PROGRAMME OF THE EUROPEAN UNION

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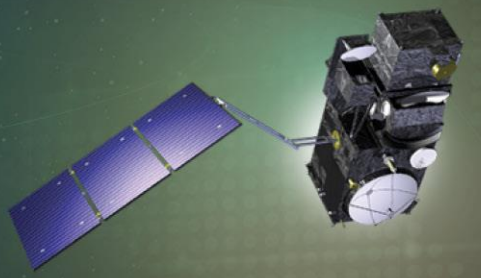

7th Sentinel-3 Validation Team Meeting 2022

18-20 October 2022 | ESA-ESRIN | Frascati (Rm), Italy

The "Copernicus Space Component Validation for Land Surface Temperature, Aerosol Optical Depth and Water Vapor Sentinel-3 Products (LAW)" Project : Overview and Main achievements regarding S3 validation

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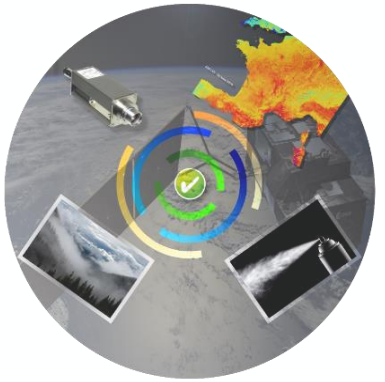
(1) ACRI-ST, (2) Finnish Meteorological Institute (FMI), (3) Swansea University, (4) Spectral Earth, (5) University of Leicester, (6) KIT - Karlsruher Institut für Technologie, (7) SERCO c/o ESA-ESRIN, (8) ESA/ESRIN

Overview of the LAW project



- 2-years ESA/Copernicus project started in January 2020 – extended in 2022 to cope with COVID travel restrictions
- European consortium gathering Validation, Instrumentation and Expert teams

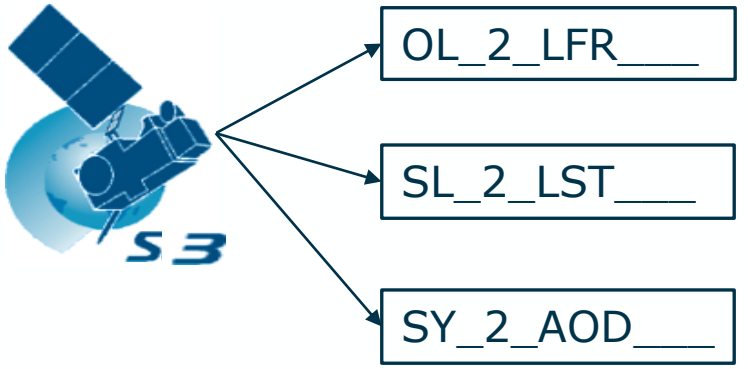
- **MAIN OBJECTIVE =** Having a **more extensive and systematic validation** of three Sentinel 3 parameters against ground-based measurements
  1. Increasing the level of confidence the users will have in these products
  2. Better identify areas where product are limited and need to be improved

ACRI ST
ILMATIETEEN LAITOS METEOROLOGISKA INSTITUTET FINNISH METEOROLOGICAL INSTITUTE
UNIVERSITY OF LEICESTER
KIT Karlsruhe Institute of Technology
Swansea University Prifysgol Abertawe
Spectral Earth

Objectives of the LAW project : Validation of S3 products using comparison with ground-based measurements:

1. Collect, control and qualify the selected in-situ measurements

2. Create S3 products /ground-based measurements **matchups**
3. Analysis of theses matchups regarding S3 quality assessment, S3 parameters uncertainties and possible Algorithm evolutions
4. **Distribution of these matchups through a dedicated web portal**



