

Pathways towards habitable planets

Barcelona
Spain
14-18
September
2009

Summary: A conference focused on habitable planets took place in Barcelona from September 14th – 18th. It concluded with a general consensus statement and the creation of a reference and continuity framework, as follows.

Pathways towards Habitable Planets has established the “Barcelona Process”

Barcelona, December 11, 2009

For Immediate Release

Exoplanet scientists from around the world gathered in Barcelona to debate and reach a consensus on defining guidelines for a new roadmap with the ultimate objective of finding habitable, and potentially inhabited, planets outside of our Solar System. In addition they reached an agreement on an appropriate framework for developing such an initiative.

During the conference, researchers presented recent discoveries and debated on the roles of future space missions and ground-based facilities for finding habitable planets around nearby stars. They concluded that only an organized and structured international cooperation could allow the fulfillment of this goal in the following decades. Therefore this “Barcelona Process” marks the commencement of a new era in exoplanet research through:

1. The **constitution of an interdisciplinary and international scientific community**, organized and coherent with the objectives it seeks.
2. The creation of a **Permanent Committee**, which will coordinate and encourage the implementation of these objectives.
3. The organization of a **Conference every three years, possibly in Barcelona**, which will allow the supervision and adjustment of the roadmap from results obtained through research as well as development and implementation of new technologies. In turn, these meetings should act as a **laboratory of ideas** capable of orienting the decisions that governments and space agencies could take in the mid and long run.

The process includes other recommendations such as the creation, in the near future, of an interdisciplinary center for meetings, the establishment of a fellowship program for young researchers and the advantages of defining an international public outreach program.

Roadmap milestones

During the Conference, four main steps were defined in order to fulfill the future objective of finding and characterizing habitable planets:

1. Carry out a statistical analysis of the frequency of exoplanets in our Galaxy, and especially those planets that are terrestrial in nature. This analysis includes elaborating a star survey; determining the stellar types that harbor planetary systems; exploring their structure, variety, and size distribution; and finding the frequency of terrestrial planets within the habitable zone. For this type of study, current technology is being employed, such as the space missions CoRoT and Kepler (transits) and the ground instrument HARPS (radial velocities). In the future, other space missions that study

transits (PLATO, TESS) and gravitational lensing should be carried out to attain a global vision of the exoplanets in our Galaxy.

2. Carry out a space mission that could complete a survey of **all** the habitable exoplanets that fall within a radius of 50 light years from our Sun. These systems are close enough to be studied in detail. The astrometry technique has shown to be the most suitable method for this objective and, in particular, the SIM Lite mission (Space Interferometry Mission Lite), which is under study by NASA. This mission will be able to detect the reflex motion caused by Earth-size exoplanets by measuring the position of their host stars with high accuracy. To fulfill the objectives of this milestone, the role of complementary ground-based facilities such as HARPS and VLT/PRIMA will be pivotal.
3. Carry out one or more missions (possibly through collaboration between space agencies) of transit observations in order to characterize hot terrestrial exoplanets. The James Webb Space Telescope (JWST, launch date in 2014), a joint mission between NASA and ESA, may be able to contribute to this objective. However a dedicated mission with an optimized design is needed to cover the wide spectral range needed, including the visible. Ground-based observations obtained with 10-m class telescopes (VLT) and the future giant 40-m class telescopes (E-ELT) could provide important contributions to the characterization of transits some of giant and Neptune-size exoplanets.
4. Launch a mission capable of characterizing habitable terrestrial exoplanets in search for biomarkers, as a joint collaboration between space agencies. To determine the technological approach of this *flagship* mission it is necessary to mature and assess concepts, including precursor missions, related to coronagraphy, interferometry and external occulter. In addition, the experience gained from upcoming missions like SPICA (JAXA/ESA) and JWST (NASA/ESA) will be essential.

The Barcelona Conference marked a starting point for new great expectations within the exoplanet scientific community. A symbolic step in the right direction was the announcement of the first terrestrial planet with both mass and radius measured, COROT-7 b, made during the conference. For the first time, we have been able to gather a multidisciplinary team of scientists, including biologists, geologists, astronomers, and planetary scientists, as well as representatives of the different space agencies and ground observatories, in order to agree upon a future vision and strategy. We will consolidate a European network of several hundred scientists which will allow us to work together to find and study planets that support life. Maybe, in the coming decades, we will be able to address the question we have been seeking to answer for so long: Are we alone in the Universe?



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Visit:

<http://www.pathways2009.net/>

for more information on the conference (including presentations download at

<http://www.pathways2009.net/programme.html>

Meeting information :

208 participants from 19 countries:

Australia

Austria

Belgium

Canada

Chile

Finland

France

Germany

Ireland

Italy

Japan

The Netherlands

Poland

Russia

Spain

Sweden

Switzerland

United Kingdom

United States of America