



# Reflections on Open EO (Data)

A focus shift from data to services in global development

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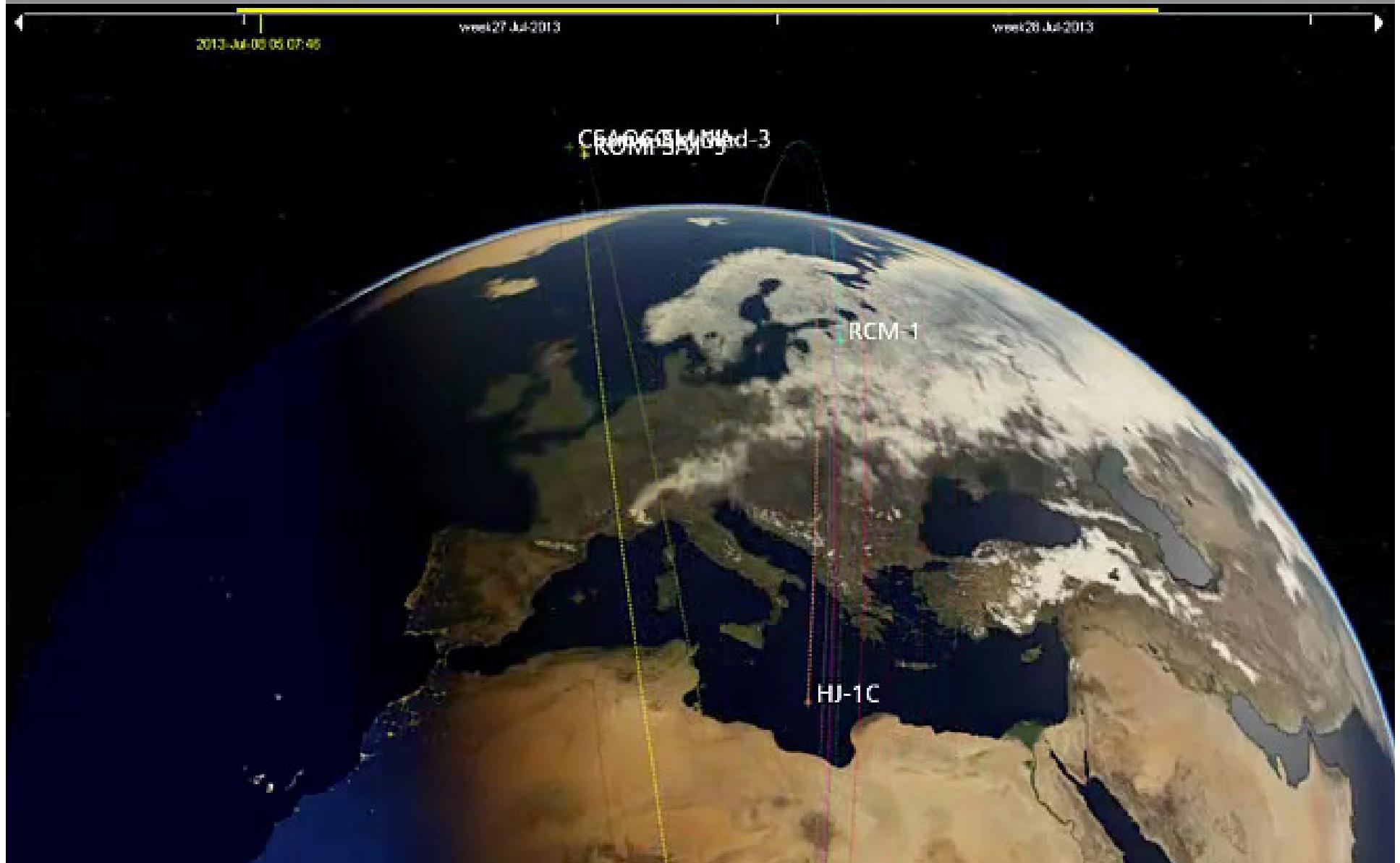
#SatSummit 2017 – Washington DC, 31 January 2017

*Panel: Open Data Roundtable*

[www.esa.int](http://www.esa.int)

# Observing our planet

[ Open Sky ]

