

*Final Programme*

# *COSMIC CATAclysms and LIFE*

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# ESLAB 08



**10 - 14 November 2008**

**ESRIN  
Frascati, Italy**

**Research and Scientific Support Department**



# *Programme*

## **Monday, 10 November 2008**

- 14:30 Welcome and Opening  
*Southwood, D., by video*  
*European Space Agency (France)*
- 14:45 Contribution of ESA's Missions and Programme to the Topic of the Symposium  
*Volonte, S.*  
*European Space Agency (France)*

### **Cosmic Cataclysms: The Biological Overview**

- 15:15 Molecules from the Interstellar Medium to Life on Planets (invited)  
*Ziurys, L.*  
*University of Arizona, Steward Observatory (United States).....12*

### **Session 1 - Big Bang and Nucleosynthesis**

- 16:00 The Chemical Evolution of the Milky Way and the Galactic Habitable Zone (invited)  
*Prantzos, N.*  
*Institut d'Astrophysique de Paris (France).....12*
- 16 :45 Overview of social events  
*Isakeit, D.*  
*European space Agency (Italy)*

**17:00-18:00 Icebreaker**

**Tuesday, 11 November 2008**

**Session 2 - Star Formation and Synthesis of Molecules**

- 10:00 Synthesis of Interstellar and Circumstellar Molecules (invited)  
*Liseau, R.*  
*Chalmers University of Technology (Sweden).....12*
- 10:30 Delivery of Complex Organic Compounds from Planetary Nebulae to the Solar System  
*Kwok, S.*  
*University of Hong Kong (Hong Kong).....12*
- 11:00 So the Last Shall Be First, and the First Last - Stellar Birth and the Fate of Protoplanets  
*Stecklum, B.<sup>1</sup>; Basu, S.<sup>2</sup>*  
*<sup>1</sup>Thuringer Landessternwarte Tautenburg (Germany); <sup>2</sup>University of Western Ontario (Canada).....13*
- 11:30 Coffee break**
- 12:00 Star and Planet Formation in Young Massive Clusters (invited)  
*Robberto, M.<sup>1</sup>; Pascucci, I.<sup>2</sup>*  
*<sup>1</sup>Space Telescope Science Institute (United States); <sup>2</sup>Johns Hopkins University (United States).....13*
- 12:30 Revealing the Relevance of Spiral Arm Crossings to Earth Cataclysms using Gaia  
*Bailer-Jones, C.A.L.*  
*Max Planck Institute for Astronomy (Germany).....13*
- 13:00 A Case Study of a Protostellar System  
*Fridlund, M.<sup>1</sup>; Liseau, R.<sup>2</sup>*  
*<sup>1</sup>ESA/ESTEC (Netherlands); <sup>2</sup>Chalmers Institute of Technology (Sweden).....14*

**13:40 Lunch**

**Session 3 - Planetary Formation and the Role of Collisions**

- 15:00 Cataclysms in Planet Formation (invited)  
*Blum, J.*  
*TU Braunschweig (Germany).....14*
- 15:45 The Fraction of Uninhabitable Extrasolar Planetary Systems due to Massive Bombardment (invited)  
*Greaves, J.*  
*University of St Andrews (United Kingdom) .....14*

**16:30 Coffee break**

**17:00-18:00 Poster Session**

**18:00- 20:30 Bus to Rome and walking tour in the Eternal City**

## Wednesday, 12 November 2008

### Session 4 - Late Heavy Bombardment, the Moon-Earth System and the Emergence of Life on Earth

10:00	Dynamics of the Late Heavy Bombardment (invited) <i>Morbidelli, A.</i> <i>CNRS/OCA/UNSA (France)</i> .....	14
10:30	Cosmochemical Constraints on the Late Heavy Bombardment <i>Gounelle, M. ; Briani, G.</i> <i>MNHN (France)</i> .....	15
10:50	A New Chronology for the Moon and Mercury <i>Marchi, S. <sup>1</sup>; Mottola, S. <sup>2</sup>; Cremonese, G. <sup>3</sup>; Massironi, M. <sup>4</sup>; Martellato, E. <sup>3</sup></i> <i><sup>1</sup>Padova University (Italy); <sup>2</sup>German Aerospace Center (DLR) (Germany); <sup>3</sup>INAF, Osservatorio Astronomico di Padova (Italy); <sup>4</sup>Department of Geosciences, Padova University (Italy)</i> .....	15
11:10	If We Had No Moon : Earth, Life, and SMART-1 <i>Foing, B.H.</i> <i>ESA (Netherlands)</i> .....	15
<b>11:30</b>	<b>Coffee break</b>	
12:00	Giant Impacts and the Formation of Terrestrial Planets (invited) <i>Benz, W.</i> <i>University of Berne (Switzerland)</i> .....	16
12:30	Projectile Identification in Terrestrial and Lunar Impact Structures <i>Goderis, S. ; Claeys, Ph.</i> <i>Vrije Universiteit Brussel (Belgium)</i> .....	16
12:50	The Meteorite Impact in a New Prehistory of Life <i>Managadze, G.G.</i> <i>Space Research Institute (Russian Federation)</i> .....	16
13:10	Free Molecular Oxygen Derived from a Giant Cometary Impact during the Impact Cataclysm <i>Premovic, P.</i> <i>University of Nis (Serbia)</i> .....	17

