1ST ESA SNAP HACKATHON

SNAP Challenges & Features

SNAP Development Team

ESA ESRIN, 15 + 16 October 2015

# 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 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

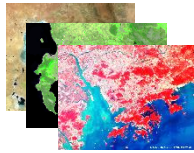# SNAP Desktop and the Toolboxes
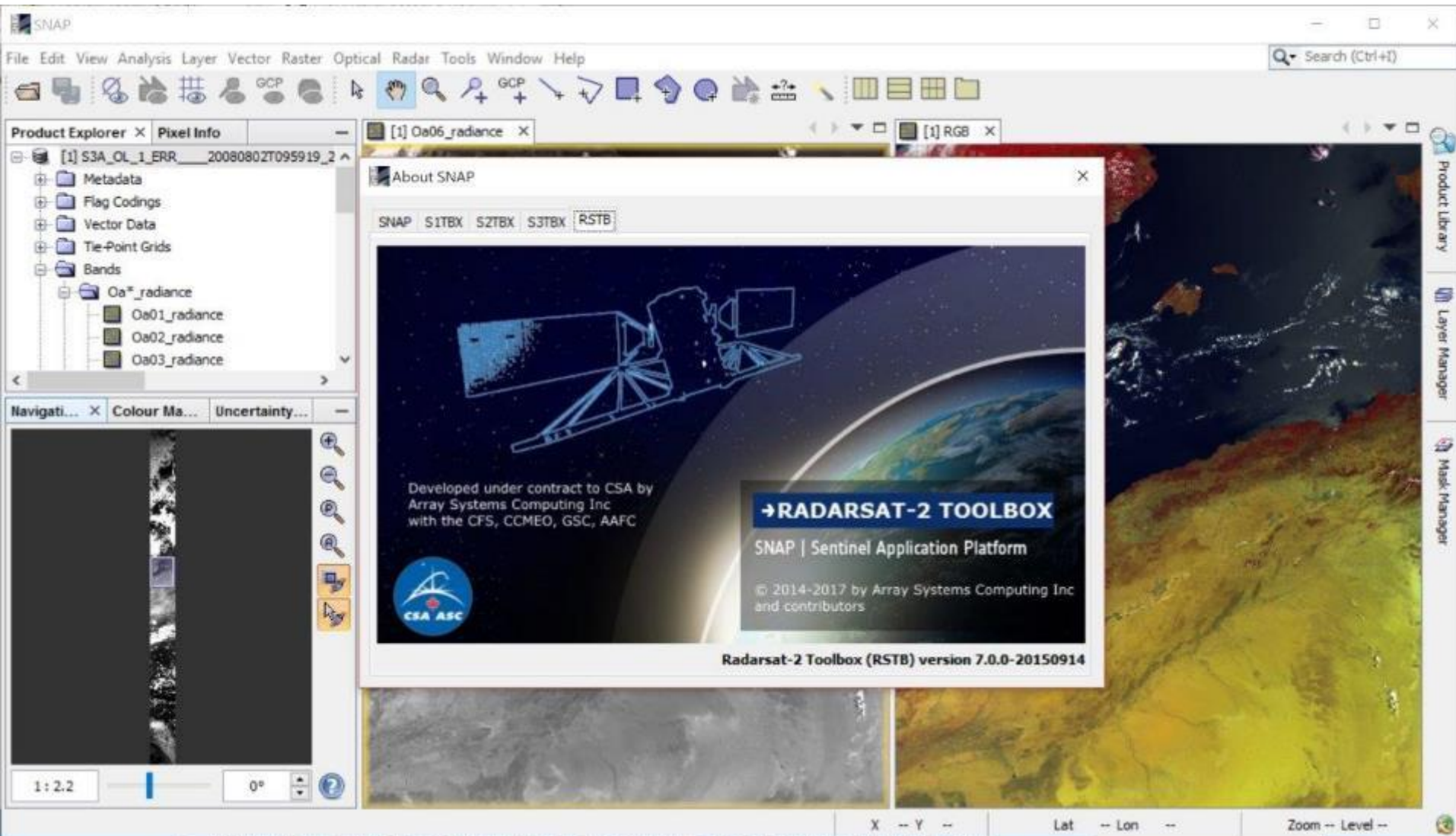
Graph Processing Framework

- 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
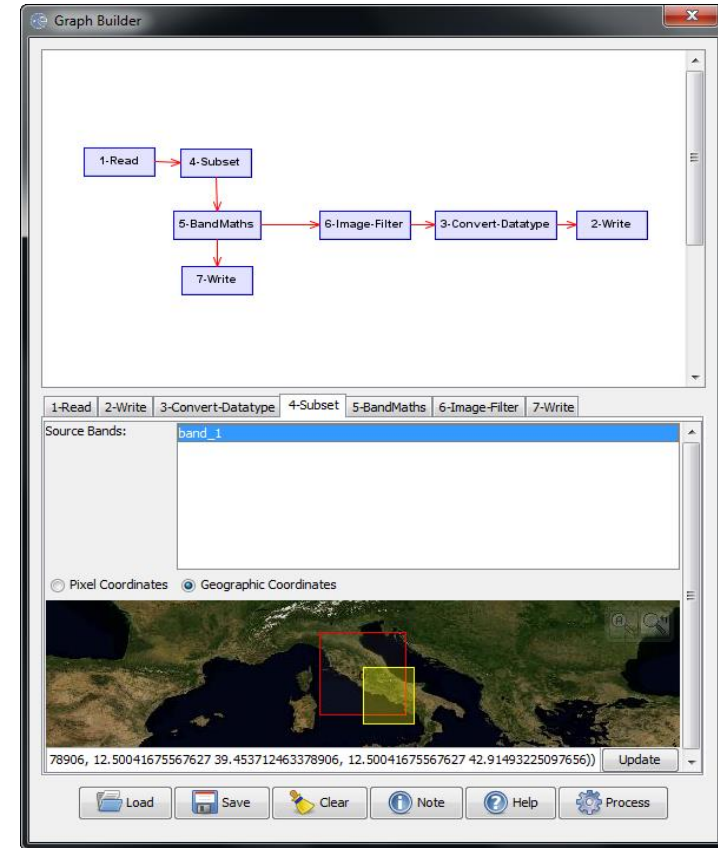
SNAP Applicaton Modes

