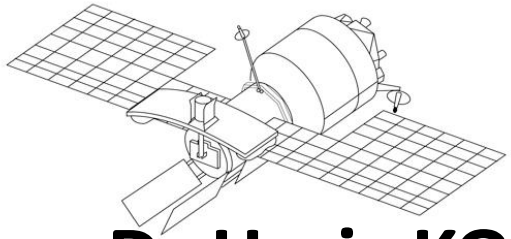
Greece's Collaborative Ground Segment Initiatives



Dr Haris KONTOES, Prof Kanaris Tsinganos

National Observatory of Athens

Dr Xenofon Tsilimparis, GRNET (GEANT)

SENTINEL COLLABORATIVE GS WORKSHOP 2014, 4 December 2014 – ESA ESRIN (Frascati)

The oldest Greek/SE European Research Institution: 170 years of continuous contribution to research and services to the society

3 Research Institutes: Astronomy and Astrophysics, Space Applications and Remote Sensing
Geodynamics, Environment and Sustainable Development

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

Scope of the Collaborative Ground Segment – Greek Mirror Site

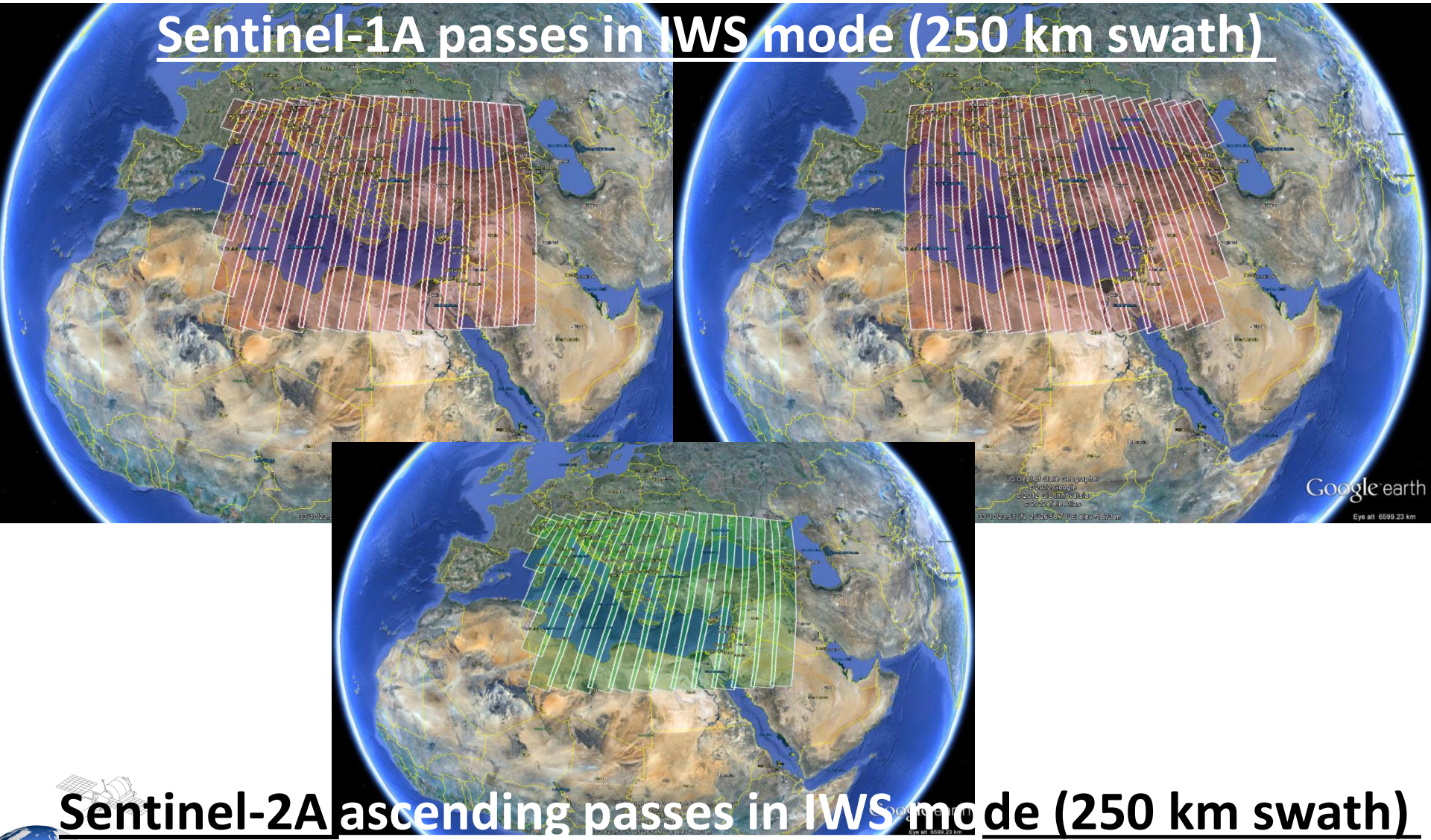
Built up an additional pick up point **(Mirror Site)** of Sentinel data at the premises of the **National Observatory of Athens (NOA)** in collaboration with the **Greek Research and Technology Network - GRNET S.A.** the Greek Partner of the GEANT network.

Disseminate Sentinel data and higher level Copernicus products to the End User & Scientific communities mainly at national level, but also to neighbouring South Eastern Mediterranean and Balkan countries on the basis of the existing and/or future transnational needs and co-operations.

The whole project is in line with the on-going 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.

