living planet symposium | BONN 23–27 May 2022

TAKING THE PULSE OF OUR PLANET FROM SPACE

SNAP (SeNtinel Application Platform)

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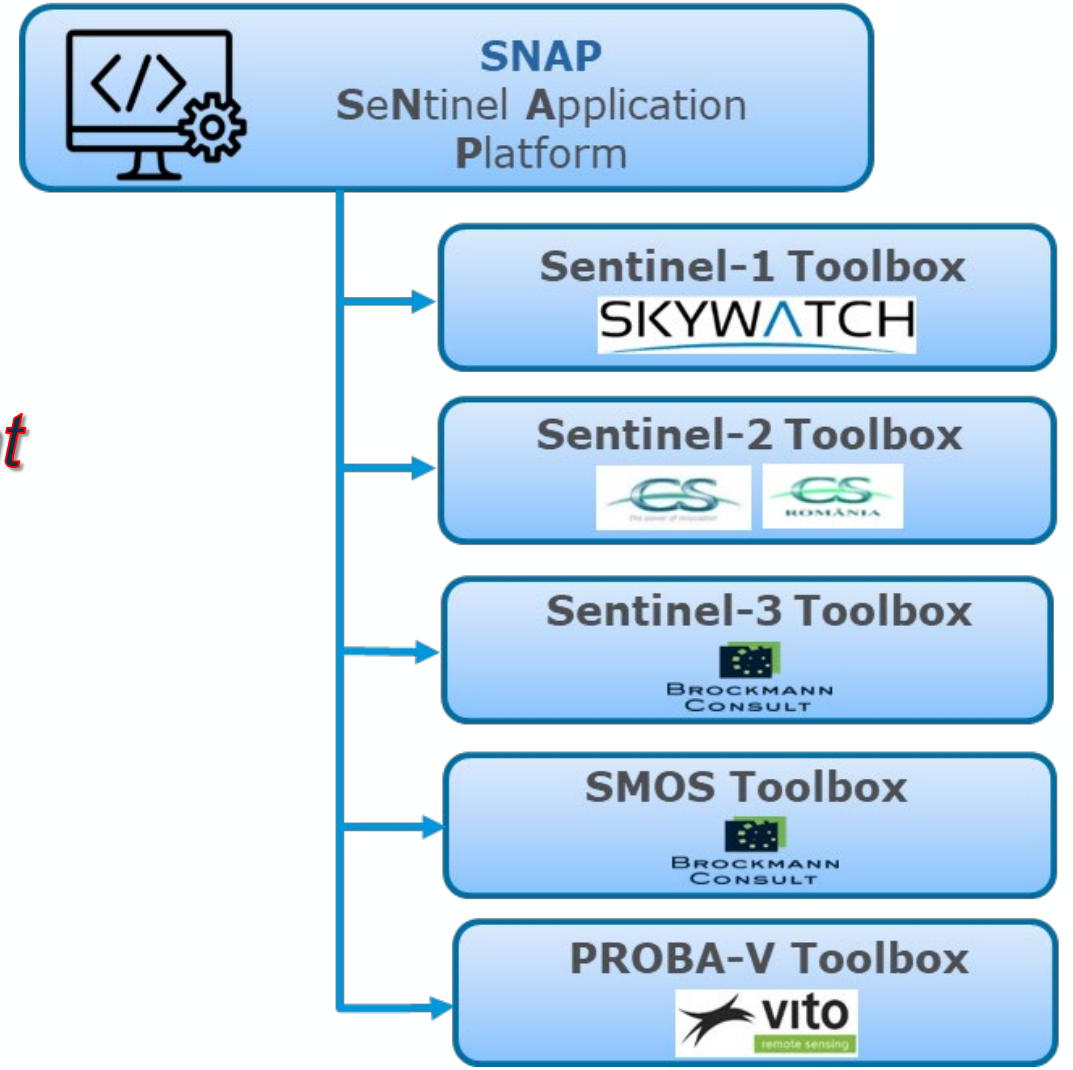
26.5.2022