### 13:40 Lunch

### Session 5 - The Role of Impacts on Life

15:00	Cataclysmic Bombardment throughout the Inner Solar System (invited) <i>Kring, D. <sup>1</sup>; Swindle, T. <sup>2</sup></i> <i><sup>1</sup>USRA-Lunar and Planetary Institute (United States); <sup>2</sup>University of Arizona (United States)</i> .....	17
15:30	Effects of Impacts on the Atmospheric Evolution of Mars <i>Pham, L.B.S. <sup>1</sup>; Karatekin, Ö. <sup>1</sup>; Dehant, V. <sup>1</sup>; Lammer, H. <sup>2</sup></i> <i><sup>1</sup>Royal Observatory of Belgium (Belgium); <sup>2</sup>Space Research Institute (Austria)</i> .....	18
16:00	Influx of Organics by Bombardment vs their In- situ Formation on the Primitive Earth <i>Bar-Nun, A.</i> <i>Tel Aviv University (Israel)</i> .....	18
<b>16:30</b>	<b>Coffee break</b>	
17:00	Impact Driven Scenario for Interplanetary Transfer of Life (invited) <i>Horneck, G.</i> <i>German Aerospace Center DLR (Germany)</i> .....	18
17:30	Evidences Support an Extraordinary Event, Possibly an Impact during the Proterozoic for Phosphorus Abundance on the Earth <i>Sisodia, M.S.</i> <i>J N Vyas University (India)</i> .....	19
<b>20:00</b>	<b>Public lecture in Roma 'The Tunguska mystery: a century later' by Giuseppe Longo (University of Bologna)</b>	

## Thursday, 13 November 2008

### Session 6 - Emergence and Habitats of Life in the Universe

10:00	Europa: A Major Target in the Solar System for Astrobiology (invited) <i>Prieur, D.</i> <i>Université de Brest (France)</i> .....	19
10:30	Habitability on Planetary Surfaces (invited) <i>Ehrenfreund, P.</i> <i>George Washington University (United States)</i> .....	19
11:00	Compound Model to Analyze Water in Terrestrial Planets Formation <i>De Souza Torres, K.</i> <sup>1</sup> ; <i>Winter, O.</i> <sup>2</sup> <i><sup>1</sup>INPE (Brazil); <sup>2</sup>FEG/UNESP (Brazil)</i> .....	20

#### 11:30 Coffee break

### Session 7 - Hazards from the Sun, Stars and the Universe, and Resilience of Life

12:00	The Sun, Geomagnetic Polarity Transitions, and Effects on System Earth (invited) <i>Glassmeier, K.H.</i> <i>Technische Universität Braunschweig (Germany)</i> .....	20
12:30	Gamma-ray Bursts and the Earth (invited) <i>Thomas, B.C.</i> <sup>1</sup> ; <i>Melott, A.L.</i> <sup>2</sup> ; <i>Jackman, C.H.</i> <sup>3</sup> <i><sup>1</sup>Washburn University (United States); <sup>2</sup>University of Kansas (United States); <sup>3</sup>NASA Goddard Space Flight Center (United States)</i> .....	20
13:00	Survival under Damaging Radiation: A Balance between Adequate Repair and Failing of the Repair System? <i>Van Oostveldt, P.M.V.</i> ; <i>Van Oostveldt, K.</i> ; <i>De Vos, W.</i> ; <i>Meesen, G.</i> ; <i>Dieriks, B.</i> <i>Ghent University (Belgium)</i> .....	21

#### 13:40 Lunch

15:00	Solar Forcing, Atmospheric Escape, and the Habitability of the Earth-Like Planets (invited) <i>Lundin, N.A.R.</i> <sup>1</sup> ; <i>Lundin, R.</i> <sup>1</sup> ; <i>Lammer, H.</i> <sup>2</sup> ; <i>Ribas, I.</i> <sup>3</sup> <i><sup>1</sup>Swedish Institute of Space Physics (Sweden); <sup>2</sup>Space res. Inst. Academy of Sciences (Austria); <sup>3</sup>Institut de Ciències de l'Espai CSIC-IEEC (Spain)</i> .....	21
15:30	Planetary Magnetic Fields and Solar Forcing: Implications for Atmospheric Evolution (invited) <i>Ribas, I.</i> <i>Institut de Ciències de l'Espai (CSIC-IEEC) (Spain)</i> .....	22
16:00	Impact of High Energy Radiation on the Biota: Gamma Ray Bursts and Soft Gamma Repeaters <i>Horvath, J.E.</i> ; <i>Galante, D.</i> <i>Universidade de Sao Paulo (Brazil)</i> .....	22
16:20	A Wavelet Based Analysis of Cosmic Ray Variation <i>Zarrouk, N.</i> <i>Faculté Des Sciences de Tunis (Tunisia)</i> .....	22