AOI

Sentinel-1A passes in IWS mode (250 km swath)



Sentinel-2A ascending passes in IWS mode (250 km swath)

NOA Sentinel Mirror Site - Overview

ESA has developed a prototype software, the Data Hub System (DHuS), with the scope to:

- 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:

- Computational Infrastructure facilities for downloading and storing Sentinel Data are under installation, configuration, and testing

- A complete set of software tools for the systematic data download and organized storage, as well as distribution of data via a Web interface is ready for testing, and operation by the users

NOA Sentinel Mirror Site - Computational Infrastructure

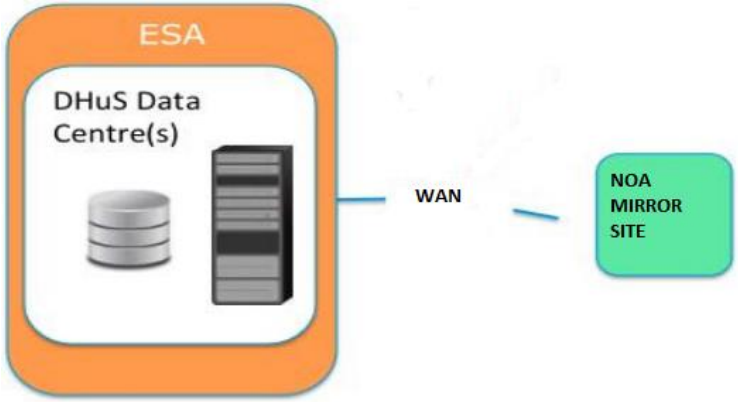
- High-Speed optical links owned by GRNET/GEANT, are used to connect ESA's Data center(s), with NOA's Mirror Site computational infrastructure
- A set of Virtual Machines (VMs), hosted by the Greek Research & Technology Network (GRNET), are configured and ready for use

OS: Ubuntu Linux 14.04 LTS, 64 Bit.

CPU: 1-2 CPU's per VM.

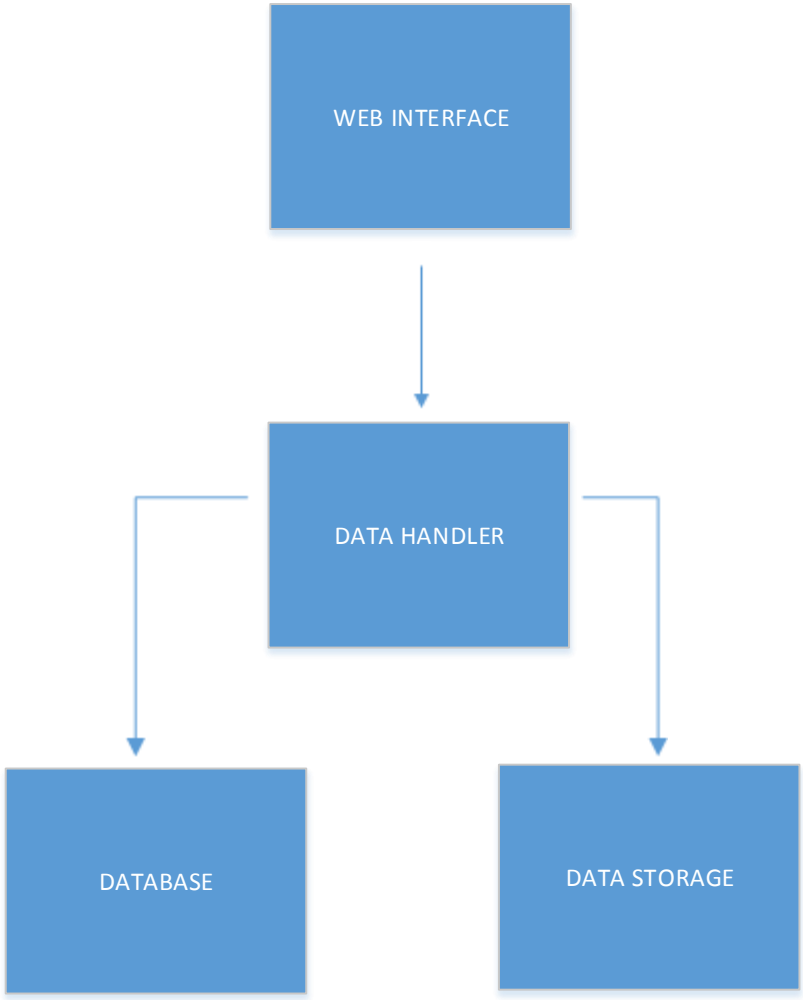
RAM: 2-4 GB per VM.