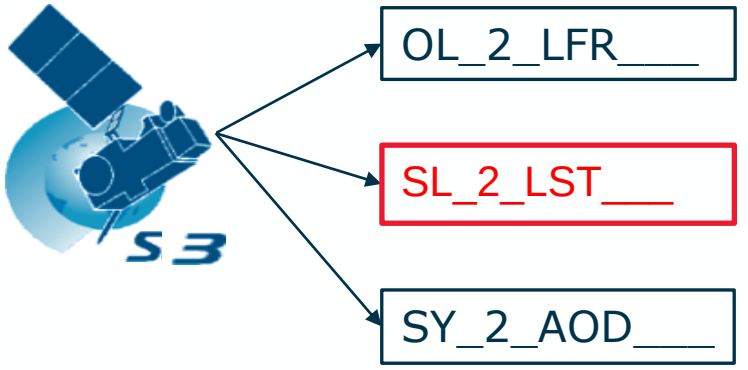
Providing **Integrated Water Vapour (IWV)** column on 300m resolution – Over Land and Ocean

Providing **Land Surface Temperature (LST)** on 1 km resolution

Providing **Aerosol Optical Depth (AOD)** on 4,5 km resolution – Over Land and Ocean

Objectives of the LAW project : Validation of S3 products using comparison with ground-based measurements:

1. Enlarge the LST-dedicated networks as current deficiency in term of biome coverage :
   - Perform a LST gap analysis to select 5 relevant locations + deploy and maintain these new 5 LST stations
2. Create S3 products /ground-based measurements **matchups**
3. Analysis of theses matchups regarding S3 quality assessment, S3 parameters uncertainties and possible Algorithm evolutions
4. **Distribution of these matchups +** + LST raw data **through a dedicated web portal**



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Main achievements of the LAW project :

- **Validation over 2-years** of the OLCI IWV dataset and the SYN AOD dataset :
  - Data quality assessment and analysis of the associated uncertainties (dedicated papers published in AMT)
  - Definition of the products limitations and specification of required algorithm evolutions

- On-going Validation of the SLSTR LST datasets (Final result end of 2022)
- **Deployment of 5 new LST stations** in Europe and Australia since October 2021 (except KIT forest -August 2020). Nominal acquisition and data transmission

- Creation of **a matchup database** fully open to anyone (after subscription) via a web portal https://law.acri-st.fr/home providing :
  - All information about the project
  - On-demand matchup request (from January 2020) + Provision of In-situ data from selected networks
  - Validation report and results

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R. Preusker – 19/10/2022 – Atmosphere Session 9:00 AM

L. Sogacheva – 19/10/2022 – Aerosols, Cloud and Surface Session 10:00 AM

- On-going Validation of the SLSTR LST datasets (Final result end of 2022)
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J. Anand – 19/10/2022 – Landcover & Temperature Session 09:00 AM

- Creation of **a matchup database** fully open to anyone (after subscription) via a web portal https://law.acri-st.fr/home providing :
  - All information about the project
  - On-demand matchup request (from January 2020) + Provision of In-situ data from selected networks
  - Validation report and results

Creation of a Matchup Database

- IWV Matchup Datasets = [Jan. 2020 – Dec. 2021]
- AOD Matchup Datasets = [Jan. 2020 – Today]
- LST Matchup Datasets = [Oct. 21 – Today] except for KIT Forest site deployed in August 2020

1. S3A and S3B satellite extraction provided with similar format than operational products
2. All operational anomalies (RFI, decontamination, Lunar Calibration, …) filtered out
3. One NetCDF file per station gathering all selected matchups

IWV Dataset	AOD dataset	LST dataset
NOAA IGRA TCCON UCAR COMMUNITY PROGRAMS COSMIC SUOMINET GRUAN	AERONET AEROSOL ROBOTIC NETWORK AERONET MARITIME AEROSOL NETWORK International SKYNET DataCenter NOAA SURFRAD	The 5 LAW LST Stations : ▪ Puéchabon, France ▪ KIT Forest, Germany ▪ Svartberget, Sweden ▪ Hyytïala, Finland ▪ Robson Creek, Australia
• 31 * 31 OLCI pixels extraction = **~ 10 km²** around each station at each overpass • All ground-based data acquired **+/- 3 hours**	• 11 * 11 SYN AOD super-pixels extraction = ~ **50 km²** around each station at each overpass • All ground-based data acquired **+/- 30 minutes**	• 51 * 51 super – pixels extraction = **~ 50 km²** around each station at each overpass • Day and night passes • All ground-based data acquired **+/- 1 hour**

