

Validation and operational monitoring of atmospheric products derived from IASI measurements

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The thermodynamic profiles and cloud information derived from the hyperspectral Infrared Atmospheric Sounding Interferometer (IASI) are part of the EUMETSAT operational Level 2 products disseminated in near-real time.

EUMETSAT/HSIR has established platforms to validate products and perform continuous monitoring of the operational L2 products quality with independent measurements to ensure meeting the User requirements.

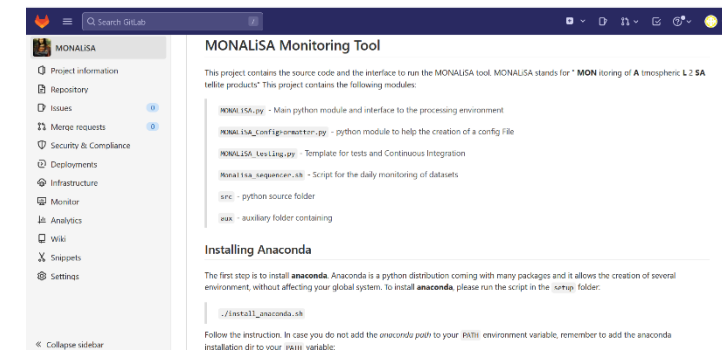


- **MONALISA** (python package)

provides an operational environment for the validation / verification of satellite L2 products (e.g. Temperature and Water Vapour profiles) with in situ and ground-based measurement (e.g. radiosonde)

