SCATTER™
SAR Phase History Simulator

The image was processed from Scattersimulated SAR data. A digital elevation model of terrain with a uniform scattering surface was used to define the land returns, while the ocean areas were represented by a heavy sea. The inset image shows a close-up of the target ship response.

PRODUCT OVERVIEW

SCATTER™ is a synthetic aperture radar (SAR) phase history simulator that can be used to simulate SAR data acquired from a space-borne SAR system. SCATTER can be used as either a "Signature Simulator" or "Phase History Simulator". In Signature Simulator mode, SCATTER produces a synthetic single-look complex (SLC) image, the pixel values of which correspond to the scattering cross section. In Phase History Simulator mode, SCATTER produces synthetic raw phase history data, which must be processed through a SAR processor to create an image.

In either mode, SCATTER combines a user-specified scene and sensor to create the required synthetic SAR product. A scene is a combination of a background and, if desired, one or more targets. The background can be specified by importing one or more digital elevation models (DEMs) and selecting the land type corresponding to the DEMs pixels. Targets can be defined as compact targets, which are imported from a MicroStation CAD design file, or point targets, such as trihedrals or dihedrals. All of the parameters governing the SAR sensor, orbit, and geometry can be controlled, allowing the user to experiment with novel SAR sensors.
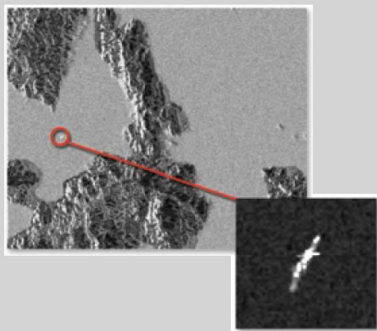
SCATTER is part of the SeaSpace Apex™ SAR processing system, and is integrated into the Apex GUI. Raw phase history data produced from SCATTER may be ingested directly into the Apex SAR Processor FOCUS™, the Apex ScanSAR Processor SWATH™, the SPOTLIGHT processor, or any other suitable SAR data processors.

The well-designed SCATTER GUI guides the user to prepare the simulation step-by-step.

1. Use the Mission Planner to set up the sensor's parameters.
2. Use the DEM Editor to mosaic together all of the input DEM files.
3. Use the Land Type editor to specify the radar properties of each pixel of the scene. This data is in the DEM, or map, geometry.
4. Use the Target Editor to convert target CAD models to facet models that can be ingested by SCATTER.
5. Use the Scene Previewer to position the swath over the scene and to position all targets within the scene.

Then, perform the simulation with different simulators.

6. Use the Scene Translator to create an image of the background.
7. Use the Signature Simulator to create a simulated image of all of the targets.
8. Use the Defocus to create the raw phase history analog echo data of the background.
9. Use the Time Domain Simulator to create a phase history simulator of all targets.
10. Use the Receiver to simulate the effects of thermal noise, interference, digitization, and gain on the phase history echo data.

KEY FEATURES

- SAR Phase History Simulation for StripMap, ScanSAR, Spotlight, and Interferometry modes
- Simulation for TerraSAR-X spotlight sliding mode
- ime-domain methods for targets simulation and frequency domain methods (inverse chirp scaling) for background
- Multiple DEM format supports include USGS, Japanese DEMs, GeoTiff and binary-metadata (SeaSpace format) DEMs
- Ocean scene simulation including sea state parameters, such as wind speed and direction
- Ability to ingest faceted 3D CAD models from MicroStation

SYSTEM SPECIFICATIONS

Hardware Platform
- Linux 64-bit
- Windows 64-bit

SCATTER Input
- Orbital parameters
- Sensor parameters
- Scene parameters
- Target specifications

SCATTER Output
- Mosaic DEM
- Background reflectivity maps
- Target signature images
- Phase history data

Wire frame of 3D CAD model produced in MicroStation for use in the Scatter. Phase History Simulator.