

CUBEO

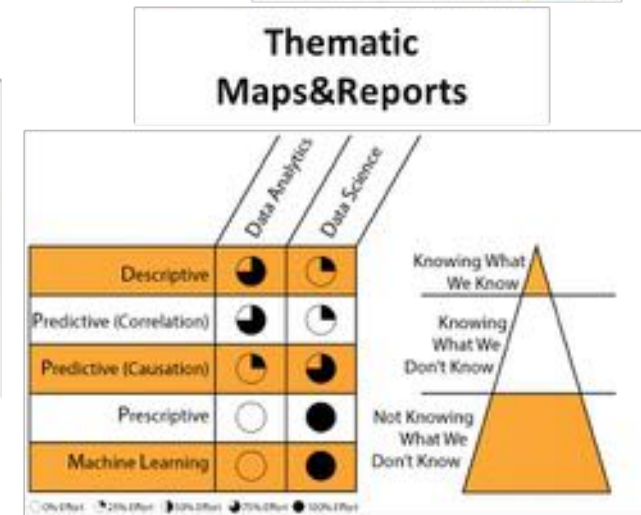
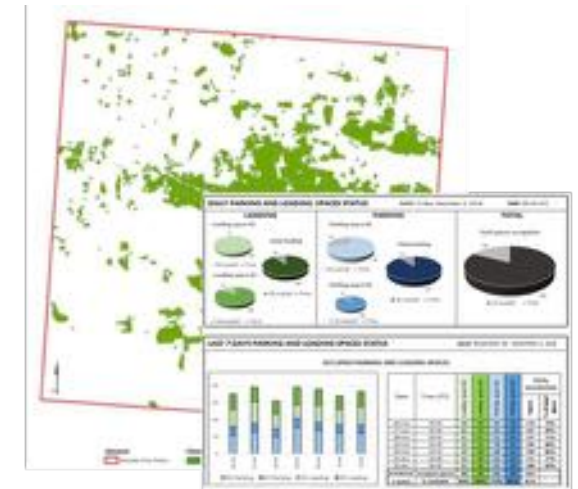
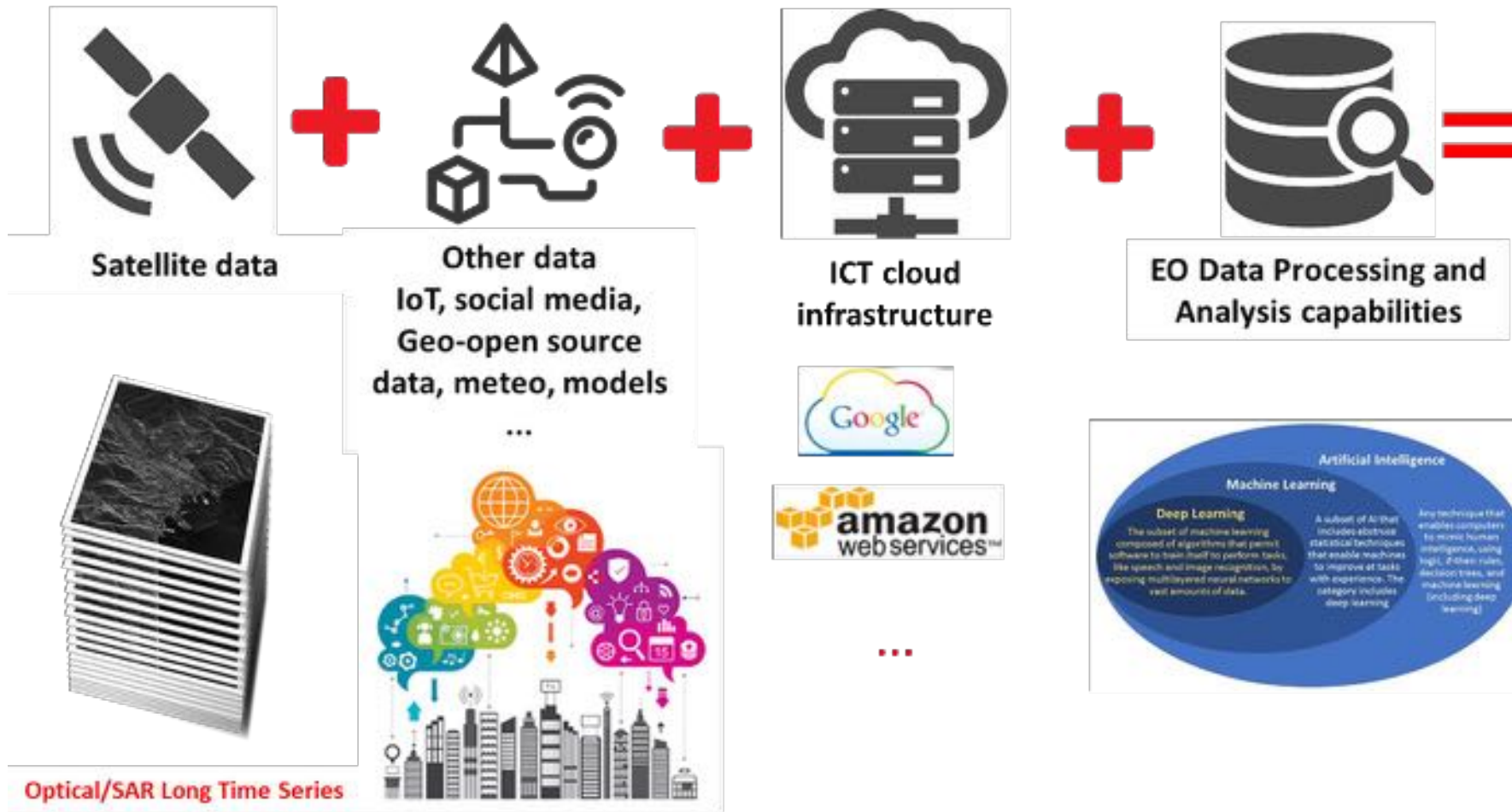
a scalable pre-processing and Data Cube platform for
Geoinformation application services

