

IU3. Committee on Space Research (COSPAR)

Report 2018 to the IUPAP

Mandate

The Committee on Space Research (COSPAR) was established by the International Council for Science (ICSU) in 1958, at the beginning of the space age, as an interdisciplinary scientific organization with the focus on the progress of all kinds of research carried out with the use of space means (including balloons).

COSPAR's guiding vision is to expand the knowledge frontier of space. COSPAR is doing very well in pursuit of its prime mission: service to the international space science community with a view to fostering a vigorous international research effort, conducted without impediments from geopolitical tensions or differences. COSPAR achieves its objectives through the organization of biennial Scientific Assemblies, Symposia, Capacity

COSPAR's membership encompasses 44 National Scientific Institutions and 13 International Scientific Unions. From the point of view of IUPAP, COSPAR is a highly physics-based organization. Most of the scientists present have a background in the discipline either as Physicists or Applied Physicists. Sensor technology and indeed spacecraft performance (pointing, positioning, thermal response, stability etc.) all rely heavily on physics as an underlying discipline. Much of the physics addressed by COSPAR is Earth sciences (including effectively all the disciplines of geophysics undertaken by remote means), astrophysics, planetary physics, space plasma physics, as well as life, material and fundamental science in space.

COSPAR is a very effective body in bringing together practitioners in the various disciplines of space research and from numerous countries. Its Scientific Assemblies provide an excellent forum for scientists to describe current activities, to learn about other space science programs, and to engage in cooperation with international colleagues. The Assemblies permit space scientists to learn about activities relating to both their own area of specialty and to those from other overlapping disciplines.

COSPAR's Strategy Statement describes the activities in pursuit of its mission, to be of service to both developing and developed space programs. COSPAR which is the only pan-national organization devoted to discussing the broad spectrum of space research activities, is expected to continue to play a useful role in defining and coordinating the direction of space research in the future. In a world where space activities have been dominated by a few large countries or regions, COSPAR's role is particularly relevant for countries with intermediate and small programs to develop their interests and plans.

For more details see COSPAR's web site: <https://cosparhq.cnes.fr>

Scientific Assemblies

The 41st COSPAR Scientific Assembly, planned to be held in Istanbul, Turkey on 30 July – 7 August 2016 (COSPAR-2016) had to be cancelled on short notice due to unforeseen developments in the host country.

The 2016 COSPAR Space Science Award went to Charles L. Bennett and Anatoly I. Grigoriev, and the COSPAR International Cooperation Medal to Lev Zelenyi. A number of other awards, some joint with other Academies of Sciences or space agencies, were also bestowed.

In 2014 Lennard A. Fisk, long-term Chair of COSPAR's Scientific Advisory Committee, was elected as President for a 4-year period, A. Jayaraman and J. Wu as Vice-Presidents.

Preparations for the 42nd COSPAR Scientific Assembly (COSPAR-2018) are in full swing (<https://www.cospar-assembly.org/>); it will take place in Pasadena, California, USA on 14-22 July 2018. Information on the scientific program and other relevant links are on-line at <https://www.cospar-assembly.org/>. The Local Organizing Committee website, for information on registration, accommodation and other matters, is open at <http://cospar2018.org/>.

The 43rd Scientific Assembly will be held in Sydney, Australia, on 15-23 August 2020.

Other activities

COSPAR continues to sponsor the development of '**Scientific Roadmaps**' providing independent scientific advice to support planning, research and development of space programs and to encourage decision makers in the relevant fields to develop collaborative programs based on the best science available. These reports have been well-received by the scientific community and by space agencies which recognize the important role of COSPAR in fostering international collaboration in space research, irrespective of any political considerations.

Four reports addressing different scientific topics, have been published so far: '*Toward a Global Space Exploration Program: A Stepping Stone Approach*' (January 2012), '*Future of Space Astronomy: a Global Roadmap for the Coming Decades*' (July 2012), '*Understanding Space Weather to Shield Society*' (June 2015) and '*Observation and Integrated Earth-system Science: a Roadmap for 2016 – 2025*' (May 2016). One Roadmap on '*Small Satellites for Space Research*' is **currently nearing completion, and one on '*Exoplanets*' is under consideration.**

COSPAR Symposia complement the Committee's Scientific Assemblies organized in even numbered years. They are generally held in countries with small to medium-size space infrastructures and stress interdisciplinarity with a focus on capacity building. Following the first COSPAR Symposium on '*Planetary Systems of our Sun and other Stars, and the Future of Space Astronomy*' in Thailand in 2013 and the second Symposium on '*Water and Life in the Universe*' in Brazil in 2015, COSPAR successfully held its third Symposium in Jeju Island, South Korea, 18

- 22 September 2017. The theme of this Symposium was *'Small Satellites for Space Research'*. The Symposium featured plenary lectures as well as parallel sessions, poster sessions and a space agency round table. A total of 362 people from 37 countries registered for the Symposium, including 140 from South Korea. A fourth Symposium with focus on *'Small Satellites for Science and Global Sustainable Development'* is being planned to take place in Tel Aviv, Israel in November 2019.

