover C. Nelson H. <i>Beyond the Edge of the Sea: Using Art to Excite People About Astrobiology</i> [#2146]
5:15 p.m.	Offerdahl E.* <i>A Brave New World: Reenvisioning Undergraduate Teaching for a Scientifically-minded Citizenry Tomorrow</i> [#2147]
5:30 p.m.	Wright K. E.* Domagal-Goldman S. <i>The Astrobiology Primer: Education, Outreach and Community Development</i> [#2148]

**TRANSMISSION INTO SPACE: SCIENTIFIC, SOCIAL, ETHICAL, AND LEGAL CONSIDERATIONS**

**3:45 p.m. Conference Room Two**

<b>Chairs:</b>	<b>Jacob Haqq-Misra Julia DeMarines</b>
3:45 p.m.	Vakoch D.* <i>Making Ourselves Understood: The Challenges of Composing Interstellar Messages</i> [#2151]
4:15 p.m.	Korbitz A.* <i>Active SETI and the Precautionary Principle</i> [#2152]
4:30 p.m.	Harp G. R.* Ackermann R. F. Arbutich J. Meitzner S. Astorga F. Bhatt A. Barott W. C. Jordan J. Richards J. Smolek K. Tarter J. C. <i>Wide Bandwidth SETI Beacons: Signaling Strategies and RFI</i> [#2153]
4:45 p.m.	Morrison I.* <i>Interstellar Beacons Should Transmit at 50 GHz</i> [#2154]
5:00 p.m.	Messerschmitt D. G.* <i>Plasma dispersion makes interstellar communication easier</i> [#2155]
5:15 p.m.	Hair T. W.* <i>Temporal Dispersion of the Emergence of Intelligence: An Inter-Arrival Time Analysis</i> [#2156]
5:30 p.m.	Atri D.* Busch M. W. DeMarines J. Haqq-Misra J. <i>The Dear ET Project</i> [#2157]

**TUESDAY, APRIL 17, 2012**  
**POSTER SESSION II**  
**3:45 – 5:45 p.m. Conference Rooms A and B**

**ENVIRONMENTAL PHYSICS AND LIFE POSTERS**

Ivarsson M.\* Broman C. Sturkell E. Ormö J.

*Impact-induced hydrothermal systems as habitats for microbial life [#2201]*

Lee C.\* Park Hong S. K.

*A microfluidic device with temperature gradient for analysis of polar microbial biofilm [#2202]*

Overholt A.\*

*High Energy Cosmic Ray Induced Neutron Irradiation [#2203]*

Tietzel I.\* Jepkemboi M.

*Effects of Gravitational Changes on HOBO Transposon in Eukaryotic Fruit Flies [#2204]*

**EXTREMEOMICS: THE BIOLOGY AND METABOLISM OF WEIRD LIFE POSTERS**

Collins E.\*

*Hima: A Meta-Database for Genomes, Metagenomes, and Phenotypes from Cold Environments [#2211]*

Neveu M.\* Lee Z. Poret-Peterson A. Elser J. Anbar A.

*Methods Development for Determining Elemental Stoichiometry of Extremophiles in Natural Samples [#2212]*

Nóbrega F.\* Baraúna R. A. Silva A. Pellizari V. H.

*Potential for survival and adaptation of extremophile *Exiguobacterium antarcticum* in simulated extraterrestrial environments [#2213]*

Papke R. T.\* Williams D. Gogarten J.

*Horizontal genetic transfer in Halobacterales is biased by evolutionary distances at all scales of divergence [#2214]*

Silver S.\* Phung L. T. Trimble W. L. Gilbert J. A.

*Total genomes for four microbes with notable arsenic metabolism [#2215]*

**MICROBES IN LITHIFYING SYSTEMS POSTERS**

Bebout G. E.\* Lazzeri K. E. Anderson L. D. Izawa M. R. Bridge N. J. Flemming R. L. Banerjee N. R.

*Nitrogen Concentrations and Isotopic Compositions of Altered Terrestrial Glassy Basaltic Rocks, and Implications for Astrobiology [#2221]*

Foster I. S.\* Schopf J. W. Farmer J. D. Kudryavtsev A. B.

*Detection of Morphologically Similar Microorganisms in Recent, Miocene and Permian Gypsum Deposits Using Confocal Laser Scanning Microscopy and Raman Imaging [#2222]*

Izawa M. R.\* Banerjee N. R. Flemming R. L. MacLean L. C. Dynes J. J. Matveev S. Southam G.

*Proteins and organic matter preserved in microbial boring in ~120 Ma basaltic glass [#2223]*

Juarez Rivera M.\* Sumner D.

*Exploring distributions of tubular structures in Fenestrae microbialites [#2224]*

Núñez J. I.\* Farmer J. D. Campbell K. A.

*Sedimentary Facies and Microbial Biosignatures in Siliceous Sinter Deposits, with Applications to Mars Exploration [#2225]*

Williams A.\* Sumner D. Y.

*Biogenic Cylindrical Filament Formation as Mineralogic Biosignatures, Iron Mountain, CA [#2226]*

Woycheese K. M.\* Meyer-Dombard D. R.

*Integrated analyses of microbialites from Laguna Bacalar, Mexico and Salda Golu, Turkey: Insights into astrobiological and paleoecological applications [#2227]*

## STABILITY AND SURVIVAL OF LIFE IN SIMULATED EXTRATERRESTRIAL ENVIRONMENTS POSTERS

Igbinosun O.\* Wood S.

*Adsorbed Water: A Potential Habitat for Microbial Life on Mars* [#2231]

Monaghan E. P.\* Patel M. Olsson-Francis K.

*The impact of Mars climate variations on a modelled subsurface habitable zone through recent geological time* [#2232]

Sinha N.\* Kral T.

*Sensitivity of Methanogens to Ultraviolet Radiation Under Aerobic and Anaerobic Conditions* [#2233]

## MICROBIOLOGY AND GEOCHEMISTRY OF DESERTS AND INVESTIGATING MARS ANALOG ENVIRONMENTS POSTERS

Blanco Y.\* Rivas L. A. Ruiz-Bermejo M. Parro V.

*Detection of mellitic acid in the surface and subsurface of the Atacama Desert by and Immunological assay:*

*Implications for searching organics on Mars* [#2241]

Lee C. M.\* Connon S. A. Beaty S. M. Stam C. N. Yung P. T. Noell A. Anderson R. C. Ponce A.  
*Extreme Microbial Habitats on Mt. Kilimanjaro* [#2241.1]

Palaich S. E.\*

*Behavior of a sulfate-carbonate-bearing salt at high pressures: a case study in ionic complexity* [#2242]

Pontefract A.\* Osinski G. R. Cockell C. Singleton A. Southam G.

*Creating Habitat: The Role of Meteorite Impacts in Promoting Microbial Growth in Crystalline Rocks from the Haughton Impact Structure* [#2243]

## THE NEW MARS: HABITABILITY OF A NEIGHBOR PLANET POSTERS

Hijji Y.\* Morris A. Hanson M.

*Solvent Evaporation Rate and Its Implications In Mars Samples Chemical Analysis* [#2251]

Ojha L.\* McEwen A. Dundas C. Mattson S. Byrne S. Schaefer E. Masse M.  
*Recurring Slope Lineae on Mars: Updated Global Survey Results* [#2252]

Radeva Y. L.\* Mumma M. J. Villanueva G. L. Tokunaga A. Novak R. E.

*Searching for Methane on Mars: Results from the 2009-2010 Observing Campaign with NIRSPEC on Keck II* [#2253]

Smith M.\* Catling D. C. Claire M. Zahnle K.

*Atmospheric Halogen Chemistry on Earth and Early Mars: Implications for Life* [#2254]

## ICY WORLDS: NICHES FOR BIOLOGICAL, PRE-BIOLOGICAL, AND ABIOTICAL CHEMISTRY POSTERS

Figewski N. M.\* Beagle L. W. Solitt L. S.

*Infrared Laser Desorption Spectroscopy for Icy Moon Surfaces* [#2261]

Johnson P. V.\* Hodyss R. Chernow V. F. Lipscomb D. M. Goguen J. D.

*Ultraviolet Photolysis of Amino Acids on Icy Solar System Bodies* [#2262]

Mirsaleh-Kohan N.\* Esmaili S. Cloutier P. Bass A. D. Sanche L. Huels M. A.

*Synthesis of organic molecules in astrophysical ices by low energy electron induced cation reactions* [#2263]

Tsou P.\* Brownlee D. E. McKay C. Yano H. Anbar A. Altweig K. Beagle L. W. Dissley R. Kanik I.  
*LIFE - Life Investigation For Enceladus* [#2264]

## ASTEROIDS, COMETS, AND ASTROBIOLOGY POSTERS

Galante D.\* Janot Pacheco E. Winter O. C. Lage C. A. Parro V. C. de Souza J. C. Augusto S. R. Benoit S. Macau E. E. de Campos Velho H. F. Scientific and Engineering Payload ASTER Team Rodrigues F.

*Aster - First Brazilian Mission to an Asteroid* [#2271]

Gibbings A.\* Vasile M. Watson I. Hopkins J. M. Burns D.

*Laser Ablation for the Effective Deflection, Exploration, and Exploitation of Asteroids* [#2272]

- Gibbings A.\* Vasile M.  
*Smart Cloud - A New Method for the Deflection and Mitigation of Asteroids* [#2273]
- Kaluna H.\* Meech K. J. Hsieh H.  
*PanSTARRS Discoveries: Main Belt Comets* [#2274]
- Landis R. R.\* Abell P. A. Barbee B. W. Johnson L.  
*Finding Near-Earth Asteroid (NEA) Destinations for Human Exploration: Implications for Astrobiology* [#2275]
- Menzel R. L.\* Roberge W. G.  
*Multifluid Shear Flows in Protoplanetary Disks: A New Venue for Prebiotic Chemistry* [#2276]
- Meech K. J.\* Mottl M. J. A'Hearn M. F. Deininger W. D. Dissly R. Johnson T. V. Randolph T. M. Sims J. A.  
*Proteus - An Astrobiology Mission Investigating the Origin of Terrestrial Water* [#2278]
- Robinson K. L.\* Taylor G. J. Hellebrand E. Nagashima K.  
*Water in Evolved Lunar Rocks: Implications for Delivery to the Inner Solar System* [#2279]
- Tachibana S.\* Yabuta H. Okazaki R. Arakawa M. Kadono T. Wada K. Saiki T. Sawada H.  
Imamura H. Shirai K. Abe M. Yoshioka M.  
*Hayabusa-2: Small Carry-on Impactor and Subsurface Sampling from the C-type Asteroid 1999JU3* [#2280]
- Ulamec S.\* Biele J. Gaudon P. Geurts K. Krause C. Maibaum M. Pätz B.  
*Rosetta Lander- Preparations for on-comet phase during cruise and hibernation* [#2281]
- Viscio M.\* Gargioli E. Viola N.  
*Deep Space Exploration Missions to Near Earth Asteroids: Impact of Human Presence* [#2282]
- Worth R.\* Sigurdsson S. House C.  
*Seeding of Life on Moons of the Outer Planets* [#2283]
- Yang C.\* Baoyin H. Li J. F.  
*Accessibility of Main-Belt Asteroids and Low-thrust Sample Return Trajectory Design* [#2284]
- Yang C.\* Baoyin H. Li J. F.  
*Target Selection and Low-Thrust Trajectory Design for Multiple Asteroid Exploration Missions* [#2285]

## SO MANY WORLDS: QUANTIFYING THE FREQUENCY OF HABITABLE PLANETS POSTERS

- Arney G. N.\* Meadows V. Schmidt S. J. Bailey J.  
*Characterizing the Surface Environment of Exo-Venus Analogs* [#2291]
- Eubanks T. M.\*  
*The Habitability of the Galactic Bulge* [#2292]
- Ge J.\*  
*Searching for Habitable Earth like Planets Using a New Generation IR high Resolution Spectrometer* [#2293]
- Gonzalez-Merino B.\* Palle E. Montañes-Rodriguez P.  
*High-resolution spectroscopy of the Earthshine* [#2294]
- Henry T. J.\* Winters J. G. Riedel A. R. Hosey A. D. Slatten K. J.  
*The Solar Neighborhood: Who Are the Stars? Where Are the Planets?* [#2295]
- Martin E. L.\*  
*A survey for habitable planets around ultracool dwarfs* [#2296]
- Martin-Torres F.\*  
*Physical Constraints in the Atmospheric Species of Exoplanets* [#2297]
- Montgomery M.\*  
*Toward Quantifying the Frequency of Habitability in White Dwarf Debris Disks* [#2298]
- Pagano M. D.\* Young P. A.  
*Creating a Database of Stellar Elemental Abundances* [#2299]
- Quinn S. N.\* White R. J. Latham D. W. Cantrell J. R.  
*A Search for a 'b' in the Beehive* [#2300]

## DEVELOPMENT OF QUANTITATIVE HABITABILITY ASSESSMENTS FOR EARTH, THE SOLAR SYSTEM, AND EXOPLANETS POSTERS

Berdyugina S.\* Berdyugin A. V. Pirola V.

*Geometrical Albedo of Exoplanetary Atmospheres* [#2311]

Rugheimer S.\* Kaltenegger L. Zsom A. Sasselov D. Segura A.  
*Spectral Fingerprints of Earth-like Planets Orbiting FGK Stars* [#2312]

## HOW CAN ASTROBIOLOGY HELP SAVE THE WORLD? A DISCUSSION OF ASTROBIOLOGY AND HUMANITY'S FUTURE POSTERS

Gale J.\*

*Climate Change and Astrobiology: The Necessary Connection* [#2401]

Intemann K.\*

*What Good is Astrobiology Anyway?* [#2402]

Resendes de Sousa Antonio M.\*

*Astrobiology: We have been Alive for 3.5 Billion Years* [#2403]

## DEVELOPING AND DEPLOYING DIGITAL MEDIA IN ASTROBIOLOGY EDUCATION POSTERS

Albarracin Gonzalez D.\* Moreno Colina L. M. Bueno J.

*3D game engines and 3D digital animation in astrobiology education* [#2411]

Cornish J.\*

*Science of the Springs: Bringing NAI science to Yellowstone tourists* [#2412]

Illangkoon H.\*

*The unveiling of a new social application which will revolutionize the way we interact at conferences* [#2413]

Impey C.\*

*Online Delivery of Astrobiology Content and Curricula* [#2414]

Klug Boonstra S. L.\* Anbar A. Bruce G. Cohen P. A. Moon P. A. Oliver C. A.

*Astrobiology Virtual Field Trips: Considerations for Engaging K-16 Classrooms in Active, Inquiry-Based Learning* [#2415]

Taylor S.\*

*QR Codes: Wave of the Future or Flash in the Pan?* [#2416]

## THE INTERSECTION OF ASTROBIOLOGY AND SOCIETY POSTER

Desmond T. O.\*

*"Astrobiology and the Bhagavad-gita: The Intersection of Astrobiology and Society"* [#2421]

## SOCIETAL IMPACT OF DISCOVERING EXTRATERRESTRIAL LIFE POSTERS

Capova K. A.\*

*The Detection of Extraterrestrial Life- Are We Ready?* [#2431]

Cirkovic M. M.\*

*A Dysonian SETI detection and its (indirect?) consequences* [#2432]

Haqq-Misra J.\*

*The Significance of Extraterrestrial Garbage* [#2433]

Leitner J. J.\* Firneis M. G.

*Is a Definition of Life only of Academic or also of Common Interest?* [#2434]

Narusawa S.\* Sakamoto M.

*OSETI with general publics and discussion on the IAA SETI protocol* [#2436]

Narusawa S.\* Harp G. R. Siemion A. Vakoch D. Fujishita M. Team Project Dorothy

Team Serendip Team SETI@home Team Kepler@GBT

*Project Dorothy: Worldwide Joint SETI Observation to Commemorate the 50th Anniversary of Project OZMA [#2437]*

### VIRUS ECOLOGY AND EVOLUTION AND ASTROVIROLOGY POSTERS

Nichols A. O.\* Drummond C. Stedman K. Ceballos M.

*Host-dependent differences in replication strategy of the Sulfolobus Spindle-shaped Virus strain SSVK1: Lytic replication in allopatric hosts [#2441]*

Held N. Herrera A. Whitaker R. J.

*Modular Evolution of the CRISPR system in 'Sulfolobus islandicus'*

### PATTERN AND PREDICTION: INTEGRATING ENERGETICS, GEOCHEMISTRY, AND GENETICS IN THE INVESTIGATION OF EARLY EARTH AND EXTRATERRESTRIAL ANALOG ENVIRONMENTS POSTERS

Conrad A. T.\* Hoeft S. E. Miller L. G. Oremland R. S. Rosen M. R. Saltikov C. W.

*Arsenophototrophs from alkaline, thermal and hypersaline environments [#2451]*

Deng W.\* Mohabir K. Neuer S.

*Effects of Nutrient Limitation on Marine Synechococcus Aggregation [#2452]*

Robador A.\* Sarid G. Braswell S.

*Modeling the temperature response of microbial energy metabolism [#2453]*

Stewart L. C.\* Holden J. F.

*Understanding energy demands at hydrothermal vent systems, an extraterrestrial analog environment [#2454]*

Urschel M.\* Hamilton T. Boyd E. Peters J. W. Shock E. Canovas P.

*Carboxydrotrophy in Acid-Sulfate-Chloride (ASC) hot springs of Yellowstone National Park [#2455]*

### MOLECULAR TOOLS FOR VIABILITY ASSESSMENT POSTERS

Chimileski S.\* Dolas K. Mackin C. Ouellette M. Gophna U. Papke R. T.

*Haloferax volcanii as a model organism for studying an unexplored archaeal DNA uptake mechanism [#2461]*

Colangelo-Lillis J.\* Deming J. W.

*Viral genes as indicators of microbial activity in the subzero brines of permafrost [#2462]*

### PLAUSIBLE GEOCHEMICAL CONDITIONS ON THE PREBIOTIC EARTH POSTER

Chaffin M.\* Novoselov A. A. Ribero F. B. O'Malley-James J. T. Pacheco M. A. Serrano P.

Moreno S. C. Lima U. A.

*From Environment to Cytoplasm: The Inorganic Ingredients for the Origin of Life [#2471]*

### FROM NON-ENZYMATİC CATALYSIS TO METABOLISM: TRACING EVOLUTION OF CATALYSIS AND ITS COUPLING WITH REPLICATION AT THE ORIGINS OF LIFE POSTERS

Beck A.\* Gardenghi D. Harris T. Szilagyi R.

*Development of Computational Methods to Simulate Molecular Fe-S Cluster Formation on Mineral Surfaces [#2481]*

Das D.\* Omosun T. Childers S. W. Mehta A. K. Lynn D. G.

*Peptide Membranes: Possible templates and catalysts for chemical evolution [#2482]*

Deere T. M.\* Lessner F. H. Lessner D. J.

*Examining Iron-Sulfur Cluster Biogenesis in the Domain Archaea [#2483]*

Doloboff I. J.\* Barge L. M. Russell M. J. Kanik I.

*Examining Morphology and Electrochemistry of Iron-Phosphate-Silicate Chemical Garden Structures: An Alkaline Hydrothermal System Analog [#2484]*

### THE ORIGIN OF BIOMOLECULES IN PLANETARY ENVIRONMENTS: FROM HCN TO RNA POSTERS

*Tuesday Poster Sessions*

Burcar B.\* Cassidy L. Moriarty E. M. McGown L. B.

*Abiotic synthesis of RNA from imidazole activated nucleotides using “molecular midwives” and montmorillonite clay as a catalytic substrate* [#2491]

Centlivre J.\* Pasek M. A.

*On the stability of reduced phosphorus salts: Are they detectable over geologic timescales?* [#2492]

Gruen D.\* House C. H.

*The effect of N<sub>2</sub> and CO<sub>2</sub> on the production of HCN under neutral atmospheric conditions* [#2493]

Gull M.\* Pasek M. A.

*Potential Prebiotic Phosphorylations in Deep Eutectic Solvents* [#2494]

Gupta A. P.\*

*The interactions of guanosine monophosphate with chiral solutes: An NMR study* [#2495]

Joshi P. C.\* Aldersley M. F. Ferris J. P.

*Prebiotic Synthesis of Biomolecules* [#2496]

Kee T. P.\*

*Emergence of Phosphorus-based Bioenergetics and Coupled Chemical Processes on the Prebiotic Earth* [#2497]

Nava Sedeño J. M.\* Segura A.

*Origins of Life on Habitable Planets around Active M Dwarfs* [#2498]

Neveu M.\* Kim H. J. Benner S. A.

*Pentose Formation in Mineral-Guided Cycles* [#2499]

**TRANSLATION: BY LIFE'S OLDEST MACROMOLECULES POSTERS**

Bernier C. R.\* Petrov A. S. Xue Y. Hershkovits E. Grover M. Harvey S. C. Williams L.

*Automated Mapping of Protein-rRNA contacts onto the Secondary Structure of the Ribosome: A Tool for Elucidating the Role of Ribosomal Proteins* [#2511]

Caetano-Anolles G.\* Harish A.

*The ribosome: A gradually coevolving ribonucleoprotein ensemble* [#2512]

Hahm S.\* Raimist J. O'Neill E. B. Athavale S. Bowman J. Watkins D. Williams L.

*Translation: By Life's Oldest Macromolecules* [#2513]

Hoskyns S. J.\* Bowman J. Nanda V. Pham I. T. Kleber T. Hsiao C. Williams L.

*Systematic Restoration of Ribosomal Secondary Domains* [#2514]

Jones B. L.\* Miles S. Dunham C. M. Snell T. W.

*Stress granule formation in Brachionus manjavacas (Rotifera)* [#2515]

Okafor D.\* Hoskyns S. J. Hsiao C. Hud N. Williams L.

*Highly Sensitive Analysis of Ribosomal Fragment Assay by High Performance Liquid Chromatography with Fluorescence Detection* [#2516]

Roy P.\* Athavale S. Schneider D. M. Bowman J. Hershkovitz E. Williams L.

*Deconstructing the LSU: Independent Folding and Assembly of Small Ribosomal Components* [#2517]

Tran Q. D.\* Fox G. E.

*An examination of tRNA movement through the ribosome* [#2518]

Washington A.\* Canzoneri J. Oyelere A. Benicewicz D.

*Synthesis of Macrolide-Peptide Conjugates* [#2519]

## THE ORIGIN AND EARLY EVOLUTION OF PHOTOSYNTHESIS POSTERS

- Hamilton T.\* Fecteau K. M. Havig J. R. Vogl K. Bryant D. A. Shock E. L. Peters J. W. Boyd E.  
*Modeling the Habitat Range of Phototrophic Microorganisms in Yellowstone National Park: Toward the Development of a Comprehensive Fitness Landscape* [#2531]
- Kakegawa T.\*  
*Bimodal distribution of carbon isotope compositions of kerogen in the 3.0 Ga Lumby Lake Group in Canada: Evidence of oxygenic photosynthesis?* [#2532]
- Krishnamurthy Y.\* Honchak B. Blankenship R. E.  
*Gene Duplication Events in the Early Evolution of Photosynthetic Reaction Center Complexes* [#2533]
- Li Y.\* Fedo C. Konhauser K.  
*Oxygenic Cyanobacteria Emerged Before the Great Oxidation Event* [#2534]
- Tang J. K.\* Callister S. J.  
*Metabolic analyses in the carbon metabolism of the aerobic anoxygenic phototrophic bacterium Roseobacter denitrificans under various growth conditions* [#2535]

## AN EVENING WITH AUTHOR DAVA SOBEL

7:00 p.m. Grand Ballroom

Award-winning author and science communicator Dava Sobel will discuss her recent works including “Galileo’s Daughter” and “A More Perfect Heaven,” as studies of scientific revolutions and the cultural, political, and individual circumstances that have given rise to them, and as legacies bequeathed to astrobiology. A book signing will follow—bring your copies from home or buy them on-site.

## WEDNESDAY, APRIL 18, 2012

### THE NEW MARS: HABITABILITY OF A NEIGHBOR PLANET

8:00 a.m.      Salon One

<b>Chairs:</b>	<b>David Des Marais</b>
	<b>Jack Farmer</b>
8:00 a.m.	Mumma M. J.* Villanueva G. L. <i>The Search for Life on Mars - Current Knowledge, Earth Analogues, and Principal Issues</i> [#3001]
8:15 a.m.	Villanueva G. L.* Mumma M. J. Radeva Y. L. Novak R. E. Kaufl H. U. Tokunaga A. Encrenaz T. Hartogh P. <i>Water and Organics on Mars: A comprehensive search at infrared wavelengths</i> [#3002]
8:30 a.m.	McMahon S.* Parnell J. Blamey N. F. <i>Analysis of volatiles in basalt, a possible source of Martian methane</i> [#3003]
8:45 a.m.	Pavlov A.* Shivak J. N. <i>Liquid water in the extremely shallow Martian subsurface</i> [#3004]
9:00 a.m.	Schorghofer N.* <i>Extreme Microclimates</i> [#3005]
9:15 a.m.	Wang A.* <i>Habitability in subsurface at equatorial regions on Mars</i> [#3006]
9:30 a.m.	<i>Discussion: Charting Habitable Environments on Mars: Recent Progress</i>

### EXTREMEOMICS: THE BIOLOGY AND METABOLISM OF WEIRD LIFE

8:00 a.m.      Salon Three

<b>Chairs:</b>	<b>Aaron Goldman</b>
	<b>Laura Landweber</b>
8:00 a.m.	Valach M.* <i>Mitochondrial DNA: Genomes at their extremes</i> [#3011]
8:30 a.m.	Landweber L.* Bracht J. Goldman A. D. Swart E. Chen X. Dolzhenko E. <i>Extreme Genome Architectures in Oxytricha</i> [#3012]
8:45 a.m.	Reaves M.* Sinha S. Rabinowitz J. D. Kruglyak L. Redfield R. J. <i>Absence of arsenate in DNA from arsenate-grown GFAJ-1 cells</i> [#3013]
9:00 a.m.	Anderson R.* Brazelton W. J. Baross J. A. <i>Assessing the nature of virus-host coevolution in hydrothermal vent systems through metagenomics</i> [#3014]
9:15 a.m.	Kuhn E.* Murray A. E. Fritsen C. H. Loeffler F. E. Doran P. <i>Addressing Lake Vida cryobrine microbial community lifestyle: 'Omics' approaches to survey biogeochemical processes of a salty-freezing-ice-sealed ecosystem</i> [#3015]
9:30 a.m.	Waters S. M.* Nicholson W. L. <i>Elucidating genomic adaptations involved in <i>Bacillus subtilis</i> evolution to hypobaric growth: Low pressure as an environmental constraint on terrestrial biological processes</i> [#3016]
9:45 a.m.	Tirumalai M. R.* Fox G. E. Allen S. Venkateswaran K. <i>Are spacecraft assembly facilities 'breeding' grounds that help <i>Bacillus</i> sp evolve to produce "hardened" spores?</i> [#3017]

### DEVELOPING AND DEPLOYING DIGITAL MEDIA IN ASTROBIOLOGY EDUCATION

8:00 a.m.      Salon Four

<b>Chair:</b>	<b>Ariel Anbar</b>
8:00 a.m.	Bruce G.* Anbar A. Summons R. Cohen P. A. Oliver C. A. Taylor W. Klug S. <i>Innovative technology behind the next generation of Virtual Field Trips in Astrobiology Education</i> [#3021]
8:15 a.m.	Kadooka M.* Meech K. J. <i>Virtual Field Trip for the Origin of Waters Story</i> [#3022]

8:30 a.m.	Granshaw F. D.* Cady S. L. <i>Use of a Mars Analog Virtual Field Environment (MAVFE) in STEM Teacher and Student Education in Astrobiology</i> [#3023]
8:45 a.m.	Butterfield T.* Sumners C. <i>Extremophiles Meet Exoplanets in the Digital Dome</i> [#3024]
9:00 a.m.	Hedges S.* Kumar S. <i>TimeTree.org: A mobile-friendly web resource for exploring the evolution of life in the universe</i> [#3025]
9:15 a.m.	Matsos H.* <i>Astrobiology Magazine and Digital Storytelling</i> [#3026]
9:30 a.m.	Cola J.* Jones B. L. Whelan T. P. Docal T. <i>Astrobiology Self-Directed Short Course and the NASA Electronic Professional Development Network</i> [#3027]
9:45 a.m.	Horodyskyj L.* Ben-Naim D. Semken S. Anbar A. <i>Hunting for Habitable Worlds: Engaging Students in an Adaptive Online Setting</i> [#3028]

**PLAUSIBLE GEOCHEMICAL CONDITIONS ON THE PREBIOTIC EARTH****8:00 a.m.      Salon Five**

<b>Chairs:</b>	<b>Jeffrey Bada</b> <b>Eric Parker</b>
8:00 a.m.	Hazen R. M.* <i>Mineralogical Constraints on the Origins of Life</i> [#3031]
8:30 a.m.	Bennett R. V.* Sokolov D. A. Davis J. Orlando T. M. Cleaves H. J. Fernandez F. M. <i>Imaging Mass Spectrometry Investigation of Formamide Reactions of Mineral Surfaces</i> [#3032]
8:45 a.m.	Cassidy L.* Burcar B. Moriarty E. M. Grossman J. McGown L. B. <i>The properties of nucleotide hydrogels, and their hypothetical impact on abiotic polymerization</i> [#3033]
9:00 a.m.	Summers D. P.* Khare B. Basa R. Rodoni D. <i>The Abiotic Fixation of Nitrogen on Terrestrial Planets</i> [#3034]
9:15 a.m.	Parker E. T.* Cleaves H. J. Bada J. Orlando T. M. Fernandez F. M. <i>The Production of Gaseous Species in the Primitive Atmosphere: Gas Phase Chemistry in Spark Discharge Experiments</i> [#3035]
9:30 a.m.	Bada J.* Zhou M. Cleaves H. J. Fernandez F. M. <i>A plausible simultaneous synthesis of amino acids and simple peptides on the primordial Earth</i> [#3036]
9:45 a.m.	Dawley M.* Michalkova Scott A. Hill F. C. Leszczynski J. Orlando T. M. <i>Adsorption of Formamide on Kaolinite Surfaces: A Combined Experimental and Theoretical Study</i> [#3037]

**TRANSITION TO THE WORLD OF GENETICALLY ENCODED PROTEINS****8:00 a.m.      Conference Room Four**

<b>Chairs:</b>	<b>Greg Fournier</b> <b>Stephen Freeland</b>
8:00 a.m.	Fournier G.* <i>Origin and Expansion of the Genetic Code: Transcending the RNA World</i> [#3041]
8:15 a.m.	Stephenson J. D.* Freeland S. <i>Simplified Amino Acid Alphabets: The B.I.G. Picture</i> [#3042]
8:30 a.m.	Petrov A. S.* Bernier C. R. Roy P. Hsiao C. Preeprem T. Hud N. Harvey S. C. Williams L. <i>Ribosomal Protein L2: Its Role, Function, and Evolution</i> [#3043]
8:45 a.m.	Erives A. J.* <i>Evolutionary origin of the proteinogenic amino acids, universal homochirality, and the anti-codon table in an early aminoacylated RNA world</i> [#3044]

*Wednesday Oral Sessions*

9:00 a.m.	Barzegari A.* Omidi A. A. <i>The ribosomal 18s rDNA introns in micro-algae as an attractive evidence for enhancement of RNA world hypothesis [#3045]</i>
9:15 a.m.	Omosun T.* Childers S. W. Bui T. Q. Mehta A. K. Lu K. Anthony N. R. Johnson S. J. Berland K. M. Lynn D. G. <i>Self-Assembly of Minimal Peptide Catalysts [#3046]</i>
9:30 a.m.	Ilardo M.* <i>The Polar Requirement of Prebiotic Amino Acids is Highly Unusual [#3047]</i>
9:45 a.m.	Freeland S.* <i>Origin and Expansion of the Genetic Code: Descent into an RNA World?</i>

**ASTEROIDS, COMETS, AND ASTROBIOLOGY**

**8:00 a.m. Conference Room Two**

<b>Chairs:</b>	<b>Douglas Vakoch</b> <b>Pascale Ehrenfreund</b>
8:00 a.m.	Jewitt D.* <i>The Main Belt Comet Zoo: Hubble Observations of 300163 [#3051]</i>
8:15 a.m.	Meech K. J.* Sarid G. Kaluna H. Riesen T. E. Urban L. U. Fernandez Y. R. <i>New Insights into Comet Activity from the EPOXI Mission Campaign and the Spitzer Comet Nucleus Survey [#3052]</i>
8:30 a.m.	Boice D.* de Almeida A. A. <i>Where is the Phosphorous in Comets? [#3053]</i>
8:45 a.m.	Ehrenfreund P.* <i>MarcoPolo-R: Near Earth Asteroid Sample Return Mission in ESA assessment study phase [#3054]</i>
9:00 a.m.	Maccone C.* <i>We are still unprepared to face an asteroid or comet threat [#3055]</i>
9:15 a.m.	Prado J.* Viso M. Y. <i>APOPHIS Express, a unique opportunity for a human visit to a NEO in 2029 [#3056]</i>
9:30 a.m.	Messidorro A.* <i>Analysis and Individuation of suitable NEAs for Single and Multi-Objectives Human Exploration Missions [#3057]</i>
9:45 a.m.	Cobb A.* <i>Nature's starships: Amino acid synthesis, frequency, and their delivery to Earth via meteorites [#3058]</i>

**TRANSLATION: BY LIFE'S OLDEST MACROMOLECULES**

**10:15 a.m. Salon One**

<b>Chairs:</b>	<b>Adegboyega Oyelere</b> <b>Arren Washington</b>
10:15 a.m.	Lenz T. K.* Hsiao C. Gossett J. Bowman J. O'Neill E. B. Harvey S. C. Hud N. Williams L. <i>Mapping Mg2+ interactions in ancient rRNA [#3061]</i>
10:30 a.m.	Fox G. E.* Tran Q. D. Tirumalai M. R. <i>What Is the Likely Order of Major Events in the Evolution of the Ribosome [#3062]</i>
10:45 a.m.	Jankowiak R.* Feng X. Koirala M. Li M. Liu Z. Reppert M. Pieper J. Chang W. <i>Spectroscopic study of the minor light-harvesting CP29 antenna complex of Photosystem II: Hole-Burning and Modeling Study [#3063]</i>
11:00 a.m.	Hsiao C.* Lenz T. K. Peters J. K. Bowman J. Preeprem T. Lie L. Gossett J. O'Neill E. B. Goss K. Athavale S. Trippe C. Murray J. Wartell R. M. Harvey S. C. Hud N. V. Williams L. <i>A Folding and Assembly of a Biochemical Model of an Ancestral Ribosome [#3064]</i>
11:15 a.m.	Canzoneri J.* Washington A. Z. Oyelere A. <i>Exploring the Ribosome with Peptolides [#3065]</i>

- 11:30 a.m. Schneider D. M.\* Hsiao C. Bowman J. Anderson E. J. Williams L.  
*In Vivo Interactions of Model Ancestral rRNA with Extant rProteins [#3066]*
- 11:45 a.m. Bowman J.\* Gulen B. Hoskyns S. J. Nanda V. Hsiao C. Williams L.  
*Mimicking Homologous Recombination in vitro [#3067]*

**ICY WORLDS: NICHES FOR BIOLOGICAL, PRE-BIOLOGICAL, AND ABIOTICAL CHEMISTRY****10:15 a.m.      Salon Three**

- Chairs:** **Perry Gerakines**  
**Marla Moore**  
**Reggie Hudson**
- 10:15 a.m. Coustenis A.\* Bampasidis G. Solomonidou A. Raulin F.  
*The case for habitable moons in the outer solar system from the study of the atmospheres and surfaces of Titan, Enceladus and Europa [#3071]*
- 10:30 a.m. Prieto Ballesteros O.\* Dougherty M. Grasset O. Bunce E. Coustenis A. Blanc M. Coates A. Drossart P. Fletcher L. Hussman H. Jaumann R. Krupp N. Tortora P. Tosi F. Van Hoolst T. Titov D. Erd C. Wielders A.  
*JUICE (JUpiter and ICy moons Explorer): A Mission Devoted to Explore the Habitability of the Jupiter System [#3072]*
- 10:45 a.m. Flynn G. J.\*  
*Evidence for the Formation of Organic Matter by Condensation of Carbon-bearing Ices Early in Solar System History [#3073]*
- 11:00 a.m. Chang Q.\* Herbst E.  
*A unified macro-micro Monte Carlo simulation of ice mantle formation on interstellar grains [#3074]*
- 11:15 a.m. Gerakines P. A.\* Hudson R. L. Moore M. H. Bell J. L.  
*Amino acids irradiated at 15-140 K: In-situ measurements of radiation stability [#3075]*
- 11:30 a.m. Dawley M.\* Orlando T. M.  
*Photochemical processing of low-temperature formamide:water ices [#3076]*
- 11:45 a.m. Gudipati M. S.\* Lignell A.  
*Ionization of Organic Impurities in Interstellar and Cometary Ices [#3077]*
- 12:00 p.m. Hudson R. L.\* Loeffler M. J.  
*Descent with Modification: Thermal Reactions of Subsurface H<sub>2</sub>O<sub>2</sub> of Relevance to Icy Satellites and Other Small Bodies [#3078]*

**THE INTERSECTION OF ASTROBIOLOGY AND SOCIETY****10:15 a.m.      Salon Four**

- Chairs:** **Erik Persson**  
**Margaret Race**
- 10:15 a.m. Foote E. J.\* Paige D. A. Siegler M. A.  
*Astrobiology Community Survey 2012 [#3081]*
- 10:30 a.m. Sullivan W. T.\*  
*Planetocentric Ethics: Principles for Exploring a Solar System that may Contain Extraterrestrial Microbial Life [#3082]*
- 10:45 a.m. Persson E.\*  
*Some philosophical questions to consider before exploiting another world [#3083]*
- 11:00 a.m. Race M. S.\*  
*Activities and Issues Beyond Astrobiology Science—Keeping Our Eyes on the Road Ahead [#3084]*
- 11:15 a.m. Korbitz A.\*  
*SETI, Metalaw and the Future of Human Society: Beyond the Visions of Haley et al [#3085]*
- 11:30 a.m. Bertka C.\*  
*Christianity's Response to the Discovery of Extraterrestrial Intelligent Life-Famine or Feast?: Insights from Science and Religion, and the Sociology of Religion [#3086]*