Accessibility of the Matchup Database on dedicated web portal

- Free access (upon subscription) on https://law.acri-st.fr/home

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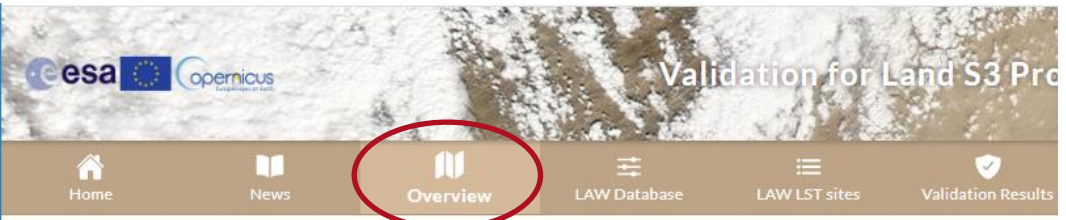


The objective of the LAW project, consists in strengthening the validation of three important L2 products:

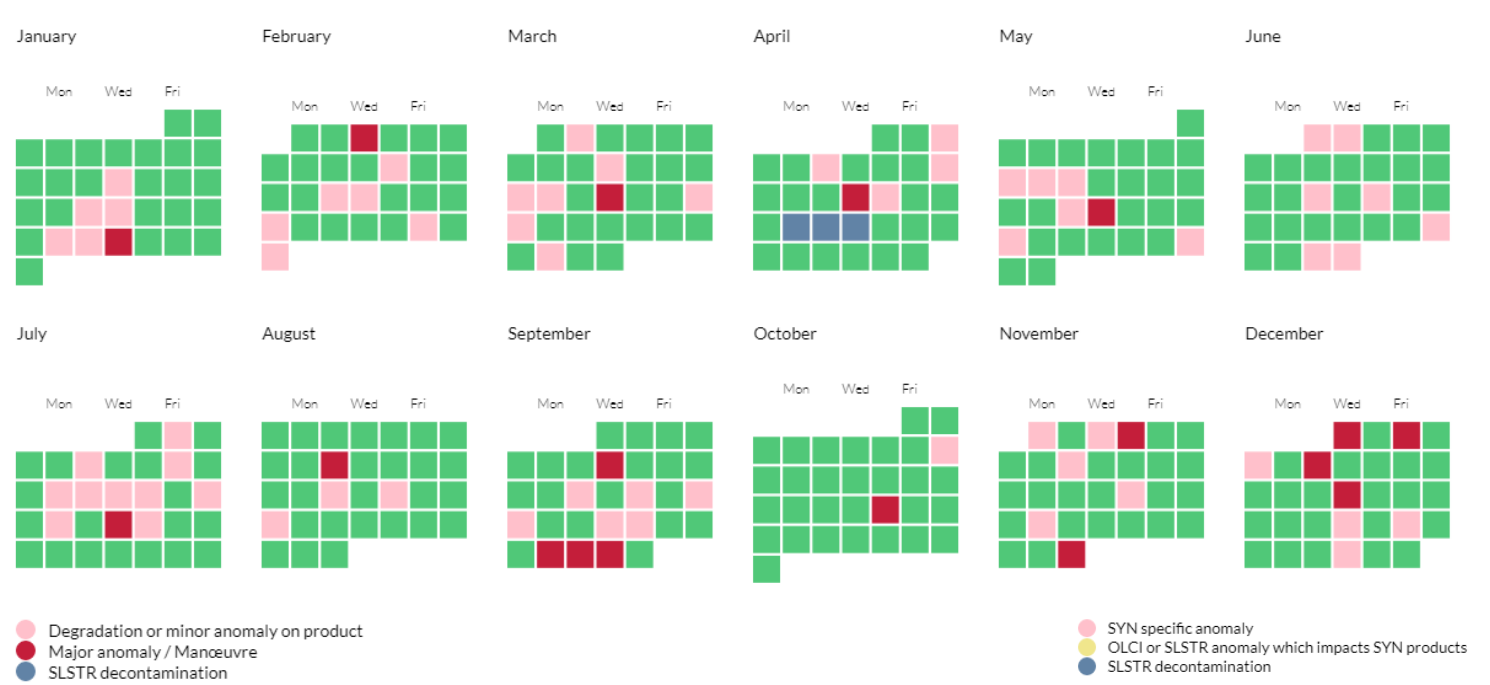
L	LST	Land Surface Temperature
A	AOD	Aerosol Optical Depth
W	IWV	Integrated Water Vapor