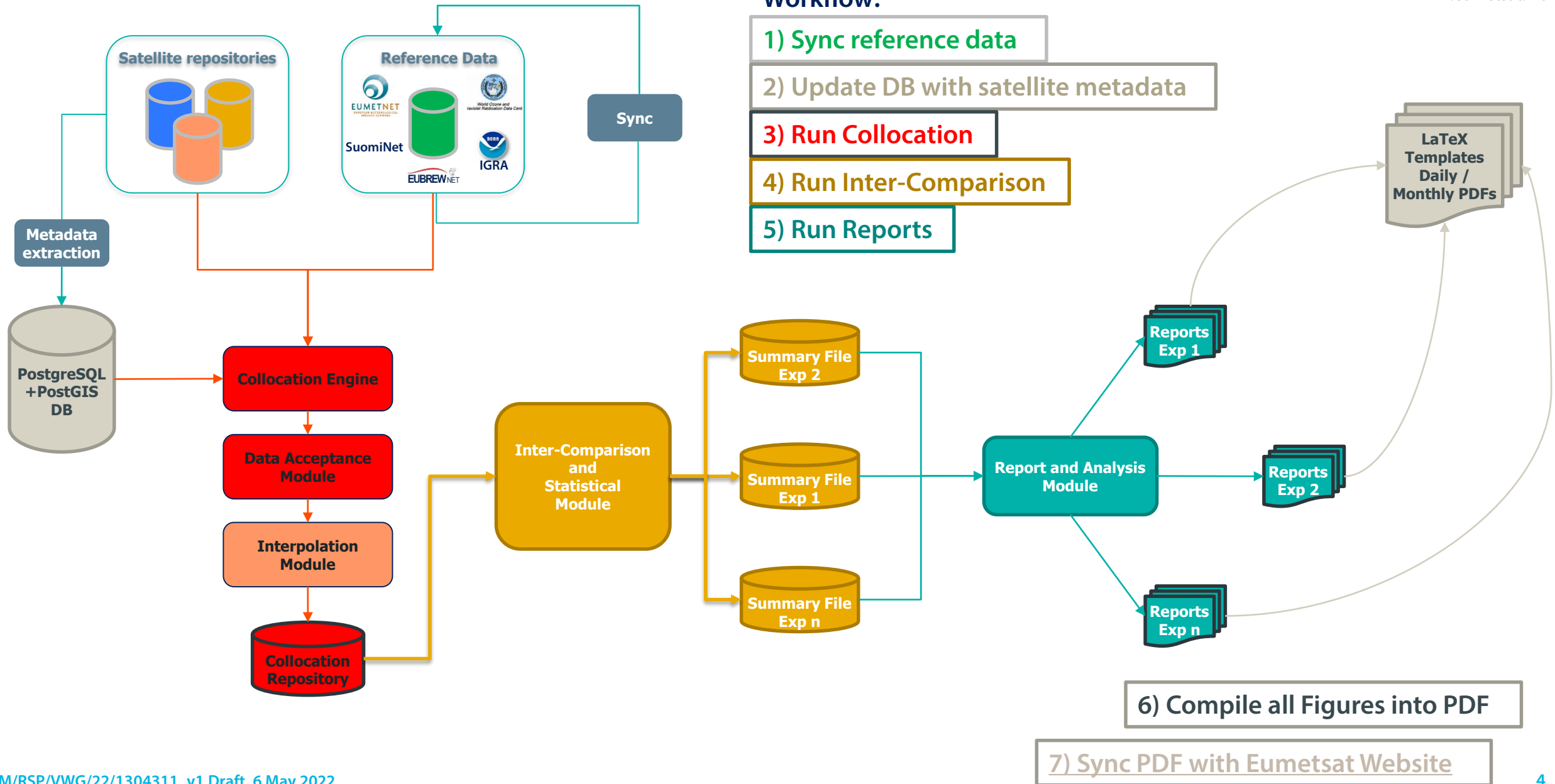
- **Features:**

- ✓ CLI - Config file based
- ✓ Automated overpass detection (PostgreSQL + PostGis)
- ✓ Automated download of reference data
- ✓ Daily, Monthly reports as PDF (published at eumetsat.int)
- ✓ End-to-end processing: cronjobs, maintenance tools (cleanup, watchdog for processing Errors and Times, config file creator)
- ✓ Git Version Controlled (Eumetsat GitLab)
- ✓ Software Release Note





MONALISA schematics





IASI Level 2 geophysical products monitoring reports



IASI

Infrared Atmospheric
Sounding Interferometer



Eumetsat.int: IASI Level 2 geophysical products monitoring reports



2022



Reference	Variable	Metop-B reports	Metop-C reports
IGRA	Temperature and humidity profiles	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
EuBrewNet	Total column ozone	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
EumetNet (E-Gvap)	Total column water-vapour	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
LSA SAF - SEVIRI	Clear-sky Land Surface Temperature	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
CALIOP-CALIPSO	Cloud products	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

