Earth Observation Science by L-band Synthetic Aperture Radar Satellite

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Satellite-based Synthetic Aperture Radar (SAR) provides high-resolution images of the Earth's surface (below 5 meters) in any weather condition. SAR is effective for both estimating ocean winds and monitoring natural disasters like floods and tsunamis. The interferometric SAR (InSAR) technique utilizes phase data to map surface deformations, allowing for the detection of displacements above earthquake faults and glaciers. Following the launch of ESA's C-band SAR ERS-1, Japan's JAXA launched the L-band JERS-1 in 1992, proving L-band InSAR's effectiveness to detect co-seismic ground deformation even over vegetated areas (e.g., Ozawa et al., 1997).
The methodology of InSAR is well-established in terms of detecting large displacements due to earthquakes, volcanic unrest, glaciers, and ice sheet motion. Generally, InSAR can more readily detect localized displacements, while long-wavelength slow deformation is more difficult because troposphere, ionosphere, and orbit error generate apparent signals. Due to the enhanced observation frequency and accumulation of SAR data, "time-series" analysis has become possible nowadays, and thus the science targets of crustal and ground deformation are shifting to the slower secular changes. Operational InSAR-based monitoring of Japanese Islands is performed at GSI, Japan. Moreover, the European Ground Motion Service (EGMS) is reporting the ground surface displacements operationally, based on Sentinel-1 data.
Another recent application of InSAR to environmental research is its use to detect up-down displacements over permafrost and peatland, which is known as a huge storage of soil organic carbon. L-band SAR and InSAR is powerful not only to detect ground surface displacements but also a unique tool to detect ionosphere anomalies because of its higher sensitivity than other frequencies. In addition, the authors have recently confirmed the detection capability of oceanic heavy rain by L-band polarimetric SAR and have been working on quantifying the rain intensity distribution. L-band SAR is thus useful not only for operational disaster prevention and mapping but also for cutting-edge Earth observation, and hence should be further promoted to continue its operation.
In 2006, we established a consortium called PIXEL (PALSAR Interferometry Consortium to Study our Evolving Land surface) as a cooperative research contract between JAXA and the Earthquake Research Institute, University of Tokyo (Furuya et al 2025; Ozawa and Furuya, 2025). The PIXEL activity includes (1) sharing ALOS-series SAR data among Japanese scientists, (2) a hands-on workshop on data processing software, (3) occasional research workshop. Generating many batchelor, master, and doctoral theses from universities, the PIXEL framework is still active as of today. However, as the size of PIXEL has grown, the voluntary efforts of coremembers are getting a load, and thus I am skeptical and concerned about the sustainability of this approach. On the other hand, ESA changed dramatically its data policy upon the Copernicus Project and made the Sentinel-1 SAR data "open free", while they used to adopt a similar policy more than two decades ago. Moreover, although ALOS-series SAR used to be the only L-band data until recently, NASA/ISRO started NISAR mission, making L-band SAR data at a variety of levels "open free". ALOS-series SAR data is only partially "open free", and PIXEL is basically limited to domestic scientists.
I wonder whether the Japanese PALSAR series satellites would play roles similar to those of the US Landsat series.

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