Satellite products are provided with their own quality flags (i.e.clouds/snow and or ice, surface class instrument /calibration /pointing errors, sun glint, ...).However, some elements like RFI affection or specific operational issues like SLSTR decontamination are not transcribed through flags inside S3 products.
S3 products affected by such operational issues have then been filtered out from the LAW database.

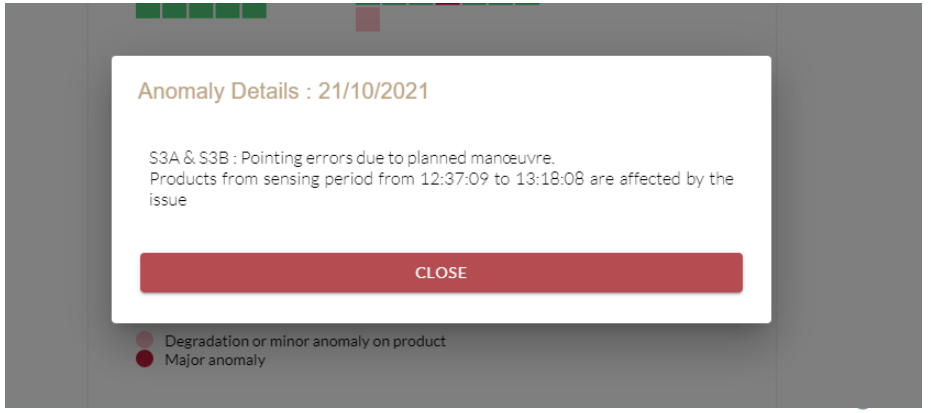
2020 Calendars

2021 Calendars

2022 Calendars



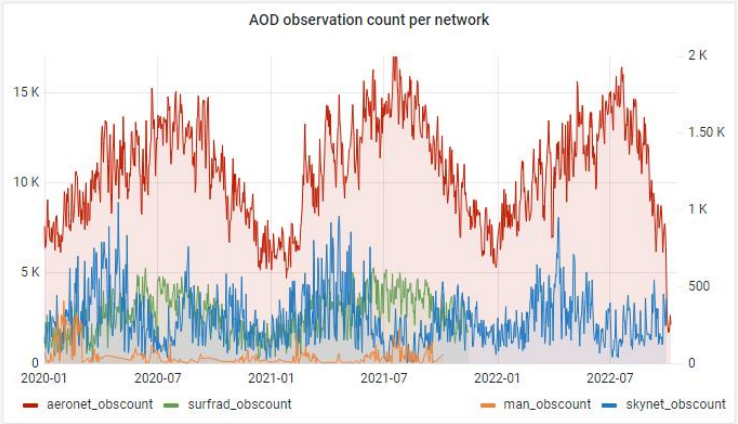
Each date is « clickable » and provides information about anomaly and the extent of affectation