Static, dedicated IPv4 and IPv6 addresses



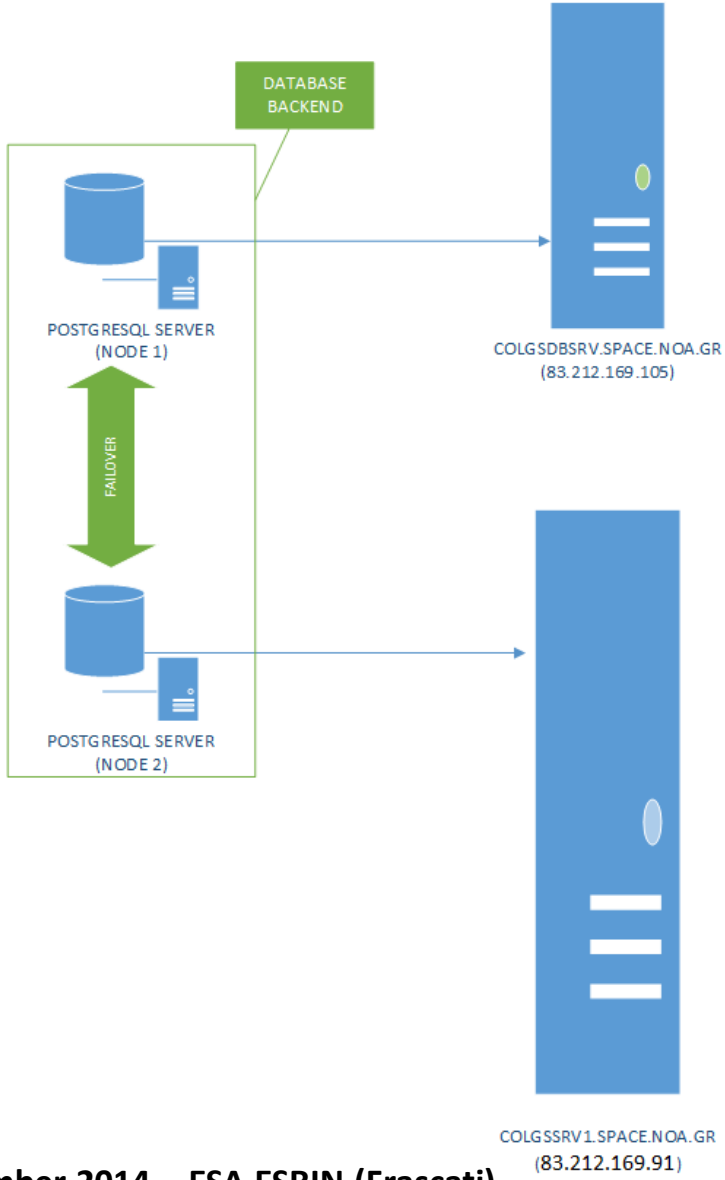
3-Level Architecture

- **Web Interface Level 1st**: the user interaction level
- **Data Handling Level 2nd**: The set of scripts that downloads and organizes data
- **Database Level 3rd**: storing metadata and system-wide events
- **Data Storage Level 3rd**: physical storage of data



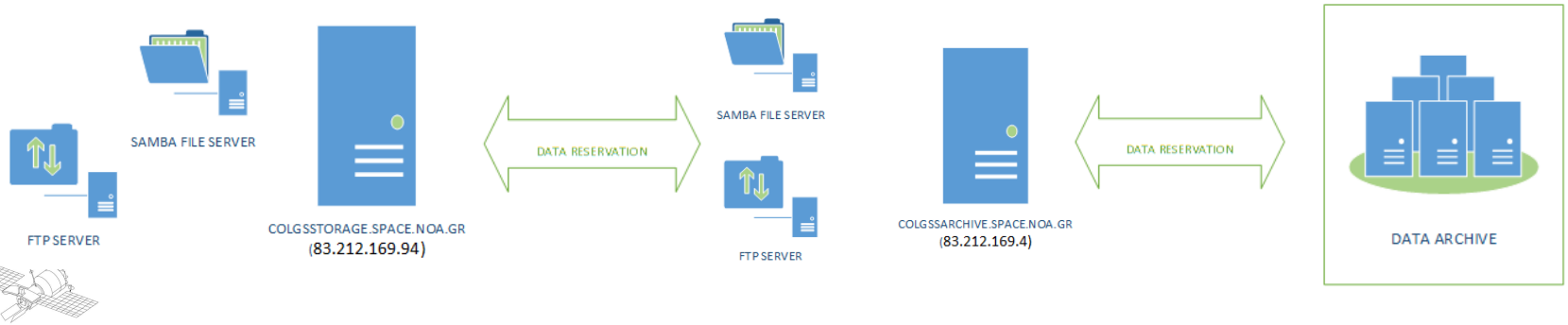
NOA Sentinel Mirror Site - Database Level

- **Utilization of 2 Database Servers**
  - ✓Main DB
  - ✓Backup DB
- **PostgreSQL 9.3**
- **Easily expandable**
- **Organized in cluster for achieving automatic fail-over, load-balancing etc**



NOA Sentinel Mirror Site – Data Storage Level

- **"Live"** data are kept in a high-performance, small storage capacity virtual machine (VM)
- **"Non-live"** data are transferred and kept in a second-level storage, in a dedicated VM
- Finally, older (than one month) data will be stored in a tape library/Hard Disk archiving solution (currently under specification)



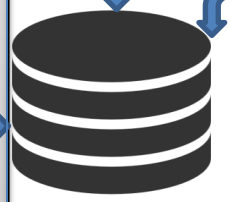
NOA Sentinel Mirror Site Back-end Architecture

The data synchronizer module:

- Searches the DataHub for updated products concerning the mirror site area of interest
- Stores their metadata descriptors into the mirror site database
- Transfers the big-data products and mirrors them for a limited amount of time as “live” data

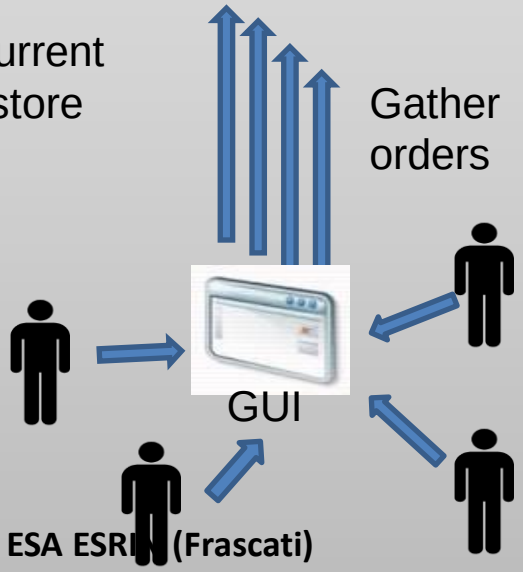
The data downloader module:

- Gathers and manages data orders applied via the NOA Mirror Site GUI
- Concurrently retrieves locally older “non-live” Sentinel products
- Informs Users when an order (collection of requested products) is ready, and its component big-data products are available via the NOA Mirror Site facilities and the Mirror Site GUI



Concurrent data store

Gather orders



Benchmark Exercise for testing the Dedicated DataHub → NOA Mirror Site Architecture

30 Parallel Transfers

ESA Dedicated SENTINEL DataHub

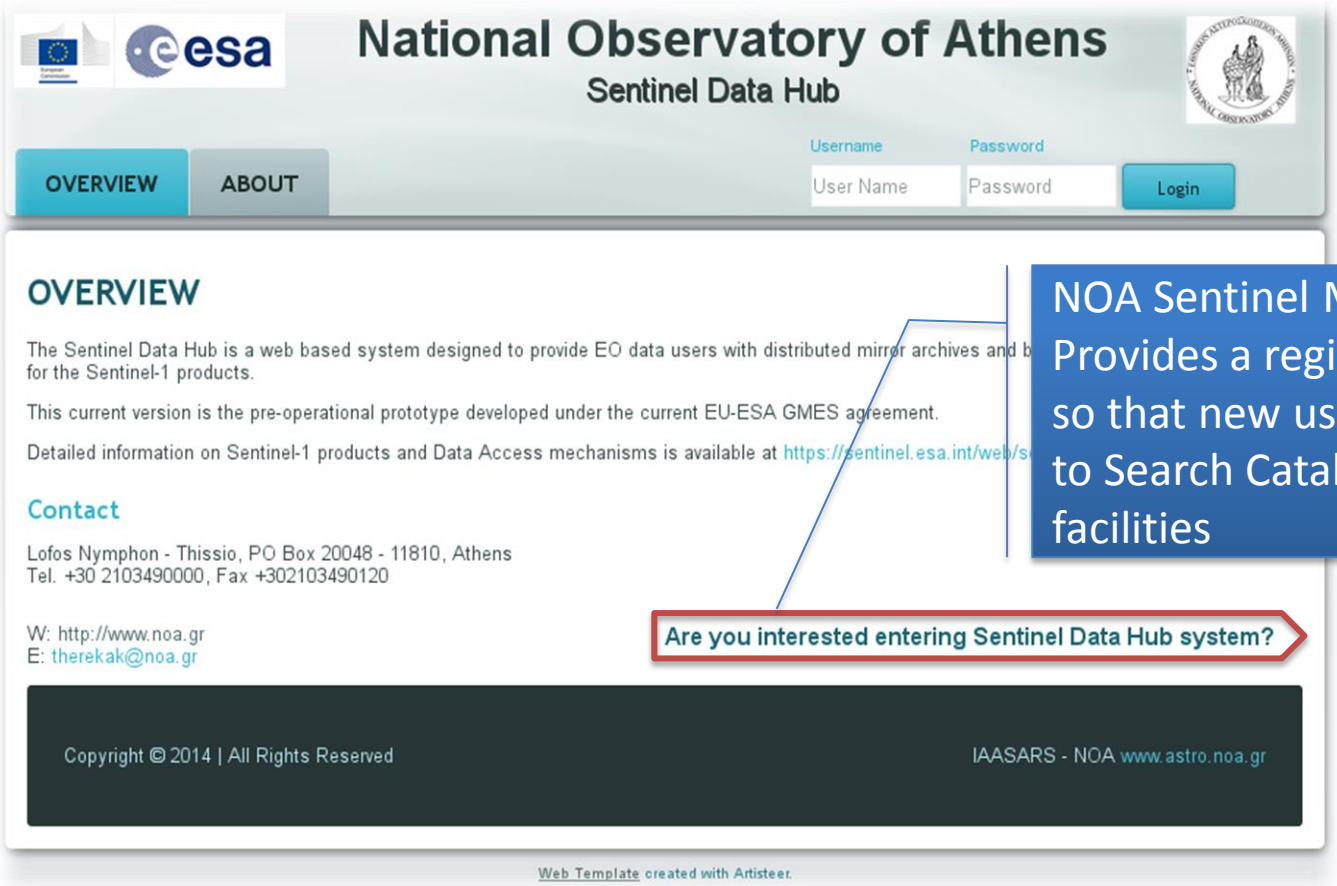
GEANT Network

Concurre
Downl
sequer
10
20
30

NOA SENTINEL MirrorSite

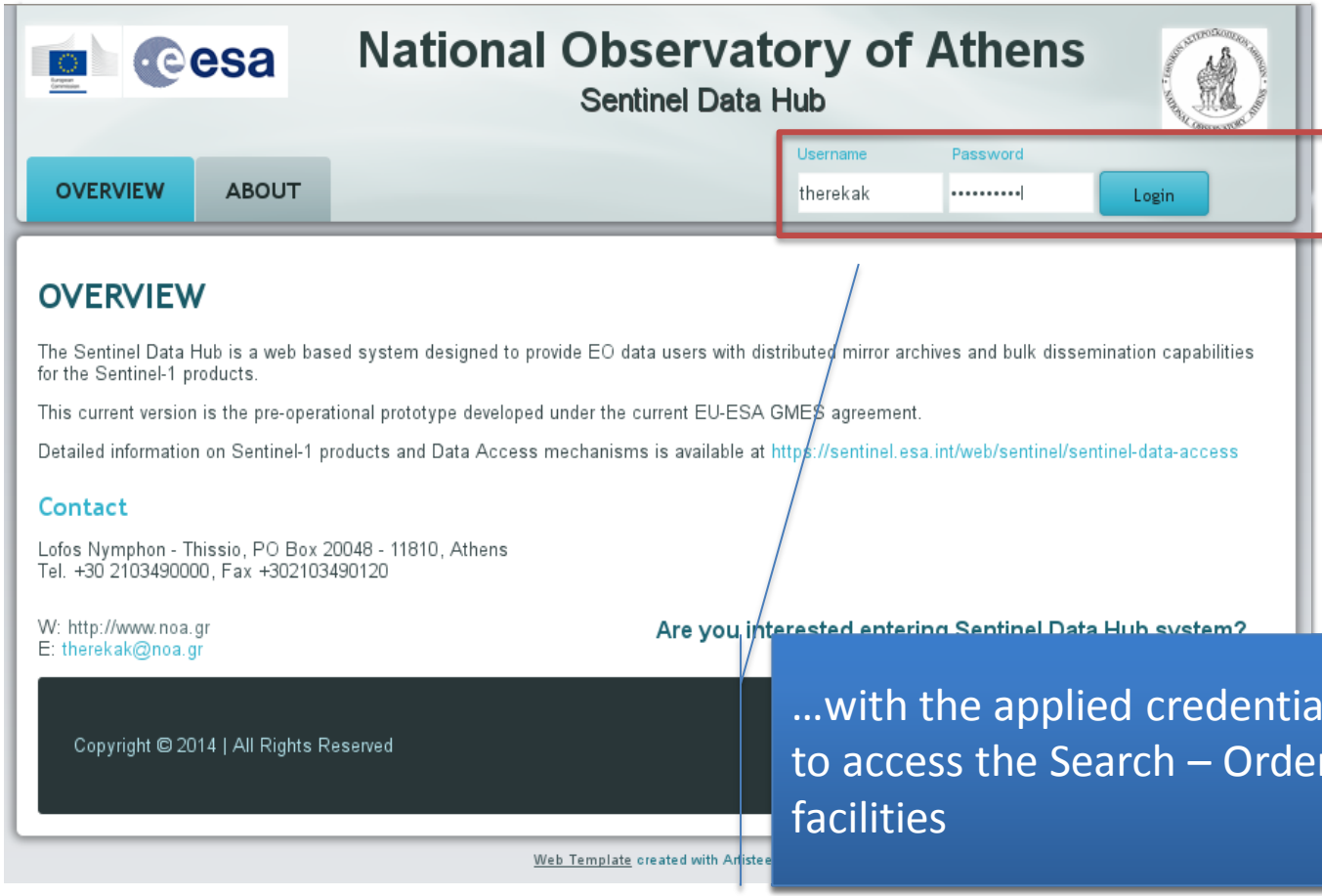
On Monday 24th November 2014 the NOA Sentinel Mirror Site team received from ESA the URL and the temporal credentials of a dedicated Sentinel DataHub instance in order to benchmark its performance.