MONALISA

MAP_GII

2023



2022



2021



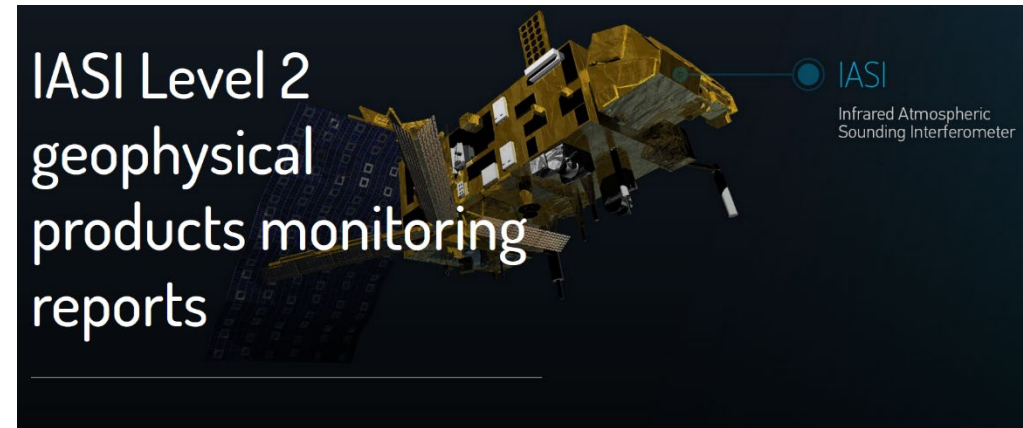
2020



2019

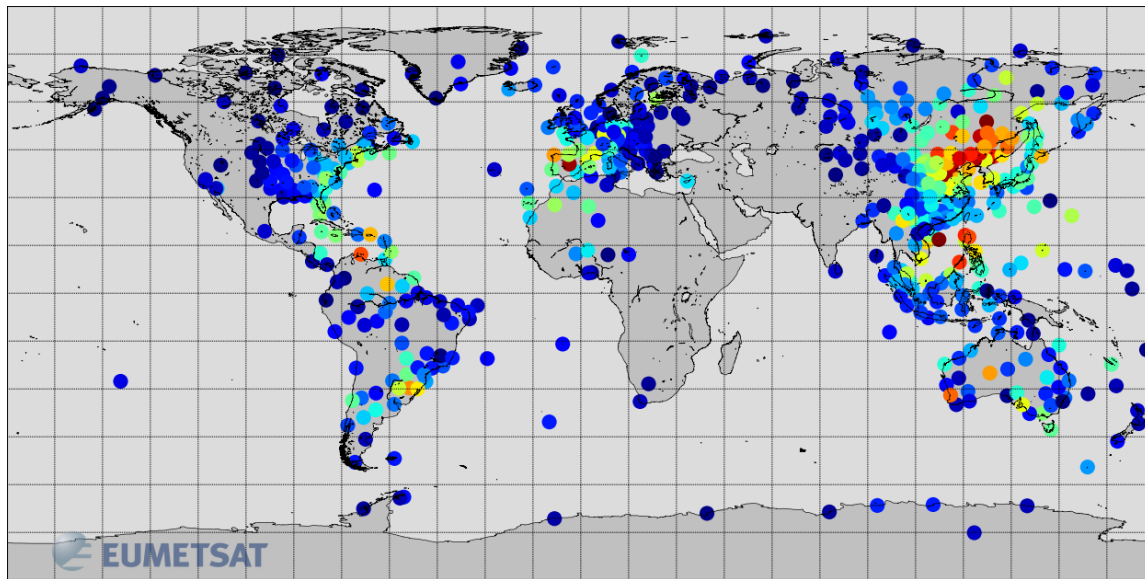


2018

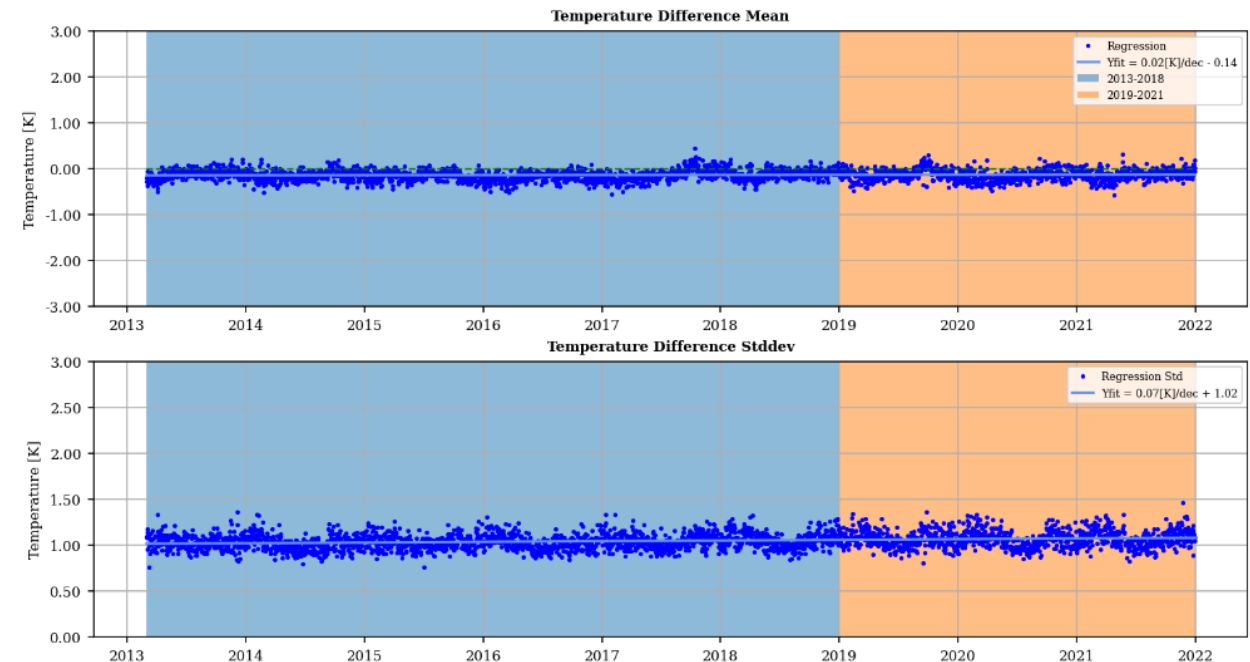


<https://www.eumetsat.int/iasi-level-2-geophysical-products-monitoring-reports>

- IGRA is the longest time series in MONALiSA, included in operational monitoring since late 2018
- It has a very dense global coverage and provides the main reference for temperature and humidity profile measurements.