SNAP

Download it at

step.esa.int

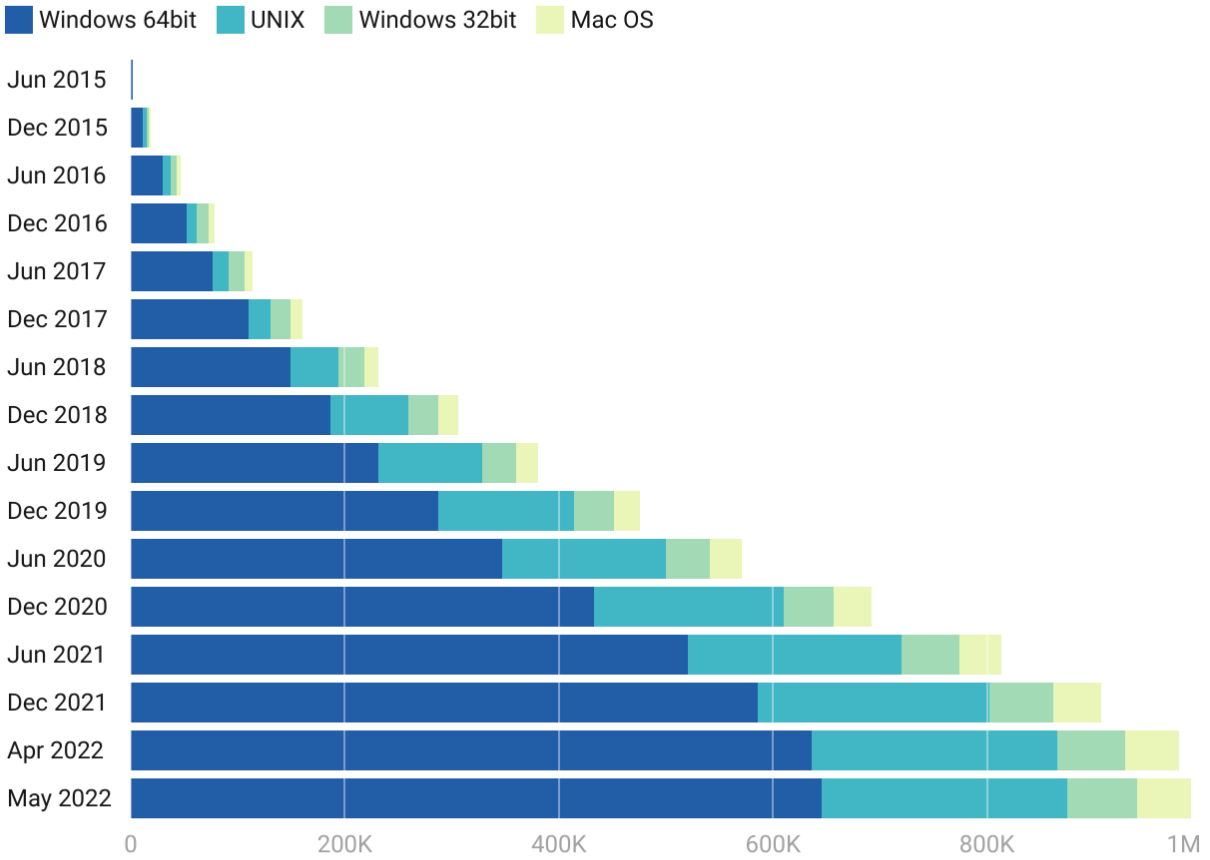


- ✓ Free and open source software (GPLv3)
- ✓ Supported by ESA in the long term
- ✓ Common Java core framework
- ✓ Interchangeable Java/Python plugins
- ✓ Portable engine – runs anywhere from laptops to data centers
- ✓ User friendly: single installation, intuitive GUI, online help, tutorials, active user forum

SNAP Adoption

- 1 million downloads breached during LPS week
- ~10000 people registered on forum
- Widely used globally in:
  - Teachingof Remote Sensing
  - Research & development
  - EO downstream industry

SNAP cumulative downloads



Downloads until 22 May

Chart: ESA • Created with Datawrapper

Processing Platforms using SNAP

European Space Agency & national Space Agencies

- Thematic Exploitation Platforms (TEPs),
- Mission Exploitation Platforms (e.g. Proba-V MEP)

