SNAP – THE SENTINELS APPLICATION PLATFORM

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What is SNAP?

- SNAP: ESA **S**e**n**tinel **A**pplication **P**latform
  - A common software platform and host for the Sentinel Toolboxes and others
  - One application, one installation on end-user's computer
  - Synergistic use of various EO data with common and specific tools
  - Fully open-source, GPL 3
  - Joint, collaborative development of the primes running the Sentinel Toolbox projects
  - It's a ESA SEOM funded activity

Sentinel Toolboxes Consortia

ARRAY SYSTEMS COMPUTING INC.

- BROCKMANN CONSULT GMBH
- DLR
- oceandatalab

CS La force de l'innovation

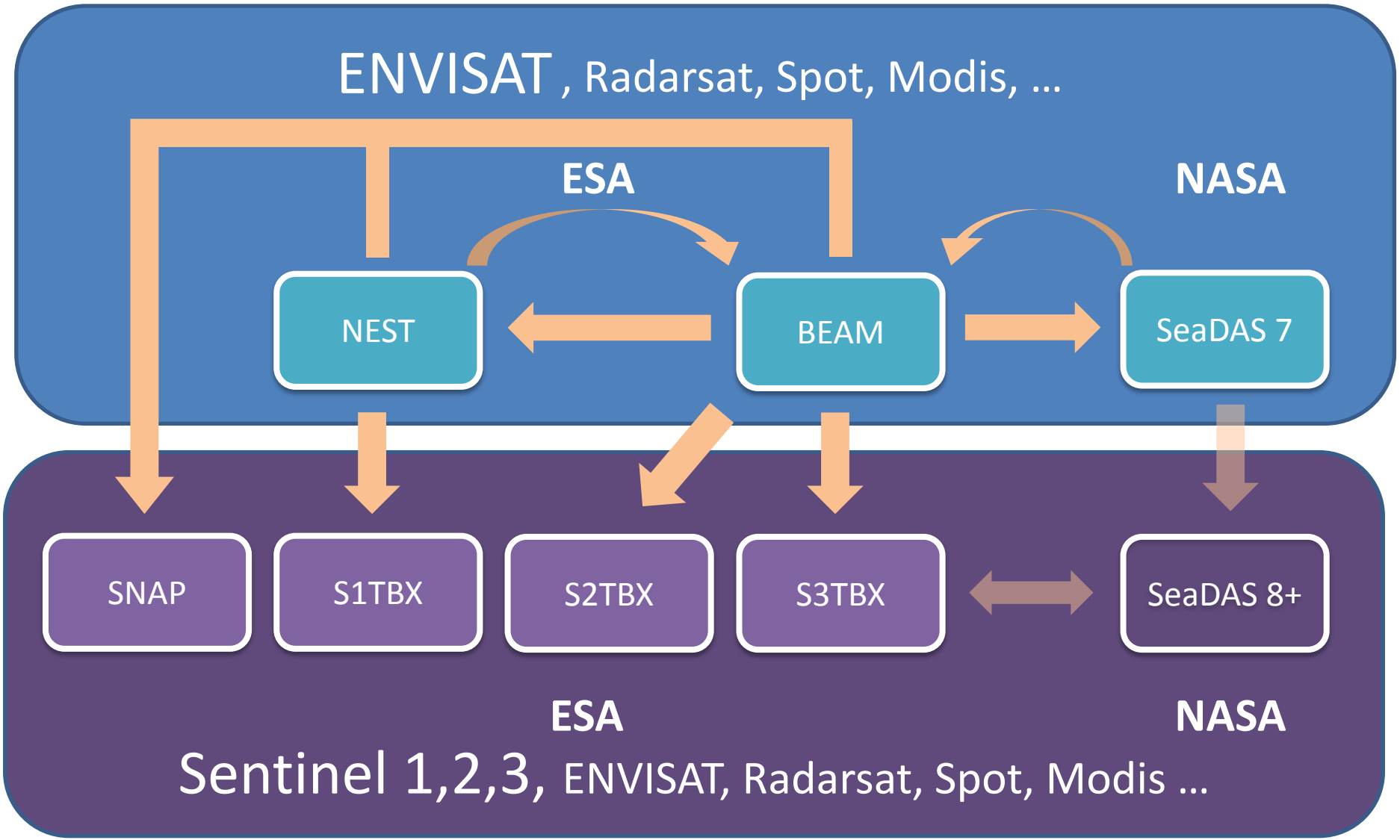
- CS ROMÂNIA
- TELESPAZIO VEGA DEUTSCHLAND — A Finmeccanica / Thales Company
- INRA SCIENCE & IMPACT
- BROCKMANN CONSULT GMBH
- UCL Université catholique de Louvain

