

# **General Assembly Meeting of the European Astrobiology Institute**

**18 June 2020**

## **Resolution 2**

The General Assembly approved the following Action Plan of the European Astrobiology Institute for the period 2020-2021.

# **Action plan for the European Astrobiology Institute**

Period 2020-2021

## **Recruitments of institutions**

Although we have a very solid basis of membership, we will try to extend our number of Participating Institutions. We will therefore start a new recruiting round in autumn 2020, which will continue into the beginning of 2021.

## **Third General Assembly**

The third General Assembly is planned to take place at La Palma Princess Hotel, Fuencaliente de La Palma (ES) from 12th to 16th April 2021. A field trip to astrobiologically interesting sights in Tenerife and Lanzarote will be organised for interested participants after the conference. In addition, there will be a 2.5 days satellite meeting for students and early career scientists just before the assembly. An ample outreach programme is planned together with the community of Fuencaliente.

## **Meeting on Mars Sample Return Mission**

There will be a meeting on the Mars Sample Return Mission in late November 2020. A Scientific Committee has been assembled and invitations to potential speakers will go out in early summer. In the following the activities of the different Working Groups (Thematic Working Groups and Activity Working Groups) until December 2021 are laid out:

### ***Thematic WG: Formation and Evolution of Planetary Systems and Detection of Habitable Worlds***

The Working group will prepare a White Paper on its future activities. Some focus subjects will be identified, first suggestions are:

- Physical and Chemical Processes in Protoplanetary disks (in cooperation with the respective Project Teams)
- Exoplanet atmospheres

It is planned to organise one or more splinter sessions on selected subjects at the European Planetary Science Congress in October in Spain. Also, virtual workshops about these themes are envisaged.

### ***Thematic WG: Planetary Environments and Habitability***

Discussions about further plans of activities are ongoing.

### ***Thematic WG: The pathway to complexity: From simple molecules to first life***

The Working Group will focus on several key subjects:

- Origin of homochirality in the building blocks of life

- The pathway to the RNA world - from synthesis of the molecule to enzyme activity and information storage and further evolution
- Origins and properties of early metabolic pathways
- Prebiotic systems chemistry
- Chemistry of protoplanetary disks (together with the project team)
- Aerosols and their role in the generation of biomolecule precursors
- Role of isomers in the build-up of more complex molecules

There are also plans to organise a meeting (virtual or in person) in the style of the one happening at Liblice 2016 "From interstellar molecules to first cells", in order to get the astrochemistry and biochemical evolution communities together. However, the timing of the meeting is still under discussion.

***Thematic WG: Early life and life under extreme conditions***

In September 2020 an *internal on-line WG meeting "Early life and life under extreme conditions"* is planned. Its main objectives are to allow the WG members to get acquainted with each other, identify research interests, and create links within the WG community.

The meeting will be used to identify topics for focused workshops, to identify and develop possible common research projects and funding, to propose speakers for seminars, and in general, to discuss any EAI issue relevant to that WG.

In December 2020 (or early 2021) an online workshop with the proposed topic: "Diversity, preservation and detection of life traces and abiotic processes mimicking life", with a focus on Mars analogue sediments of early Earth and modern aquatic environments analog to ExoMars and Mars 2020 landing sites is planned. This aims to build up strong background knowledge to identify key questions to address in new EAI research projects and field activities.

The Working Group will also organise 1 or 2 sessions at the General Assembly in April.

***Thematic WG: Biosignatures and the detection of life beyond Earth***

The working group will focus on several key subjects, as there are:

- Biosignatures of extant and extinct life on Earth (organics, microorganisms, fossils...)
- Potential Biosignatures of extant and extinct life on Mars (organics, microorganisms, fossils...)
- Potential Biosignatures of extant and extinct life on the icy ocean worlds (organics, microorganisms,...)
- Potential Biosignatures on Exoplanets
- In situ detection on Mars – Techniques, operations and missions
- In situ detection on Icy ocean worlds – Techniques, operations and missions
- Remote detection on exo-planets – Techniques, operations and missions
- Life detection support activities in the labs and in LEO
- Life detection and Planetary Protection
- Sample Return Scenarios and Planetary Protection

One of the main activities of this WG during the next time is the organisation of the meeting in November 2020 on the Mars Sample Return Mission and maintaining an active astrobiology community to prepare this mission.

