Leveraging an operational archive of ARIA standard InSAR products for higher level time-series generation

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Interferometric Synthetic Aperture Radar (InSAR) is a precise geodetic technique that has revolutionized how we study our dynamic planet by providing surface deformation observations critical for studies of plate boundaries, land surface change, magmatic processes, and mantle dynamics. JPL's Advanced Rapid Imaging and Analysis (ARIA) project has been automatically generating standardized InSAR products from ESA's Sentinel-1 mission by leveraging the ISCE software. ARIA (http://aria-products.jpl.nasa.gov/) and the Getting Ready for NISAR archive at ASF (http://vertex.daac.asf.alaska.edu/) provide free access to browse and download these products. Targeted regions cover the complete Sentinel-1 observational record, where products are automatically added when new acquisitions are made.

Our geocoded unwrapped interferometric product generated through cloud-processing at a 90m posting packaged in CF compliant netcdf4 (HDF-family) format allows users to work with the dataset in most GIS software and processing environments without requiring specialized radar processing software. We developed an open-source package (https://github.com/aria-tools/ARIA-tools) for manipulation of standard products and preparation for time-series analysis. Although ARIA-tools is not a time-series processor itself, its outputs are compatible with open-source packages such as the Generic InSAR Analysis Toolbox (GIAnT, http://earthdef.caltech.edu/projects/giant) and the Miami INsar Time-series software in PYthon (MintPy, https://github.com/insarlab/MintPy) methods.

We will provide examples on how the ARIA standard InSAR products can be used in combination with ARIA-tools and MintPy for generating surface displacement maps and history for mapping earthquakes cycle processes, subsidence, and volcano unrest. Our examples include California central valley, the San Francisco Bay, and over the island of Hawaii.