BROCKMANN CONSULT

- University of Reading
- CS La force de l'innovation
- ACRI ST
- ARRAY SYSTEMS COMPUTING INC.

driven by user requirements, guided by user expertise, implemented by a experienced technical team

Toolbox Evolution



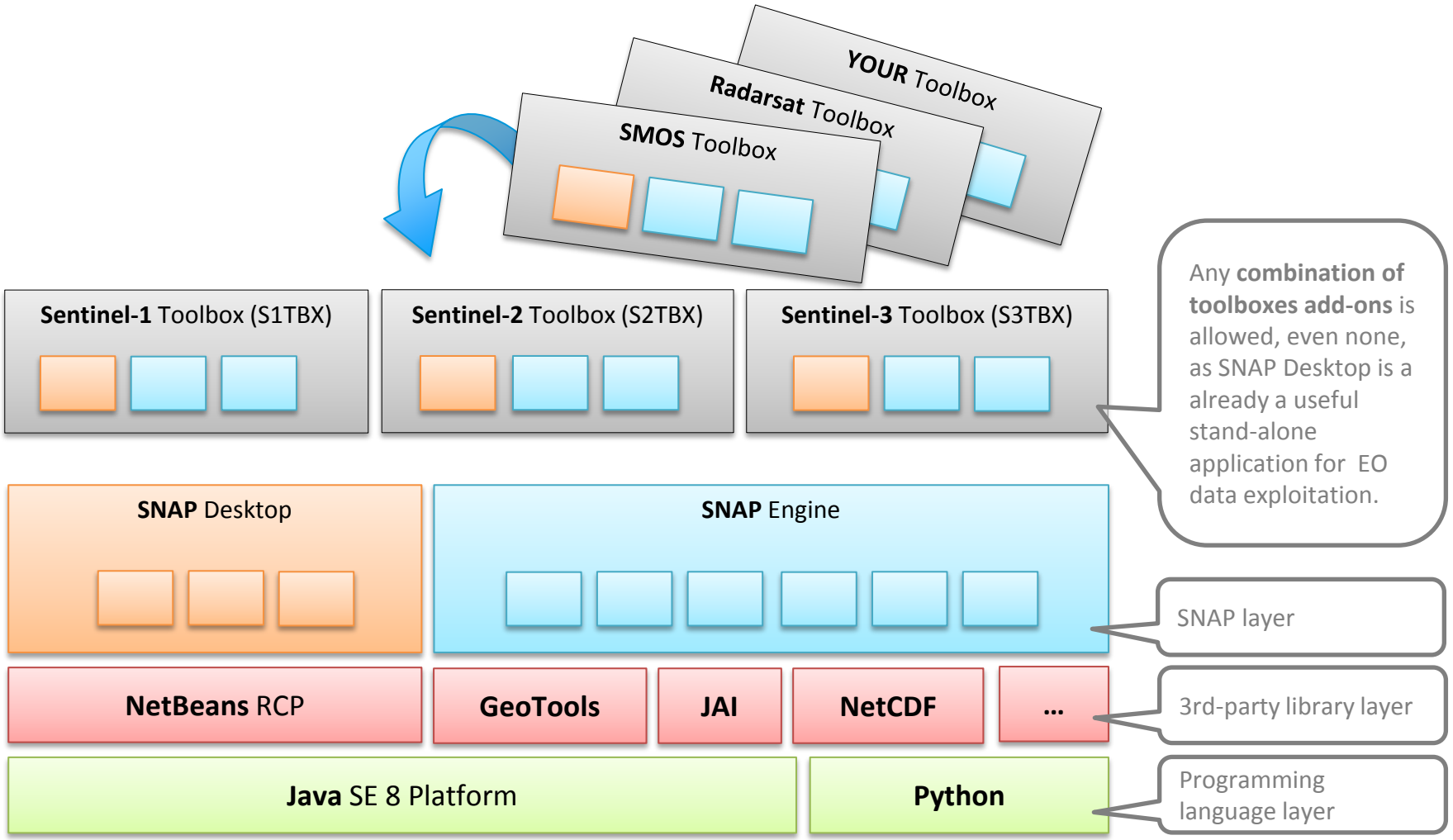
Challenges for ESA's toolboxes in a new era of Earth Observation

