Geophysical Research Abstracts
Vol. 21, EGU2019-6178, 2019
EGU General Assembly 2019

First Demonstration of SFU SARlab's Experimental Airborne Miniature SAR Sensor

Bernhard Rabus, Manuele Pichierri, Jayson Eppler, and Mike Kubanski
Simon Fraser University, Applied Science, School of Engineering Science, Burnaby, Canada (btrabus@sfu.ca)

The Synthetic Aperture Laboratory at Simon Fraser University has recently acquired an experimental airborne miniature SAR sensor. The small (ca. 10x20x40 cm^3) sensor was developed to our specifications by Artemis Inc based on their SlimSAR line heritage.
The SARlab's SlimSAR is a dual frequency (X- and L-band) pulsed SAR system with chirp bandwidths providing slightly better than 1 meter range resolution at both bands. There are two monostatic fully polarimetric L-band patch antennas, mounted in an along-track InSAR (ATI) configuration (2 x 4 channels), and three bi-static X-band horn antennas mounted across-track for single-pass acquisition (2 channels). The system can operate any combination of maximum 6 channels simultaneously, so e.g. we can acquire single pass X-band and fully polarimetric L-band on the same flight trajectory. Transmit power (60 W at L-band and 25 W at X-band) allows flying heights up to 2000 m above ground level with reasonable SNR for most surfaces. The system includes an IMU/GNSS module allowing accurate mocomp and after differential processing also repeat pass InSAR at L-band.
A first comprehensive demonstration test of the SARlab SlimSAR using a helio courier aircraft as platform was conducted from 30 August to 3 September 2018 over areas in and around Kluane National Park, Yukon. We will present preliminary analysis results of the acquired datasets covering a variety of phenomena, glaciers, landslides, tundra and forest terrains, airfields and roads, and water surface over Kluane Lake. Data configuration examples span (alone or in combination) single pass DEMs, polarimetry, ATI, and repeat pass InSAR.
We will show encountered challenges during raw data focusing with back propagation time domain processing algorithms and how they can be overcome by using differentially processed IMU/GNSS and autofocus algorithms and mocomp on multiple SAR channels simultaneously. In addition, we will present initial results of polarimetric decomposition-based classification as well as single- and repeat-pass InSAR examples. We will outline our plans for accurate calibration next field season using artificial targets and simultaneous spaceborne data acquisitions (TerraSAR-X, ALOS-2, Sentinel-1).