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1: e-GEOS, Italy; 2: MEE0, Italy



The new **Geoinformation** paradigm



CUBEO in the Geoinformation «Distillery»

CUBEO

Customers using CUBEO as
a machine to generate
Analysis Ready Data



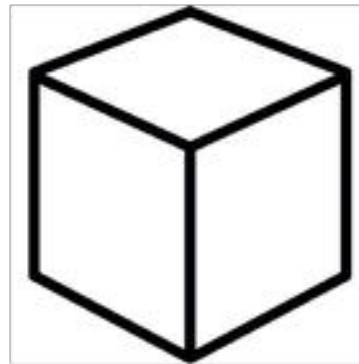
Raw data

Sentinel-1 L1A
Sentinel-2 L1C
COSMO-SkyMed L1A
...



Data preparation pipelines

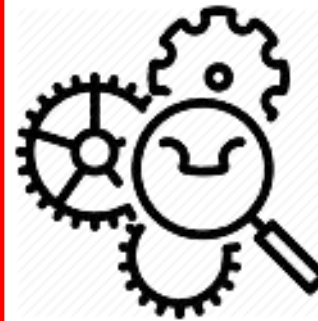
Optical pre-processing
SAR pre-processing



Analysis Ready Data
(ARD) - Data Cube

Surface Reflectance (Opt.)
Amplitude/Coherence (SAR)

Customers using CUBEO to
generate Decision Ready
Products



Data analysis

Machine learning, deep
learning, stats



Decision Ready Products
(DRP)

Anomaly detection
Change detection
Crop productivity
...

Increasing information value

CUBEO Data Cube «as a Service»

What if..

... you can build multi-sensors EO Data Cubes in **few clicks** and in a **few hours**?

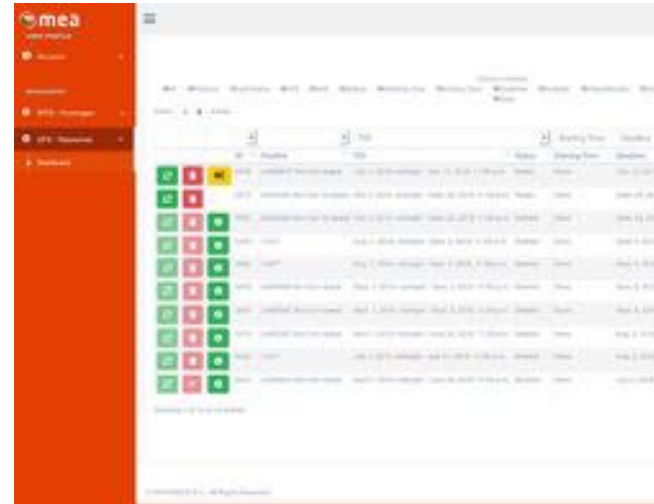
...you can **access** EO data you need very efficiently and **at scale**?

hiding the complexity of EO data processing behind a simple API call.



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CUBEO Data Cube «as a Service»