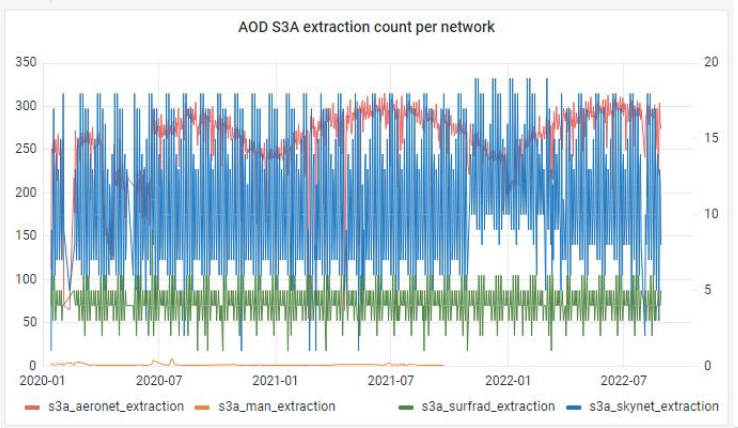


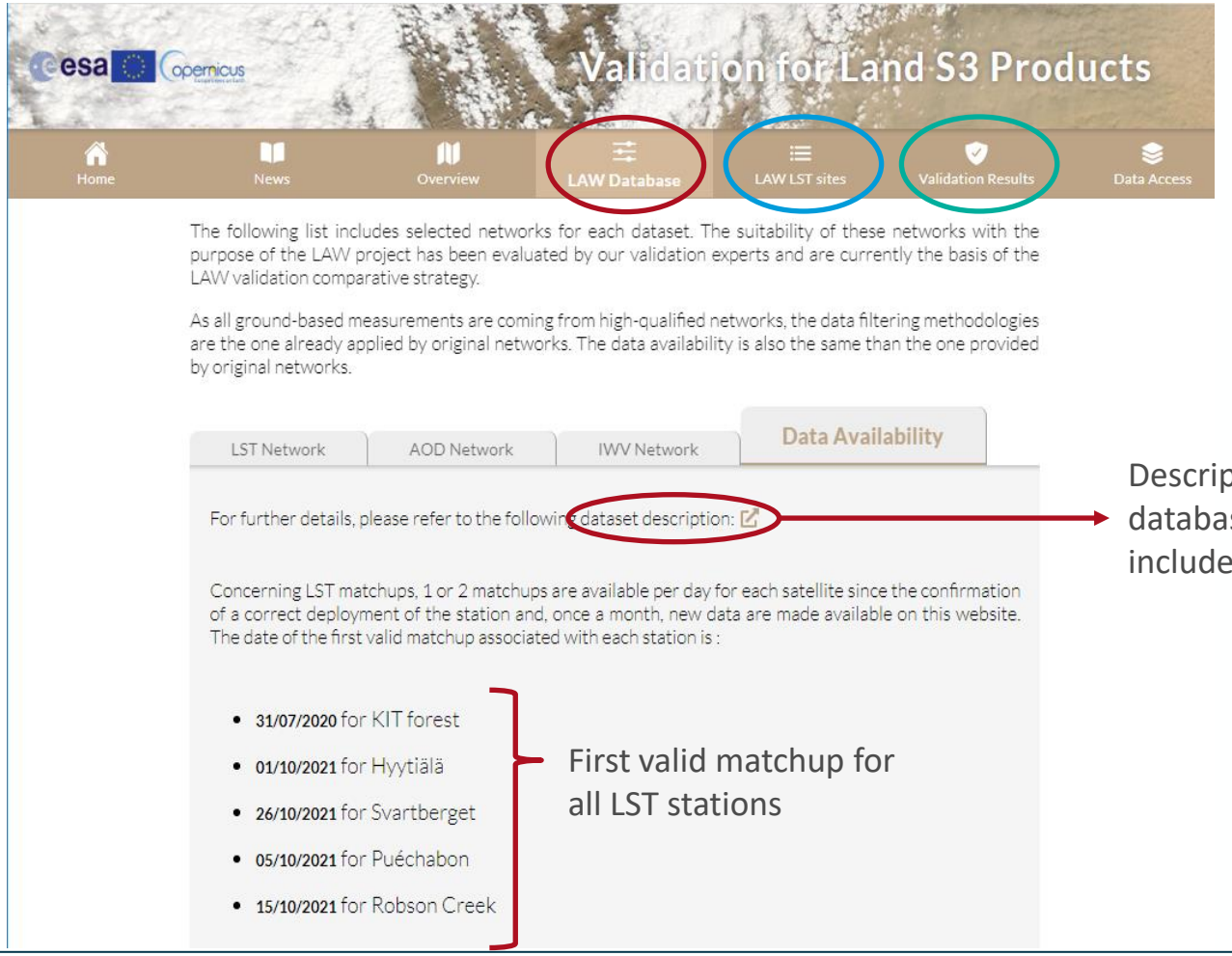
Data availability for AOD and IWV ground-based measurements and satellite extraction

