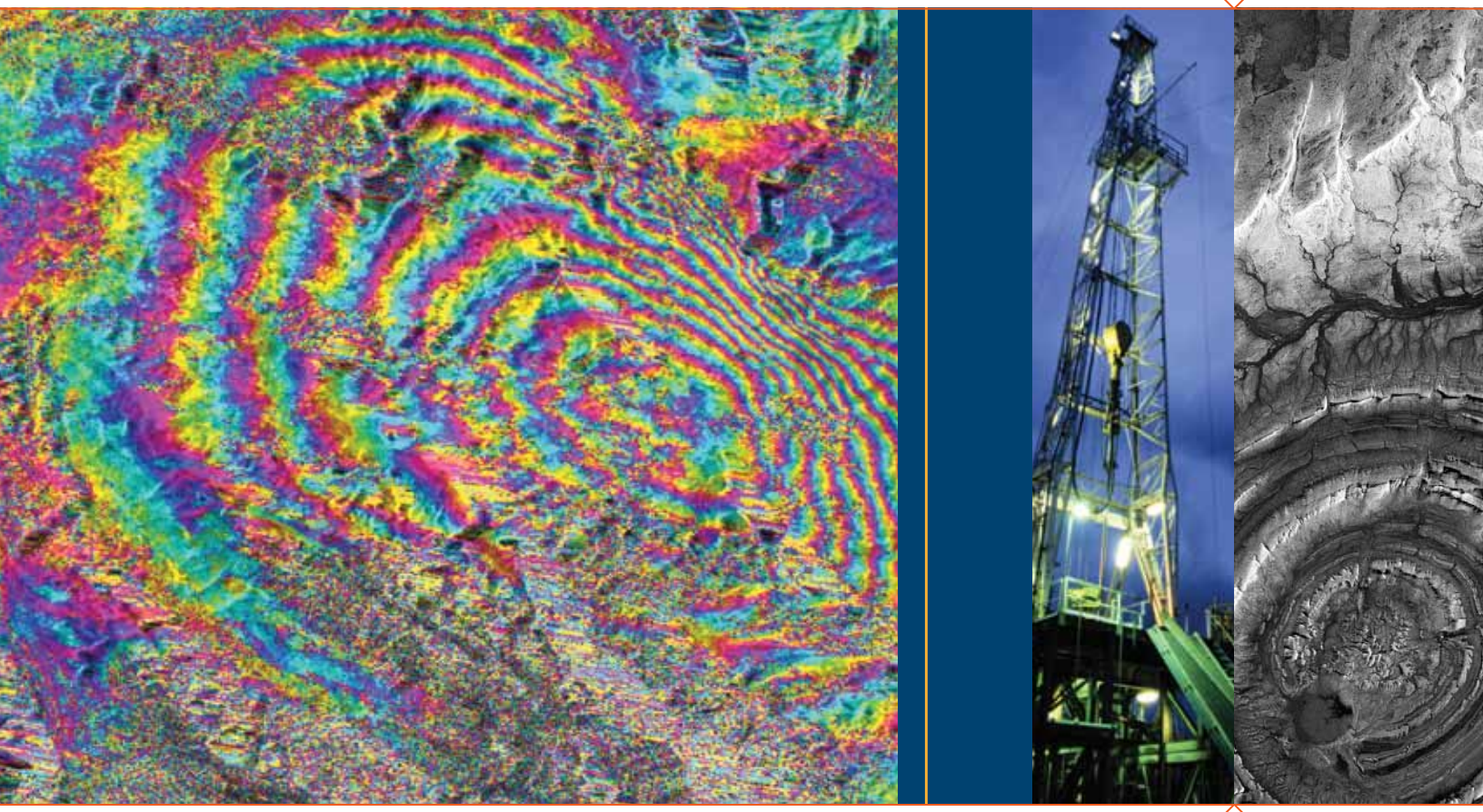
EXELIS

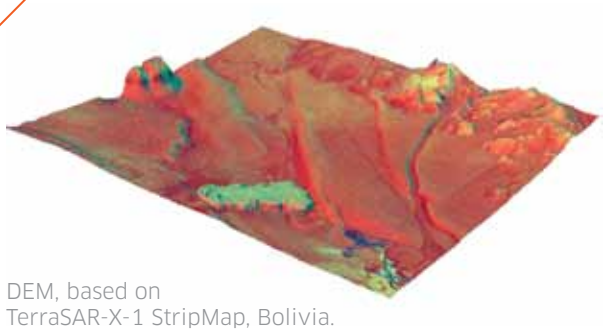
Visual Information Solutions

SARscape® Modules for ENVI

Read, process, analyze, and output products from SAR data.



ENVI. Easy to Use Tools. Proven Functionality. Fast Results.