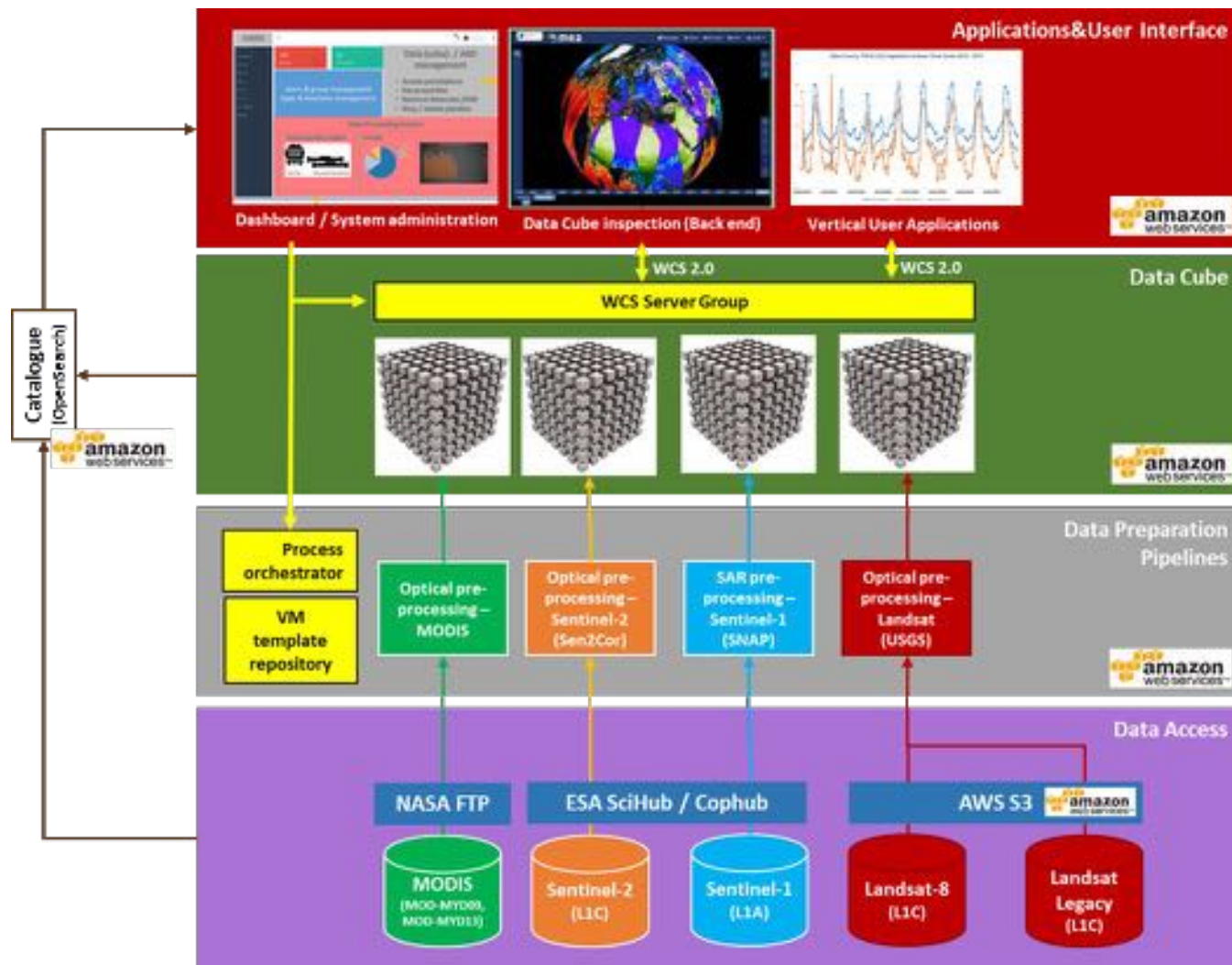


1. Select your Data Cube parameters (AOI, TOI, EO Data)

2. Run your Data Cube creation pipeline

3. Explore your Data Cube

CUBEO High Level architecture



The **CUBEO Dashboard** allows the users to create and manage new and existing Data Cubes.

New data Cubes can be created by defining simple and expert parameters (area of interest, time of interest, data sources, deadline for data cube creation, ...)

Existing Data Cubes can be inspected using a back end user interface or used as input data sources in further vertical applications

Pre-processed data are stored on AWS S3 storage in Cloud Optimized Geotiff (COG) format. New Data Cubes are registered in the catalogue and they are accessible through standard OGC WCS interfaces provided by the WCS server (with scalability group).

The **WCS Server group** is able to manage multiple request in parallel and it is optimized to source data from object storage (e.g. S3)

Data Preparation Pipelines are deployed on demand using cheap and scalable AWS Spot instances on the basis of pre-defined VM templates and orchestrated to optimize AWS resources consumption, fitting user requirements for delivery time.

Every data Preparation pipeline is self consistent and it is arranged in order to maximize the parallelism across multiple resources (horizontal scalability).

Data Access is managed through the connection to external data access services (e.g. NASA for MODIS, ESA for Sentinels) or through the direct access to EO data collections available in AWS (e.g. Landsat)

CUBEO Data Access and Data Preparation



Sentinel-1
(L1A)



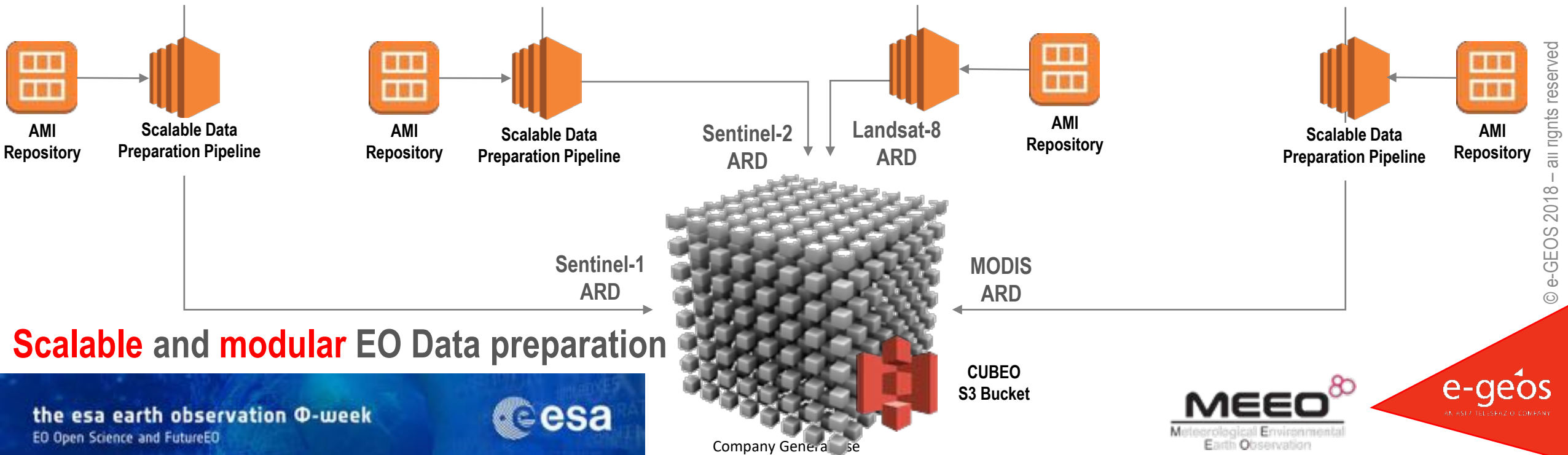
Sentinel-2
(L1C)