Description of LAW LST stations in dedicated tab

Final Validation Reports for AOD and IWV datasets + Current LST Validation report (Monthly Updated)

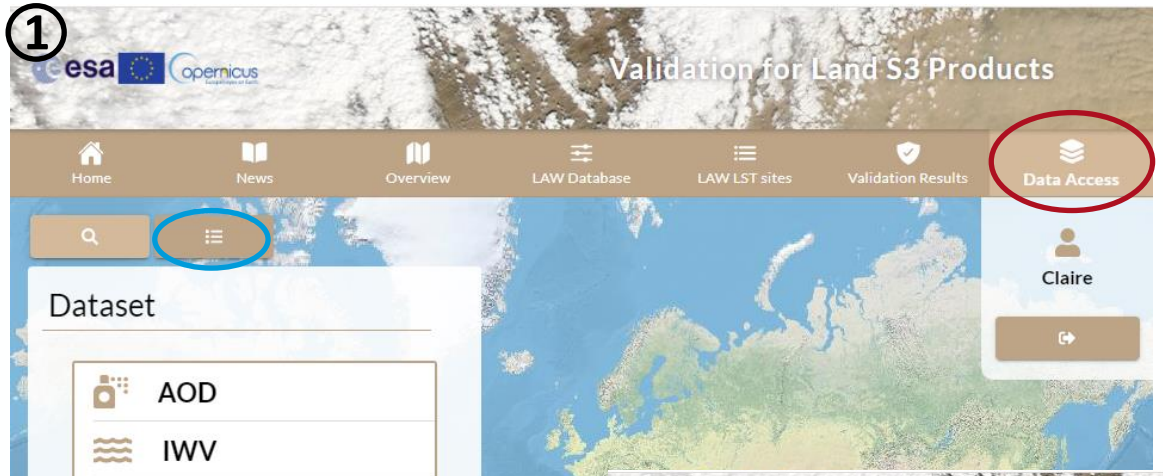






Description of the Matchup database (specific readme included in each request)