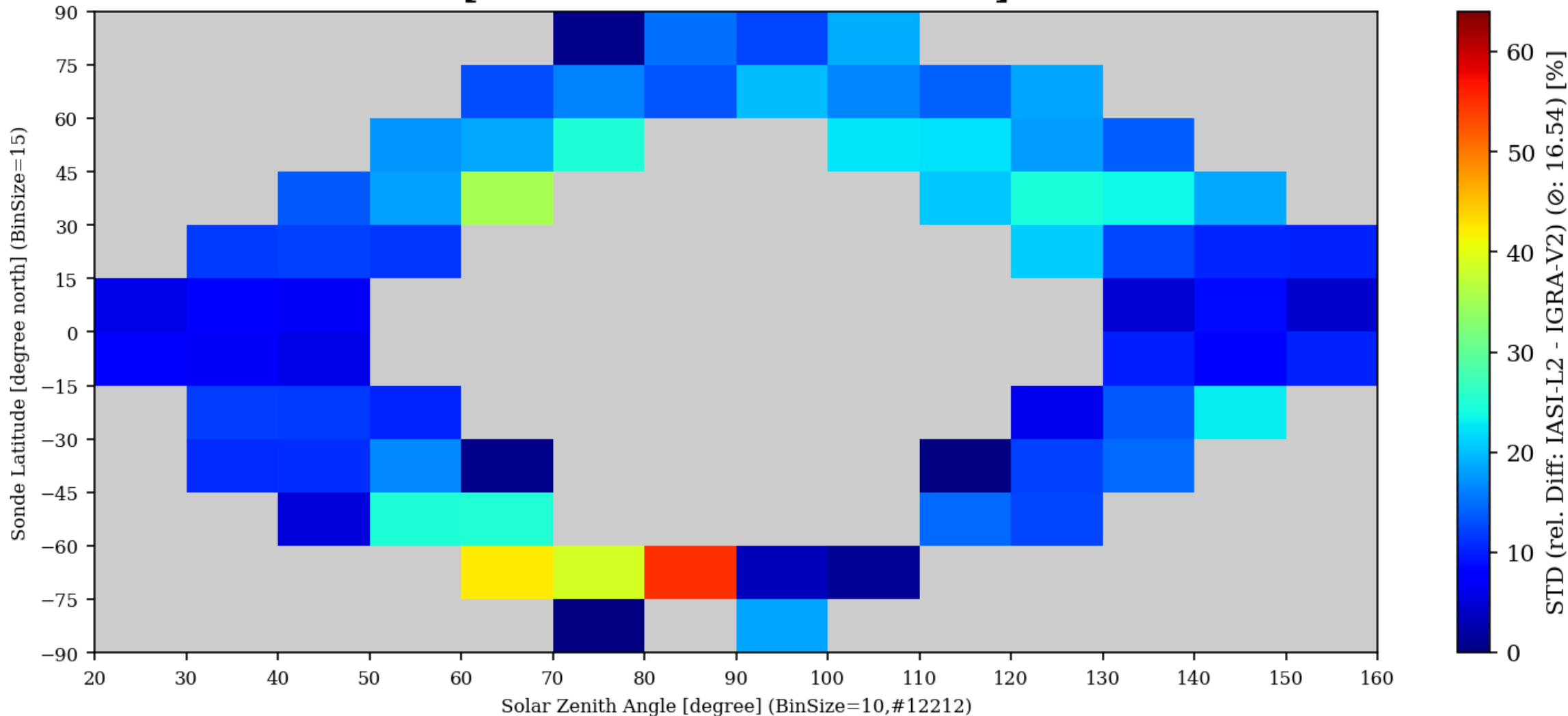


IASI-B - PWLR – CDR validation report