Landsat-8
(L1C)



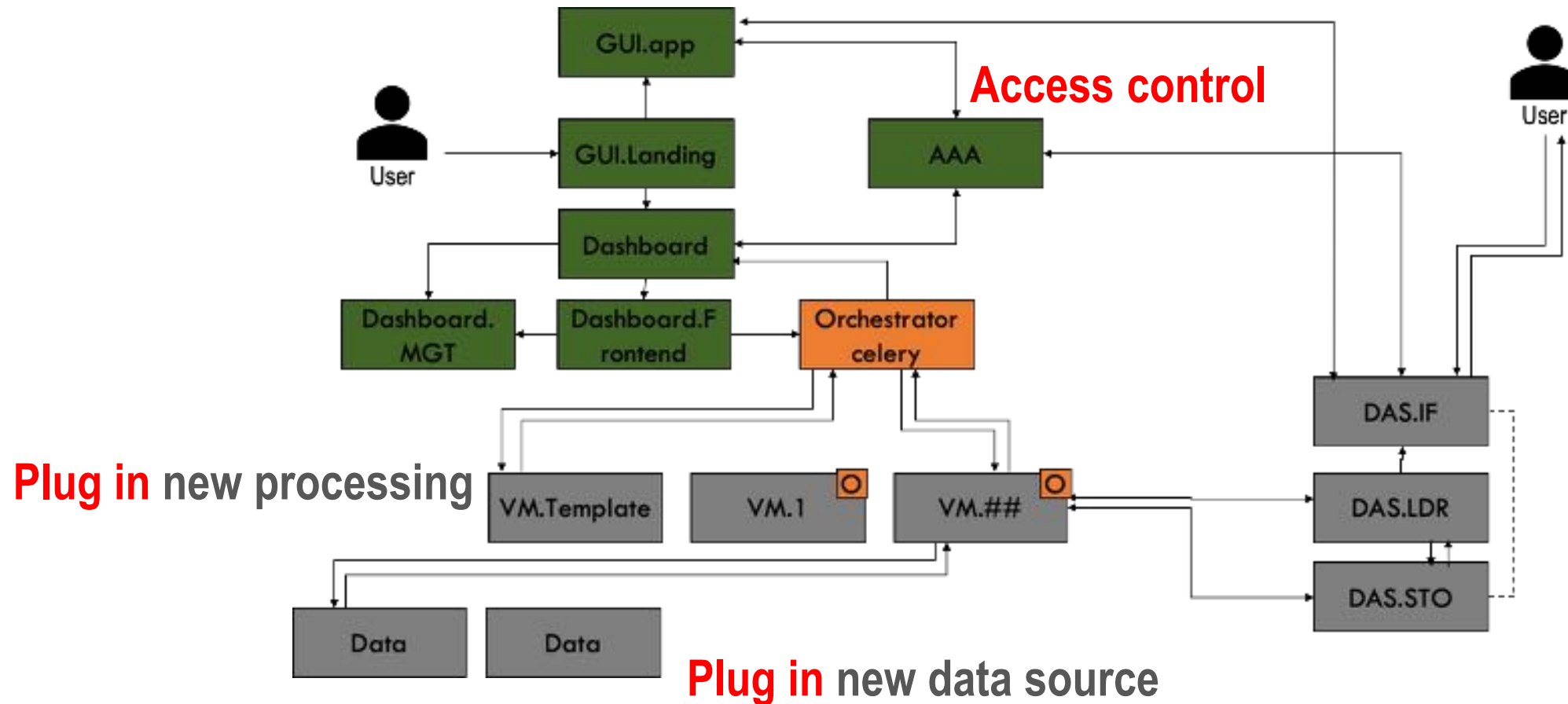
MODIS
(MOD/MYD13)



CUBEO Data Access and Data Preparation Pipelines

Easy access to datacube

M2M / API interface



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CUBEO Data Cube technology (ADAM)

Effective data access

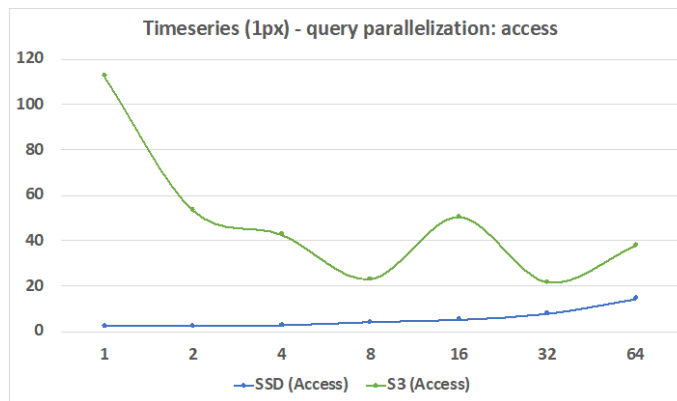
- Monitoring urban area of Rome

Landsat-5 (path/row = 191/31)

- 26 years (1985 - 2011)
- ~160GB (~400MB/product)

