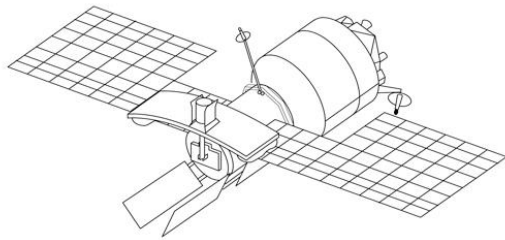


BEYOND Center The Ground Segment & The Hellenic Mirror Site Initiative



- **Dr Haris KONTOES**
- National Observatory of Athens

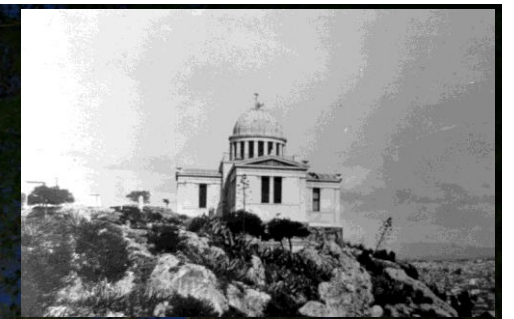
BE  OND

www.beyond-eocenter.eu





The 1st Collaborative Ground Segment (Mirror Site) for Sentinel satellite missions was signed between ESA and NOA on 12 May 2014



Activity in the framework of the
COPERNICUS PROGRAM
The **EUROPEAN EARTH OBSERVATION FLAGSHIP PROGRAM (EU/ESA)**
<http://www.copernicus.eu/>





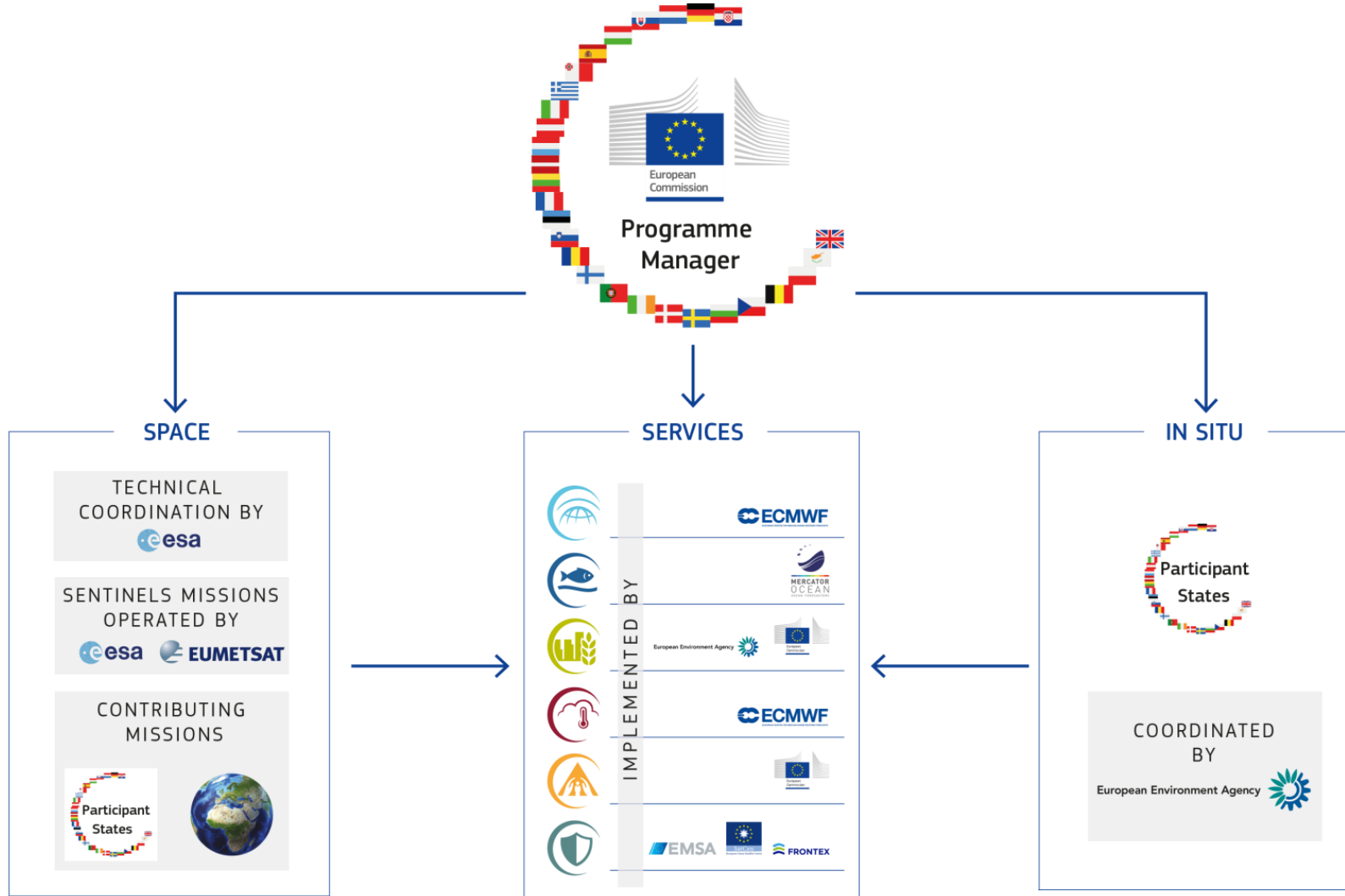
OFFICIAL ANNOUNCEMENT OF
HELLENIC MIRROR SITE
ATHENS: 28 MARCH – 5 APRIL

LINK:
[HTTP://SENTINELS.SPACE.NOA.GR](http://sentinels.space.noa.gr)

C O P E R N I C U S I N B R I E F

- **Copernicus, a flagship programme** of the European Union:
 - Monitors **the Earth**, its environment and ecosystems
 - Prepares for **crises, security risks** and **natural or man-made disasters**
 - Contributes to the **EU's role as a global soft power**
- Adopts a **full, free and open data policy**
- Is a tool for **economic development** and a driver for the **digital economy**

COPERNICUS GOVERNANCE



COPERNICUS IS DRIVEN BY THE USERS

User Requirements: Strategic, Technical, Operational

Copernicus
space and *in situ* data

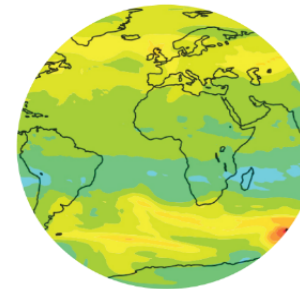
Copernicus
Services

Downstream Services
"Copernicus Economy"

User
Uptake

YOU
ARE
HERE

Users



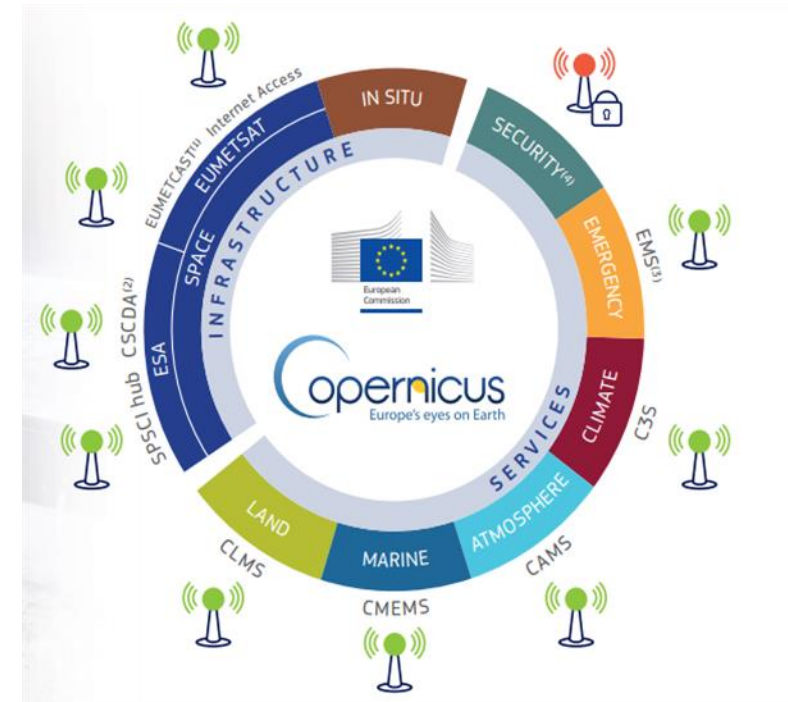
Data sources

Service Information

Value Added Services and Applications

Copernicus Data Access Overview

- 10 European Data Access points:
 - 4 for Satellite Data
 - 6 for Services Data and Information
- Satellite data =
 - Access to images in NRT
 - Access to archives
- Services Data and Information=
 - Added value products, indicators
 - Models
 - Archives, Near Real Time and Forecasts products