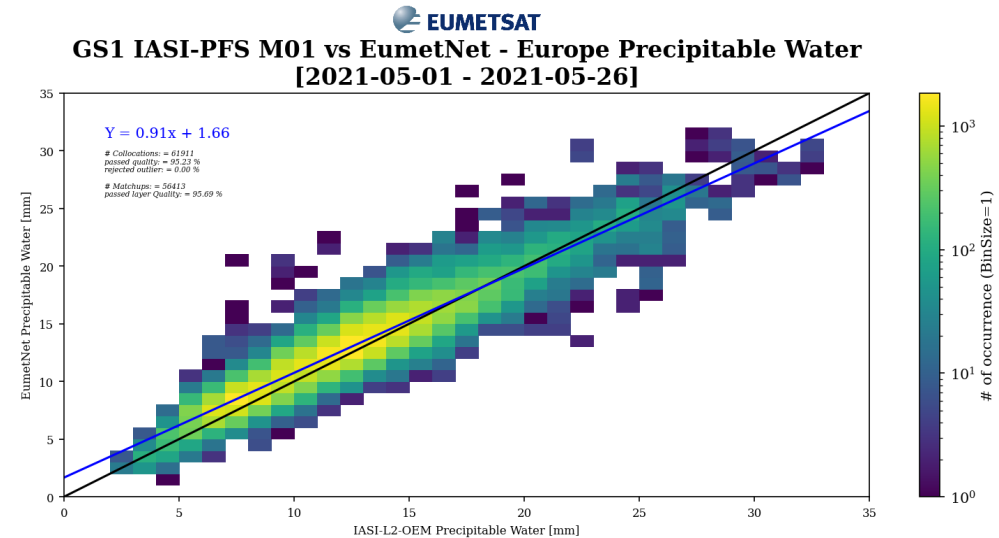
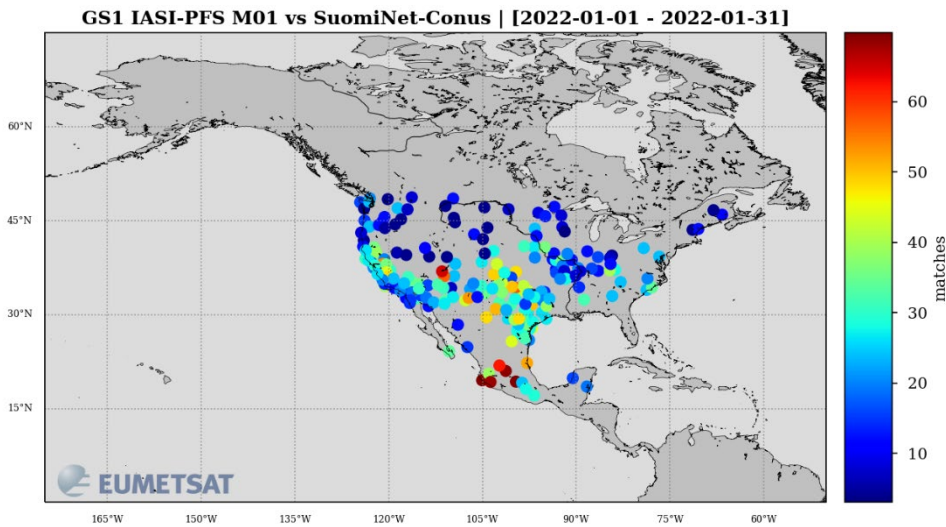


