

# **Life on Earth and beyond: emergence, survivability, and impact on the environment**

## **Final Program & Information for Participants**

19th - 24th March 2018  
University Residential Centre (Ce.U.B.)  
Bertinoro (FC) - Italy



## Information for the Participants

### Venue Address

University Residential Centre (Ce.U.B.)  
Via Frangipane, 6  
Bertinoro (FC)  
Telephone: 0039 0543 446 500

### Taxi Service

In front of train station:  
+39 0543 31111 from Forlì  
+39 0547 610710 from Cesena

### Excursion (March 22th, Thursday)

Ravenna historical centre and Byzantine mosaics

### Gala Dinner (March 22th, Thursday)

Ristorante Casa Artusi  
Via Andrea Costa, 31  
47034 Forlimpopoli (FC)  
Telephone: 0039 0543 748049

### For any information, please call:

John Robert Brucato  
Mobile: 0039 380 412 2160  
[jbrucato@arcetri.astro.it](mailto:jbrucato@arcetri.astro.it)



## **The Venue: University Residential Centre of Bertinoro**

The University Residential Centre of Bertinoro (Ce.U.B.) is active since 1994 in the field of vocational training, conferences, congresses and lectures. Ce.U.B. is a vocational training centre of the University of Bologna and it is located in the ancient town of Bertinoro (Forlì-Cesena).

Ce.U.B. provides Italian and foreign Universities, companies, conference agencies and individuals with extensive conference and lodging facilities:

- 14 training rooms;
- 2 computer labs;
- 86 bedrooms;
- canteen for breakfast, lunch and gala dinners.

During the past years, Ce.U.B. has gained a lot of experience, at national and international level, allowing the Centre to fully support agencies, private and public institutions to plan or to organize their courses and events.

## Scientific Organizing Committee

- John Robert Brucato, INAF-Astrophysical Observatory of Arcetri, Italy
- Muriel Gargaud, University of Bordeaux, France
- Wolf Geppert, University of Stockholm, Sweden
- Olga Prieto Ballesteros, Centro of Astrobiologia, Spain
- Daniela Billi, University of Rome, Italy
- Barbara Cavalazzi, University of Bologna, Italy
- David Duner, Lund University, Sweden
- Florian Gallet, University of Geneva, Switzerland
- Emmanuelle Javaux, University of Liege, Belgium
- Inge Loes ten Kate, University of Utrecht, The Netherlands
- Terence Kee, University of Leeds, UK
- Akos Kereszturi, Research Center for Astronomy and Earth Sciences, Hungary
- Purificación López-García, Orsay Paris-Sud, France
- Nigel Mason, Open University, UK
- Lena Noack, University of Berlin, Germany
- Raffaele Saladino, University of Tuscia, Italy
- Ewa Szuszkiewicz, University Szczecin, Poland
- Stephan Tirard, University of Nantes, France

## Local Organizing Committee

- John Robert Brucato, INAF-Astrophysical Observatory of Arcetri, Firenze
- Andrea Meneghin, INAF-Astrophysical Observatory of Arcetri, Firenze
- Barbara Cavalazzi, University of Bologna
- Victor M. Rivilla, INAF-Astrophysical Observatory of Arcetri, Firenze

# Programme

## March 19th, Monday

10.00 - 16.00 Encyclopedia of astrobiology meeting (M.Gargaud, France)

17.00 - 18.00 Next COST call: finalization of the proposal (L.Noack, Germany)

17.00 - 19.00 Conference registration

18.00 - 19.00 Welcome ice-breaker

## March 20th, Tuesday

8.30 - 9.00 Opening of Conference, Welcome speeches

### Session WG1-a: Towards the characterisation of planets *(Chair Amedeo Balbi)*

9.00 - 9.30

Caroline Dorn (Switzerland) - Interiors and atmospheres of Super-Earths

9.30 - 10.30

Lena Noack (Germany) - Mantle and atmosphere evolution depending on planet mass and composition

G. Vladilo (Italy) - Exploring the habitability evolution of exoplanets with climate models tailored for terrestrial-type planet

