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BUILDING AUSTRALIAN EARTH OBSERVATION CAPACITY WITH NOVASAR-1

Abstract

In September 2017, Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) announced an agreement with Surrey Satellite Technologies Ltd to co-invest in the NovaSAR-1 mission and acquire a 10+ per cent share of satellite tasking and image acquisitions. Weighing under 500 kg and utilising commercial-off-the-shelf technologies, NovaSAR-1 provides an affordable S-band ($\lambda \sim 9.4$ cm) Synthetic Aperture Radar (SAR) Earth Observation (EO) platform with a secondary Automatic Identification System payload. Launched in September 2018, the mission is managed via a multi-stakeholder capacity-share partnership, through which CSIRO has priority to task image acquisitions within the Australian Exclusive Economic Zone.

Throughout the life of the NovaSAR-1 mission, CSIRO will demonstrate how effective management and prioritisation of even a limited acquisition capacity (10 per cent of a 2-minute duty cycle) can serve Australia's needs for research, strategic mapping and emergency event imaging, supporting both systematic, multi-season, continental-scale (Australia-wide) time-series observations, plus high-temporal observations over dedicated study sites. In support of this objective, CSIRO has designed a suite of additional acquisition modes that better serve the needs of the EO community and are now operational for NovaSAR-1. These include dual-polarisation (co and cross-polar) acquisition modes and gap-free coverage.

Australia is one of the world's largest users of EO data from space, with satellite data underpinning more than 100 federal and state programs across the nation. The NovaSAR-1 mission is bolstering this capability, with CSIRO operating Australia's capacity-share as a National Research Facility to provide data to users free of charge, and where it is planned that CSIRO-provided data products will conform to standards for Analysis-Ready Data for Land (CARD4L), as specified by the Committee on Earth Observation Satellites. This will stimulate new applications research in EO and scope the observational capabilities of an S-band SAR sensor, which sits in a "sweet spot" between more commonly used C- ($\lambda \sim 5.6$ cm) and L-bands ($\lambda \sim 23.5$ cm).

Significantly, NovaSAR-1 presents the first opportunity for Australia to be in direct "shutter-control" of an EO satellite, with data directly downlinked into local ground stations for rapid delivery to end-users. This capability represents a step-change in Australia's growth as a space nation, providing a technological and operational pathfinder towards a full-scale sovereign satellite constellation.