- Sentinel (and other products) come with new features
  - per pixel uncertainty
  - multi-resolution
  - very flexible file format (SAFE like)
- Very large raster size of Sentinel Products
  - e.g. Sentinel 2: 40.000 x 40.000 pixels and larger
- Big Data Volumes
  - Sentinels 1+2+3 = Terabytes / day
  - Petabytes / missions
- Processing Algorithm Complexity
  - Intense use of spatial & temporal window processing
  - Working on time series / time series analysis
  - Iterations & recursion
- Processing where the data is instead of data to processors
- Exploiting cloud services
- Community tools to share data, resources, results, …
- High expectations from users: free, open, extendible, quality (stable, fast, support, …)

SNAP Architecture

- Dynamic, module-based architecture, with various extension points and extensions
- Install and update of extension modules
- Use from Java and Python programs, extend by Java and Python plugins
- Write a SNAP plugin, use it in all toolboxes
- High-level architecture comprises two subsystems
  - **SNAP Engine**, the core and command-line interface
  - **SNAP Desktop**, the graphical user interface

SNAP Architecture



Main Subsystems

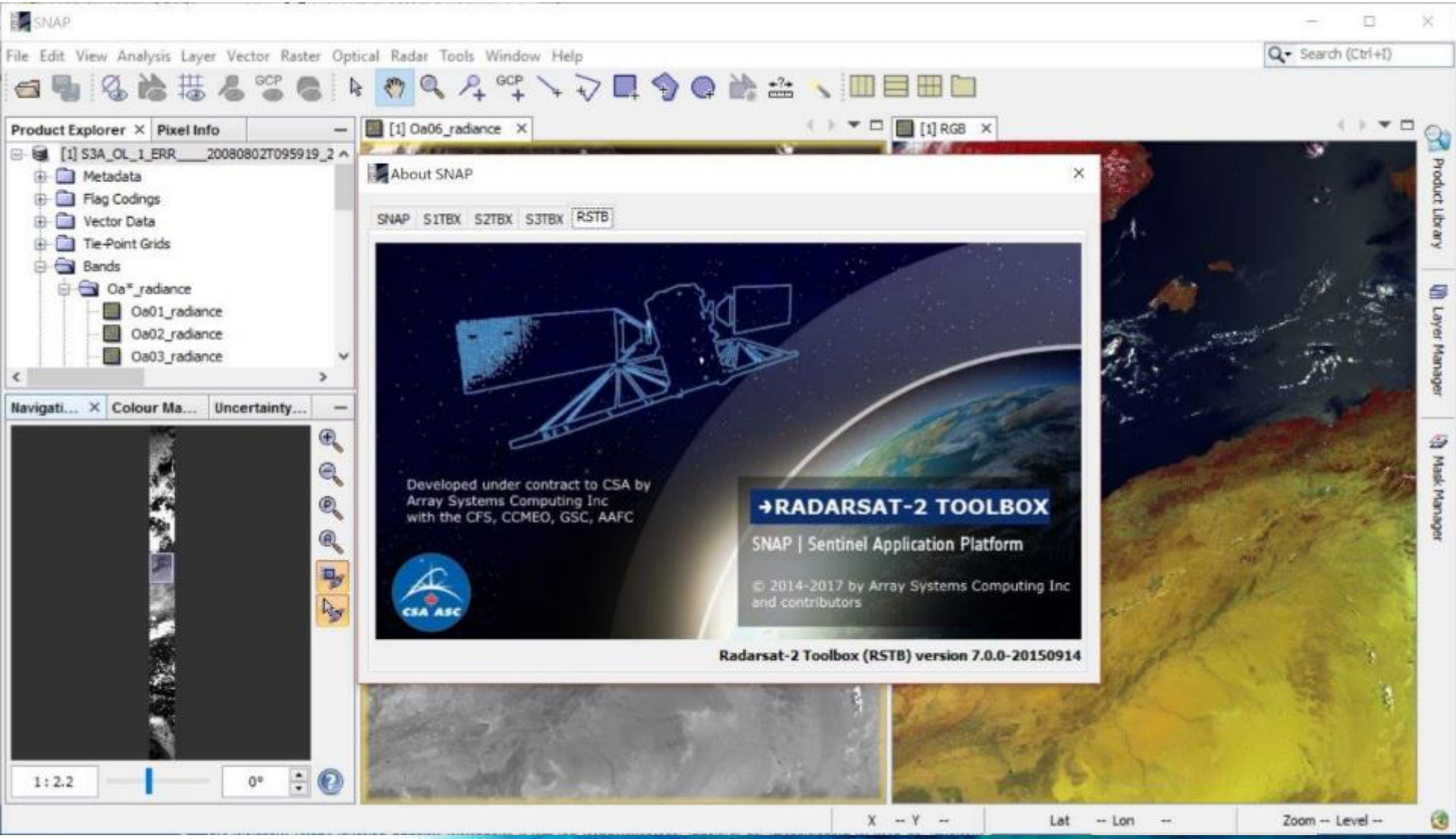
- SNAP Desktop
  - Modern, intuitive and rich user interface
  - Fast display of giga-pixel images
  - Large portfolio of analysis and visualisation functions
  - Operator interfaces and graph builder for processing
- SNAP Engine
  - SNAP core code base
  - EO data model, I/O & operator APIs
  - Python API allowing to use also numpy, scipy, pandas, etc with SNAP
  - Common, generic I/O formats: NetCDF, HDF, GeoTIFF, Shapefiles, …
  - Common, generic functions: reprojection, subset, geo-coding, collocation, band maths, image filters, masking tools, …
  - Command-line interface, no GUI
  - Various uses: library, service implementation, Cloud services exploitation