***Thematic WG: Historical, philosophical, societal and ethical issues in astrobiology***

The activities of the Working Group will focus on the following issues:

- Ethical issues concerning missions to other planets (contamination etc.)
- History of ideas about the origin of the universe, life and life on other planets in different cultures
- Societal impacts of an eventual detection of life on other planets

Some of the questions above will be discussed in Höör on the Mars Sample Return missions meeting. There are also plans for a meeting and a summer school on ethical, historical, societal and philosophical issues in 2022. Two similar events were held in 2015 with great success.

Furthermore, virtual workshops will be held on the focus subjects.

***Activity WG: Training (European Astrobiology Campus)***

The RED'21 will be held in LeTeich in early spring providing basic training in astrobiology. We also plan a training workshop in Tartu on micro- and nanosatellites in summer 2021 again, preferably in cooperation with Europlanet.

In autumn 2021 there will be a training workshop on *Volcanism, Plate Tectonics, Hydrothermal vents and Life on Early Earth*. This will be organised together with the colleagues from the University of the Azores. The focus will be an introduction into history of early life on Earth and the influence of geodynamic processes on life and the role of volcanism, plate tectonics and hydrothermal vents in the emergence of life. After the workshop, there will be a field trip to the islands of Terceira, Pico, Faial and São Miguel, where participants can visit and sample at interesting field sites (solfatares, lava caves, hot springs, recent lava fields etc.).

The summer school scheduled for 2020 on “*Formation of planetary systems and detection of habitable planets and moons*” will take place in Torun (PL) in August 2021. Visits of interesting sights (Morasko impact crater), museums and group work on outreach will be integrated into the programme of the summer school.

There will be also a training workshop again on “*Micro- and nanosatellites in planetary science*”. A teacher training event on the use of micro- and nanosatellites and astrobiology in education will be organised in the aftermath of this event.

A draft plan of future training events of the European Astrobiology Campus has been laid out and will be discussed and refined further.

***Activity WG: Field sites and Field Site Managements***

One of the most important tasks will be the preparation of the two field trips, the one at the Canaries after the General Assembly and the one at the Azores. Other plans on a longer range are as follows:

### ***1. Creation of Official Field sites***

We plan to create official field sites of the EAI for which the institute provides detailed information to the community. Characterisation of an official field site should be:

- Availability of detailed information on the web about field sites, infrastructure and red tape
- Lab and logistics infrastructure at local universities
- Cooperation with citizen scientist and other organisations
- Use of field sites for training events possible
- A dedicated field officer or more acting as a point of contact, to provide specific information of the given site and to support scientific and logistical planning for the activity at the given location.

Based on the Research Infrastructure proposal that will be submitted and include some field sites, the following field sites are envisaged:

- Azores (lava caves and solfatares)
- Iceland (lava caves, hot springs, glaciers, hydrothermal systems Mars-analogue landscapes)
- Romanian caves (ice caves, caves with special environments)
- Southern Italian volcanic areas (Pantelleria, Liparian Islands) in cooperation with the ROBEX alliance in Germany
- Australia (early life and ancient rock sites (Pilbara), stromatolites)
- Greece: Santorini, Milos, and Nisyros Islands.

### **2. Protection of field sites**

Another area of activity also will be lobbying work for protection of field sites cooperation with the WG on Funding and Policy. Many sites are endangered due to careless visitors and ruthless industrial and touristic exploitation of astrobiologically relevant field sites. Here we can be really active and with some powerful organisations in our institute we should also have a greater pondus to get our voice heard than individual organisations and scientists.