GS1 IASI-PFS M01 vs IGRA sondes Precipitable Water [2022-10-01 - 2022-10-16]

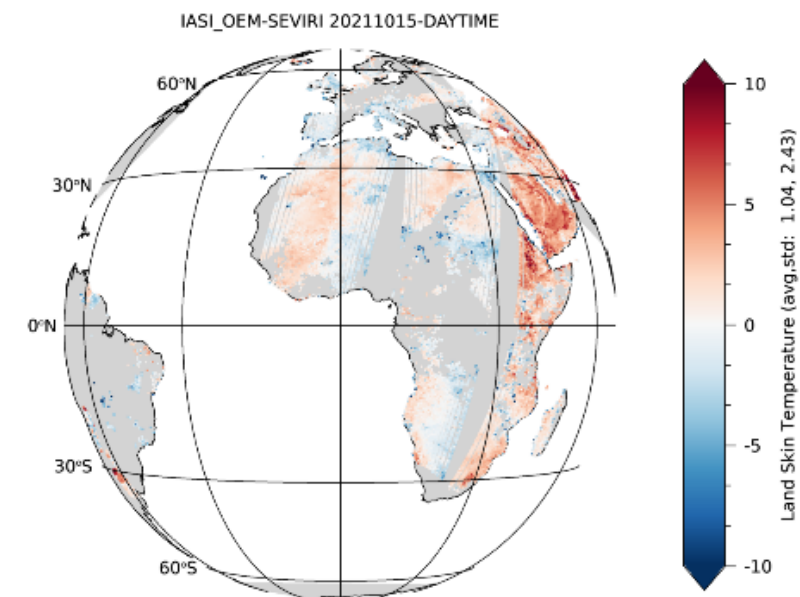
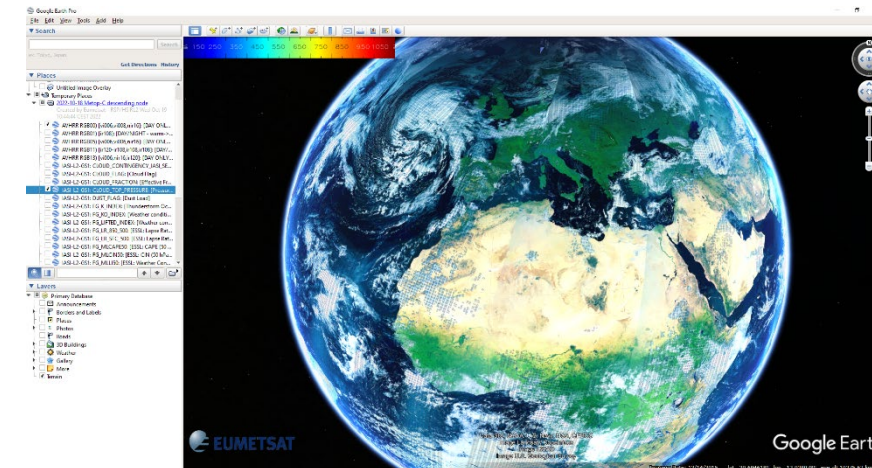




- EumetNet is the latest reference included into MONALISA
- It completes the IWV study started with SuomiNet and focuses mainly on Europe