SNAP and the Cloud

- SNAP Engine (and Desktop) is truly platform independent and can be used in various environments
- Distributed Computing using Virtual Machines
- Implementation of Web Processing Services
- Integrates perfectly with
- Apache Yarn/Hadoop, e.g. the *Calvalus* processing system

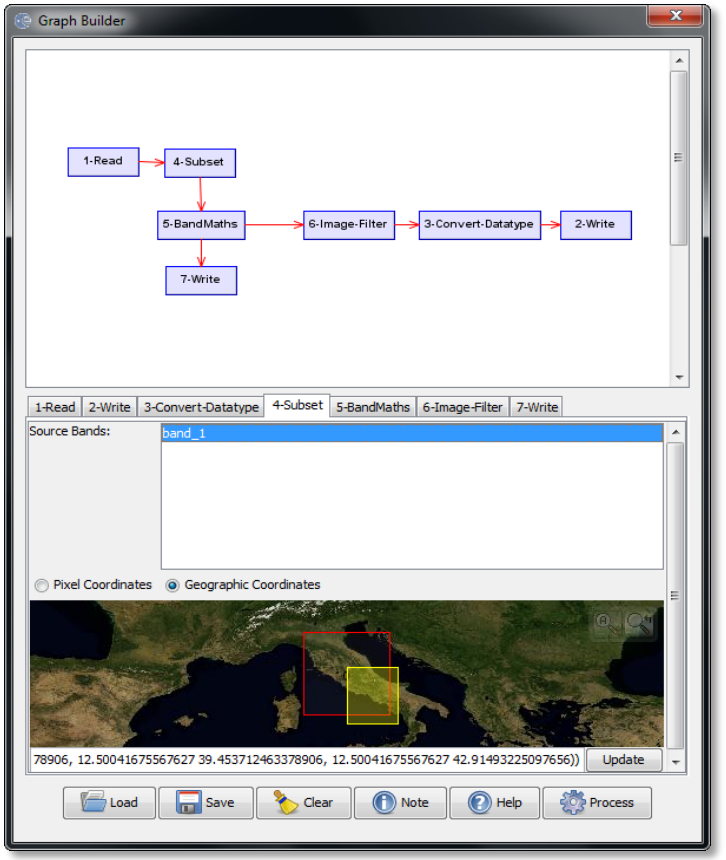
→ More in Luis Veci's talk on Sentinel-1 Toolbox (16:30) and his Cloud Exploitation Demoon Amazon EC2, Wednesday afternoon