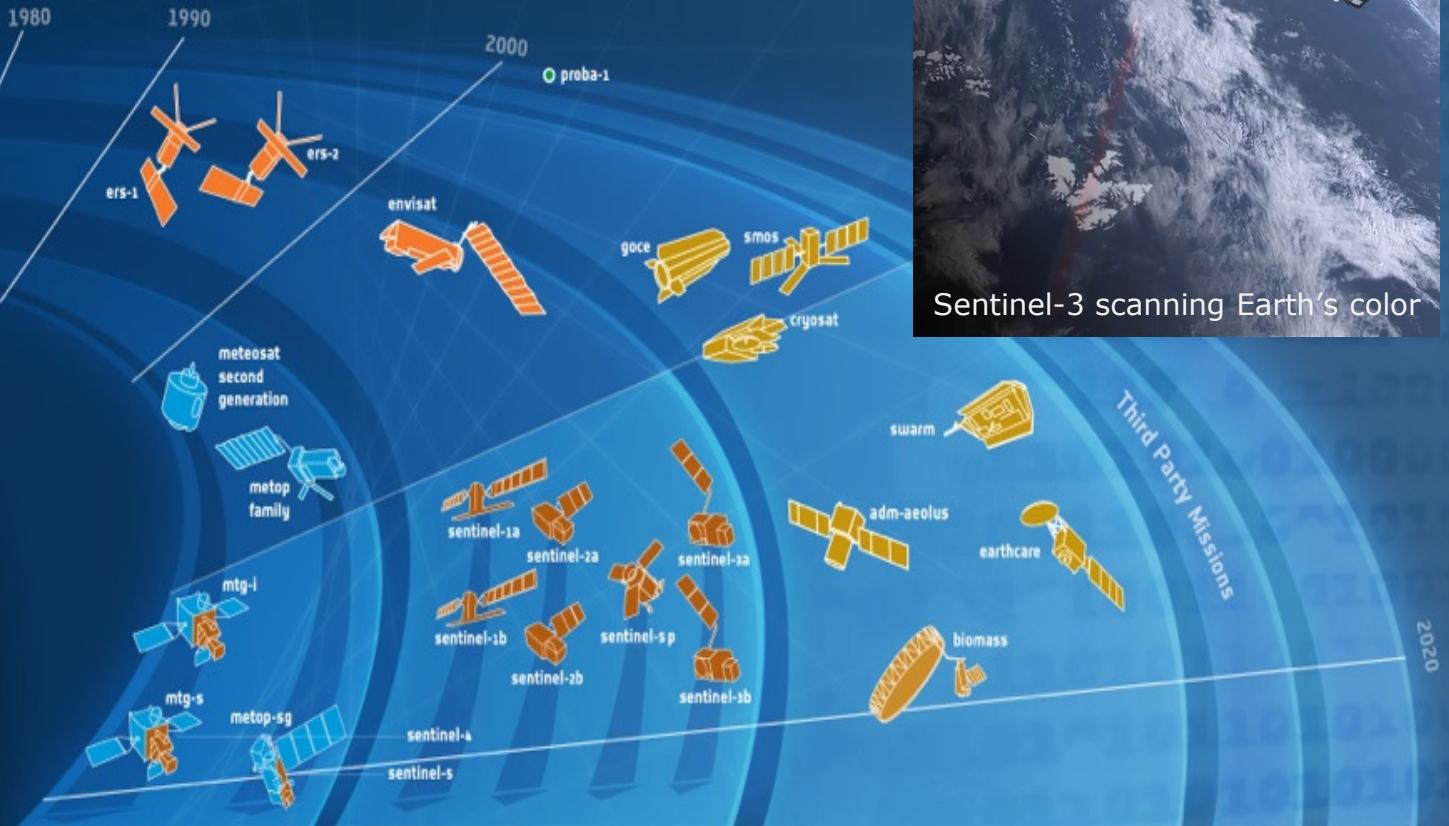


# → THE ESA EARTH OBSERVATION PROGRAMME



## The Sentinel Family

- S1A/B
- S2A/B
- S3A/B
- S4A/B
- S5P
- S5A/B/C
- S6 J-CS A/B



**Meteorological Missions**  
driven mainly by Weather forecasting and Climate monitoring needs. These missions developed in partnership with EUMETSAT include the Meteorological Operational satellite programme (MetOp), forming the space segment of EUMETSAT's Polar System (EPS), and the new generation of Geostationary Meteosat satellites (MS6 & MTG satellites).

**Copernicus Sentinel Missions** driven by Users needs to contribute to the European Global Monitoring of Environment & Security (GMES) initiative. These satellite missions developed in partnership with the EU include C-band imaging radar (Sentinel-1), high-resolution optical (Sentinel-2), optical and infrared radiometer (Sentinel-3) and atmospheric composition monitoring capability (Sentinel-4 & Sentinel-5 on board Met missions MTG and EPS-SG respectively).

