

This communication is to alert potential proposers that NASA is soliciting proposals for one-time funding for use over an eighteen-month period for data analysis of multi-frequency radar-surface interactions, modeling, and algorithm development of Airborne Synthetic Aperture Radar L+S airborne data, as a program element in ROSES-2019. A mandatory notice of intent will be due 30 days after release of the call. Proposals will be due 60 days after the release of the call:

ROSES-19 Amendment 5:

[A.53 Utilization of L- and S- Band Synthetic Aperture Radar Imagery over North America – Joint NASA and ISRO Airborne Campaign.](#)

NASA and the Indian Space Research Organisation (ISRO) have a mutual interest in collecting and analyzing L+S band synthetic aperture radar (SAR) for improved detection, characterization, and understanding of Earth processes. As part of a broader cooperative effort in Earth science research and applications and in preparation for the NASA-ISRO Synthetic Aperture Radar (NISAR) satellite mission, NASA will collect L+S band SAR data from ISRO's Airborne Synthetic Aperture Radar (ASAR) instrument mounted on NASA's Gulfstream III aircraft utilizing the antenna pod and navigation package for NASA UAVSAR radar system (shortened to ASAR-L+S). ISRO's ASAR is a dual L+S band SAR science instrument that measures the Earth's polarized reflectivity at 24 cm and 9 cm wavelength simultaneously, at meter scale spatial resolution. The ASAR campaign is anticipated to be between August and December 2019 and will collect the first-of-a-kind data in the North America that will enable new and innovative L+S band research opportunities and will facilitate the development of new algorithms in advance of NISAR.

Some relevant characteristics of the system and planned campaign are as follows:

- Swath Width: 10 km, centered on 40 degrees incidence angle
- Swath Length: up to 100 km
- Slant-range single-look resolution: Selectable to 15 m, 6 m, 3 m, 2 m
- Azimuth single-look resolution: ~0.5 m
- L- and S-band acquisitions will be acquired simultaneously
- Polarizations used for the acquisitions can be selected as Quad Pol or Compact Pol
- Repeat-pass capability for interferometry will be limited. While the aircraft can support repeating the flight track, variable wind conditions make interferometry difficult because the antenna is not electronically steerable. This would only be attempted on unique high-reward science targets.
 - Racetracks with repeat acquisitions every 30 minutes or so are possible.
 - 1-day repeat acquisitions over a period of 3-4 days is possible.
 - Repeat tracks with longer time separations over the same site are not likely.
- NASA will provide SLC of the acquisitions

This airborne campaign will collect radar data/imagery products relevant to Earth science research and applications activities in a number of topic areas by capturing dual frequency radar data for the cryosphere, ecosystems, water cycle, natural hazards/solid Earth, and ocean science research along with data supporting a wide range of applications including agriculture, oil spills and infrastructure. The sites selected are expected to support research into the following topics:

Cryosphere

- Glacier dynamics
- Sea ice (Beaufort Sea)
- Snow on glaciers
- Permafrost

Ecosystems

- Arctic/Boreal – [ABoVE](#)
- Natural and anthropogenic
- Forest
- Wetland
- Agriculture and soils

Hydrology/Water Cycle

- Snow – [SnowEX](#)
- Inundation/ surface water extent
- Soil moisture

Natural Hazards – Solid Earth

- Landslides
- Sinkholes
- Volcanoes Ocean Science
- Ocean currents
- Internal waves
- Oil spills

The ASAR–L+S data/imagery will be collected in three phases to maximize the scientific breadth of data collected and to allow sufficient time for the land surface to change between acquisitions.

The first phase of the data collection plan is anticipated to collect snow (Sierra and Cascades), solid Earth (landslides, volcanoes), and oceanic (Pacific) imagery over targets in California, Oregon, and Washington, en route to supporting cryosphere (glacier, permafrost), and ABoVE science targets in Alaska and possibly Canada. A selected number of scientific targets will be re-imaged when the plane returns to Armstrong Flight Research Center, in Southern California.

The second phase will be based out of Johnson Space Center (JSC) in Texas and will co-collect imagery in the Central United States along a predetermined UAVSAR flight plan designed to match NISAR's 12-days collection frequency over a diverse set of ecosystem, wetland (nominally in Louisiana), and agriculture research targets. It is anticipated that there will be one or two flights to the Northeast US to collect data over ecological research sites, such as the Harvard Forest. Additional flights based out of JSC are anticipated to collect data over a

persistent oil spill in the Gulf region and to image a region with active sinkholes in West Texas. The JSC deployment is scheduled to span the fall crop harvest.

The third phase will begin in California and recollecting selected targets along the flight path to Alaska with the key objective of capturing dynamic process and sea ice in the Beaufort Sea, north of Alaska. This phase will likely collect ASAR–L+S data in conjunction with planned SnowEx activities in November. UAVSAR may co-collect data during flight segments in each of the collection phases to better calibrate the imagery collected by each system and to explore potential synergies between the radar systems such as bistatic and interferometric collection strategies.