Gražina Tautvaišienė (Lithuania) - Spectroscopic and Photometric Survey of the Northern Sky for Exoplanetary Research

10.30 - 11.00 Coffee break

### Session WG1-b: Detection of planets and search for life *(Chair Ewa Szuszkiewicz)*

11.00 - 11.30

Przemyslaw Mroz (Poland) - Exoplanets in 2018: recent discoveries and future challenges

11.30 - 12.50

Eduardo L. Martín (Spain) - Planets around M dwarfs and beyond

Amadeo Balbi (Italy) - Supermassive black holes and planetary habitability

Lorenzo Amati (Italy) - The impact of Gamma-Ray Bursts on the emergence and survivability of life in the Universe

Lewis Dartnell (UK) - Cosmic radiation and the search for life beyond Earth

**12.50 - 14.30 Lunch break and informal discussion**

**Session WG2-a: Formation, detection and delivery of complex molecules** (*Chair John Brucato*)

**14.30 - 15.00**

Judit Spöner (Czech Republic) - The formamide-based model of the origin of life - from structural and energetic perspective

**15.00 - 16.00:**

Sonia Melandri (Italy) - Accurate rotational spectroscopy for astrophysical investigations: the challenge of flexible molecules and molecular complexes

Gaia Micca Longo (Italy) - Atmospheric entry model of carbonate and sulfate micrometeoroids

Frantisek Krcma (Czech Republic) - Laboratory mimics of discharge initiated processes in Titan and Mars atmospheres

**16.00 - 16.30 Coffee break**

**Early Career Investigator Presentations** (*Chair Lena Noack*)

**16.30 - 17.30**

Iliia Zymak (Czech Republic) - Study of the O<sup>-</sup> transfer gas-phase ion molecular reaction relevant to the atmosphere of Mars

Camilla Calabrese (Spain) - High Resolution Rotational Absorption Spectroscopy: a key factor for the astronomical detection

Min Shi (China-Belgium) - Microfossil assemblages from the Paleoproterozoic (Changcheng Group) and Mesoproterozoic (Huailai Group) of North China

Claudia Pacelli (Italy) - Stress resistance of the Antarctic black fungus *Cryomyces antarcticus* and implications for astrobiology

**17.30 - 17.45 Short break**

**17.45 - 19.00**

Corentin Loron (Belgium) - Evidence for earlier Proterozoic eukaryotic diversification in Arctic Canada

Catalina Haidau (Romania) - Functional diversity of methylotrophs in oligotrophic soils

Yohan Cornet (Belgium) - FTIR micro-spectroscopy: a tool to identify microfossils

Jodie Belilla (France) - Testing the limits of microbial life in the multi-extreme environment of Dallol, Ethiopia

Yannick Lara (Belgium) - The survival toolkit of the Antarctic cyanobacterium *Phormidesmis priestleyi* ULC007

## March 21th, Wednesday

### Session WG2-b: From prebiotic chemistry to the early steps of life *(Chair Terence Kee)*

#### 9.00 - 9.30

Doron Lancet (Israel) - And yet GARD evolves

#### 9.30 - 10.50

Addy Pross (Israel) - Biology Reducible to Physics and Chemistry?

Kepa Ruiz-Mirazo (Spain) - Emergence and evolutionary development of protocells

Gonen Askenazy (Israel) - Emerging of Complex Functions in Primitive Chemical Networks

Bruno Bizzari (Italy) - Proton irradiation: a key to challenge N-glycosidic bond formation in a prebiotic context

#### 10.50 - 11.20 Coffee break

### Session WG3-a: Early Earth conditions & signatures or pseudosignatures of Life *(Chair Pruificación López-García)*

#### 11.20 - 11.50

Marie Catherine Sforza (Belgium-France-Italy) - Mineralogical control on the abiotic formation of condensed carbonaceous matter in the hydrating oceanic crust

#### 11.50 - 12.50

Camille Francois (Belgium) - Evidence of Paleoproterozoic plate tectonics: eclogitic subduction and record of a Wilson cycle in the DR Congo