SNAP Desktop and the Toolboxes



Graph Processing Framework

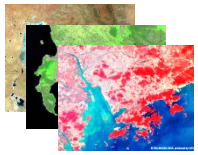
- Majority of SNAP „functions“ are implemented as operators
- Each operator can be invoked from SNAP Desktop and from the command line
- Processing chains („graphs“) are configured in XML files
- Graphical Graph Builder
- Graph Processing Tool (gpt) for executing of graphs (chains)
  >gpt -help

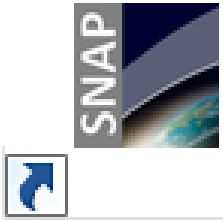


SNAP Applicaton Modes

I

Interactive Exploration

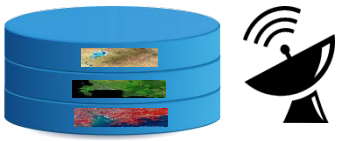




PC, notebook, tablet

II

bulk / NRT processing

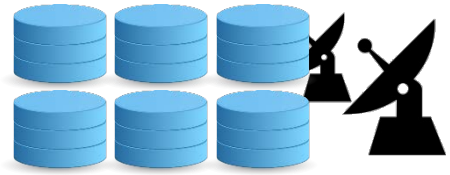


SNAP Graph Processing Framework

PC, notebook server

III

EO data processing centre

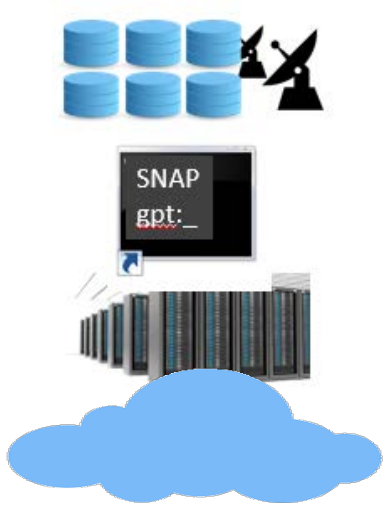


SNAP Graph Processing Framework

cluster, cloud

IV

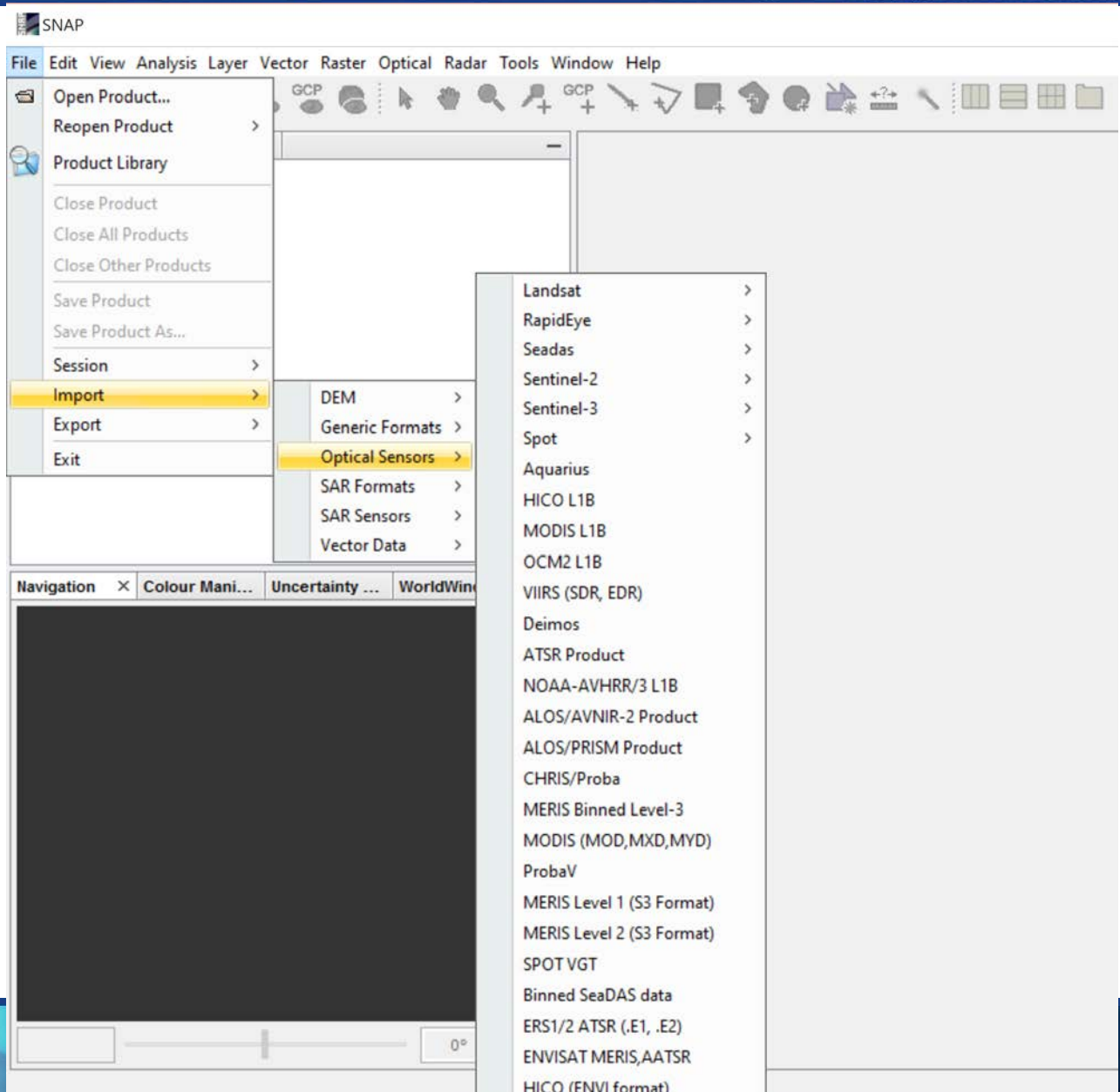
Cloud Exploitation Platform



PC, notebook, tablet

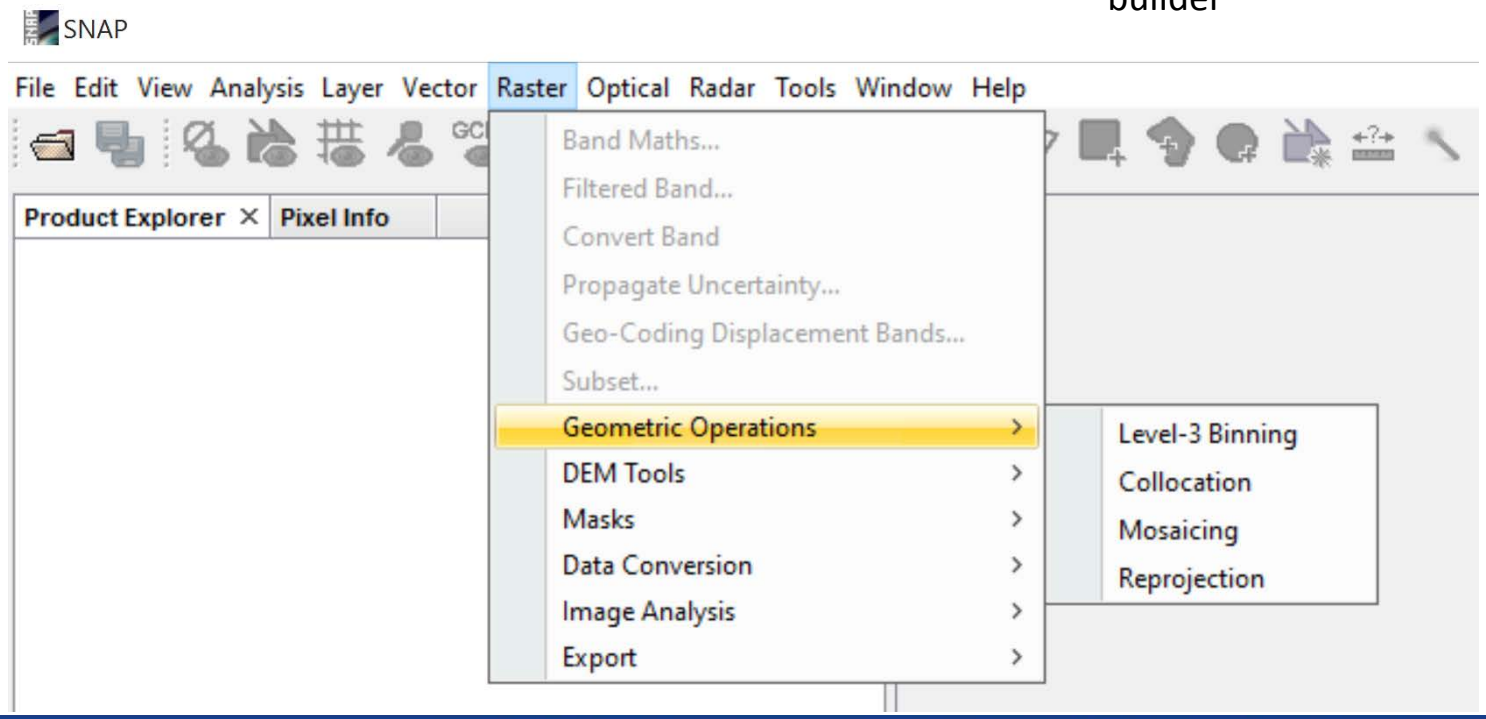
Multi-Sensor Support

- SNAP supports generic NetCDF, GeoTIFF, shapefiles, etc.
- Toolboxes add specific reader plugins for their domain

