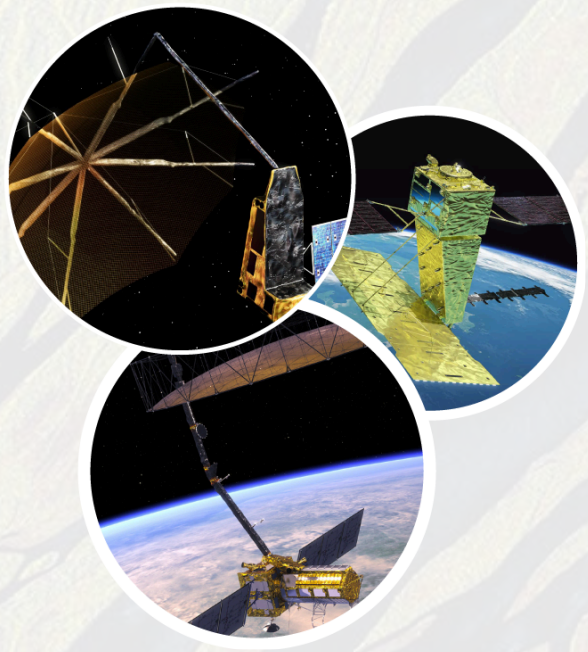
ICGS-SAR
INTERNATIONAL COORDINATION GROUP FOR SPACEBORNE SAR MISSIONS

International Coordination Group for Spaceborne Synthetic Aperture Radar (SAR) Missions



The international suite of spaceborne SAR programs have significant overlap in their goals. There is strong consensus that closer coordination and collaboration will significantly enhance the overall utility of the present and planned systems for the benefit of all.

Since 2018, a group of several space agencies began community-wide discussions on ways to improve the international coordination of spaceborne synthetic aperture radar (SAR) missions to maximum science and societal returns.

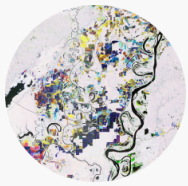
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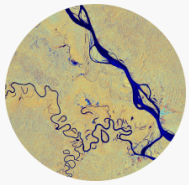
Working Groups & Thematic Areas



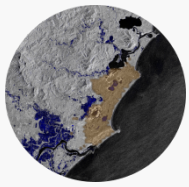
WG1: Present and Future Data - Visibility and Access (L0-L2)



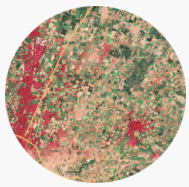
WG2: Future Imaging Systems - Goals, Plans, Challenges and Opportunities



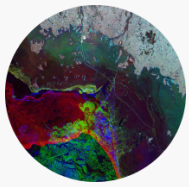
WG3: Data exploration - Cal/Val, Fusion and Assimilation (L3-L4)



TA1: Polarimetric and Multi-frequency SAR Applications



TA2: Interferometric SAR Applications



TA3: Program and Mission Coordination

History and Background

Over the last two decades several operational civilian free flying spaceborne SAR missions have been launched by Argentina, Canada, China, ESA, Germany, Italy, Japan and Russia, as well as commercial missions, and used for a large spectrum of applications. They cover spectral ranges in the L-, C-, and X-Bands. In the next decade, more than a dozen missions are expected to operate simultaneously, with each mainly driven by the needs of its agency. As each agency designs their mission for specific objectives on unique timelines, the coordination of observation plans for SAR missions is complex.

Many of these data sets are available to the science applications community either shortly after acquisition or retrospectively. At the same time, computational technologies are undergoing a revolution in speed, interconnectivity, software maturity and openness, and interoperability. Therefore, coordination across the international community of SAR data providers with respect to efficient data acquisition, planning, science algorithm development, data product standards, framework for science data processing methodologies, data requests and processing resources should, in principle, be possible and would be highly advantageous to all parties. In recent years, a number of commercial initiatives have been started aiming to also provide services based on SAR images with high geometric and temporal resolution through constellations of small SAR satellites.

The International Coordination Group for Spaceborne SAR (ICGS-SAR) was formed in response to these needs, with workshops held in 2018, hosted by NASA / JPL, and 2022, hosted by ESA. A third workshop is planned for September 2024, hosted by JAXA.

Agencies

The International Coordination Group for Spaceborne Synthetic Aperture Radar (SAR) Missions consists of representatives from ASI, CONAE, CSA, DLR, ESA, ISRO, JAXA, and NASA.

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First Workshop Recommendations

1. Archival, present and future data should be easily and electronically accessible with a standard and common format, at little or no cost.
2. Develop a mechanism to coordinate future data acquisition and coverage by present and planned systems, as well as ground reception and processing approaches for mutual benefit.
3. Take an optimized systems approach to the overall constellation of planned and proposed missions to explore the possible mutual benefit of the total constellation coverage and capabilities.
4. Coordinate and share common test sites and sites for calibration and validation.

To implement these recommendations, three working groups that include radar systems experts, users, and scientists have been established.

Second Workshop Recommendations

Overarching: Identified in multiple working groups

- Data Discovery: harmonise data discovery metadata across all space agencies
- Data Access: Free and open, unrestricted Data Policy is an enabler for coordination of spaceborne SAR missions
    - Encourage the removal for EULAs where possible to facilitate broader data use (access to data basis for international collaboration from missions to data uptake and use)
    - Support Agency initiatives at national level to influence data access regulations. Government data restrictions or national laws are often roadblocks for data availability (e.g not up to the Agency)
    - Facilitate the access to New Space data for R&D activities and development of new applications
- Data Products: Free and openly accessible products (preferably based on the CEOS Analysis Ready Data standard).
    - Encourage Agencies to coordinate/share information on the development of higher-level products with the objective of harmonising products across multiple mission, i.e. RTC, interferogram.