### **3. Preparation of field sites for Mars Sample Return**

The task will be to develop Mars-analogue field sites for that mission together with scientist and organisations active in the mission and with a possible Project Team on Mars Sample Return.

The Working Group has already started to compose a detailed planning paper for those tasks.

#### ***Activity WG: Outreach and corporate identity***

One major tasks will be the design of the new website. The team hopes to launch the new website version in autumn 2020. The new version of the website should be up and running at the beginning of 2021. The work with social media will continue. It will be the task of the relevant working group to develop the outreach work together with media representatives and IT experts.

The EPSC 2020, originally to take place in Granada, Spain, in autumn 2020, was moved to virtual space and the WG plans to assist Europlanet with outreach for the event as much as

possible. The specifics are being discussed between members of Europlanet and EAI as of now (early June 2020).

In addition, the WG will organize outreach events that were originally planned for BEACON 2020 (postponed due to the coronavirus pandemic) at BEACON 2021 in La Palma, to benefit both the locals and tourists at the site: a panel discussion about life in the universe, a science-music evening, a stargazing night, and an astrobiology bingo for children.

Finally, the project team “Science Fiction as A Tool of Astrobiology Outreach and Education”, is running and completed its first major project (the science fiction coupled with nonfiction anthology *Strangest of All*) in spring 2020. It is the intention to continue this line of work, ideally with even more ambitious projects should the budget allow that.

We will continue and extend the already very successful work with social media (LinkedIN, Facebook, Twitter)

#### ***Activity WG: Dissemination and Intellectual Output***

On-line seminars on a biweekly basis or at least monthly basis by the EAI are planned to start from September. These can concentrate on the focus themes of the working groups and other hot topics in astrobiology. The WGs should come in with suggestions for speakers and teams and take an active role in organising them. Those activities could put the EAI on the map and create an active life of the Working Groups and Project Teams even under those difficult times.

#### ***Activity WG: Education***

Education activities will carry on collecting astrobiology related educational materials and add a list of materials from non-EAI affiliated sources that are freely available. The WG will work out ways how to make these visible with EAI website team. In 2020-2021 the WG will further the collaboration with (local) science centres to offer astrobiology related subjects to their activity plans. For that purpose, the WG will shortlist the main themes that have the potential to arouse interest among different generations and offer astrobiology expertise during planning and preparatory phase.

The WG will also launch a teacher training event to prepare front line schoolteachers to better convey astrobiology themes in their curriculum and offer concise and up-to-date materials for the purpose. It will prepare a set of semi-standardised and practical materials for various age groups that teachers can use during their lessons.

Furthermore, the WG will contribute to outreach and education activities during the next GA in 2021.

#### ***Activity WG: Funding and policy***

The WG will focus on the following themes:

- Funding possibilities
- Co-operations with astrobiology organisation outside Europe
- Protection of field sites
- Mars Sample Return Mission

Concerning the first point it is important to not only to make sure that EAI entities are alerted to future funding possibilities on European, regional (e.g. Nordic) and national level. It is also important to work proactively to include astrobiology-related issues into funding and research programmes.

The WG will also discuss and prepare partnership agreements with ACA (Australia), SETI (USA) and ELSI (Japan). Together with ELSI we will submit a bid for a core-to-core collaboration of the JSPS. I will inform you about details, deadline usually is in autumn (might be different this year).

One area of activity will be lobbying work for protection of field sites (See below)

The WG will also address political issues concerning the Mars Sample Return These will also be discussed at the meeting in the end of November 2020. The WG will also inform EAI entities and their members about relevant policy documents concerning the mission.

