Get HyP3! SAR processing for everyone

Joseph H. Kennedy, Krik Hogenson, Andrew Johnston, Heidi Kristenson, Alex Lewandowski, Thomas A. Logan, Franz J. Meyer, and James Rine
Alaska Satellite Facility, University of Alaska Fairbanks, Fairbanks, United States of America (jhkennedy@alaska.edu)

Synthetic Aperture Radar (SAR), with its capability of imaging day or night, ability to penetrate dense cloud cover, and suitability for interferometry, is a robust dataset for event/change monitoring. SAR data can be used to inform decision makers dealing with natural and anthropogenic hazards such as floods, earthquakes, deforestation and glacier movement. However, SAR data has only recently become freely available with global coverage, and requires complex processing with specialized software to generate analysis-ready datasets. Furthermore, processing SAR is often resource-intensive, in terms of computing power and memory, and the sheer volume of data available for processing can be overwhelming. For example, ESA's Sentinel-1 has produced ~10PB of data since launch in 2014. Even subsetting the data to a small scientific area of interest can result in many thousands of scenes, which must be processed into an analysis-ready format.

The Alaska Satellite Facility (ASF) Hybrid Pluggable Processing Pipeline (HyP3), which is now out of beta and available to the public, provides custom, on-demand processing of Sentinel-1 SAR data at no cost to users. HyP3 is integrated directly into Vertex, ASF's primary data discovery tool, so users can easily select an area of interest on the Earth, find available SAR products, and click a button to send them (individually, or as a batch) to HyP3 for Radiometric Terrain Correction (RTC), Interferometric SAR (InSAR), or Change Detection processing. Processing leverages AWS cloud computing and is done in parallel for rapid product generation. Each process provides options to customize the processing and final output products, and provides metadata-rich, analysis-ready final products to users.

In addition to the Vertex user interface, HyP3 provides a RESTful API and a python software developers kit (SDK) to allow programmatic access and the ability to build HyP3 into user workflows. HyP3 is open source and designed to allow users to develop new processing plugins or stand up their own custom processing pipeline.

We will present an overview of using HyP3, both inside Vertex and programmatically, and the available output products. We will demonstrate using HyP3 to investigate the consequences of natural hazards and very briefly discuss the technologies and software design principles used in the development of HyP3 and how users could contribute new plugins, or stand up their own custom processing pipeline.