DEM, based on
TerraSAR-X-1 StripMap, Bolivia.
©TerraSAR-X-1 data, Infoterra

The use of Synthetic Aperture Radar (SAR) data has become increasingly popular in recent years, offering professionals in a wide array of industries a measurable, analytical approach to getting information about an area or object of interest. SAR data, acquired from airborne and spaceborne platforms, enable the generation of two or three-dimensional products of the Earth's surface. When combined and merged with other data, SAR often adds critical information to your analysis.

Get the Information You Need from Your SAR Data.

The SARscape® modules for ENVI allow you to easily read, process, analyze your SAR data, and generate products, while giving you the option to integrate this information with other geospatial products. This unique data analysis capability takes your data from hard-to-interpret numbers to meaningful, contextual information. And, since SARscape modules are integrated with ENVI, the premier image processing and analysis solution, you get the added benefit of image analysis tools and SAR processing functionality in one package.

SARSCAPE BASIC MODULE

The Basic Module includes a set of processing steps for the generation of SAR products based on intensity and coherence. This module is complemented by:

- **Focusing Module**
  Supports ERS-1/2 SAR, JERS-1 SAR, ENVISAT ASAR, and ALOS PALSAR-1 data.
- **Gamma & Gaussian Filter Module**
  Includes SAR specific filters, extending the range of filters of the Basic Module.

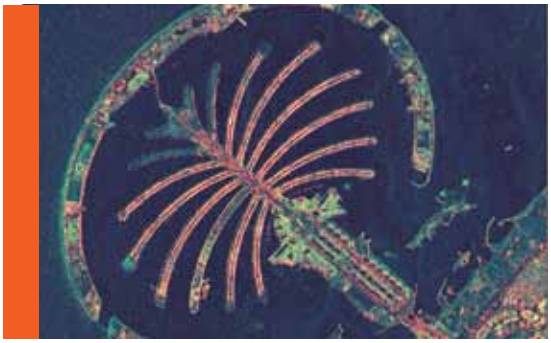
SARSCAPE INTERFEROMETRY MODULE

The Interferometry Module supports the processing of Interferometric SAR (2-pass interferometry, InSAR) and Differential Interferometric SAR (n-pass interferometry, DInSAR) data for the generation of Digital Elevation Models (DEMs), Coherence, and Land Displacement / Deformation maps. This module is complemented by:

- **ScanSAR Interferometry Module**
  Offers the capabilities to process InSAR and DInSAR data over large areas (400 km by 400 km).
- **SAR Polarimetry / Polarimetric Interferometry Module**
  Supports the processing of polarimetric and polarimetric interferometric SAR data.
- **Interferometric Stacking Module**
  Based on Small Baseline Subset (SBAS) and Persistent Scatterers (PS) techniques, it determines displacements of point and distributed-targets.

ENVI and SARscape.
When You Need Every Piece of the Puzzle.

ENVI



False color composite of Palm Island (Jumeirah), Dubai, TerraSAR-X-1 StripMap. ©Infoterra

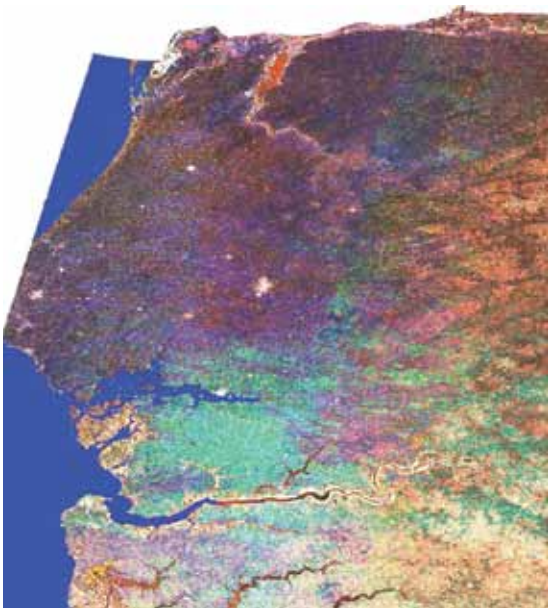
SARscape Basic Module

PREPARE YOUR SAR IMAGERY

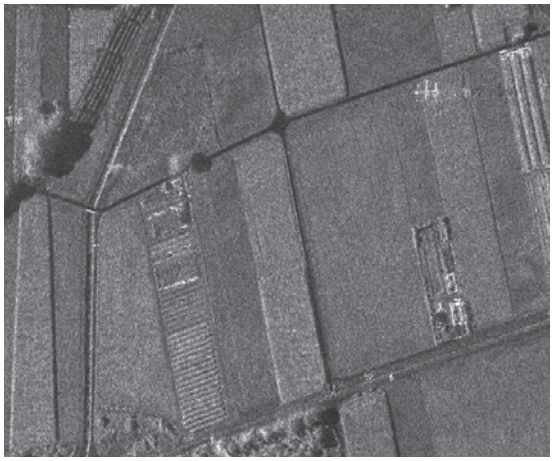
The SARscape Basic Module includes processing functionality for generating airborne and spaceborne SAR products, based on intensity and coherence. This is complemented by a multi-purpose tool, which includes a wide range of functions - from image visualization, to Digital Elevation Model import and interpolation, to cartographic and geodetic transforms.