*Wednesday Oral Sessions*

- 11:45 a.m. Worms J.\* Swings J. P. Zic Fuchs M. Landfester U. Kancewicz-Hoffman N. Thiele G. Weehuizen R. Walter N.  
*SPACEROAD - A social sciences and humanities-based rationale for human space exploration [#3087]*
- 12:00 p.m. Race M. S.\* Denning K.  
*The NAI Astrobiology and Society Focus Group: Origins and Evolution To Date [#3088]*

**FROM NON-ENZYMATIC CATALYSIS TO METABOLISM: TRACING EVOLUTION OF CATALYSIS AND ITS COUPLING WITH REPLICATION AT THE ORIGINS OF LIFE**

**10:15 a.m.      Salon Five**

- Chairs:** **John Peters**  
**Andrew Pohorille**
- 10:15 a.m. Boyd E.\* Hamilton T. Peters J. W.  
*On the Origin and Evolution of Complex Iron-Sulfur Enzymes [#3091]*
- 10:30 a.m. Lessner D. J.\* Lessner F. H. Jennings M. Hirata A. Duin E. C.  
*Iron-sulfur clusters and the evolution of the enzymatic synthesis of RNA [#3092]*
- 10:45 a.m. Lindsey J.\* Soares A. Taniguchi M. Chandrasekhar V.  
*Self-Organization of Simple Organic Constituents to Give Photoactive Protocells [#3093]*
- 11:00 a.m. Seelig B.\* Chao F. Morelli A. Haugner J. C. Churchfield L. Wilson M. A. Pohorille A. Veglia G.  
*Primordial enzymes created in the laboratory exhibit unusual protein structure [#3094]*
- 11:15 a.m. Wilson M. A.\* Seelig B. Chao F. Veglia G. Pohorille A.  
*Computer Modeling of an in vitro evolved RNA-ligase [#3095]*
- 11:30 a.m. Goldman A. D.\* Landweber L.  
*The TIM barrel fold as a driver of early protein-mediated metabolism [#3096]*
- 11:45 a.m. Babbitt P. C.\*  
*Privileged structural scaffolds and the evolution of enzyme function [#3097]*

**MICROBIOLOGY AND GEOCHEMISTRY OF DESERTS AND INVESTIGATING MARS ANALOG ENVIRONMENTS**

**10:15 a.m.      Conference Room Four**

- Chairs:** **Alfonso Davila**  
**Timothy Shirey**
- 10:15 a.m. Introduction
- 10:30 a.m. Bonaccorsi R. M.\* Willson D. McKay C. Valdré G.  
*Astrobiology field research in a High-Fidelity Desert Analog Site: The Ubehebe Volcanic Field, Death Valley, California [#3102]*
- 10:45 a.m. Rask J.\* De Leon P. McKay C. Marinova M.  
*The Exploration of Marambio Antarctica as a Mars Analog [#3103]*
- 11:00 a.m. Azua-Bustos A.\* Arenas C. Salas L. Vicuña R.  
*Compatible Solute Biosynthesis in Chroococcidiopsis AAB1, A Novel Strain Extremely Tolerant to Desiccation Isolated from the Atacama Desert [#3104]*
- 11:15 a.m. Parro V.\* de Diego-Castilla G. Moreno-Paz M. Blanco Y. Cruz-Gil P. Rodriguez-Manfredi J. A. Fernández-Remolar D. Gomez F. Gómez M. J. Rivas L. A. Demergasso C. S. Echeverría A. Urtuvia V. N. Ruiz-Bermejo M. García-Villadangos M. Postigo M. Sánchez-Román M. Chong-Díaz G. Gomez-Elvira J.  
*The discovery of a new hypersaline habitat in the Atacama subsurface by a life detector chip and implications for searching for life on Mars [#3105]*
- 11:30 a.m. DiRuggiero J.\* Robinson C. K. Souterre T. Ravel J. Fricke W. F. Ascaso C. Wierzchos J.  
*Microbial colonization in rocks and soils from a Mars analog environment, the Atacama Desert, Chile [#3106]*

- 11:45 a.m. Shirey T. B.\* Olson J. B. Findlay R. H.  
*Detection, Diversity, and the Environmental Conditions Shaping the Microbial Communities in the Atacama Desert, Chile* [#3107]
- 12:00 p.m. Fernández-Remolar D. C.\* Sánchez-Román M. Prieto Ballesteros O. Gómez-Ortíz D. García-Villadangos M. Molina A. Rodríguez N. Barragán T. Gleeson D. Banerjee N. Southam G. Izawa M. Loiselle L. Schmitt-Kopplin P. Granda A. Quesada C. Amils R.  
*Searching for Biosignatures in Deep Regions of the Rio Tinto Aquifer: The Iberian Pyritic Belt Subsurface Life (IPBSL) Project* [#3108]

### MOLECULAR TOOLS FOR VIABILITY ASSESSMENT

**10:15 a.m. Conference Room Two**

- Chairs:** **Adrian Ponce**  
**Christine Lee**
- 10:15 a.m. Ogles D.\* Baldwin B. Biernacki A. Davis G.  
*Using PLFA in the "omics" Era: A Mature Method that Still Deserves a Seat at the Table* [#3111]
- 10:45 a.m. Lee C. M.\* Stam C. N. Mikkelsen B. Ponce A.  
*Assessing microbial viability using propidium monoazide coupled with PCR methods* [#3112]
- 11:00 a.m. Vaishampayan P.\* La Duc M. Venkateswaran K.  
*Development and implementation of molecular tools for assessing the viability of microbes on spacecraft and associated surfaces* [#3113]
- 11:15 a.m. Stam C.\* Lee C. M. Noell A. Ponce A.  
*Evaluating the viability of heat-inactivated *Bacillus atrophaeus* spores using propidium monoazide - quantitative polymerase chain reaction* [#3114]
- 11:30 a.m. Noell A.\* Yung P. T. Yang W. Ponce A.  
*A sensitive method for measuring bacterial spores in environmental samples by detecting dipicolinic acid released during spore germination or lysis* [#3115]
- 11:45 a.m. Kuhlman K.\* Corcoran A. C. Noguera D. R.  
*Application of CARD-FISH to Identification of Microbes in Rock Varnish* [#3116]
- 12:00 p.m. House C. H.\* Martino M. J. Rhodes M. E. Biddle J. F. Brandt L. D. Tomsho L. P.  
*Development of a new degenerate PCR-based method for whole genome amplification of very low biomass samples* [#3117]

### PLENARY SESSION: HONORING THOSE WE HAVE LOST: SCIENCE AND REFLECTION

**1:30 p.m. Grand Ballroom**

- Chairs:** **Carl Pilcher**  
**Mary Voytek**

*This special plenary session is dedicated to honoring the contributions of community members whom we have lost recently. The session will include both scientific content and reflection. Audience participation is welcome.*

**THURSDAY, APRIL 19, 2012**

**SO MANY WORLDS: QUANTIFYING THE FREQUENCY OF HABITABLE PLANETS**

**8:00 a.m.      Salon One**

<b>Chairs:</b>	<b>Margaret Turnbull</b>
	<b>Lucianne Walkowicz</b>
	<b>Patrick Young</b>
8:00 a.m.	Walkowicz L.* <i>Stellar Variability and Kepler: Understanding Exoplanets in Light of their Host Stars [#4001]</i>
8:15 a.m.	Winters J. G.* Henry T. J. Riedel A. R. Jao W. C. Slatten K. J. <i>Stellar Multiplicity in the Solar Neighborhood [#4002]</i>
8:30 a.m.	Young P. A.* <i>The Impact of Abundance Variations on Stellar Habitable Zones [#4003]</i>
8:45 a.m.	Hinkel N. R.* Timmes F. X. Turnbull M. <i>Abundances in Known Exoplanet Host Stars using the Hypatia Catalog [#4004]</i>
9:00 a.m.	Davison C. L.* White R. Henry T. J. Bailey J. Jao W. C. Riedel A. R. Subasavage J. P. <i>A Search for Planets around Cool Stars [#4005]</i>
9:15 a.m.	Turnbull M.* <i>Studying Exo-Earths with a Starshade [#4006]</i>
9:30 a.m.	Kane S.* Gelino D. M. <i>The Habitable Zone Gallery [#4007]</i>
9:45 a.m.	Mendez A.* Candelaria J. F. <i>Distribution, Diversity and Distance of Nearby Earth-like Exoplanets [#4008]</i>

**THE ORIGIN OF BIOMOLECULES IN PLANETARY ENVIRONMENTS: FROM HCN TO RNA  
(SESSION IN HONOR OF JAMES FERRIS)**

**8:00 a.m.      Salon Three**

<b>Chairs:</b>	<b>Doug Whittet</b>
	<b>Prakash Joshi</b>
8:00 a.m.	Lazcano A.* <i>HCN chemistry and the abiotic synthesis of metabolic intermediates: Is there a connection with primitive biosynthetic pathways? [#4011]</i>
8:15 a.m.	Keane T.* <i>The Coupled Photochemistry of Ammonia and Acetylene: Implications for Giant Planets, Comets and Astrobiology? [#4012]</i>
8:30 a.m.	Tran B. N.* Joseph J. C. Force M. Briggs R. G. Vuitton V. Chera J. J. Persans P. D. Ferris J. P. <i>Photochemical Flow Reactor: A Laboratory Investigation of the Photochemical Reactions in Titan's Atmosphere [#4013]</i>
8:45 a.m.	Pizzarello S.* Schrader D. Monroe A. Lauretta D. S. <i>Molecular Asymmetry in Primitive Asteroids: Giving Life a Hand? [#4014]</i>
9:00 a.m.	Delano J.* Joshi P. C. Aldersley M. F. Ferris J. P. Tailby N. D. <i>RNA Oligomerization: Possible Environments, Materials, and Processes [#4015]</i>
9:15 a.m.	Aldersley M. F.* Joshi P. C. Price J. D. Ferris J. P. <i>The Role of Montmorillonite in RNA Synthesis [#4016]</i>
9:30 a.m.	McGown L. B.* Cassidy L. M. Burcar B. Grossman J. D. Moriarty E. M. <i>Why G? The Unique Properties of Guanosine in a Prebiotic World [#4017]</i>
9:45 a.m.	Deamer D.* <i>Combinatorial chemistry in the prebiotic environment [#4018]</i>

**SOCIETAL IMPACT OF DISCOVERING EXTRATERRESTRIAL LIFE****8:00 a.m.      Salon Four****Chairs:****Douglas Vakoch****Constance Bertka**

8:00 a.m.	Dick S. J.* <i>The Relevance of History to the Societal Impact of Extraterrestrial Life</i> [#4021]
8:30 a.m.	Lavrakas P. J.* <i>Measuring Belief in Extraterrestrial Life and Its Societal Implications</i> [#4022]
8:45 a.m.	Peters T.* <i>Would ETI Contact Provoke a Religious Crisis?</i> [#4023]
9:00 a.m.	Lowrie I.* <i>Cultural Frames and Cognitive Resources: Anthropological contributions to the study of societal responses to the discovery of extraterrestrial life</i> [#4025]
9:15 a.m.	Coe K.* Weigel M. <i>Impact of Extraterrestrial Life Discovery for Third World Societies</i> [#4026]
9:30 a.m.	Jones M.* <i>Mainstream Media and Social Media Reactions to Extraterrestrials</i> [#4027]
9:45 a.m.	Denning K.* <i>Anticipating the Alien</i> [#4028]

**THE TAXONOMY OF COMETS: TESTING THE ORIGINS OF ORGANICS AND WATER, AND THEIR DELIVERY TO YOUNG PLANETS****8:00 a.m.      Salon Five****Chairs:****Michael Mumma****Michael DiSanti**

8:00 a.m.	Mumma M. J.* Charnley S. <i>Comets as Messengers from the Early Solar System: Emerging Insights on Delivery of Water, Nitriles, and Organics to Earth</i> [#4031]
8:30 a.m.	Bonev B. P.* Gibb E. Villanueva G. L. DiSanti M. A. Paganini L. Keane J. Meech K. J. Mumma M. J. <i>Near-Infrared Searches for Deuterated Water and Methane in Comets</i> [#4032]
8:45 a.m.	Villanueva G. L.* Mumma M. J. Bonev B. P. DiSanti M. A. Paganini L. Radeva Y. L. Magee-Sauer K. Gibb E. <i>Probing the Formation &amp; Evolution of Comets via Nuclear Spin Temperatures</i> [#4033]
9:00 a.m.	Radeva Y. L.* Mumma M. J. Villanueva G. L. Bonev B. P. DiSanti M. A. A'Hearn M. F. <i>The Unique Organic Composition of Comet 2P/Encke Revealed Through Infrared Spectroscopy</i> [#4034]
9:15 a.m.	Gibb E.* Bonev B. P. Villanueva G. L. DiSanti M. A. Mumma M. J. Sudholt E. Radeva Y. L. <i>The Chemically Distinct Comet C/2007 N3 (Lulin)</i> [#4035]
9:30 a.m.	Milam S. N.* Charnley S. Kuan Y. Chuang Y. Villanueva G. L. Coulson I. Remijan A. <i>Radio Observations of Organics in Comets</i> [#4036]
9:45 a.m.	Paganini L.* Mumma M. J. DiSanti M. A. Villanueva G. L. Bonev B. P. Gibb E. Radeva Y. L. Charnley S. <i>Evidence for polar and apolar ice aggregates in cometary nuclei: Constraining their possible origin and connection to protostellar environments</i> [#4037]

**MICROBES IN LITHIFYING SYSTEMS**

**8:00 a.m. Conference Room Four**

**Chairs:**

**John Spear**

**Frank Corsetti**

- 8:00 a.m. Petryshyn V.\* Corsetti F. Frantz C. M. Berelson W. M. Lund S. P. Tripati A. K.  
*Magnetic Susceptibility as a Biosignature [#4041]*
- 8:15 a.m. Frantz C. M.\* Bhartia R. Corsetti F. Salas E. C. Sessions A. L. Nealson K. H.  
*Stromatolite Biosignature Analysis Using Deep-UV Native Fluorescence Spectroscopy [#4042]*
- 8:30 a.m. Macalady J.\* McCauley R. L. Kakuk B. Schaperdorff I.  
*Extremely low-light adapted phototrophic biofilm community in a Bahamian blue hole [#4043]*
- 8:45 a.m. Pepe-Ranney C.\* Corsetti F. Berelson W. M. Spear J.  
*Cyanobacterial construction of finely-laminated siliceous stromatolites in a Yellowstone National Park hot spring [#4044]*
- 9:00 a.m. Corsetti F. A.\* Miller S. E. Petryshyn V.  
*Microfacies analysis of Green River Formation stromatolites and comparison to microbial mat experiments: Implications for the formation of fine vs. coarse-grained stromatolites [#4045]*
- 9:15 a.m. Shapiro R. S.\*  
*Hematite-coated microfossils: Ecological fingerprint or taphonomic oddity of the Paleoproterozoic? [#4046]*
- 9:30 a.m. Loyd S.\* Berelson W. M. Lyons T. W. Hammond D. Tripati A. K. Eiler J. M. Corsetti F. A.  
*Microbially induced carbonate precipitation: Preserving metabolic signatures in concretions of the Monterey Formation [#4047]*
- 9:45 a.m. Ibarra Y.\* Corsetti F.  
*Oocardium stratum calcite biosignatures and their utility in carbonate-depositing springs [#4048]*

**PATTERN AND PREDICTION: INTEGRATING ENERGETICS, GEOCHEMISTRY, AND GENETICS IN THE INVESTIGATION OF EARLY EARTH AND EXTRATERRESTRIAL ANALOG ENVIRONMENTS**

**8:00 a.m. Conference Room Two**

**Chairs:**

**Eric Boyd**

**Eric Roden**

**E. Shock**

- 8:00 a.m. Meyer-Dombard D. R.\* Swingley W. Raymond J. Shock E.  
*Coordination of parallel datasets reveals geochemical, energetic, and genomic support for biogeochemical cycling in a hot spring ecosystem [#4051]*
- 8:30 a.m. Alsop E. B.\* Boyd E. Raymond J.  
*Hydrothermal Environments as Hot Spots of Microbial Evolution [#4052]*
- 8:45 a.m. Loiacono S. T.\* Havig J. R. Shock E. L. Meyer-Dombard D. R.  
*High-temperature nitrogen cycling: merging genomics, transcriptomics, and geochemistry to evaluate nitrogen-cycling in terrestrial hydrothermal systems [#4053]*
- 9:00 a.m. Wright K. E.\* Williamson C. Spear J. Grasby S. E. Templeton A. S.  
*Habitable niches for subsurface microbes in an arctic analog for icy, sulfur-rich sites on Mars and Europa [#4054]*
- 9:15 a.m. Miller L.G.\* Baesman S. Carlstrom C. Coates J. D. Semrau J. Oremland R. S.  
*Perchlorate reduction linked to methane oxidation: A possible scenario for life on Mars [#4055]*
- 9:30 a.m. Puente F.\* Moreno-Paz M. Cruz-Gil P. Rivas L. A. Garrido P. Postigo M. Gómez M. J. García-Villadangos M. Parro V.  
*Exploring the microbial diversity of the Iberian Pyritic Belt subsurface by using DNA microarrays and a life detecting immunochip, LDCHIP [#4056]*
- 9:45 a.m. Chopra A.\* Lineweaver C. H.  
*Elemental Composition of Life [#4057]*

**OXYGEN AND EVOLUTION: LOOKING AT ANCIENT BIOCHEMISTRY****10:15 a.m.      Salon One****Chairs:****Loren Williams****Chiaolong Hsiao**

- 10:15 a.m. Athavale S.\* Petrov A. S. Hsiao C. Watkins D. Prickett C. D. Gossett J. J. Bowman J. O'Neill E. B. Bernier C. R. Lie L. Hud N. V. Wartell R. M. Harvey S. C. Williams L. *Iron-ing out the RNA world: Connecting the geological record with the RNA world* [#4061]
- 10:45 a.m. Lie L.\* Athavale S. Petrov A. S. Hsiao C. Gossett J. J. Bowman J. O'Neill E. Watkins D. Hud N. Harvey S. C. Williams L. Wartell R. M. *Iron and the RNA World: Fe<sup>2+</sup> facilitates Ribozyme catalysis and RNA folding in the absence of Oxygen* [#4062]
- 11:00 a.m. Williams L. *Iron-RNA and Catalysis: Ancient Biochemistry*
- 11:15 a.m. Jennings M.\* Lessner D. J. Lessner F. H. *Investigation of the role of iron-sulfur clusters in RNA polymerase formation and function* [#4063]
- 11:30 a.m. She Z.\* Papineau D. Strother P. *Terminal Proterozoic Cyanobacterial blooms and phosphogenesis* [#4064]
- 11:45 a.m. Caetano-Anolles G.\* Kim K. M. Zhang H. Y. *The emergence of aerobic metabolism, planetary oxygen, modern translation and diversified lineages inferred from protein domain structures in hundreds of genomes* [#4065]

**EXOPLANET HABITABILITY****10:15 a.m.      Salon Three****Chairs:****Rory Barnes****Tyler Robinson**

- 10:15 a.m. Kopparapu R.\* Ramirez R. M. Kasting J. F. *Habitable Zones Around Low-Mass Stars* [#4071]
- 10:30 a.m. Ramirez R. M.\* Kasting J. F. *The Greenhouse Effect of CH<sub>4</sub> for Planets with Dense CO<sub>2</sub> Atmospheres around F, G, and M-STARS* [#4072]
- 10:45 a.m. Lineweaver C. H.\* Chopra A. *The Habitability Limits of Our Earth and Other Earths* [#4073]
- 11:00 a.m. Misra A.\* Meadows V. Claire M. Crisp D. *Measuring Atmospheric Pressure on Earth-like Exoplanets* [#4074]
- 11:15 a.m. Haghighipour N.\* Kaltenegger L. *Habitability of Planets In and Around Binary Star Systems: Calculating the Boundaries of Habitable Zone* [#4075]
- 11:30 a.m. Carter-Bond J.\* O'Brien D. P. Raymond S. N. *Migration and Extrasolar Terrestrial Planets: Watering the Planets* [#4076]
- 11:45 a.m. Armstrong J. C.\* Barnes R. Domagal-Goldman S. *Tilt-A-Worlds: Chaotic Obliquities and the Limits of the Habitable Zone* [#4077]
- 12:00 p.m. Norman C. A.\* *The Voyage of Exoplanetary Systems around the Galaxy* [#4078]

**LABORATORY ASTROCHEMISTRY**

**10:15 a.m.      Salon Four**

**Chairs:**

**Michel Nuevo**

**Louis Le Sergeant d'Hendecourt**

10:15 a.m.

Le Sergeant d'Hendecourt L.\*

*What Astrochemistry May Tell Us About the Origin of Life: A Methodological Approach* [#4081]

10:30 a.m.

Kobayashi K.\* Kawamoto Y. Okabe T. Eto M. Sarker P. K. Obayashi Y. Kaneko T.

Takahashi J. Mita H. Yabuta H. Yoshida S. Kanda K.

*Laboratory Simulation of Alteration of Interstellar Organics by Cosmic and Solar Radiation: Search for Origins of Organics in Extraterrestrial Bodies* [#4082]

10:45 a.m.

Nuevo M.\* Sandford S. A. Materese C. K. Milam S. N.

*Photochemistry of Pyrimidine in Astrophysical Ice Analogs: Formation of Nucleobases and Other Prebiotic Molecules* [#4083]

11:00 a.m.

Oberg K. I.\* Fayolle E. C. Linnartz H. Bertin M. Fillion J.

*Wavelength Dependent Ice Photodesorption* [#4084]

11:15 a.m.

Pirronello V.\* Accolla M. Congiu E. Dulieu F. Manicò G. Chaabouni H. Matar E.

Mokrane H. Lemaire J.

*Experimental Evidence of Porosity Reduction in Amorphous Ice after H Atom Exposure at Interstellar Temperatures* [#4085]

11:30 a.m.

Pirronello V.\* Oba Y. Watanabe N. Kouchi A. Hama T.

*Efficient Formation of Carbonic Acid Molecules by Surface Reactions of OH and CO at Low Temperatures* [#4086]

11:45 a.m.

Wehres N.\* Cole C. Yang Z. Bierbaum V. M. Snow T. P.

*Determining Reaction Rate Constants and Branching Ratios of Molecules of Astrophysical Interest* [#4087]

12:00 p.m.

Geppert W. D.\* Hamberg M. Vigren E. Zhaunerchyk V. Thomas R. D. Persson C. M.

Wirström E. S. Kaminska M. Semaniak J. Millar T. J. Walsh C. af Ugglas M. Larsson M.

*Formation of biomolecule precursors in the interstellar medium and planetary atmospheres* [#4088]

**SERPENTINIZATION IN ASTROBIOLOGY: FROM MOLECULAR TO COSMIC SCALES**

**10:15 a.m.      Salon Five**

**Chairs:**

**Matt Schrenk**

**Dawn Cardace**

10:15 a.m.

Sleep N. H.\*

*Serpentinization and the origin of life* [#4091]

10:45 a.m.

Russell M. J.\* Branscomb E.

*The tectonic production of serpentinizing fracture engines led to onset of metabolism* [#4092]

11:00 a.m.

Sherwood Lollar B.\* Lacrampe-Couloume G. Onstott T. C. Ballentine C. J.

*Serpentinization in space and time: H<sub>2</sub> generation for life from the worlds' oldest rocks* [#4093]

11:15 a.m.

Wiegel J.\* Mesbah N. M.

*Polyextremophiles: Anaerobic halophilic alkalithermophiles with high resistance to UV radiation* [#4094]

11:30 a.m.

Brazelton W.\* Nelson B. Szponar N. Morrill P. L. Schrenk M. O.

*Metagenomic evidence for subsurface microbial activity fueled by serpentinization* [#4095]

11:45 a.m.

Ehlmann B. L.\*

*Serpentinization on Mars: Evidence, Implications and Needed Measurements* [#4096]

12:00 p.m.

Vance S.\*

*In Situ Investigations of Serpentine Settings for Habitability Characterization and Life Detection* [#4097]

**LIFE AND HABITATS WITHIN AND UNDER ICE: GLACIERS AND ICE SHEETS,  
LAKES AND ICE SHELVES**

**10:15 a.m. Conference Room Four**

**Chairs:**

**Peter Doran**

**Mark Skidmore**

- 10:15 a.m. Winebrenner D.\* Elam W. T.  
*Thermal Melt Probes for Clean, Extensive Observations in Subglacial Waters [#4101]*
- 10:30 a.m. Stone W.\* Hogan B. P. Richmond K. Siegel V. L. Doran P. Priscu J.  
*Sub-Ice Exploration of West Lake Bonney: Summary of the ENDURANCE Project [#4102]*
- 10:45 a.m. Stone W.\* Hogan B. P. Siegel V. L.  
*Project VALKYRIE: A Next-Gen Cryobot for Sub-glacial Access [#4103]*
- 11:00 a.m. Dugan H. A.\* Doran P. Wagner B. Arcone S. Fritsen C. Murray A.  
*Exposing Lake Vida, Antarctica - How hydrological changes and sediment deposition led to an atmospherically isolated brine habitat beneath a 20+ m ice cover [#4104]*
- 11:15 a.m. Parro V.\* Blanco Y. Prieto Ballesteros O. Gómez M. J. Moreno-Paz M. García-Villadangos M. Rodriguez-Manfredi J. A. Cruz-Gil P. Sánchez-Román M. Rivas L. A.  
*Exploring the prokaryotic communities in the surface and the permafrost of Deception Island (Antarctica) with LDChip300, a life detector chip designed for planetary exploration [#4105]*
- 11:30 a.m. Mironov V.\* Gilichinsky D. Demidov N. E. Abramov A. A.  
*Can microorganisms survive on Mars (how long and where)? [#4106]*
- 11:45 a.m. Berndt T.\* Skidmore M.  
*A synthesis map of glacial features on Mars: A guide for identifying locations with enhanced microbial habitability potential [#4107]*
- 12:00 p.m. Boyd E.\* Hamilton T. Dore J. Canovas P. Havig J. Spotts T. Shock E. Peters J. W. Skidmore M.  
*Seasonal variation in biological methane production in a subglacial ecosystem [#4108]*

**BIOLOGICAL ENERGY TRANSDUCTION, QUENCHING, AND CONFORMATION AS A FUNCTION  
OF THE SPECTRAL RADIATION ENVIRONMENT**

**10:15 a.m. Conference Room Two**

**Chairs:**

**Lewis Dartnell**

**Nancy Kiang**

- 10:15 a.m. Redfield S.\*  
*Exploring the Diversity of Astronomical Radiation Incident on Planets [#4111]*
- 10:45 a.m. Dadachova E.\* Khajo A. Bryan R. A. Casadevall A. Magliozzo R. S.  
*Changes in melanin chemical structure and paramagnetism during exposure of live melanized cells to lethal doses of gamma radiation [#4112]*
- 11:00 a.m. Turick C. E.\* Milliken C. E. Dadachova E. Casadevall A.  
*Sustained Redox Activity of Gamma Irradiated Melanin in the Presence of an Electron Source: Implications for Microbial Growth Coupled to Ionizing Radiation [#4113]*
- 11:15 a.m. Munshi S.\* Stanley R. J.  
*Extremophile Enzymatic DNA Repair [#4114]*
- 11:30 a.m. Strankman A. W.\* Susbilla C. B. Rawat M.  
*Thiol levels in Bacillus species exposed to ultraviolet radiation [#4115]*
- 11:45 a.m. Galante D.\* Paulino Lima I. G. Rodrigues F. Janot Pacheco E. Lage C. A. Mason N. J. Cockell C. Olsson-Francis K.  
*Survival of Extromophiles under Simulated High Energy Astrophysical Events [#4116]*
- 12:00 p.m. Dartnell L.\* Storrie-Lombardi M. C. Mullineaux C. W. Ruban A. V. Wright G. Griffiths A. D. Muller J. P. Ward J. M.  
*Degradation of Cyanobacterial Biosignatures by Ionizing Radiation [#4117]*

**PLENARY SESSION:  
HOW DO WE EXPLAIN OURSELVES?  
CHALLENGES IN COMMUNICATING ABOUT ASTROBIOLOGY**  
**1:30 p.m.      Grand Ballroom**

*Public interest in astrobiology is strong, and indications are that this interest will grow as more and more planetary missions focus on searching for evidence of habitability and life in extraterrestrial environments. This interest cuts across boundaries of age, class, culture, and gender. Surrounding astrobiology, the world of journalism and mass communication is rapidly changing. Bloggers, tweeters, and other social media practitioners who may be Ph.D. scientists or simply interested bystanders are producing more and more science news and commentary in a free and open, 24/7, online information environment. How can astrobiologists meet the challenges of science communication in the 21st century?*

<b>Chairs:</b>	<b>Linda Billings</b>
	<b>Patricia Marsteller</b>
1:30 p.m.	Billings L.* <i>Challenges in communicating about astrobiology [#4121]</i>
1:45 p.m.	Marsteller P.* <i>When and where do we learn to communicate? [#4122]</i>
2:00 p.m.	Hotz R.* <i>The Trust Experiment: Science, Journalism and Public Confidence [#4123]</i>
2:15 p.m.	Widicus Weaver S. L.* <i>Lost in translation: The challenge of conveying technical research details to a general audience [#4124]</i>
2:30 p.m.	Vermeulen A.* <i>Using Community Art as a Strategy to Communicate Astrobiology [#4125]</i>
2:45 p.m.	<i>Panel Discussion: The Challenges of Communicating about Astrobiology in the Current Cultural Environment</i>

**LIGHTNING TALKS II**

**3:45 p.m.      Grand Ballroom**

**Chair:** **Sanjoy Som**

*A series of five-minute presentations on a variety of subjects.*

**THE ORIGIN AND EARLY EVOLUTION OF PHOTOSYNTHESIS**

**3:45 p.m.      Conference Room Four**

<b>Chairs:</b>	<b>Robert Blankenship</b>
	<b>Jason Raymond</b>
3:45 p.m.	Blankenship R. E.* <i>Origin and Early Evolution of Photosynthesis and the Transition to an Aerobic World [#4141]</i>
4:00 p.m.	Bosak T.* Petroff A. P. Rothman D. H. <i>Record of early metabolisms and biological evolution in Archean stromatolites [#4142]</i>
4:15 p.m.	Flannery D.* <i>Photosynthesis and the Archean Microbialite Record [#4143]</i>
4:30 p.m.	Hartman H.* <i>The Evolution of Bacterial Photosynthesis [#4144]</i>
4:45 p.m.	Chen M.* <i>Red-shifted chlorophylls and their evolutionary relationship [#4145]</i>

- 5:00 p.m. Mielke S. P.\* Kiang N. Y. Blankenship R. E. Gunner M. R. Mauzerall D.  
*Photosynthetic energy storage in the cyanobacterium, Acaryochloris marina: Oxygenic photochemistry at the red edge* [#4146]
- 5:15 p.m. Allen J. F.\*  
*A genetic photoswitch in the transition from anoxygenic to oxygenic photosynthesis and in the function of chloroplast DNA* [#4147]
- 5:30 p.m. Swingley W. D.\* Ardell D. H.  
*Using tRNA to Illuminate the Origin of the Chloroplast* [#4148]

**DEVELOPMENT OF QUANTITATIVE HABITABILITY ASSESSMENTS FOR EARTH,  
 THE SOLAR SYSTEM, AND EXOPLANETS**

**3:45 p.m. Conference Room Two**

**Chairs:**

**Abel Mendez**

**Dirk Schulze-Makuch**

- 3:45 p.m. Hoehler T.\* Alperin M. J. McCollom T. M.  
*Energy and habitability: A case study of methanogenesis in serpentizing systems* [#4151]
- 4:00 p.m. Kempes C.\* Follows M. J. Girvan M. West G. B. Dutkiewicz S. Crowell K.  
*Bioenergetics and Body Size: General models for predicting the metabolism and growth of diverse organisms* [#4152]
- 4:15 p.m. Mendez A.\*  
*A Generalized Framework for Quantitative Habitability Assessments* [#4153]
- 4:30 p.m. Domagal-Goldman S.\*  
*One Plot to Rule Them All: Multiple Habitable Zones on a Single Graph* [#4154]
- 4:45 p.m. Rushby A. J.\* Watson A. J.  
*Dwell Time Index- A new habitability metric for Astrobiology* [#4155]
- 5:00 p.m. Schulze-Makuch D.\* Mendez A. Fairen A. G. von Paris P. Turse C. Boyer G. Davila A. Resendes de Sousa Antonio M. Catling D. Irwin L. N.  
*Metrics to Assess Planetary Habitability: The Earth Similarity Index and the Planetary Habitability Index* [#4156]
- 5:15 p.m. Irwin L. N.\* Mendez A. Fairen A. G. Catling D. Schulze-Makuch D.  
*Metrics for Predicting Biological Complexity on Other Worlds* [#4157]
- 5:30 p.m. Berdyugina S.\*  
*Polarimetric Signatures of Habitable Planets* [#4158]

**THURSDAY, APRIL 19, 2012**  
**POSTER SESSION III**  
**3:45 – 5:45 p.m. Conference Rooms A and B**

**EXPERIMENTAL EVOLUTION POSTERS**

Lineweaver C. H.\*

*How our Understanding of the Evolution of Multicellularity can Help Cure Cancer [#4201]*

Rosenzweig R. F.\* Nagarajan S. Piotrowski J. S. Kroll E. Kruckeberg A. L. Stanberry A. Chiotti K. Sherlock G. Dunn B.

*Different selective pressures lead to different genomic outcomes as newly-formed hybrid yeasts evolve [#4202]*

**EXOPLANET HABITABILITY POSTERS**

Bandyopadhyay P. S.\* Bertasso M. Peters J. W.

*The Probability of Life in the Universe: A Bayesian Plea for Space Exploration [#4211]*

Barnes R.\* Mullins K. Goldblatt C. Meadows V. Kasting J. F. Heller R.

*Tidal Venuses: Triggering a Climate Catastrophe via Tidal Heating [#4212]*

Domagal-Goldman S.\* Segura A. Claire M. Kasting J. F. Meadows V.

*Impostors! Accumulation of Ozone on Lifeless Planets [#4213]*

Fendall M.\*

*Determining exoplanet habitability by starlight analysis [#4214]*

Guzmán-Marmolejo A.\* Segura A.

*Abiotic Production of Methane by Serpentization in Terrestrial Planets [#4215]*

Hong P. K.\* Sekine Y. Sugita S.

*Reducing Atmospheres on Terrestrial Exoplanets with Deep Surface Oceans [#4216]*

Robinson T. D.\* Meadows V. Catling D. C. Crisp D.

*Towards a Modeling Hierarchy: Two New General-Purpose, 1-D Planetary Climate Models [#4217]*

Schwieterman E. W.\* Robinson T. D. Meadows V. Deming L. D. A'Hearn M. F. Charbonneau D.

Hewagama T. Lisse C. Livengood T. A. McFadden L. Seager S. Wellnitz D. D.

*Characterizing Terrestrial Exoplanets: Evaluating Temperature and Albedo Retrieval Methods with Near-IR EPOXI Earth and Mars Spectra [#4218]*

Shields A.\* Meadows V. Bitz C. M. Joshi M. M. Pierrehumbert R. T.

*The Effect of Host Star Spectral Energy Distribution on Ice Line Latitude in Terrestrial Exoplanetary Systems [#4219]*

Tata R.\* Martioli E. Martin E. L.

*Using spectropolarimetry to probe reflected starlight from exoplanets [#4220]*

**TRANSMISSION INTO SPACE: SCIENTIFIC, SOCIAL, ETHICAL, AND LEGAL CONSIDERATIONS POSTERS**

Haqq-Misra J.\* Busch M. W. Som S. Baum S.

*Harms and Benefits of Transmission Into Space [#4231]*

Maccone C.\*

*Modelling Evolution and SETI Mathematically [#4232]*

**CAN A CROSS-DISCIPLINARY APPROACH TO COMMUNICATION GIVE NEW INSIGHTS IN ASTROBIOLOGY? POSTERS**

Persson E.\* Vajda V. Ahrén D. Cabak Rédei A. Dainis D. Dunér D. Feltzing S. Holmberg G. Persson P. *Presentation of the research project: Signatures of Life on Earth and in Cosmos [#4241]*

Waller S.\* Beebe C. Bertasso M. Bandyopadhyay P.

*What We Think We Know about Flying Saucers: Justification and Testimony in Astrobiology [#4242]*

**INTEGRATING THE STUDY OF INTELLIGENCE WITHIN ASTROBIOLOGY POSTER**

Sharpe F.\*

*Liquid Mediums, Humpbacks Whales, and Survival Intelligence [#4251]***DEALING WITH THE DATA DELUGE AND SILO-ED STORAGE: WHAT CAN WE LEARN FROM DATA EXPERTS AND OUR COLLEAGUES? POSTERS**

Gowanlock M.\* Gazan R.

*Assessing Researcher Interdisciplinarity: A Case Study of the University of Hawaii NASA Astrobiology Institute [#4261]*

Miller L. J.\* Still S.

*Information theoretic clustering of astrobiology documents [#4262]***SPACE, SLIME, AND THE SEARCH FOR LIFE: ASTROBIOLOGY EDUCATION AND PUBLIC OUTREACH POSTERS**

Bacon L. R.\*

*Using Astrobiology to Increase Student Interest in Earth Science [#4271]*

Barge L. M.\* Congreve C. Pulschen A. A. Kishimoto D. E. Mendes Emygdio A. P. Bendia A. G.

de Morais M. Teles A. Stoupin D. Chaffin M.

*Life, the Universe, and Everything: A Proposal to Build an International Traveling Astrobiology Exhibit [#4272]*

Brelsford M.\* Peters J. W.

*Train the Trainers, Field Courses in Yellowstone National Park [#4273]*

Cheung C. Y.\*

*Walk Through Solar System Times: An Exhibit with an Astrobiology Emphasis [#4274]*

Cola J.\* Greenwood J. Randall R. N. Gaucher E. Snell T. Williams L.

*Astrobiology Summer Learning Program for High School Students [#4275]*

Cornish J.\*

*Astronauts and Aliens: NASA Science Family Nights for Libraries [#4276]*

Delano J.\* Zachos P. A. Pruzek R. M. Doane W. E.