Access to Satellite Data

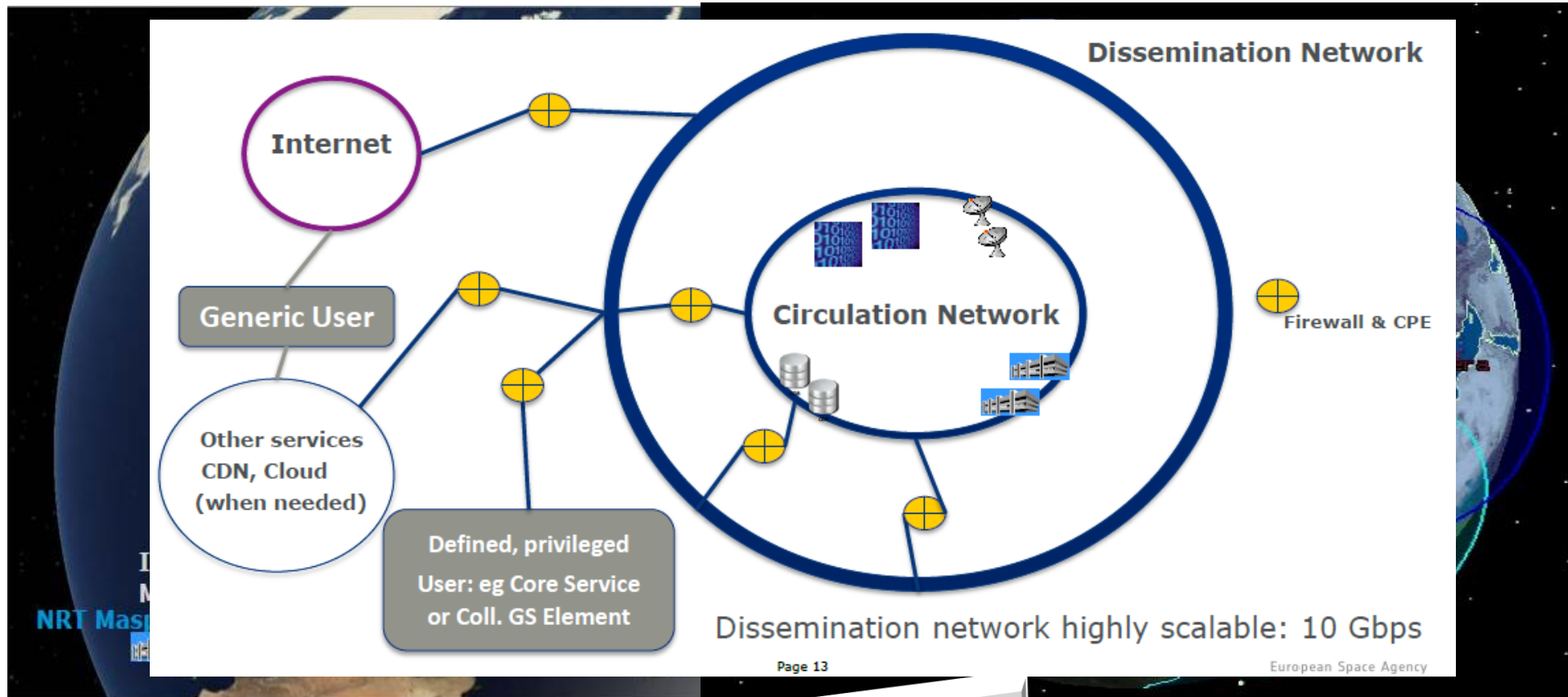
- 4 data access points:
- 2 managed by ESA:
 - Scientific Data Hub (SCI Hub)
 - Copernicus Space Component Data Access (CSCDA)
- 2 managed by EUMETSAT
 - EUMETCast
 - Copernicus Online Data Access (CODA)

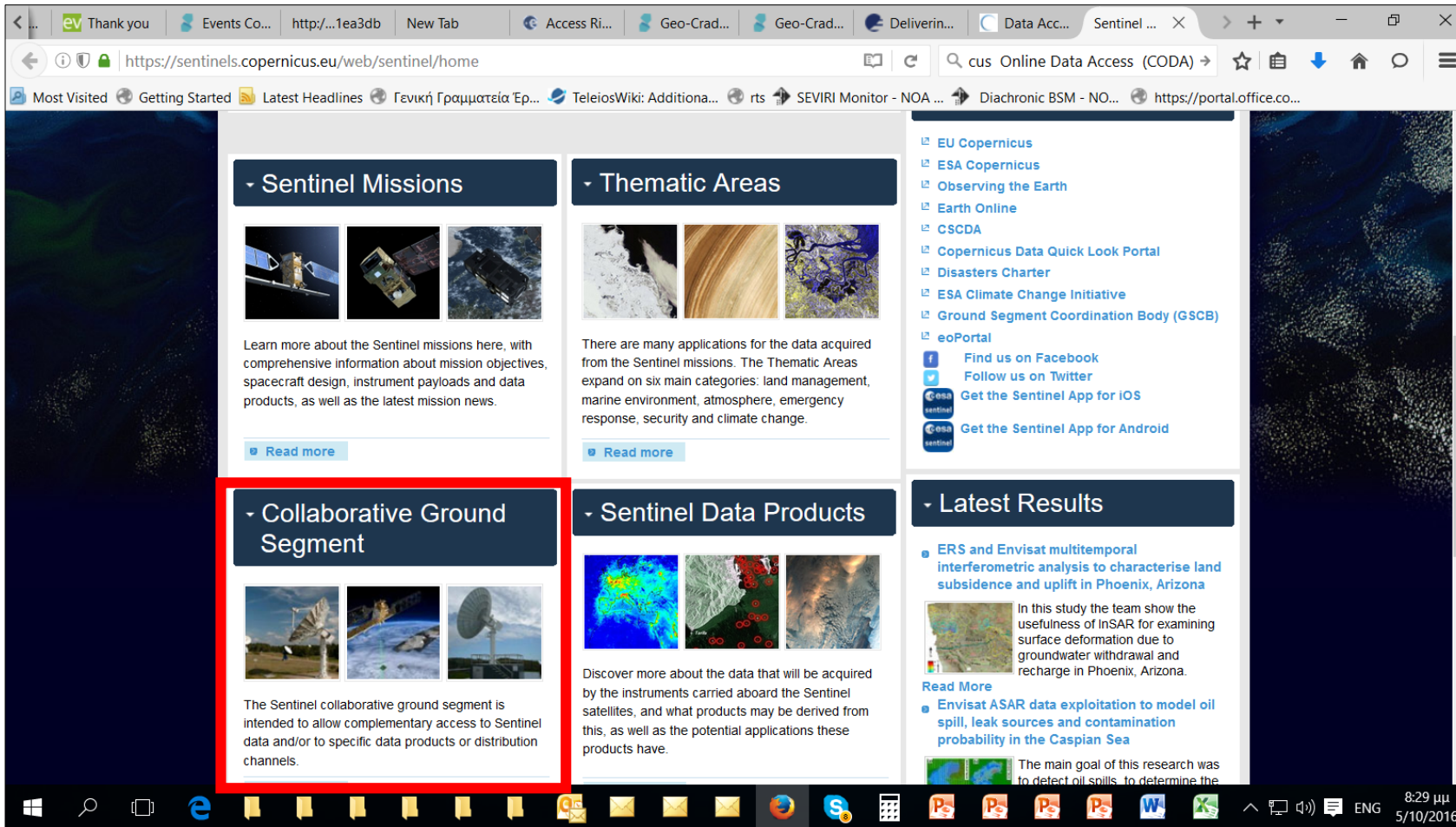


OTHER DATA ACCESS PUBLIC INITIATIVES

National Initiatives- Collaborative Ground Segment		
Initiative Name	Initiative Leader	Website and Target User Group
THEIA Land Data Centre	CEA, Cerema, IRSTEA, IRD, CNRS, INRA, IGN, Meteo France, CIRAD, ONERA	<ul style="list-style-type: none"> • URL: theia-land.fr • Scientific communities and public authorities
NOA Hellenic National Sentinel Data Mirror Site	NOA, IAASARS	<ul style="list-style-type: none"> • URL: sentinels.space.noa.gr • Scientific communities, public authorities, private industry players
CATAPULT Satellite Applications and CEDA	UK Space Agency	<ul style="list-style-type: none"> • URL: sa.catapult.org.uk • Scientific communities, public authorities, private industry players
ESA Thematic Exploitation Platforms	ESA	<ul style="list-style-type: none"> • URL: tep.eo.esa.int • All user types
Platform for Exploiting Products from Sentinels (PEPS1)	CNES	<ul style="list-style-type: none"> • URL: peps.cnes.fr • Scientific communities and public authorities

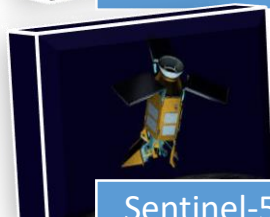
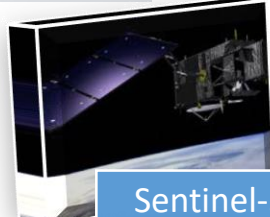
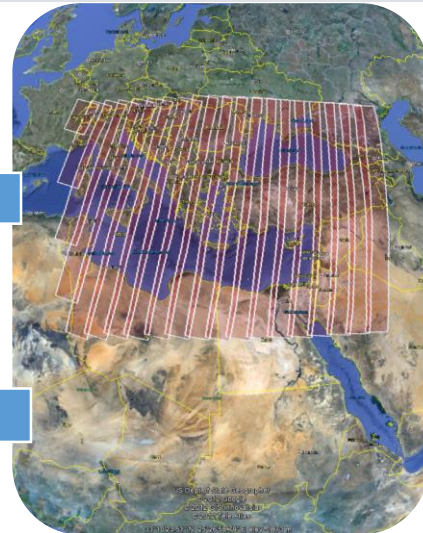
- a **GSC Core Ground Segment**, with **GSC-funded Functions and Elements**, providing :
 - the primary access to Sentinel Missions data as well as
 - the coordinating access functions to Contributing Missions data