The SARscape module provides automated pre-processing tools that allow you to quickly and easily prepare your imagery for analysis and visualization. With the SARscape Basic Module, the following processing capabilities are supported:

- Multilooking
- Coregistration
- Despeckling
- Geocoding and Radiometric Calibration
- Mosaicking
- Feature Extraction
- Segmentation
- Classification



Multi-temporal mosaic of Senegal, 180 ENVISAT ASAR images. ©ASAR data, ESA



Intensity image, OrbiSAR-1 X-band, Switzerland. ©OrbiSAR-1 data, Orbisat

Accessory Modules for the Basic Module:

FOCUSING MODULE

The Focusing Module generates complex images (SLC) based on a ω-κ frequency domain algorithm. It supports ERS-1/2 SAR, JERS-1 SAR, ENVISAT ASAR and ALOS PALSAR-1 data.

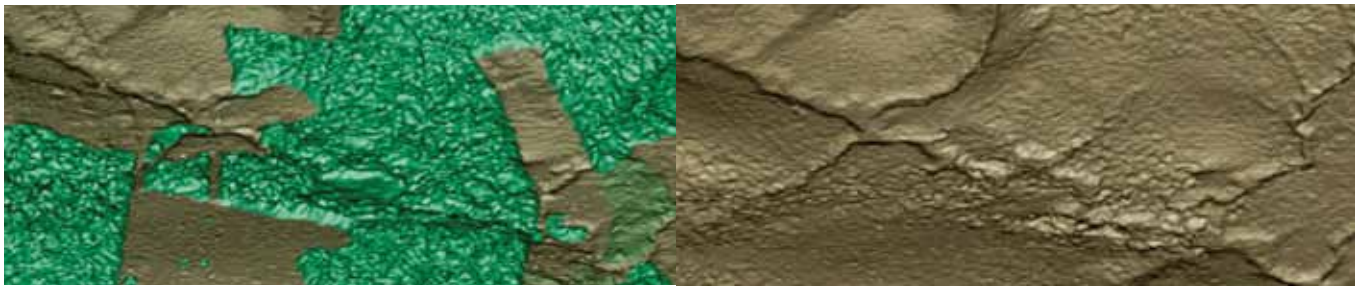
GAMMA AND GAUSSIAN FILTER MODULE

The Gamma and Gaussian Filter Module includes a variety of SAR specific filters, extending the range of filters of the Basic Module. Algorithms for this module are based on Gamma and Gaussian-distributed scene models. They are particularly efficient in reducing speckle noise while preserving radar reflectivity, textural properties, and spatial resolution, especially in strongly textured SAR images.

SARscape Interferometry (InSAR/DInSAR) Module

GENERATE YOUR INTERFEROMETRIC PRODUCTS

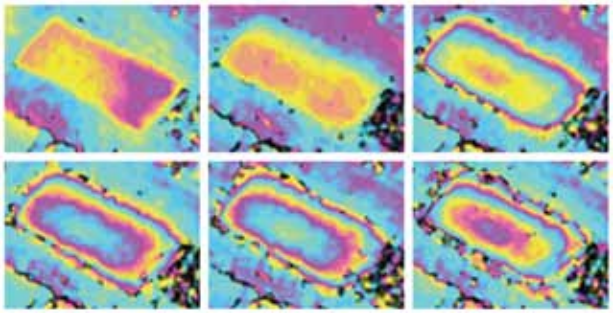
This module enables the generation of Digital Elevation Models (InSAR technique) and surface deformation maps (DInSAR technique). State-of-the-art methodology, applied to data acquired from recent SAR sensors, generate accurate (up to a vertical resolution of few meters) and detailed surface and terrain height products. The DInSAR technique can detect centimeter-scale displacements over time spans of days to years. The interferometry module is applicable in geophysical monitoring of natural hazards like earthquakes, volcanoes, and landslides. It is also useful in structural engineering, particularly for the monitoring of subsidence and structural stability.



The SARscape Interferometry Module allows you to process Interferometric SAR (2-pass interferometry, InSAR), and Differential Interferometric SAR (n-pass interferometry, DInSAR) data.