*A Large Enrollment, University-level Astrobiology Course and Assessment of its Learning Objectives [#4277]*

Fergusson J.\* Oliver C. A. Walter M. R.

*Engaging in science through astrobiology outreach [#4278]*

Ferrari K.\*

*Using NASA's Volunteer Networks in Support of Astrobiology Education and Public Outreach [#4279]*

Gaynor J.\* Duboise S. Gikonyo K. Miller S. M. Hodum D. Doucette D. Troiano A. Mancinelli R.

Rothschild L. J. Bowen D. Eggleston S. Tsairides C. Shehata T.

*Integrating Astrobiology Research and Scientific Ballooning Mission Design into High School STEM Education [#4280]*

Harman P. K.\* Backman D. E.

*NASA Stratospheric Observatory for Infrared Astronomy (SOFIA) Airborne Astronomy Ambassador (AAA) Program: Educator Teams On Board! [#4281]*

Johnson J. W.\*

*ART & ARTIFACT: The Aesthetics of Astrobiology [#4282]*

Johnson J. W.\*

*Astrobiology Education in an Alternative Education Classroom for Special Needs Children [#4283]*

Kadooka M.\* Armstrong J. D.

*HI STAR Student Astrobiology and Astronomy Research Projects [#4284]*

Leach D.\*

*Astrobiology in the High School - A Valuable Experience [#4285]*

Mroczka K. L.\*

*The Search for Extraterrestrial Intelligence: Catching Girls' Interest in Science [#4286]*

Nixon S.\* Cockell C. Rice K. MacPhee C. Loveday J. Bryce C. Attfield P. Spagnolo L. Atizar-Ladislau B. Raven J. Greaves J. Fraser H. Parnell J. Lee M. Phoenix V.

*The UK Centre for Astrobiology [#4287]*

Norsted B.\*

*Life in the Extreme Trading Cards- A NASA Educational Product [#4288]*

Roohan M. E.\*

*Inspiring Students with Astrobiology and Utilizing Assessments to Confirm Cognitive Engagement [#4289]*

Sarmiento Lopez G. A.\* Bueno J. Jimenez Hernandez M. F.

*ABPA PROGRAM COLOMBIA: Problem Based Learning for Astrobiology [#4290]*

Serrano-Núñez Y.\*

*Promoting among faculty members the integration of Astrobiology topics in their courses at the Inter American University of Puerto Rico, Bayamón Campus [#4291]*

### **ASTROBIOLOGY IN HISTORICAL PERSPECTIVE POSTERS**

Bandyopadhyay P. S.\* Greenwood M. Beard T. Bertasso M. Peters J. W.

*The Debate over Origin of Life Theories: A Lesson from Simpson's Paradox [#4301]*

Briot D.\*

*The Creator of Astrobotany, G. A. Tikhov [#4302]*

Malaterre C.\*

*On the Many Processes of Chemical Evolution [#4303]*

Nord J.\*

*Is space becoming a cultural landscape? And how do we deal with that? Thinking of space from the archaeologist's point of view [#4304]*

### **HOW DO WE EXPLAIN OURSELVES? CHALLENGES IN COMMUNICATING ABOUT ASTROBIOLOGY POSTERS**

Berkowitz J.\*

*The Stardust Revolution: A new way to tell the astrobiology story [#4311]*

Chambers N.\*

*Bringing the Science Into the Secondary Astrobiology Classroom: Successes, Suggestions, and Lessons Learned [#4312]*

Gazan R.\*

*Rebroadcasting Astrobiology Information Through Social Media [#4313]*

Gronstal A. L.\*

*Astrobiology: The Story of our Search for Life in the Universe Issue 3- Missions to the Inner Solar System [#4314]*

Illangkoon H.\* Cunningham N.

*Quillting together: A new App to revolutionize how we communicate science [#4315]*

Impey C.\*

*Life on Earth and Beyond—What People Believe and Don't Believe [#4316]*

Persson E.\*

*The attitude towards astrobiology among students and the interested public [#4317]*

Taylor S.\* Peters J. W.

*The most integrated science communications class ever? [#4318]*

Zimmerman Brachman R.\*

*Astrobiology Education for K-12 Teachers and Students [#4319]*

## LABORATORY ASTROCHEMISTRY POSTERS

Carroll A.\* Rocher B. Widicus Weaver S. L.

*THz spectral studies of molecular ions [#4401]*

Cole C.\* Yang Z. Demarais N. Martinez O. Snow T. Bierbaum V. M.  
*Reactions of N*

*itrogen-Containing Carbanions in the Gas Phase [#4402]*

Davis S.\*

*Transport in the early Solar Nebula: Follow the Water [#4403]*

Hays B.\* DePrince B. A. Kroll J. A. Widicus Weaver S. L.

*Calculations and Experimental Design for the Investigation of Prebiotic Molecules Using O(1D) Insertion Reactions [#4404]*

Kroll J. A.\* Shipman S. T. Widicus Weaver S. L.

*Laboratory Spectroscopy and Observational Search for 2-Butanone: Testing Interstellar Organic Chemical Complexity [#4405]*

Modica P.\* de Marcellus P. Baklouti D. Brunetto R. Noun M. Della Negra S. Le Sergeant d'Hendecourt L. De Person M. Moussa F.

*Organic residues from UV photochemistry of ices: A key to cosmic organic complexity for prebiotic chemistry [#4406]*

Pirronello V.\* Watanabe N. Kimura Y. Kouchi A. Chigai T. Hama T.

*Measurements of H Atom Residence Time and the Spin Temperature of Nascent H<sub>2</sub> Molecules on Amorphous Water Ice [#4407]*

Zoumplis A. B.\* White D. Mastrapa R.

*IR Spectroscopy of Trans-Neptunian Ice Mixtures [#4408]*

## NEW FRONTIERS IN STABLE ISOTOPE ANALYSIS FOR ASTROBIOLOGY POSTER

Socki R. A.\* Fu Q. Niles P. B. Gibson E. K.

*C and H Isotope Measurements of Alcohols and Organic Acids by Online Pyroprobe-GC-IRMS [#4411]*

## EXTRATERRESTRIAL BIOMOLECULES IN THE NEW AGE OF ASTRONOMICAL INSTRUMENTATION POSTERS

Cordiner M.\* Charnley S. Kisiel Z.

*Searching for bio-preursors and complex organic molecules in space using the GBT [#4421]*

Crockett N. R.\* Bergin E. A. Neill J. L.

*Herschel Observations of EXtra-Ordinary Sources (HEXOS): New HIFI Constraints of Complex Organics Toward Orion KL [#4422]*

Despois D.\* Brouillet N.

*Dimethyl Ether and Methyl Formate in Orion-KL: 2 complex molecules with a common precursor? [#4423]*

Garrod R.\*

*Modeling the formation of glycine in star-forming cores [#4424]*

Halfen D. T.\* Ziurys L. M.

*Establishing the Complete Inventory of Complex Organic Molecules in an Interstellar Cloud [#4425]*

Hardegree-Ullman E. E.\* Harju J. Sipila O. Horne D. Whittet D. Hotzel S.

*Chemical and Physical Conditions of SL42 in the Corona Australis Molecular Cloud [#4426]*

Langston G. I.\*

*GBT Measurements of the Physical and Molecular Properties of the Sgr B2 Region [#4427]*

Liu T.\* Wu Y.

*Shocked chemistry in the high-mass star forming region G9.62+0.19 [#4428]*

McGuire B.\* Pulliam R. Remijan A.

*A Search for Interstellar Hydroxylamine (NH<sub>2</sub>OH) [#4429]*

Neill J. L.\* Bergin E. A. Crockett N. R. Wang S. Pearson J. C. Xu L. Bell T. A.

*A New Look at Deuterium Chemistry in Orion KL with Herschel/HIFI [#4430]*

## Thursday Poster Sessions

Radhuber M. L.\* Kroll J. A. Sanders J. Wang S. Lis D. Widicus Weaver S. L.  
*A New Spectral Analysis Software for Automated Assignment of Broadband Line Surveys* [#4432]

Sanders J.\* Radhuber M. L. Laas J. C. Kroll J. A. Widicus Weaver S. L.  
*Submillimeter Line Surveys of Young Stellar Objects Using the Caltech Submillimeter Observatory* [#4433]

Steber A.\* Neill J. L. Muckle M. Zaleski D. Lattanzi V. Spezzano S. McCarthy M. Remijan A. Friedel D. Widicus Weaver S. L. Pate B.  
*Spatial Distributions and Interstellar Reaction Processes* [#4434]

Wu Y.\* Liu T.  
*Dense cores and large molecules* [#4435]

Zaleski D.\* Loomis R. A. Muckle M. Steber A. Seifert N. A. Pate B. H. Neill J. L. Corby J. F. Lattanzi V. Martinez O. McCarthy M. C. Remijan A.  
*Broadband Nitrile Reaction Screening and its Pre-biotic Implications* [#4436]

## ASTROBIOLOGY AND ROBOTICS TECHNOLOGY POSTERS

Jimenez Hernandez M. F.\* Mauledoux Monroy M. F. Sarmiento G.  
*Trajectory Tracking Control System for the Locomotion of a Robotic Moon Regolith Collector* [#4441]

Uckert K.\* Chanover N. Glenar D. A. Voelz D. G. Xiao X. Tawalbeh R. Boston P. J. Brinckerhoff W. Getty S. Merrill Floyd M. A. Mahaffy P.  
*A Miniature AOTF-LDTOF Spectrometer Suite for the Detection of Biomarkers on Planetary Surfaces* [#4442]

## ASTROBIOLOGY IN ORBIT POSTERS

Bérçes A.\*  
*The Experiment ROSE8 PUR on EXPOSE-R* [#4451]

Bertrand M.\* Chabin A. Brack A. Cottin H. Westall F.  
*The effects of exposition to the space environment on amino acids on the International Space Station* [#4452]

Bryce C.\* Nixon S. Edwards H. Horneck G. Cockell C.  
*Survival of Chroococcidiopsis and its biosignatures in Low Earth Orbit* [#4453]

Elsaesser A.\* Quinn R. C. Mattioda A. Ricco A. J. Salama F. Santos O. Ehrenfreund P. Cottin H. Dartois E. Demets R. d'Hendecourt L. Foing B. Kros A. Martins Z. Sephton M. Spaans M.  
*OREOcube: ORganics Exposure in Orbit* [#4454]

Grant K. C.\* Khodadad C. L. Foster J.  
*Microgravity-induced changes in the expression of the global regulator hfq in the mutualistic bacterium Vibrio fischeri* [#4455]

Haranas I.\* Gkigkitzis I. Zouganelis G.  
*Particle Concentration due to Sedimentation in Spacecraft Experiments in Orbit around a Planetary Body* [#4456]

Khodadad C. L.\* Foster J.  
*Microgravity-induced changes in the normal development of an animal-bacterial symbiosis* [#4457]

Kobayashi K.\* Eto M. Hashimoto H. Imai E. Kawai H. Kawamoto Y. Mita H. Nakagawa K. Okudaira K. Sarker P. K. Tabata M. Yabuta H. Yamashita M. Yano H. Yamagishi A. Yokobori S. Tanpopo WG  
*The Tanpopo Mission: Capture of Micrometeoroids and Exposure of microorganisms and organic compounds on the International Space Station* [#4458]

## BIOLOGICAL LIFE SUPPORT SYSTEM POSTERS

Barzegari A.\* Omidi A. A.  
*Designing a robust photo-bioreactor as life support system in space* [#4461]

Barzegari A.\* Ata saei A. Omidi A. A.  
*Probiotics beyond Terrestrial Limits* [#4462]

## CAN TERRESTRIAL MICROBES GROW ON MARS? POSTERS

Harpool J. D.\* Kral T.

*Survival of Methanogens Exposed to High Concentrations of Perchlorate [#4471]*

Lavender L.\* Kral T.

*Effect of pH on Methanogen Use of Insoluble Carbonates as Sole Carbon Source: Implication for Life on Mars [#4472]*

Nixon S.\* Cockell C.

*Meteoritic non-proteinogenic amino acids as a source of electron donors for microbial iron-reduction on Mars? [#4473]*

Palmer J.\* Burnier A. M. Fujishima K. Lima I. Mulligan J. Rothschild L. J. Huang Y. Head J.

*Constructing Biological Tools for Missions to Mars [#4474]*

Tarasashvili M. M.\*

*MTA- Mars Terraformation Autotrophs- Applications for Synthetic Biology [#4475]*

Valdivia-Silva J. E.\* McKay C.

*Relationship between oxidant activity and bacteria distribution in hyper-arid Mars-like soils: An exploration in the limits of life [#4476]*

## MINERALOGY AS AN INDICATOR OF AQUEOUS PROCESSES ON MARS POSTERS

Ackiss S. E.\* Wray J. J.

*Hydrated Sulfates in the Southern High Latitudes of Mars [#4481]*

Beard B.\* Ludois J. M. Lapen T. J. Johnson C.

*Pre-4.0 billion year weathering on Mars constrained by Rb-Sr geochronology on meteorite ALH84001 [#4482]*

Hallis L.\* Taylor G. J. Nagashima K. Huss G. R.

*Magmatic Water in Martian Meteorites [#4483]*

Shivak J. N.\* Flemming R. L. Banerjee N.

*Aqueous alteration of Nakhla: Implications for habitability of Martian rocks [#4484]*

## SERPENTINIZATION IN ASTROBIOLOGY: FROM MOLECULAR TO COSMIC SCALES POSTERS

Cardace D.\* Carnevale D. Hoehler T. McCollom T. Schrenk M.

*Active Serpentinitization in the Coast Range Ophiolite: Intersections of Petrography, Geochemistry, and Bioenergetics [#4491]*

Chowdhury S.\* Brazelton W. Schrenk M.

*Metabolic Capabilities of Microbial Communities in the Serpentinite Subsurface Biosphere [#4492]*

Melchiorre E.\* Lopez A.

*Carbon and Hydrogen Isotope Values of Fluids within Methane-rich Serpentinizing Environments of Early Earth: Evidence from Stichtite [#4493]*

Meyer-Dombard D. R.\* Yargicoglu E. Cardace D. Gulecal Y. Temel M.

*Biogeochemical Cycling in Fault-Associated and Ophiolite-Hosted Springs [#4494]*

Morrill P. L.\* Szponar N. Kavanagh H. Rietze A. Brazelton W. Schrenk M. Bower D. M. Steele A.

Kuenen J. G. Suzuki-Ishii S. Nealson K. H.

*Sourcing methane at two continental sites of present-day serpentinization: The Tablelands, NL, CAN and The Cedars, CA, USA [#4495]*

Schrenk M.\* Brazelton W. Lang S. Q.

*Serpentinitization, Carbon, and Deep Life [#4496]*

Som S.\* Alperin M. Hoehler T.

*Numerical quantification of habitability in serpentinitizing systems [#4497]*

Suzuki-Ishii S.\* Ishii S. Wanger G. Schipper K. Kuenen J. G. Nealson K. H.

*Microbial community in ultra-basic and highly reducing serpentinitizing The Cedars springs [#4498]*

*Thursday Poster Sessions*

Twing K. I.\* Brazelton W. Quinn E. Kloysuntia A. Schrenk M.

*Linking Identity and Function in Serpentinite-Hosted Microbial Communities [#4500]*

Wray A. C.\* Bolser D. Kubo M. Hoehler T.

*Carbon Monoxide and its Role in Subsurface Anaerobic Microbial Metabolism [#4501]*

Xu H.\* Hong K. S.

*Tectonic hydrogen production through piezoelectrochemical (PZEC) effect [#4502]*

**LIFE AND HABITATS WITHIN AND UNDER ICE:  
GLACIERS AND ICE SHEETS, LAKES AND ICE SHELVES POSTERS**

Finke N.\* Baer S. Joye S. B.

*Methane production in marine sea ice in the Chukchi Sea, Barrow Alaska [#4511]*

Mackey T. J.\* Sumner D. Hawes I. Andersen D. T.

*Microbial ecology-driven transitions in stromatolite morphogenesis decoupled from sedimentary processes under ice in modern Lake Joyce, Antarctica [#4512]*

Vallalar B.\* Rainey F. A.

*Isolation of Ionizing Radiation Resistant Bacteria from Permafrost [#4513]*

**FRIDAY, APRIL 20, 2012****EXPERIMENTAL EVOLUTION****8:00 a.m.      Salon One****Chair:** **Raphael Rosenzweig**

- 8:00 a.m. Wade B. D.\* Lenski R. E.  
*Experimentally evolved desiccation and UV-C-radiation tolerance in Escherichia coli, stresses present on the early Earth and current Mars [#5001]*
- 8:15 a.m. Arslan B. K.\* Gaucher E.  
*Laplace's Demon and Life's Eerie Unpredictability: Monitoring Evolution of Ancient Proteins in Action [#5002]*
- 8:30 a.m. Herron M. D.\* Doebeli M.  
*Genetics of sympatric adaptive diversification [#5003]*
- 8:45 a.m. Turk-MacLeod R. M.\* Xulvi-Brunet R. Chen I. A.  
*Defining a fitness landscape for a ligase ribozyme [#5004]*
- 9:00 a.m. Laos R.\* Shaw R. W. Benner S. A.  
*Directed evolution of DNA polymerases to accept nucleotides with non-standard hydrogen-bond patterns [#5005]*
- 9:15 a.m. Kroll E.\* Dunn B. Rosenzweig F.  
*Chromosomal speciation in a eukaryotic microbe [#5006]*
- 9:30 a.m. Adamala K.\* Szostak J. W.  
*Investigating the chemical beginning of Darwinian evolution [#5007]*
- 9:45 a.m. Kinnersley M.\* Rosenzweig F. Sherlock G. Wenger J.  
*Experimental Evolution of Cross-Feeding Laboratory Populations of Escherichia coli [#5008]*

**MINERALOGY AS AN INDICATOR OF AQUEOUS PROCESSES ON MARS****8:00 a.m.      Salon Three****Chairs:** **James Wray**  
**Janice Bishop**

- 8:00 a.m. Des Marais D.\* Athena Science Team  
*Initial Observations by the Mars Exploration Rover Opportunity at Cape York, Meridiani Planum [#5011]*
- 8:15 a.m. Bishop J. L.\* Wray J. J. Lowe D. Loizeau D. McKeown N. K.  
Saper L. Parente M. Beyer R.  
*Evidence for Sedimentary Processes at Mawrth Vallis, Mars and Implications for Habitability [#5012]*
- 8:30 a.m. Amador E. S.\* Bandfield J. L.  
*Elevated Bulk Silica Deposits in Nili Fossae, Mars: Implications for Habitability [#5013]*
- 8:45 a.m. Karunatillake S.\* Gasnault O. McLennan S. Rogers A. D. Wray J. J.  
Squyres S. Boynton W. V.  
*The Hydration State of Sulfates on Mars [#5014]*
- 9:00 a.m. Battler M.\* Osinski G. R. Banerjee N.  
*Mineralogy of Mars analogue saline cold springs on Axel Heiberg Island, Canada [#5015]*
- 9:15 a.m. Wray J. J.\* Murchie S. L. Ehlmann B. L. Milliken R. E. Bishop J. L. Seelos K. D.  
Noe Dobrea E. Z.  
*Expanding the inventory of carbonate-bearing rocks on Mars [#5016]*
- 9:30 a.m. Osinski G. R.\* Tornabene L. L. Wray J. J.  
*Impact craters and aqueous mineral phases on Mars [#5017]*
- 9:45 a.m. Papineau D.\*  
*Carbonaceous material associated with apatite in the Chassigny meteorite from Mars [#5018]*

**NEW FRONTIERS IN STABLE ISOTOPE ANALYSIS FOR ASTROBIOLOGY**

**8:00 a.m.      Salon Four**

**Chairs:**

**Jamie Elsila**

**Christopher House**

- 8:00 a.m. Adande G.\* Ziurys L. M.  
*New Measurements of the 14N/15N Ratios in Interstellar Clouds, Circumstellar Gas, and Supernovae Remnants using Millimeter Astronomy [#5021]*
- 8:15 a.m. Webster C. R.\*  
*Overview of Requirements and Capabilities for Planetary Measurements of Abundances and Stable Isotope Ratios [#5022]*
- 8:30 a.m. Bramall N.\* Berman E. Dong F. Gupta M. Fortson S. Bebout B. McKay C.  
*Off-axis Integrated Cavity Output Spectroscopy (OA-ICOS) and its Application to Astrobiology [#5023]*
- 8:45 a.m. Horita J.\* Polyakov V. B.  
*Isotope Fractionation of Prebiotic Organic Molecules in the Solar System and Beyond [#5024]*
- 9:00 a.m. Elsila J. E.\* Burton A. S. Callahan M. P. Charnley S. Glavin D. P. Dworkin J. P.  
*Compound-specific isotopic analysis of meteoritic amino acids as a tool for evaluating potential formation pathways [#5025]*
- 9:15 a.m. Pizzarello S.\* Williams L. B.  
*Ammonia in the Early Solar System: An Account from Carbonaceous Meteorites [#5026]*
- 9:30 a.m. Harouaka K.\* Eisenhauer A. Fantle M.  
*Experimental investigation of Ca isotopic fractionation during abiotic gypsum precipitation: Context for identifying biological isotopic signatures [#5027]*
- 9:45 a.m. Discussion

**ASTROBIOLOGY IN ORBIT**

**8:00 a.m.      Salon Five**

**Chairs:**

**Wayne Nicholson**

**Petra Rettberg**

- 8:00 a.m. Rettberg P.\* Rabbow E. Willnecker R. Reitz G.  
*EXPOSE Missions on the ISS- Overview and Lessons Learned [#5031]*
- 8:30 a.m. Rettberg P.\* Rabbow E. Barczyk S. Bauermeister A. Billi D. Cockell C. Flemming H. C. Froesler J. Wingender J. Panitz C. Stan-Lotter H. Venkateswaran K.  
*The experiment BOSS on the EXPOSE R-2 mission [#5032]*
- 8:45 a.m. Bryson K.\* Peeters Z. Salama F. Foing B. Ehrenfreund P. Ricco A. J. Jessberger E. Bischoff A. Breitfellner M. Schmidt W. Robert F.  
*The ORGANIC Experiment on EXPOSE-R on the ISS [#5033]*
- 9:00 a.m. Vaishampayan P.\* Rabbow E. Horneck G. Venkateswaran K.  
*Survival of Bacillus pumilus spores for a prolonged period of time in real space conditions [#5034]*
- 9:15 a.m. Nicholson W. L.\* Moeller R. Horneck G.  
*Changes in the Bacillus subtilis germination transcriptome after 1.5 years of exposure to space parameters and simulated martian conditions on the EXPOSE-E experiment PROTECT [#5035]*
- 9:30 a.m. Nicholson W. L.\* Ricco A. J. Ehrenfreund P.  
*The O/OREOS astrobiology nanosatellite mission: complete science data from the Space Environment Survivability of Living Organisms (SESLO) payload [#5036]*
- 9:45 a.m. Cook A.\* Ehrenfreund P. Mattioda A. L. Quinn R. C. Ricco A. J. Bramall N. Chittenden J. D. Bryson K. Minelli G.  
*SEVO (Space Environment Viability of Organics) Preliminary Results [#5037]*

**ASTROBIOLOGY AND ROBOTICS TECHNOLOGY****8:00 a.m. Conference Room Four****Chair:****German Sarmiento**

8:00 a.m.

Josset J.\*

*CLUPI, a high-performance imaging system on the ESA-NASA rover of the 2018 ExoMars mission to discover biofabrics on Mars [#5041]*

8:15 a.m.

Karouia F.\* Peyvan K. Ricco A. J. Pohorille A.

*Automated, Miniaturized Instrument for Measuring Gene Expression in Space [#5042]*

8:30 a.m.

Younse P.\*

*Robotic Sample Caching and Sample Tube Sealing for Potential Mars Astrobiology Sample Return Missions [#5043]*

8:45 a.m.

Gentry D.\* Rothschild L. J.

*Designs and Decisions for High-Altitude Sampling of Aerobiological Diversity [#5044]*

9:00 a.m.

Grunthaner F.\* Mielke R. E. Chun W. W. Lee M. C. White V. E. Quinn R. C.

*In Situ Chemical Activation of Sensor Arrays for Astrobiology Exploration [#5045]*

9:15 a.m.

Aubrey A.\* O'Neil G. D. Lee M. C. Quinn R. C. Grunthaner F. Hecht M. Kounaves S.

*Microfluidic Chemical Sensing Technologies for Planetary Science [#5046]*

9:30 a.m.

Sarmiento Lopez G. A.\* Mauledoux Monroy M. F. Jimenez Hernandez M. F.

*A Multi-Robot Distributed Intelligent System with Application to Mars Exploration [#5047]*

9:45 a.m.

Thompson D. R.\* Abbey W. Allwood A. Bekker D. Bornstein B. J. Cabrol N. A.

Estlin T. Fuchs T. Wagstaff K.

*TextureCam: Onboard Image Analysis for Rapid Astrobiology Surveys [#5048]***CAN A CROSS-DISCIPLINARY APPROACH TO COMMUNICATION GIVE NEW INSIGHTS IN ASTROBIOLOGY?****8:00 a.m. Conference Room Two****Chairs:****Jesper Jorgensen****Douglas Vakoch**

8:00 a.m.

*Introduction: Communication: The Most Distinct Signal of Life in Any Form*

8:30 a.m.

Waters D. P.\*

*Molecules, Messages, and Languages: A Generalized Model for Life Signatures [#5052]*

8:45 a.m.

Galantucci B.\* Roberts G.

*Studying Novel Communication Systems in the Laboratory [#5053]*

9:00 a.m.

Renshaw C.\*

*The Drake Equation, Maxwell's Equations and the Missing Signals from Advanced Civilizations [#5054]*

9:15 a.m.

Siemion A.\* Werthimer D. Korpela E. Cobb J. Lebofsky M.

*Searching for Electromagnetic Communications from Intelligent Extraterrestrial Life [#5055]*

9:30 a.m.

Vakoch D.\* Lower T. A. Niles B. A. Cahueich L.

*What Should We Say to an Extraterrestrial?: La Tierra Habla, A Spanish-Language Internet Project [#5056]*

9:45 a.m.

Kultys M.\*

*Lingua Extraterrestris: Lessons in universal communication or the communication designer's understanding of CETI in science and fiction [#5057]*

**SUBSURFACE ECOSYSTEMS**  
**8:00 a.m. Conference Room A**

**Chairs:**

**Penelope Boston**

**Glen Cushing**

8:00 a.m.

Boston P. J.\* Spilde M. N.

*Microbial Ecosystems At Depth: Contrasts In Nutrient And Other Environmental Gradients Between Natural Caves And Ultra-Deep Mines* [#5061]

8:30 a.m.

Ivarsson M.\* Sallstedt T. Lundberg J. Sjöberg R. Vidal Romani J. R.

*Geobiology of a dolerite cave in Northern Sweden: an analog to mafic caves on Mars* [#5062]

8:45 a.m.

Parro V.\* Fernández-Remolar D. Rodriguez-Manfredi J. A. López de Saro F. Oggerin M. Sánchez-Román M. Omorégie E. Fernández P. García-Villadangos M. Rodríguez N. Puente-Sánchez F. Molina A. Gómez-Ortiz D. Arias-Rivas S. Moreno-Paz M. Cruz-Gil P. Briones C. Gómez F. Timmis K. Amils R.

*The Iberian Pyrite Belt Subsurface Life (IPBSL) drilling project* [#5063]

9:00 a.m.

Macalady J.\* Jones D. S. Polerecky L. Dempsey B.

*Fate of sulfide in limestone aquifers and implications for cave formation* [#5064]

9:15 a.m.

Salas E. C.\* Bhartia R. Hug W. F. Reid R. Beegle L. W. Edwards K. J.  
*Probing deep: studying intraterrestrials to understand extraterrestrials* [#5065]

9:45 a.m.

Cushing G. E.\*

*Martian Cave-Entrance Candidates* [#5066]

**ORIGIN OF LIFE: A NEW FILM ABOUT ASTROBIOLOGY**

**8:00 a.m. Conference Room B**

**Chairs:**

**John Peters**

**Loren Williams**

*Origin of Life* takes a personal look at scientists around the United States working with the NASA Astrobiology Institute to understand the origin of life. Attempting the seemingly impossible, these researchers want to answer one of humanity's oldest questions: How did life begin? View the debut of this film that will be televised in the future.

*Misunderstood by much of the public, NAI scientists face not only a myriad of problems in the lab but also a series of obstacles they must overcome when attempting to communicate their work to a skeptical public. Origin of Life chronicles the struggles of these scientists in their attempt to both understand the nature of life on Earth and be understood by people outside the confines of their lab. Each scientist is challenged to develop and execute a radical new way of communicating their research to the rest of the world.*

**MINIMAL AND ANCESTRAL GENOMES**

**10:15 a.m. Salon One**

**Chairs:**

**Eric Gaucher**

**Ziming Zhao**

10:15 a.m.

Mushegian A.\* Li H. Kannan L. Rubinstein B.

*Probabilistic reconstruction of gene content in LUCA, the Last Universal Common Ancestor* [#5081]

10:45 a.m.

Hecht M.\*

*Steps Toward Artificial Genomes: Sustaining Cell Growth with Sequences Designed De Novo* [#5082]

11:00 a.m.

Zhao Z.\* Gaucher E.

*Using Ancestral Genome Reconstruction to Infer the Minimal Genome* [#5083]

11:15 a.m.

Stern J. G.\* Gaucher E.

*A phylogenomic approach to the Bacterial ur-ribosome* [#5084]

11:30 a.m.

Collins E.\* Higgs P.

*Testing the Infinitely Many Genes Model for the Evolution of the Bacterial Core Genome and Pangenome* [#5085]

11:45 a.m.

Walker S. I.\* Davies P. C.

*The Algorithmic Origins of Life* [#5086]

**EXTRATERRESTRIAL BIOMOLECULES IN THE NEW AGE OF ASTRONOMICAL INSTRUMENTATION****10:15 a.m.      Salon Three****Chairs:** **Anthony Remijan****Eva Wirström**

- 10:15 a.m. Belloche A.\* Menten K. M. Mueller H. S. Garrod R.  
*Complex organic molecules in the interstellar medium: Pushing the limits with millimeter-wavelength spectroscopy* [#5091]
- 10:45 a.m. Oberg K. I.\* Qi C. Wilner D.  
*Constraints on Molecular Formation Pathways from Chemical Imaging of Protoplanetary Disks* [#5092]
- 11:00 a.m. Harris B.\* Yang C. Remijan A. Brogan C. Lehmann K. Pate B.  
*Exploration of the Interstellar Medium: A New Age of Broadband Data Cube Analysis* [#5093]
- 11:15 a.m. Wootten A.\*  
*High Resolution Radiospectroscopy: Peering into the Birthplaces of Stars and Chemical Complexity* [#5094]
- 11:30 a.m. Lockman F. J.\* O'Neil K. Remijan A.  
*A New Tool for Investigating the Extremes of Astrobiology- Current and Future Capabilities with the Green Bank Telescope* [#5095]
- 11:45 a.m. Widicus Weaver S. L.\* Radhober M. L. Wang S. Sanders J. Kroll J. A. Laas J. C. Lis D. Herbst E.  
*Unraveling the Mysteries of Complex Interstellar Organic Chemistry Using Observational Spectral Line Surveys* [#5096]
- 12:00 p.m. Bergin E.\*  
*The Herschel Space Observatory and Biological Molecules in Space* [#5097]

**INTEGRATING THE STUDY OF INTELLIGENCE WITHIN ASTROBIOLOGY****10:15 a.m.      Salon Four****Chairs:** **Lori Marino****Kathryn Denning**

- 10:15 a.m. Denning K.\* Marino L.  
*A New Conversation About Intelligence in the Universe* [#5101]
- 10:30 a.m. Marino L.\* Denning K.  
*Virtual Workshops on the Study of Intelligence in Astrobiology: A Status Report* [#5102]
- 10:45 a.m. Resendes de Sousa Antonio M.\* Schulze-Makuch D.  
*Social Structure as the Propeller of Intelligent Features* [#5103]
- 11:00 a.m. Gold D. A.\*  
*Trees on the Mind: How the Emerging Animal Phylogeny Challenges Our Conception of Brain Evolution* [#5104]
- 11:15 a.m. Marino L.\*  
*Trends and the Contingency Versus Convergence Debate: Creating a New Framework* [#5105]
- 11:30 a.m. Connor R. C.\* Krützen M.  
*The evolution of extreme brain size and intelligence in humans, dolphins, and elephants* [#5106]
- 11:45 a.m. Herzing D. L.\*  
*Signatures of Intelligence: COMPLEX: A Multi-Dimensional Scale for Assessment of “types” of non-human Intelligence* [#5107]
- 12:00 p.m. Denning K.\*  
*The Logic of Ideas about Intelligence in the Universe (Or, Thoughts about Thinking about the Ability to Think)* [#5108]

**THE OLD WORLD AND THE NEW: EARLY EARTH AS A PROXY FOR AN EXTRASOLAR PLANET**

**10:15 a.m.      Salon Five**

**Chairs:** **Sanjoy Som**

**Julia DeMarines**

- 10:15 a.m. Som S.\* Catling D. Harnmeijer J. Polivka P. Buick R.  
*Air density 2.7 billion years ago revealed by fossil raindrop imprints [#5111]*
- 10:30 a.m. Sanromá Ramos E.\* Palle E.  
*Reconstructing Cloud Distributions of the Ancient Earth [#5112]*
- 10:45 a.m. Haqq-Misra J.\* Kasting J. F. Lee S.  
*Availability of Oxygen on Pre-Photosynthetic Earth [#5113]*
- 11:00 a.m. Claire M.\* Zerkle A. L. Domagal-Goldman S. Farquhar J. Poulton S.  
*Evidence for methane and organic haze in the Neoarchean atmosphere [#5114]*
- 11:15 a.m. Wordsworth R.\* Pierrehumbert R.  
*Hydrogen-nitrogen greenhouse warming in Earth's early atmosphere [#5115]*
- 11:30 a.m. Domagal-Goldman S.\* Meadows V. Robinson T. D.  
*Pale Orange Dot: The Meso-Archean Earth from Afar [#5116]*
- 11:45 a.m. DeMarines J.\* McKay C.  
*Challenges Associated with Remote Detection of the Primitive Biosignatures [#5117]*

**CAN TERRESTRIAL MICROBES GROW ON MARS?**

**10:15 a.m.      Conference Room Four**

**Chairs:** **Wayne Nicholson**

**Andrew Schuerger**

- 10:15 a.m. Nicholson W. L.\* Krivushin K. Gilichinsky D. Schuerger A.  
*Isolation and characterization of bacteria from Siberian permafrost capable of growth under simulated Mars conditions [#5121]*
- 10:45 a.m. Schuerger A.\* Nicholson W. L.  
*Ultrastructure of *Serratia liquefaciens* and *Carnobacterium* sp. grown at 7 mbar under Simulated Martian Conditions [#5122]*
- 11:00 a.m. Krivushin K.\* Gilichinsky D. Nicholson W. L. Schuerger A.  
*Permafrost microorganisms under Mars-simulated pressure [#5123]*
- 11:15 a.m. Bauermeister A.\* Rettberg P. Reitz G. Flemming H.  
*Resistance of the iron-oxidizing bacterium *Acidithiobacillus ferrooxidans* to Mars-relevant stress conditions [#5124]*
- 11:30 a.m. de Vera J. P.\* Schulze-Makuch D. Khan A. Lorek A. Koncz A. Moehlmann D. Spohn T.  
*Physiological adaptation of the lichen *Pleopsidium chlorophanum* to Martian surface conditions can occur within 34 days [#5125]*
- 11:45 a.m. Rainey F. A.\* Vallalar B. Navarro-Gonzalez R.  
*Survival and Growth at High Concentrations of Perchlorate of Bacterial Strains from the Mars-like Soils of the Atacama Desert [#5126]*

**ASTROBIOLOGY IN HISTORICAL PERSPECTIVE**

**10:15 a.m.      Conference Room Two**

**Chairs:** **Douglas Vakoch**

**Steven Dick**

- 10:15 a.m. Danielson D.\*  
*Seventeenth-century ET, Reflexive Telescopes, and their Relevance Today [#5131]*
- 10:30 a.m. Sullivan W. T.\*  
*Evidence put forward circa 1800 by William Herschel and others for extraterrestrial life [#5132]*
- 10:45 a.m. Tirard S.\*  
*What does the XIXth century say us about epistemological obstacle in the relationship between origins of life and evolution of life? [#5133]*

11:00 a.m.	Vakoch D.* <i>Life beyond Earth and the Synthetic Theory of Natural Selection [#5134]</i>
11:15 a.m.	Berkowitz J.* <i>The Other Hubble: Paul Merrill—The Man who Discovered the Evolving Universe [#5135]</i>
11:30 a.m.	Impey C.* <i>The First Thousand Exoplanets—Two Decades of Excitement and Surprise [#5136]</i>
11:45 a.m.	Gronstal A. L.* <i>Astrobiology: The Story of our Search for Life in the Universe [#5137]</i>
12:00 p.m.	Dick S. J.* <i>Lessons from the History of Astrobiology [#5138]</i>

**THE POTENTIAL FOR LIFE AND ITS DETECTION ON EUROPA**

10:15 a.m. Conference Room A

<b>Chairs:</b>	<b>Katherine Wright</b> <b>Kevin Hand</b>
10:15 a.m.	Vance S.* Pappalardo R. T. Bagenal F. Barr A. C. Bills B. G. Blaney D. L. Blankenship D. D. Brinkerhoff W. Connerney J. Hand K. Hoehler T. Kurth W. McGrath M. Mellon M. Moore J. M. Prockter L. M. Senske D. A. Shock E. Smith D. E. Garner G. Magner T. Cooke B. C. Adams L. Klaasen K. Patterson G. W. <i>Mission Options For Exploring Europa's Habitability [#5141]</i>
10:45 a.m.	Hand K.* Casani J. Strange N. Eisen H. McElrath T. Dooley J. Skulsky E. Elliot J. Weiss J. Gallon J. Johnson A. <i>Europa Direct: Design of a 'simple' Europa lander mission focused on astrobiology related science goals [#5142]</i>
11:00 a.m.	Schmidt B. E.* Soderlund K. M. Blankenship D. D. <i>Shallow Subsurface Water on Europa: Lakes, Layers, and Life? [#5143]</i>
11:15 a.m.	Pasek M. A.* Greenberg R. <i>The pH of Europa's subsurface ocean [#5144]</i>
11:30 a.m.	Gudipati M. S.* Li Barnett I. Lignell A. <i>Quantification of Electron Induced Damage Depths of Organic Matter in Ice- Implications to Europa's Surface [#5145]</i>
11:45 a.m.	Hamilton T.* Havig J. R. Canovas P. Skidmore M. Peters J. W. Shock E. L. Boyd E. <i>Molecular evidence for indigenous lithoautotrophic microbial populations in a sub-ice environment [#5146]</i>
12:00 p.m.	Hand K.* Carlson R. W. <i>Laboratory spectroscopic analyses of electron irradiated alkanes and alkenes in simulated Europa surface ice conditions [#5147]</i>

