



OSARIS, a parallelized ‘Open Source SAR Investigation System’ for high-performance computing environments

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With the advent of the two Sentinel 1 satellites, high-quality Synthetic Aperture Radar (SAR) data with high temporal and spatial resolution became freely available. This provides a promising framework to facilitate broad applications of detailed SAR- and interferometry- based surface change and motion timeseries. However, computing environments focusing on efficient processing of large stacks of SAR data are rare and often have specific goals. SAR processing is time- and resource-consuming, often involving manual configuration work between individual processing steps. Conversely, access to High-Performance Computing (HPC) clusters is abundant today.

Here we present OSARIS, the ‘Open Source SAR Investigation System’, as a tool to process large stacks of Sentinel 1 data in HPC environments. Based on GMTSAR, shell scripts, and the workload manager Slurm, OSARIS provides an open and modular structure combining parallelization of high-performance C programs, flexibility of processing schemes, and convenient configuration. Basic processing yields all GMTSAR data products, including amplitude, coherence, interferometric phase, line-of-sight displacement, and (optionally) unwrapped interferometric phase. On a test system with Intel Xeon E5-2640 processors, OSARIS processes an entire pair of S1 scenes in ~40 Minutes (excluding phase unwrapping which typically requires additional 20 to 60 minutes with moderate settings); The number of pairs that can be processed in parallel is only limited by the hardware setup, i.e. available cores, RAM, and disk space. The library of available OSARIS modules is growing quickly, to date including tools to merge and cut data, to compute Damage Proxy Maps, extract coherence and phase timeseries of individual coordinates, and to normalize unwrapped interferograms to stable ground points or persistent scatterers. The application of OSARIS is demonstrated by a case study of glacier-related natural hazards in the northern Tien Shan, Central Asia.

More information on OSARIS is provided on cryo-tools.org/tools/osaris/ – the git repository is located at github.com/cryotools/osaris