



The COST Action "Origin and Evolution of Life on Earth and in the Universe": An interdisciplinary research, training and outreach effort

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The COST Action "Origins of Life on Earth and in the Universe" (2014-2018) is a multidisciplinary network involving around 170 researchers (many of them early career investigators) from 30 European countries.

Research activities are coordinated by five working groups:

- Understanding the formation and evolution of planetary systems and habitable planets
- Searching for the origins of the building blocks of Life
- Tracing the origin of life on Earth and finding its limits
- Detecting life on other planets and its satellites
- History and philosophy of science.

Also, two teams: "Education and Training" and "Outreach and Dissemination" existed. Efforts of the Working Groups resulted in numerous peer-reviewed papers of which many were a direct result of >80 short term scientific missions funded by the Action. The bridging between natural sciences and humanities initiated by WG5 led to an international conference, a summer school and a White paper entitled "Astrobiology and Society in Europe Today".

The Action has organised four major international conferences:

- "Habitability in the Universe: From the Early Earth to Exoplanets", Porto(PT), 2015
- "From star and planet formation to early Life", Vilnius(LT), 2016,
- "Early Earth and exo-Earths: origin and evolution of life", Warsaw (PL), 2017
- "Life on Earth and beyond: emergence, survivability and impact on the environment", Bertinoro(IT), 2018

Between these events, thematic workshops were held:

- "Missions to Habitable Worlds", Budapest(HU), 2015
- "Evolution of chemical complexity", Liblice(CZ), 2016
- EGU Galileo Conference "Geosciences for the Understanding of Habitability in the Solar System and Beyond", Azores(PT), 2017

Altogether, eight interdisciplinary training schools were organised by the action and mostly held at geologically interesting sites (Iceland, Karelia, Saaremaa, Azores, La Palma). They involved “real science” field work and attracted many early career researchers from different countries. The events received excellent feedback from participants. These schools inspired several teams of young scientists to perform follow-up expeditions leading to new cooperations and interesting scientific results. In addition, the Action supported the training schools “Rencontres Exobio pour Doctorants” covering the basics of astrobiology and obtained recognition by the IAU in 2016. Action members also successfully started an Erasmus+ strategic partnership “European Astrobiology Campus” devoted to optimising training in the field.

Two large-scale dissemination projects were carried out:

- Publication of the second edition of the “Encyclopaedia of Astrobiology” containing 3000 entries by more than 350 authors (many of them Action participants) and preparation of the third edition.
- Design and translation into several languages of a travelling exhibition “River of Time” tracing the main stages of the history of our planet from the formation of the solar system until the emergence and diversification of life.

The Action has also created several scientific databases, e.g. on biosignatures and pseudo-signatures and the reconstruction of the Martian paleoenvironment. Finally, another ongoing major networking effort is the preparation to launch a European Astrobiology Institute providing a long-term sustainable structure for the European Astrobiology community.