European Commission

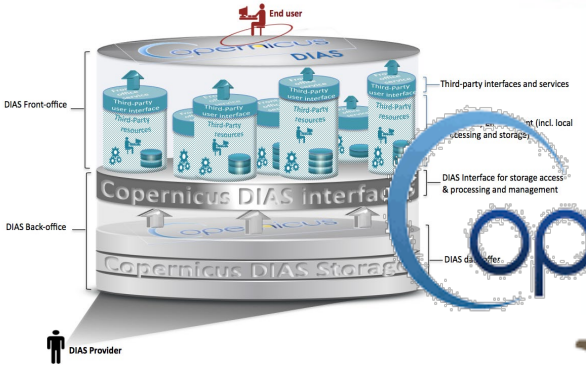
- Copernicus Data and Information Access Services (DIAS)

Copernicus Collaborative Ground Segments

- CODE-DE,
- CEMS

tep thematic exploitation platform

proba-v mep



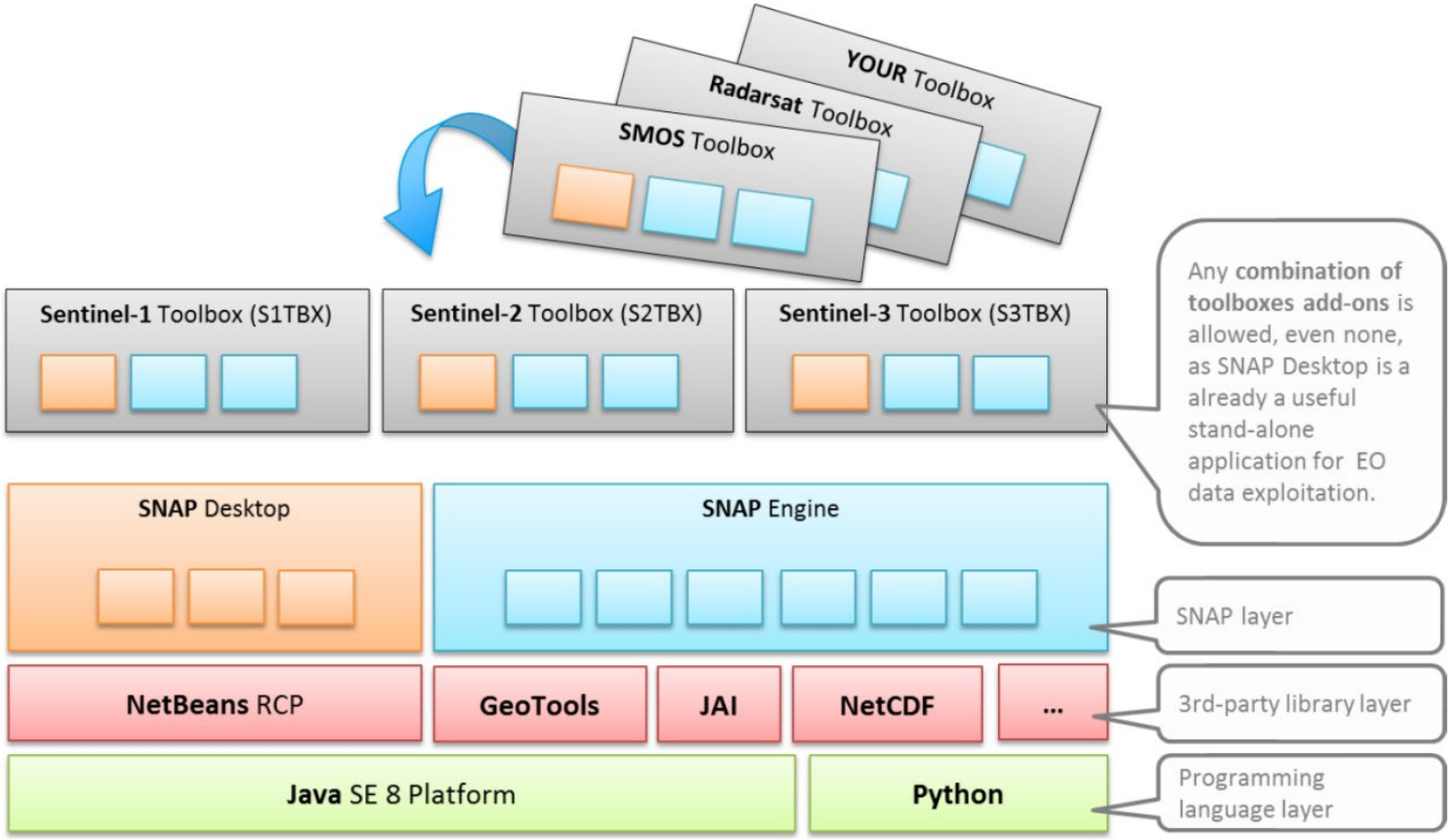
opernicus

eodc

CODE-DE

CEMS An ISIC Facility

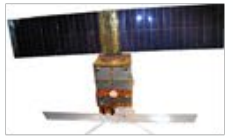
SNAP
Modular Architecture



SNAP & SAR Functionality
(Sentinel-1 Toolbox)


Sentinel-1


ENVISAT


ERS-1

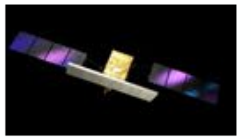

TerraSAR-X


RADARSAT


KOMPSAT-5


ALOS 1&2

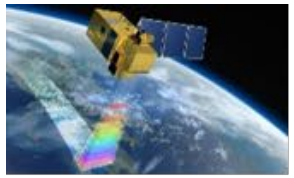

ICEYE


COSMO-SkyMed

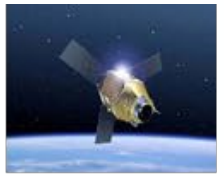
Main features:

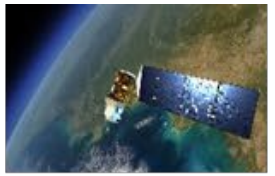
- ✓ Absolute calibration, Multilooking, Speckle filtering, Precise orbits handling
- ✓ Coregistration of detected and complex products
- ✓ Full support of Sentinel-1 TOPS interferometry, debursting, slice assembly
- ✓ Terrain Correction
- ✓ SAR simulation and Layover and shadow masks
- ✓ Applications: oil spill detection, ship detection, wind field estimation etc.