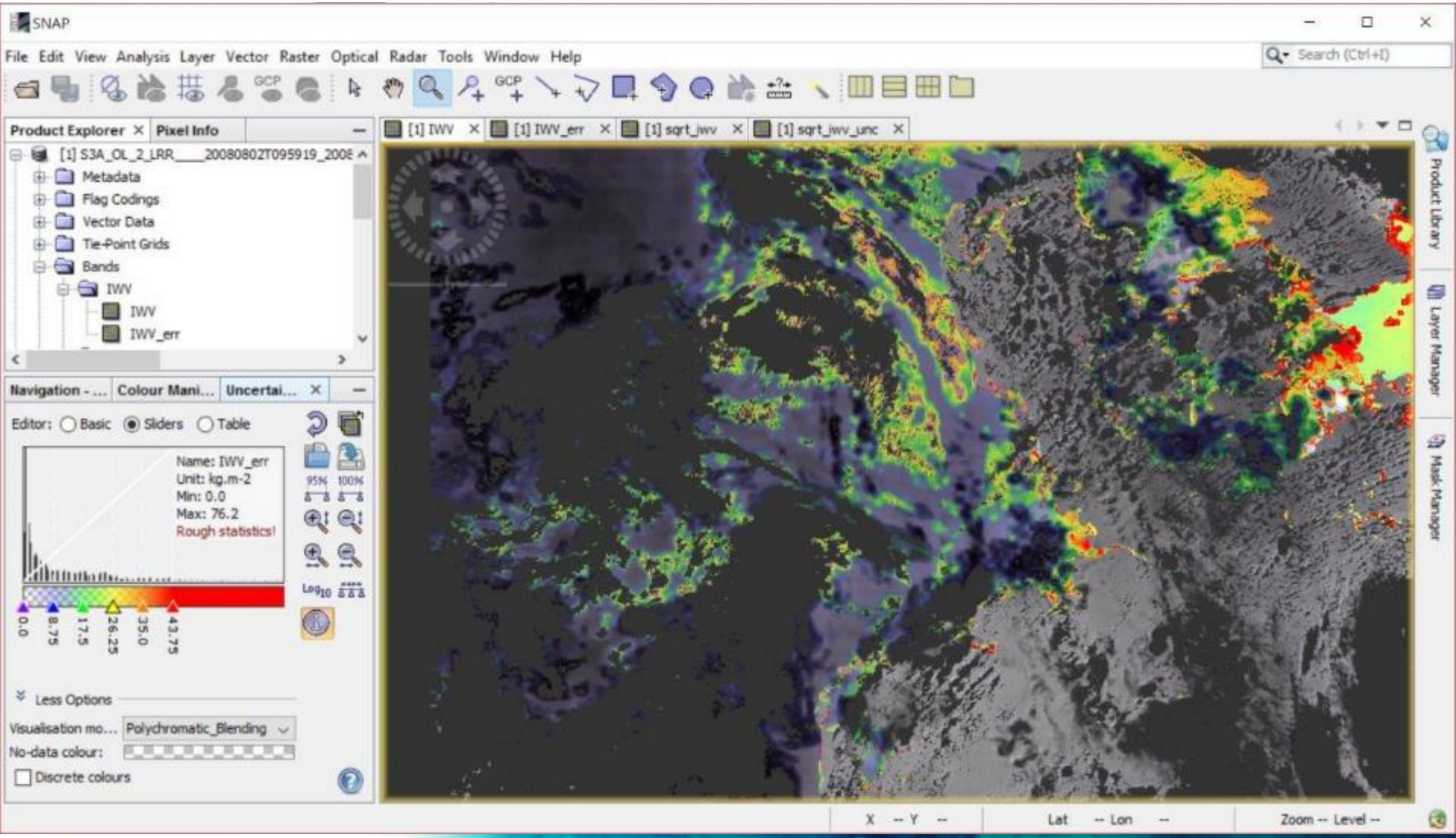


Generic Functions and Tools

- Applicable for all toolboxes and wide range of sensors
- Raster data and vector data tools
- Visualisation
  - Multi-layer displays, layer editors
  - Image, mask, shapes overlays
  - Colour management, fast navigation
- Data Analysis
  - Various statistics and plot types
  - Spectrum display (optical)
- Data processing
  - Reprojection, Collocation, Mosaicing
  - Level-3 processor
  - Graph processing, ürocessing graph builder



Sentinel-3 Toolbox



STEP

- step.esa.int
- Science Toolbox Exploitation Platform
- EO Science collaborative platform
- Technical forum and community animation
- Gathering user feedback and usage
- SNAP tutorials and documentation
- SNAP software download

→ see talk of Yves-Louis Desnos at 16:15

SNAP Download

step
science toolbox exploitation platform

esa

ESA | STEP | TOOLBOXES | DOWNLOAD | GALLERY | DOCUMENTATION | COMMUNITY

- SNAP
- Sentinel 1 Toolbox
- Sentinel 2 Toolbox
- Sentinel 3 Toolbox
- Download
- Community

Home > Download

Download

Here you can download the latest installers for SNAP and the Sentinel Toolboxes.

Data provision is available to all users via the **Sentinel Data Hub**.