**Earth Explorer Missions** driven by Scientific needs to advance our understanding of how the ocean, atmosphere, hydrosphere, cryosphere and Earth's interior operate and interact as part of an interconnected system. These Research missions, exploiting Europe's excellence in technological innovation, pave the way towards new development of future EO applications.

Missions With Partners

EOP Operated Missions

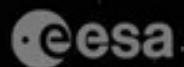
Long-term (decadal) continuous, consistent data



Flavio Sabattini, Lupacchino school, Frascati, Sentinel School Contest (c) 2015

European Space Agency

# Space & Time: An EO paradigm shift



0 days 00 hours 00 minutes  
Sentinel-2 constellation:  
summer solstice

# Towards efficient data access



**Copernicus** **Sentinels Scientific Data Hub**

### Welcome to the Sentinels Scientific/Other use Data Hub

The [Sentinels](#) Scientific Data Hub provides complete, free and open access to [Sentinel-1](#) and [Sentinel-2](#) user products, starting from the In-Orbit Commissioning Review (IOCR).

[Scientific Hub](#)

[API Hub](#)

[S-3 PreOpsHub](#)

[User Guide](#)

[Roadmap](#)

### Statistics

 <b>6273</b> products published in the last 24h (S1 + S2 + S3)	 <b>52000</b> products downloaded in the last 24h (SciHub + API Hub + S3 PreOps)	 <b>201</b> queries responded in the last 24h (SciHub + API Hub + S3 PreOps) <small>Data updated hourly</small>
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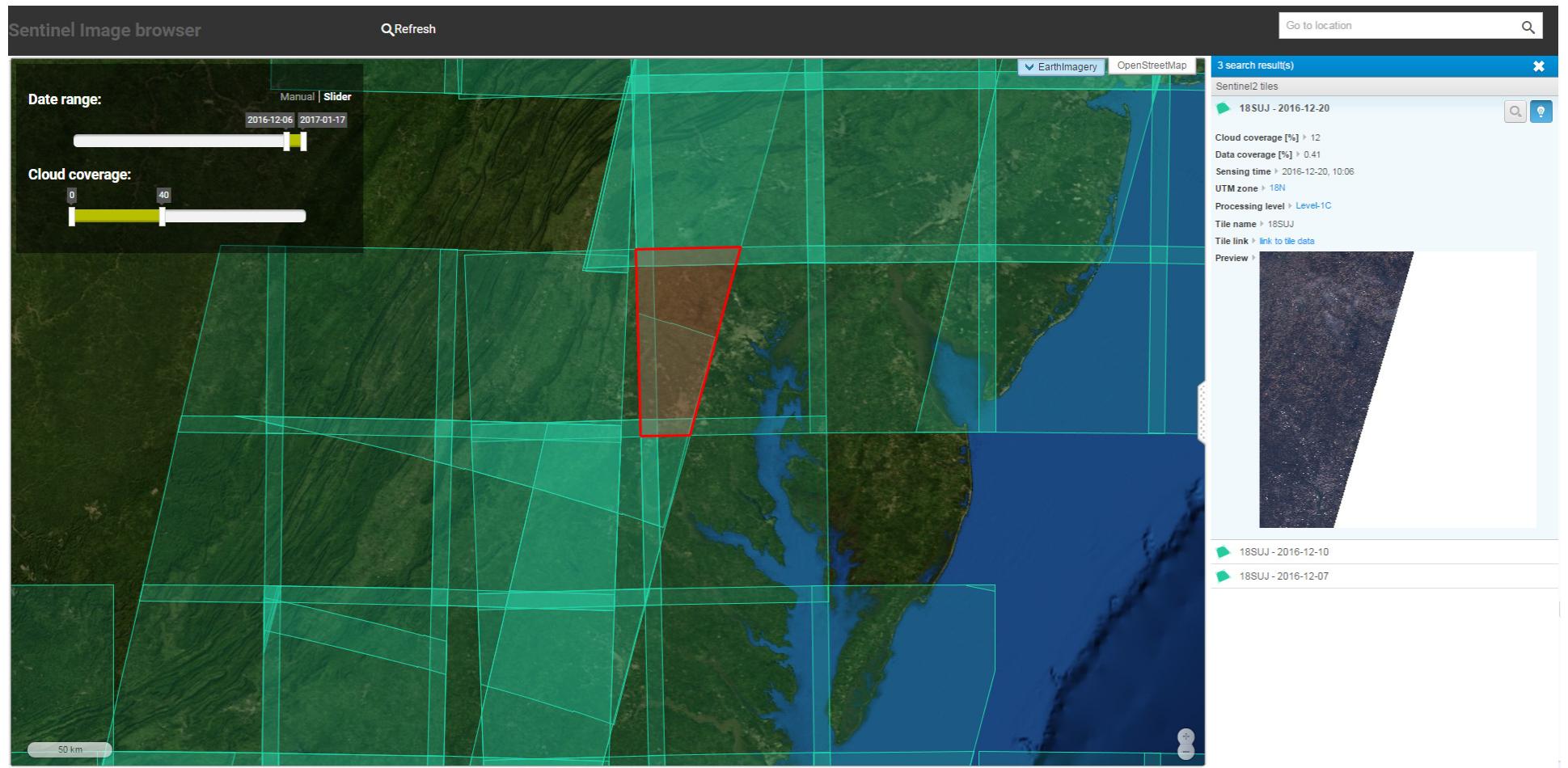
ESA UNCLASSIFIED – For Official Use