WG-1: Present and Future Data

- Need for diversity to fill in data gaps – this is achieved by multiple missions
- Need for data stacks to proceed time series analysis and change detection monitoring

- Explore ways to coordinate cyclone/typhoon/hurricane imaging (like as Need rapid tasking for disaster response)

WG-2: Future imaging systems

- Fostering international coordination of observation requirements for future mission
- Nations should systematically consider the landscape of future missions (including the spectrum and temporal sampling space) as part of their feasibility study phase
- Largest obstacles identified are programmatic – all technical obstacles appear to be manageable

WG-3: Data exploration

- Coordination agreements between space agencies should include the collation and provision of regional and global bio- and geo-physical in situ data relevant to SAR science products
- Space agencies should provide long-term support for installation and maintenance of SAR image calibration arrays
- Multi-sensor and multi-agency calibration campaigns should be coordinated over the same natural and artificial target sites
- Free and open sharing of all calibration/validation data and results should be provided through a single, reliable, and long-term data archive
- The community should foster validation of high-level image products
- The use of cloud platforms should be promoted to facilitate research and development of data assimilation and data fusion

TA-1: PolSAR/Multi-frequency applications

- Implement systematic observation strategies to explore high potential of full-polarimetric and multi-frequency SAR data
- Continuity (sensor characteristics) and spatial (global coverage) & temporal (dense time-series) homogeneity are critically important for operational applications and monitoring of dynamic processes
- Define core study sites for systematic SAR data collection, and coordinated tower and airborne campaigns, for joint use by both Agencies and Commercial providers
- Support the development of Open Source toolboxes for advanced SAR, PolSAR and InSAR processing and learning tools.

TA-2: InSAR science/applications

- Standardized / unified interface for tasking and for data discovery / download
- Re-establish Polar Space Task Group to coordinate polar acquisitions from current & upcoming missions
- Harmony-like companions for more missions
- For Next-Gen missions, coordinate observations to get daily to sub-daily coverage.

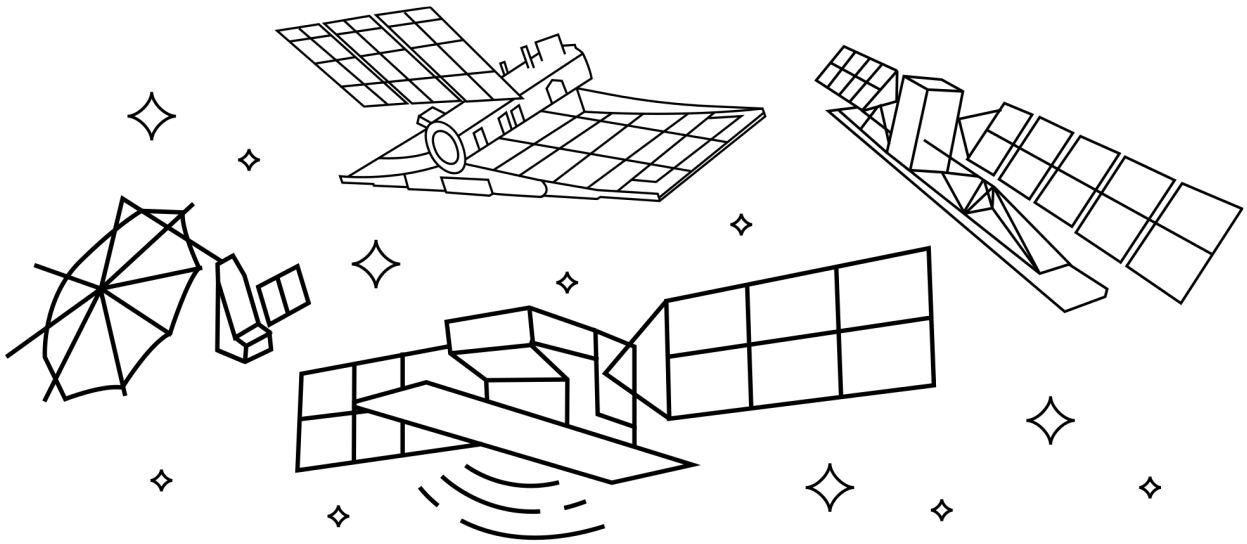
TA-3: Program coordination

Mission coordination

- Encourage multilateral information exchange on mission formulation such as anticipated architectures, collection strategies, and modes, to help foster future partnership and mission coordination.
- Recommend SAR Agencies to better coordinate SAR calibration/validation activities and infrastructure to promote sustained cross-mission calibration including the participation in CEOS SAR cal/val WG.
- Encourage Agencies to develop standards and contribute to multi-mission science products cal/val.

Commercial SAR (ComSAR)

- Encourage Agencies who are evaluating ComSAR to share quality assessment and evaluation of ComSAR data. Lessons learned on how ComSAR can address mission science requirements: data availability, tasking, strengths/weakness.
- Explore mechanisms with New Space/ComSAR sector to open the archive to support science after a given time period and seek a better understand from the ComSAR sector on the purchase of large data volumes for science: i,e. systematically image Greenland.
- Encourage to work together to protect the SAR spectrum



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ICGS-SAR 2023