Previous Versions

Former releases can be downloaded from the **Previous Versions** page. But we highly encourage you to test the beta version for the next release !

Current Version

Search...

seom
scientific exploitation of operational missions

EO Science 2.0

6th ESA Advanced Training Course on Land Remote Sensing

1600 beta user
Thanks you so much for valuable feedback!

SNAP Roadmap

- SNAP 2.0 beta 8 on Wednesday (before Hackathon)
  - Feature freeze for S1TBX, S2TBX, S3TBX
- SNAP 2.0 final end of October
  - Multi-size issue stable, blocking all tools that request single-size
  - S1TBX, S2TBX, S3TBX
  - New SMOS Toolbox
- SNAP 3.0 January 2016
  - True multi-size, resampling operator
  - Lots of new features for S1TBX, S2TBX, S3TBX
- SNAP 4.0 March 2016
- SNAP 5.0 June 2016

→ Project ends in July 2016

Related Talks and Events

- Today
  - 16:15 – Sentinel Toolbox Exploitation Platform, Yves-Louis Desnos, ESA ESRIN
  - 16:30 - The Sentinel-1 Toolbox, Luis Veci
- Wednesday afternoon:
  - Demonstration of Cloud services exploitation with SNAP, Luis Veci
  - Demonstration of Sentinel-2 Toolbox, Julien Malik
- Thursday / Friday:
  - SNAP Hackathon, learn from SNAP developers