COSPAR has been organizing a series of **Capacity Building Workshops** with various partners in order to convey practical knowledge in areas of interest to COSPAR and to build lasting bridges between scientists, especially with young researchers in developing countries. This program of Capacity Building starting in 2001 has been highly successful and expanding. For example, during one of the workshops a new transient magnetar, the ninth of its class, was identified by a team of young astronomers led by a Chinese PhD student. The annual frequency of the workshops could also be increased if more manpower and funding were available. Three workshops each took place in 2014 and 2015.

In 2016 two further workshops were organized, in Mexico on *'Crystallography for Space Sciences'* and in Kamchatka, Russia on the *'Impact of Space Weather on Earth'*, with the former bringing in a new International Scientific Union partner, the International Union on Crystallography (IUCr). In 2017 four workshops were held, in Argentina the *'Latin American X-ray School for Different Astrophysical Scenarios'*, in Ghana on *'Interdisciplinary Remote Sensing, Modeling and Validation of Environmental Processes'*, in South Korea on *'Small Satellites, Big Sciences'* and in Taiwan the *'International Reference Ionosphere 2017 Workshop: Improved Real-time Ionospheric Predictions with COSMIC and other GNSS Data'*.

In 2018 three Capacity Building Workshops are scheduled: on *'Infrared and Sub-millimeter Astrophysics Data Analysis'* in Quito, Ecuador in March, on *'Coronal and Interplanetary Shocks: Data Analysis from SOHO, Wind, and e-CALLISTO Data'* in Mekelle, Ethiopia in May and a *'Space Weather Capacity Building Workshop'* in Sao Paulo, Brazil in September.

To enable young scientists who have been participants of one of the COSPAR Capacity Building workshops to build on skills gained, COSPAR also organizes fellowships. This program provides for visits of 2-4 weeks duration for the purpose of carrying out joint research at laboratories which collaborate with COSPAR for this program.

To date International Scientific Union partners in COSPAR's Capacity Building program include the IAU, URSI, IUGG/IAGA, ISPRS and IUCr. In addition, ESA, the UN, WMO and national scientific entities, including in some cases space agencies, were co-sponsors and financial supporters. ESA and NASA also regularly participate in the workshops by providing in kind support in the form of teaching staff. Efforts are continuing to promote improved coordination and cooperation among various international and intergovernmental organizations that have their own capacity building programs in space science and technology. COSPAR welcomes other partners and topics in order to cover additional disciplines represented in COSPAR.

Possible ways for IUPAP to be involved in COSPAR activities in the near-term future are: award nominations and nomination of officers, proposals for and/or co-sponsorship of future Capacity Building Workshops, co-sponsorship of future Scientific Assemblies with a modest contribution to the grants program which provides partial support to young scientists and those from developing or economies in transition countries.

COSPAR continues to **sponsor and co-sponsor** scientific meetings throughout the world and to participate actively in major international gatherings such as the Scientific Conference 'Our Common Future under Climate Change' held in Paris in July 2015 in preparation for the UN Climate Change Conference and UNISPACE +50 to be held in Vienna, Austria.

COSPAR is also an important partner in a study on **Planetary Protection**, selected for funding by the European Commission. This is a particular important issue for COSPAR and its Planetary Protection Panel which has the responsibility under the UN Outer Space Treaty to set the policies for planetary protection.

There is a slightly growing number of **COSPAR Associated Supporters**, primarily public or private organizations or individuals who wish to support the Committee's activities.

Publications

COSPAR maintains various means of communication with the international space research community. The address of COSPAR's website is given above. *Advances in Space Research* (ASR) is the flagship for the COSPAR community. The journal is open to all relevant submissions and fully refereed. Covering all areas of space research, its editorial structure has been correspondingly adapted. COSPAR's new journal '*Life Sciences in Space Research*' (LSSR) publishes high quality original research in the field and has its contents available in PubMed. LSSR recently published its 150th paper. *Space Research Today* (SRT) is a key tool in communication of information within the COSPAR community. This information bulletin provides COSPAR Associates and others with articles on current topics in space research by practitioners in the field, regular information on meetings, COSPAR and space-related news and other topics of interest to the community. It is issued three times a year. Contributions from IUPAP are welcome (science articles, meeting announcements and reports, etc.).

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