First valid matchup for all LST stations



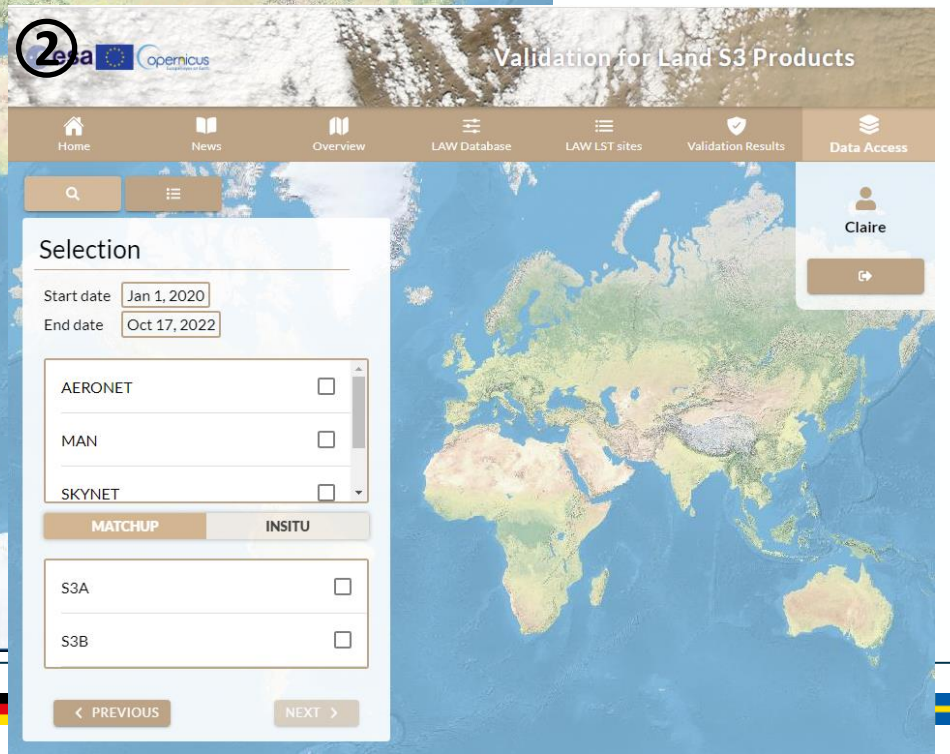
Data access upon subscription

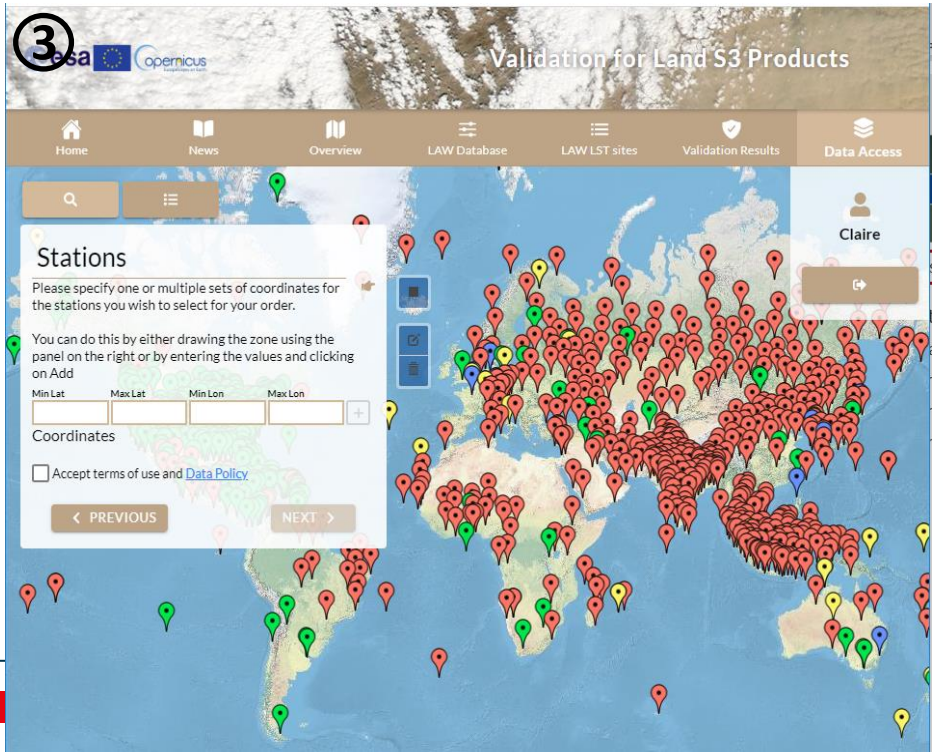
- Selection criteria =
  1. 1 Dataset
  2. 1 Time window + 1 or 2 Satellites +1 or several networks
  3. 1 or several Regions of Interest