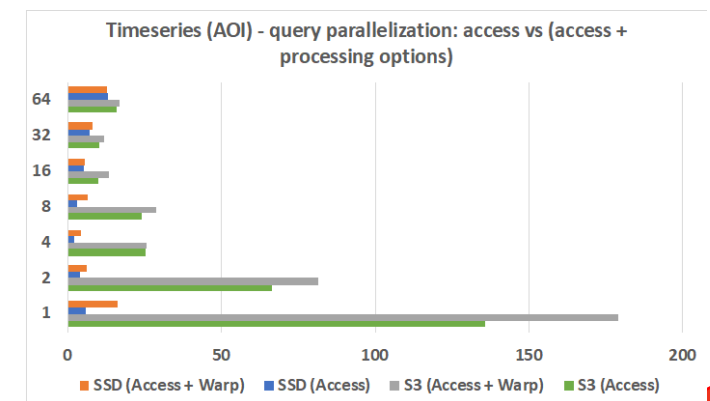
RGB timeseries 26 years

- RGB full tile (blue line): ~22GB
- RGB over Rome (red line): ~4GB



Flexible and scalable data access

- File system, object-storage, ...
- Low, medium, high, very high resolution, ...
- Optical, SAR, ...
- Level1, Level2, Level3, ...
- GeoTIFF, jp2, nc, COG, ...
- 2D, 3D, 4D, ...



CUBEO Create a new Data Cube

mea USER PROFILE

Account

RESOURCES

WCS - Coverages

DPS - Resources

Dashboard

Define the datacube AOI

Back to list

Create Cube

Area of Interest

Pipeline: LANDSAT Atm Corr (base)

Products Number: 106

Instances Number: 1

Start Date: 2018-07-01

End Date: 2018-10-10

Deadline: 2018-10-13

Near Real Time: ☐

Cloud Coverage: 100

Choose Plan: ☐ On-Demand: 5.31 \$ ☒ SPOT: 1.50 \$

Pipeline Options:

☐ Disable Inerts loading

☐ Disable LZW compression in product result

☐ Disable Cloud Optimized GeoTIFF in product result

☐ Add too for search band in output result

☐ Force to process product if already exists

Submit

Compute Costs

Submit the process

Compute costs

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Data protection privacy | Terms and condition

Few parameters required
(AOI, TOI, sensor)

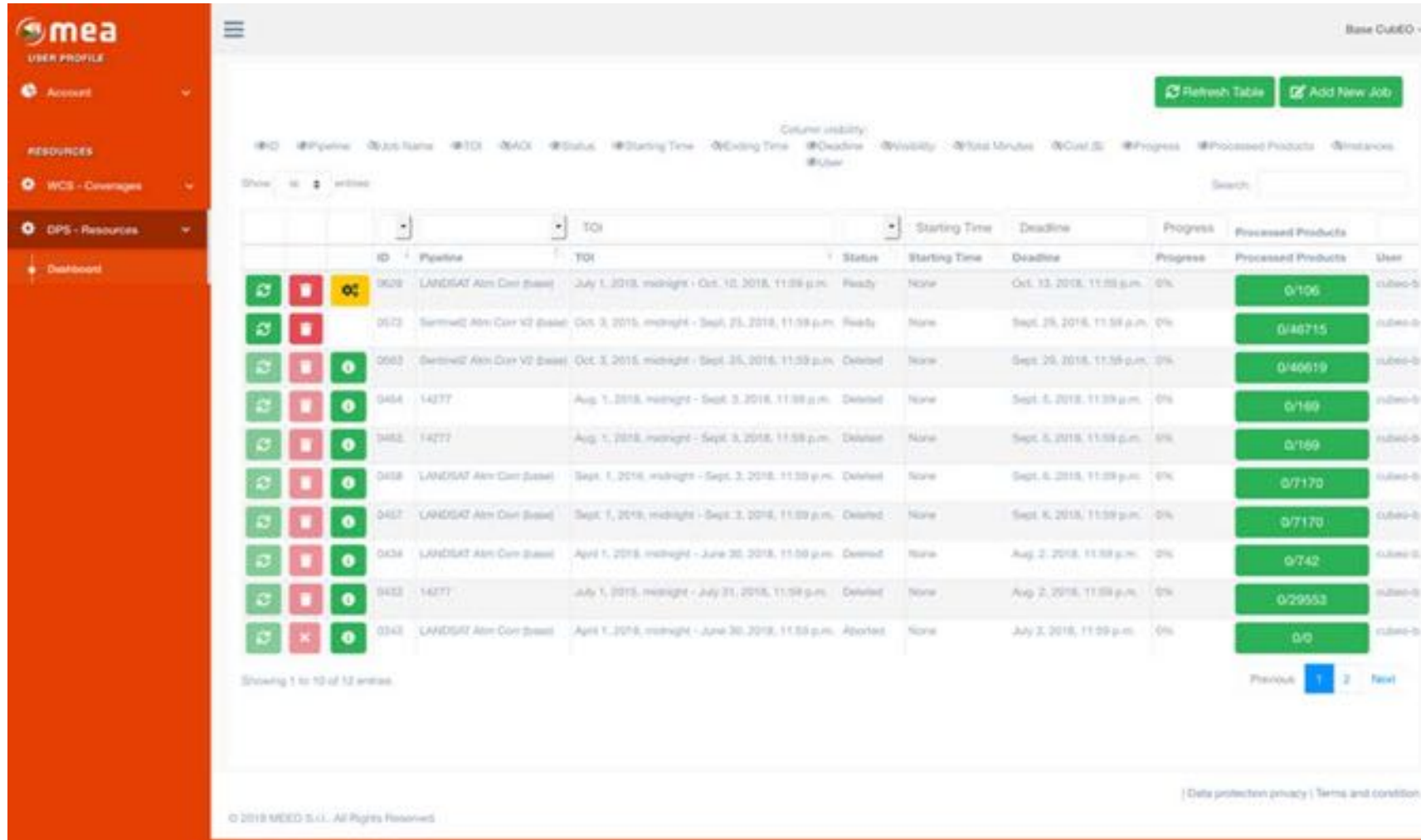
Cost estimation for Data
Cube creation and
maintenance