European Space Agency

# Towards efficient data access



Preview of Sentinel-2 imagery ([Sentinel Image browser](#)) for access via AWS



# Towards efficient data access



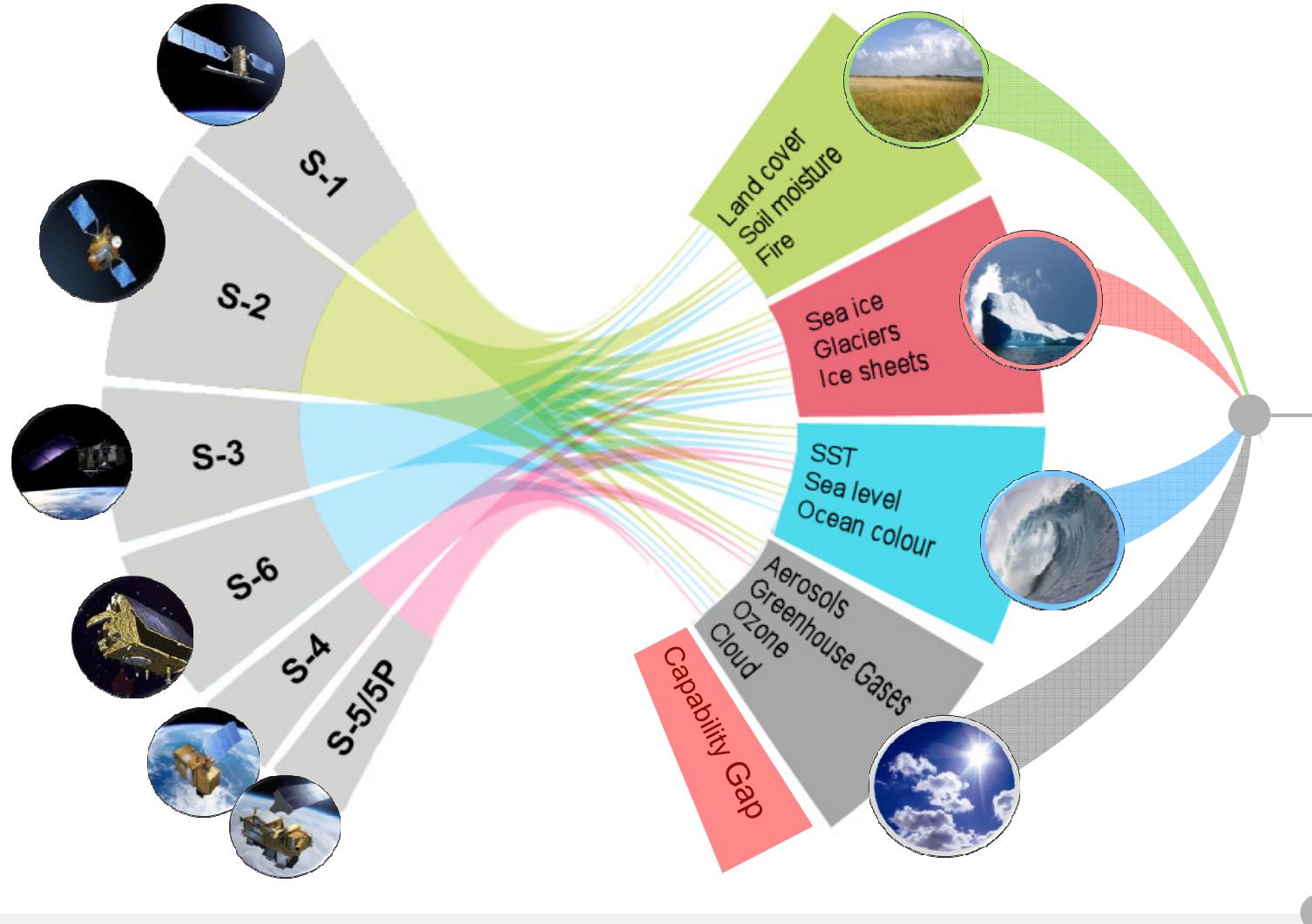
[www.geoportal.org](http://www.geoportal.org)