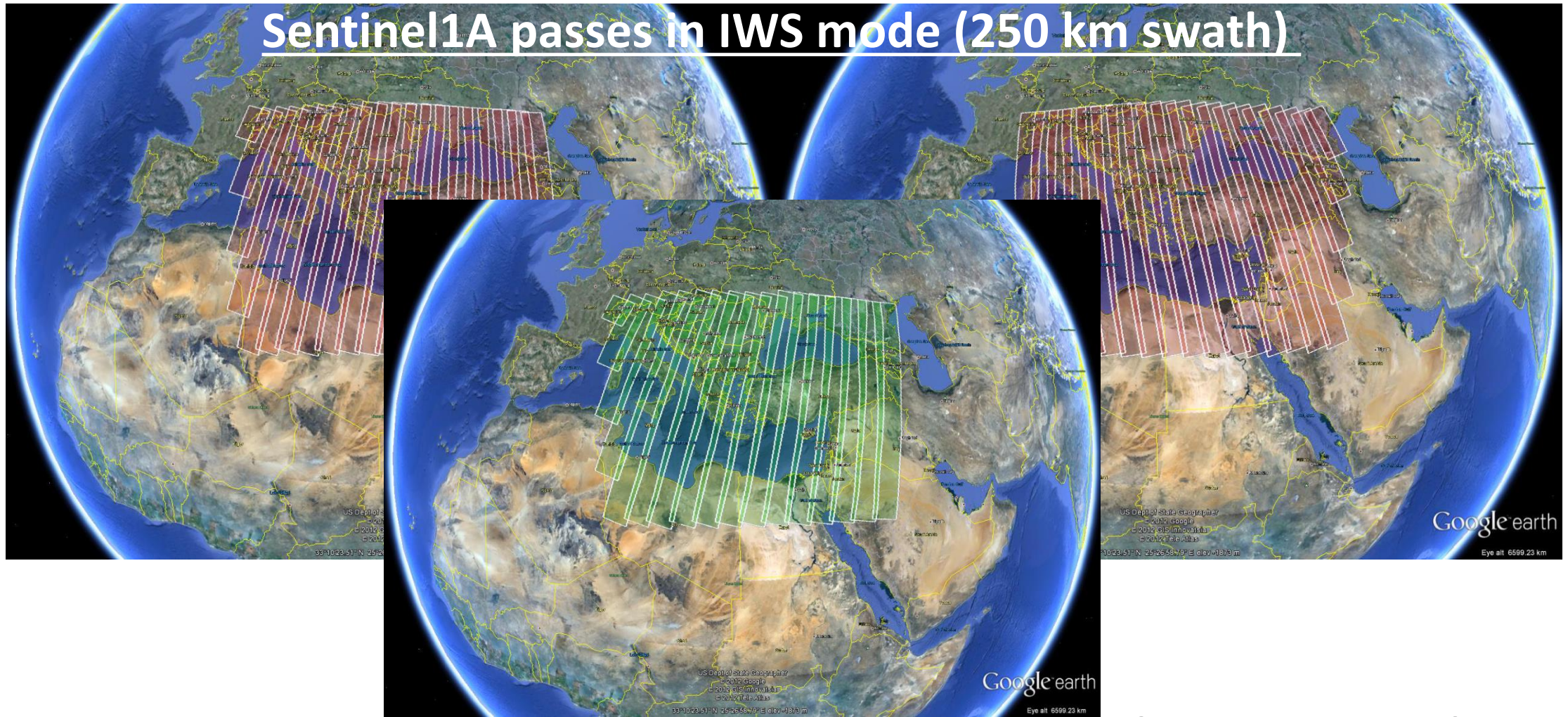


- Built up an additional pick up point (**Mirror Site**) of Sentinel data at the premises of the **National Observatory of Athens (NOA)** in collaboration with the **Greek Research and Technology Network GRNET S.A.** the Greek Partner of the GEANT network.
- Disseminate Sentinel data and higher level Copernicus products to the End User & Scientific communities mainly at national level, but also to neighboring South Eastern Mediterranean and Balkan countries on the basis of the existing and/or future transnational needs and cooperations.
- The whole project is in line with the ongoing initiatives and strategic objectives for building at NOA a Center of Excellence for EO based monitoring of the Environment and Natural Disasters and processing of Space Data.

Operate the 1st Collaborative Ground Segment
(Hellenic Sentinel Data Hub- Mirror Site),
allowing near real time acquisition of S-1, S-2,
S3, and future S5P satellite missions



<http://Sentinels.space.noa.gr>



Sentinel1A passes in IWS mode (250 km swath)

Sentinel2A ascending passes in IWS mode (250 km swath)



ESA Has Developed A Prototype Software, The Data Hub System (Dhus), with the scope to:

Sentinel Online

- Allow Collaborative Partners To Centrally Access Sentinel Data Through A Dedicated Hub

Noa → Esa's Collaborative Partner For The Use Of Dhus Software



- At NOA/GRNET Level:
- Computational Infrastructure Facilities For Downloading And Storing Sentinel Data



- A Complete Set Of Software Tools For The Systematic Data Download And Organized Storage, As Well As Distribution Of Data Via A Web Interface



- Archiving Infrastructure Facilities For Physical Storage Of Sentinel Data

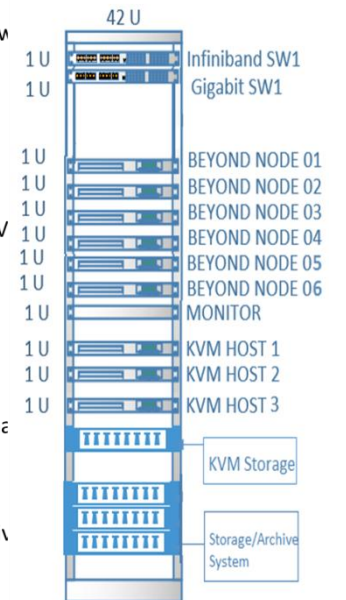


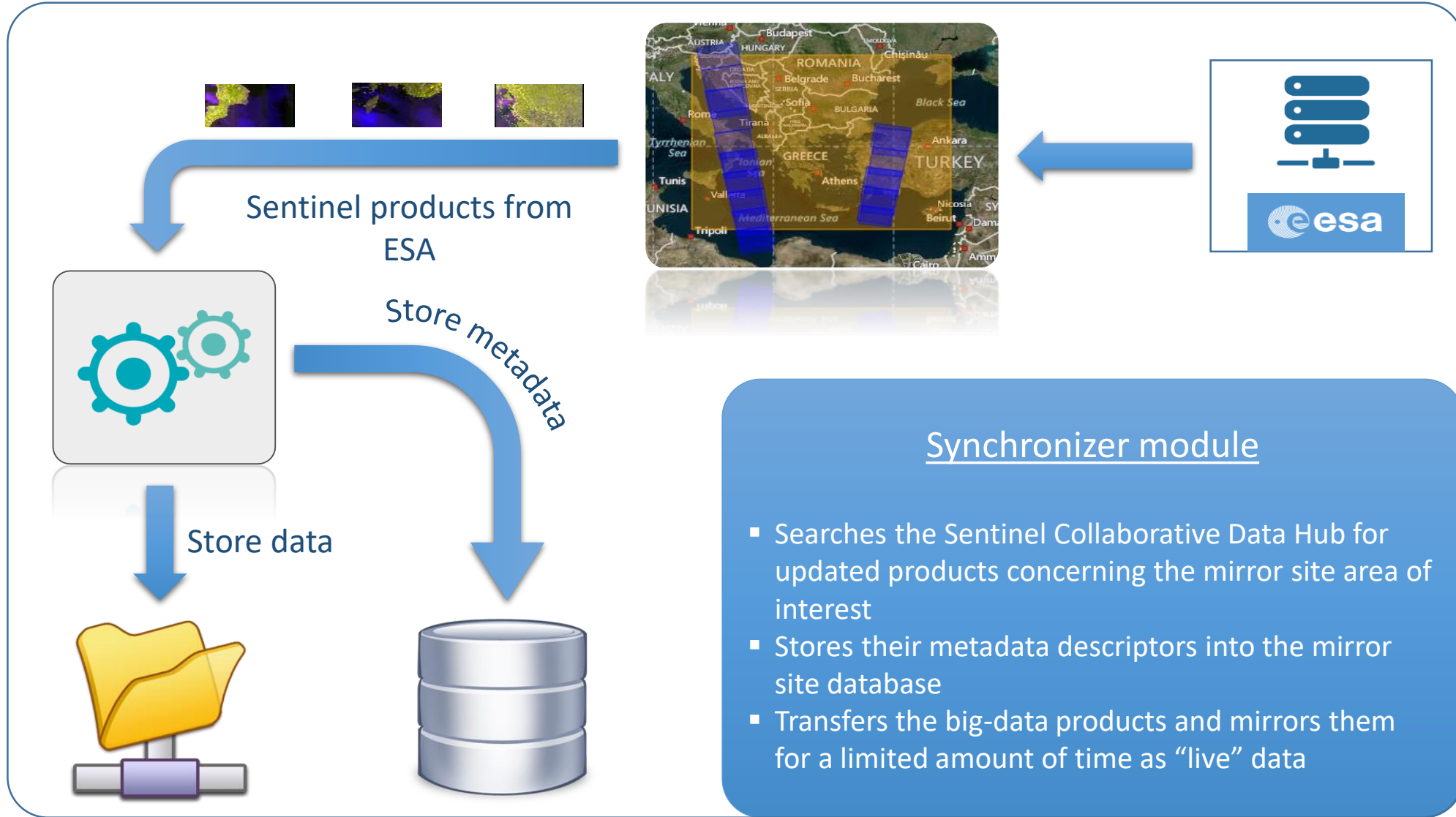
- Highspeed Optical Links Are Used To Connect Esa's Data Center(s), With Noa's Mirror Site Computational Infrastructure
- A Set Of Virtual Machines (Vms), Are Set In Full Operation