**THE EXTENT OF CHIRALITY IN COSMOCHEMISTRY AND ITS POSSIBLE ROLE IN THE ORIGINS OF LIFE**

10:15 a.m. Conference Room B

<b>Chair:</b>	<b>Sandra Pizzarello</b>
10:15 a.m.	Nagdimunov L.* Kolokolova L. Sparks W. <i>Circular Polarization as a Tool to Search for Homochiral Molecules in Space [#5151]</i>
10:30 a.m.	Evans A.* Meinert C. Meierhenrich U. J. Le Sergeant d'Hendecourt L. Hoffmann S. Nahon L. Goesmann F. Giri C. <i>Photochemical synthesis, chirality and detection of amino acids in interstellar ice analogues and comets [#5152]</i>
10:45 a.m.	Cooper G.* <i>Enantiomer Ratios of Meteoritic Sugar Derivatives [#5153]</i>
11:00 a.m.	Pizzarello S.* <i>Molecular asymmetry in prebiotic chemistry: The lesson of meteorites [#1054]</i>
11:15 a.m.	Hein J.* <i>A "Chicken or Egg" Pathway for the Genesis of Homochirality in Carbohydrates and Amino Acids [#5155]</i>
11:30 a.m.	Discussion

## PRINT ONLY ABSTRACTS

- Alsop E. B. Boyd E. Raymond J.  
*Whole Proteome Approach to Top Down Evolutionary Analysis* [#6001]
- Bolser D. Imanaka H.  
*Carbon and Nitrogen isotope fractionation during possible organic aerosol formation in Titan and the early Earth* [#6005]
- Christian C.  
*Citizen Science: Contributions to Astrobiology?* [#6010]
- Clairmont R. M. Cope E. D. Mamajanov I. Zhou M. Springsteen G. Bommarius A. Eckert C. Liotta C.  
*Amino acid condensations in formamide: using a day-night cycle to enhance oligomer formation* [#6015]
- Ford E. B.  
*Transit Timing is Confirming and Characterizing Planets Identified by Kepler* [#6020]
- Gupta A.  
*Discovery of extraterrestrial intelligence: Speculations on possible human response* [#6024]
- Gupta H. Kulkarni R. Kumar Neelam D. Patidar N. Jangir G. Sharma P. Pareek M.  
*Screening of important enzyme producing thermophilic bacteria from the soils of Rajasthan* [#6024.1]
- Gupta R. S.  
*Evolution of Photosynthesis: Important Insights into Its Origin and Spread From Conserved Indels in Key Bacteriochlorophyll Biosynthesis Proteins* [#6025]
- Kobashigawa C. T.  
*Relevance for Timelines in Astrobiology* [#6030]
- Korbitz A.  
*Seven Proposed Signposts for Re-Evaluating Metalaw and its Relationship to SETI* [#6032]
- Lynch K. Moskal B. Lundstrom K.  
*Implementing astrobiology education in the elementary classroom through the Bechtel K-5 Educational Excellence Initiative* [#6035]
- Morehead R. C. Ford E. B.  
*Validating Kepler Multiple Planets with Transit Duration Analysis* [#6040]
- Oberg K. I. Fayolle E. van der Marel N. van Dishoeck E. F.  
*Observational Evidence for Different Complex Organic Compositions in Cold and Hot Protostellar Environments* [#6045]
- Qasim D. McMullin J. Chandler C. Myers S. Goss M. Sandell G.  
*Understanding the evolution of Sun-like stars: IRAS 4* [#6046]
- Shostak S.  
*What Happens When the Signal is Found* [#6048]
- Smith D. J.  
*The High Life: Transport of Microorganisms in Earth's Upper Atmosphere* [#6050]
- Treiman A. H.  
*Real World Complexities of Serpentization: Josephine Peridotite, Ca* [#6067]
- Yang B. Hsieh H. H.  
*Searching for Water Ice in the Main Belt Objects* [#6095]

# AUTHOR INDEX

A'Hearn M. F.	Asteroids, Comets Posters, Tue, Conf A Exoplanet Habitability Posters, Thu, Conf A Taxonomy of Comets, Thu, Salon Five	Anbar A.	How Can Astrobiology Save World?, Mon, Ballroom Icy Worlds and Chemistry Posters, Tue, Conf A $O_2$ and Evo: Look to the Past, Tue, Salon Four
Abbey W.	Robotics Technology, Fri, Conf Four	Andam C. P.	Early Evo of Life I, Mon, Salon Three
Abbott H. L.	Titan Prebiotic Chemistry Posters, Mon, Conf B	Andersen D.	Meta-omics of Microbial Mats, Tue, Salon One Meta-omics of Microbial Mats Posters, Mon, Conf B
Abe M.	Asteroids, Comets Posters, Tue, Conf A	Andersen D. T.	Microbial Ecosystems, Mon, Salon Three
Abell P. A.	Asteroids, Comets Posters, Tue, Conf A	Anderson B.	Ice Life Posters, Thu, Conf B
Abramov A. A.	Ice Life, Thu, Conf Four	Anderson E. J.	Meta-omics of Microbial Mats, Tue, Salon One
Accolla M.	Laboratory Astrochemistry, Thu, Salon Four	Anderson J. L.	Translation, Wed, Salon One Early Evo of Life Posters, Mon, Conf A
Achterberg R.	Titan Prebiotic Chemistry, Mon, Salon Five	Anderson J. L.	Microbes in Space and Time, Tue, Salon Four
Ackeann R. F.	Transmission into Space, Tue, Conf Two	Anderson L. D.	Microbes in Lithifying Systems Posters, Tue, Conf A
Ackiss S. E.	Mineralogy and Aqueous Processes Posters, Thu, Conf B	Anderson R.	Science of Mars Science Laboratory, Mon, Conf Two
Adam Z. R.	Early Evo of Life Posters, Mon, Conf A	Andrulis E. D.	Microbiology/ Geochemistry, Wed, Conf Four
Adamala K.	Experimental Evo, Fri, Salon One	Anitori R. P.	Extremeomics, Wed, Salon Three Virus Ecology/ Astrovirology, Tue, Conf Two
Adams L.	Europa, Fri, Conf A	Anthony N. R.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A
Adande G.	New Frontiers in Isotope Analysis, Fri, Salon Four	Aponte J. C.	Microbial Ecosystems Posters, Mon, Conf B
Adhikary A.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One	Aquino A.	Chemical Evo, Tue, Salon Five
Adkins J. F.	Microbes in Space and Time, Tue, Salon Four	Arakawa K.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five
af Uggla M.	Laboratory Astrochemistry, Thu, Salon Four	Arakawa M.	Transition to Genetically Encoded Proteins, Wed, Conf Four
Ahrén D.	Cross-Disciplinary Communication Posters, Thu, Conf A	Arbunich J.	Establishing Biogenicity Posters, Mon, Conf A
Albarracin Gonzalez D.	Digital Media in Education Posters, Tue, Conf B	Archer P. D.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One
Albert I.	Microbes in Space and Time Posters, Mon, Conf B	Archibald J. C.	Radiation Effects: Microbes to Man, Mon, Salon One
Aldersley M. F.	Biomolecular Evo, Thu, Salon Three Biomolecular Evo Posters, Tue, Conf B	Arcone S.	Asteroids, Comets Posters, Tue, Conf A
Alexander C.	Organic Continuum, Tue, Salon Five Organic Continuum Posters, Mon, Conf B	Ardell D. H.	Transmission into Space, Tue, Conf Two
Algeo T. J.	$O_2$ and Evo: Look to the Past, Tue, Salon Four	Archer P. D.	Survival in ET Environments, Mon, Conf Two
Allen C. M.	Oxidation in Extreme Environments, Tue, Conf Four	Archibald J. C.	Astrobiology E/PO, Tue, Conf Four
Allen J. F.	Origin/ Evo of Photosynthesis, Thu, Conf Four	Arcone S.	Ice Life, Thu, Conf Four
Allen M.	Titan Prebiotic Chemistry, Mon, Salon Five	Ardell D. H.	Origin/ Evo of Photosynthesis, Thu, Conf Four
Allen S.	Extremeomics, Wed, Salon Three	Arenas C.	Microbiology/ Geochemistry, Wed, Conf Four
Allen W. D.	Quantum Chemistry, Mon, Salon Four	Arias-Rivas S.	Subsurface Ecosystems, Fri, Conf A
Allwood A.	Robotics Technology, Fri, Conf Four	ASTER Team	Asteroids, Comets Posters, Tue, Conf A
Alperin M.	Early Evo of Life I, Mon, Salon Three Prospecting for Life Posters, Mon, Conf A	Astrong J.	Astrobiology E/PO Posters, Thu, Conf A
Alsop E. B.	Serpentinization Posters, Thu, Conf B Habitability Metrics, Thu, Conf Two	Arney G. N.	Exoplanet Habitability, Thu, Salon Three
Altweig K.	Pattern and Prediction, Thu, Conf Two	Arslan B. K.	Quantifying Frequency Posters, Tue, Conf A
Amador E. S.	Print Only	Ascaso C.	Experimental Evo, Fri, Salon One
Amils R.	Icy Worlds and Chemistry Posters, Tue, Conf A Mineralogy Indicates Aqueous, Fri, Salon Three	Astorga F.	How Can Astrobiology Save World?, Mon, Ballroom
Anbar A.	Mars Science Laboratory Posters, Mon, Conf B Microbial Ecosystems, Mon, Salon Three Microbiology/ Geochemistry, Wed, Conf Four Subsurface Ecosystems, Fri, Conf A	Ata saei A.	Microbiology/ Geochemistry, Wed, Conf Four
	History of Oxygenation, Mon, Conf Four $O_2$ and Evo: Look to the Past, Tue, Salon Four	Athavale S.	Transmission into Space, Tue, Conf Two
	Digital Media in Education, Wed, Salon Four	Athena Science Team	Biological Life Support Posters, Thu, Conf B
	Digital Media in Edu Posters, Tue, Conf B		$O_2$ and Evo: Ancient Biochemistry, Thu, Salon One
	Extremeomics Posters, Tue, Conf A		Translation, Wed, Salon One
			Translation Posters, Tue, Conf B
			Mineralogy Indicates Aqueous, Fri, Salon Three

# AUTHOR INDEX

Atizar-Ladislau B.	Astrobiology E/PO Posters, Thu, Conf A	Bao X.	Prospecting for Life Posters, Mon, Conf A
Atri D.	How Can Astrobiology Save World?, Mon, Ballroom	Baoyin H.	Asteroids, Comets Posters, Tue, Conf A
	Radiation Effects: Microbes to Man Posters, Mon, Conf A	Bar-Cohen Y.	Prospecting for Life Posters, Mon, Conf A
	Transmission into Space, Tue, Conf Two	Baraúna R. A.	Extremeomics Posters, Tue, Conf A
Attfield P.	Astrobiology E/PO Posters, Thu, Conf A	Barbatti M.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One
Aubrey A.	Robotics Technology, Fri, Conf Four	Barbee B. W.	Asteroids, Comets Posters, Tue, Conf A
	Science of Mars Science Laboratory, Mon, Conf Two	Barber S. J.	Astrobiology of Planetesimals Posters, Mon, Conf B
Augusto S. R.	Asteroids, Comets Posters, Tue, Conf A	Barbosa R. A.	Diversity in Research and Edu, Mon, Salon Four
Avietia M.	HGT in Innovation, Tue, Conf Four	Barczyk S.	Astrobiology in Orbit, Fri, Salon Five
Avitia M.	Microbes in Space and Time Posters, Mon, Conf B	Barge L. M.	Astrobiology E/PO Posters, Thu, Conf A
Azua-Bustos A.	Microbiology/ Geochemistry, Wed, Conf Four		From Non-Enzymatic Catalysis Posters, Tue, Conf B
Babbitt P. C.	From Non-Enzymatic Catalysis, Wed, Salon Five	Barnes R.	Mineral-based Catalysis, Tue, Conf Two
Backman D. E.	Astrobiology E/PO Posters, Thu, Conf A	Baross J. A.	Exoplanet Habitability, Thu, Salon Three
Bacon L. R.	Astrobiology E/PO Posters, Thu, Conf A	Barott W. C.	Exoplanet Habitability Posters, Thu, Conf A
Bada J.	Plausible Geochemical Conditions, Wed, Salon Five	Barr A. C.	Extremeomics, Wed, Salon Three
Badescu M.	Prospecting for Life Posters, Mon, Conf A	Barr E.	Virus Ecology/ Astrovirology, Tue, Conf Two
Baer S.	Ice Life Posters, Thu, Conf B	Barragán T.	Transmission into Space, Tue, Conf Two
Baesman S.	Pattern and Prediction, Thu, Conf Two	Barratt C.	Europa, Fri, Conf A
Bagenal F.	Europa, Fri, Conf A	Barzegari A.	Microbial Ecosystems Posters, Mon, Conf B
Bagnulo S.	Astrobiology of Planetesimals Posters, Mon, Conf B	Basa R.	Microbiology/ Geochemistry, Wed, Conf Four
Bailey B.	Microbes in Space and Time Posters, Mon, Conf B	Bass A. D.	Chemical Evo Posters, Mon, Conf A
Bailey J.	Quantifying Frequency, Thu, Salon One	Bastidas M.	Icy Worlds and Chemistry Posters, Tue, Conf A
	Quantifying Frequency Posters, Tue, Conf A	Battistuzzi F.	Astroecology Posters, Mon, Conf B
Bains W.	History of Oxygenation, Mon, Conf Four	Battler M.	Early Evo of Life II, Tue, Salon Three
Baklouti D.	Laboratory Astrochemistry Posters, Thu, Conf B	Baueeister A.	Mineralogy Indicates Aqueous, Fri, Salon Three
Baldwin B.	Molecular Tools, Wed, Conf Two	Baum S.	Astrobiology in Orbit, Fri, Salon Five
Ballentine C. J.	Serpentinization, Thu, Salon Five	Bayramova K. H.	Terrestrial Microbes on Mars?, Fri, Conf Four
Balseiro E.	Astroecology Posters, Mon, Conf B		Transmission into Space Posters, Thu, Conf A
Bampasidis G.	Icy Worlds and Chemistry, Wed, Salon Three	Beard B.	Radiation Effects: Microbes to Man Posters, Mon, Conf A
	Titan Prebiotic Chemistry, Mon, Salon Five		Establishing Biogenicity, Mon, Conf Four
	Titan Prebiotic Chemistry Posters, Mon, Conf B		Microbial Ecosystems Posters, Mon, Conf B
Banda T. S.	How Can Astrobiology Save World?, Mon, Ballroom		Mineralogy and Aqueous Processes Posters, Thu, Conf B
Bandfield J. L.	Mineralogy Indicates Aqueous, Fri, Salon Three	Beard T.	Astrobiology in Historical Perspective Posters, Thu, Conf A
Bandyopadhyay P.	Cross-Disciplinary Communication Posters, Thu, Conf A	Beaty S. M.	Microbiology/ Geochemistry, Wed, Conf Four
	Astrobiology in Historical Perspective Posters, Thu, Conf A	Beauchamp J.	Prospecting for Life Posters, Mon, Conf A
	Exoplanet Habitability Posters, Thu, Conf A	Beaudoin D.	Titan Prebiotic Chemistry, Mon, Salon Five
Banerjee N.	Microbial Ecosystems, Mon, Salon Three		Meta-omics of Microbial Mats Posters, Mon, Conf B
	Microbiology/ Geochemistry, Wed, Conf Four	Bebout B.	New Frontiers in Isotope Analysis, Fri, Salon Four
	Mineralogy and Aqueous Processes, Fri, Salon Three	Bebout G. E.	Microbes in Lithifying Systems Posters, Tue, Conf A
	Mineralogy and Aqueous Processes Posters, Thu, Conf B	Beck A.	From Non-Enzymatic Catalysis Posters, Tue, Conf B
	Microbes in Lithifying Systems Posters, Tue, Conf A		
	Microbial Ecosystems Posters, Mon, Conf B		
Banyasz A.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One		

# AUTHOR INDEX

Beebe C.	Cross-Disciplinary Communication Posters, Thu, Conf A	Bertasso M.	Cross-Disciplinary Communication Posters, Thu, Conf A
Beegle L. W.	Icy Worlds and Chemistry Posters, Tue, Conf A Prospecting for Life Posters, Mon, Conf A Subsurface Ecosystems, Fri, Conf A	Berthelson M.	Astrobiology in Historical Perspective Posters, Thu, Conf A Exoplanet Habitability Posters, Thu, Conf A
Bej A.	Meta-omics of Microbial Mats, Tue, Salon One Meta-omics of Microbial Mats Posters, Mon, Conf B	Bertin M.	Diversity in Research and Edu Posters, Mon, Conf A
Bekker A.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Bertka C.	Laboratory Astrochemistry, Thu, Salon Four
Bekker D.	Robotics Technology, Fri, Conf Four	Bertrand M.	Intersection of Astrobiology/ Society, Wed, Salon Four
Bell B. P.	Diversity in Research and Edu, Mon, Salon Four	Beukes N.	Astrobiology in Orbit Posters, Thu, Conf B
Bell J. L.	Icy Worlds and Chemistry, Wed, Salon Three	Beyer R.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
Bell T. A.	Extraterrestrial Biomolecule Posters Thu, Conf B	Bhandari N.	Mineralogy Indicates Aqueous, Fri, Salon Three
Belloche A.	Extraterrestrial Biomolecules, Fri, Salon Three	Bhartia R.	Mineral-based Catalysis, Tue, Conf Two
Ben-Naim D.	Digital Media in Education, Wed, Salon Four	Bhatt A.	Microbes in Lithifying Systems, Thu, Conf Four
Bendia A. G.	Astrobiology E/PO Posters, Thu, Conf A	Bhattacharya A.	Mineral-based Catalysis, Tue, Conf Two
Benicewicz D.	Translation Posters, Tue, Conf B	Biddle J. F.	Subsurface Ecosystems, Fri, Conf A
Benner S. A.	Biomolecular Evo Posters, Tue, Conf B Experimental Evo, Fri, Salon One	Biele J.	Transmission into Space, Tue, Conf Two
	Titan Prebiotic Chemistry, Mon, Salon Five	Bierbaum V. M.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
	UV Radiation in Prebiotic Chemistry II, Tue, Salon One	Biernacki A.	Molecular Tools, Wed, Conf Two
Bennett R.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five	Billi D.	Asteroids, Comets Posters, Tue, Conf A
	Plausible Geochemical Conditions, Wed, Salon Five	Billing-Ross P.	Laboratory Astrochemistry, Thu, Salon Four
		Billings L.	Laboratory Astrochemistry Posters Thu, Conf B
Benoit S.	Asteroids, Comets Posters, Tue, Conf A	Bills B. G.	Molecular Tools, Wed, Conf Two
Bera P. P.	Quantum Chemistry, Mon, Salon Four	Blamey N. F.	Astrobiology in Orbit, Fri, Salon Five
Bérces A.	Astrobiology in Orbit Posters, Thu, Conf B	Blitz C. M.	Early Evo of Life II, Tue, Salon Three
	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A	Bishop J. L.	How Do We Explain Ourselves? Plenary, Thu, Ballroom
Berdugin A. V.	Habitability Metrics Posters, Tue, Conf A	Blanco Y.	Europa, Fri, Conf A
Berdugina S.	Habitability Metrics, Thu, Conf Two	Biondi E.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five
	Habitability Metrics Posters, Tue, Conf A	Bischoff A.	Astrobiology in Orbit, Fri, Salon Five
Berelson W. M.	Microbes in Lithifying Systems, Thu, Conf Four	Bishop J. L.	Mineralogy Indicates Aqueous, Fri, Salon Three
Bergin E. A.	Extraterrestrial Biomolecule Posters Thu, Conf B	Bitz C. M.	Exoplanet Habitability Posters, Thu, Conf A
Bergin E.	Extraterrestrial Biomolecules, Fri, Salon Three	Blamey N. F.	New Mars, Wed, Salon One
Bergin M.	Meta-omics of Microbial Mats, Tue, Salon One	Blanc M.	Icy Worlds and Chemistry, Wed, Salon Three
Bergquist P.	Microbial Ecosystems Posters, Mon, Conf B	Blanco Y.	Ice Life, Thu, Conf Four
Berkowitz J.	Astrobiology in Historical Perspective, Fri, Conf Two	Blaney D. L.	Microbiology/ Geochemistry, Wed, Conf Four
	How Do We Explain Ourselves? Posters, Thu, Conf A	Blankenship D.	Microbiology/ Geochemistry Poster Tue, Con A
Berland K. M.	Chemical Evo, Tue, Salon Five	Blankenship R. E.	Europa, Fri, Conf A
	Transition to Genetically Encoded Proteins, Wed, Conf Four	Boctor N. Z.	Origin/ Evo of Photosynthesis, Thu, Conf Four
Bean E.	New Frontiers in Isotope Analysis, Fri, Salon Four	Boice D.	Origin/ Evo of Photosynthesis Posters, Tue, Conf B
Berndt T.	Ice Life, Thu, Conf Four	Bolduc B.	Mineral-based Catalysis, Tue, Conf Two
Bernhard J. M.	Meta-omics of Microbial Mats Posters, Mon, Conf B	Bolser D.	Asteroids, Comets, Wed, Conf Two
Bernier C. R.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One	Bommaris A.	Virus Ecology/ Astrovirology, Tue, Conf Two
	Transition to Genetically Encoded Proteins, Wed, Conf Four	Boonaccorsi R. M.	Serpentinitization Posters, Thu, Conf B
	Translation Posters, Tue, Conf B	Bonev B. P.	Print Only
		Bommarius A.	Print Only
		Bonaccorsi R. M.	Print Only
		Bonev B. P.	How Can Astrobiology Save World?, Mon, Ballroom
			Microbiology/ Geochemistry, Wed, Conf Four
		Bonilla Rosso G.	Organic Continuum, Tue, Salon Five
			Taxonomy of Comets, Thu, Salon Five
			Meta-omics of Microbial Mats, Tue, Salon One

## AUTHOR INDEX

Bornstein B. J.	Robotics Technology, Fri, Conf Four	Bridge N. J.	Microbes in Lithifying Systems Posters, Tue, Conf A
Bosak T.	Early Evo of Life Posters, Mon, Conf A O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four Origin/ Evo of Photosynthesis, Thu, Conf Four	Briggs R. G.	Biomolecular Evo, Thu, Salon Three
Boston P. J.	Robotics Technology Posters, Thu, Conf B Subsurface Ecosystems, Fri, Conf A	Brinkerhoff W.	Robotics Technology Posters, Thu, Conf B Europa, Fri, Conf A
Bowen D.	Astrobiology E/PO Posters, Thu, Conf A	Briones C.	Subsurface Ecosystems, Fri, Conf A
Bower D. M.	Establishing Biogenicity, Mon, Conf Four Serpentinization Posters, Thu, Conf B	Briot D.	Astrobiology in Historical Perspective Posters, Thu, Conf A
Bowman J.	Early Evo of Life Posters, Mon, Conf A O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One Translation, Wed, Salon One Translation Posters, Tue, Conf B	Brogan C.	Extraterrestrial Biomolecules, Fri, Salon Three
Boyd E.	Quantum Chemistry, Mon, Salon Four Europa, Fri, Conf A From Non-Enzymatic Catalysis, Wed, Salon Five Ice Life, Thu, Conf Four Microbes in Space and Time, Tue, Salon Four Pattern and Prediction, Thu, Conf Two Pattern and Prediction Posters, Tue, Conf B Print Only Origin/ Evo of Photosynthesis Posters, Tue, Conf B	Broman C.	Environmental Physics and Life Posters, Tue, Conf A
Boyer G.	Habitability Metrics, Thu, Conf Two Microbial Ecosystems, Mon, Salon Three	Brouillet N.	Extraterrestrial Biomolecules Posters, Thu, Conf B
Boynton W. V.	Mineralogy Indicates Aqueous, Fri, Salon Three Survival in ET Environments, Mon, Conf Two	Brown C.	Diversity in Research and Edu, Mon, Salon Four
Bracht J.	Extremeomics, Wed, Salon Three	Brown I.	Meta-omics of Microbial Mats Posters, Mon, Conf B
Brack A.	Astrobiology in Orbit Posters, Thu, Conf B	Brown L.	Organic Continuum Posters, Mon, Conf B
Bradburne C.	Astrobiology of Planetesimals Posters, Mon, Conf B	Brownlee D. E.	Icy Worlds and Chemistry Posters, Tue, Conf A
Bradford K. C.	Diversity in Research and Edu, Mon, Salon Four	Bruce G.	Digital Media in Education, Wed, Salon Four Digital Media in Education Posters, Tue, Conf B
Brainard J.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A	Brunetto R.	Laboratory Astrochemistry Posters, Thu, Conf B
Braissant O.	Meta-omics of Microbial Mats, Tue, Salon One	Bryan R. A.	Biological Radiation Energy Capture, Thu, Conf Two Radiation Effects: Microbes to Man, Mon, Salon One
Bramall N.	Astrobiology in Orbit, Fri, Salon Five New Frontiers in Isotope Analysis, Fri, Salon Four	Bryant D. A.	Origin/ Evo of Photosynthesis Posters, Tue, Conf B
Brandt L. D.	Molecular Tools, Wed, Conf Two	Bryce C.	Astrobiology E/PO Posters, Thu, Conf A Astrobiology in Orbit Posters, Thu, Conf B
Brangwynne C. P.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five	Bryson C. E.	Oxidation in Extreme Environments, Tue, Conf Four
Branscomb E.	Serpentinization, Thu, Salon Five	Bryson K.	Astrobiology in Orbit, Fri, Salon Five
Brantley S. L.	Microbes in Space and Time Posters, Mon, Conf B	Buch A.	Science of Mars Science Laboratory, Mon, Conf Two
Braswell S.	Pattern and Prediction Posters, Tue, Conf B	Buckle J. V.	Organic Continuum, Tue, Salon Five
Bratsolis E.	Titan Prebiotic Chemistry Posters, Mon, Conf B	Buckley R.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
Brazelton W.	Serpentinization Posters, Thu, Conf B Extremeomics, Wed, Salon Three Virus Ecology/ Astrovirology, Tue, Conf Two Serpentinization, Thu, Salon Five	Bueno J.	Astrobiology E/PO Posters, Thu, Conf A Digital Media in Education Posters, Tue, Conf B
Breitfellner M.	Astrobiology in Orbit, Fri, Salon Five	Bui T. Q.	Transition to Genetically Encoded Proteins, Wed, Conf Four
Brelsford M.	Astrobiology E/PO Posters, Thu, Conf A Diversity in Research and Edu Posters, Mon, Conf A	Buick R.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five
Brennecka G.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Bunce E.	Icy Worlds and Chemistry, Wed, Salon Three
		Burcar B.	Biomolecular Evo, Thu, Salon Three Plausible Geochemical Conditions, Wed, Salon Five Biomolecular Evo Posters, Tue, Conf B
		Burke D. H.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five
		Burnier A. M.	Astroecology Posters, Mon, Conf B Terrestrial Microbes on Mars? Posters, Thu, Conf B
		Burns B. P.	Meta-omics of Microbial Mats, Tue, Salon One

## AUTHOR INDEX

Burns D.	Asteroids, Comets Posters, Tue, Conf A	Carlson R.	Titan Prebiotic Chemistry, Mon, Salon Five
Burton A. S.	New Frontiers in Isotope Analysis, Fri, Salon Four	Europa, Fri, Conf A	Europa, Fri, Conf A
	Organic Continuum, Tue, Salon Five	Carlstrom C.	Pattern and Prediction, Thu, Conf Two
	Organic Continuum Posters, Mon, Conf B	Carnevale D.	Serpentinitization Posters, Thu, Conf B
Busby B.	Last Universal Common Ancestor, Tue, Salon Three	Carroll A.	Laboratory Astrochemistry Posters, Thu, Conf B
Busch M. W.	Transmission into Space, Tue, Conf Two	Carter-Bond J.	Exoplanet Habitability, Thu, Salon Three
	Transmission into Space Posters, Thu, Conf A	Carvajal M. S.	Diversity in Research and Edu, Mon, Salon Four
Busigny V.	History of Oxygenation, Mon, Conf Four	Casadevall A.	Biological Radiation Energy Capture, Thu, Conf Two
Butterfield T.	Digital Media in Education, Wed, Salon Four		Radiation Effects: Microbes to Man, Mon, Salon One
Butzin N. C.	HGT in Innovation, Tue, Conf Four	Casani J.	Europa, Fri, Conf A
Bychkov A. Y.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One	Casillas-Martinez L.	Meta-omics of Microbial Mats, Tue, Salon One
Byrne S.	New Mars Posters, Tue, Conf A	Cassidy L.	Biomolecular Evo, Thu, Salon Three
Cabak Rédei A.	Cross-Disciplinary Communication Posters, Thu, Conf A		Biomolecular Evo Posters, Tue, Conf B
Cable M. L.	Chemical Evo, Tue, Salon Five		Plausible Geochemical Conditions, Wed, Salon Five
	Prospecting for Life Posters, Mon, Conf A	Cater M. D.	Titan Prebiotic Chemistry Posters, Mon, Conf B
	Titan Prebiotic Chemistry Posters, Mon, Conf B	Catling D.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five
Cabrol N. A.	Robotics Technology, Fri, Conf Four		Habitability Metrics, Thu, Conf Two
Cady S. L.	Virus Ecology/ Astrovirology, Tue, Conf Two		Exoplanet Habitability Posters, Thu, Conf A
	Digital Media in Education, Wed, Salon Four	Ceballos M.	New Mars Posters, Tue, Conf A
Caetano-Anolles G.	Last Universal Common Ancestor, Tue, Salon Three		Diversity in Research and Edu, Mon, Salon Four
	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One		Diversity in Research and Edu Posters, Mon, Conf A
	Translation Posters, Tue, Conf B		Microbial Ecosystems Posters, Mon, Conf B
Cafferty B.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A		Virus Ecology/ Astrovirology, Tue, Conf Two
Cahuich L.	Cross-Disciplinary Communication, Fri, Conf Two		Virus Ecology/ Astrovirology Posters, Tue, Conf B
Calef F.	Science of Mars Science Laboratory, Mon, Conf Two	Centlivre J.	Biomolecular Evo Posters, Tue, Conf B
Callahan M. P.	New Frontiers in Isotope Analysis, Fri, Salon Four	Cetinel Aksoy S.	Meta-omics of Microbial Mats Posters, Mon, Conf B
	Organic Continuum, Tue, Salon Five	Chaabouni H.	Laboratory Astrochemistry, Thu, Salon Four
	Organic Continuum Posters, Mon, Conf B	Chabin A.	Astrobiology in Orbit Posters, Thu, Conf B
Callister S. J.	Origin/ Evo of Photosynthesis Posters, Tue, Conf B	Chaffin M.	Astrobiology E/PO Posters, Thu, Conf A
Campana J.	Astrobiology E/PO, Tue, Conf Four		Plausible Geochemical Conditions Posters, Tue, Conf B
Campbell K.	Microbes in Lithifying Systems Posters, Tue, Conf A	Chambers N.	How Do We Explain Ourselves? Posters, Thu, Conf A
	Microbes in Space and Time Posters, Mon, Conf B	Chan C. S.	History of Oxygenation, Mon, Conf Four
Candelaria J. F.	Quantifying Frequency, Thu, Salon One	Chandler C.	Extraterrestrial Biomolecules Posters, Thu, Conf B
Canfield D. E.	O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A	Chand rashaker V.	From Non-Enzymatic Catalysis, Wed, Salon Five
Canovas P.	Europa, Fri, Conf A	Chang Q.	Icy Worlds and Chemistry, Wed, Salon Three
	Ice Life, Thu, Conf Four	Chang W.	Translation, Wed, Salon One
	Pattern and Prediction Posters, Tue, Conf B	Changela H.	Organic Continuum Posters, Mon, Conf B
Cantrell J. R.	Quantifying Frequency Posters, Tue, Conf A	Changenet-Barret P.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One
Canzoneri J.	Translation, Wed, Salon One	Chanover N.	Robotics Technology Posters, Thu, Conf B
	Translation Posters, Tue, Conf B	Chao F.	From Non-Enzymatic Catalysis, Wed, Salon Five
Capes M.	Radiation Effects: Microbes to Man, Mon, Salon One	Chappaz A.	History of Oxygenation, Mon, Conf Four
Capova K. A.	Societal Impact of ET Life Posters, Tue, Conf B	Charbonneau D.	Exoplanet Habitability Posters, Thu, Conf A
Cardace D.	Serpentinitization Posters, Thu, Conf B		
Carelli F.	Quantum Chemistry Posters, Mon, Conf B		

# AUTHOR INDEX

Charnley S.	Extraterrestrial Biomolecule Posters Thu, Conf B New Frontiers in Isotope Analysis, Fri, Salon Four Organic Continuum, Tue, Salon Five Taxonomy of Comets, Thu, Salon Five	Cloutier P. Cloutis E. A.	Icy Worlds and Chemistry Posters, Tue, Conf A Microbial Ecosystems, Mon, Salon Three Microbial Ecosystems Posters, Mon, Conf B
Chen C.	Chemical Evo, Tue, Salon Five Chemical Evo Posters, Mon, Conf A	Coates A. Coates J. D.	Icy Worlds and Chemistry, Wed, Salon Three Pattern and Prediction, Thu, Conf Two
Chen I. A.	Experimental Evo, Fri, Salon One	Cobb A. Cobb J.	Asteroids, Comets, Wed, Conf Two Cross-Disciplinary Communication, Fri, Conf Two
Chen J.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A	Cockell C.	Astrobiology E/PO Posters, Thu, Conf A Astrobiology in Orbit, Fri, Salon Five
Chen L.	Quantum Chemistry, Mon, Salon Four		Astrobiology in Orbit Posters, Thu, Conf B Biological Radiation Energy Capture, Thu, Conf Two
Chen M.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A Origin/ Evo of Photosynthesis, Thu, Conf Four		Terrestrial Microbes on Mars? Posters, Thu, Conf B
Chen X.	Extremeomics, Wed, Salon Three		Microbiology/ Geochemistry Poster Tue, Con A Survival in ET Environments, Mon, Conf Two
Chen Y.	Mars Science Laboratory Posters, Mon, Conf B	Cody G.	Microbes in Space and Time Posters, Mon, Conf B
Chera J. J.	Biomolecular Evo, Thu, Salon Three		Mineral-based Catalysis, Tue, Conf Two
Chernow V. F.	Icy Worlds and Chemistry Posters, Tue, Conf A		Organic Continuum, Tue, Salon Five
Cheung C. Y.	Astrobiology E/PO Posters, Thu, Conf A	Coe K.	Societal Impact of ET Life, Thu, Salon Four
Chigai T.	Laboratory Astrochemistry Posters, Thu, Conf B	Coe L.	How Can Astrobiology Save World?, Mon, Ballroom
Childers S. W.	From Non-Enzymatic Catalysis Posters, Tue, Conf B Transition to Genetically Encoded Proteins, Wed, Conf Four	Cohen P. A.	Astrobiology E/PO, Tue, Conf Four Digital Media in Education, Wed, Salon Four
Childers W. S.	Chemical Evo, Tue, Salon Five Chemical Evo Posters, Mon, Conf A Prebiotic Chemistry/ Biopolymers, Mon, Salon Five	Cola J.	Digital Media in Education Posters Tue, Conf B Astrobiology E/PO Posters, Thu, Conf A
Chimileski S.	Microbial Ecosystems Posters, Mon, Conf B Molecular Tools Posters, Tue, Conf B	Colangelo-Lillis J.	Digital Media in Education, Wed, Salon Four
Chiotti K.	Experimental Evo Posters, Thu, Conf A		Molecular Tools Posters, Tue, Conf B
Chittenden J. D.	Astrobiology in Orbit, Fri, Salon Five	Cole C.	Laboratory Astrochemistry, Thu, Salon Four
Choney A. P.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A		Laboratory Astrochemistry Posters Thu, Conf B
Chong-Díaz G.	Microbiology/ Geochemistry, Wed, Conf Four	Coleman M.	From Genomes to Biomarkers, Mon, Conf Four
Chopra A.	Exoplanet Habitability, Thu, Salon Three Last Universal Common Ancestor Posters, Mon, Conf A Pattern and Prediction, Thu, Conf Two	Collins E.	Extremeomics Posters, Tue, Conf A
Chowdhury S.	Serpentinization Posters, Thu, Conf B	Collins L.	From Genomes to Biomarkers, Mon, Conf Four
Christian C.	Print Only	Congiu E.	Minimal and Ancestral Genomes, Fri, Salon One
Chuang Y.	Taxonomy of Comets, Thu, Salon Five	Congreve C.	Meta-omics of Microbial Mats, Tue, Salon One
Chun W. W.	Robotics Technology, Fri, Conf Four	Connerney J.	Laboratory Astrochemistry, Thu, Salon Four
Churchfield L.	From Non-Enzymatic Catalysis, Wed, Salon Five	Connon S. A.	Astrobiology E/PO Posters, Thu, Conf A
Cirkovic M. M.	Societal Impact of ET Life Posters, Tue, Conf B	Connor R. C.	Europa, Fri, Conf A
Claire M.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five Exoplanet Habitability, Thu, Salon Three Exoplanet Habitability Posters, Thu, Conf A New Mars Posters, Tue, Conf A	Conrad A. T.	Microbiology/ Geochemistry, Wed, Conf Four
Claiont R. M.	Print Only	Conrad P. G.	Intelligence and Astrobiology, Fri, Salon Four
Clark E.	Astroecology Posters, Mon, Conf B	Cook A.	Pattern and Prediction Posters, Tue, Conf B
Clark R. M.	Organic Continuum, Tue, Salon Five	Cooke B. C.	Science of Mars Science Laboratory, Mon, Conf Two
Cleaves H. J.	Plausible Geochemical Conditions, Wed, Salon Five	Cooper G.	Astrobiology in Orbit, Fri, Salon Five
Clore A. J.	Virus Ecology/ Astrovirology, Tue, Conf Two	Cooper W. J.	Europa, Fri, Conf A
		Cope E. D.	Chirality in Cosmochemistry, Fri, Conf Two
		Corby J. F.	Establishing Biogenicity Posters, Mon, Conf A
			Print Only
		Corcoran A. C.	Extraterrestrial Biomolecules Posters, Thu, Conf B
		Cordiner M.	Molecular Tools, Wed, Conf Two
			Extraterrestrial Biomolecules Posters, Thu, Conf B
			Organic Continuum, Tue, Salon Five
		Coan J.	Astroecology Posters, Mon, Conf B