- ✓ Fully integrated and featured InSAR tools for Stripmap and Zero-Doppler focused data
- ✓ Compatibility with PolSARpro Toolbox (Reader, Writer)
- ✓ Integrated Export to SNAPHU (interferometric phase unwrapping) and STAMPS (PS InSAR)

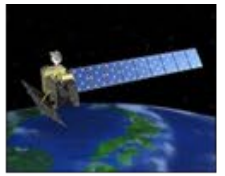
SNAP & Optical HR Functionality
(Sentinel-2 Toolbox)


Sentinel-2


SPOT


Pleiades


Landsat


ALOS AVNIR


RapidEye


Kompsat


Ikonos


Worldview

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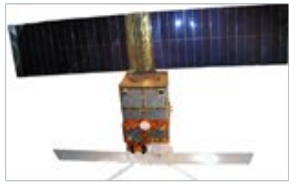
Main features:

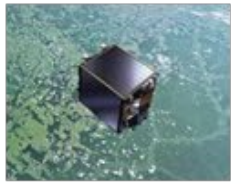
- **Sen2Cor** and **i-Cor** for Atmospheric Correction
- L2B **biophysical processor** (LAI, fAPAR, …)
- Reflectance to Radiance Processor
- **Radiometric Indices**
  - ✓ ***Vegetation indices:*** *DVI, RVI, PVI, IPVI, WDVI, TNDVI, GNDVI, GEMI, ARVI, NDI45, MTCI, MCARI, REIP, S2REP, IRECI, PSSRa*
  - ✓ ***Soil indices:*** *SAVI, TSAVI, MSAVI, MSAVI2, BI, BI2, RI, CI*
  - ✓ ***Water indices:*** *NDWI, NDWI2, MNDWI, NDPI, NDTI*
- **IdePix Processor:** pixel classification
- **OTB tools:** Pansharpening, Rasterization, Segmentation, …