IAASARS has empowered it's computational infrastructure with high-performance server hardware

- BEYOND NODES 01-06:
 - Model: Dell PowerEdge R620 servers
 - CPU: 2x Xeon 8 Core
 - RAM: 64GB
 - OS: Centos 6.6 Minimal
- PowerVault MD3400, 12G SAS, 2U-12 drive (KVM Storage for the KVM Virtualization Servers)
- 3 KVM Virtualization Servers
 - Model: Dell PowerEdge R815
 - CPU: 2x AMD Opteron 6128
 - RAM: 512GB
 - OS: RHEL 6.0 64-bit (Dell pre-installed image)
- Storage & Archive System
 - PowerEdge R430 Server
 - PowerVault MD3460, 12G SAS, 4U-60 drive dense array with a capacity of **100 TB**.





Downloader module

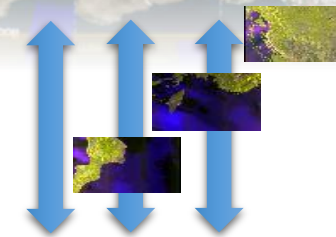
- Gathers the Mirror Site user requests posed through the GUI in the form of orders (i.e. collections of products).
- Concurrently downloads products that are not lying in the local storage.
- Informs users for the availability of the big data products in order to download them via the Mirror Site facilities and its Web GUI.



Concurrently
store data



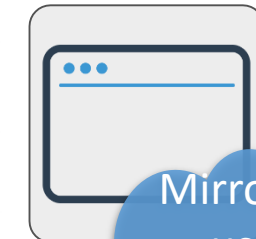
Concurrently
update
metadata



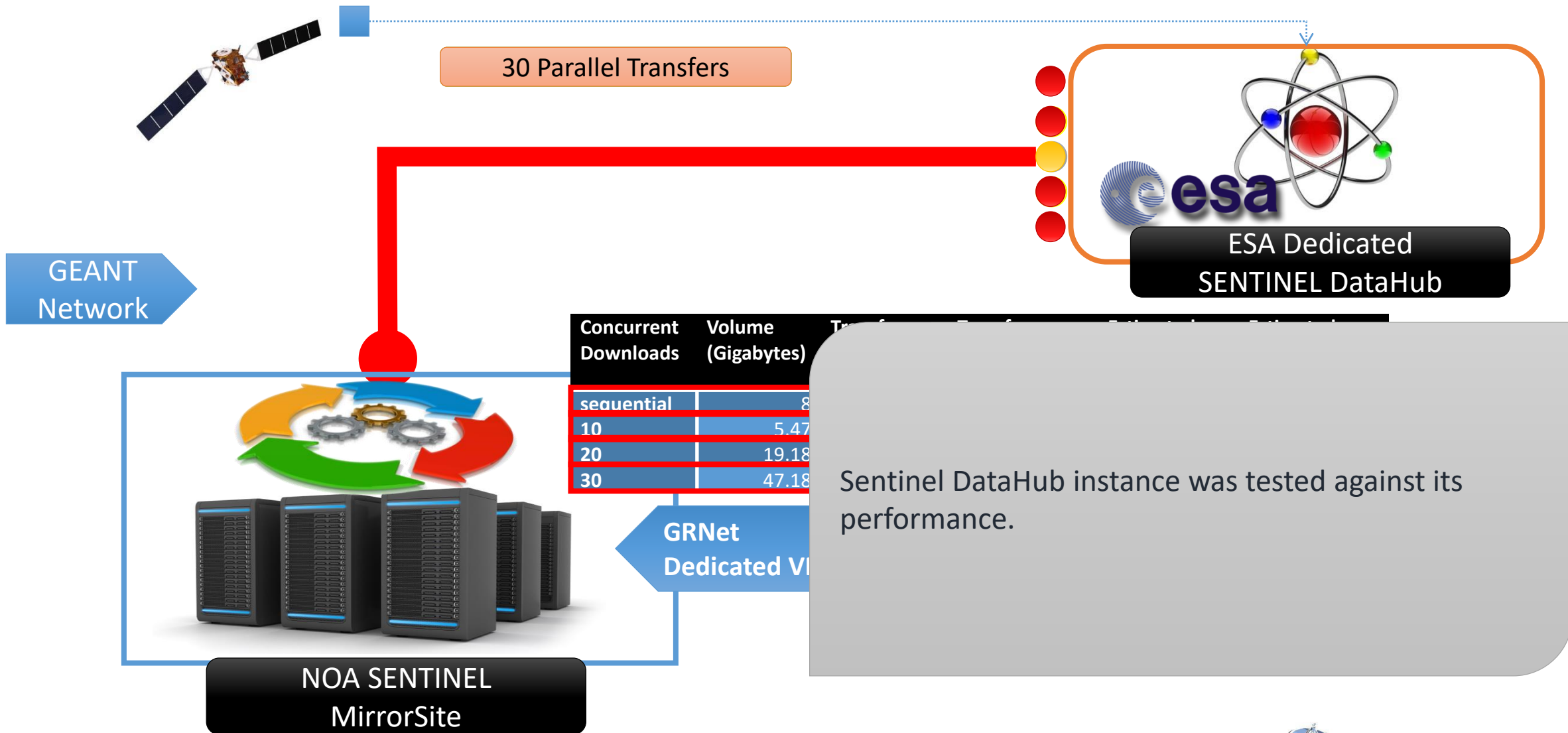
Concurrent download
of Sentinel products
from ESA



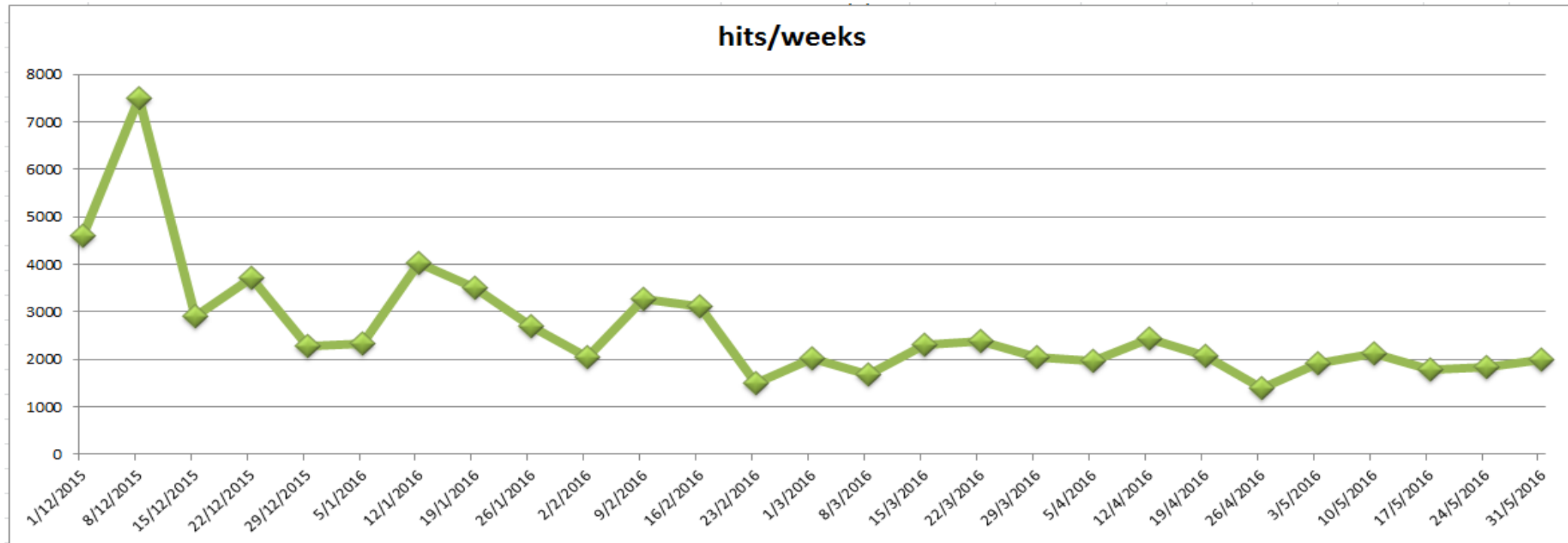
Requests of users
for Sentinel
products



Mirror site
users
interacting
with the
GUI



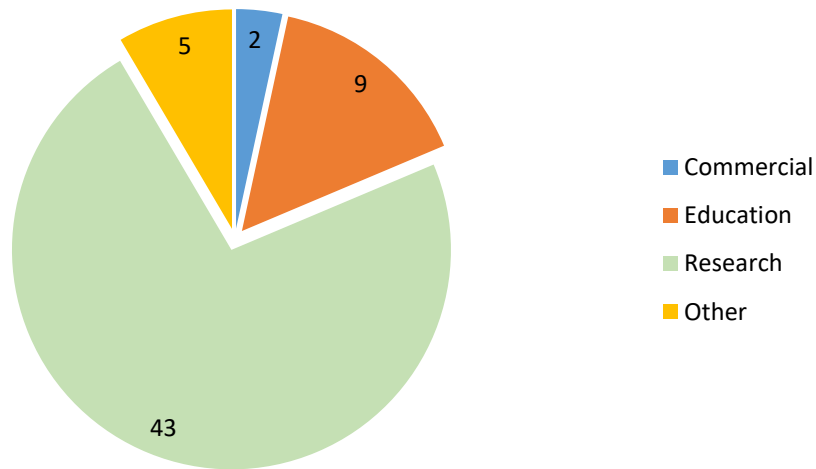
- **Hits per week for the last 6 months of operations (1/12/2015 – 31/5/2016):** The Hellenic Sentinel Data Hub (Mirror Site) managed to maintain a stable visitor/user base.