# AUTHOR INDEX

Cornish J.	Astrobiology E/PO Posters, Thu, Conf A Digital Media in Education Posters, Tue, Conf B Mineral-based Catalysis, Tue, Conf Two	Dash H. B.	Diversity in Research and Edu, Mon, Salon Four
Corsetti F.	Microbes in Lithifying Systems, Thu, Conf Four Prospecting for Life Posters, Mon, Conf A	DasSarma P.	Radiation Effects: Microbes to Man, Mon, Salon One
Cottin H.	Astrobiology in Orbit Posters, Thu, Conf B	DasSarma S.	Radiation Effects: Microbes to Man, Mon, Salon One
Coulson I.	Taxonomy of Comets, Thu, Salon Five	Davies P. C.	Chemical Evo, Tue, Salon Five Minimal and Ancestral Genomes, Fri, Salon One
Coustenis A.	Icy Worlds and Chemistry, Wed, Salon Three Titan Prebiotic Chemistry Posters, Mon, Conf B	Davila A.	Habitability Metrics, Thu, Conf Two
Couturier-Tamburelli I.	Icy Worlds and Chemistry, Wed, Salon Three Titan Prebiotic Chemistry, Mon, Salon Five	Davis G.	Molecular Tools, Wed, Conf Two
Cowen J. P.	Titan Prebiotic Chemistry, Mon, Salon Five	Davis J.	Plausible Geochemical Conditions, Wed, Salon Five
Craig M. A.	Microbes in Space and Time, Tue, Salon Four	Davis S.	Laboratory Astrochemistry Posters, Thu, Conf B
Crawford D.	Microbial Ecosystems, Mon, Salon Three	Davison C. L.	Quantifying Frequency, Thu, Salon One
Creaser R. A.	Quantum Chemistry, Mon, Salon Four	Dawley M.	Icy Worlds and Chemistry, Wed, Salon Three Plausible Geochemical Conditions, Wed, Salon Five
Crespo-Hernandez C. E.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	de Almeida A. A.	Titan Prebiotic Chemistry Posters, Mon, Conf B
Crisp D.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One	de Campos Velho	UV Radiation in Prebiotic Chemistry II, Tue, Salon One
Crockett N. R.	Exoplanet Habitability, Thu, Salon Three Exoplanet Habitability Posters, Thu, Conf A	de Diego-Castilla	Asteroids, Comets, Wed, Conf Two
Crowell K.	Extraterrestrial Biomolecules Posters, Thu, Conf B	de La Torre Juárez M.	Asteroids, Comets Posters, Tue, Conf A
Cruikshank D. P.	Habitability Metrics, Thu, Conf Two	de Leon P.	Microbiology/ Geochemistry, Wed, Conf Four
Crutchfield J.	Organic Continuum, Tue, Salon Five	de Marcellus P.	Laboratory Astrochemistry Posters, Thu, Conf B
Cruz-Gil P.	Microbial Ecosystems Posters, Mon, Conf B	de Mendoza A.	From Genomes to Biomarkers Posters, Mon, Conf A
Cuassolo F.	Ice Life, Thu, Conf Four	de Morais M.	Astrobiology E/PO Posters, Thu, Conf A
Cumbers J.	Microbiology/ Geochemistry, Wed, Conf Four	De Person M.	Laboratory Astrochemistry Posters, Thu, Conf B
Cunningham N.	Pattern and Prediction, Thu, Conf Two	de Souza J. C.	Asteroids, Comets Posters, Tue, Conf A
Cushing G. E.	Subsurface Ecosystems, Fri, Conf A	de Vera J. P.	Terrestrial Microbes on Mars?, Fri, Conf Four
Czaja A. D.	Subsurface Ecosystems, Fri, Conf A	de Vries M. S.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
da Silva J. P.	Establishing Biogenicity, Mon, Conf Four	Deamer D.	Titan Prebiotic Chemistry Posters, Mon, Conf B
Dadachova E.	Quantum Chemistry Posters, Mon, Conf B	Deere T. M.	Biomolecular Evo, Thu, Salon Three
Dainis D.	Biological Radiation Energy Capture, Thu, Conf Two	Deininger W. D.	From Non-Enzymatic Catalysis Posters, Tue, Conf B
Daka O.	Radiation Effects: Microbes to Man, Mon, Salon One	Delano J.	Asteroids, Comets Posters, Tue, Conf A
Dalle Ore C. M.	Cross-Disciplinary Communication Posters, Thu, Conf A	DeLeon-Rodriguez N.	Astrobiology E/PO Posters, Thu, Conf A
Danielson D.	How Can Astrobiology Save World?, Mon, Ballroom	Delgado-Bonal A.	Biomolecular Evo, Thu, Salon Three
Darroch S. A.	Organic Continuum, Tue, Salon Five	Della Negra S.	Meta-omics of Microbial Mats, Tue, Salon One
Dartnell L.	Astrobiology in Historical Perspective, Fri, Conf Two	Delmas N.	Theodynamics, Disequilibrium, Mon, Conf Two
Dartois E.	Early Evo of Life Posters, Mon, Conf A	Demarais N.	Laboratory Astrochemistry Posters, Thu, Conf B
Das D.	Biological Radiation Energy Capture, Thu, Conf Two		Virus Ecology/ Astrovirology, Tue, Conf Two
	Survival in ET Environments, Mon, Conf Two		Laboratory Astrochemistry Posters, Thu, Conf B
	Astrobiology in Orbit Posters, Thu, Conf B		
	Chemical Evo, Tue, Salon Five		
	From Non-Enzymatic Catalysis Posters, Tue, Conf B		

# AUTHOR INDEX

DeMarines J.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five How Can Astrobiology Save World?, Mon, Ballroom Transmission into Space, Tue, Conf Two	Domagal-Goldman S.	Astrobiology E/PO, Tue, Conf Four Early Earth as Extrasolar Planet Proxy, Fri, Salon Five Exoplanet Habitability, Thu, Salon Three Exoplanet Habitability Posters, Thu, Conf A Habitability Metrics, Thu, Conf Two How Can Astrobiology Save World?, Mon, Ballroom
Demergasso C. S.	Microbiology/ Geochemistry, Wed, Conf Four	Dong F.	New Frontiers in Isotope Analysis, Fri, Salon Four
Demets R.	Astrobiology in Orbit Posters, Thu, Conf B	Dooley J.	Europa, Fri, Conf A
Demidov N. E.	Ice Life, Thu, Conf Four	Doose L. R.	Titan Prebiotic Chemistry, Mon, Salon Five
Deming J. W.	Molecular Tools Posters, Tue, Conf B	Doran P.	Extremeomics, Wed, Salon Three
Deming L. D.	Exoplanet Habitability Posters, Thu, Conf A	Dore J.	Ice Life, Thu, Conf Four
Dempsey B.	Subsurface Ecosystems, Fri, Conf A	Doucette D.	Astrobiology E/PO Posters, Thu, Conf A
Deng W.	Pattern and Prediction Posters, Tue, Conf B	Dougherty M.	Icy Worlds and Chemistry, Wed, Salon Three
Denning K.	Intelligence and Astrobiology, Fri, Salon Four Intersection of Astrobiology/ Society, Wed, Salon Four Societal Impact of ET Life, Thu, Salon Four	Douki T.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One
DePrince B. A.	Laboratory Astrochemistry Posters Thu, Conf B	Drossart P.	Icy Worlds and Chemistry, Wed, Salon Three Titan Prebiotic Chemistry Posters, Mon, Conf B
Des Marais D.	Mineralogy Indicates Aqueous, Fri, Salon Three	Drummond C.	Virus Ecology/ Astrovirology Posters, Tue, Conf B
Desmond T. O.	Intersection of Astrobiology/ Society Posters, Tue, Conf B	Dubois S.	Astrobiology E/PO Posters, Thu, Conf A
Despois D.	Extraterrestrial Biomolecule Posters Thu, Conf B	Dueck S.	Astrobiology E/PO, Tue, Conf Four
DeVeaux L. C.	Radiation Effects: Microbes to Man, Mon, Salon One	Dugan H. A.	Ice Life, Thu, Conf Four
DeVore E. K.	Astrobiology E/PO, Tue, Conf Four	Duin E. C.	From Non-Enzymatic Catalysis, Wed, Salon Five
DeYonker N. J.	Quantum Chemistry, Mon, Salon Four	Duke G. I.	Diversity in Research and Edu, Mon, Salon Four Diversity in Research and Edu Posters, Mon, Conf A
d'Hendecourt L.	Astrobiology in Orbit Posters, Thu, Conf B	Dulieu F.	Laboratory Astrochemistry, Thu, Salon Four
Di Mauro E.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A	Dumit J.	Microbial Ecosystems Posters, Mon, Conf B
Dibrova D. V.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One	Dundas C.	New Mars Posters, Tue, Conf A
Dick S. J.	Astrobiology in Historical Perspective, Fri, Conf Two Societal Impact of ET Life, Thu, Salon Four	Dunham C. M.	Translation Posters, Tue, Conf B
Diemer G. S.	Microbes in Space and Time Posters, Mon, Conf B Virus Ecology/ Astrovirology, Tue, Conf Two	Dunn B.	Experimental Evo, Fri, Salon One Experimental Evo Posters, Thu, Conf A
Direito S. O.	Survival in ET Environments, Mon, Conf Two	Dunér D.	Cross-Disciplinary Communication Posters, Thu, Conf A
DiRuggiero J.	Astrobiology of Planetesimals Posters, Mon, Conf B Microbiology/ Geochemistry, Wed, Conf Four Oxidation in Extreme Environments, Tue, Conf Four	Dupraz C.	Meta-omics of Microbial Mats, Tue, Salon One
DiSanti M. A.	Organic Continuum, Tue, Salon Five Taxonomy of Comets, Thu, Salon Five	Dutkiewicz S.	Habitability Metrics, Thu, Conf Two
Dissly R.	Icy Worlds and Chemistry Posters, Tue, Conf A Asteroids, Comets Posters, Tue, Conf A	Dworkin J. P.	Science of Mars Science Laboratory, Mon, Conf Two New Frontiers in Isotope Analysis, Fri, Salon Four
Dixon J. C.	Microbial Ecosystems, Mon, Salon Three	Dyar M. D.	Organic Continuum, Tue, Salon Five Organic Continuum Posters, Mon, Conf B
Doane W. E.	Astrobiology E/PO Posters, Thu, Conf A	Dynes J. J.	Microbial Ecosystems, Mon, Salon Three
Docal T.	Digital Media in Education, Wed, Salon Four	Echeverría A.	Microbes in Lithifying Systems Posters, Tue, Conf A
Doebeli M.	Experimental Evo, Fri, Salon One	Eckert C.	Microbiology/ Geochemistry, Wed, Conf Four
Dolas K.	Microbial Ecosystems Posters, Mon, Conf B Molecular Tools Posters, Tue, Conf B	Edgcomb V. P.	Print Only Meta-omics of Microbial Mats Posters, Mon, Conf B
Doloboff I. J.	From Non-Enzymatic Catalysis Posters, Tue, Conf B Mineral-based Catalysis, Tue, Conf Two	Edwards H.	Astrobiology in Orbit Posters, Thu, Conf B
Dolzhenko E.	Extremeomics, Wed, Salon Three	Edwards J. L.	Organic Continuum, Tue, Salon Five
		Edwards K. J.	Subsurface Ecosystems, Fri, Conf A
		Eggleslon S.	Astrobiology E/PO Posters, Thu, Conf A

# AUTHOR INDEX

Eguiarte L. E.	HGT in Innovation, Tue, Conf Four Meta-omics of Microbial Mats, Tue, Salon One Microbes in Space and Time, Tue, Salon Four Microbes in Space and Time Posters, Mon, Conf B	Fantle M.	New Frontiers in Isotope Analysis, Fri, Salon Four
Ehlmann B. L.	Mineralogy Indicates Aqueous, Fri, Salon Three Serpentinization, Thu, Salon Five	Faer J. D.	Microbes in Lithifying Systems Posters, Tue, Conf A
Ehrenfreund P.	Survival in ET Environments, Mon, Conf Two Asteroids, Comets, Wed, Conf Two Astrobiology in Orbit, Fri, Salon Five Astrobiology in Orbit Posters, Thu, Conf B How Can Astrobiology Save World?, Mon, Ballroom	Farquhar J.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five
Eigenbrode J. L.	Establishing Biogenicity, Mon, Conf Four Science of Mars Science Laboratory, Mon, Conf Two	Fayolle E.	Print Only
Eiler J. M.	Microbes in Lithifying Systems, Thu, Conf Four	Fecteau K. M.	Laboratory Astrochemistry, Thu, Salon Four
Eisen H.	Europa, Fri, Conf A	Fedo C.	Origin/ Evo of Photosynthesis Posters, Tue, Conf B
Eisenhauer A.	New Frontiers in Isotope Analysis, Fri, Salon Four	Feltzing S.	Establishing Biogenicity, Mon, Conf Four
Elam W. T.	Ice Life, Thu, Conf Four	Fendall M.	Origin/ Evo of Photosynthesis Posters, Tue, Conf B
Elbaz C.	Microbial Ecosystems Posters, Mon, Conf B	Feng X.	Cross-Disciplinary Communication Posters, Thu, Conf A
Elliot J.	Europa, Fri, Conf A	Fergusson J.	Exoplanet Habitability Posters, Thu, Conf A
Elsaesser A.	Astrobiology in Orbit Posters, Thu, Conf B	Fernandes D.	Translation, Wed, Salon One
Elser J.	Extremeomics Posters, Tue, Conf A Astroecology Posters, Mon, Conf B	Fernandez F.	Astrobiology E/PO Posters, Thu, Conf A
Elsila J. E.	Organic Continuum Posters, Mon, Conf B New Frontiers in Isotope Analysis, Fri, Salon Four Organic Continuum, Tue, Salon Five	Fernández P.	Organic Continuum, Tue, Salon Five
Emberson J.	Organic Continuum, Tue, Salon Five	Fernandez Y. R.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five
Emerson D.	From Genomes to Biomarkers, Mon, Conf Four History of Oxygenation, Mon, Conf Four	Fernandez-	Plausible Geochemical Conditions, Wed, Salon Five
Emry J. R.	Science of Mars Science Laboratory, Mon, Conf Two	Remolar D.	Subsurface Ecosystems, Fri, Conf A
Encrenaz T.	New Mars, Wed, Salon One	Ferrari K.	Asteroids, Comets, Wed, Conf Two
Engelhart A.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A	Ferris J. P.	Microbial Ecosystems, Mon, Salon Three
	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five	Field E.	Microbiology/ Geochemistry, Wed, Conf Four
Erd C.	Icy Worlds and Chemistry, Wed, Salon Three	Figewski N. M.	Subsurface Ecosystems, Fri, Conf A
Erives A. J.	Transition to Genetically Encoded Proteins, Wed, Conf Four	Fillion J.	Astrobiology E/PO Posters, Thu, Conf A
Erwin D. H.	Early Evo of Life Posters, Mon, Conf A From Genomes to Biomarkers, Mon, Conf Four	Findlay R. H.	Biomolecular Evo, Thu, Salon Three
Esmaili S.	Icy Worlds and Chemistry Posters, Tue, Conf A	Finke N.	Biomolecular Evo Posters, Tue, Conf B
Espinoza C.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Firneis M.	From Genomes to Biomarkers, Mon, Conf Four
Espitia J. M.	Diversity in Research and Edu, Mon, Salon Four	Fisher T. M.	Icy Worlds and Chemistry Posters, Tue, Conf A
Estlin T.	Robotics Technology, Fri, Conf Four	Flannery D.	Origin/ Evo of Photosynthesis, Thu, Conf Four
Eto M.	Astrobiology in Orbit Posters, Thu, Conf B Laboratory Astrochemistry, Thu, Salon Four	Flasar F. M.	Titan Prebiotic Chemistry, Mon, Salon Five
Eubanks T. M.	Quantifying Frequency Posters, Tue, Conf A	Fleming E.	History of Oxygenation, Mon, Conf Four
Evans A.	Chirality in Cosmochemistry, Fri, Conf Two	Flemming H.	Terrestrial Microbes on Mars?, Fri, Conf Four
Evans N. L.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One	Flemming R. L.	Astrobiology in Orbit, Fri, Salon Five
	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A	Fletcher L.	Microbes in Lithifying Systems Posters, Tue, Conf A
Fairen A. G.	Habitability Metrics, Thu, Conf Two	Flynn G. J.	Mineralogy and Aqueous Processes Posters, Thu, Conf B
		Fogel M.	Icy Worlds and Chemistry, Wed, Salon Three
		Foing B.	Icy Worlds and Chemistry, Wed, Salon Three
		Follows M. J.	Organic Continuum, Tue, Salon Five
		Foote E. J.	Astrobiology in Orbit, Fri, Salon Five
			Astrobiology in Orbit Posters, Thu, Conf B
			Survival in ET Environments, Mon, Conf Two
			Habitability Metrics, Thu, Conf Two
			Intersection of Astrobiology/ Society, Wed, Salon Four

# AUTHOR INDEX

Force M.	Biomolecular Evo, Thu, Salon Three	Gaddamnugu S.	Radiation Effects: Microbes to Man, Mon, Salon One
Ford E. B.	Print Only	Galante D.	Asteroids, Comets Posters, Tue, Conf A Biological Radiation Energy Capture, Thu, Conf Two
Fortenberry R. C.	Quantum Chemistry, Mon, Salon Four	Galantucci B.	Cross-Disciplinary Communication, Fri, Conf Two
Fortson S.	New Frontiers in Isotope Analysis, Fri, Salon Four	Gale J.	How Can Astrobiology Save World? Posters, Tue, Conf B
Foster I. S.	Microbes in Lithifying Systems Posters, Tue, Conf A	Gallagher K. L.	Meta-omics of Microbial Mats, Tue, Salon One
Foster J.	Astrobiology in Orbit Posters, Thu, Conf B Meta-omics of Microbial Mats, Tue, Salon One	Gallardo V.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
Fournier G.	Early Evo of Life I, Mon, Salon Three HGT in Innovation, Tue, Conf Four Transition to Genetically Encoded Proteins, Wed, Conf Four	Gallego I.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A
Fox G. E.	Extremeomics, Wed, Salon Three HGT in Innovation, Tue, Conf Four Last Universal Common Ancestor, Tue, Salon Three Microbes in Space and Time Posters, Mon, Conf B Translation, Wed, Salon One Translation Posters, Tue, Conf B	Gallon J.	Europa, Fri, Conf A
Francisco J. S.	Quantum Chemistry, Mon, Salon Four	Galperin M. Y.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One
Frantz C. M.	Microbes in Lithifying Systems, Thu, Conf Four	Garby T.	From Genomes to Biomarkers, Mon, Conf Four
Franz H.	Science of Mars Science Laboratory, Mon, Conf Two	Garcia R.	Mars Science Laboratory Posters, Mon, Conf B
	Mars Science Laboratory Posters, Mon, Conf B	García-Villadangos M.	Ice Life, Thu, Conf Four Microbiology/ Geochemistry, Wed, Conf Four Pattern and Prediction, Thu, Conf Two Subsurface Ecosystems, Fri, Conf A
Fraser H.	Astrobiology E/PO Posters, Thu, Conf A	Gardner N.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
Freeland S.	Transition to Genetically Encoded Proteins, Wed, Conf Four	Gargioli E.	Asteroids, Comets Posters, Tue, Conf A
Freeman K. H.	History of Oxygenation, Mon, Conf Four	Garner G.	Europa, Fri, Conf A
Freissinet C.	Science of Mars Science Laboratory, Mon, Conf Two	Garrido P.	Pattern and Prediction, Thu, Conf Two
French K. L.	O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A	Garrison D. H.	Meta-omics of Microbial Mats Posters, Mon, Conf B
Fricke W. F.	Microbiology/ Geochemistry, Wed, Conf Four	Garrod R.	Extraterrestrial Biomolecules, Fri, Salon Three Extraterrestrial Biomolecules Posters, Thu, Conf B UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
Fried B.	Diversity in Research and Edu, Mon, Salon Four	Gary T. P.	Diversity in Research and Edu, Mon, Salon Four
Friedel D.	Extraterrestrial Biomolecules Posters, Thu, Conf B	Gasda P.	Organic Continuum Posters, Mon, Conf B
Friedman M.	Radiation Effects: Microbes to Man, Mon, Salon One	Gasnault O.	Mineralogy Indicates Aqueous, Fri, Salon Three
Fries M. D.	Establishing Biogenicity, Mon, Conf Four	Gaucher E.	Astrobiology E/PO Posters, Thu, Conf A Experimental Evo, Fri, Salon One Minimal and Ancestral Genomes, Fri, Salon One
Fritsen C.	Ice Life, Thu, Conf Four	Gaudon P.	Asteroids, Comets Posters, Tue, Conf A
	Extremeomics, Wed, Salon Three	Gaynor J.	Astrobiology E/PO Posters, Thu, Conf A
Froesler J.	Astrobiology in Orbit, Fri, Salon Five	Gazan R.	Data Challenges Posters, Thu, Conf A How Do We Explain Ourselves? Posters, Thu, Conf A
Fu D.	Radiation Effects: Microbes to Man, Mon, Salon One	Ge J.	Quantifying Frequency Posters, Tue, Conf A
Fu Q.	New Frontiers in Isotope Analysis Posters, Thu, Conf B	Gelino D. M.	Quantifying Frequency, Thu, Salon One
	Oxidation in Extreme Environments, Tue, Conf Four	Gentry D.	Robotics Technology, Fri, Conf Four Microbes in Space and Time Posters, Mon, Conf B
Fuchs T.	Robotics Technology, Fri, Conf Four	Genzer M.	Science of Mars Science Laboratory, Mon, Conf Two
Fujishima K.	Astroecology Posters, Mon, Conf B		Mars Science Laboratory Posters, Mon, Conf B
	Terrestrial Microbes on Mars? Posters, Thu, Conf B	Geppert W. D.	Laboratory Astrochemistry, Thu, Salon Four
Fujishita M.	Societal Impact of ET Life Posters, Tue, Conf B	Gerakines P. A.	Icy Worlds and Chemistry, Wed, Salon Three
Fulton J. M.	History of Oxygenation, Mon, Conf Four	Getty S.	Robotics Technology Posters, Thu, Conf B
Furukawa Y.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A	Geurts K.	Asteroids, Comets Posters, Tue, Conf A

# AUTHOR INDEX

Gianturco F. A.	Quantum Chemistry, Mon, Salon Four Quantum Chemistry Posters, Mon, Conf B	Gonzalez-Merino B.	Quantifying Frequency Posters, Tue, Conf A
Gibb E.	Organic Continuum, Tue, Salon Five Organic Continuum Posters, Mon, Conf B Taxonomy of Comets, Thu, Salon Five	Goodwin J.	Chemical Evo, Tue, Salon Five Chemical Evo Posters, Mon, Conf A
Gibbings A.	Asteroids, Comets Posters, Tue, Conf A	Gophna U.	Molecular Tools Posters, Tue, Conf B
Gibson E. K.	New Frontiers in Isotope Analysis Posters, Thu, Conf B	Gordon A. D.	Mineral-based Catalysis, Tue, Conf Two
Gikonyo K.	Astrobiology E/PO Posters, Thu, Conf A	Goss K.	Translation, Wed, Salon One
Gilbert J. A.	Extremeomics Posters, Tue, Conf A	Goss M.	Extraterrestrial Biomolecules Posters, Thu, Conf B
Gilichinsky D.	Terrestrial Microbes on Mars?, Fri, Conf Four Ice Life, Thu, Conf Four	Gossett J.	Translation, Wed, Salon One $O_2$ and Evo: Ancient Biochemistry, Thu, Salon One
Gillespie A.	Microbial Ecosystems, Mon, Salon Three	Gowanlock M.	Data Challenges Posters, Thu, Conf A
Gilmour I.	Survival in ET Environments, Mon, Conf Two	Grabenstatter J.	Establishing Biogenicity, Mon, Conf Four From Genomes to Biomarkers Posters, Mon, Conf A
Giri C.	Chirality in Cosmochemistry, Fri, Conf Two	Grace J. M.	Microbes in Space and Time Posters, Mon, Conf B
Girvan M.	Habitability Metrics, Thu, Conf Two	Grady M. M.	Astrobiology of Planetary Minerals Posters, Mon, Conf B
Gkigkitzis I.	Astrobiology in Orbit Posters, Thu, Conf B	Granda A.	Microbiology/ Geochemistry, Wed, Conf Four
Glass J. B.	Microbes in Space and Time, Tue, Salon Four	Granshaw F. D.	Digital Media in Education, Wed, Salon Four
Glavin D. P.	Science of Mars Science Laboratory, Mon, Conf Two Mars Science Laboratory Posters, Mon, Conf B New Frontiers in Isotope Analysis, Fri, Salon Four	Grant K. C.	Astrobiology in Orbit Posters, Thu, Conf B
	Organic Continuum, Tue, Salon Five Organic Continuum Posters, Mon, Conf B	Grasby S. E.	Pattern and Prediction, Thu, Conf Two
Gleeson D.	Microbiology/ Geochemistry, Wed, Conf Four	Grasset O.	Icy Worlds and Chemistry, Wed, Salon Three
Glenar D. A.	Robotics Technology Posters, Thu, Conf B	Greaves J.	Astrobiology E/PO Posters, Thu, Conf A
Goessmann F.	Chirality in Cosmochemistry, Fri, Conf Two	Greenberg R.	Europa, Fri, Conf A
Gogarten J.	Early Evo of Life I, Mon, Salon Three Extremeomics Posters, Tue, Conf A HGT in Innovation, Tue, Conf Four	Greenwood J.	Astrobiology E/PO Posters, Thu, Conf A
	HGT in Innovation Posters, Mon, Conf A	Greenwood M.	Astrobiology in Historical Perspective Posters, Thu, Conf A
Goguen J. D.	Icy Worlds and Chemistry Posters, Tue, Conf A	Grice K.	$O_2$ and Evo: Look to the Past, Tue, Salon Four
Gold D. A.	Intelligence and Astrobiology, Fri, Salon Four	Grieves G. A.	Titan Prebiotic Chemistry Posters, Mon, Conf B
Goldblatt C.	Exoplanet Habitability Posters, Thu, Conf A	Griffin P.	Microbes in Space and Time Posters, Mon, Conf B
Goldman A. D.	Early Evo of Life Posters, Mon, Conf A Extremeomics, Wed, Salon Three From Non-Enzymatic Catalysis, Wed, Salon Five Last Universal Common Ancestor, Tue, Salon Three	Griffiths A. D.	Biological Radiation Energy Capture, Thu, Conf Two
Goldman N.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A	Grimberg I.	Diversity in Research and Edu Posters, Mon, Conf A
Goldschmidt G.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A	Grinspoon D.	How Can Astrobiology Save World?, Mon, Ballroom
Gómez F.	Mars Science Laboratory Posters, Mon, Conf B Microbiology/ Geochemistry, Wed, Conf Four Subsurface Ecosystems, Fri, Conf A	Gronstal A. L.	Astrobiology in Historical Perspective, Fri, Conf Two How Do We Explain Ourselves? Posters, Thu, Conf A
Gómez M. J.	Pattern and Prediction, Thu, Conf Two Ice Life, Thu, Conf Four Microbiology/ Geochemistry, Wed, Conf Four	Grossman J.	Plausible Geochemical Conditions, Wed, Salon Five Biomolecular Evo, Thu, Salon Three
Gómez Z.	HGT in Innovation, Tue, Conf Four	Grote J.	Microbes in Space and Time, Tue, Salon Four
Gomez-Elvira J.	Science of Mars Science Laboratory, Mon, Conf Two	Grover M.	Chemical Evo, Tue, Salon Five Translation Posters, Tue, Conf B
Gómez-Ortíz D.	Mars Science Laboratory Posters, Mon, Conf B Microbiology/ Geochemistry, Wed, Conf Four Subsurface Ecosystems, Fri, Conf A	Gruen D.	Biomolecular Evo Posters, Tue, Conf B
	Microbiology/ Geochemistry, Wed, Conf Four	Grunthaner F.	Robotics Technology, Fri, Conf Four
Gómez-Ortíz D.	Microbial Ecosystems, Mon, Salon Three	Grunthaner F.	Oxidation in Extreme Environments, Tue, Conf Four
Gonsior M.	Establishing Biogenicity Posters, Mon, Conf A	Gröcke D. R.	$O_2$ and Evo: Look to the Past Posters, Mon, Conf A
		Guandique E.	Titan Prebiotic Chemistry, Mon, Salon Five Europa, Fri, Conf A

# AUTHOR INDEX

Gudipati M. S.	Icy Worlds and Chemistry, Wed, Salon Three Titan Prebiotic Chemistry, Mon, Salon Five	Hansel C.	Oxidation in Extreme Environments, Tue, Conf Four
Gulecal Y.	Meta-omics of Microbial Mats Posters, Mon, Conf B Serpentinization Posters, Thu, Conf B	Hansma H. G.	Last Universal Common Ancestor, Tue, Salon Three
Gulen B.	Translation, Wed, Salon One	Hanson M.	New Mars Posters, Tue, Conf A
Gulian L.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A	Haqq-Misra J.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five Societal Impact of ET Life Posters, Tue, Conf B Transmission into Space, Tue, Conf Two Transmission into Space Posters, Thu, Conf A
Gull M.	Biomolecular Evo Posters, Tue, Conf B	Haranas I.	Astrobiology in Orbit Posters, Thu, Conf B
Gunner M. R.	Origin/ Evo of Photosynthesis, Thu, Conf Four	Hardegree-Ullman E.	Extraterrestrial Biomolecules Posters Thu, Conf B
Gupta A.	Societal Impact of ET Life, Thu, Salon Four	Harish A.	Translation Posters, Tue, Conf B
Gupta A.	Biomolecular Evo Posters, Tue, Conf B	Harju J.	Extraterrestrial Biomolecules Postes,Thu, ConfB
Gupta H.	Print Only	Haan P. K.	Astrobiology E/PO, Tue, Conf Four Astrobiology E/PO Posters, Thu, Conf A
Gupta M.	New Frontiers in Isotope Analysis, Fri, Salon Four	Harmmeijer J.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five
Gupta R. S.	Print Only	Harnoto R. S.	Radiation Effects: Microbes to Man, Mon, Salon One
Gupta V. K.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A	Harouaka K.	New Frontiers in Isotope Analysis, Fri, Salon Four
Gustavsson T.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One	Harp G. R.	Societal Impact of ET Life Posters, Tue, Conf B Transmission into Space, Tue, Conf Two
Guy B.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Harpool J. D.	Terrestrial Microbes on Mars? Posters, Thu, Conf B
Guzmán-Maolejo A.	Exoplanet Habitability Posters, Thu, Conf A	Harri A. M.	Science of Mars Science Laboratory, Mon, Conf Two Mars Science Laboratory Posters, Mon, Conf B
Gygli P. E.	Radiation Effects: Microbes to Man, Mon, Salon One	Harris B.	Extraterrestrial Biomolecules, Fri, Salon Three
Ha C. T.	Radiation Effects: Microbes to Man, Mon, Salon One	Hartman H.	Last Universal Common Ancestor, Tue, Salon Three Origin/ Evo of Photosynthesis, Thu, Conf Four
Haberle R. M.	Mars Science Laboratory Posters, Mon, Conf B	Hartogh P.	New Mars, Wed, Salon One
Haghhighi N.	Exoplanet Habitability, Thu, Salon Three	Harvey S. C.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One Transition to Genetically Encoded Proteins, Wed, Conf Four Translation, Wed, Salon One Translation Posters, Tue, Conf B
Hahm S.	Translation Posters, Tue, Conf B	Hashimoto H.	Astrobiology in Orbit Posters, Thu, Conf B
Hair T. W.	Transmission into Space, Tue, Conf Two	Haugner J. C.	From Non-Enzymatic Catalysis, Wed, Salon Five
Halfen D. T.	Extraterrestrial Biomolecule Posters Thu, Conf B	Hausrath E. M.	Microbes in Space and Time Posters, Mon, Conf B
Hallis L.	Mineralogy and Aqueous Processes Posters, Thu, Conf B	Havig J.	Ice Life, Thu, Conf Four Pattern and Prediction, Thu, Conf Two Origin/ Evo of Photosynthesis Posters, Tue, Conf B
Hallmann C.	Establishing Biogenicity, Mon, Conf Four Establishing Biogenicity Posters, Mon, Conf A	Hawes I.	Europa, Fri, Conf A Microbes in Space and Time, Tue, Salon Four Ice Life Posters, Thu, Conf B
Hama T.	Laboratory Astrochemistry, Thu, Salon Four Laboratory Astrochemistry Posters, Thu, Conf B	Hays B.	Microbial Ecosystems, Mon, Salon Three Laboratory Astrochemistry Posters, Thu, Conf B
Hamann B.	Microbial Ecosystems Posters, Mon, Conf B	Hays L.	Microbial Ecosystems, Mon, Salon Three From Genomes to Biomarkers, Mon, Conf Four
Hamberg M.	Laboratory Astrochemistry, Thu, Salon Four	Hazen R. M.	Plausible Geochemical Conditions, Wed, Salon Five
Hamersley M. R.	Science of Mars Science Laboratory, Mon, Conf Two		
Hamilton T.	Europa, Fri, Conf A From Non-Enzymatic Catalysis, Wed, Salon Five Ice Life, Thu, Conf Four Microbes in Space and Time, Tue, Salon Four Pattern and Prediction Posters, Tue, Conf B Origin/ Evo of Photosynthesis Posters, Tue, Conf B		
Hammond D.	Microbes in Lithifying Systems, Thu, Conf Four		
Hand K.	Diversity in Research and Edu Posters, Mon, Conf A Europa, Fri, Conf A How Can Astrobiology Save World?, Mon, Ballroom		
Hanger R.	O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A		

# AUTHOR INDEX

He C.	Titan Prebiotic Chemistry Posters, Mon, Conf B	Hoehler T.	Europa, Fri, Conf A
Head J.	Terrestrial Microbes on Mars? Posters, Thu, Conf B		Habitability Metrics, Thu, Conf Two
Hecht M.	Robotics Technology, Fri, Conf Four	Hoffmann S.	Serpentinization Posters, Thu, Conf B
	Minimal and Ancestral Genomes, Fri, Salon One	Hogan B. P.	Chirality in Cosmochemistry, Fri, Conf Two
Hedges S.	Digital Media in Education, Wed, Salon Four	Holden J. F.	Ice Life, Thu, Conf Four
	Early Evo of Life I, Mon, Salon Three	Holmberg G.	Pattern and Prediction Posters, Tue, Conf B
Hein J.	Chirality in Cosmochemistry, Fri, Conf Two	Honchak B.	Cross-Disciplinary Communication Posters, Thu, Conf A
Hellebrand E.	Asteroids, Comets Posters, Tue, Conf A	Hong K. S.	Origin/ Evo of Photosynthesis Posters, Tue, Conf B
Heller R.	Exoplanet Habitability Posters, Thu, Conf A	Hong P. K.	Serpentinization Posters, Thu, Conf B
Helz G. R.	History of Oxygenation, Mon, Conf Four	Hong S. K.	Exoplanet Habitability Posters, Thu, Conf A
Henneberger R.	Microbial Ecosystems Posters, Mon, Conf B	Hopkins J. M.	Environmental Physics and Life Posters, Tue, Conf A
M.		Horikawa D.	Asteroids, Comets Posters, Tue, Conf A
Henry T. J.	Quantifying Frequency, Thu, Salon One	Horita J.	Radiation Effects: Microbes to Man, Mon, Salon One
	Quantifying Frequency Posters, Tue, Conf A	Horiuchi M.	New Frontiers in Isotope Analysis, Fri, Salon Four
Herbert J.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One	Horne A. J.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A
Herbst E.	Extraterrestrial Biomolecules, Fri, Salon Three	Horne D.	Oxidation in Extreme Environments, Tue, Conf Four
	Icy Worlds and Chemistry, Wed, Salon Three	Horneck G.	Extraterrestrial Biomolecules Poster Thu, Conf B
	Organic Continuum Posters, Mon, Conf B	Horodyskyj L.	Astrobiology in Orbit, Fri, Salon Five
	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A	Horst S.	Astrobiology in Orbit Posters, Thu, Conf B
Herd C. D.	Organic Continuum, Tue, Salon Five	Hosey A. D.	Digital Media in Education, Wed, Salon Four
Herrera Y.	Diversity in Research and Edu Posters, Mon, Conf A	Hoskyns S. J.	Titan Prebiotic Chemistry Posters, Mon, Conf B
Herann A. D.	History of Oxygenation, Mon, Conf Four	Hotz R.	Quantifying Frequency Posters, Tue, Conf A
	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Hotzel S.	Translation, Wed, Salon One
Herron M. D.	Experimental Evo, Fri, Salon One	House C.	Translation Posters, Tue, Conf B
Hershkovitz E.	Translation Posters, Tue, Conf B	Hredzak-Showalter P.	How Do We Explain Ourselves? Plenary, Thu, Ballroom
Hertkorn N.	Establishing Biogenicity Posters, Mon, Conf A	Hsiao C.	Extraterrestrial Biomolecules Poster Thu, Conf B
Herzing D. L.	Intelligence and Astrobiology, Fri, Salon Four		Asteroids, Comets Posters, Tue, Conf A
Hewagama T.	Exoplanet Habitability Posters, Thu, Conf A		Microbes in Space and Time, Tue, Salon Four
Hickman A.	Early Evo of Life I, Mon, Salon Three		Biomolecular Evo Posters, Tue, Conf B
Higgins M. B.	Microbial Ecosystems, Mon, Salon Three		Molecular Tools, Wed, Conf Two
Higgs P.	Minimal and Ancestral Genomes, Fri, Salon One		History of Oxygenation, Mon, Conf Four
Hiji Y.	New Mars Posters, Tue, Conf A		Transition to Genetically Encoded Proteins, Wed, Conf Four
Hill F. C.	Plausible Geochemical Conditions, Wed, Salon Five		Early Evo of Life Posters, Mon, Conf A
	UV Radiation in Prebiotic Chemistry II, Tue, Salon One		O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One
Hill G. A.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A	Hsieh H.	Translation, Wed, Salon One
Hinkel N. R.	Quantifying Frequency, Thu, Salon One	Huang J.	Translation Posters, Tue, Conf B
Hinman N.	Establishing Biogenicity Posters, Mon, Conf A		Asteroids, Comets Posters, Tue, Conf A
	Microbial Ecosystems Posters, Mon, Conf B		Print Only
Hirata A.	From Non-Enzymatic Catalysis, Wed, Salon Five	Huang X.	HGT in Innovation, Tue, Conf Four
Hironaka Y.	Organic Continuum, Tue, Salon Five		HGT in Innovation Posters, Mon, Conf A
Hirtzig M.	Titan Prebiotic Chemistry Posters, Mon, Conf B		Meta-omics of Microbial Mats, Tue, Salon One
Ho J.	Astroecology Posters, Mon, Conf B		Meta-omics of Microbial Mats Posters, Mon, Conf B
Hodum D.	Astrobiology E/PO Posters, Thu, Conf A	Huang Y.	Quantum Chemistry Posters, Mon, Conf B
Hodyss R.	Icy Worlds and Chemistry Posters, Tue, Conf A		Terrestrial Microbes on Mars? Posters, Thu, Conf B
	Prospecting for Life Posters, Mon, Conf A		Establishing Biogenicity Posters, Mon, Conf A
	Titan Prebiotic Chemistry Posters, Mon, Conf B		
Hoefl S. E.	Pattern and Prediction Posters, Tue, Conf B		

