



SARscape® Persistent Scatterers for ENVI

SARscape® Persistent Scatterers module enables to measure very small ground displacements and to trace the deformation rate related to natural or man-induced phenomena (e.g. volcanic or seismic activity, landslides, subsidence, building collapses, etc.), with excellent accuracy and spatial detail.

The technique, extending SAR Interferometry to the analysis of large multi-temporal observations, enables to improve the measurement accuracy from few centimetres (classical Interferometry approach) to few millimetres (Persistent Scatterers approach). In addition to that, limitations typical of SAR Interferometry (i.e. atmospheric distortions or temporal de-correlation) are dramatically reduced.

This technique relies on the identification in the study areas of a certain number of “coherent radar signal reflectors” (Persistent Scatterers). The processing is then focused on the analysis of the phase history of these very reliable single points (pixels), as opposed to the conventional approaches that process the whole area together.

Examples of PS candidates are typically represented by urban features (e.g. house roofs, bridges, antennas, etc.), other man-made structures (e.g. green-houses, dams, metallic and concrete features such as well fields surrounding structures, pipelines and dwells etc.), well exposed outcropping rock formations. A minimum density of scatterers (at least 5 to 10 per sqkm) must be detectable in the SAR viewing geometry.

The output product of this module consists of the average displacement rate of every single PS together with their temporal coherence map.

A quite large number of SAR observations (15 to 20 images can be considered as the minimum amount) obtained from the same sensor with the same acquisition geometry is used as input to the module. The temporal distribution of the acquisitions shall also be adequate compared with the expected dynamics of the displacements under analysis. Thus, we recommend an amount of at least 1GB of RAM for using this module.

The Persistent Scatterers module, which supports only SAR data acquired by ERS and ENVISAT satellites, is released as a standalone module (i.e. Basic and / or Interferometry SARscape® modules are not mandatory) under either ENVI® or ArcView® software platforms. It is anyway important to mention that, in order to exploit at best the potential of the Persistent Scatterers module, its combined use with the Basic and Interferometry modules is strongly advised. The SARscape® integrated module approach will enable to comprehensively process the SAR multi-temporal series in terms of both intensity (e.g. accurately filtered, geocoded and calibrated images outputted by the Basic module) and interferometric products (e.g. coherence images, interferograms, DEMs and Displacement maps outputted by the Interferometry module). Both the Basic and the Interferometry modules will be then essential to generate those SAR reference products, which are crucial to properly interpret and present the results derived from the use of the Persistent Scatterers module.

The module has been jointly developed by sarmap s.a. and Aresys (a spin off company of the Polytechnic University of Milan) and will be distributed by CREASO and its cooperation partner ITT VIS.