The screenshot shows the GEOSS Portal interface. At the top left is the GEO Group on Earth Observations logo. The main header reads "GEOSS Portal". On the right are links for "Send Feedback" and "Terms & Conditions". The central part of the screen displays a satellite map of Europe with a zoomed-in view of the Netherlands. A search bar at the top left contains the text "sentinel 2a". Below it, the search results are listed:

- Sentinel2A\_20160616\_Yamal**  
[Organization: ArcGIS Online ESRI]  
Sentinel 2A image of Yamal coastal zone. Image acquired at 16-6-2016. The image in this web mapping application consists of four 10 meter spectral bands [B, G, R and NIR]. Presentation in false colour (NIR-R-G-R-G-B).
- Sentinel2A\_Netherlands\_wm**  
[Organization: ArcGIS Online ESRI]  
Sentinel2A mosaic of The Netherlands. Composed of S2A acquisition dates 1 May 2016 (western part) and 8 May 2016 (eastern part). Within country border: natural colour combination of S2A spectral bands 4,3,2 (R,G,B). Outside country border: black&white presentation of near infr ...

At the bottom of the search results, it says "Visible 1-4 of 4". The interface includes various buttons for filtering, sorting, and interacting with the data.

# From data to products to services



Monitoring

Prediction

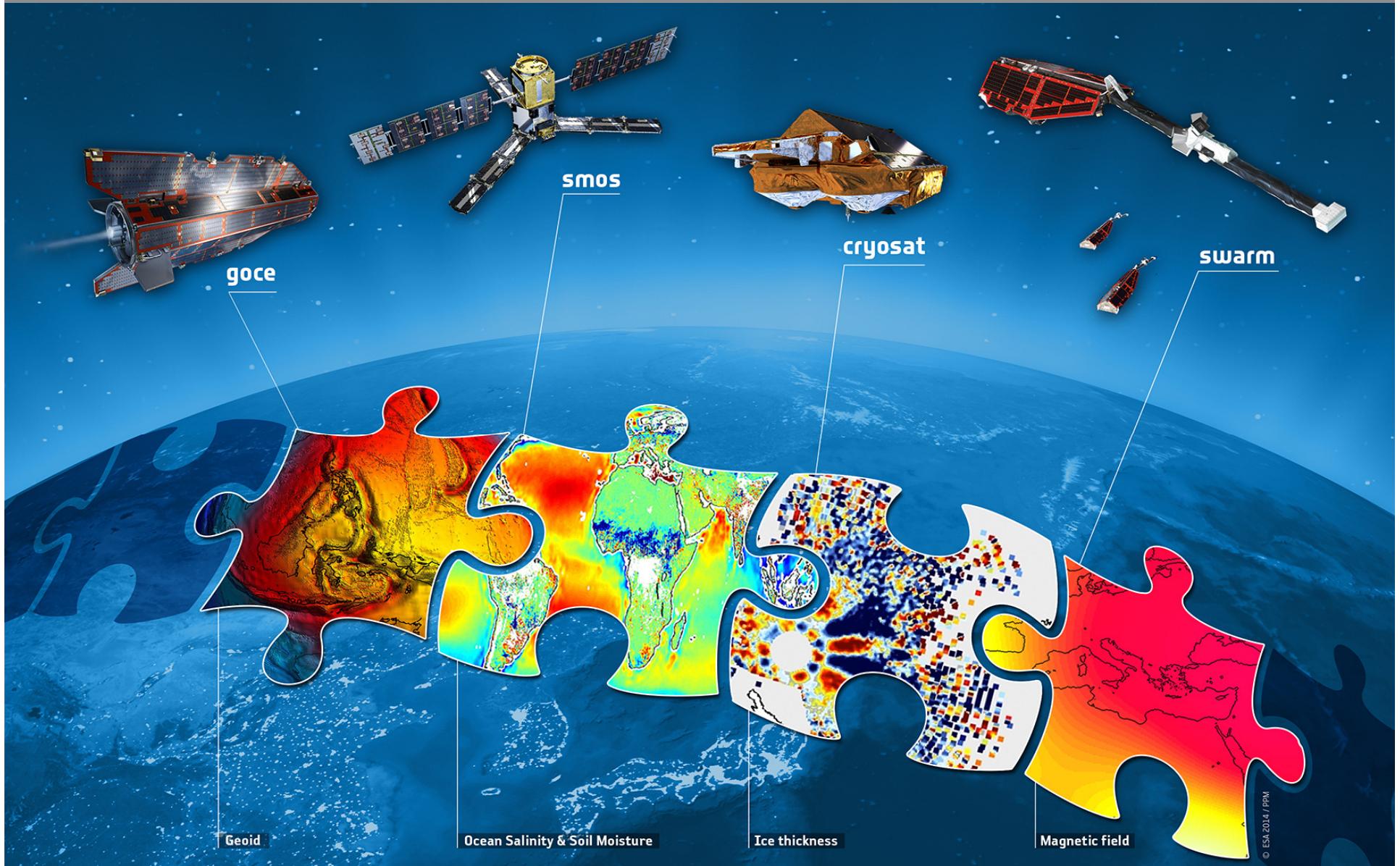
Projection

Re-analysis

Informing Decision

Understanding

# From data to products to services



# Towards efficient data/product access



**climate change initiative**  
open data portal

esa

# Towards efficient data exploitation



geohazards-tep.eo.esa.int