# AUTHOR INDEX

Hud N.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One Translation, Wed, Salon One  Chemical Evo, Tue, Salon Five Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A Transition to Genetically Encoded Proteins, Wed, Conf Four Translation Posters, Tue, Conf B UV Radiation in Prebiotic Chemistry II, Tue, Salon One	Jahnert R. Jahnke L.  Jamal A. Jangir G. Jankowiak R. Janot Pacheco E.  Jao W. C. Jaumann R.  Jennings D. E. Jennings M.  Jensen E. Jepkemboi M.  Jerez A. F.  Jessberger E. Jewitt D. Jezequel D. Jiang Z.  Jiao H. Jimenez Hernandez M. F.  Johnson A. Johnson C.  Johnson J. W. Johnson L. Johnson N. M. Johnson P. V.  Johnson S. J.  Johnson T. V. Jones B. L.  Jones C. Jones D. S. Jones M. Jordan J. Joseph J. C. Joshi M. M. Joshi P. C.	Meta-omics of Microbial Mats, Tue, Salon One Microbial Ecosystems Posters, Mon, Conf B Virus Ecology/ Astrovirology, Tue, Conf Two  Titan Prebiotic Chemistry, Mon, Salon Five Microbial Ecosystems Posters, Mon, Conf B Translation, Wed, Salon One Asteroids, Comets Posters, Tue, Conf A Biological Radiation Energy Capture, Thu, Conf Two  Quantifying Frequency, Thu, Salon One Icy Worlds and Chemistry, Wed, Salon Three Titan Prebiotic Chemistry Posters, Mon, Conf B  Titan Prebiotic Chemistry, Mon, Salon Five From Non-Enzymatic Catalysis, Wed, Salon Five O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One  Prospecting for Life Posters, Mon, Conf A Environmental Physics and Life Posters, Tue, Conf A  Diversity in Research and Edu, Mon, Salon Four  Astrobiology in Orbit, Fri, Salon Five Asteroids, Comets, Wed, Conf Two History of Oxygenation, Mon, Conf Four Radiation Effects: Microbes to Man, Mon, Salon One  Prospecting for Life Posters, Mon, Conf A Astrobiology E/PO Posters, Thu, Conf A Robotics Technology, Fri, Conf Four Robotics Technology Posters, Thu, Conf B Diversity in Research and Edu, Mon, Salon Four  Europa, Fri, Conf A Establishing Biogenicity, Mon, Conf Four Microbial Ecosystems Posters, Mon, Conf B Mineralogy and Aqueous Processes Posters, Thu, Conf B  Astrobiology E/PO Posters, Thu, Conf A Asteroids, Comets Posters, Tue, Conf A Organic Continuum Posters, Mon, Conf B Icy Worlds and Chemistry Posters, Tue, Conf A Prospecting for Life Posters, Mon, Conf A  Chemical Evo, Tue, Salon Five Chemical Evo Posters, Mon, Conf A Transition to Genetically Encoded Proteins, Wed, Conf Four  Asteroids, Comets Posters, Tue, Conf A Digital Media in Education, Wed, Salon Four Translation Posters, Tue, Conf B  Theodynamics, Disequilibrium, Mon, Conf Two Subsurface Ecosystems, Fri, Conf A  Societal Impact of ET Life, Thu, Salon Four Transmission into Space, Tue, Conf Two Biomolecular Evo, Thu, Salon Three  Exoplanet Habitability Posters, Thu, Conf A Biomolecular Evo, Thu, Salon Three Biomolecular Evo Posters, Tue, Conf B
Hudson R. L.	Icy Worlds and Chemistry, Wed, Salon Three		
Huels M. A.	Icy Worlds and Chemistry Posters, Tue, Conf A		
Hug W. F.	Subsurface Ecosystems, Fri, Conf A		
Hunter S. E.	History of Oxygenation, Mon, Conf Four		
Huseynova I. M.	Radiation Effects: Microbes to Man Posters, Mon, Conf A		
Huss G. R.	Mineralogy and Aqueous Processes Posters, Thu, Conf B		
Hussman H.	Icy Worlds and Chemistry, Wed, Salon Three		
Ibarra Y.	Microbes in Lithifying Systems, Thu, Conf Four		
Igbinosun O.	Survival in ET Environments Posters, Tue, Conf A		
Ikehara M.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four		
Ilardo M.	Transition to Genetically Encoded Proteins, Wed, Conf Four		
Illangkoon H.	Digital Media in Education Posters, Tue, Conf B  How Can Astrobiology Save World?, Mon, Ballroom  How Do We Explain Ourselves? Posters, Thu, Conf A		
Imai E.	Astrobiology in Orbit Posters, Thu, Conf B		
Imamura H.	Asteroids, Comets Posters, Tue, Conf A		
Imanaka H.	Print Only  UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A		
Impey C.	Astrobiology in Historical Perspective, Fri, Conf Two  Digital Media in Education Posters, Tue, Conf B  How Do We Explain Ourselves? Posters, Thu, Conf A		
Intemann K.	How Can Astrobiology Save World? Posters, Tue, Conf B		
Irwin L. N.	Habitability Metrics, Thu, Conf Two		
Irwin P. G.	Titan Prebiotic Chemistry Posters, Mon, Conf B		
Ishii S.	Serpentinization Posters, Thu, Conf B		
Ito T.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four		
Ivarsson M.	Environmental Physics and Life Posters, Tue, Conf A  Subsurface Ecosystems, Fri, Conf A		
Izawa M.	Microbiology/ Geochemistry, Wed, Conf Four  Microbes in Lithifying Systems Posters, Tue, Conf A  Microbial Ecosystems, Mon, Salon Three		
Jacobsen K.	Astrobiology E/PO, Tue, Conf Four		
Jacovi R.	Titan Prebiotic Chemistry, Mon, Salon Five		
Jagota S.	Titan Prebiotic Chemistry Posters, Mon, Conf B		

# AUTHOR INDEX

Josset J.	Robotics Technology, Fri, Conf Four	Kavanagh H.	Serpentinization Posters, Thu, Conf B
Joye S. B.	Ice Life Posters, Thu, Conf B Microbes in Space and Time, Tue, Salon Four	Kawai H.	Astrobiology in Orbit Posters, Thu, Conf B
Juarez Rivera M.	Microbes in Lithifying Systems Posters, Tue, Conf A	Kawai J.	Titan Prebiotic Chemistry Posters, Mon, Conf B
Jungbluth S.	Microbes in Space and Time, Tue, Salon Four	Kawamoto Y.	Astrobiology in Orbit Posters, Thu, Conf B Laboratory Astrochemistry, Thu, Salon Four
Kadono T.	Asteroids, Comets Posters, Tue, Conf A Organic Continuum, Tue, Salon Five	Keane J.	Taxonomy of Comets, Thu, Salon Five
Kadooka M.	Astrobiology E/PO Posters, Thu, Conf A Digital Media in Education, Wed, Salon Four	Keane T.	Biomolecular Evo, Thu, Salon Three
Kahanpää H.	Mars Science Laboratory Posters, Mon, Conf B	Kebukawa Y.	Organic Continuum, Tue, Salon Five
Kaiser R. I.	Titan Prebiotic Chemistry, Mon, Salon Five	Kee T. P.	Biomolecular Evo Posters, Tue, Conf B
Kakegawa T.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A Origin/ Evo of Photosynthesis Posters, Tue, Conf B	Keelor J. D.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five
Kakuk B.	Microbes in Lithifying Systems, Thu, Conf Four	Kellogg L.	Microbial Ecosystems Posters, Mon, Conf B
Kalkan O.	Meta-omics of Microbial Mats Posters, Mon, Conf B	Kelly S. B.	Diversity in Research and Edu Posters, Mon, Conf A
Kaltenegger L.	Exoplanet Habitability, Thu, Salon Three Habitability Metrics Posters, Tue, Conf A	Kempes C.	Habitability Metrics, Thu, Conf Two
Kaluna H.	Asteroids, Comets, Wed, Conf Two Asteroids, Comets Posters, Tue, Conf A	Kendall B.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
Kaminska M.	Laboratory Astrochemistry, Thu, Salon Four	Kent R. E.	Astroecology Posters, Mon, Conf B
Kancewicz-Hoffman N.	Intersection of Astrobiology/ Society, Wed, Salon Four	Khajo A.	Biological Radiation Energy Capture, Thu, Conf Two
Kanda K.	Laboratory Astrochemistry, Thu, Salon Four	Khan A.	Terrestrial Microbes on Mars?, Fri, Conf Four
Kane S.	Quantifying Frequency, Thu, Salon One	Khanam J.	Titan Prebiotic Chemistry Posters, Mon, Conf B
Kaneko T.	Laboratory Astrochemistry, Thu, Salon Four	Khare B.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
Kanik I.	From Non-Enzymatic Catalysis Posters, Tue, Conf B	Khodadad C.	Plausible Geochemical Conditions, Wed, Salon Five
	Icy Worlds and Chemistry Posters, Tue, Conf A Mineral-based Catalysis, Tue, Conf Two	Kiang N. Y.	Titan Prebiotic Chemistry Posters, Mon, Conf B
Kanja P.	How Can Astrobiology Save World?, Mon, Ballroom	Kim H.	Meta-omics of Microbial Mats, Tue, Salon One
Kannan L.	Minimal and Ancestral Genomes, Fri, Salon One	Kim K. M.	Astrobiology in Orbit Posters, Thu, Conf B
Karalkar N. B.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One	Kimura Y.	Origin/ Evo of Photosynthesis, Thu, Conf Four
Karan R.	Radiation Effects: Microbes to Man, Mon, Salon One	Kinahan S.	Biomolecular Evo Posters, Tue, Conf B
Karkoschka E.	Titan Prebiotic Chemistry, Mon, Salon Five	King P. L.	Titan Prebiotic Chemistry, Mon, Salon Five
Karouia F.	Robotics Technology, Fri, Conf Four	Kinnersley M.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One
Karr E. A.	Oxidation in Extreme Environments, Tue, Conf Four	Kirven-Brooks M. J.	Last Universal Common Ancestor, Tue, Salon Three
Karunatillake S.	Mineralogy Indicates Aqueous, Fri, Salon Three	Kishimoto D. E.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One
Kasting J. F.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five	Kisiel Z.	Laboratory Astrochemistry Posters, Thu, Conf B
	Exoplanet Habitability, Thu, Salon Three	Kislov V. V.	Astrobiology E/PO Posters, Thu, Conf A
	Exoplanet Habitability Posters, Thu, Conf A	Kitajima K.	Extraterrestrial Biomolecules Posters, Thu, Conf B
	O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A	Kiyokawa S.	Titan Prebiotic Chemistry, Mon, Salon Five
Katayama T.	Radiation Effects: Microbes to Man, Mon, Salon One	Klaasen K.	Establishing Biogenicity, Mon, Conf Four
Kater L.	Establishing Biogenicity, Mon, Conf Four	Kleber T.	Microbial Ecosystems, Mon, Salon Three
Katz L. A.	Early Evo of Life I, Mon, Salon Three	Kloysuntia A.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
	Early Evo of Life II, Tue, Salon Three	Klug S.	Europa, Fri, Conf A
Kaufl H. U.	New Mars, Wed, Salon One		Translation Posters, Tue, Conf B
			Serpentinization Posters, Thu, Conf B
			Digital Media in Education, Wed, Salon Four

# AUTHOR INDEX

Klug Boonstra S.	Digital Media in Education Posters, Tue, Conf L	Kroll J. A.	Laboratory Astrochemistry Poster, Thu, Conf B
	B		Extraterrestrial Biomolecules, Fri, Salon Three
Knoll A. H.	Early Evo of Life II, Tue, Salon Three		Extraterrestrial Biomolecules Poster Thu, Conf B
Knowles E. J.	Establishing Biogenicity Posters, Mon, Conf A		Laboratory Astrochemistry Poster Thu, Conf B
Kobashigawa C.	Print Only	Kros A.	Astrobiology in Orbit Posters, Thu, Conf B
Kobayashi D.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Kruckeberg A. L.	Experimental Evo Posters, Thu, Conf A
Kobayashi K.	Titan Prebiotic Chemistry Posters, Mon, Conf B	Kruglyak L.	Extremeomics, Wed, Salon Three
	Astrobiology in Orbit Posters, Thu, Conf B	Krupp N.	Icy Worlds and Chemistry, Wed, Salon Three
	Laboratory Astrochemistry, Thu, Salon Four	Krützen M.	Intelligence and Astrobiology, Fri, Salon Four
Kobayashi Y.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Kuan Y.	Taxonomy of Comets, Thu, Salon Five
Koirala M.	Translation, Wed, Salon One	Kubala J. M.	Chemical Evo Posters, Mon, Conf A
Kolb V. M.	Chemical Evo, Tue, Salon Five	Kubo M.	Serpentinization Posters, Thu, Conf B
Kolokolova L.	Chirality in Cosmochemistry, Fri, Conf Two	Kudryavtsev A.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
Koncz A.	Terrestrial Microbes on Mars?, Fri, Conf Four		Microbes in Lithifying Systems Posters, Tue, Conf A
Kondo T.	Organic Continuum, Tue, Salon Five	Kuenen J. G.	Serpentinization Posters, Thu, Conf B
Konhauser K.	Establishing Biogenicity, Mon, Conf Four	Kuhlman K.	Molecular Tools, Wed, Conf Two
	Origin/ Evo of Photosynthesis Posters, Tue, Conf B	Kuhn E.	Extremeomics, Wed, Salon Three
	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Kulkarni R.	Microbial Ecosystems Posters, Mon, Conf B
Konishi H.	Establishing Biogenicity Posters, Mon, Conf A	Kultys M.	Cross-Disciplinary Communication, Fri, Conf Two
Konstantinidis K.	Meta-omics of Microbial Mats, Tue, Salon One	Kumar A.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One
Koonin E.	Virus Ecology/ Astrovirology, Tue, Conf Two	Kumar S.	Digital Media in Education, Wed, Salon Four
Koonin E.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One	Kumar Neelam D.	Early Evo of Life II, Tue, Salon Three
Kopparapu R.	Exoplanet Habitability, Thu, Salon Three	Kump L. R.	Microbial Ecosystems Posters, Mon, Conf B
Korbitz A.	Intersection of Astrobiology/ Society, Wed, Salon Four		History of Oxygenation, Mon, Conf Four
	Print Only		O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A
	Transmission into Space, Tue, Conf Two	Kuner S.	Diversity in Research and Edu, Mon, Salon Four
Korpela E.	Cross-Disciplinary Communication, Fri, Conf Two	Kunieda T.	Radiation Effects: Microbes to Man, Mon, Salon One
Kotler J. M.	Microbial Ecosystems Posters, Mon, Conf B	Kurth W.	Europa, Fri, Conf A
	Survival in ET Environments, Mon, Conf Two	Kyle J. E.	Microbial Ecosystems Posters, Mon, Conf B
Kouchi A.	Laboratory Astrochemistry, Thu, Salon Four	Kyriakopoulos K.	Virus Ecology/ Astrovirology, Tue, Conf Two
	Laboratory Astrochemistry Posters, Thu, Conf B	Kyriazis S.	Titan Prebiotic Chemistry Posters, Mon, Conf B
Koujelev A.	Microbial Ecosystems, Mon, Salon Three		How Can Astrobiology Save World?, Mon, Ballroom
Kounaves S.	Robotics Technology, Fri, Conf Four	La Duc M.	Molecular Tools, Wed, Conf Two
Kouris A.	Microbes in Space and Time Posters, Mon, Conf B	Laas J. C.	Extraterrestrial Biomolecules, Fri, Salon Three
Kovaliczký É.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A		Extraterrestrial Biomolecules Posters, Thu, Conf B
Kral T.	Terrestrial Microbes on Mars? Posters, Thu, Conf B		UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
	Survival in ET Environments Posters, Tue, Conf A	Lacrampe-Couloume G.	Serpentinization, Thu, Salon Five
Krause C.	Asteroids, Comets Posters, Tue, Conf A	Laflamme M.	Early Evo of Life Posters, Mon, Conf A
Krebs J. E.	Microbes in Space and Time Posters, Mon, Conf B		From Genomes to Biomarkers, Mon, Conf Four
Krepški S. T.	History of Oxygenation, Mon, Conf Four	Lage C. A.	Asteroids, Comets Posters, Tue, Conf A
Kreylos O.	Microbial Ecosystems Posters, Mon, Conf B		Biological Radiation Energy Capture, Thu, Conf Two
Krim L.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A	Lahr D.	Early Evo of Life II, Tue, Salon Three
Krishnamurthy Y.	Origin/ Evo of Photosynthesis Posters, Tue, Conf B	Lai B.	Early Evo of Life Posters, Mon, Conf A
Krivushin K.	Terrestrial Microbes on Mars?, Fri, Conf Four		Oxidation in Extreme Environments, Tue, Conf Four
Kroll E.	Experimental Evo Posters, Thu, Conf A	Laidler J. R.	Virus Ecology/ Astrovirology, Tue, Conf Two
	Experimental Evo, Fri, Salon One	Landera A.	Titan Prebiotic Chemistry, Mon, Salon Five

# AUTHOR INDEX

Landfester U.	Intersection of Astrobiology/ Society, Wed, Salon Four	Lee Z.	Astroecology Posters, Mon, Conf B
Landis R. R.	Asteroids, Comets Posters, Tue, Conf A	Lee Van Dover C.	Extremeomics Posters, Tue, Conf A
Landweber L.	Early Evo of Life Posters, Mon, Conf A	Lehman N.	Astrobiology E/PO, Tue, Conf Four
	Extremeomics, Wed, Salon Three	Lehmann K.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five
	From Non-Enzymatic Catalysis, Wed, Salon Five	Leitner J. J.	Extraterrestrial Biomolecules, Fri, Salon Three
	Last Universal Common Ancestor, Tue, Salon Three	Lemaire J.	Mars Science Laboratory Posters, Mon, Conf B
Lang S. Q.	Serpentinization Posters, Thu, Conf B	Lenski R. E.	Societal Impact of ET Life Posters, Tue, Conf B
Langston G. I.	Extraterrestrial Biomolecules Posters, Thu, Conf B		Titan Prebiotic Chemistry Posters, Mon, Conf B
Lannan F. M.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A	Lenski R. E.	Laboratory Astrochemistry, Thu, Salon Four
Laos R.	Experimental Evo, Fri, Salon One	Lenz T. K.	Experimental Evo, Fri, Salon One
Lapen T. J.	Mineralogy and Aqueous Processes Posters, Thu, Conf B	Lepinette A.	Oxidation in Extreme Environments, Tue, Conf Four
Larkum A. W.	From Genomes to Biomarkers, Mon, Conf Four	Lepland A.	Translation, Wed, Salon One
Larsson M.	Laboratory Astrochemistry, Thu, Salon Four	Lepot K.	Mars Science Laboratory Posters, Mon, Conf B
Laspoumaderes C.	Astroecology Posters, Mon, Conf B	Lera M.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
Latham D. W.	Quantifying Frequency Posters, Tue, Conf A	Leshin L.	Establishing Biogenicity, Mon, Conf Four
Lathem T.	Meta-omics of Microbial Mats, Tue, Salon One	Lessner D. J.	Microbial Ecosystems, Mon, Salon Three
Lattanzi V.	Extraterrestrial Biomolecules Posters, Thu, Conf B	Lessner D. J.	Oxidation in Extreme Environments, Tue, Conf Four
Lauer H. V.	Survival in ET Environments, Mon, Conf Two	Lessner F. H.	Science of Mars Science Laboratory, Mon, Conf Two
Laughlin B. P.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A	Lessner F. H.	From Non-Enzymatic Catalysis, Wed, Salon Five
Lauretta D. S.	Biomolecular Evo, Thu, Salon Three	Leszczynski J.	From Non-Enzymatic Catalysis Posters, Tue, Conf B
Lavender L.	Terrestrial Microbes on Mars? Posters, Thu, Conf B	Leuko S.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One
LaVine R. J.	O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A	Leveille R.	From Non-Enzymatic Catalysis Posters, Tue, Conf B
Lavrakas P. J.	Societal Impact of ET Life, Thu, Salon Four	Li H.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One
Lavvas P.	Titan Prebiotic Chemistry, Mon, Salon Five	Li J. F.	Plausible Geochemical Conditions, Wed, Salon Five
Lazcano A.	Biomolecular Evo, Thu, Salon Three	Li M.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One
	Last Universal Common Ancestor, Tue, Salon Three	Li S.	Radiation Effects: Microbes to Man, Mon, Salon One
Lazzeri K. E.	Microbes in Lithifying Systems Posters, Tue, Conf A	Li W.	Minimal and Ancestral Genomes, Fri, Salon One
Le Mouélic S.	Titan Prebiotic Chemistry Posters, Mon, Conf B	Li X. H.	Asteroids, Comets Posters, Tue, Conf A
Le Sergeant d'Hendecourt L.	Laboratory Astrochemistry Posters, Thu, Conf B	Li Y.	Translation, Wed, Salon One
	Chirality in Cosmochemistry, Fri, Conf Two		Prebiotic Chemistry/ Biopolymers, Mon, Salon Five
	Laboratory Astrochemistry, Thu, Salon Four		Establishing Biogenicity, Mon, Conf Four
Leach D.	Astrobiology E/PO Posters, Thu, Conf A		Radiation Effects: Microbes to Man, Mon, Salon One
Lebedev N.	HGT in Innovation, Tue, Conf Four		Europa, Fri, Conf A
Lebofsky M.	Cross-Disciplinary Communication, Fri, Conf Two	Li Barnett I.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One
Lee C.	Environmental Physics and Life Posters, Tue, Conf A	Liang J.	Origin/ Evo of Photosynthesis Posters, Tue, Conf B
	Microbiology/ Geochemistry Poster Tue, Con B	Liang Y.	Chemical Evo Posters, Mon, Conf A
	Molecular Tools, Wed, Conf Two		
Lee M.	Astrobiology E/PO Posters, Thu, Conf A		
	Robotics Technology, Fri, Conf Four		
Lee S.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five		
Lee T. J.	Quantum Chemistry Posters, Mon, Conf B		

# AUTHOR INDEX

Lie L.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One Translation, Wed, Salon One	Loyd S.	Microbes in Lithifying Systems, Thu, Conf Four
Lieann L. J.	Microbes in Space and Time Posters, Mon, Conf B	Lozada-Chávez I.	Diversity in Research and Edu Posters, Mon, Conf A
Ligare M. R.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A	Lu K.	Transition to Genetically Encoded Proteins, Wed, Conf Four
Lignell A.	Europa, Fri, Conf A Icy Worlds and Chemistry, Wed, Salon Three Titan Prebiotic Chemistry, Mon, Salon Five	Ludois J. M.	Mineralogy and Aqueous Processes Posters, Thu, Conf B
Lima I.	Terrestrial Microbes on Mars? Posters, Thu, Conf B	Lui S.	Microbial Ecosystems, Mon, Salon Three
Lima U. A.	Plausible Geochemical Conditions Posters, Tue, Conf B	Lund S. P.	Microbes in Lithifying Systems, Thu, Conf Four
Lin G.	Titan Prebiotic Chemistry Posters, Mon, Conf B	Lundberg J.	Subsurface Ecosystems, Fri, Conf A
Lin H.	Microbes in Space and Time, Tue, Salon Four	Lundstrom K.	Print Only
Lindsey J.	From Non-Enzymatic Catalysis, Wed, Salon Five	Luther G. W.	History of Oxygenation, Mon, Conf Four
Lineweaver C. H.	Exoplanet Habitability, Thu, Salon Three Experimental Evo Posters, Thu, Conf A Last Universal Common Ancestor Posters, Mon, Conf A Pattern and Prediction, Thu, Conf Two Theodynamics, Disequilibrium, Mon, Conf Two	Lynch K.	How Can Astrobiology Save World?, Mon, Ballroom Print Only
Linnartz H.	Laboratory Astrochemistry, Thu, Salon Four	Lynn D. G.	Chemical Evo, Tue, Salon Five Chemical Evo Posters, Mon, Conf A From Non-Enzymatic Catalysis Posters, Tue, Conf B Prebiotic Chemistry/ Biopolymers, Mon, Salon Five Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A Transition to Genetically Encoded Proteins, Wed, Conf Four Chemical Evo, Tue, Salon Five
Liotta C.	Print Only	Lyons T. W.	History of Oxygenation, Mon, Conf Four Microbes in Lithifying Systems, Thu, Conf Four
Lipscomb D. M.	Icy Worlds and Chemistry Posters, Tue, Conf A	Ma L.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
Lis D.	Extraterrestrial Biomolecules, Fri, Salon Three Extraterrestrial Biomolecules Posters, Thu, Conf B	Macalady J.	Astroecology Posters, Mon, Conf B
Lischka H.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One	Macau E. E.	History of Oxygenation, Mon, Conf Four
Lisse C.	Exoplanet Habitability Posters, Thu, Conf A	Maccone C.	Microbes in Lithifying Systems, Thu, Conf Four
Liu T.	Extraterrestrial Biomolecules Poster Thu, Conf B	Macdonald F.	Subsurface Ecosystems, Fri, Conf A
Liu Z.	Translation, Wed, Salon One	MacKenzie L. A.	Asteroids, Comets Posters, Tue, Conf A
Livengood T. A.	Exoplanet Habitability Posters, Thu, Conf A	Mackey T. J.	Asteroids, Comets Posters, Tue, Conf A Transmission into Space Posters, Thu, Conf A
Lo C.	How Can Astrobiology Save World?, Mon, Ballroom	Mackin C.	Early Evo of Life Posters, Mon, Conf A From Genomes to Biomarkers, Mon, Conf Four
Lockhart J. S.	Radiation Effects: Microbes to Man, Mon, Salon One	MacLean L. C.	Microbial Ecosystems Posters, Mon, Conf B
Lockman F. J.	Extraterrestrial Biomolecules, Fri, Salon Three	Mackee T. J.	Ice Life Posters, Thu, Conf B
Loeffler F. E.	Extremeomics, Wed, Salon Three	Mackin C.	Molecular Tools Posters, Tue, Conf B
Loeffler M. J.	Icy Worlds and Chemistry, Wed, Salon Three	MacLean L. C.	Microbes in Lithifying Systems Posters, Tue, Conf A
Loiacono S. T.	Pattern and Prediction, Thu, Conf Two	MacPhee C.	Astrobiology E/PO Posters, Thu, Conf A
Loiselle L.	Microbial Ecosystems, Mon, Salon Three Microbiology/ Geochemistry, Wed, Conf Four	Magee-Sauer K.	Organic Continuum, Tue, Salon Five
Loizeau D.	Mineralogy Indicates Aqueous, Fri, Salon Three	Magers D.	Taxonomy of Comets, Thu, Salon Five
Loizeau J. L.	Microbial Ecosystems Posters, Mon, Conf B	Magliozzo R. S.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
Loomis R. A.	Extraterrestrial Biomolecules Poster Thu, Conf B	Magner T.	Biological Radiation Energy Capture, Thu, Conf Two
Lopez A.	Diversity in Research and Edu, Mon, Salon Four Serpentinization Posters, Thu, Conf B	Mahaffy P.	Europa, Fri, Conf A
López de Saro F.	Subsurface Ecosystems, Fri, Conf A		Science of Mars Science Laboratory, Mon, Conf Two
Lorek A.	Terrestrial Microbes on Mars?, Fri, Conf Four		Mars Science Laboratory Posters, Mon, Conf B
Loveday J.	Astrobiology E/PO Posters, Thu, Conf A		Robotics Technology Posters, Thu, Conf B
Lowe D.	Mineralogy Indicates Aqueous, Fri, Salon Three		
Lower T. A.	Cross-Disciplinary Communication, Fri, Conf Two		
Lowrie I.	Societal Impact of ET Life Posters, Tue, Conf B		

# AUTHOR INDEX

Mahar H. D.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A	Matsika S.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One
Maibaum M.	Asteroids, Comets Posters, Tue, Conf A	Matsos H.	Digital Media in Education, Wed, Salon Four
Makey T.	Microbial Ecosystems Posters, Mon, Conf B	Mattioda A.	Astrobiology in Orbit Posters, Thu, Conf B
Malaterre C.	Astrobiology in Historical Perspective Posters, Thu, Conf A	Mattson S.	Astrobiology in Orbit, Fri, Salon Five
Malespin C. A.	Mars Science Laboratory Posters, Mon, Conf B	Matveev S.	New Mars Posters, Tue, Conf A
Mamajanov I.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A Print Only	Matys E.	Microbes in Lithifying Systems Posters, Tue, Conf A
Mancinelli R.	Astrobiology E/PO Posters, Thu, Conf A Radiation Effects: Microbes to Man, Mon, Salon One	Mauledoux	Early Evo of Life Posters, Mon, Conf A
Manicò G.	Laboratory Astrochemistry, Thu, Salon Four	Monroy M. F.	Robotics Technology, Fri, Conf Four
Manrubia S. C.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five		Robotics Technology Posters, Thu, Conf B
Mao F.	HGT in Innovation Posters, Mon, Conf A		Diversity in Research and Edu, Mon, Salon Four
Marceau C. D.	Virus Ecology/ Astrovirology, Tue, Conf Two	Mauzerall D.	Origin/ Evo of Photosynthesis, Thu, Conf Four
Marceau J. O.	Virus Ecology/ Astrovirology, Tue, Conf Two	Maxwell A. W.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five
Marcu O.	Oxidation in Extreme Environments, Tue, Conf Four	McAdam A. C.	Mars Science Laboratory Posters, Mon, Conf B Science of Mars Science Laboratory, Mon, Conf Two
Marino L.	Intelligence and Astrobiology, Fri, Salon Four	McCarthy M.	Extraterrestrial Biomolecules Poster Thu, Conf B
Marinova M.	Microbiology/ Geochemistry, Wed, Conf Four	McCauley R. L.	Microbes in Lithifying Systems, Thu, Conf Four
Markovitsi D.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One	McClellan D. A.	From Genomes to Biomarkers, Mon, Conf Four
Marnocha C. L.	Microbial Ecosystems, Mon, Salon Three	McCleskey R. B.	Microbes in Space and Time Posters, Mon, Conf B
Marroquin N. A.	Microbial Ecosystems Posters, Mon, Conf B	McCollom T.	Serpentinization Posters, Thu, Conf B Habitability Metrics, Thu, Conf Two
Marshall C.	Science of Mars Science Laboratory, Mon, Conf Two	McCubbin F.	Science of Mars Science Laboratory, Mon, Conf Two
Marsteller P.	How Do We Explain Ourselves? Plenary, Thu, Ballroom	McElrath T.	Europa, Fri, Conf A
Martin E. L.	Exoplanet Habitability Posters, Thu, Conf A Quantifying Frequency Posters, Tue, Conf A	McEwen A.	New Mars Posters, Tue, Conf A
Martin M. G.	Organic Continuum Posters, Mon, Conf B	McFadden L.	Exoplanet Habitability Posters, Thu, Conf A
Martin- Torres F.	Theodynamics, Disequilibrium, Mon, Conf Two Mars Science Laboratory Posters, Mon, Conf B Quantifying Frequency Posters, Tue, Conf A	McGown L. B.	Biomolecular Evo, Thu, Salon Three Biomolecular Evo Posters, Tue, Conf B Plausible Geochemical Conditions, Wed, Salon Five
Martinez L. A.	Diversity in Research and Edu, Mon, Salon Four	McGrath M.	Europa, Fri, Conf A
Martinez O.	Extraterrestrial Biomolecules Poster Thu, Conf B Laboratory Astrochemistry Poster, Thu, Conf B	McGuire B.	Extraterrestrial Biomolecules Poster Thu, Conf B
Martino M. J.	Molecular Tools, Wed, Conf Two	McIntyre-Wressnig A.	Meta-omics of Microbial Mats Posters, Mon, Conf B
Martins Z.	Astrobiology in Orbit Posters, Thu, Conf B Survival in ET Environments, Mon, Conf Two	McKay C.	How Can Astrobiology Save World?, Mon, Ballroom
Martoli E.	Exoplanet Habitability Posters, Thu, Conf A		Titan Prebiotic Chemistry Posters, Mon, Conf B
Martucci H. F.	Oxidation in Extreme Environments, Tue, Conf Four		Terrestrial Microbes on Mars? Posters, Thu, Conf B
Martínez-Frías J.	Mars Science Laboratory Posters, Mon, Conf B		Early Earth as Extrasolar Planet Proxy, Fri, Salon Five
Marvasi M.	Meta-omics of Microbial Mats, Tue, Salon One		Icy Worlds and Chemistry Posters, Tue, Conf A
Marziali A.	Astrobiology of Planetary Minerals Posters, Mon, Conf B		Microbiology/ Geochemistry, Wed, Conf Four
Mason N. J.	Biological Radiation Energy Capture, Thu, Conf Two		New Frontiers in Isotope Analysis, Fri, Salon Four
Masse M.	New Mars Posters, Tue, Conf A		UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
Mastrapa R.	Laboratory Astrochemistry Poster, Thu, Conf B	McKeown N. K.	Mineralogy Indicates Aqueous, Fri, Salon Three
Matar E.	Laboratory Astrochemistry, Thu, Salon Four	McLain J. L.	Titan Prebiotic Chemistry Posters, Mon, Conf B
Materese C. K.	Laboratory Astrochemistry, Thu, Salon Four	McLennan S.	Mineralogy Indicates Aqueous, Fri, Salon Three
		McMahon S.	New Mars, Wed, Salon One
		McMullin J.	Extraterrestrial Biomolecules Poster Thu, Conf B