NOA Sentinel MirrorSite GUI



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

NOA Sentinel MirrorSite GUI

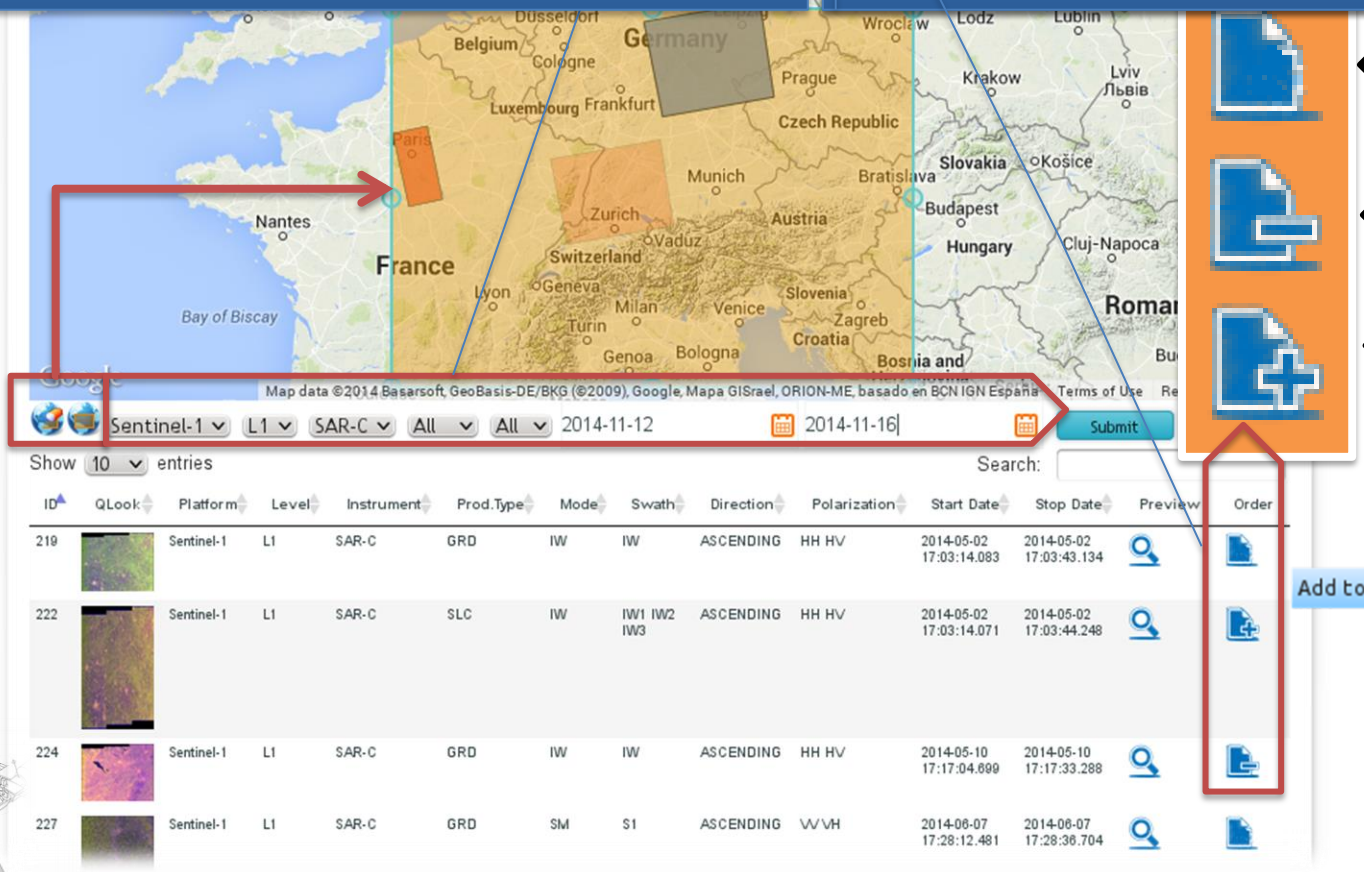


…with the applied credentials users may login to access the Search – Order and Data access facilities