- Spikes are detected **during** and **after** events where the Mirror Site was presented and promoted, as well as other events such as increased use of S-1 products in applications running at national level

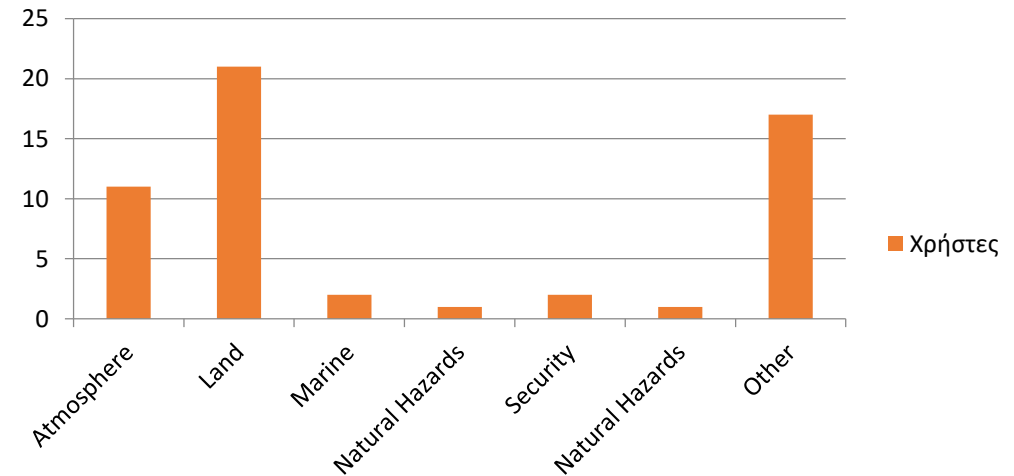
- The Hellenic Sentinel Data Hub is **popular** amongst the members of the **scientific community**

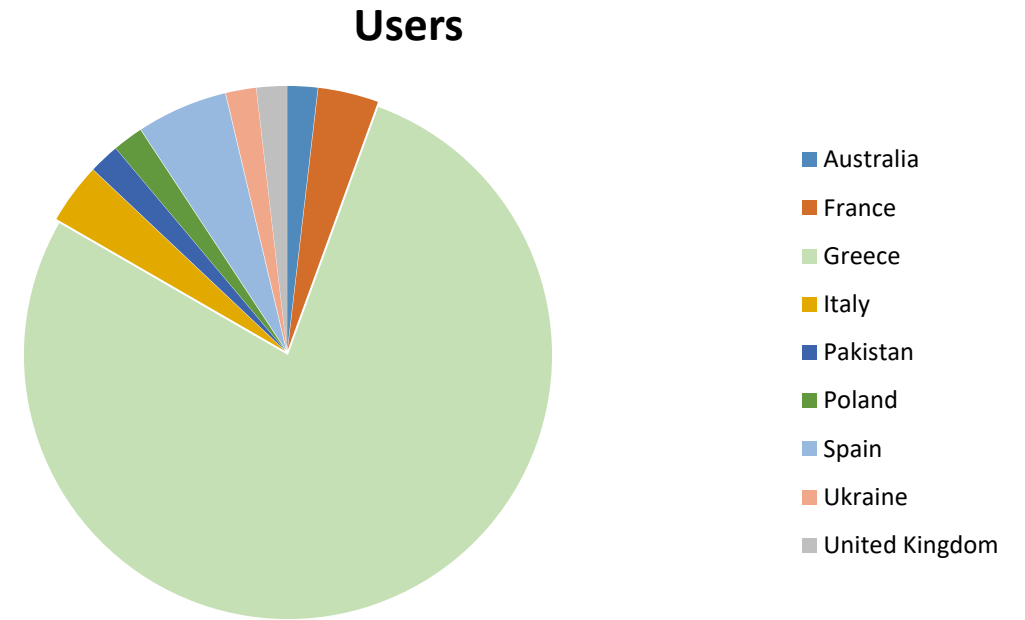
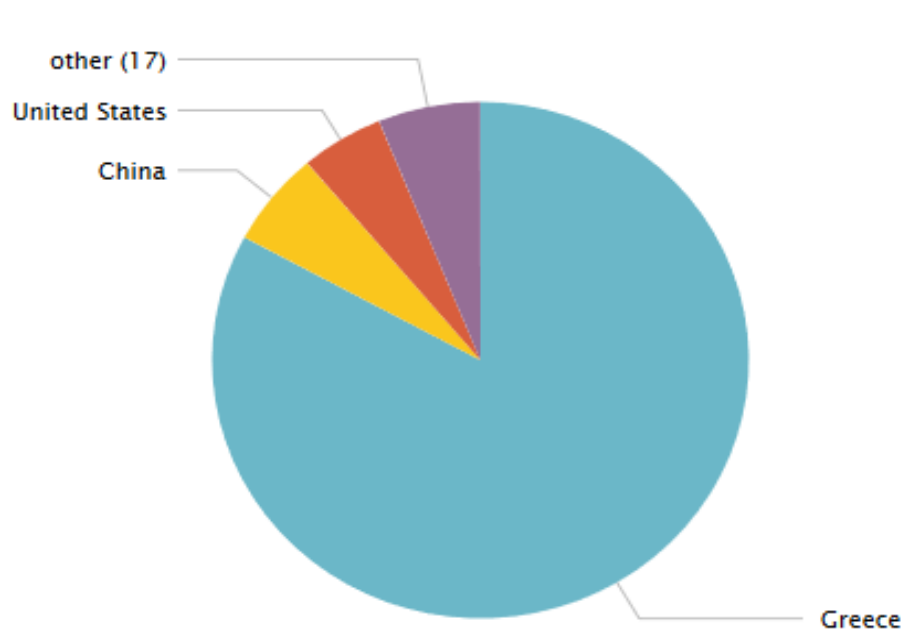
Number of users per usage purposes



- Atmosphere, Land, and “Other” application domains** are ranked between the main fields of Sentinel data use

Number of Users Per Domain of Expertise





- The distribution of IP addresses accessing the Mirror Site indicates that most visits come from the Greek domain, while there is a considerable number of international visitors

- Most registered users are from Greece but also a number of European and non European countries (France, Italy, Australia, Pakistan, Poland, Spain, Ukraine, United Kingdom etc).

Hellenic National Sentinel Data Mirror Site

Provided by the:
National Observatory of Athens
Powered by the:
Greek Research & Technology Network

OVERVIEW ABOUT

User Name Password Login

OVERVIEW

The Hellenic National Sentinel Data Mirror Site is a web based system designed to provide EO data users with Search and Dissemination capabilities for the Sentinel products.

This current version is the first operational prototype developed under the current EU-ESA GMES / NOA agreement.

Detailed information on Sentinel products and Data Access mechanisms is available at <https://sentinel.esa.int/web>

References

- ▶ <http://www.copernicus.eu/>
- ▶ <https://sentinel.esa.int/>

Register at the Hellenic National Sentinel Data Mirror Site. REGISTRATION

View the Hellenic National Sentinel Data Mirror Site User Manual.

NOA Hellenic National Sentinel Data Mirror Site Team
NOA Official: Prof. Kanaris C. Tsinganos, President of NOA
Scientific Coordinator: Dr. Haris Kontoes, Research Director
WebMaster: MSc. Themistocles Herekakis, Research Associate
Development: MSc. Vassilis Tsironis, Research Associate
Curator: Mr. Vaggelis Papakirikou, Research Associate

National Observatory of Athens

Last Updated: 12 February 2015
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NOA Web Site: www.noa.gr
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[Contact Us](#)

NOA Sentinel Mirror Site GUI
Provides a registration mechanism
so that new users can obtain access
to Catalogue Search and Order
facilities

Hellenic National Sentinel Data Mirror Site

Provided by the: National Observatory of Athens
Powered by the: Greek Research & Technology Network

OVERVIEW ABOUT

therekak | | Login

OVERVIEW

The Hellenic National Sentinel Data Mirror Site is a web based system designed to provide EO data users with Search - Cataloguing - Order and Dissemination capabilities for the Sentinel products.

This current version is the first operational prototype developed under the current EU-ESA GMES / NOA agreement.

Detailed information on Sentinel products and Data Access mechanisms is available at <https://sentinel.esa.int/web/sentinel/sentinel-data-access>

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IAASARS Web Site: www.astro.noa.gr
[Contact Us](#)

Web Template created with Artisteer.

...with the applied credentials users may login to access the Search – Order and Data access facilities

necessary
their account is
information

...the catalogue of queried products provides more information regarding the spatial coverage, the attributes and their order status.