## AUTHOR INDEX

Meadows V.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five Exoplanet Habitability, Thu, Salon Three Exoplanet Habitability Posters, Thu, Conf A Quantifying Frequency Posters, Tue, Conf A	Milam S. N.	Laboratory Astrochemistry, Thu, Salon Four Taxonomy of Comets, Thu, Salon Five
Mebel A.	Titan Prebiotic Chemistry, Mon, Salon Five	Miles S.	Translation Posters, Tue, Conf B
Meech K. J.	Asteroids, Comets, Wed, Conf Two Asteroids, Comets Posters, Tue, Conf A Digital Media in Education, Wed, Salon Four Taxonomy of Comets, Thu, Salon Five	Millar T. J.	Laboratory Astrochemistry, Thu, Salon Four Organic Continuum, Tue, Salon Five
Mehta A. K.	Chemical Evo, Tue, Salon Five Chemical Evo Posters, Mon, Conf A From Non-Enzymatic Catalysis Posters, Tue, Conf B Prebiotic Chemistry/ Biopolymers, Mon, Salon Five Transition to Genetically Encoded Proteins, Wed, Conf Four	Miller L.	Pattern and Prediction, Thu, Conf Two Pattern and Prediction Posters, Tue, Conf B
Meierhenrich U.	Chirality in Cosmochemistry, Fri, Conf Two	Miller L.	Data Challenges Posters, Thu, Conf A
Meinert C.	Chirality in Cosmochemistry, Fri, Conf Two	Miller S. E.	Microbes in Lithifying Systems, Thu, Conf Four
Meitzner S.	Transmission into Space, Tue, Conf Two	Miller S. M.	Astrobiology E/PO Posters, Thu, Conf A
Melchiorre E.	Diversity in Research and Edu, Mon, Salon Four Serpentinization Posters, Thu, Conf B	Miller S. R.	Oxidation in Extreme Environments, Tue, Conf Four
Melendez I.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Miller S.	Microbes in Space and Time, Tue, Salon Four
Mellon M.	Europa, Fri, Conf A	Milliken C. E.	Biological Radiation Energy Capture, Thu, Conf Two
Melott A. L.	Print Only Radiation Effects: Microbes to Man Posters, Mon, Conf A	Milliken R. E.	Mineralogy Indicates Aqueous, Fri, Salon Three
Mendes Emegdio A. P.	Astrobiology E/PO Posters, Thu, Conf A	Mills D.	O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A
Mendez A.	Diversity in Research and Edu, Mon, Salon Four Habitability Metrics, Thu, Conf Two Quantifying Frequency, Thu, Salon One	Minelli G.	Astrobiology in Orbit, Fri, Salon Five
Menger F. M.	Chemical Evo, Tue, Salon Five	Ming D. W.	Survival in ET Environments, Mon, Conf Two
Menten K. M.	Extraterrestrial Biomolecules, Fri, Salon Three	Mironov V.	Ice Life, Thu, Conf Four
Menzel R. L.	Asteroids, Comets Posters, Tue, Conf A	Mirsaleh-Kohan N.	Icy Worlds and Chemistry Posters, Tue, Conf A
Merrill Floyd M.	Robotics Technology Posters, Thu, Conf B	Misra A.	Exoplanet Habitability, Thu, Salon Three
Merrison J. P.	Survival in ET Environments, Mon, Conf Two	Misra P.	Mars Science Laboratory Posters, Mon, Conf B
Merz K. M.	Quantum Chemistry Posters, Mon, Conf B	Mita H.	Astrobiology in Orbit Posters, Thu, Conf B Laboratory Astrochemistry, Thu, Salon Four
Mesbah N. M.	Serpentinization, Thu, Salon Five	Mobberley J.	Meta-omics of Microbial Mats, Tue, Salon One
Messerschmitt D.	Transmission into Space, Tue, Conf Two	Modenutti B.	Astroecology Posters, Mon, Conf B
Messidoro A.	Asteroids, Comets, Wed, Conf Two	Modica P.	Laboratory Astrochemistry Poster, Thu, Conf B
Meyer Dombard D. R.	Microbial Ecosystems, Mon, Salon Three Microbes in Lithifying Systems Posters, Tue, Conf A Microbes in Space and Time, Tue, Salon Four Pattern and Prediction, Thu, Conf Two Serpentinization Posters, Thu, Conf B	Moehlmann D.	Terrestrial Microbes on Mars?, Fri, Conf Four
Michalkova Scott A.	Plausible Geochemical Conditions, Wed, Salon Five UV Radiation in Prebiotic Chemistry II, Tue, Salon One	Moeller R.	Astrobiology in Orbit, Fri, Salon Five
Mielke R. E.	Robotics Technology, Fri, Conf Four Chemical Evo, Tue, Salon Five Mineral-based Catalysis, Tue, Conf Two	Mogk D. W.	Early Evo of Life Posters, Mon, Conf A
Mielke S. P.	Origin/ Evo of Photosynthesis, Thu, Conf Four	Mohabir K.	Pattern and Prediction Posters, Tue, Conf B
Mikkelsen B.	Molecular Tools, Wed, Conf Two	Mojib N.	Meta-omics of Microbial Mats, Tue, Salon One
		Mokrane H.	Laboratory Astrochemistry, Thu, Salon Four
		Molina A.	Subsurface Ecosystems, Fri, Conf A Microbiology/ Geochemistry, Wed, Conf Four
		Monaghan E. P.	Survival in ET Environments, Mon, Conf Two Survival in ET Environments Posters, Tue, Conf A
		Monroe A.	Biomolecular Evo, Thu, Salon Three
		Montañes-Rodriguez P.	Quantifying Frequency Posters, Tue, Conf A
		Montgomery M.	Quantifying Frequency Posters, Tue, Conf A
		Montoya L.	Diversity in Research and Edu Posters, Mon, Conf A
		Moon P. A.	Digital Media in Education Poster, Tue, Conf B
		Moore J. M.	Europa, Fri, Conf A
		Moore M. H.	Icy Worlds and Chemistry, Wed, Salon Three
		Moore W. S.	Microbes in Space and Time, Tue, Salon Four
		Mora M. F.	Chemical Evo, Tue, Salon Five Prospecting for Life Posters, Mon, Conf A
		Morehead R. C.	Titan Prebiotic Chemistry Posters, Mon, Conf B Print Only

# AUTHOR INDEX

Morelli A.	From Non-Enzymatic Catalysis, Wed, Salon Five	Nagashima K.	Asteroids, Comets Posters, Tue, Conf A Mineralogy and Aqueous Processes Posters, Thu, Conf B
Moreno S. C.	Plausible Geochemical Conditions Posters, Tue, Conf B	Nagdimunov L.	Chirality in Cosmochemistry, Fri, Conf Two
Moreno Colina L. M.	Digital Media in Education Posters, Tue, Conf B	Nahon L.	Chirality in Cosmochemistry, Fri, Conf Two
Moreno-Paz M.	Ice Life, Thu, Conf Four Microbiology/ Geochemistry, Wed, Conf Four Pattern and Prediction, Thu, Conf Two Subsurface Ecosystems, Fri, Conf A	Nakabayashi M.	Organic Continuum, Tue, Salon Five
Moriarty E. M.	Biomolecular Evo, Thu, Salon Three Biomolecular Evo Posters, Tue, Conf B Plausible Geochemical Conditions, Wed, Salon Five	Nakagawa K.	Astrobiology in Orbit Posters, Thu, Conf B
Morneau B. N.	Chemical Evo Posters, Mon, Conf A	Nakamura T.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
Morrill P. L.	Serpentinization, Thu, Salon Five Serpentinization Posters, Thu, Conf B	Nanda V.	Translation, Wed, Salon One Translation Posters, Tue, Conf B
Morris A.	New Mars Posters, Tue, Conf A	Naraoka H.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
Morris J. J.	Oxidation in Extreme Environments, Tue, Conf Four	Narusawa S.	Societal Impact of ET Life Posters, Tue, Conf B
Morrison I.	Transmission into Space, Tue, Conf Two	Nava Sedeño J.	Biomolecular Evo Posters, Tue, Conf B
Moskal B.	Print Only	Navarro S.	Mars Science Laboratory Posters, Mon, Conf B
Moss E.	Astroecology Posters, Mon, Conf B	Navarro-Gonzalez R.	Terrestrial Microbes on Mars?, Fri, Conf Four
Mottl M. J.	Asteroids, Comets Posters, Tue, Conf A	Nealson K. H.	Microbes in Lithifying Systems, Thu, Conf Four Serpentinization Posters, Thu, Conf B
Moussa F.	Laboratory Astrochemistry Poster, Thu, Conf B	Neilan B. A.	From Genomes to Biomarkers, Mon, Conf Four
Moussas X.	Titan Prebiotic Chemistry Posters, Mon, Conf B	Neill J. L.	Extraterrestrial Biomolecules Poster Thu, Conf B
Mroczka K. L.	Astrobiology E/PO Posters, Thu, Conf A	Neish C.	Astrobiology of Planetesimals Posters, Mon, Conf B
Muckle M.	Extraterrestrial Biomolecules Poster Thu, Conf B	Nelson B.	Serpentinization, Thu, Salon Five
Mueller H. S.	Extraterrestrial Biomolecules, Fri, Salon Three	Nelson H.	Astrobiology E/PO, Tue, Conf Four
Mulkidjanian A. Y.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One	Nenes A.	Meta-omics of Microbial Mats, Tue, Salon One
Muller J. P.	Biological Radiation Energy Capture, Thu, Conf Two Survival in ET Environments, Mon, Conf Two	Neuer S.	Pattern and Prediction Posters, Tue, Conf B
Mulligan J.	Terrestrial Microbes on Mars? Posters, Thu, Conf B	Neveu M.	Biomolecular Evo Posters, Tue, Conf B Extremeomics Posters, Tue, Conf A Titan Prebiotic Chemistry, Mon, Salon Five
Mullineaux C. W.	Biological Radiation Energy Capture, Thu, Conf Two	Newman D. K.	From Genomes to Biomarkers, Mon, Conf Four
Mullins K.	Exoplanet Habitability Posters, Thu, Conf A	Newsom H.	Science of Mars Science Laboratory, Mon, Conf Two
Mumma M. J.	New Mars, Wed, Salon One New Mars Posters, Tue, Conf A Organic Continuum, Tue, Salon Five Taxonomy of Comets, Thu, Salon Five	Ngolyia E.	How Can Astrobiology Save World?, Mon, Ballroom
Munshi S.	Biological Radiation Energy Capture, Thu, Conf Two	Nguyen M.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One
Murabona S.	How Can Astrobiology Save World?, Mon, Ballroom	Nguyen V. S.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One
Murchie S. L.	Mineralogy Indicates Aqueous, Fri, Salon Three	Ni R.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five
Murray A.	Ice Life, Thu, Conf Four Extremeomics, Wed, Salon Three	Nichols A. O.	Virus Ecology/ Astrovirology Posters, Tue, Conf B
Murray J.	Translation, Wed, Salon One	Nicholson W. L.	Astrobiology in Orbit, Fri, Salon Five Terrestrial Microbes on Mars?, Fri, Conf Four Extremeomics, Wed, Salon Three
Mushegian A.	Minimal and Ancestral Genomes, Fri, Salon One	Nieto D. D.	Diversity in Research and Edu, Mon, Salon Four
Myers S.	Extraterrestrial Biomolecules Poster Thu, Conf B	Nieto F.	Microbial Ecosystems, Mon, Salon Three
Myles E. L.	Diversity in Research and Edu, Mon, Salon Four	Niles B. A.	Cross-Disciplinary Communication, Fri, Conf Two
Nachtigallova D.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One	Niles P. B.	New Frontiers in Isotope Analysis Posters, Thu, Conf B Oxidation in Extreme Environments, Tue, Conf Four Survival in ET Environments, Mon, Conf Two
Nagarajan S.	Experimental Evo Posters, Thu, Conf A	Nitschke W.	Mineral-based Catalysis, Tue, Conf Two
		Nittler L.	Organic Continuum Posters, Mon, Conf B

# AUTHOR INDEX

Nixon C. A.	Titan Prebiotic Chemistry, Mon, Salon Five Titan Prebiotic Chemistry Posters, Mon, Conf B	Ojha L.	New Mars Posters, Tue, Conf A
Nixon S.	Astrobiology E/PO Posters, Thu, Conf A Astrobiology in Orbit Posters, Thu, Conf B Terrestrial Microbes on Mars? Posters, Thu, Conf B	Okabe T.	Laboratory Astrochemistry, Thu, Salon Four
Noe Dobrea E.	Mineralogy Indicates Aqueous, Fri, Salon Three Science of Mars Science Laboratory, Mon, Conf Two	Okafor C. D.	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A
Noell A.	Microbiology/ Geochemistry, Wed, Conf Four Molecular Tools, Wed, Conf Two	Okafor D.	Translation Posters, Tue, Conf B
Noguera D. R.	Molecular Tools, Wed, Conf Two	Okazaki R.	Asteroids, Comets Posters, Tue, Conf A
Noll K. M.	HGT in Innovation, Tue, Conf Four	Okie J.	Early Evo of Life II, Tue, Salon Three
Nord J.	Astrobiology in Historical Perspective Posters, Thu, Conf A	Öksüz N.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One
Nordstrom D. K.	Microbes in Space and Time Posters, Mon, Conf B	Okudaira K.	Astrobiology in Orbit Posters, Thu, Conf B
Noan C. A.	Exoplanet Habitability, Thu, Salon Three	Olcott A.	Science of Mars Science Laboratory, Mon, Conf Two
Norsted B.	Astrobiology E/PO, Tue, Conf Four Astrobiology E/PO Posters, Thu, Conf A	Oliver C. A.	Astrobiology E/PO Posters, Thu, Conf A Digital Media in Education, Wed, Salon Four Digital Media in Education Posters, Tue, Conf B
Noun M.	Laboratory Astrochemistry Poster, Thu, Conf B	Olmedo G.	HGT in Innovation, Tue, Conf Four Meta-omics of Microbial Mats, Tue, Salon One
Novak R. E.	New Mars, Wed, Salon One New Mars Posters, Tue, Conf A	Olson J. B.	Microbiology/ Geochemistry, Wed, Conf Four
Noveron J.	Chemical Evo Posters, Mon, Conf A	Olson S. L.	O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A
Novoselov A. A.	Plausible Geochemical Conditions Posters, Tue, Conf B	Olsson-Francis K.	Biological Radiation Energy Capture, Thu, Conf Two Survival in ET Environments, Mon, Conf Two Survival in ET Environments Posters, Tue, Conf A
Nuevo M.	Laboratory Astrochemistry, Thu, Salon Four	Omidi A. A.	Biological Life Support Posters, Thu, Conf B Transition to Genetically Encoded Proteins, Wed, Conf Four
Nóbrega F.	Extremeomics Posters, Tue, Conf A	Omeregic E.	Subsurface Ecosystems, Fri, Conf A
Núñez J. I.	Microbes in Lithifying Systems Posters, Tue, Conf A	Omosun T.	Chemical Evo, Tue, Salon Five From Non-Enzymatic Catalysis Posters, Tue, Conf B
O'Brien D. P.	Exoplanet Habitability, Thu, Salon Three	Ono S.	Transition to Genetically Encoded Proteins, Wed, Conf Four
O'Hara S.	Diversity in Research and Edu Posters, Mon, Conf A	Onstott T. C.	Establishing Biogenicity, Mon, Conf Four O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
O'Malley-James J. T.	Plausible Geochemical Conditions Posters, Tue, Conf B	Oremland R. S.	Mars Science Laboratory Posters, Mon, Conf B Serpentinization, Thu, Salon Five
O'Neil G. D.	Robotics Technology, Fri, Conf Four	Oren A.	Pattern and Prediction, Thu, Conf Two Pattern and Prediction Posters, Tue, Conf B
O'Neil K.	Extraterrestrial Biomolecules, Fri, Salon Three	Orlando T. M.	Microbes in Space and Time, Tue, Salon Four Icy Worlds and Chemistry, Wed, Salon Three Plausible Geochemical Conditions, Wed, Salon Five
O'Neill E.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One  Translation, Wed, Salon One Translation Posters, Tue, Conf B	Oö J.	Titan Prebiotic Chemistry Posters, Mon, Conf B UV Radiation in Prebiotic Chemistry II, Tue, Salon One UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
Oba Y.	Laboratory Astrochemistry, Thu, Salon Four	Orphan V. J.	Environmental Physics and Life Posters, Tue, Conf A
Obayashi Y.	Laboratory Astrochemistry, Thu, Salon Four	Orton G. S.	Microbes in Space and Time, Tue, Salon Four
Oberg K. I.	Extraterrestrial Biomolecules, Fri, Salon Three Laboratory Astrochemistry, Thu, Salon Four Print Only	Osinski G.	Titan Prebiotic Chemistry, Mon, Salon Five
Odenwald S. F.	Astrobiology E/PO, Tue, Conf Four		Microbial Ecosystems, Mon, Salon Three
Oduro H. D.	Establishing Biogenicity, Mon, Conf Four O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four		Microbiology/ Geochemistry Posters, Tue, Conf A
Offerdahl E.	Astrobiology E/PO, Tue, Conf Four		Mineralogy Indicates Aqueous, Fri, Salon Three
Oggerin M.	Microbial Ecosystems, Mon, Salon Three Subsurface Ecosystems, Fri, Conf A	Ostryakov V. M.	Survival in ET Environments, Mon, Conf Two
Ogles D.	Molecular Tools, Wed, Conf Two	Ouellette M.	Molecular Tools Posters, Tue, Conf B
Ohara S.	Mineral-based Catalysis, Tue, Conf Two		
Ohmoto H.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A		
Ohno S.	Organic Continuum, Tue, Salon Five		

# AUTHOR INDEX

Overholt A.	Environmental Physics and Life Posters, Tue, Conf A	Pavlov A.	New Mars, Wed, Salon One Survival in ET Environments, Mon, Conf Two
Oyelere A.	Translation, Wed, Salon One Translation Posters, Tue, Conf B	Pearson A.	From Genomes to Biomarkers, Mon, Conf Four Microbial Ecosystems, Mon, Salon Three
Ozcan K.	Meta-omics of Microbial Mats Posters, Mon, Conf B	Pearson J. C.	Extraterrestrial Biomolecules Poster Thu, Conf B
Pacheco M. A.	Plausible Geochemical Conditions Posters, Tue, Conf B	Peeters Z.	Astrobiology in Orbit, Fri, Salon Five Organic Continuum Posters, Mon, Conf B
Paganini L.	Organic Continuum, Tue, Salon Five Taxonomy of Comets, Thu, Salon Five	Peimbert M.	Meta-omics of Microbial Mats, Tue, Salon One
Pagano M. D.	Quantifying Frequency Posters, Tue, Conf A	Pellizari V. H.	Extremeomics Posters, Tue, Conf A
Pages A.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Pendleton Y.	Organic Continuum, Tue, Salon Five
Paige D. A.	Intersection of Astrobiology/ Society, Wed, Salon Four	Pepe-Ranney C.	Microbes in Lithifying Systems, Thu, Conf Four
Palaich S. E.	Microbiology/ Geochemistry Poster Tue, Con A	Percak-Dennett E. M.	Establishing Biogenicity, Mon, Conf Four Microbial Ecosystems Posters, Mon, Conf B
Palle E.	Astrobiology of Planetesimals Posters, Mon, Conf B	Pérez-Mercader J.	Theodynamics, Disequilibrium, Mon, Conf Two
	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five	Persans P. D.	Biomolecular Evo, Thu, Salon Three
	Quantifying Frequency Posters, Tue, Conf A	Persson C. M.	Laboratory Astrochemistry, Thu, Salon Four
Palmer J.	Astroecology Posters, Mon, Conf B Terrestrial Microbes on Mars? Posters, Thu, Conf B	Persson E.	Cross-Disciplinary Communication Posters, Thu, Conf A How Do We Explain Ourselves? Posters, Thu, Conf A
Panitz C.	Astrobiology in Orbit, Fri, Salon Five	Persson P.	Intersection of Astrobiology/ Society, Wed, Salon Four
Papineau D.	Mineralogy Indicates Aqueous, Fri, Salon Three O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One	Peters J. K.	Cross-Disciplinary Communication Posters, Thu, Conf A
Papke R. T.	Extremeomics Posters, Tue, Conf A Microbial Ecosystems Posters, Mon, Conf B Molecular Tools Posters, Tue, Conf B	Peters J. W.	Translation, Wed, Salon One Astrobiology E/PO Posters, Thu, Conf A Astrobiology in Historical Perspective Posters, Thu, Conf A
Pappalardo R. T.	Europa, Fri, Conf A		Diversity in Research and Edu Posters, Mon, Conf A
Pareek M.	Microbial Ecosystems Posters, Mon, Conf B		Europa, Fri, Conf A
Parente M.	Mineralogy Indicates Aqueous, Fri, Salon Three		Exoplanet Habitability Posters, Thu, Conf A
Park	Environmental Physics and Life Posters, Tue, Conf A		From Non-Enzymatic Catalysis, Wed, Salon Five
Parker D. R.	Prospecting for Life Posters, Mon, Conf A		How Do We Explain Ourselves? Posters, Thu, Conf A
Parker E. T.	Plausible Geochemical Conditions, Wed, Salon Five		Ice Life, Thu, Conf Four
Parnell J.	Astrobiology E/PO Posters, Thu, Conf A New Mars, Wed, Salon One		Microbes in Space and Time, Tue, Salon Four
Parro V.	Asteroids, Comets Posters, Tue, Conf A		Pattern and Prediction Posters, Tue, Conf B
	Ice Life, Thu, Conf Four		Origin/ Evo of Photosynthesis Posters, Tue, Conf B
	Microbiology/ Geochemistry, Wed, Conf Four	Peters T.	Societal Impact of ET Life, Thu, Salon Four
	Microbiology/ Geochemistry Poster Tue, Con A	Peterson K. J.	Early Evo of Life Posters, Mon, Conf A
	Pattern and Prediction, Thu, Conf Two		From Genomes to Biomarkers, Mon, Conf Four
	Subsurface Ecosystems, Fri, Conf A	Petroff A. P.	Origin/ Evo of Photosynthesis, Thu, Conf Four
Pasek M. A.	Biomolecular Evo Posters, Tue, Conf B	Petrov A. S.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One
	Europa, Fri, Conf A		Transition to Genetically Encoded Proteins, Wed, Conf Four
	Titan Prebiotic Chemistry, Mon, Salon Five		Translation Posters, Tue, Conf B
Pate B.	Extraterrestrial Biomolecules, Fri, Salon Three	Petrus A. K.	HGT in Innovation, Tue, Conf Four
	Extraterrestrial Biomolecules Poster Thu, Conf B	Petryshyn V.	Microbes in Lithifying Systems, Thu, Conf Four
Patel M.	Survival in ET Environments, Mon, Conf Two		
	Survival in ET Environments Poster Tue, Con A	Peyvan K.	Robotics Technology, Fri, Conf Four
Patidar N.	Microbial Ecosystems Posters, Mon, Conf B	Pham I. T.	Translation Posters, Tue, Conf B
Patterson G. W.	Europa, Fri, Conf A	Phoenix V.	Astrobiology E/PO Posters, Thu, Conf A
Pätz B.	Asteroids, Comets Posters, Tue, Conf A	Phung L. T.	Extremeomics Posters, Tue, Conf A
Paulino Lima I. G.	Biological Radiation Energy Capture, Thu, Conf Two	Pieper J.	Translation, Wed, Salon One
Paulsen G.	Prospecting for Life Posters, Mon, Conf A		

# AUTHOR INDEX

Pierrehumbert R.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five	Priscu J.	Ice Life, Thu, Conf Four
	Exoplanet Habitability Posters, Thu, Conf A		Diversity in Research and Edu Posters, Mon, Conf A
Pirola V.	Habitability Metrics Posters, Tue, Conf A	Prockter L. M.	Europa, Fri, Conf A
Pinilla L. F.	Diversity in Research and Edu, Mon, Salon Four	Pruss S.	Early Evo of Life Posters, Mon, Conf A
Pino S.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A	Pruzek R. M.	Astrobiology E/PO Posters, Thu, Conf A
Piotrowski J. S.	Experimental Evo Posters, Thu, Conf A	Pudritz R. E.	Organic Continuum, Tue, Salon Five
Pirim C.	Titan Prebiotic Chemistry Posters, Mon, Conf B	Puente F.	Pattern and Prediction, Thu, Conf Two
Pirronello V.	Laboratory Astrochemistry, Thu, Salon Four	Puente-Sánchez F.	Subsurface Ecosystems, Fri, Conf A
Pisani D.	Laboratory Astrochemistry Poster, Thu, Conf B	Pulliam R.	Extraterrestrial Biomolecule Poster, Thu, Conf B
Pizzarello S.	From Genomes to Biomarkers, Mon, Conf Four	Pulschen A. A.	Astrobiology E/PO Posters, Thu, Conf A
	Biomolecular Evo, Thu, Salon Three	Qasim D.	Extraterrestrial Biomolecule Poster, Thu, Conf B
	Chirality in Cosmochemistry, Fri, Conf Two	Qi C.	Extraterrestrial Biomolecules, Fri, Salon Three
	New Frontiers in Isotope Analysis, Fri, Salon Four	Quesada C.	Microbiology/ Geochemistry, Wed, Conf Four
Planavsky N.	History of Oxygenation, Mon, Conf Four	Quinn E.	Serpentinization Posters, Thu, Conf B
	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Quinn R. C.	Robotics Technology, Fri, Conf Four
Plasser F.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One		Astrobiology in Orbit, Fri, Salon Five
Pohorille A.	From Non-Enzymatic Catalysis, Wed, Salon Five		Astrobiology in Orbit Posters, Thu, Conf B
	Robotics Technology, Fri, Conf Four		Oxidation in Extreme Environments, Tue, Conf Four
	From Non-Enzymatic Catalysis, Wed, Salon Five	Quinn S. N.	Quantifying Frequency Posters, Tue, Conf A
Polerecky L.	Subsurface Ecosystems, Fri, Conf A	Rabbow E.	Astrobiology in Orbit, Fri, Salon Five
Polivka P.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five		Microbes in Space and Time Posters, Mon, Conf B
Polyakov V. B.	New Frontiers in Isotope Analysis, Fri, Salon Four	Rabinowitz J. D.	Astrobiology in Orbit, Fri, Salon Five
Ponce A.	Microbiology/ Geochemistry, Wed, Conf Four	Race M. S.	Extremeomics, Wed, Salon Three
	Molecular Tools, Wed, Conf Two	Radeva Y. L.	Intersection of Astrobiology/ Society, Wed, Salon Four
Pontefract A.	Microbiology/ Geochemistry Poster Tue, Con A	Radhuber M. L.	New Mars, Wed, Salon One
Poret-Peterson A.	Extremeomics Posters, Tue, Conf A		New Mars Posters, Tue, Conf A
Porro I.	Astrobiology E/PO, Tue, Conf Four		Organic Continuum, Tue, Salon Five
Postigo M.	Microbiology/ Geochemistry, Wed, Conf Four		Taxonomy of Comets, Thu, Salon Five
	Pattern and Prediction, Thu, Conf Two	Raimist J.	Extraterrestrial Biomolecules, Fri, Salon Three
Poulton S.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five	Rainey F. A.	Extraterrestrial Biomolecules Poster Thu, Conf B
	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four		Translation Posters, Tue, Conf B
Pownar M. W.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five	Ramirez R. M.	Terrestrial Microbes on Mars?, Fri, Conf Four
		Ramirez S.	Ice Life Posters, Thu, Conf B
Prado J.	Asteroids, Comets, Wed, Conf Two		Exoplanet Habitability, Thu, Salon Three
Pratt L. M.	Microbial Ecosystems Posters, Mon, Conf B	Ramos M.	Diversity in Research and Edu Posters, Mon, Conf A
Preeprem T.	Transition to Genetically Encoded Proteins, Wed, Conf Four	Rampersand J.	Mars Science Laboratory Posters, Mon, Conf B
	Translation, Wed, Salon One	Randall R. N.	HGT in Innovation, Tue, Conf Four
Preston L.	Microbial Ecosystems, Mon, Salon Three	Randolph T. M.	Astrobiology E/PO Posters, Thu, Conf A
	Astrobiology of Planetesimals Posters, Mon, Conf B	Rankin R. L.	Asteroids, Comets Posters, Tue, Conf A
Price J. D.	Biomolecular Evo, Thu, Salon Three		Diversity in Research and Edu, Mon, Salon Four
Prickett C. D.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One	Rappé M. S.	Microbes in Space and Time, Tue, Salon Four
Prieto Ballesteros	Ice Life, Thu, Conf Four	Rask J.	Microbiology/ Geochemistry, Wed, Conf Four
O.	Icy Worlds and Chemistry, Wed, Salon Three	Raulin F.	Icy Worlds and Chemistry, Wed, Salon Three
	Microbiology/ Geochemistry, Wed, Conf Four	Ravel J.	Microbiology/ Geochemistry, Wed, Conf Four
	Microbial Ecosystems, Mon, Salon Three	Raven J.	Astrobiology E/PO Posters, Thu, Conf A
		Ravindra R.	Meta-omics of Microbial Mats Posters, Mon, Conf B
		Rawat M.	Biological Radiation Energy Capture, Thu, Conf Two

# AUTHOR INDEX

Raymond J.	Pattern and Prediction, Thu, Conf Two Print Only	Roberge W. G.	Asteroids, Comets Posters, Tue, Conf A
Raymond S. N.	Exoplanet Habitability, Thu, Salon Three	Robert F.	Astrobiology in Orbit, Fri, Salon Five
Reaves M.	Extremeomics, Wed, Salon Three	Roberts G.	Cross-Disciplinary Communication, Fri, Conf Two
Rebollar E.	Microbes in Space and Time, Tue, Salon Four		UV Radiation in Prebiotic Chemistry II, Tue, Salon One
Redfield R. J.	HGT in Innovation, Tue, Conf Four		UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
Redfield S.	Extremeomics, Wed, Salon Three	Robinson C.	Astrobiology of Planetary Processes Posters, Mon, Conf B
Regmi A.	Biological Radiation Energy Capture, Thu, Conf Two		Microbiology/ Geochemistry, Wed, Conf Four
Reichardt C.	Radiation Effects: Microbes to Man, Mon, Salon One		Oxidation in Extreme Environments, Tue, Conf Four
Reid R.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One	Robinson J.	Last Universal Common Ancestor, Tue, Salon Three
Reinhard C.	Subsurface Ecosystems, Fri, Conf A	Robinson K. L.	Asteroids, Comets Posters, Tue, Conf A
Reitz G.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Robinson R. S.	Microbial Ecosystems, Mon, Salon Three
Remijan A.	Astrobiology in Orbit, Fri, Salon Five	Robinson T. D.	Exoplanet Habitability Posters, Thu, Conf A
	Terrestrial Microbes on Mars?, Fri, Conf Four		Early Earth as Extrasolar Planet Proxy, Fri, Salon Five
	Extraterrestrial Biomolecules, Fri, Salon Three		Exoplanet Habitability Posters, Thu, Conf A
	Extraterrestrial Biomolecules Posters, Thu, Conf B	Rocher B.	Laboratory Astrochemistry Poster, Thu, Conf B
	Taxonomy of Comets, Thu, Salon Five	Roden E.	Microbial Ecosystems Posters, Mon, Conf B
Renno N. O.	Mars Science Laboratory Posters, Mon, Conf B		Establishing Biogenicity, Mon, Conf Four
Renshaw C.	Cross-Disciplinary Communication, Fri, Conf Two		Establishing Biogenicity Posters, Mon, Conf A
Reppert M.	Translation, Wed, Salon One	Rodoni D.	Chemical Evo Posters, Mon, Conf A
Resendes de Sousa Antonio M.	Habitability Metrics, Thu, Conf Two		Plausible Geochemical Conditions, Wed, Salon Five
	How Can Astrobiology Save World? Posters, Tue, Conf B	Rodrigues F.	Asteroids, Comets Posters, Tue, Conf A
	Intelligence and Astrobiology, Fri, Salon Four		Biological Radiation Energy Capture, Thu, Conf Two
Rettberg P.	Terrestrial Microbes on Mars?, Fri, Conf Four	Rodríguez N.	Microbial Ecosystems, Mon, Salon Three
	Microbes in Space and Time Posters, Mon, Conf B		Microbiology/ Geochemistry, Wed, Conf Four
	Astrobiology in Orbit, Fri, Salon Five		Subsurface Ecosystems, Fri, Conf A
Rhodes M. E.	Microbes in Space and Time, Tue, Salon Four	Rodriguez S.	Titan Prebiotic Chemistry Posters, Mon, Conf B
	Molecular Tools, Wed, Conf Two	Rodríguez- Manfredi J. A.	Ice Life, Thu, Conf Four
Ribero F. B.	Plausible Geochemical Conditions Posters, Tue, Conf B		Science of Mars Science Laboratory, Mon, Conf Two
Ricco A. J.	Robotics Technology, Fri, Conf Four		Mars Science Laboratory Posters, Mon, Conf B
	Astrobiology in Orbit, Fri, Salon Five		Microbiology/ Geochemistry, Wed, Conf Four
	Astrobiology in Orbit Posters, Thu, Conf B		Subsurface Ecosystems, Fri, Conf A
Rice K.	Astrobiology E/PO Posters, Thu, Conf A	Rodríguez-Torres M.	HGT in Innovation, Tue, Conf Four
Richards J.	Transmission into Space, Tue, Conf Two	Rogers A. D.	Mineralogy Indicates Aqueous, Fri, Salon Three
Richardson C. D.	Microbial Ecosystems Posters, Mon, Conf B	Rogoffa D.	Radiation Effects: Microbes to Man, Mon, Salon One
Richardson M.	Mars Science Laboratory Posters, Mon, Conf B	Rolfe S. M.	Survival in ET Environments, Mon, Conf Two
Richmond K.	Ice Life, Thu, Conf Four	Röling W. F.	Survival in ET Environments, Mon, Conf Two
Riedel A. R.	Quantifying Frequency, Thu, Salon One	Romanek N.	Microbial Ecosystems, Mon, Salon Three
	Quantifying Frequency Posters, Tue, Conf A	Romani P.	Titan Prebiotic Chemistry, Mon, Salon Five
Riesen T. E.	Asteroids, Comets, Wed, Conf Two	Romaniello S. J.	History of Oxygenation, Mon, Conf Four
Rietze A.	Serpentinization Posters, Thu, Conf B	Rontó G.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
Ringrose T. J.	Survival in ET Environments, Mon, Conf Two	Roohan M. E.	Astrobiology E/PO Posters, Thu, Conf A
Rios-Velazquez C.	Meta-omics of Microbial Mats, Tue, Salon One	Rosen M. R.	Pattern and Prediction Posters, Tue, Conf B
Rivas L. A.	Ice Life, Thu, Conf Four	Rosenzweig F.	Experimental Evo, Fri, Salon One
	Microbiology/ Geochemistry, Wed, Conf Four	Rosenzweig R. F.	Experimental Evo Posters, Thu, Conf A
	Microbiology/ Geochemistry Poster Tue, Conf A	Rothman D. H.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
	Pattern and Prediction, Thu, Conf Two		Origin/ Evo of Photosynthesis, Thu, Conf Four
Robador A.	Pattern and Prediction Posters, Tue, Conf B		
Robbins J.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four		

# AUTHOR INDEX

Rothschild L. J.	Astrobiology E/PO Posters, Thu, Conf A Robotics Technology, Fri, Conf Four Astroecology Posters, Mon, Conf B Terrestrial Microbes on Mars? Posters, Thu, Conf B Microbes in Space and Time Posters, Mon, Conf B Radiation Effects: Microbes to Man, Mon, Salon One	Sandell G. Sanders J.	Extraterrestrial Biomolecules Poster Thu, Conf B Extraterrestrial Biomolecules, Fri, Salon Three Extraterrestrial Biomolecules Poster Thu, Conf B
Röttger K. Rouillard M.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One Prospecting for Life Posters, Mon, Conf A	Sanford S. A. Sanromá Ramos E.	Laboratory Astrochemistry, Thu, Salon Four Early Earth as Extrasolar Planet Proxy, Fri, Salon Five
Roy P.	Transition to Genetically Encoded Proteins, Wed, Conf Four Translation Posters, Tue, Conf B	Santos O. Saper L.	Astrobiology in Orbit Posters, Thu, Conf B Mineralogy Indicates Aqueous, Fri, Salon Three
Ruban A. V.	Biological Radiation Energy Capture, Thu, Conf Two	Sapers H. M.	Microbial Ecosystems, Mon, Salon Three
Rubinstein B.	Minimal and Ancestral Genomes, Fri, Salon One	Sarid G.	Asteroids, Comets, Wed, Conf Two Astrobiology of Planetary Ices Posters, Mon, Conf B Pattern and Prediction Posters, Tue, Conf B
Rugheimer S.	Habitability Metrics Posters, Tue, Conf A	Sarker P. K.	Astrobiology in Orbit Posters, Thu, Conf B Laboratory Astrochemistry, Thu, Salon Four
Ruiz-Beejo M.	Microbiology/ Geochemistry, Wed, Conf Four Microbiology/ Geochemistry Poster Tue, Con A	Sarkisova S. A.	Meta-omics of Microbial Mats Posters, Mon, Conf B
Ruiz-Trillo I.	From Genomes to Biomarkers Posters, Mon, Conf A	Sasselov D.	Habitability Metrics Posters, Tue, Conf A
Rummel J.	How Can Astrobiology Save World?, Mon, Ballroom	Sawada H.	Asteroids, Comets Posters, Tue, Conf A
Rushby A. J.	Habitability Metrics, Thu, Conf Two	Sawyer A. W.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five
Russell M. J.	Chemical Evo, Tue, Salon Five From Non-Enzymatic Catalysis Posters, Tue, Conf B Mineral-based Catalysis, Tue, Conf Two Serpentinization, Thu, Salon Five	Scalice D. Schaefer E.	Astrobiology E/PO, Tue, Conf Four New Mars Posters, Tue, Conf A
Saenz E. G. Saiento G.	Diversity in Research and Edu, Mon, Salon Four Robotics Technology Posters, Thu, Conf B	Schaperdoth I.	Microbes in Lithifying Systems, Thu, Conf Four
Saiento Lopez C. A.	Diversity in Research and Edu, Mon, Salon Four	Schipper K.	Serpentinization Posters, Thu, Conf B
Saiento Lopez G. A.	Diversity in Research and Edu, Mon, Salon Four	Schmid T.	Microbial Ecosystems, Mon, Salon Three
Saiki T.	Astrobiology E/PO Posters, Thu, Conf A Robotics Technology, Fri, Conf Four	Schmidt B. E.	Europa, Fri, Conf A
Sakaiya T.	Asteroids, Comets Posters, Tue, Conf A	Schmidt S. J.	Quantifying Frequency Posters, Tue, Conf A
Sakamoto M.	Organic Continuum, Tue, Salon Five	Schmidt W.	Astrobiology in Orbit, Fri, Salon Five
Sakamoto R.	Societal Impact of ET Life Posters, Tue, Conf B	Schmitt-Kopplin P.	Establishing Biogenicity Posters, Mon, Conf A Microbiology/ Geochemistry, Wed, Conf Four
Salama F.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Schneider D. M.	Early Evo of Life Posters, Mon, Conf A Translation, Wed, Salon One Translation Posters, Tue, Conf B
Salas E. C.	Astrobiology in Orbit, Fri, Salon Five	Schoonen M. A.	Mineral-based Catalysis, Tue, Conf Two
Salas L.	Astrobiology in Orbit Posters, Thu, Conf B	Schopf J. W.	Microbes in Lithifying Systems Posters, Tue, Conf A
Sallstedt T.	Microbes in Lithifying Systems, Thu, Conf Four	Schorghofer N.	Microbial Ecosystems, Mon, Salon Three O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
Saltikov C. W.	Subsurface Ecosystems, Fri, Conf A	Schrader D.	New Mars, Wed, Salon One
Sanche L.	Pattern and Prediction Posters, Tue, Conf B	Schrader M.	Biomolecular Evo, Thu, Salon Three
Sánchez E. J.	Icy Worlds and Chemistry Posters, Tue, Conf A	Schrenk M.	Microbes in Space and Time Posters, Mon, Conf B
Sanchez-Navas N.	Microbial Ecosystems Posters, Mon, Conf B	Schubotz F.	Serpentinization, Thu, Salon Five
Sánchez-Román M.	Microbial Ecosystems, Mon, Salon Three	Schuerger A.	Serpentinization Posters, Thu, Conf B
	Ice Life, Thu, Conf Four	Schulze-Makuch D.	Microbial Ecosystems, Mon, Salon Three
	Microbiology/ Geochemistry, Wed, Conf Four	Schumann D.	Terrestrial Microbes on Mars?, Fri, Conf Four
	Subsurface Ecosystems, Fri, Conf A	Schutte C.	Habitability Metrics, Thu, Conf Two
	Microbial Ecosystems, Mon, Salon Three	Schwartz P.	Intelligence and Astrobiology, Fri, Salon Four
	Microbiology/ Geochemistry, Wed, Conf Four	Schwietean E. W.	Titan Prebiotic Chemistry Posters, Mon, Conf B
		Scott J. R.	Microbial Ecosystems, Mon, Salon Three
			Microbes in Space and Time, Tue, Salon Four
			Chemical Evo Posters, Mon, Conf A
			Exoplanet Habitability Posters, Thu, Conf A
			Microbial Ecosystems Posters, Mon, Conf B