### ***Activity WG: Industry Liaison***

The following plans are envisaged for the coming years:

- Providing general information about issues concerning industry academia collaborations (both on the web at the EAI website, at scientific meetings and through personal contacts addressing academia as well as industry) including:
  - Planning of academia- industry collaborations
  - Forms of collaboration
  - Co-supervision of students
  - Grants for industry – academia co-operations
  - Patent issues
  - Interested cooperation partners from academia and industry
- Gathering and highlighting examples of successful partnerships between academia and SME/industry
- Alerting the scientific community as well as interested companies to call deadlines for funding of grants focusing on or including industry – academia partnerships
- Providing support for writing proposals for funding of industry-academic co-operations
- Co-organising training events in generic skills for early career astrobiologists in cooperation with the European Astrobiology Campus
- Helping to raise sponsoring of meetings
- Organising information events on “Careers in space technology and biotechnology for astrobiologists” at a regular basis
- Organising fairs and stalls of companies around large events
- As a long-term project: Providing a database for industry – academia collaborations containing:
  - Short presentations of companies interested in cooperation with higher education and research institutions
  - Presentations of research groups and institutions interested in such co-operations
  - A listing of open internships and Ph. D. research positions of astrobiological relevance that are available
  - A listing of companies at our website that are willing to participate in proposals for EU projects (This might make it easier for scientists to find industrial partners)
- Create long-standing cooperations with enterprises (especially SMES) engaged in

- Ecotourism: training guides and improving knowledge inside companies about the field sites and their ecosystems to foster site preservation and to improve the performance of them and their marketability and benefit to local communities
- Providers of lab equipment: improving supply chains to enable efficient lab and field site use, especially to institutions in remote areas and Less-represented member states
- Biotechnology companies: to ensure that marketable research results are exploited by European companies in a sustainable and environmentally friendly way respecting General Data Protection Regulations.
- Mining: Promoting sustainable mining in field sites
- Provide the European economy with expertise and future personnel by training the next generation of scientists and engineers using a holistic and multidisciplinary approach.

Many of these things are also part of the proposal for a Research Infrastructure Starting Community proposal.

***Project Team: Tracing life and identifying habitable environment***

A ISSI Team proposal "TOWARDS A UNIVERSAL TRACERS PORTAL" was submitted in March 2020. (PI: Prof. Dr. Inge Loes ten Kate, Utrecht University, the Netherlands Co-PI: Prof. Dr. Lena Noack, Freie Universität Berlin, Germany; Co-PI: Prof. Dr. Emmanuelle Javaux, Université de Liège, Belgium; within the EAI, in total 4 participating institutions, 2 core institutions, and other international collaborators)

In case of success, the ISSI team led by Inge Loes ten Kate and Lena Noack will start its work. If not, a resubmission of the proposal is envisaged.

***Project Team: "Protoplanetary disks and their physical and chemical processes"***

The goal of the team is to exploit the expertise available through both membership of, and awareness of, the European Astrobiology Institute to recruit an international and cross-disciplinary team of experts on protoplanetary disks, the birthplaces of planets. Through regular interactions between sub-disciplines, the team will define and address some of the outstanding scientific questions (preliminary versions of which are outlined below) on the physics and chemistry of protoplanetary disks and planet formation. The team will also disseminate the outputs of the project team to the wider community through the organisation of focus meetings and the publication of research and review articles.

Science questions that will be addressed by the team:

- What are the key chemical and physical processes that shape the composition of planet-building material, and the propensity to build planets, in protoplanetary disks?
- What dust processes and properties are the most critical for the first steps towards building planets?
- What is the mass and angular momentum transport through the disk?
- What observations are required to fully characterise the planet-building environment (gas, dust, and ice)?
- What simulations are needed in addition to the existing ones (parameter space, phys./chem. effects, new tools)?
- What can studies of the Solar System tell us about planet formation?

The project team will be assembled by invitation, ensuring a broad cross section of expertise, career stage, nationality, and gender. The team is anticipated to have ~ 14 - 16 members. Catherine Walsh (University of Leeds) & Gesa Bertrang (MPIA) will function as coordinators of the team.

**Administration**

The administration will be carried out by our host organisation (European Science Foundation).