[Sign in](#)



[Register](#)



[Contact](#)

CEOS GEO



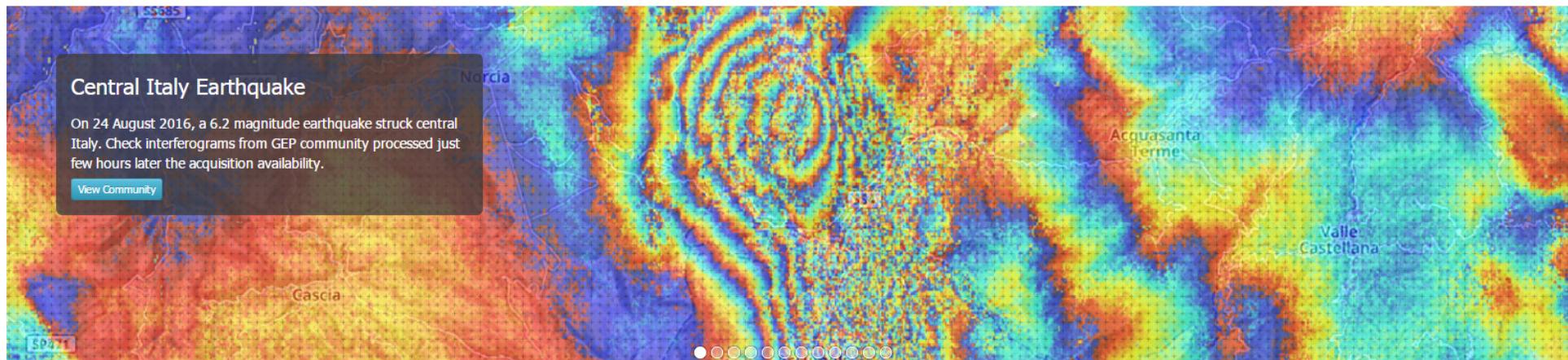
[Home](#)

[Observations & Measurements](#)

[Information Processing](#)

[Community](#)

[EO sector Collaboration](#)



Background



Geo Browser



Activities

# Towards efficient data exploitation



The screenshot shows the geohazards portal interface. At the top, there's a search bar with 'Search Terms' and a 'Geo Filter X' button. The main area displays a map of Europe and North Africa with several green and yellow circular markers indicating specific locations or events. A legend at the bottom left shows two dates: 2002-08-26 and 2012-04-08. Below the map, there are sections for 'Features Basket' and 'Data Packages', both currently showing 'No results found.' On the right side, there's a grid of service icons and their names:

- NEST ToolBox
- PF-ERG
- SISAS SIA
- BRGM Digital Elevation Ma...
- ADORE DORIS interferome...
- Repeat Orbit Interferometr...
- StaMPS Permanent Scatterer...
- GMTSAR Interferometric pr...
- SISAS MTA
- DIAPASON INSAR - StripMap(SM)
- DIAPASON HSAR Sentinel...

Below the service icons, there's a detailed description of the DIAPASON INSAR - StripMap(SM) service:

**DIAPASON INSAR - StripMap(SM)**  
DIAPASON is an InSAR tool suite developed by the French Space Agency (CNES) and maintained by ALTIMETRA. INFORMATION: This service performs an InSAR workflow on ENVISAT/ERS-1/2 and SLC or Sentinel-1 (SLC) stripmap data, producing interferograms, amplitude and coherence maps. To run this service, specify a master and a slave image of the same mission.