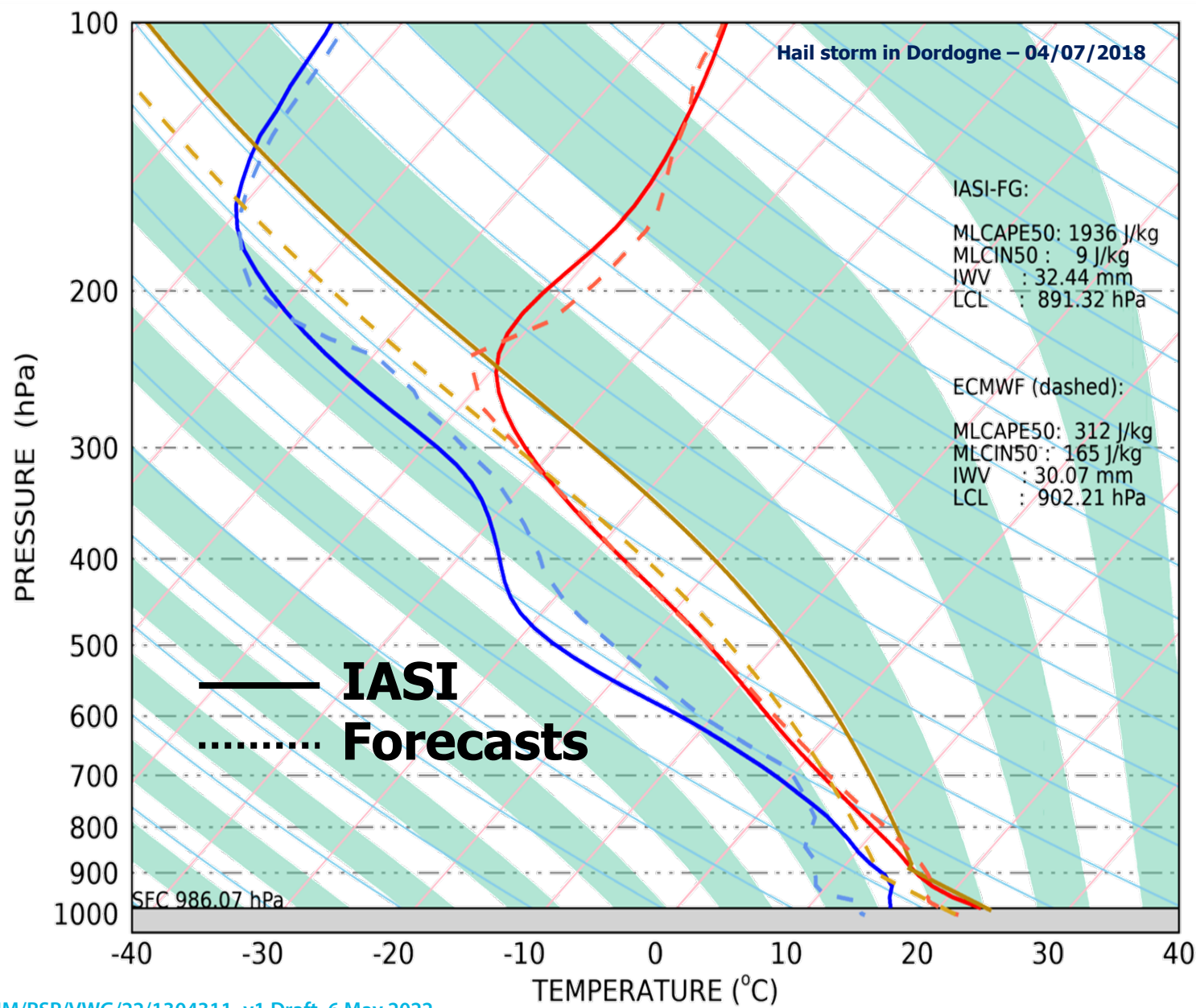


- 2 main schemes
 - **Case Study** approach - to provide visual inspections of IASI L2 products on top of AVHRR based RGB'S
 - Intercomparison and **validation** approach including **statistical evaluation** with active satellite sensors
- Applications:
 - ✓ Global Instability Indices , e.g. CAPE, KO-Index vs. ECMWF – NWP
 - ✓ Global Google Earth visualizations (daily)
 - ✓ AVHRR RGB's
 - ✓ IASI Cloud products, IWV
 - ✓ IASI/SEVIRI cloud mask contingencies
 - ✓ Cloud products Validation, e.g. Cloud detection, Cloud Top vs. CALIOP (daily reports)
 - ✓ LST vs LSA SAF SEVIRI/AVHRR (daily reports)