Barbara Cavalazzi (Italy) - Ikaite and glendonite – biosignatures for astrobiology

Olivier Strbak (Slovakia) - Archean Iron Cycling and Magnetotaxis Origin

#### 12.50 - 14.30 Lunch break and informal discussion

### Session WG3-b: Molecular approach to life evolution and adaptations to extreme conditions *(Chair Emmanuelle Javaux)*

#### 14.30 - 15.00

Anja Spang (NL) - A short history of the archaea and their role in the evolution of life on Earth

#### 15.00 - 16.00

Purification Lopez-Garcia (France) - Metagenomes of microbial mats along redox gradients illuminate metabolic transitions in the early Earth

Joshua Berryman (Luxembourg) - Pulling on the Thread that Leads to the Dawn of Life

Daniela Billi (Italy) - Desert cyanobacteria under space and planetary simulations: towards the limits of life

**16.00 - 16.30 Coffee break**

**16.30 - 18.30 Poster session**

**17.30 - 19.30:MC meeting**

## **March 22th, Thursday**

### **Session WG4-a: Mars terrestrial analogs** *(Chair Elias Chatzitheodoridis)*

**9.00 - 9.30**

Jessica Flahaut (France) - Understanding Mars sulfate-rich environments through terrestrial analog fieldwork

**9.30 - 10.30**

Assimo Maris (Italy) - Investigation of Terrestrial Analogues of Mars By Simulating Different Environmental Condition

Akos Kereszturi (Hungary) - Cold, dry and high UV – first report on a high altitude Mars analogue expedition in Atacama Desert

Karen Olson-Francis (UK) - The impact of Martian brine chemistry on the growth of microorganisms

**10.30 - 11.00: Coffee break**

### **Session WG4-b: Space exploration and instrumentation** *(Chair Akos Kereszturi)*

**11.00 - 11.30**

Elias Chatzitheodoridis (Greece) - Instrument concepts for the future planetary exploration

**11.30 - 12.20**

Christian Muller (Belgium) - Evolution of terrestrial biosignatures from the emergence of life to the present Anthropocene

Franco Ferrari (Poland) - Challenges posed by radiation to space travels beyond the Low Earth Orbit (BLEO)

**12.20 - 14.30 Lunch break and informal discussion**

**14.30 - 23.00 Excursion and gala diner**

## **March 23th, Friday**

### **Session WG5-a: Life and survival** *(Chair David Duner)*

**9.00 - 9.30**

Sabine Höhler (Sweden) - From Life to Life Support: The Environmental Life Support System on Earth and Beyond since the 1960s

**9.30 - 10.30**



Terence Kee (UK) - The Dissipative Model of Living: Changing our view on Life?

Michael Waltemathe (Germany) - Fire Ants in space!? On the ethical values of biodiversity in human space exploration

Andreas Loech (Switzerland) - Is the sustainable survival of humankind of value? On how to evaluate the development of science and technology

**10.30 - 11.00 Coffee break**

**Session WG5-b: The societal impact of astrobiology** (*Chair Nigel Mason*)

**11.00 - 11.30**

Steven Dick (US) - The Societal Impact of Discovering Life Beyond Earth

**11.30 - 11.45**

Klara Capova (UK) - White paper «Societal aspects of Astrobiology in Europe

**11.45-12.30 Closing ceremony**

**12.30 - 14.30 Lunch break and informal discussion**

**- End of the COST conference -**

**Friday afternoon**

**European Astrobiology Institute meeting**

## Posters

*Astrobiology as transdisciplinary tool for biology teaching: searching for structuring concepts in life sciences*  
Alabi, Leticia Paola; Gallo, Tamires Michelle; Rodrigues, Fabio; Santos, Charles Morphy D.; Galante, Douglas; Teixeira, Verônica de Carvalho

*EMP and FTIR studies of apatite crystals from Komatiite Formation, Barberton greenstone belt*  
Birski Ł., Słaby E., Koch-Müller M., Wudarska A.