«Live» Data Cubes for
monitoring purposes

Set deadline for processing
completion

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CUBEO Manage on-going Data Cube creation pipelines



The screenshot displays the CUBEO web interface. On the left is an orange sidebar with the 'mea' logo and navigation links: 'Account', 'RESOURCES', 'WCS - Coverages', 'DPS - Resources', and 'Dashboard'. The main area features a table of pipelines with columns for ID, Pipeline, TOI, Status, Starting Time, Deadline, Progress, Processed Products, and User. The table lists 12 entries, each with a green refresh icon, a red stop icon, and a yellow cube icon. The first entry (ID 0628) is 'LANDSAT Alos Cori (swat)' with a 'Ready' status. The last entry (ID 0343) is 'LANDSAT Alos Cori (swat)' with an 'Aborted' status. At the bottom of the table, it says 'Showing 1 to 12 of 12 entries'. The footer includes '© 2018 MEEEO S.r.l. All Rights Reserved' and a link to 'Data protection privacy | Terms and condition'.

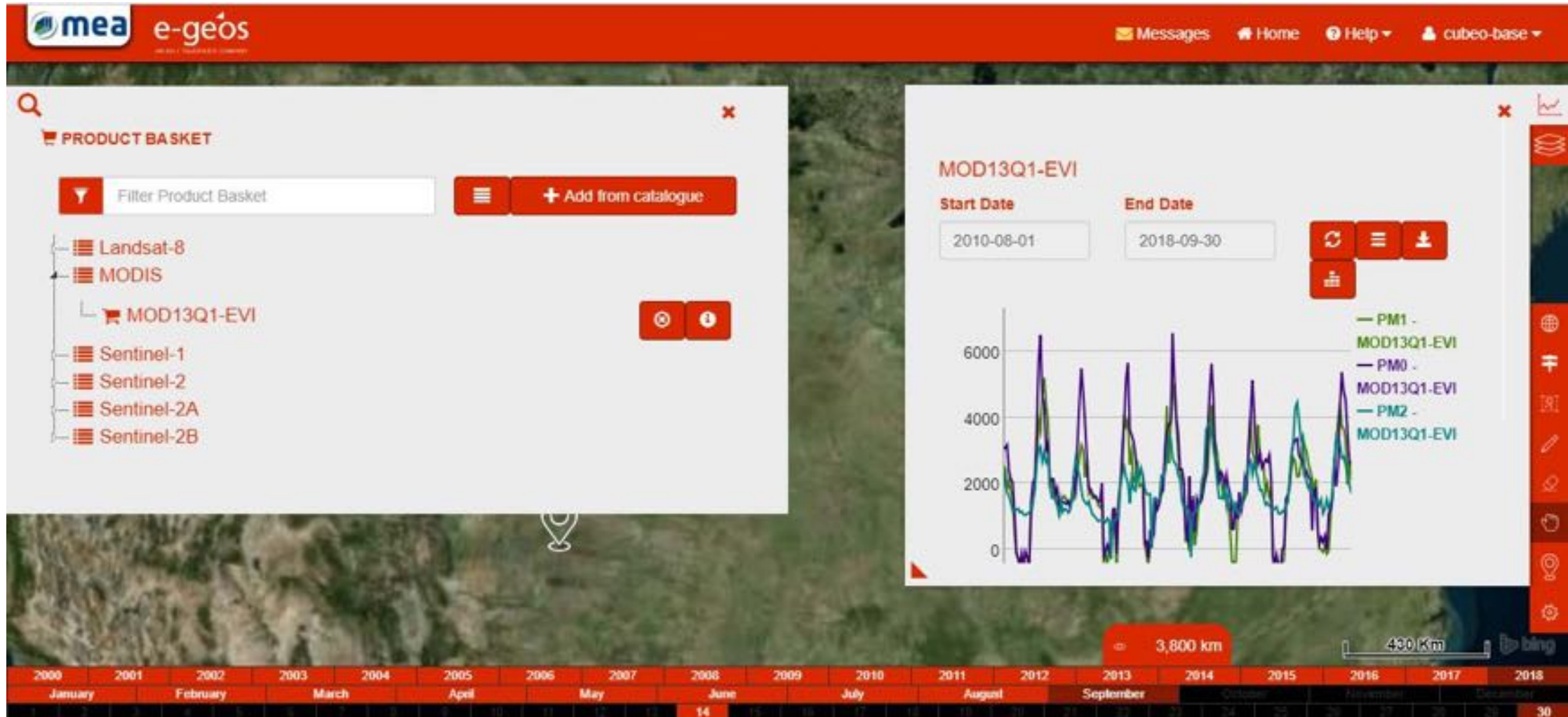
ID	Pipeline	TOI	Status	Starting Time	Deadline	Progress	Processed Products	User
0628	LANDSAT Alos Cori (swat)	July 1, 2018, midnight - Oct. 10, 2018, 11:59 p.m.	Ready	None	Oct. 13, 2018, 11:59 p.m.	0%	0/106	cubeo-0
0623	Satellite Alos Cori V2 (swat)	Oct. 3, 2018, midnight - Sept. 25, 2018, 11:59 p.m.	Ready	None	Sept. 26, 2018, 11:59 p.m.	0%	0/46715	cubeo-0
0603	Satellite Alos Cori V2 (swat)	Oct. 3, 2018, midnight - Sept. 25, 2018, 11:59 p.m.	Deleted	None	Sept. 26, 2018, 11:59 p.m.	0%	0/46619	cubeo-0
0484	14277	Aug. 1, 2018, midnight - Sept. 3, 2018, 11:59 p.m.	Deleted	None	Sept. 5, 2018, 11:59 p.m.	0%	0/169	cubeo-0
0483	14277	Aug. 1, 2018, midnight - Sept. 3, 2018, 11:59 p.m.	Deleted	None	Sept. 5, 2018, 11:59 p.m.	0%	0/169	cubeo-0
0438	LANDSAT Alos Cori (swat)	Sept. 1, 2018, midnight - Sept. 3, 2018, 11:59 p.m.	Deleted	None	Sept. 5, 2018, 11:59 p.m.	0%	0/7170	cubeo-0
0427	LANDSAT Alos Cori (swat)	Sept. 1, 2018, midnight - Sept. 3, 2018, 11:59 p.m.	Deleted	None	Sept. 5, 2018, 11:59 p.m.	0%	0/7170	cubeo-0
0436	LANDSAT Alos Cori (swat)	April 1, 2018, midnight - June 30, 2018, 11:59 p.m.	Deleted	None	Aug. 2, 2018, 11:59 p.m.	0%	0/742	cubeo-0
0433	14277	July 1, 2018, midnight - July 31, 2018, 11:59 p.m.	Deleted	None	Aug. 2, 2018, 11:59 p.m.	0%	0/29553	cubeo-0
0343	LANDSAT Alos Cori (swat)	April 1, 2018, midnight - June 30, 2018, 11:59 p.m.	Aborted	None	July 3, 2018, 11:59 p.m.	0%	0/0	cubeo-0