.. and then by querying the desired date range and product attributes...

The screenshot displays the Hellenic Sentinel Data Hub interface. At the top, there is a map of the Mediterranean region with various countries and cities labeled. Below the map is a search and query interface. The search criteria are set to Platform: Sentinel-1, Level: L0, Instrument: SAR, Type: All, Mode: All, Start Date: 2015-01-21, and End Date: 2015-01-31. A 'Submit Query' button is visible. Below the search bar is a table showing the results of the query. The table has columns for QLook, Platform, Level, Instrument, Prod.Type, Mode, Swath, Direction, Polarization, Start Date, Stop Date, Preview, and Order. Three rows of data are visible, all for Sentinel-1 SAR Slice L0 products. The 'Order' column contains icons for 'In order', 'Remove from order', and 'Add to order'. A callout box on the right side of the table highlights the 'Order' column and provides instructions for each icon.

QLook	Platform	Level	Instrument	Prod.Type	Mode	Swath	Direction	Polarization	Start Date	Stop Date	Preview	Order
	SENTINEL-1	SAR Slice L0 product	SAR	RAW	IW		ASCENDING	VV	2015-01-27 17:22:33.294807	2015-01-27 17:23:05.694694		
	SENTINEL-1	SAR Slice L0 product	SAR	RAW	IW		ASCENDING	VV	2015-01-28 16:23:31.023506	2015-01-28 16:24:03.4235		
	SENTINEL-1	SAR Slice L0 product	SAR	RAW	IW		ASCENDING	VV	2015-01-27 17:20:53.293342	2015-01-27 17:21:25.693336		



The Cart preview page offers cart management facilities. Users can submit the present session's selected products thus creating a new order cart...

OID	Date Submitted	Date Expired	Status
Order with ID: 52	2015-02-20 17:46:19.823876	-	In Queue
Order with ID: 53	2015-02-20 17:49:25.721513	-	In Queue

QLook	Platform	Level	Instrument	Prod.Type	Mode	Swath	Direction	Polarization	Start Date	Stop Date	Preview	Order
	SENTINEL-1	SAR Standard L1 Product	SAR	GRD	IW	IW	ASCENDING	VH	2015-01-26 16:40:40.810257	2015-01-26 16:41:05.809273		
	SENTINEL-1	SAR Standard L1 Product	SAR	SLC	IW	IW3	DESCENDING	VH	2015-01-26 05:35:55.487505	2015-01-26 05:36:12.801456		
	SENTINEL-1	SAR Standard L1 Product	SAR	SLC	IW	IW3	DESCENDING	VH	2015-01-30 05:03:02.825174	2015-01-30 05:03:31.134295		

3 entries

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National Observatory of Athens

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 NOA Web Site: www.noa.gr
 IAASARS Web Site: www.astro.noa.gr
[Contact Us](#)

CART

...and view the status of the previously submitted order cart. The status of the Sentinel products under the carts is depicted by a number of indicators.

QLook	Platform	Level	Instrument	Prod.Type	Mode	Swath	Direction	Polarization	Start Date	Stop Date	Preview	Order
	SENTINEL-1	SAR Standard L1 Product	SAR	GRD	IW	IW	ASCENDING	VH	2015-01-26 16:40:40.810257	2015-01-26 16:41:05.809273		
	SENTINEL-1	SAR Standard L1 Product	SAR	SLC	IW	IW3	DESCENDING	VH	2015-01-26 05:35:55.487505	2015-01-26 05:38:12.801456		
	SENTINEL-1	SAR Standard L1 Product	SAR	SLC	IW	IW3	DESCENDING	VH	2015-01-30 05:03:02.825174	2015-01-30 05:03:31.134295		

- The product is located at ESA DataHub
- The product is being downloaded
- The product is corrupted
- The product is ready to download

CART

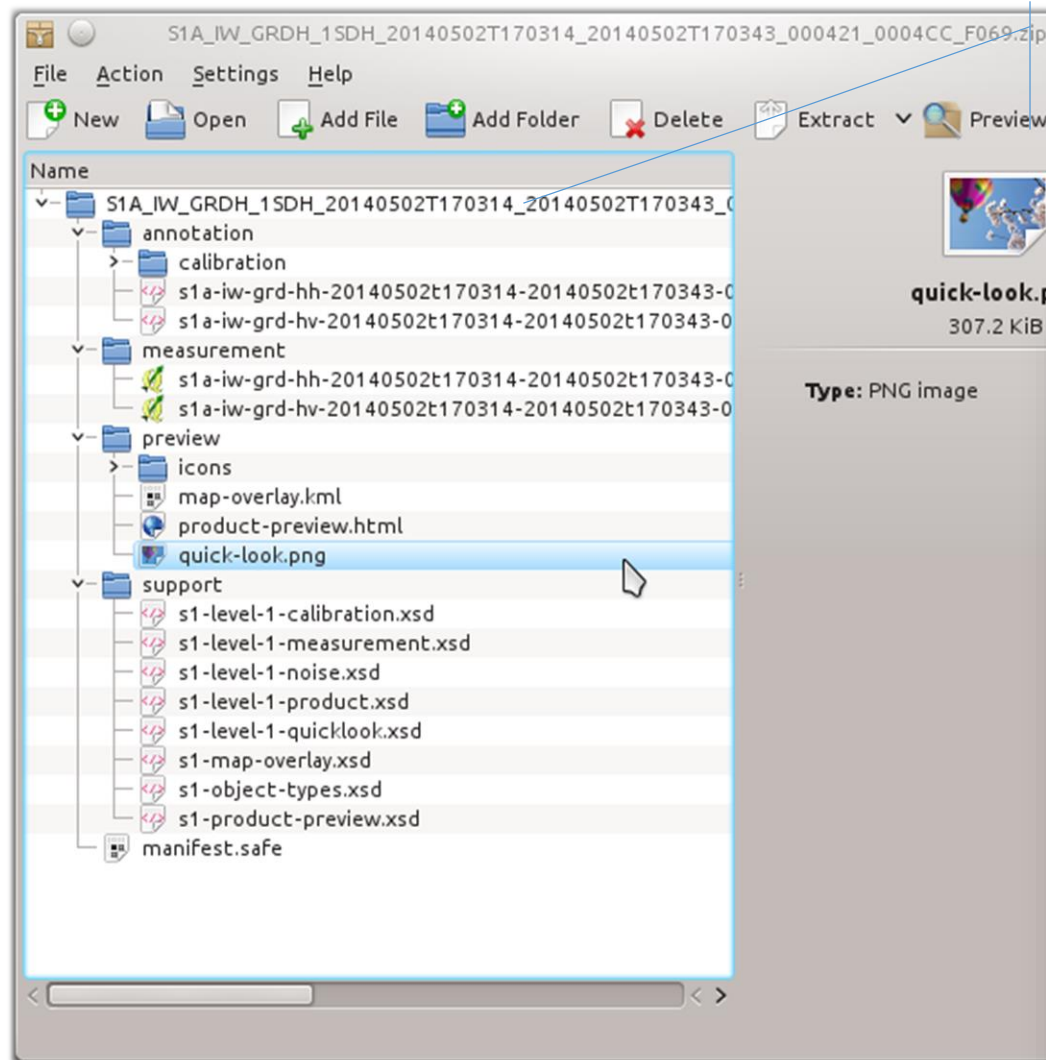
...the Hellenic Sentinel Data Hub user is free to download locally the available Sentinel products

Order with ID: 54 2015-02-20 17:53:44.048772

Search:

QLook	Platform	Level	Instrument	Prod.Type	Mode	Swath	Direction	Polarization	Start Date	Stop Date	Preview	Order
	SENTINEL-1	SAR Standard L1 Product	SAR	GRD	IW	IW	ASCENDING	VH	2015-01-26 16:40:40.810257	2015-01-26 16:41:05.809273		
	SENTINEL-1	SAR Standard L1 Product	SAR	SLC	IW	IW3	DESCENDING	VH	2015-01-26 05:35:55.487505	2015-01-26 05:36:12.801456		
	SENTINEL-1	SAR Standard L1 Product	SAR	SLC	IW	IW3	DESCENDING	VH	2015-01-30 05:03:02.825174	2015-01-30 05:03:31.134295		

Product Ready to Download



...and inspect their content



quick-look.png

307.2 KIB

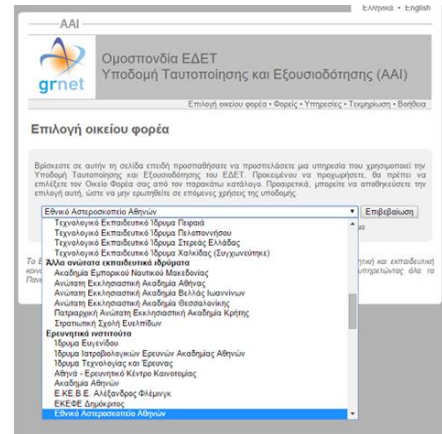
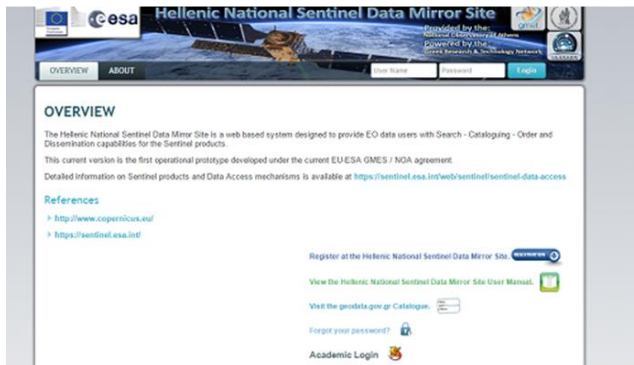
Type: PNG image