NOA Sentinel MirrorSite GUI

…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…



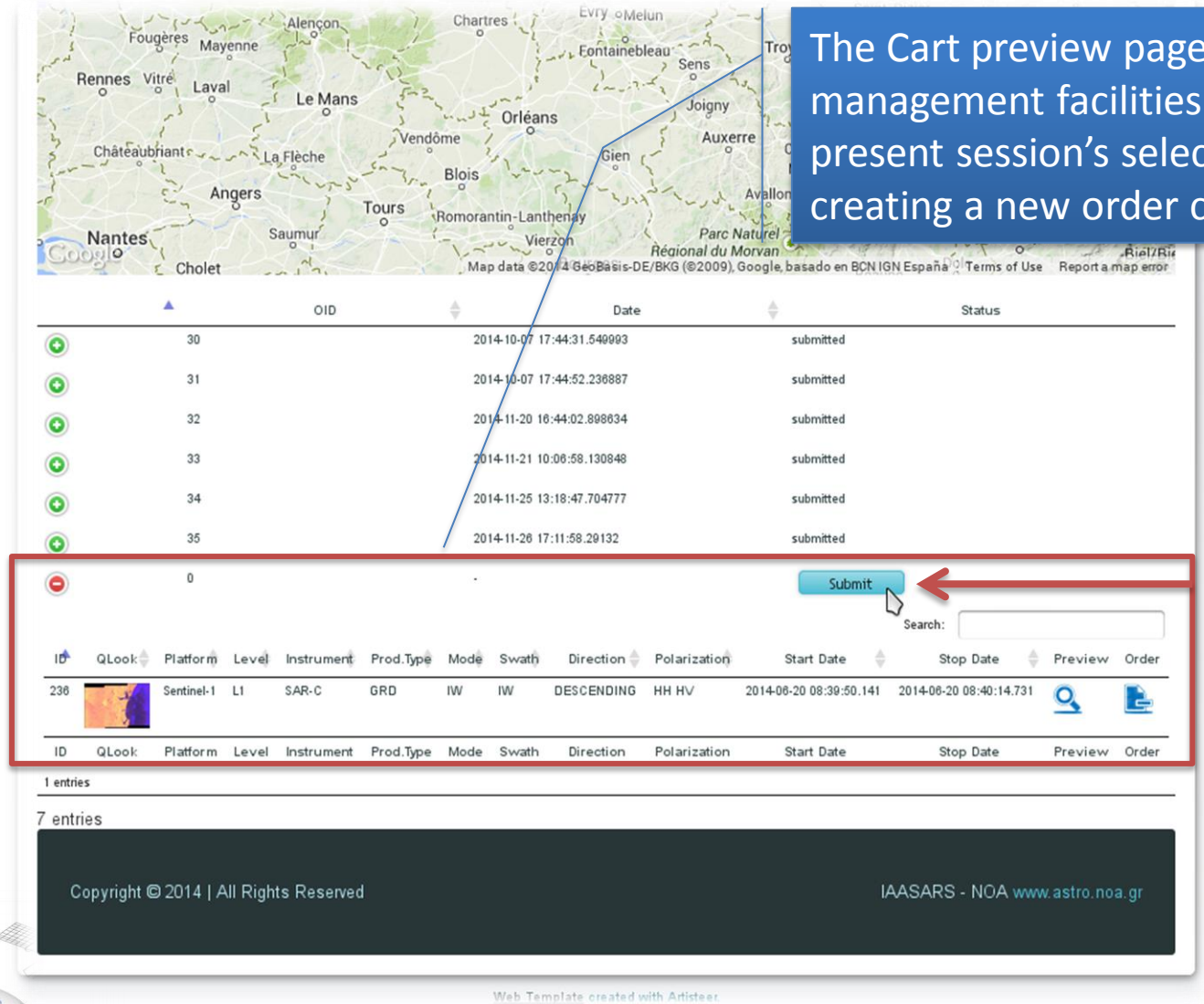
In order

Remove from order

Add to order

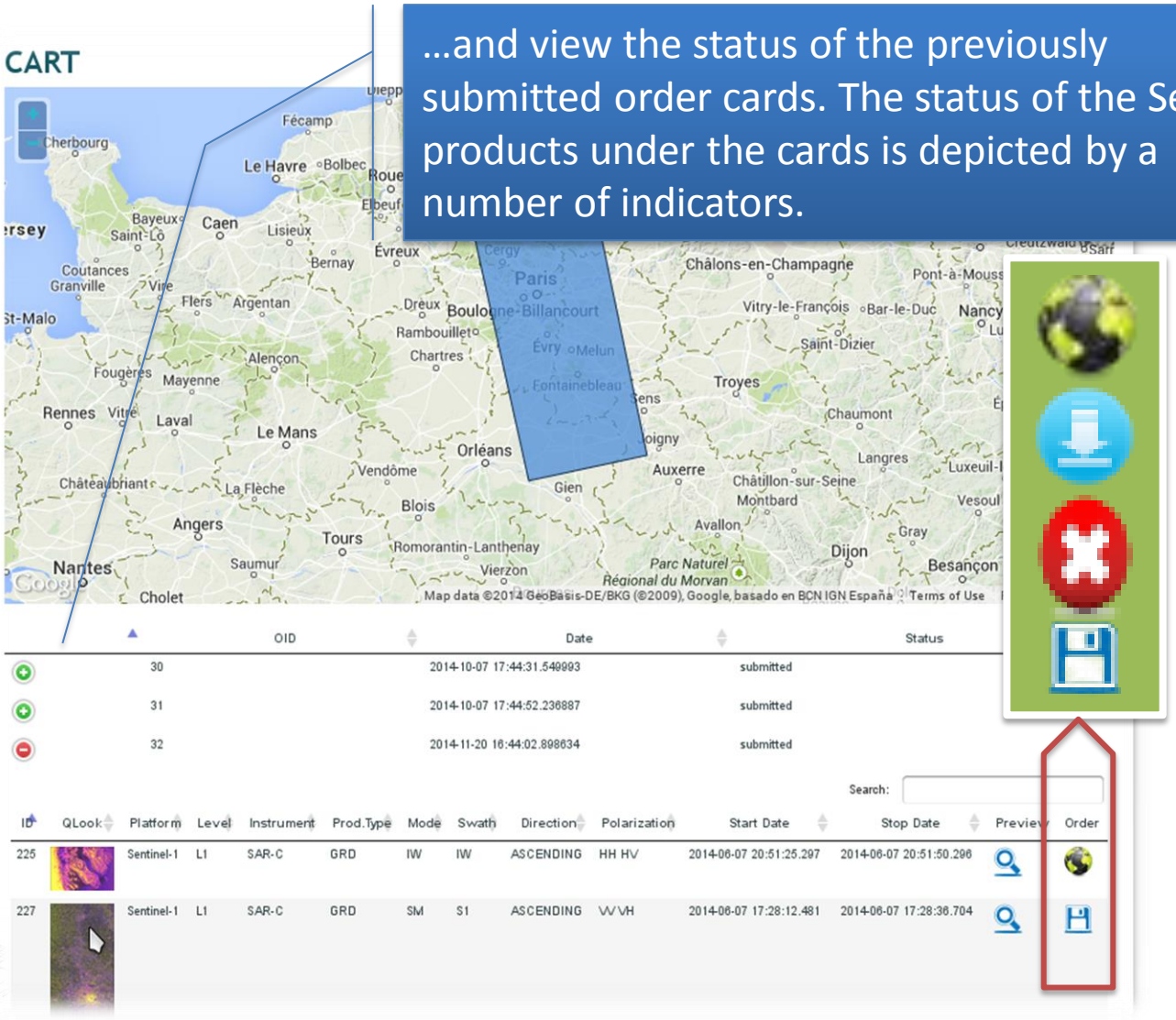
NOA Sentinel MirrorSite GUI