SNAP & Optical/Thermal MR Functionality
(Sentinel-3 Toolbox)

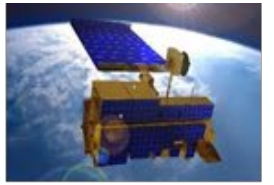

Sentinel-3


ENVISAT


ERS


Proba-V


SPOT VGT


MODIS


AVHRR


VIIRS

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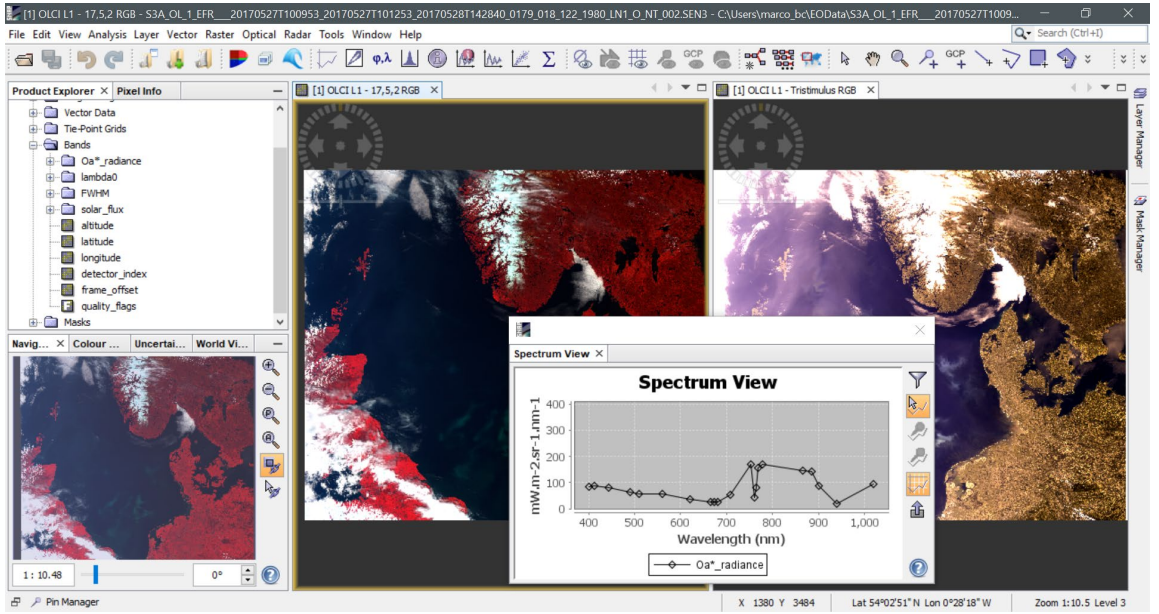
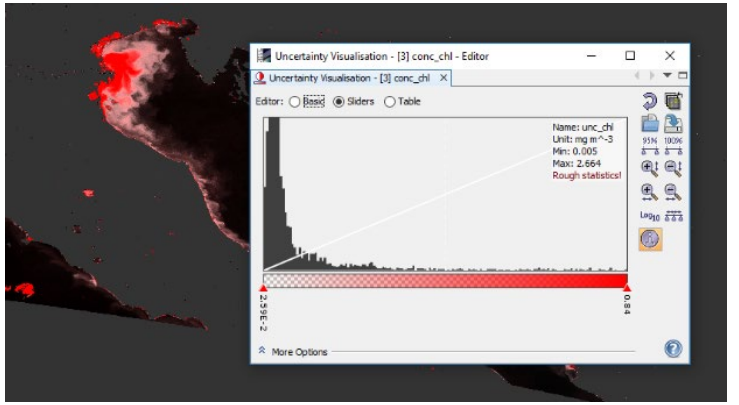
Main features:

- Visualizing spectrum of pixels
- **Uncertainty** visualization and propagation of uncertainty in BandMaths
- Pixel extraction tool
- Specific sensor processors:
  - ✓ *S3 OLCI Radiometry, S3 SLSTR PDU stitching*
  - ✓ *AATSR/SLSTR Regridding*
  - ✓ *Performs radiometric corrections on MERIS*
- Optical water type classification based on atmospherically corrected reflectances
- FU (Forel-Ule) Classification used to derive the hue angle and FU value
- **IdePix Processor:** pixel classification
- FLH (Fluorescence Line Height) / MCI (Maximum Chlorophyll Index) retrieval
- Case-2 C2RCC water processor
- MERIS FUB-CSIRO Coastal Water Processor

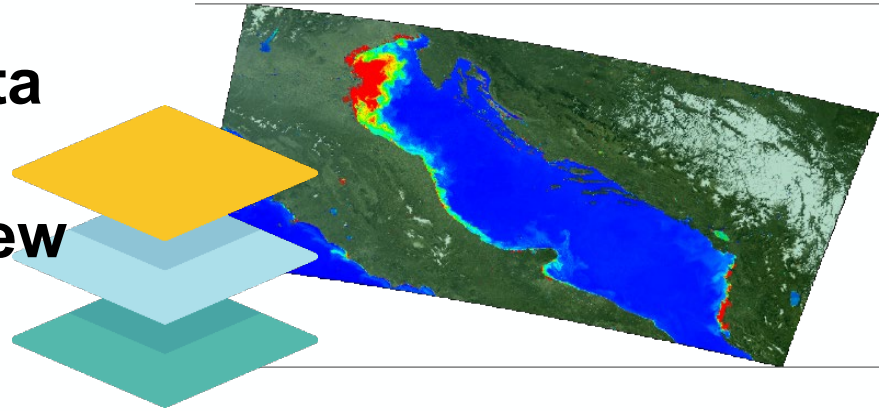
Using SNAP (on the Desktop)