- The Hellenic Sentinel Data Hub is expected to boost it's popularity by allowing all members of the Greek Academic community (professors, students, researchers) to securely login via their academic credentials.
- The Hellenic Sentinel Data Hub has joined the GRNET's SSO Federation, which is based on **Shibboleth**.
- Enhanced security using secure http (https) connections



Shibboleth



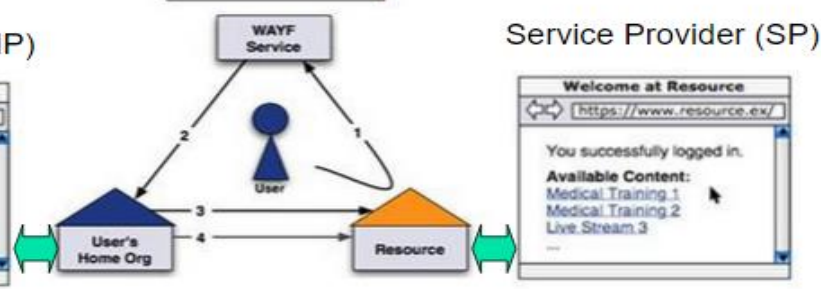
Identity Provider (IdP)



Main WAYF Server



Service Provider (SP)



The SENTINEL Image Processing Toolbox application is accessible via the Hellenic National Sentinel Data Mirror Site and the "TOOLBOX" menu item.

The screenshot shows the website header with logos for ESA, European Commission, and the National Observatory of Athens. The main navigation bar includes 'OVERVIEW', 'SEARCH', 'CART', 'TOOLBOX', 'USER PROFILE', and 'ABOUT'. A user is logged in as 'therekak'. The main content area is titled 'SENTINEL IMAGE PROCESSING TOOLBOX' and includes a description, a link to the user manual, and contact information for the team.

SENTINEL IMAGE PROCESSING TOOLBOX

Sentinel Image Processing Toolbox Overview and Description Text.

[View the Sentinel Processing Toolbox User Manual.](#)

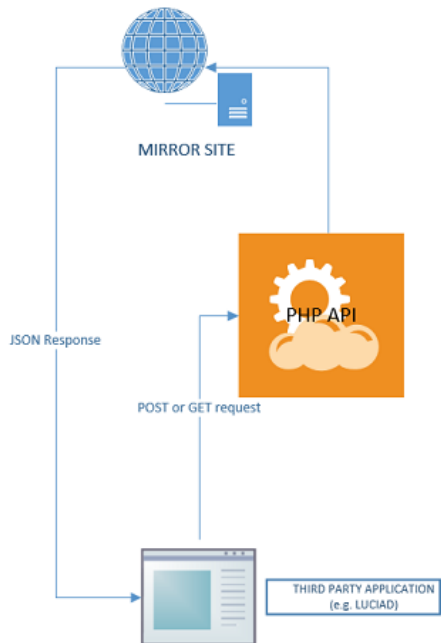
NOA Hellenic National Sentinel Data Mirror Site Team
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Curator: Mr. Vaggelis Papakirikou, Research Associate

National Observatory of Athens

BEOND

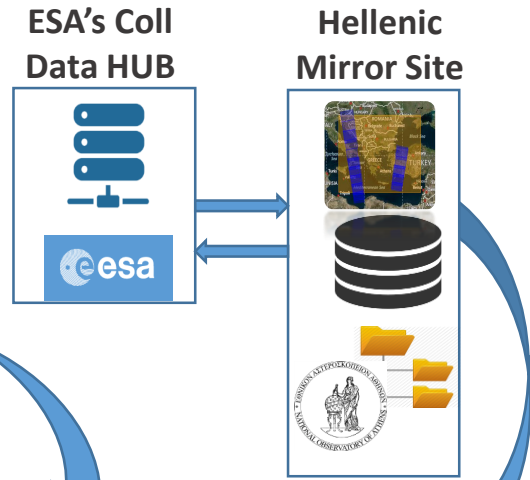
Last Updated: 03 March 2015
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 NOA Web Site: www.noa.gr
 IAASARS Web Site: www.astro.noa.gr
[Contact Us](#)

Web Template created with Artisteer.

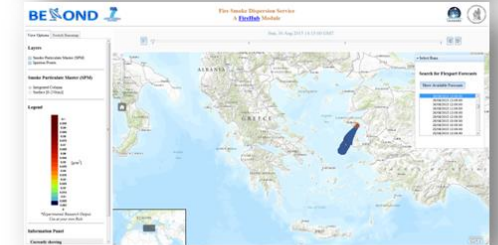
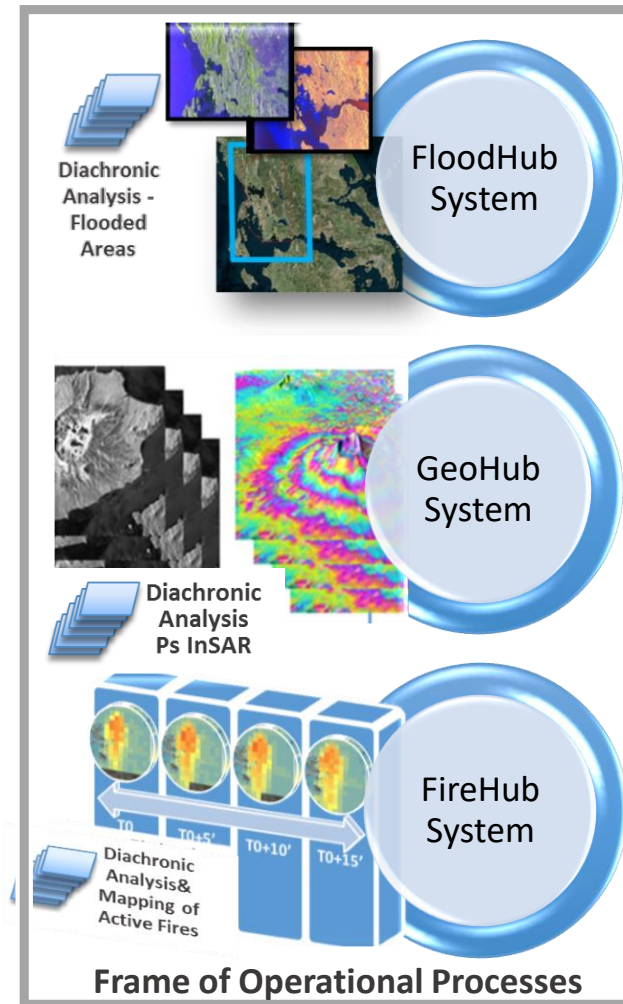


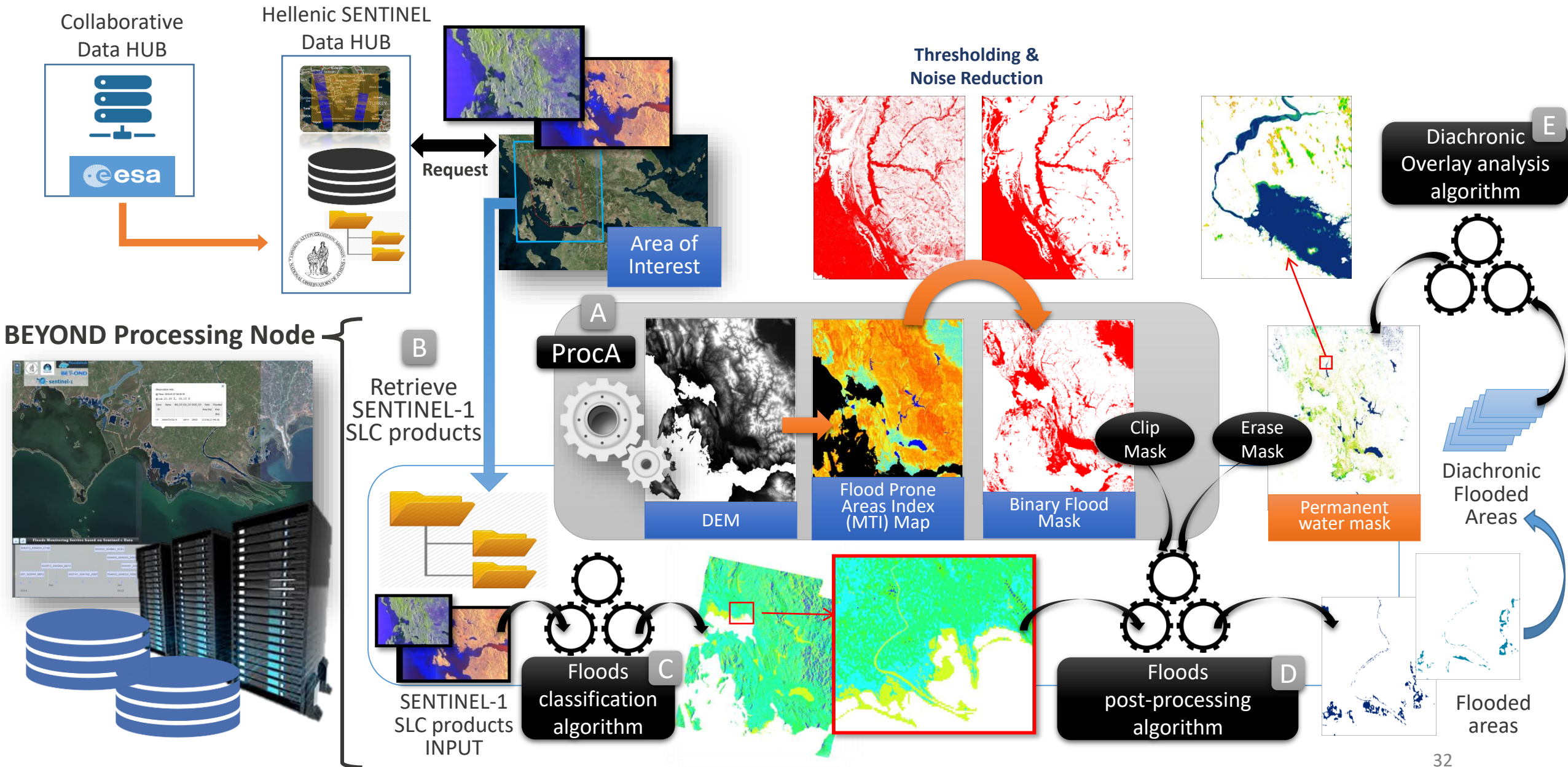
A detailed manual with instructions on how to create on ~Oceanos, Virtual Machines ready to apply the SENTINEL Toolbox algorithms is provided too.

