

COSPAR's Contribution to the Scientific Applications of GNSS



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Chair Panel on Satellite Dynamics



Committee on Space Research

- Created by ICSU in 1958, now affiliated to successor organization ISC
- First Space Science Symposium in Nice in January 1960
- Interdisciplinary scientific organization
- COSPAR's objective is to promote an international scientific research in space, open to all scientists
- All kinds of research carried out with the use of space means (including balloons)
- Members: **44 countries and 13 Intern. Scientific Unions**

- More details: <https://cosparhq.cnes.fr/>



Activities

- Biennial Scientific Assemblies
- Biennial Symposiums
- Journals 'Advances in Space Research' and 'Life Sciences in Space Research'
- COSPAR Information Bulletin – 'Space Research Today'
- Newsletter 'COSPAR News'
- COSPAR Book Series (starting)
- Capacity Building Workshops
- Colloquia and Symposia
- COSPAR Scientific Roadmaps
- Participation in the UN and other intergovernmental organizations on space research
- Promotion of large international collaborative programs and projects of space research



COSPAR scientific structure

- Eight scientific commissions (A-H)

- A. Space Studies of the Earth's Surface, Meteorology and Climate
- B. Space Studies of the Earth-Moon System, Planets, and Small Bodies of the Solar System
- C. Space Studies of the Upper Atmospheres of the Earth and Planets Including Reference Atmospheres
- D. Space Plasmas in the Solar System, Including Planetary Magnetospheres
- E. Research in Astrophysics from Space
- F. Life Sciences as Related to Space
- G. Materials Sciences in Space
- H. Fundamental Physics in Space

GNSS related topics

Chair - ICG observer role

- Twelve panels

- **Technical Panel on Satellite Dynamics**

- Panel on Technical Problems Related to Scientific Ballooning
- Panel on Potentially Environmentally Detrimental Activities in Space
- Panel on Radiation Belt Environment Modelling
- **Panel on Space Weather**
- Panel on Planetary Protection

- Panel on Capacity Building
- Panel on Education
- Panel on Exploration
- Panel on Interstellar Research
- Panel on Innovative Solutions
- Panel on Social Sciences and Humanities

- Seven Task Groups +1 starting on climate change. One Industry Advisory Committee



Panel on Satellite Dynamics (PSD)

Terms of References

The aim of the Panel is to support and coordinate all activities aimed at the detailed description of the motion of artificial celestial bodies. This should be achieved by improvement of the theories of motion and by more sophisticated evaluation of the determining forces. Detailed theoretical understanding of the dynamics of satellites should be matched with the results of precise tracking in order to obtain the most precise knowledge possible of the orbit itself and of individual positions within the orbit.

The activity of the Panel is directed also to the unification of procedures for the adjustment of satellite orbits from very precise tracking data. The comparison and possible unification of definitions of orbital elements is one of the important matters for discussion.

As to the responsibilities in the above-mentioned scientific goals, the Panel endorses the formulation expressed for the responsibilities of the Scientific Commissions.



Panel on Satellite Dynamics (PSD)

- Discussion of GNSS related topics during scientific sessions:
 - ✓ 2018 Pasadena: 12 (out of 36) papers
 - ✓ 2021 Sydney (virtual): 15 (30) papers
 - ✓ 2022 Athens: 14 (31) papers
- Topics: GNSS spacecraft modelling, LEO orbit determination, gravity field determination, thermosphere modelling
- COSPAR Outstanding Paper Awards for Young Scientists with GNSS-related topics
 - 2020-2022 (46 awards in total)
 - SC C: 3 out of 8 awards given
 - PSD: 4 out of 11 awards given



Selected research topics (not complete)

- Modelling of non-gravitational forces acting on the GNSS satellites – satellite macro models
- GNSS clock modelling
- Multi-GNSS processing => LEO precise orbit determination
- Terrestrial reference frame determination
- Space weather/ionosphere studies (determination of TEC)
- Study of plate motion and tectonics in combination with other techniques
- Use of GNSS for lunar missions
- etc.



Next COSPAR meetings

5th COSPAR Symposium

Space Science with Small Satellites

Singapore

April 16-21, 2023

45th COSPAR Scientific Assembly

Busan, South Korea

July 13-21, 2024



ICG-16, October 9-14, 2022, Abu Dhabi, UAE