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



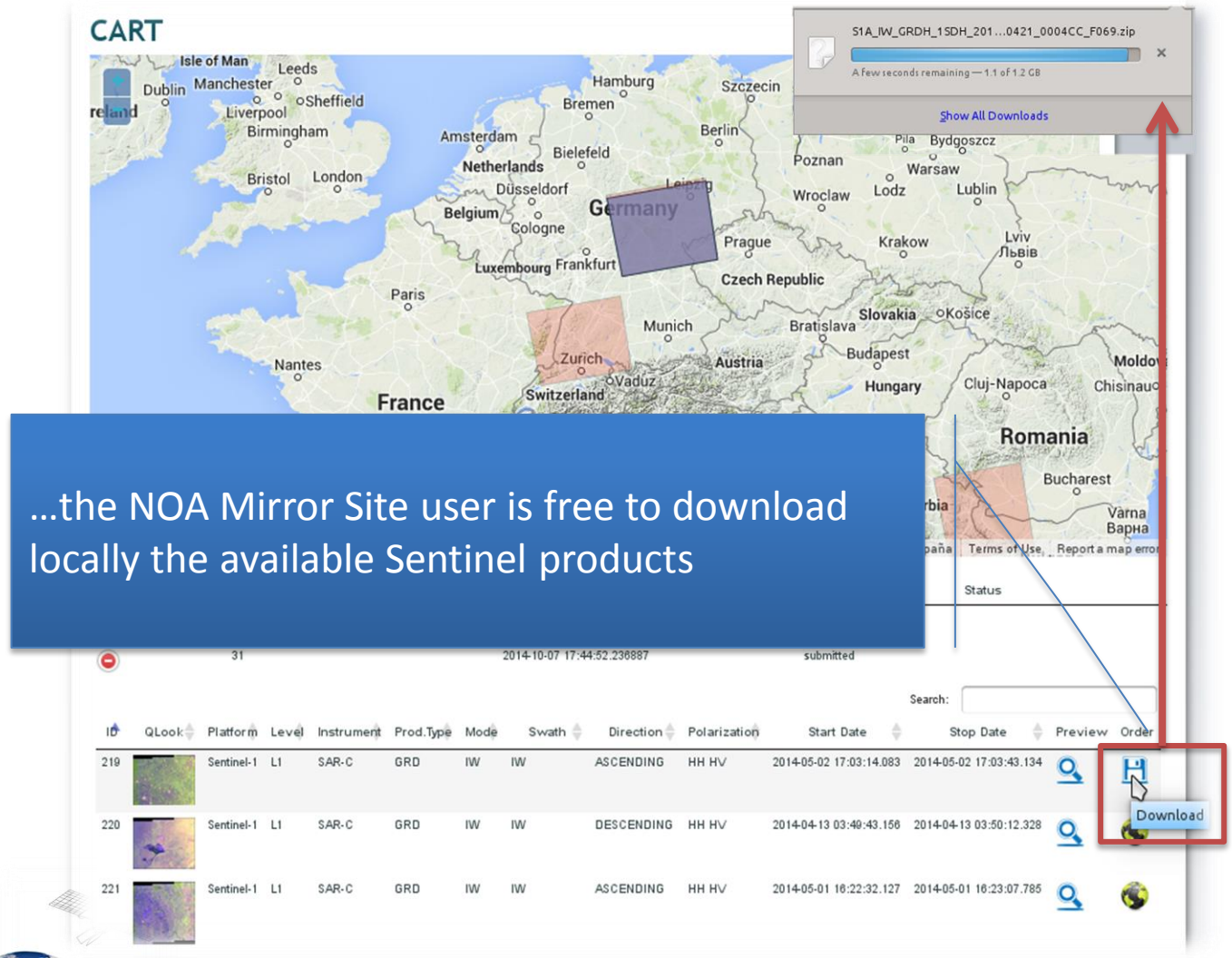
NOA Sentinel MirrorSite GUI

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



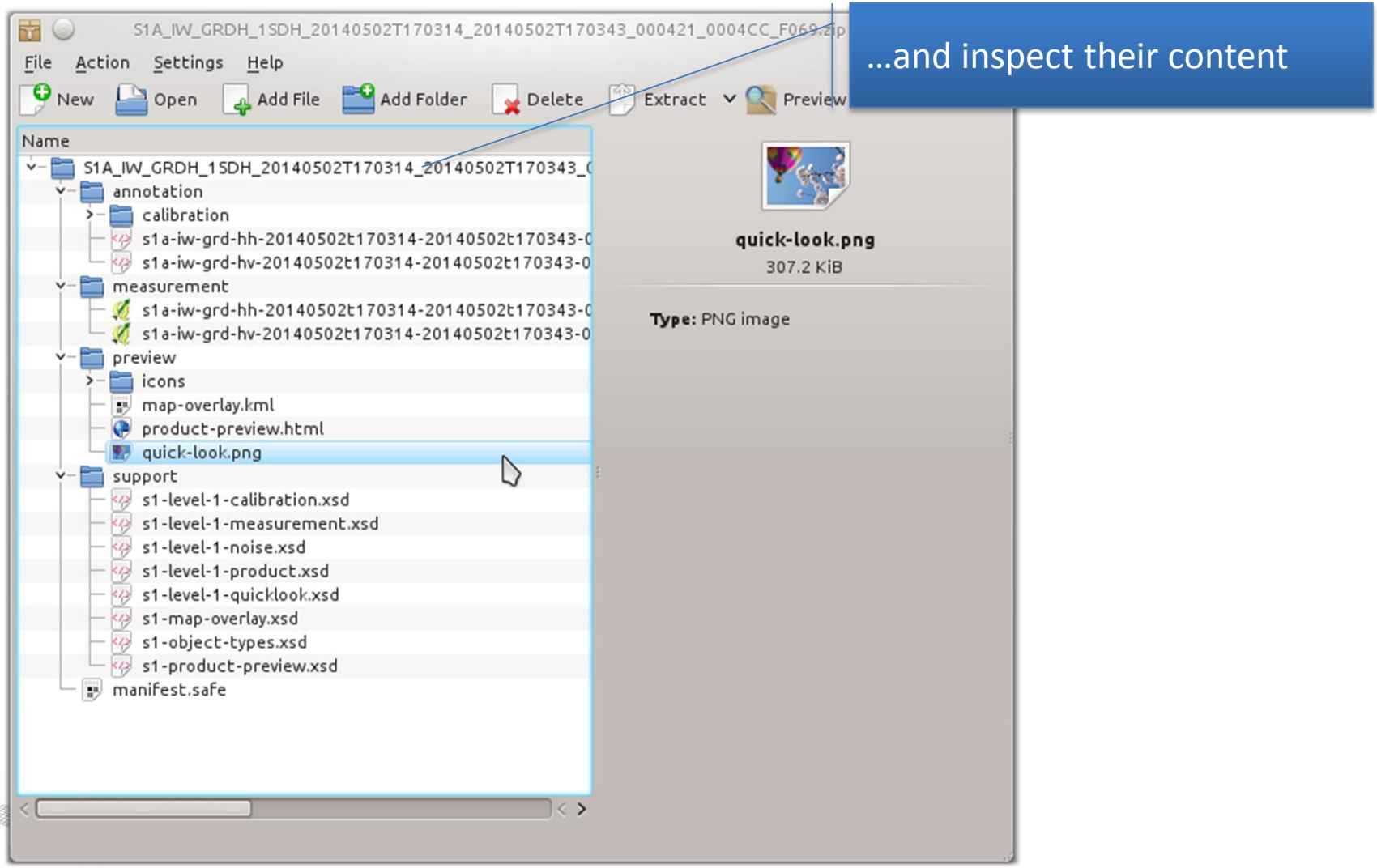
- The product is located at ESA DataHub
- The product is being downloaded
- The product is corrupted
- The product is ready to download

NOA Sentinel MirrorSite GUI



…the NOA Mirror Site user is free to download locally the available Sentinel products

NOA Sentinel MirrorSite GUI



Thank you for your attention!