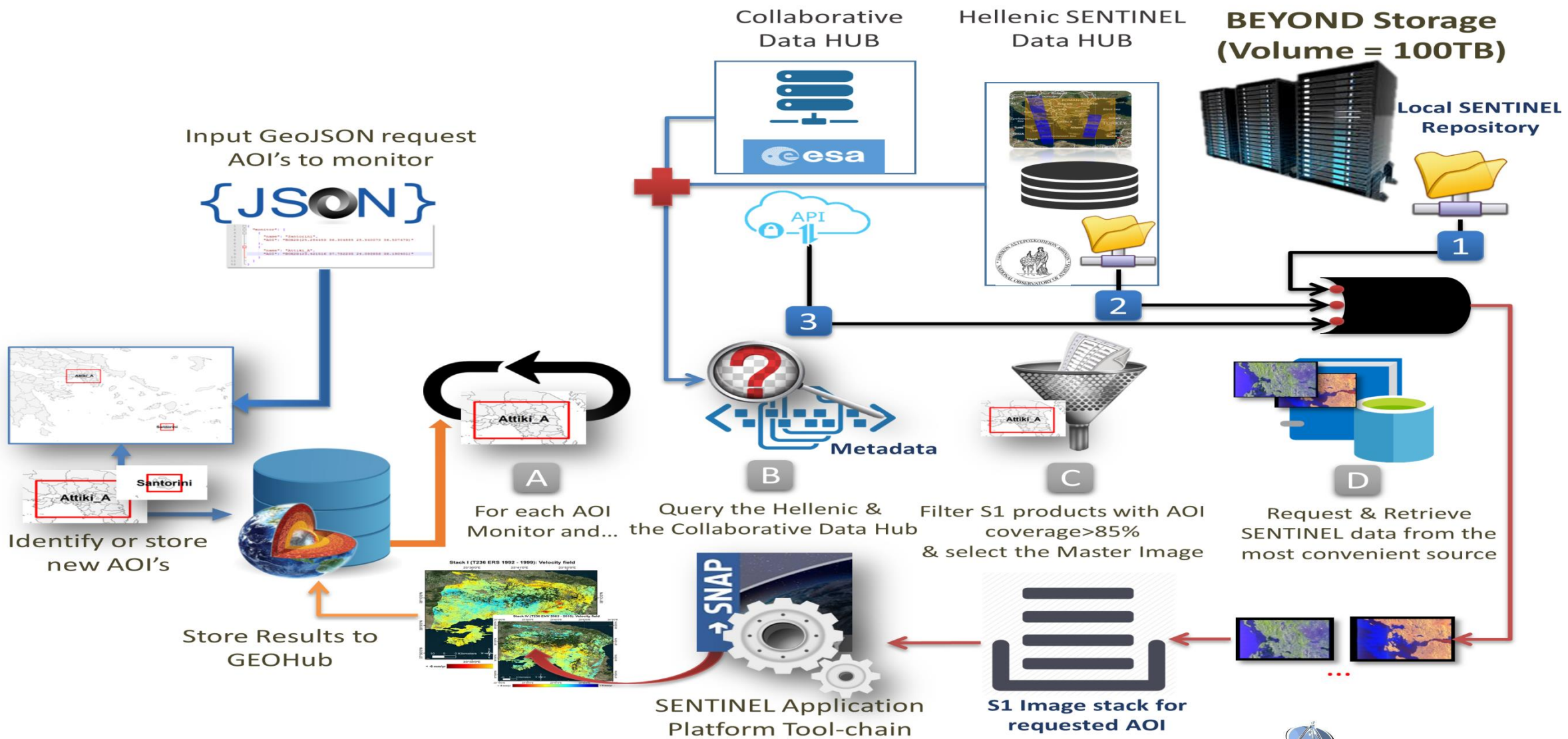
The screenshot shows the Hellenic National Sentinel Data Mirror Site interface. At the top, there are logos for ESA, National Observatory of Athens, and Greek Research & Technology Network. The main navigation bar includes 'OVERVIEW', 'SEARCH', 'CART', 'TOOLBOX', 'USER PROFILE', and 'ABOUT'. A user is logged in as 'therekak'. Below the navigation bar, the 'SENTINEL-1-TLBOX MANUAL' is displayed, with 'Step 1: a) FROM PUBLIC IMAGES, b) Select ESA SAR TOOLBOX' highlighted. A 'Create new machine' dialog box is open, showing a list of available images. The 'ESA SAR Toolbox' image is selected. The dialog box also includes a 'confirm' button and a warning message: 'You have selected a user-provided image, which is not officially endorsed by ~oceanos. Please make sure it is from a trustworthy source.'



BEYOND Processing Node

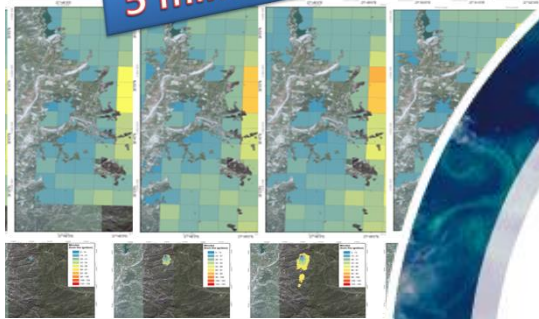




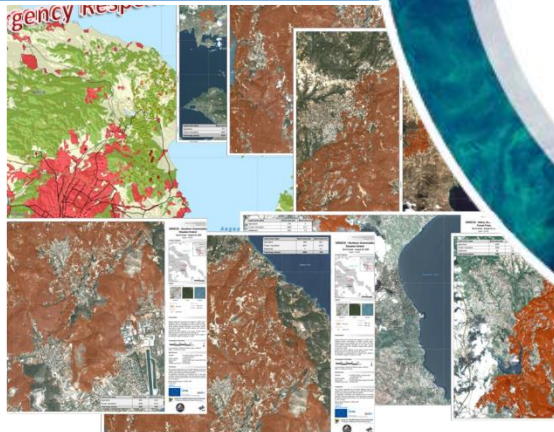


Active Fire Mapping: 5' - 500 m - 24/7

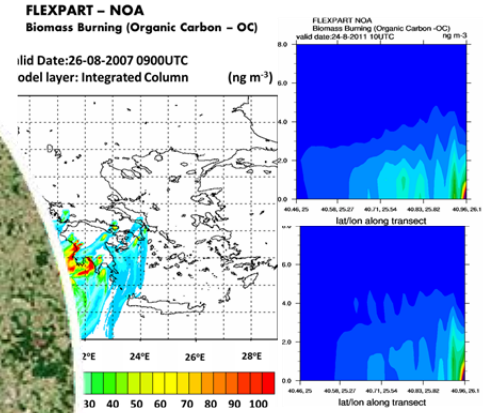
5 minutes basis



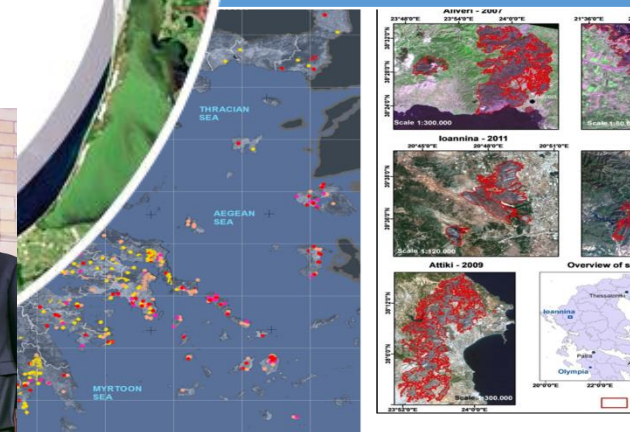
Burnt Area Mapping: daily/weekly/seasonal



Hourly Fire Smoke dispersion



Burnt Area Mapping



Thank you and
any questions?



The Hellenic
Sentinel Data
Mirror Site!