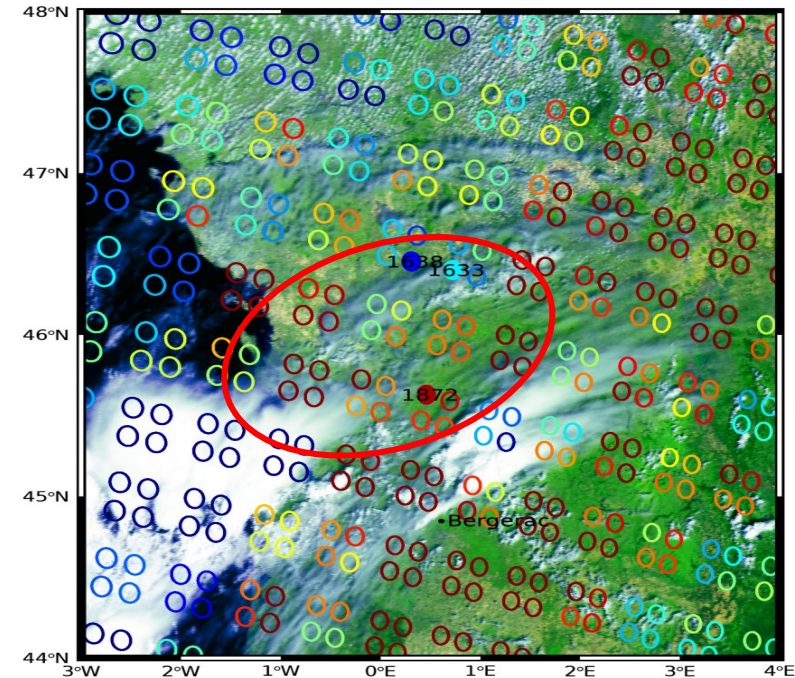




Severe Weather Case studies



Metop-B/IASI 04/07/2018 09:50





	Reference instrument	Source	Geophysical Parameters	Coverage
Routine monitoring	Radiosondes	IGRA (NOAA)	Temperature and humidity profiles and associated uncertainty estimates. Lapse rate: 0-1.5 km and 850-500 hPa. Partial WV column 0-1.5 km and 850-500 hPa. Total column water-vapour.	Global
	Ground-GNSS	EumetNet	Total column water-vapour	Europe (dense) Global (sparse)
	Ground-GNSS	NOAA	Total column water-vapour	US (ConUS, dense) Global (SuomiNet, very sparse – data stream stopped)
	Brewer	EuBrewNet	Total column ozone	Europe (low density) Global (very sparse)
	SEVIRI	LSA SAF	Land Surface Temperature	GEO disk
	Buoys	OSI SAF	Sea Surface Temperature	Global
	CALIOP	NASA	Cloud top height, cloud type, cloud mask	Sub-polar belts
	AVHRR, SEVIRI	EUMETSAT	Cloud mask, instability indices, dust indicator and TCWV for scene visual inspection with RGB imagery	Global
Validation study	Airborne sondes	AMDAR	Atmospheric temperature and humidity	Global (denser near airports, along commercial flight routes)
	Radiosondes	WOUDC	Ozone profile	Global (sparse)
	Ground-based radiometer	KIT	Land surface temperature	3 sites
	AirCore	NOAA, LMD	CH ₄ mixing ratio	Few sites
	Airborne probes and sondes	HIPPO, IAGOS, CONTRAIL	CH ₄ mixing ratio	Global (sparse)
	Ground-based FTIR	NDACC, TCCON	CH ₄ , CO ₂	Global (sparse)



- EUMETSAT performs a continuous monitoring of L2 products of the operational products quality with independent measurements
- Quality monitoring tools have been established and are operational
 - To check accuracy and precision of L2 products
 - To verify the stability, e.g. of the reprocessed CDR
- Experiences of existing tools will be used/adapted for the new missions MTG-IRS / IASI-NG
- Public reports for IASI are available at the EUMETSAT website and will be completed for new L2 products/missions

<https://www.eumetsat.int/iasi-level-2-geophysical-products-monitoring-reports> Feedback is very welcome.



Thank you!
Questions are welcome.