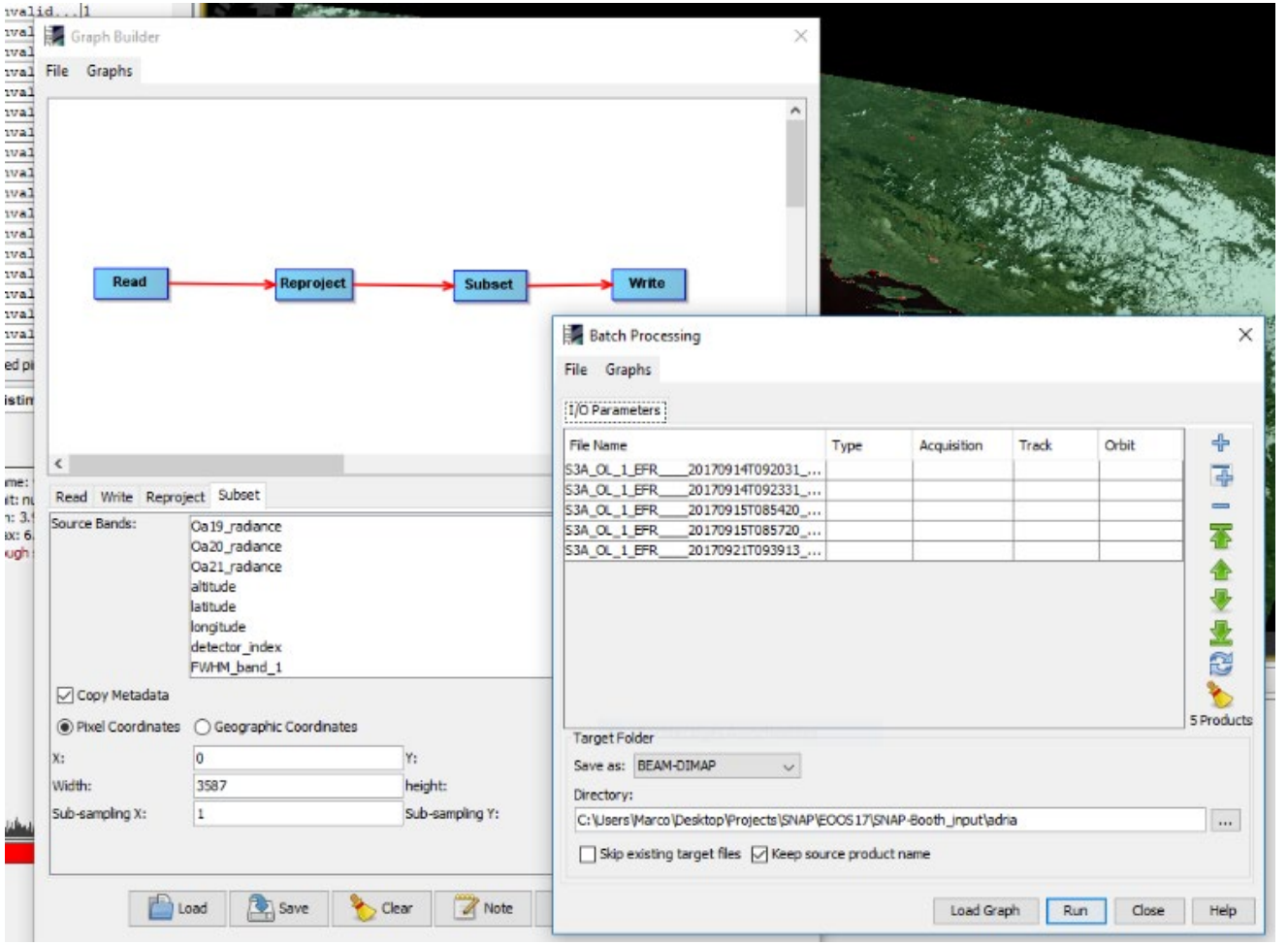
Display uncertainty information

Layer data sources in one view



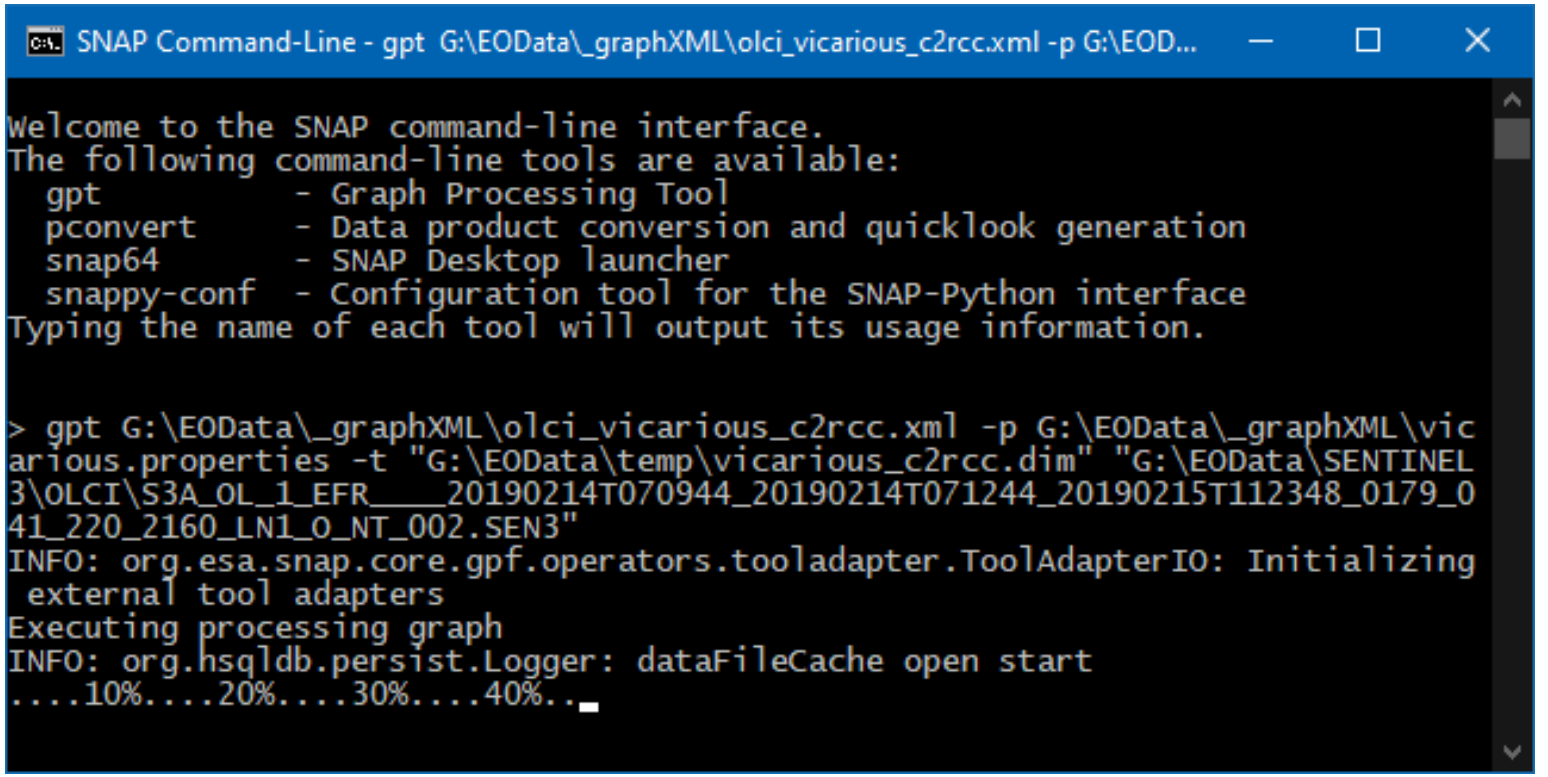
Fast visualisation by tiled image pyramids