Monitor Data Cube creation status

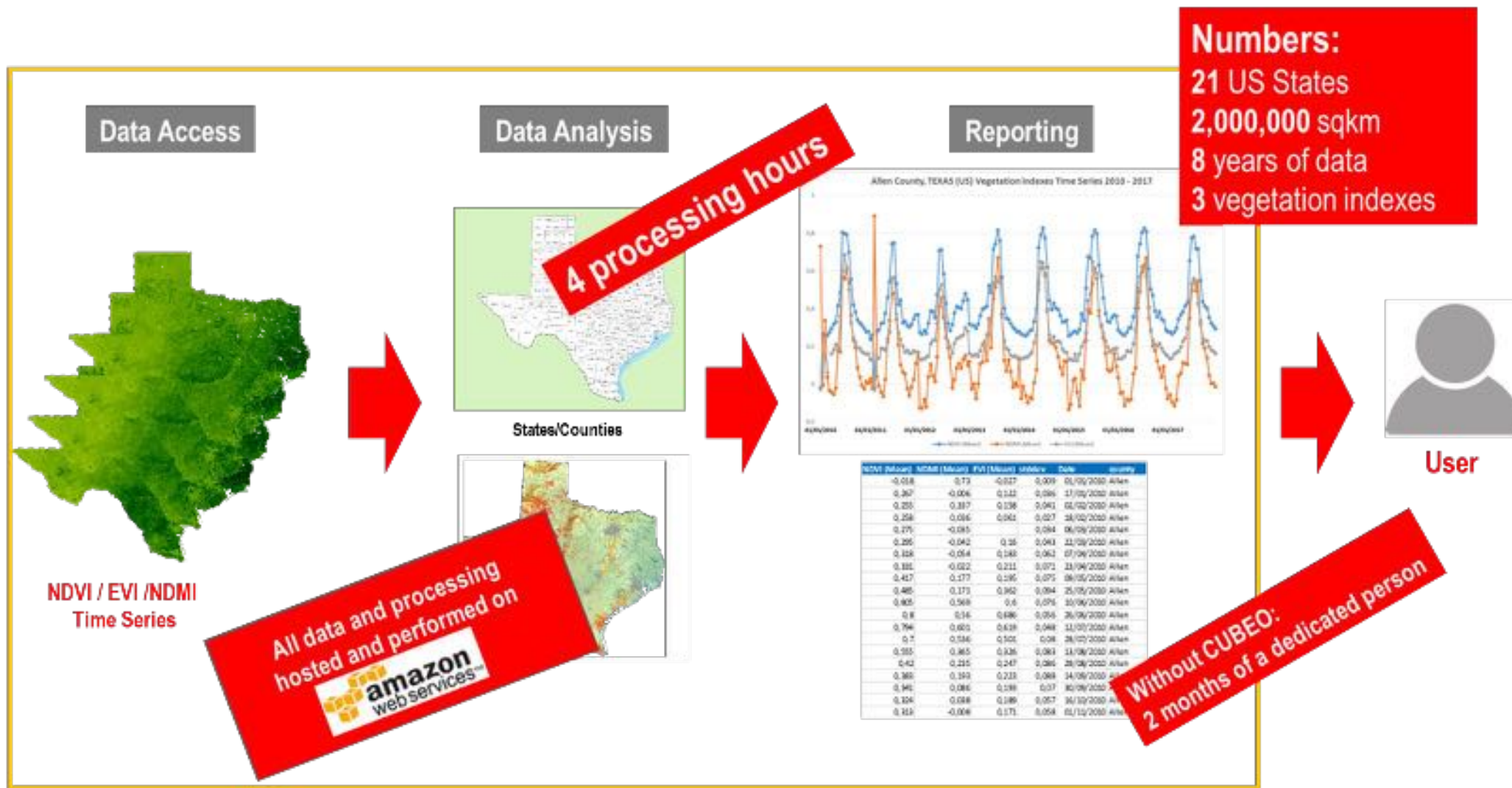
Check parameters

See detailed **reports** and **statistics**

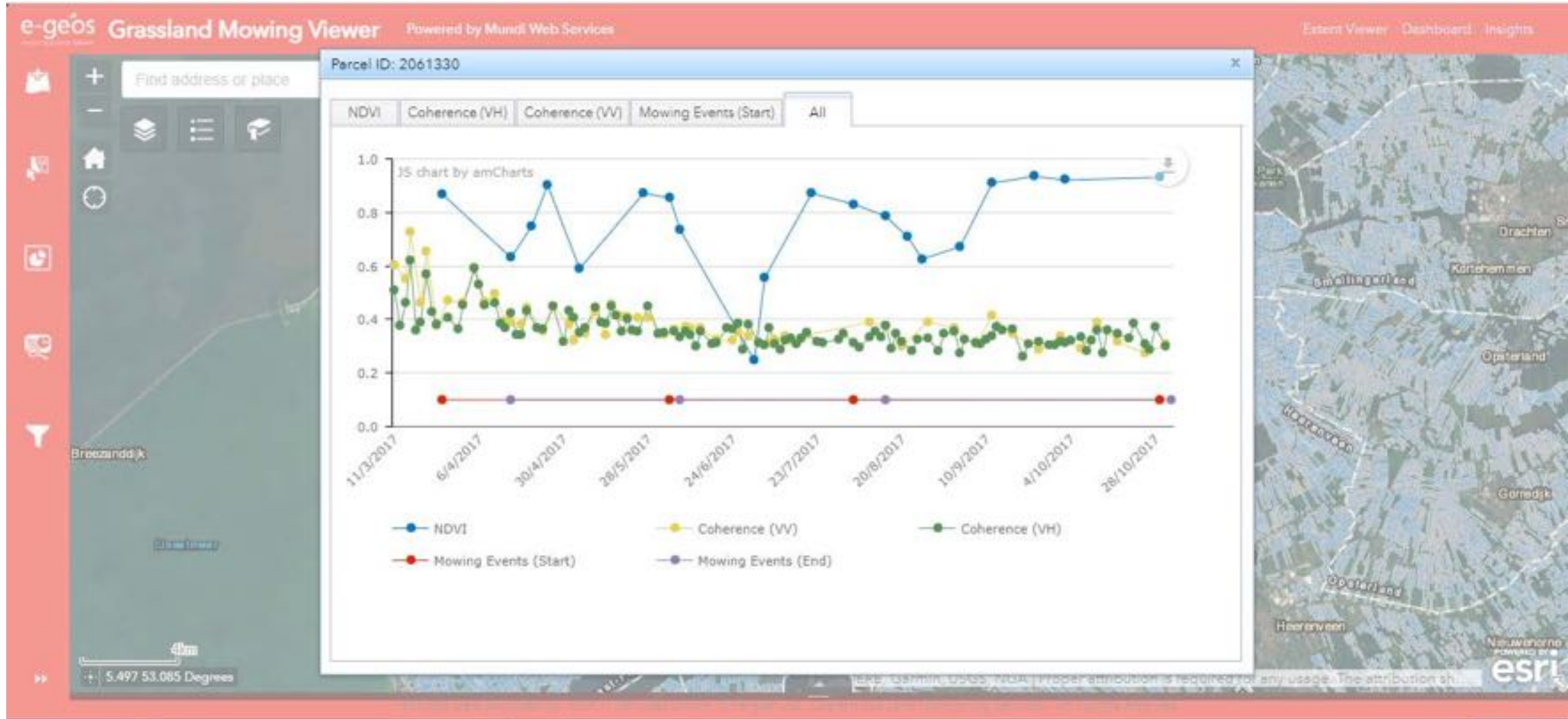
CUBEO Explore Data Cubes



CUBEO in action: Large scale processing



CUBEO in action: Monitor Grassland Management



CUBEO Future outlook

Definition of **Analysis Ready Data**, especially for SAR (amplitude and interferometric coherence Time Series)

Do «**more with less**», heavily exploiting cost efficient **storage** solutions (i.e. object storage), **computing** solutions (e.g. serverless processing) and **elastic and scalable** Data Cube access (i.e. WCS)

Add **more EO and non EO data** to the catalogue of available data sources

Improve the UX, by adding customer support functions

CUBEO Learn more

For more information visit our booth in the

EXHIBITION



the esa earth observation Φ -week
EO Open Science and FutureEO



Company General Use



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Thank you for your attention!

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Product manager

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