# Towards efficient data exploitation



**step**  
science toolbox exploitation platform

ESA STEP TOOLBOXES DOWNLOAD GALLERY DOCUMENTATION COMMUNITY THIRD PARTY PLUGINS

SNAP Sentinel 1 Toolbox Sentinel 2 Toolbox Sentinel-3 Toolbox SMOS Toolbox Download Community Useful Links

Search...

Home > Scientific Toolbox Exploitation Platform

## multimission scientific toolboxes

ESA is developing free open source toolboxes for the scientific exploitation of Earth Observation missions under the the Scientific Exploitation of Operational Missions (SEOM) programme element. STEP is the ESA community platform for accessing the software and its documentation, communicating with the developers, dialoguing within the science community, promoting results and achievements as well as providing tutorials and material for training scientists using the Toolboxes.

The ESA toolboxes support the scientific exploitation for the ERS-ENVISAT missions, the Sentinels 1/2/3 missions and a range of National and Third Party missions. The three toolboxes are called respectively Sentinel 1, 2 and 3 Toolboxes and share a common architecture called SNAP. They contain some functionalities of historical toolboxes such as BEAM, NEST and Orfeo Toolbox that were developed over the last years.

SNAP SURVEY

SNAP Features Documentation Download Developers Tutorials Gallery Community Blog

seom  
scientific exploitation of operational missions

2017

ESA POLInSAR 2017 Workshop

2016

Colour and Light in the Ocean from Earth Observation

EO OPEN SCIENCE 2016 Conference

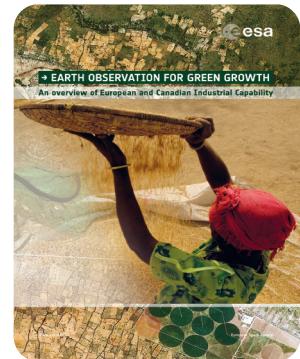
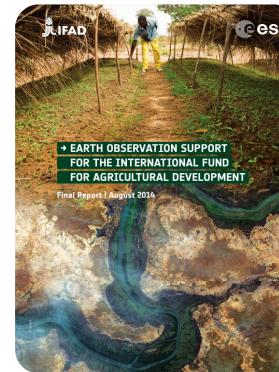
EARTH OBSERVATION SUMMER SCHOOL Earth System Monitoring & Modeling seom

*"Open source toolbox development for scientific exploitation of EO missions"*

# Promoting data literacy and use in international development



- 65 small-scale demonstrations of EO services in support of IFI projects since 2008



THE WORLD BANK  
Working for a 'World Free of Poverty'

A BOUT DATA RESEARCH LEARNING NEWS PROJECTS & OPERATIONS PUBLICATIONS COUNTRIES TOPICS

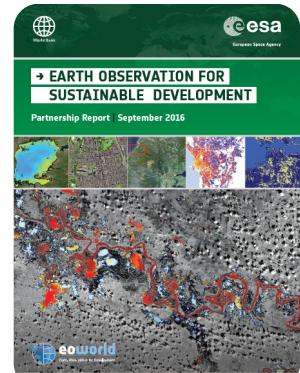
TECHNOLOGY Satellite Data Informs Development

A World Bank Group partnership with the European Space Agency is using satellites to gather a wide variety of information about climate change, water quality, coastal erosion, flooding, urban growth, and more. It has been particularly useful in conflict zones, where data can be difficult to gather.

[Satellite Success Stories](#) | [Website](#)

• • • •

ESA UNCLASSIFIED COMMUNITY SLIDE 13



# Promoting data literacy and use in international development



- 65 small-scale demonstrators using EO services in support of UN projects since 2008



## → EO OPEN SCIENCE 2016

12–16 September 2016 | Esa-Esrin  
Frascati (Rome) Italy

# EO Open Science



The collage is divided into three columns representing 'DAY 1', 'DAY 2', and 'DAY 3'. Each column contains two images.

- DAY 1:**
  - Top image: A logo for 'sentinel data hub' featuring a blue globe icon and text 'sentinel data hub'.
  - Bottom image: A graphic showing four blue rectangles labeled 'SNAP', 'S-1 SNAP', 'S-2 SNAP', and 'S-3 SNAP'.
- DAY 2:**
  - Top image: Three people outdoors holding small objects up towards a satellite dish antenna.
  - Bottom image: A complex, colorful 3D visualization of a virtual research environment.
- DAY 3:**
  - Top image: A person wearing a dark t-shirt with the text '#lucatuetus' and a lanyard with a Twitter logo, looking at a smartphone.
  - Bottom image: Several people working at desks in an office setting, likely a control room or educational facility.