Using SNAP (GUI processing)



Batch processing within the GUI

Using SNAP (CLI processing)



Powerful data processing via the Command Line Interface

Using SNAP (API usage for processing)

```
source = ProductIO.readProduct('G:/EoData/S3/S3A_OL_1_EFR____20200216T101647_..._2160_LN1_O_NT_002.SEN3')

parameters = HashMap()
parameters.put('salinity', 32)
parameters.put('temperature', 10.3)
parameters.put('outputAsRrs', True)
result1 = GPF.createProduct('c2rcc.olci', parameters, source)
parameters = HashMap()
parameters.put('crs', 'EPSG:4326')
result2 = GPF.createProduct('reproject', parameters, result1)

ProductIO.writeProduct(result2, 'G:/EoData/temp/S3A_OL_1_EFR____20200216T101647_C2RCC_WGS84.dim')
```

Use Java or Python to implement your own processing steps or to script the processing of your data

SNAP 9 features

SNAP features:

- Introducing new ZNAP data format
  Smaller footprint on disk, faster writing, and it uses a single file or directory; It is Zarr based and can easily be read with Python/Xarray
- Support for the high-resolution Copernicus DEM
- Improved Colour Manipulation Tool, e.g., auto-applied colour schemes based on band-name

S1TBX features:

- S1 ARD functionality enhanced with the addition of a Noise Power Image and Gamma-to-Sigma ratio image
- Support for SAR missions Cosmo-Skymed SG, Gaofen-3 and Spacety

S2TBX features:

- Added new plugins adapter for MAJA and Sen2Cor tools
- Added windowed reading of products in Graph Builder

S3TBX features:

- New pre-processing operators for Sentinel-3 data. The OLCI Anomaly Detection operator, and operator for harmonising OLCI A and B data
- OLCI L2 Land and Water products contain masks recommended by the QWG

Future

2022-2024:

- New functionality & support of new sensors
- Official Docker images
- Official Python-wrapper (snapista)
- Processing throughput improvements (optimisation of tile-processing)
- Full adoption of three-tier architecture
- Review of codebase & help + tutorials

Longer term evolution of SNAP 2024+ (ideas)

- SNAP as a cloud-service
- webSNAP in browser
- Language-agnostic processing-chains.

Thank you!

Download SNAP https://step.esa.int/main/toolboxes/snap/

STEP Discussion Forum https://forum.step.esa.int/

Please participate in SNAP User Survey!