# AUTHOR INDEX

Seager S.	Exoplanet Habitability Posters, Thu, Conf A History of Oxygenation, Mon, Conf Four	Shivak J. N.	Mineralogy and Aqueous Processes Posters, Thu, Conf B New Mars, Wed, Salon One
Sebastian E.	Science of Mars Science Laboratory, Mon, Conf Two Mars Science Laboratory Posters, Mon, Conf B	Shock E.	Europa, Fri, Conf A Ice Life, Thu, Conf Four Microbes in Space and Time, Tue, Salon Four Microbial Ecosystems, Mon, Salon Three Pattern and Prediction, Thu, Conf Two Pattern and Prediction Posters, Tue, Conf B Origin/Evo of Photosynthesis Posters, Tue, Conf B
Sebree J.	Titan Prebiotic Chemistry, Mon, Salon Five	Shostak S.	Print only
See C.	Titan Prebiotic Chemistry, Mon, Salon Five	Shukla M.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One
Seelig B.	From Non-Enzymatic Catalysis, Wed, Salon Five	Shumlas S. L.	Mineral-based Catalysis, Tue, Conf Two
Seelos K. D.	Mineralogy Indicates Aqueous, Fri, Salon Three	Siefert J.	Astroecology Posters, Mon, Conf B HGT in Innovation, Tue, Conf Four
Segre D.	Theodynamics, Disequilibrium, Mon, Conf Two	Siegel V. L.	Ice Life, Thu, Conf Four
Segura A.	Habitability Metrics Posters, Tue, Conf A Biomolecular Evo Posters, Tue, Conf B Diversity in Research and Edu Posters, Mon, Conf A Exoplanet Habitability Posters, Thu, Conf A	Siegler M. A.	Intersection of Astrobiology/Society, Wed, Salon Four
Seifert N. A.	Extraterrestrial Biomolecules Poster Thu, Conf B	Siemion A.	Cross-Disciplinary Communication, Fri, Conf Two Societal Impact of ET Life Posters, Tue, Conf B
Sekine Y.	Exoplanet Habitability Posters, Thu, Conf A	Siering P. L.	Microbes in Space and Time Posters, Mon, Conf B
Semaniak J.	Laboratory Astrochemistry, Thu, Salon Four	Sigurdsson S.	Asteroids, Comets Posters, Tue, Conf A
Semken S.	Digital Media in Education, Wed, Salon Four	Silva A.	Extremeomics Posters, Tue, Conf A
Semrau J.	Pattern and Prediction, Thu, Conf Two	Silver S.	Extremeomics Posters, Tue, Conf A
Senske D. A.	Europa, Fri, Conf A	Simoncini E.	Theodynamics, Disequilibrium, Mon, Conf Two
Septon M.	Astrobiology in Orbit Posters, Thu, Conf B	Sims J. A.	Asteroids, Comets Posters, Tue, Conf A
Sepúlveda J.	Survival in ET Environments, Mon, Conf Two	Singleton A.	Microbiology/Geochemistry Poster Tue, Con A
Serrano P.	O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A	Sinha N.	Survival in ET Environments Poster Tue, Con A
Serrano-Núñez Y.	Plausible Geochemical Conditions Posters, Tue, Conf B	Sinha S.	Extremeomics, Wed, Salon Three
Sessions A. L.	Astrobiology E/PO Posters, Thu, Conf A	Sipila O.	Extraterrestrial Biomolecules Poster Thu, Conf B
Sevilla M. D.	Microbes in Lithifying Systems, Thu, Conf Four	Sjöberg R.	Subsurface Ecosystems, Fri, Conf A
Seymour K. S.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One	Skidmore M.	Ice Life, Thu, Conf Four Early Evo of Life Posters, Mon, Conf A
Shapiro R. S.	Titan Prebiotic Chemistry Posters, Mon, Conf B	Skulsky E.	Europa, Fri, Conf A
Shaa P.	Microbes in Lithifying Systems, Thu, Conf Four	Slater G.	Microbial Ecosystems Posters, Mon, Conf B
Sharpe F.	Microbial Ecosystems Posters, Mon, Conf B	Slatten K. J.	Quantifying Frequency, Thu, Salon One Quantifying Frequency Posters, Tue, Conf A
Shaw R. W.	Intelligence and Astrobiology Posters, Thu, Conf A	Sleep N. H.	Serpentinization, Thu, Salon Five
She Z.	Experimental Evo, Fri, Salon One	Smirnov A.	Mineral-based Catalysis, Tue, Conf Two
Shehata T.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One	Smith D.	How Can Astrobiology Save World?, Mon, Ballroom
Shelobolina E. S.	Astrobiology E/PO Posters, Thu, Conf A	Smith D. E.	Europa, Fri, Conf A
Sherlock G.	Establishing Biogenicity Posters, Mon, Conf A	Smith D. J.	Print Only
Sherrill D.	Experimental Evo, Fri, Salon One	Smith M. A.	Titan Prebiotic Chemistry Posters, Mon, Conf B UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
Sherrit S.	Experimental Evo Posters, Thu, Conf A	Smith M.	New Mars Posters, Tue, Conf A
Sherwood Lollar B.	Quantum Chemistry, Mon, Salon Four	Smith R. W.	Microbial Ecosystems Posters, Mon, Conf B
Shieh S. R.	Prospecting for Life Posters, Mon, Conf A	Smolek K.	Transmission into Space, Tue, Conf Two
Shields A.	Serpentinization, Thu, Salon Five	Snell T.	Astrobiology E/PO Posters, Thu, Conf A
Shigemori K.	Microbial Ecosystems, Mon, Salon Three	Snow T.	Translation Posters, Tue, Conf B
Shipman S. T.	Exoplanet Habitability Posters, Thu, Conf A		Laboratory Astrochemistry Poster, Thu, Conf B
Shirai K.	Organic Continuum, Tue, Salon Five		Laboratory Astrochemistry, Thu, Salon Four
Shirey T. B.	Laboratory Astrochemistry Poster, Thu, Conf B		
	Asteroids, Comets Posters, Tue, Conf A		
	Microbiology/Geochemistry, Wed, Conf Four		

# AUTHOR INDEX

Snyder J.	Virus Ecology/ Astrovirology, Tue, Conf Two	Stanley R. J.	Biological Radiation Energy Capture, Thu, Conf Two
Soares A.	From Non-Enzymatic Catalysis, Wed, Salon Five	Staudigel H.	Microbes in Space and Time Posters, Mon, Conf B
Socki R. A.	New Frontiers in Isotope Analysis Posters, Thu, Conf B	Stavros V.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One
	Oxidation in Extreme Environments, Tue, Conf Four		UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
Soderlund K. M.	Europa, Fri, Conf A	Steber A.	Extraterrestrial Biomolecules Poster Thu, Conf B
Sokolov D. A.	Plausible Geochemical Conditions, Wed, Salon Five	Stedman K.	Microbial Ecosystems Posters, Mon, Conf B
Sollitt L. S.	Icy Worlds and Chemistry Posters, Tue, Conf A		Microbes in Space and Time Posters, Mon, Conf B
Solomonidou A.	Icy Worlds and Chemistry, Wed, Salon Three		Virus Ecology/ Astrovirology, Tue, Conf Two
	Titan Prebiotic Chemistry Posters, Mon, Conf B		Virus Ecology/ Astrovirology Posters, Tue, Conf B
Som S.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five	Steele A.	Establishing Biogenicity, Mon, Conf Four
	How Can Astrobiology Save World?, Mon, Ballroom		Serpentinization Posters, Thu, Conf B
	Serpentinization Posters, Thu, Conf B	Stepanauskas R.	From Genomes to Biomarkers, Mon, Conf Four
	Transmission into Space Posters, Thu, Conf A	Stephan K.	Titan Prebiotic Chemistry Posters, Mon, Conf B
Song M.	Astroecology Posters, Mon, Conf B	Stephenson J. D.	Transition to Genetically Encoded Proteins, Wed, Conf Four
Sotin C.	Titan Prebiotic Chemistry Posters, Mon, Conf B	Stern J.	Science of Mars Science Laboratory, Mon, Conf Two
Souterre T.	Microbiology/ Geochemistry, Wed, Conf Four		Minimal and Ancestral Genomes, Fri, Salon One
Southam G.	Microbes in Lithifying Systems Posters, Tue, Conf A		Titan Prebiotic Chemistry, Mon, Salon Five
	Microbial Ecosystems Posters, Mon, Conf B	Sterzik M. F.	Astrobiology of Planetsimals Posters, Mon, Conf B
	Microbiology/ Geochemistry, Wed, Conf Four	Stevens E.	Microbial Ecosystems Posters, Mon, Conf B
	Microbial Ecosystems, Mon, Salon Three	Stewart L. C.	Pattern and Prediction Posters, Tue, Conf B
	Microbiology/ Geochemistry Poster Tue, Con A	Stich M.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five
Souza M. S.	Astroecology Posters, Mon, Conf B	Still S.	Data Challenges Posters, Thu, Conf A
Souza V.	Microbes in Space and Time, Tue, Salon Four	Stockton A. M.	Chemical Evo, Tue, Salon Five
	HGT in Innovation, Tue, Conf Four		Mineral-based Catalysis, Tue, Conf Two
	Meta-omics of Microbial Mats, Tue, Salon One		Prospecting for Life Posters, Mon, Conf A
	Microbes in Space and Time Posters, Mon, Conf B	Stoker C.	Titan Prebiotic Chemistry Posters, Mon, Conf B
Sowa M. B.	Radiation Effects: Microbes to Man, Mon, Salon One	Stone W.	Survival in ET Environments, Mon, Conf Two
Spaans M.	Astrobiology in Orbit Posters, Thu, Conf B	Storrie-Lombardi M. C.	Ice Life, Thu, Conf Four
Spagnolo L.	Astrobiology E/PO Posters, Thu, Conf A		Biological Radiation Energy Capture, Thu, Conf Two
Spano A.	HGT in Innovation, Tue, Conf Four		Survival in ET Environments, Mon, Conf Two
Sparks W.	Chirality in Cosmochemistry, Fri, Conf Two	Stoupin D.	Astrobiology E/PO Posters, Thu, Conf A
Spear J.	Microbes in Lithifying Systems, Thu, Conf Four	Strange N.	Europa, Fri, Conf A
	Pattern and Prediction, Thu, Conf Two	Strankman A. W.	Biological Radiation Energy Capture, Thu, Conf Two
Sperling E. A.	From Genomes to Biomarkers, Mon, Conf Four	Stromberg J.	Microbial Ecosystems Posters, Mon, Conf B
Spezzano S.	Extraterrestrial Biomolecules Poster Thu, Conf B	Strongin D.	Mineral-based Catalysis, Tue, Conf Two
Spicuzza M. J.	Establishing Biogenicity, Mon, Conf Four	Strother P.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One
Spilde M. N.	Subsurface Ecosystems, Fri, Conf A	Stroud R.	Organic Continuum Posters, Mon, Conf B
Spitzer J.	Last Universal Common Ancestor, Tue, Salon Three	Stucky G. D.	Mineral-based Catalysis, Tue, Conf Two
Spohn T.	Terrestrial Microbes on Mars?, Fri, Conf Four	Stuhldreier M. C.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One
Spotts T.	Ice Life, Thu, Conf Four	Sturkell E.	Environmental Physics and Life Posters, Tue, Conf A
Springsteen G.	Print Only	Subasavage J. P.	Quantifying Frequency, Thu, Salon One
Squyres S.	Mineralogy Indicates Aqueous, Fri, Salon Three	Sudholt E.	Taxonomy of Comets, Thu, Salon Five
Stalport F.	Science of Mars Science Laboratory, Mon, Conf Two	Sugita S.	Exoplanet Habitability Posters, Thu, Conf A
Stam C.	Microbiology/ Geochemistry, Wed, Conf Four		
	Molecular Tools, Wed, Conf Two		
Stan-Lotter H.	Astrobiology in Orbit, Fri, Salon Five		
Stanberry A.	Experimental Evo Posters, Thu, Conf A		

# AUTHOR INDEX

Sugitani K.	Early Evo of Life Posters, Mon, Conf A	Tailby N. D.	Biomolecular Evo, Thu, Salon Three
Suleymanov S. Y.	Radiation Effects: Microbes to Man Posters, Mon, Conf A	Takahashi J.	Chirality in Cosmochemistry Posters, Mon, Conf B
Sullivan W. T.	Astrobiology in Historical Perspective, Fri, Conf Two		Laboratory Astrochemistry, Thu, Salon Four
	Intersection of Astrobiology/ Society, Wed, Salon Four	Tamura K.	Early Evo of Life II, Tue, Salon Three
Sullivan-Fowler M.	Astrobiology E/PO, Tue, Conf Four	Tan J.	Chemical Evo, Tue, Salon Five
Summers D. P.	Chemical Evo Posters, Mon, Conf A		Chemical Evo Posters, Mon, Conf A
	Plausible Geochemical Conditions, Wed, Salon Five	Tang J. K.	Origin/ Evo of Photosynthesis Posters, Tue, Conf B
Summons R.	Digital Media in Education, Wed, Salon Four	Taniguchi M.	From Non-Enzymatic Catalysis, Wed, Salon Five
	Establishing Biogenicity, Mon, Conf Four	Tanpopo W.G.	Astrobiology in Orbit Posters, Thu, Conf B
	Establishing Biogenicity Posters, Mon, Conf A	Tarasashvili M.	Terrestrial Microbes on Mars? Posters, Thu, Conf B
	From Genomes to Biomarkers, Mon, Conf Four	Tarazona O. Y.	Diversity in Research and Edu, Mon, Salon Four
	From Genomes to Biomarkers Posters, Mon, Conf A	Tarozo R.	Establishing Biogenicity Posters, Mon, Conf A
	Meta-omics of Microbial Mats Posters, Mon, Conf B	Tarter J. C.	Transmission into Space, Tue, Conf Two
	Microbial Ecosystems, Mon, Salon Three	Tata R.	Exoplanet Habitability Posters, Thu, Conf A
	O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A	Tawalbeh R.	Robotics Technology Posters, Thu, Conf B
Sumner D.	Ice Life Posters, Thu, Conf B	Taylor G. J.	Asteroids, Comets Posters, Tue, Conf A
	Microbes in Lithifying Systems Posters, Tue, Conf A		Mineralogy and Aqueous Processes Posters, Thu, Conf B
	Microbial Ecosystems, Mon, Salon Three	Taylor S.	Organic Continuum Posters, Mon, Conf B
	Microbial Ecosystems Posters, Mon, Conf B		Digital Media in Education Poster, Tue, Conf B
Sumners C	Digital Media in Education, Wed, Salon Four		How Do We Explain Ourselves? Posters, Thu, Conf A
Susbilla C. B.	Biological Radiation Energy Capture, Thu, Conf Two	Taylor W.	Digital Media in Education, Wed, Salon Four
Sutherland J.	UV Radiation in Prebiotic Chemistry I, Mon, Salon One	Team Dorothy	Societal Impact of ET Life Posters, Tue, Conf B
Sutter B.	Survival in ET Environments, Mon, Conf Two	Team Kepler @GBT	Societal Impact of ET Life Posters, Tue, Conf B
Suzuki-Ishii S.	Serpentinization Posters, Thu, Conf B	Team SETI @home	Societal Impact of ET Life Posters, Tue, Conf B
Svadlenak N.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A	Team Serendip	Societal Impact of ET Life Posters, Tue, Conf B
Swain A.	Meta-omics of Microbial Mats Posters, Mon, Conf B	Teanby N.	Societal Impact of ET Life Posters, Tue, Conf B
Swanson E.	Diversity in Research and Edu Posters, Mon, Conf A	Temel M.	Titan Prebiotic Chemistry, Mon, Salon Five
Swart E.	Extremeomics, Wed, Salon Three		Titan Prebiotic Chemistry Posters, Mon, Conf B
Swingley W.	Pattern and Prediction, Thu, Conf Two	Templeton A.	Meta-omics of Microbial Mats Posters, Mon, Conf B
	Origin/ Evo of Photosynthesis, Thu, Conf Four		Serpentinization Posters, Thu, Conf B
Swings J. P.	Intersection of Astrobiology/ Society, Wed, Salon Four		Establishing Biogenicity Posters, Mon, Conf A
Swithers K.	HGT in Innovation, Tue, Conf Four	Temps F.	Pattern and Prediction, Thu, Conf Two
	HGT in Innovation Posters, Mon, Conf A		UV Radiation in Prebiotic Chemistry II, Tue, Salon One
Syombua B.	How Can Astrobiology Save World?, Mon, Ballroom	ten Kate I. L.	Mars Science Laboratory Posters, Mon, Conf B
Szabó J.	UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A	Thiele G.	Intersection of Astrobiology/ Society, Wed, Salon Four
Szostak J. W.	Experimental Evo, Fri, Salon One	Thomas B. C.	Print Only
	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five	Thomas D. A.	Titan Prebiotic Chemistry, Mon, Salon Five
Szponar N.	Serpentinization, Thu, Salon Five	Thomas K.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
	Serpentinization Posters, Thu, Conf B	Thomas R. D.	Laboratory Astrochemistry, Thu, Salon Four
Tabata M.	Astrobiology in Orbit Posters, Thu, Conf B	Thompson D. R.	Robotics Technology, Fri, Conf Four
Tachibana S.	Asteroids, Comets Posters, Tue, Conf A	Tietzel I.	Environmental Physics and Life Posters, Tue, Conf A
Tahata M.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	Timmes F. X.	Quantifying Frequency, Thu, Salon One
		Timmis K.	Subsurface Ecosystems, Fri, Conf A
		Tirard S.	Astrobiology in Historical Perspective, Fri, Conf Two

# AUTHOR INDEX

- Tirumalai M. R. Extremeomics, Wed, Salon Three  
HGT in Innovation, Tue, Conf Four  
Microbes in Space and Time Posters, Mon, Conf B  
Translation, Wed, Salon One
- Titov D. Icy Worlds and Chemistry, Wed, Salon Three
- Tokunaga A. New Mars, Wed, Salon One  
New Mars Posters, Tue, Conf A
- Tomasko M. G. Titan Prebiotic Chemistry, Mon, Salon Five
- Tomsho L. P. Molecular Tools, Wed, Conf Two
- Tornabene L. L. Mineralogy Indicates Aqueous, Fri, Salon Three
- Torres J. Science of Mars Science Laboratory, Mon, Conf Two
- Tortora P. Icy Worlds and Chemistry, Wed, Salon Three
- Tosi F. Icy Worlds and Chemistry, Wed, Salon Three
- Toyoda A. Radiation Effects: Microbes to Man, Mon, Salon One
- Trabucho-Alexandre J. O<sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A
- Trainer M. G. Titan Prebiotic Chemistry, Mon, Salon Five
- Tran B. N. Biomolecular Evo, Thu, Salon Three
- Tran Q. HGT in Innovation, Tue, Conf Four  
Translation, Wed, Salon One  
Translation Posters, Tue, Conf B
- Treiman A. H. Print Only
- Trimble W. L. Extremeomics Posters, Tue, Conf A
- Trindle C. Quantum Chemistry Posters, Mon, Conf B
- Tringe S. G. Meta-omics of Microbial Mats Posters, Mon, Conf B
- Tripathi A. K. Microbes in Lithifying Systems, Thu, Conf Four
- Tripp C. Translation, Wed, Salon One
- Troiano A. Astrobiology E/PO Posters, Thu, Conf A
- Troutman M. R. Organic Continuum Posters, Mon, Conf B
- Tsairides C. Astrobiology E/PO Posters, Thu, Conf A
- Tsao L. E. Microbial Ecosystems, Mon, Salon Three
- Tsapin A. I. Prospecting for Life Posters, Mon, Conf A
- Tsou P. Icy Worlds and Chemistry Posters, Tue, Conf A
- Tuiasosopo B. Microbes in Space and Time Posters, Mon, Conf B
- Turick C. E. Biological Radiation Energy Capture, Thu, Conf Two
- Turk-MacLeod R. Experimental Evo, Fri, Salon One
- Turnbull M. Quantifying Frequency, Thu, Salon One
- Turse C. Habitability Metrics, Thu, Conf Two  
Titan Prebiotic Chemistry Posters, Mon, Conf B
- Tweedt S. Early Evo of Life Posters, Mon, Conf A  
From Genomes to Biomarkers, Mon, Conf Four
- Twing K. I. Serpentinization Posters, Thu, Conf B
- Uckert K. Robotics Technology Posters, Thu, Conf B
- Ulamec S. Asteroids, Comets Posters, Tue, Conf A
- Ullrich S. UV Radiation in Prebiotic Chemistry I, Mon, Salon One  
UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
- Urban L. U. Asteroids, Comets, Wed, Conf Two  
Pattern and Prediction Posters, Tue, Conf B
- Urtuvia V. N. Microbiology/ Geochemistry, Wed, Conf Four
- Ushikubo T. Establishing Biogenicity, Mon, Conf Four  
Microbial Ecosystems, Mon, Salon Three
- Uzel A. Meta-omics of Microbial Mats Posters, Mon, Conf B
- Vaidya N. Prebiotic Chemistry/ Biopolymers, Mon, Salon Five
- Vaishampayan P. Microbes in Space and Time Posters, Mon, Conf B  
Astrobiology in Orbit, Fri, Salon Five  
Molecular Tools, Wed, Conf Two
- Vajda V. Cross-Disciplinary Communication Posters, Thu, Conf A
- Vakoch D. Astrobiology in Historical Perspective, Fri, Conf Two  
Cross-Disciplinary Communication, Fri, Conf Two  
Societal Impact of ET Life Posters, Tue, Conf B  
Transmission into Space, Tue, Conf Two
- Valach M. Extremeomics, Wed, Salon Three
- Valdivia-Silva J. Terrestrial Microbes on Mars? Posters, Thu, Conf B
- Valdre' G. Microbiology/ Geochemistry, Wed, Conf Four
- Vallalar B. Terrestrial Microbes on Mars?, Fri, Conf Four  
Ice Life Posters, Thu, Conf B
- Valley J. W. Establishing Biogenicity, Mon, Conf Four  
Microbial Ecosystems, Mon, Salon Three
- van der Marel N. Print Only
- van Dishoeck E. Print Only
- Van Hoolst T. Icy Worlds and Chemistry, Wed, Salon Three
- Van Kranendonk M. J. Establishing Biogenicity, Mon, Conf Four  
O<sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
- Vance S. Europa, Fri, Conf A  
Serpentinization, Thu, Salon Five
- Vasile M. Asteroids, Comets Posters, Tue, Conf A
- Vasilyev G. I. Survival in ET Environments, Mon, Conf Two
- Vasyunin A. I. Organic Continuum Posters, Mon, Conf B
- Vayá I. UV Radiation in Prebiotic Chemistry II, Tue, Salon One
- Veglia G. From Non-Enzymatic Catalysis, Wed, Salon Five
- Velasquez C. Diversity in Research and Edu, Mon, Salon Four
- Venkateswaran K. Microbes in Space and Time Posters, Mon, Conf B  
Astrobiology in Orbit, Fri, Salon Five  
Extremeomics, Wed, Salon Three  
Molecular Tools, Wed, Conf Two
- Verdasca J. Mars Science Laboratory Posters, Mon, Conf B
- Veeulen A. How Can Astrobiology Save World?, Mon, Ballroom  
How Do We Explain Ourselves? Plenary, Thu, Ballroom
- Vicuña R. Microbiology/ Geochemistry, Wed, Conf Four
- Vidal Romani J. Subsurface Ecosystems, Fri, Conf A
- Vigren E. Laboratory Astrochemistry, Thu, Salon Four

# AUTHOR INDEX

Villanueva G. L.	New Mars, Wed, Salon One New Mars Posters, Tue, Conf A Organic Continuum, Tue, Salon Five Taxonomy of Comets, Thu, Salon Five	Wartell R. M.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One Translation, Wed, Salon One
Vinatier S.	Titan Prebiotic Chemistry, Mon, Salon Five	Washington A.	Translation, Wed, Salon One Translation Posters, Tue, Conf B
Viola N.	Asteroids, Comets Posters, Tue, Conf A	Watanabe N.	Laboratory Astrochemistry, Thu, Salon Four Laboratory Astrochemistry Poster, Thu, Conf B
Viscio M.	Asteroids, Comets Posters, Tue, Conf A	Watanabe Y.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
Viso M. Y.	Asteroids, Comets, Wed, Conf Two	Waters D. P.	Cross-Disciplinary Communication, Fri, Conf Two
Visscher P. T.	Meta-omics of Microbial Mats, Tue, Salon One Meta-omics of Microbial Mats Posters, Mon, Conf B	Waters S. M.	Extremeomics, Wed, Salon Three
Voelz D. G.	Robotics Technology Posters, Thu, Conf B	Watkins D.	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One Translation Posters, Tue, Conf B
Vogl K.	Origin/ Evo of Photosynthesis Posters, Tue, Conf B	Watson A. J.	Habitability Metrics, Thu, Conf Two
von Kiparski G.	Prospecting for Life Posters, Mon, Conf A	Watson I.	Asteroids, Comets Posters, Tue, Conf A
von Paris P.	Habitability Metrics, Thu, Conf Two	Webb K.	Oxidation in Extreme Environments, Tue, Conf Four
Vuitton V.	Biomolecular Evo, Thu, Salon Three	Weber A. L.	Prebiotic Chemistry/ Biopolymers, Mon, Salon Five
Wada K.	Asteroids, Comets Posters, Tue, Conf A	Webster C. R.	New Frontiers in Isotope Analysis, Fri, Salon Four
Wade B. D.	Experimental Evo, Fri, Salon One	Weehuizen R.	Intersection of Astrobiology/ Society, Wed, Salon Four
Wade L.	Prospecting for Life Posters, Mon, Conf A	Wegener Parfrey L.	Early Evo of Life II, Tue, Salon Three
Wagner B.	Ice Life, Thu, Conf Four	Wehres N.	Laboratory Astrochemistry, Thu, Salon Four
Wagner I. D.	Microbes in Space and Time, Tue, Salon Four	Weigel M.	Societal Impact of ET Life, Thu, Salon Four
Wagstaff K.	Robotics Technology, Fri, Conf Four	Weiss J.	Europa, Fri, Conf A
Waldbauer J. R.	From Genomes to Biomarkers, Mon, Conf Four	Welander P. V.	From Genomes to Biomarkers, Mon, Conf Four
Walker S. I.	Chemical Evo, Tue, Salon Five How Can Astrobiology Save World?, Mon, Ballroom Minimal and Ancestral Genomes, Fri, Salon One Prebiotic Chemistry/ Biopolymers, Mon, Salon Five	Wellnitz D. D.	Exoplanet Habitability Posters, Thu, Conf A
Walkowicz L.	Quantifying Frequency, Thu, Salon One	Wenger J.	Experimental Evo, Fri, Salon One
Wall C.	Microbes in Space and Time, Tue, Salon Four	Werthimer D.	Cross-Disciplinary Communication, Fri, Conf Two
Waller S.	Cross-Disciplinary Communication Posters, Thu, Conf A	Wessel G.	Astroecology Posters, Mon, Conf B
Walsh C.	Laboratory Astrochemistry, Thu, Salon Four Organic Continuum, Tue, Salon Five	West G. B.	Habitability Metrics, Thu, Conf Two
Walter M. R.	Astrobiology E/PO Posters, Thu, Conf A From Genomes to Biomarkers, Mon, Conf Four Microbial Ecosystems Posters, Mon, Conf B O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four	West R.	Titan Prebiotic Chemistry, Mon, Salon Five
Walter N.	Intersection of Astrobiology/ Society, Wed, Salon Four	Westall F.	Astrobiology in Orbit Posters, Thu, Conf B
Wang A.	New Mars, Wed, Salon One	Whelan T. P.	Digital Media in Education, Wed, Salon Four
Wang S.	Extraterrestrial Biomolecules Poster Thu, Conf B Extraterrestrial Biomolecules, Fri, Salon Three Extraterrestrial Biomolecules Poster Thu, Conf B	Whitaker R. J.	Microbes in Space and Time Posters, Mon, Conf B
Wang Y.	Quantum Chemistry, Mon, Salon Four Microbes in Space and Time Posters, Mon, Conf B Organic Continuum, Tue, Salon Five	White D.	Laboratory Astrochemistry Poster, Thu, Conf B
Wanger G.	Serpentinization Posters, Thu, Conf B	White L. M.	Chemical Evo, Tue, Salon Five Mineral-based Catalysis, Tue, Conf Two
Ward J. M.	Biological Radiation Energy Capture, Thu, Conf Two Survival in ET Environments, Mon, Conf Two	White R.	Quantifying Frequency, Thu, Salon One Quantifying Frequency Posters, Tue, Conf A
Ward L. M.	O <sub>2</sub> and Evo: Look to the Past Posters, Mon, Conf A	White V. E.	Robotics Technology, Fri, Conf Four
		Whitehill A.	O <sub>2</sub> and Evo: Look to the Past, Tue, Salon Four
		Whittet D.	Extraterrestrial Biomolecules Poster Thu, Conf B
		Widicus Weaver S. L.	Extraterrestrial Biomolecules, Fri, Salon Three Extraterrestrial Biomolecules Poster Thu, Conf B How Do We Explain Ourselves? Plenary, Thu, Ballroom Laboratory Astrochemistry Poster, Thu, Conf B UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
		Wiegel J.	Microbes in Space and Time, Tue, Salon Four Serpentinization, Thu, Salon Five

# AUTHOR INDEX

Wielders A.	Icy Worlds and Chemistry, Wed, Salon Three	Wright G.	Biological Radiation Energy Capture, Thu, Conf Two
Wierzchos J.	Microbiology/ Geochemistry, Wed, Conf Four	Wright K. E.	Astrobiology E/PO, Tue, Conf Four
Williams A.	Microbes in Lithifying Systems Posters, Tue, Conf A	Wu L.	Pattern and Prediction, Thu, Conf Two
Williams C. A.	UV Radiation in Prebiotic Chemistry II, Tue, Salon One	Wu Y.	Establishing Biogenicity, Mon, Conf Four
Williams D.	Extremeomics Posters, Tue, Conf A	Xiao M.	Extraterrestrial Biomolecules Poster Thu, Conf B
Williams L.	Astrobiology E/PO Posters, Thu, Conf A	Xiao S.	Radiation Effects: Microbes to Man, Mon, Salon One
	Early Evo of Life Posters, Mon, Conf A	Xiao X.	Early Evo of Life II, Tue, Salon Three
	O <sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One	Xu H.	Robotics Technology Posters, Thu, Conf B
	Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A	Xu L.	Establishing Biogenicity Posters, Mon, Conf A
	Transition to Genetically Encoded Proteins, Wed, Conf Four	Xu Y.	Serpentinization Posters, Thu, Conf B
	Translation, Wed, Salon One	Xue Y.	Extraterrestrial Biomolecules Poster Thu, Conf B
	Translation Posters, Tue, Conf B	Xulvi-Brunet R.	HGT in Innovation Posters, Mon, Conf A
Williams L. B.	New Frontiers in Isotope Analysis, Fri, Salon Four	Yabuta H.	Translation Posters, Tue, Conf B
Williamson C.	Pattern and Prediction, Thu, Conf Two	Yamagishi A.	Experimental Evo, Fri, Salon One
Williford K. H.	Establishing Biogenicity, Mon, Conf Four	Yamaguchi K. E.	Asteroids, Comets Posters, Tue, Conf A
	Microbial Ecosystems, Mon, Salon Three		Astrobiology in Orbit Posters, Thu, Conf B
Willis P. A.	Chemical Evo, Tue, Salon Five		Laboratory Astrochemistry, Thu, Salon Four
	Prospecting for Life Posters, Mon, Conf A		Organic Continuum, Tue, Salon Five
	Titan Prebiotic Chemistry Posters, Mon, Conf B	Yamanaka T.	Astrobiology in Orbit Posters, Thu, Conf B
Willnecker R.	Astrobiology in Orbit, Fri, Salon Five	Yamashita M.	Print Only
Willson D.	Microbiology/ Geochemistry, Wed, Conf Four	Yang B.	Extraterrestrial Biomolecules, Fri, Salon Three
Wilner D.	Extraterrestrial Biomolecules, Fri, Salon Three	Yang C.	Asteroids, Comets Posters, Tue, Conf A
Wilson A. M.	Microbes in Space and Time, Tue, Salon Four	Yang W.	Molecular Tools, Wed, Conf Two
Wilson M. A.	From Non-Enzymatic Catalysis, Wed, Salon Five	Yang Z.	Laboratory Astrochemistry, Thu, Salon Four
Wilson M. S.	Microbes in Space and Time Posters, Mon, Conf B	Yano H.	Laboratory Astrochemistry Poster, Thu, Conf B
Winebrenner D.	Ice Life, Thu, Conf Four	Yargicoglu E.	Astrobiology in Orbit Posters, Thu, Conf B
Wing B.	From Genomes to Biomarkers, Mon, Conf Four	Yerrapragada S.	Serpentinization Posters, Thu, Conf B
Wingender J.	Astrobiology in Orbit, Fri, Salon Five	Yesavage T. A.	HGT in Innovation, Tue, Conf Four
Winter O. C.	Asteroids, Comets Posters, Tue, Conf A		Microbes in Space and Time Posters, Mon, Conf B
Winters J. G.	Quantifying Frequency, Thu, Salon One	Yokobori S.	Astrobiology in Orbit Posters, Thu, Conf B
	Quantifying Frequency Posters, Tue, Conf A	Yoshida S.	Laboratory Astrochemistry, Thu, Salon Four
Wirström E. S.	Laboratory Astrochemistry, Thu, Salon Four	Yoshikawa M.	Asteroids, Comets Posters, Tue, Conf A
Wirth R.	Establishing Biogenicity Posters, Mon, Conf A	Young M.	Virus Ecology/ Astrovirology, Tue, Conf Two
Wolf Y.	Virus Ecology/ Astrovirology, Tue, Conf Two	Young P. A.	Quantifying Frequency, Thu, Salon One
Wolfe G. S.	Microbes in Space and Time Posters, Mon, Conf B	Younse P.	Quantifying Frequency Posters, Tue, Conf A
Wood S.	Survival in ET Environments Poster Tue, Con A	Yu H.	Robotics Technology, Fri, Conf Four
Woolf N. J.	Organic Continuum, Tue, Salon Five		UV Radiation in Prebiotic Chemistry I, Mon, Salon One
Woon D. E.	Quantum Chemistry, Mon, Salon Four		UV Radiation in Prebiotic Chemistry Posters, Mon, Conf A
Wootton A.	Extraterrestrial Biomolecules, Fri, Salon Three	Yu J.	Astroecology Posters, Mon, Conf B
Wordsworth R.	Early Earth as Extrasolar Planet Proxy, Fri, Salon Five		Oxidation in Extreme Environments, Tue, Conf Four
Wos J.	Intersection of Astrobiology/ Society, Wed, Salon Four	Yue J.	HGT in Innovation Posters, Mon, Conf A
Worth R.	Asteroids, Comets Posters, Tue, Conf A	Yung P. T.	Microbiology/ Geochemistry, Wed, Conf Four
Woycheese K. M.	Microbes in Lithifying Systems Posters, Tue, Conf A	Zachos P. A.	Molecular Tools, Wed, Conf Two
Wray A. C.	Serpentinization Posters, Thu, Conf B	Zack L. N.	Astrobiology E/PO Posters, Thu, Conf A
Wray J. J.	Mineralogy and Aqueous Processes Posters, Thu, Conf B	Zacny K.	Organic Continuum, Tue, Salon Five
	Mineralogy Indicates Aqueous, Fri, Salon Three	Zahnle K.	Prospecting for Life Posters, Mon, Conf A
			New Mars Posters, Tue, Conf A

## AUTHOR INDEX

- Zaleski D. Extraterrestrial Biomolecules Posters, Thu, Conf B
- Zerkle A. L. Early Earth as Extrasolar Planet Proxy, Fri, Salon Five
- Zhang F. Establishing Biogenicity Posters, Mon, Conf A
- Zhang H. Y. O<sub>2</sub> and Evo: Ancient Biochemistry, Thu, Salon One
- Zhang L. Chemical Evo Posters, Mon, Conf A
- Zhao Z. Minimal and Ancestral Genomes, Fri, Salon One
- Zhaunerchyk V. Laboratory Astrochemistry, Thu, Salon Four
- Zhou C. HGT in Innovation Posters, Mon, Conf A
- Zhou M. Plausible Geochemical Conditions, Wed, Salon Five  
Print Only
- Zic Fuchs M. Intersection of Astrobiology/ Society, Wed, Salon Four
- Zimmerman Brachman R. How Do We Explain Ourselves? Posters, Thu, Conf A
- Zins E. Prebiotic Chemistry/ Biopolymers Posters, Mon, Conf A
- Zinser E. Oxidation in Extreme Environments, Tue, Conf Four
- Ziurys L. M. Extraterrestrial Biomolecules Posters, Thu, Conf B  
New Frontiers in Isotope Analysis, Fri, Salon Four  
Organic Continuum, Tue, Salon Five
- Zorzano M. P. Science of Mars Science Laboratory, Mon, Conf Two  
Mars Science Laboratory Posters, Mon, Conf B
- Zouganelis G. Astrobiology in Orbit Posters, Thu, Conf B
- Zoumplis A. B. Laboratory Astrochemistry Posters, Thu, Conf B
- Zsom A. Habitability Metrics Posters, Tue, Conf A

**NOTES:**

This page is intentionally left blank.



Go paperless! Access AbSciCon  
Scientific Program and Abstracts at  
<http://abscicon2012.arc.nasa.gov>