*Biosignatures of modern and fossil cyanobacteria*  
Catherine Demoulin, Yannick Lara, Camille François, Emmanuelle J Javaux

*Impact Shock Wave Chemical Reprocessing of early terrestrial Planets: Transformation of Atmospheres and Synthesis of Biomolecules*  
Martin Ferus

*Isolating kerogeneous organic-walled microfossils from Precambrian fine-grained siliciclastic rocks*  
Marcela Giraldo Martin, Yohan Cornet, Emmanuelle J. Javaux

*Potential prebiotic catalytic hydrogels*  
Kirsten Hawkins, David K. Smith and Paul A. Clarke

*Abiogenically Relevant Self-Assembly Processes in Silica Hydrogels*  
Kamal Albdeery

*Disks from the different perspectives*  
Andjelka Kovačević, Luka Č. Popović, Alla I. Shapovalova, Dragana Ilić

*X and UV Active Galactic Nuclei radiation effects on exoplanets atmospheres vaporization*  
Agata Wislocka, Andjelka Kovačević

*Burning coal-mining waste heaps versus biological activity – a potential model for survivability in a harsh environment?*  
Kruszewski Łukasz, Matlakowska Renata

*White Dwarfs and Icy Worlds - Evolving Habitability*  
Pauli Laine

*Polar cyanobacteria in the BCCM/ULC collection : diversity and characterization*  
Yannick Lara, Kim Beets, Veronique Simons, Benoit Durieu, Luc Cornet, H. D. Laughinghouse, Emmanuelle J. Javaux, Denis Baurain, Annick Wilmotte

*Emergence of the cell membranes via primitive transient compartments of the early molecular replicators*  
Kirsi Lehto, Lauri Nikkanen, Anni Kauko, Margareta Segerståhl

*Astrobiology as transdisciplinary tool for biology teaching: searching for structuring concepts in life sciences*  
Alabi, Leticia Paola; Gallo, Tamires Michelle; Rodrigues, Fabio; Santos, Charles Morphy D.; Galante, Douglas; Teixeira, Verônica de Carvalho

*Is the sustainable survival of humankind of value? On how to evaluate the development of science and technology*

Andreas Losch

*Laboratory mimic of a prebiotic atmosphere by negative corona discharge in a N<sub>2</sub>-CH<sub>4</sub> mixture with added CO<sub>2</sub>*

Vera Mazankova, Ladislav Moravsky, David Trunec, Nigel J. Mason

*Ultraviolet photoprocessing of glycine and other amino acids adsorbed on various space relevant minerals*

Giovanni Poggiali, John Robert Brucato, Teresa Fornaro, Andrea Meneghin, Sara Faggi

*Metabarcoding analysis of hot spring-associated microbial mats from Southern Siberia*

Reboul G., Moreira D., Bertolino P., Annenkova NV. and Lopez-Garcia P.

*Microbial diversity in deep sediments of Lake Baikal*

Reboul G. 1, Moreira D., Bertolino P., Galindo L., Annenkova NV and Lopez-Garcia P.

*Phosphorus, a key biogenic element, in star-forming regions*

Víctor M. Rivilla, Francesco Fontani, María Teresa Beltrán, Anton Vasyunin, Paola Caselli, Chiara Mininni, Jesús Martín-Pintado, and Riccardo Cesaroni

*Use of different geothermometry methods on fossiliferous Proterozoic sediments to constrain thermal maturity of microfossils and sedimentary basins (DR Congo, Mauritania & Australia)*

B.K. baludikay, C. François, M. C. Sforza, J. Beghin, Y. Cornet, J.-Y. Storme, N. Fagel, F. Fontaine, R. Littke, D. Baudet, D. Delvaux and E. J. Javaux

*Sensitivity analysis of kinetic model for chemical reactions in prebiotic atmospheres*

David Trunec, Vera Mazankova

*What is the story of metasedimentary rocks in Eoarchean Isua supracrustal belt?*

Alicja Wudarska, Ewa Słaby, Michael Wiedenbeck, Aivo Lepland, Łukasz Birski, Richard Wirth, Jens Götze