

# Recommendations from the 3rd Workshop for the International Coordination Group of Spaceborne SAR Missions (ICGS-SAR)

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The following recommendations were derived following discussions at the 3rd workshop of ICGS-SAR, held 6-8 November 2024.

## 1. **Data access and tasking:**

- a. Agencies should revise the table of data availability, adding new missions, as well as revising the TA1 observation requirements table.
- b. Agencies should explore establishing automated disaster monitoring tasking and data sharing on Web GIS systems and coordinate with existing international frameworks such as the International Disaster Charter (International Charter Space and Major Disasters) and Sentinel Asia. Agencies should advocate for the automation of tasking requests following activation of the International framework, as well as consider automated or facilitated tasking for forecasted disasters (e.g. typhoons). Low latency data products ( $\leq 1$  hr, SLC, L1 or higher) need to be provided to ensure the appropriate response to a disaster management.
- c. Agencies should consider Global Precipitation Mission (GPM) or OPERA models for product generation: where data from multiple satellite missions are combined to generate common products (e.g. [GPM/GSMap](#), [GPM/IMERG global precipitation](#), [OPERA](#): global surface water and disturbance (SAR+optical)). The application of these methods should be considered for higher level SAR products with multi frequency, polarization, and/or multi-source (i.e. SAR + optical) data products.
- d. Agencies should consider the interoperability of their cloud systems by using APIs, standard metadata (STAC, YAML, etc.) and data formats, such that multi-mission data analysis is streamlined.
- e. Agencies should collaborate on a white paper to understand the current tasking schemes for ocean wind measurements and typhoon/cyclone/hurricane tracking with SAR observations, coordinating with WMO.
- f. Observations for the polar regions (Greenland, Arctic sea ice, and Antarctica) should be coordinated to maximize science and applications needs with right-, left-, and multi-looking missions (i.e. Sentinel-1, NISAR, and ALOS-2/4) while filling polar

observational gaps. Agencies should support and propose membership for the evolution/re-establishment of WMO's Polar Space Task Group (PSTG).

- g. ICGS-SAR encourages commercial/New Space SAR companies to collect and maintain background data/observations that support time series analysis. This would provide valuable baseline data to support change detection products during major disasters and would provide important data to support scientific analysis across a wide range of activities.
- h. ESA & CSA should coordinate to ensure enough C-band data is collected for permafrost applications, ensuring no gap in the time series and global permafrost coverage.

## **2. Future Mission coordination:**

- a. To improve digital elevation models and 4D change observations, future SAR missions (of any band) should consider companion satellites, passive or active, such as Harmony for Sentinel-1.
- b. To assess the benefits of multi-mission constellations, and take advantage of international cooperation, Agencies should use a tool with capabilities like the NASA/JPL Performance Tool for ICGS-SAR constellation science and applications performance studies, and the CSA Multi-Mission Planning Tool for ICGS-SAR coverage studies. Extended capabilities should include a broader range of geophysical parameters to be optimized and their associated error models to address an array of measurement needs common across agencies.
- c. Agencies should cross-validate agency mission planning tools with other agencies, to ensure optimal mission plan, aligned with the observation requirements from TA1&2.
- d. A performance model validation framework should be established to create confidence among agencies that constellation performance is properly/sufficiently estimated as input to decision-making on international coordination. Develop data sets and ground truth to estimate performance from observations and compare to model predictions.

## **3. Science and applications research enhancement:**

Agencies should consider the following recommendations from the science and applications community in developing their missions and observation plans:

- a. Increase open data access for science at a minimum, if not already done.
- b. Enhance synergy between L-band SAR missions to build long-term data records at both dual and full polarimetry
  - i. Continue current plans for dual-polarimetric dense time-series coverage of all land areas by NISAR and ALOS-4 as they are deemed of critical importance for a great variety of science applications.

- ii. Acquire ALOS-4 and SAOCOM-1 wide-swath full-polarimetric observations that are highly complementary to (i) . Multi-seasonal coverage of global vegetated areas are recommended, with dual-seasonal (summer/winter; dry/wet season) coverages a minimum requirement; 4 times per year would be deemed ideal.
- iii. Consider making SAOCOM-1A/B, ALOS and ALOS-2 global archives open for scientific use.
- c. Agencies should support science initiatives such as the CEOS Land Surface Imaging Virtual Constellation (LSI-VC) POLINSAR task to, on a best-effort basis, collect polarimetric and multi-frequency time-series data over selected study sites covering a wide range of ecosystems and science disciplines. Ensure coverage by all available frequency bands (P, L, S, C, X) and polarisation combinations (dual-, compact- and full pol) operated by participating agencies.
- d. Agencies should consider establishing an activity similar to the CEOS LSI-VC POLINSAR task for 3D-InSAR to coordinate imaging geometry diversity at regional sites worldwide.
- e. Distributed among the non-NASA agencies, agencies should commit to provide consistent and spatially comprehensive long-term monitoring of northern latitude land and sea ice not covered by NISAR, e.g., coordinated through a revived International Polar Space Task Group.
- f. Agencies should coordinate X-band InSAR systematic observations over urban centers in high hazard areas, e.g., tropical and temperate coastal cities, cities in tectonically active areas, to reduce latency in disaster response.
- g. Agencies should provide the lowest-latency data products possible (ideally <1 hr) for high risk/impact hazards and disaster response.
- h. Commercial VHR X-band SAR missions have a potential complementary role to play to public medium-resolution SAR missions through their capacity for targeted observations at high spatial and temporal resolution. However, dedicated observation scheduling is imperative to make the data useful. Agencies considering governmental data purchases for science (e.g. NASA CSDA, ESA EDAP) are recommended to consider tasking rights a requirement for procurement.

#### **4. Other topics:**

- a. Agencies should continue to advocate to their national frequency authorities for protection of the radar band (X-, C-, S-, L-, P-band) allocations for use for Earth observation, and not be used by the telecommunication sector looking for additional spectrum, to ensure the missions can continue to operate. Commercial companies should also advocate for this.