**OPEN DATA & TOOLS** (Day 1)

**CITIZEN SCIENCE** (Day 2)

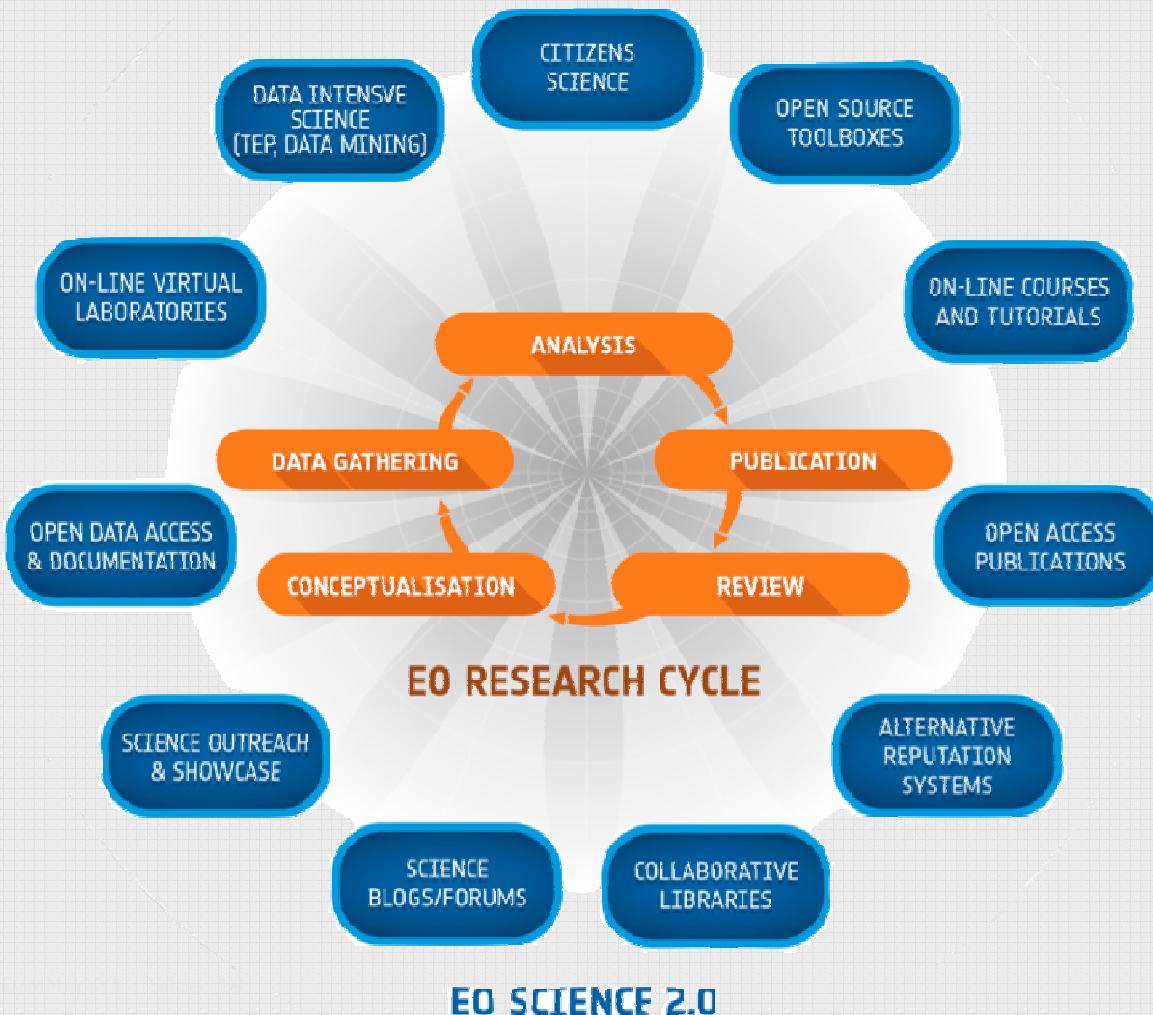
**COMMUNICATION & VISUALISATION** (Day 3)

**OPEN EO INNOVATION** (Day 1)

**VIRTUAL RESEARCH ENVIRONMENT** (Day 2)

**EDUCATION** (Day 3)

## OPENING UP THE EO RESEARCH PROCESS





## **Earth Observation: A Necessity**

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ESA/ESRIN – World Bank



## Sat-puccino

*The Future is here, it is just not evenly distributed.  
William Gibson*