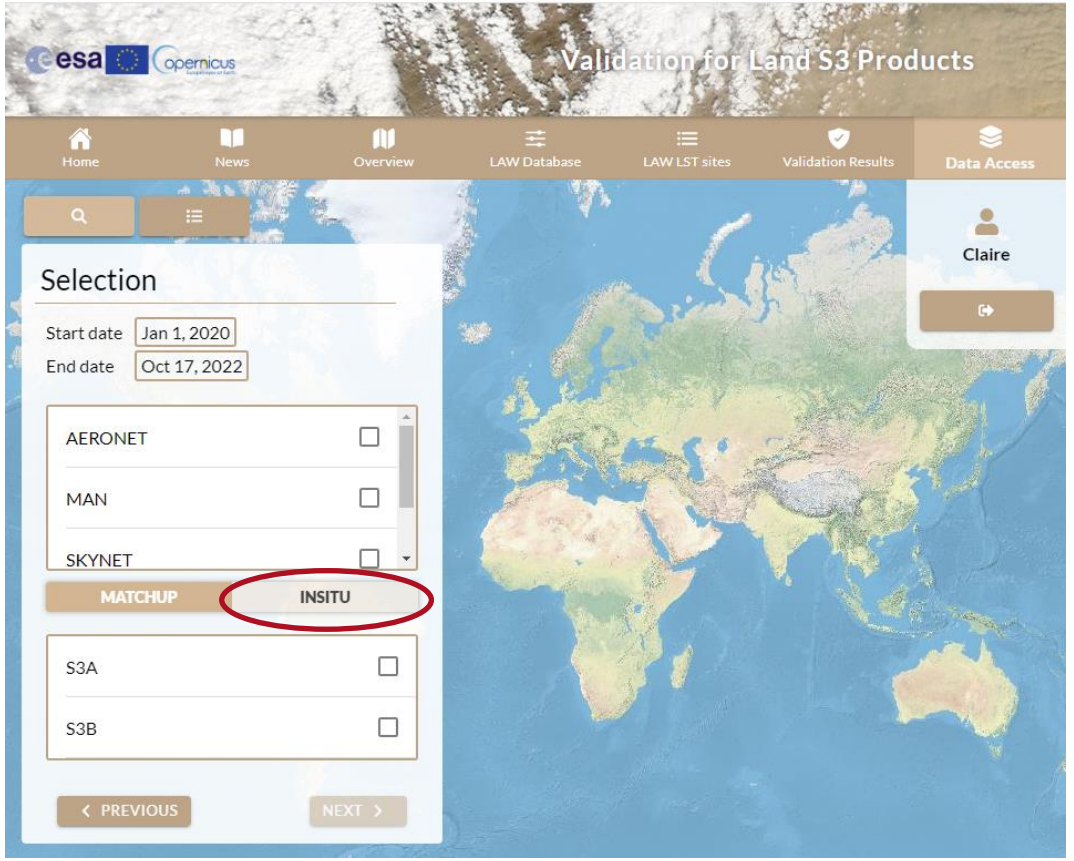
→ One zipped file including several NetCDF files, one per station

→ Email with direct link

→ Order list with status and download link



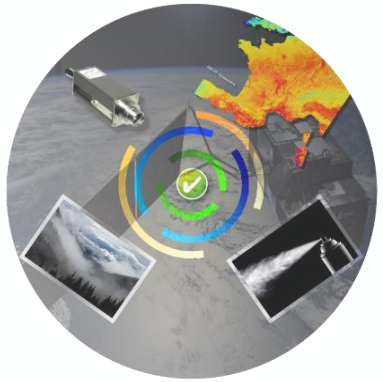




NEW Selection criteria – only ground-based measurements

Option required for LST, extended to AOD and IWV ground based measurements

1. 1 Dataset
2. 1 Time window + 1 or several networks
3. 1 or several Regions of Interest



THANK YOU FOR YOUR ATTENTION

https://law.acri-st.fr/app/home

contact-law@acri-st.fr