NEST: the ESA toolbox for scientific exploitation of SAR data

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- NEST architecture
- Supported SAR missions
- NEST functionalities
- NEST User community
Project Overview
NEST (Next ESA SAR Toolbox) is an open source ESA software for exploitation (visualizing, analyzing and post-processing) of ESA and 3rd party SAR data processed from Level-1 or higher.

**Project time schedule**

- Kick off November 2007

**Phase A**

- SRR System Requirements Review (month 2)
- PDR Preliminary Design Review (month 4)

**Phase B**

Release 1A – 1B – **1C** Public release November 2008
Release 2A – 2B – **2C** (June 2009)
Release 3A -3B- **3C beta FRINGE 2009**
**3C** final release (late January 2010)
NEST is being developed by Array Systems Computing Inc. of Toronto Canada under ESA Contract number 20698/07/I-LG.

NEST TEAM

- **ESA**
  - Marcus Engdahl, Andrea Minchella (RSAC c/o ESA)

- **Array Systems Computing**
  - Rajesh Jha, Luis Veci, Jun Lu, Shengli Dai

- **Brockmann Consult**
  - Norman Fomferra, Marco Peters

- **PPO.labs**
  - Petar Marinkovic

- **TU Delft**
  - Ramon Hanssen
NEST architecture
- Fully portable to multiple hardware platforms and operating systems (Windows, Linux, Mac) thanks to a **100% pure Java** implementation.

- **Modular design** for easy modifications and upgrades

- An **API** enables users to easily add their own modules and extend the capabilities of NEST

- Fully Open Source under the GNU GPL
NEST Architecture

**NEST-BEAM Co-development**

- NEST is built re-using the BEAM Earth Observation Toolbox and Development Platform

- With cooperation between Array Systems Computing and Brockmann Consult, the shared **NEST-BEAM Core** supports plug-in modules for both toolboxes

- Both toolboxes may benefit from improvements and new features from either project
NEST Modules: data flow

Display and Analysis Tool

Image Display, Statistics, ROI, Image Manipulation, Data Analysis

Readers

Generic Product Model

Writers

Graph Processing Tool

Data Conversion, Band Arithmetic, Image Filtering, Data Analysis, Orthorectification, Co-Registration, Reprojection, Mosaicking, Calibration, Interferometry, Oil Spill Detection, Wind Field Estimation, Object Detection

ERS 1 & 2 AMI
JERS
Radarsat 1 & 2
ALOS PALSAR
TerraSar-X
Cosmo-Skymed
Sentinel 1

BEAM DIMAP
GeoTIFF
HDF 4 & 5
NetCDF

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Supported SAR Missions

- Readers
- The Import Browser
NEST SAR data readers:
- ENVISAT ASAR
- ERS-1&2
- ALOS PALSAR
- Radarsat-1&2
- JERS SAR
- TerraSAR-X
- Cosmo-SkyMed (coming soon)

NEST supports common EO formats:
- GeoTiff, HDF 4 & 5, NetCDF, Generic Binary
- Convenient browsing and importing of products having information and product previews.
- Apply batch processing chain
NEST Functionalities

- Basic Utilities
- Advanced Tools
- Graph builder
- Product information
- Statistics & Data Analysis
- Export (GeoTiff, HDF 4 & 5, NetCDF, Binary)
Basic Utilities

- Resampling (under-over sampling)
- Data conversion
- Band arithmetic & filtering
- Subset
- Layers Stack
- Orbit Correction (Doris, Prare and Delft precise orb.)
- Envisat ASAR, ERS 1&2 and ALOS calibration
- Coregistration of detected and complex products
- Multilooking & speckle filtering
- Debursting of ASAR WSS
- Map projection
- Orthorectification with GIM Mask
- Orthorectification using rigorous SAR simulation
- Radiometric normalization for ASAR (and ERS)
- Ellipsoid correction
- Mosaicking
Advanced Tools

- Basic object detection tools
- In-SAR capability (see next presentation)
Graph Builder

- Create your own processing chains
- Visual Graph Processing Framework interface
- Executed from command line or from GUI
- Allows for batch processing on stack of images
From SLC to Orthorectified product

Slant range geometry

ASA_IMS_1PNUPA20081212_092731_000000162074_00351_35475_2365.N1
From SLC to Orthorectified product

Multilook 2:10

ASA_IMS_1PNUPA20081212_092731_00000162074_00351_35475_2365.N1
From SLC to Orthorectified product

Range Doppler orthorectification

ASA.IMS.1PNUPA20081212_092731_00000162074_00351_35475_2365.N1
Radiometric normalization using the DEM local incidence angle

From SLC to Orthorectified product
3D View WorldWind
Mosaicking

62 ASAR GM Products Mosaic of Australia
NEST User Community

NEST Users

- 1810 Registered Users
- 268417 Total Page Views

NEST Website Visits

- 14% United States
- 11% Italy
- 6% Germany
- 6% China
- 6% Canada
- 5% Great Britain
- 3% Brazil
- 3% Spain
- 3% France
- 3% Netherlands
- 3% Russian Federation
- 2% Czech Republic
- 2% Austria
- 2% Poland
- 2% Greece
- 2% Sweden
- 2% India
- 1% Australia
- 1% Norway
- 14% All Others
For software upgrades, documentation and more information regarding the NEST project, please visit the website at

http://earth.esa.int/nest
Thank you