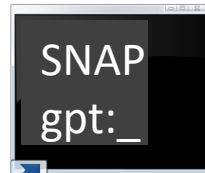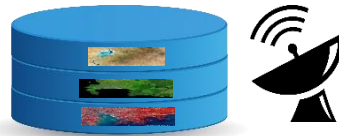| I	II	III	IV
Interactive Exploration	Bulk / NRT processing	EO data processing centre	Cloud Exploitation Platform

SNAP Desktop

SNAP gpt:_

SNAP Graph Processing Framework

SNAP gpt:_

SNAP Graph Processing Framework

SNAP gpt:_

SNAP Desktop
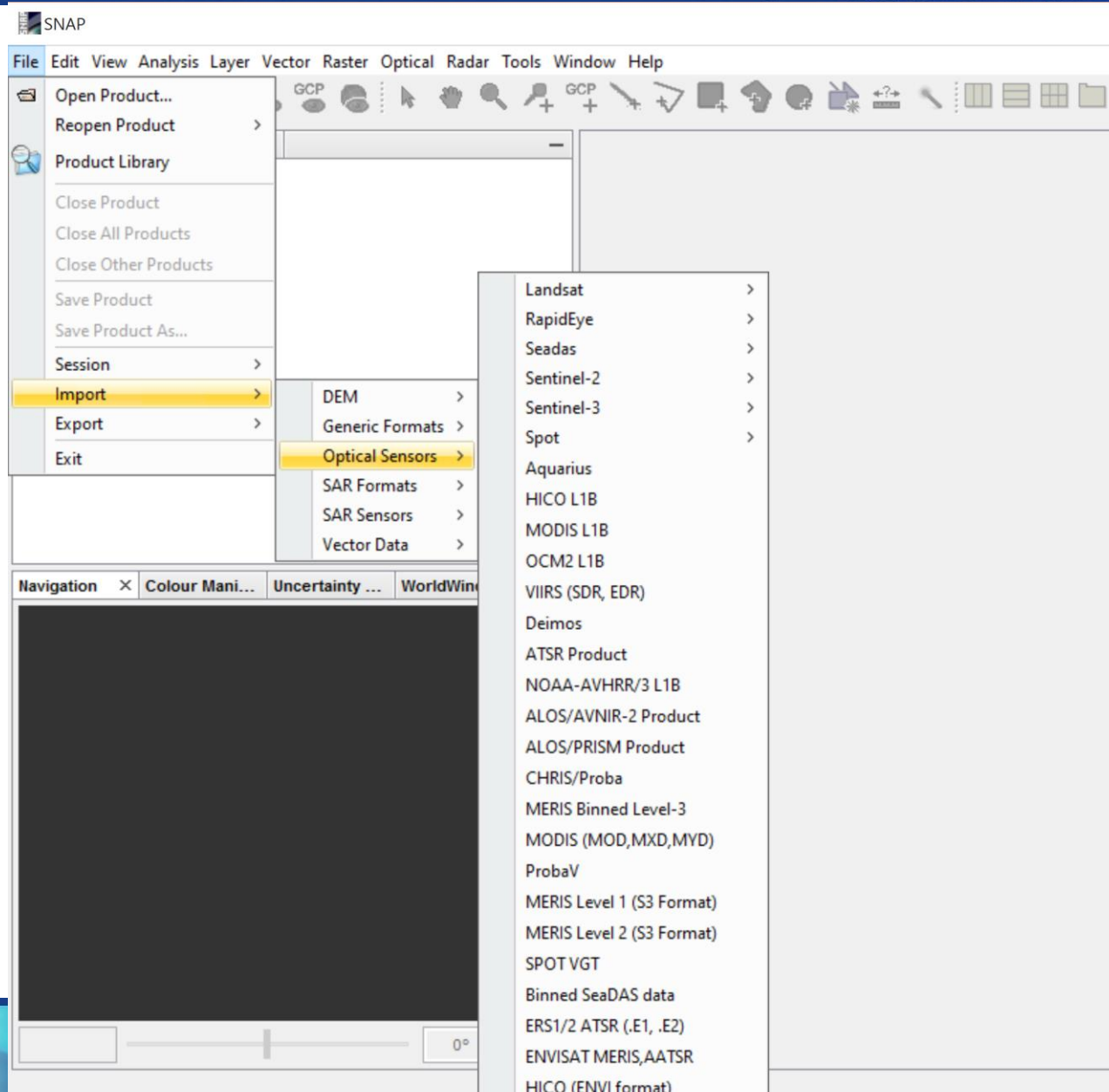
PC, notebook, tablet

PC, notebook server

cluster, cloud

PC, notebook, tablet

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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