#### 16:40-17:15 Coffee break and Poster Session

17:30 Bus to Castel-Gandolfo and visit of the Vatican Observatory

20:30 Conference 'Full moon' Dinner at Lo Specchio di Diana, Nemi

## Friday, 14 November 2008

### Session 8 - Cosmic Habitability, Prevalence of Earth-like Planets and the Fate of Earth

10:00	Strategies for Life Detection (invited) <i>Selsis, F.</i> <i>CNRS (France)</i> .....	22
10:30	Evolution of a Habitable Planet - Assembling the Puzzle <i>Kaltenegger, L.</i> <i>Harvard-Smithsonian Center for Astrophysics (United States)</i> .....	23
10:50	How Common are Extrasolar Late Heavy Bombardments? <i>Booth, M.</i> <sup>1</sup> ; <i>Wyatt, M.C.</i> <sup>1</sup> ; <i>Morbidelli, A.</i> <sup>2</sup> ; <i>Moro-Martin, A.</i> <sup>3</sup> ; <i>Levison, H.F.</i> <sup>4</sup> <sup>1</sup> <i>University of Cambridge (United Kingdom)</i> ; <sup>2</sup> <i>Observatoire de la Cote d'Azur (France)</i> ; <sup>3</sup> <i>Princeton University (United States)</i> ; <sup>4</sup> <i>Southwest Research Institute (United States)</i> .....	23
11:10	The Vega System: Quiescent or Cataclysmic? <i>Krivov, A.V.</i> <sup>1</sup> ; <i>Augereau, J.-C.</i> <sup>2</sup> ; <i>Mueller, S.</i> <sup>1</sup> ; <i>Reche, R.</i> <sup>2</sup> ; <i>Absil, O.</i> <sup>2</sup> ; <i>Loehne, T.</i> <sup>1</sup> ; <i>Beust, H.</i> <sup>2</sup> <sup>1</sup> <i>Astrophysical Institute, U. Jena (Germany)</i> ; <sup>2</sup> <i>LAOG Grenoble (France)</i> .....	23
<b>11:30</b>	<b>Coffee break</b>	
11:50	The Search for Life in the Universe (invited) <i>Owen, T.C.</i> <i>University of Hawai (United States)</i> .....	23
12:20	New Insights Into the Causes of Mass-Extinction Events <i>Feulner, G.</i> <i>Potsdam Institute for Climate Impact Research (Germany)</i> .....	23
12:40	Late Stage Evolution of Planetary Systems: The Case of V 391 PEG B <i>Silvotti, R.</i> <i>INAF (Italy)</i> .....	24
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13:00	The Ultimate Cataclysm, the Orbital (in)Stability of Terrestrial Planets in Exoplanet-systems including Planets in Binaries (invited) <i>Pilat-Lohinger, E.</i> <i>Institute for Astronomy, University of Vienna (Austria)</i> .....	24
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## Poster Session

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Geochemical Analysis of Materials Excavated by the Large South Pole - Aitken Impact Event <i>Borst, A.M., Bexkens, F. ; Foing, B. ; Koschny, D.</i> <i>ESA/ESTEC (Netherlands)</i> .....	25
The Global Geological Context and Impact Signatures in the Lunar SPA Basin; the Biggest Cataclysm in the Solar System <i>Bexkens, F.S.</i> <sup>1</sup> ; <i>Borst, A.M.</i> <sup>2</sup> ; <i>Foing, B.H.</i> <sup>3</sup> ; <i>Peters, S.T.M.</i> <sup>2</sup> ; <i>Koschny, D.</i> <sup>3</sup> <sup>1</sup> <i>Vrije Universiteit (Netherlands)</i> ; <sup>2</sup> <i>Department of Petrology, Vrije Universiteit (Netherlands)</i> ; <sup>3</sup> <i>SCI-S. Research and Scientific Support Department, ESA ESTEC (Netherlands)</i> .....	25
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Differences Between the Impact Regimes of the Terrestrial Planets <i>Horner, J.</i> <sup>1</sup> ; <i>Mousis, O.</i> <sup>2</sup> ; <i>Petit, J.-M.</i> <sup>2</sup> ; <i>Jones, B.W.</i> <sup>1</sup> <sup>1</sup> <i>The Open University (United Kingdom)</i> ; <sup>2</sup> <i>Observatoire de Besancon (France)</i> .....	28