The processing includes the following steps:

- Coregistration Using DEM Data
- Interferogram Generation
- DEM Flattening
- Interferogram Adaptive Filtering and Coherence
- Phase Unwrapping
- Phase Editing
- Geometry Optimization, Based on Ground Control Points
- Phase to Map Conversion and Geocoding (DEMs)
- Phase to Displacement Conversion and Geocoding (Displacement Maps)



Filtered interferograms (every 11 days) of a building in Barcelona, TerraSAR-X-1 StripMap, 1 fringe ~1.55 cm displacement. ©TerraSAR-X-1 data, Infoterra

The three accessory modules ScanSAR Interferometry, SAR Polarimetry Polarimetric Interferometry, and Interferometric Stacking, complement the InSAR/DInSAR Module.

Download detailed technical information, get pricing, or purchase the SARscape Module for ENVI at www.exelisvis.com/ENVI or call 303.786.9900.

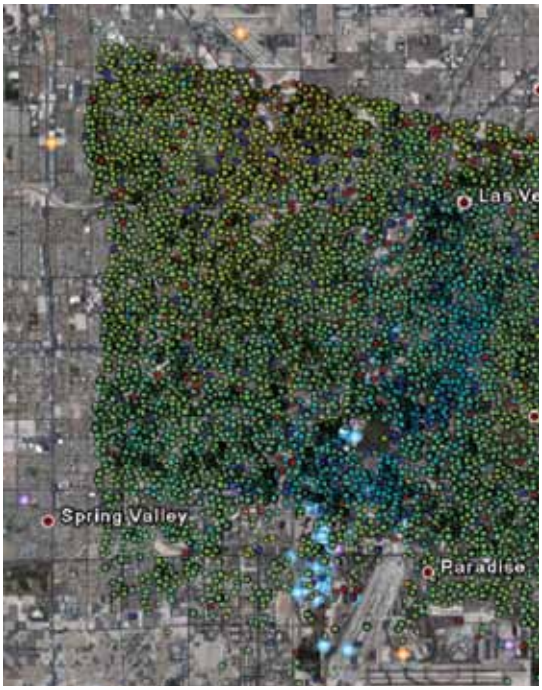
Accessory Modules to the Interferometry Module

The ScanSAR Interferometry Module allows you to generate Digital Elevation Models, Coherence and Land Displacement maps based on ENVISAT ASAR Wide Swath data (400 km x 400 km). In addition, this module provides hybrid interferometric products, by combining StripMode (ASAR Image Mode) data with ScanSAR (ASAR Wide Swath) data.

INTERFEROMETRIC STACKING MODULE

The Interferometric Stacking Module integrates point-based (PS-like) and area-based (SBAS-like) techniques for the processing of interferometric stacks. This combined approach enables users to obtain accurate results both on point and distributed targets.

- **Persistent Scatterers (PS)**
  Enables users to detect very small displacements (mm scale) and to infer the deformation velocity - and its variation over the time - in particular for very stable (man-made) reflectors that might have independent displacements in respect to the surrounding areas.
- **Small Baseline Subset (SBAS)**
  Is a complementary method that exploits differential synthetic aperture radar interferometry (DIFSAR) techniques to analyze stacks of SAR acquisitions to extract small deformations over large areas, when no point targets are identified but large, correlated displacements occur over natural targets.



PS analysis of Las Vegas, U.S., ENVISAT ASAR Image Mode. ©ASAR data, ESA

The combination of the two approaches allows analyzing deformation phenomena affecting both extended area (e.g. natural features) and localized structures (e.g. man-made features), related to natural or man-induced phenomena (e.g. volcanic or seismic activity, landslides, subsidence, building failures, etc.).

SAR POLARIMETRY/POLARIMETRIC INTERFEROMETRY (POL/POLLNSAR) MODULE

The SAR Polarimetry/Polarimetric Interferometry (Pol/PolInSAR) Module allows you to process polarimetric data, polarimetric interferometric ALOS PALSAR-1, RADARSAT-2, and TerraSAR-X-1/2 data.

- **SAR Polarimetry**
  Includes among others Pauli Decomposition, Entropy-Anisotropy-Alfa Decomposition, and Classification Tools.
- **Polarimetric SAR Interferometry**
  Includes among others SLC Coregistration, Polarimetric Phase Difference, Interferogram Generation, Polarimetric / Interferometric Coherence, and Coherence Optimization.

ENVI. Get the Information You Need from Imagery.

Today's imagery analysts and scientists in a wide variety of disciplines choose ENVI®, the premier software solution for extracting information from geospatial imagery. ENVI provides advanced, user-friendly tools to access, analyze, and share information from geospatial imagery.

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