

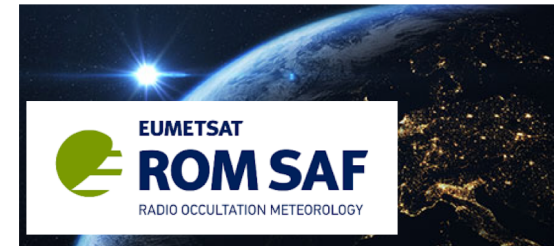
Latent and Sensible Heat from CM SAF and LSA SAF

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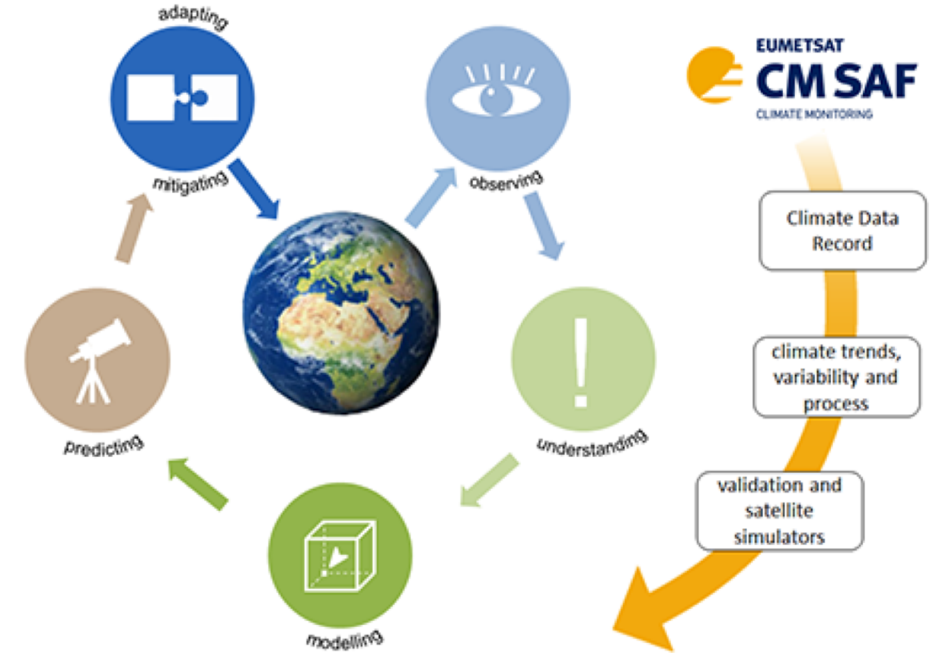
Processing EUMETSAT satellite data





LSA SAF : Monitoring land surface

- "Now"
 - Near real-time
 - Operational monitoring
 - Maximal exploitation of newest sensor & developments



CM SAF : Climate

- 'Then'
 - Historical data / ICDR
 - Trend analysis
 - Climate monitoring
 - Best quality forcing

Same ET model, and both exploit mainly geostationary satellite inputs but different focus, different limitations => **2 products.**

Presentation focuses on CM SAF products (closest similarity with GLEAM)

User-driven concept and product definition

- ☞ Collection user needs (User workshop)
- ☞ Identify gaps
- ☞ Defining product goal

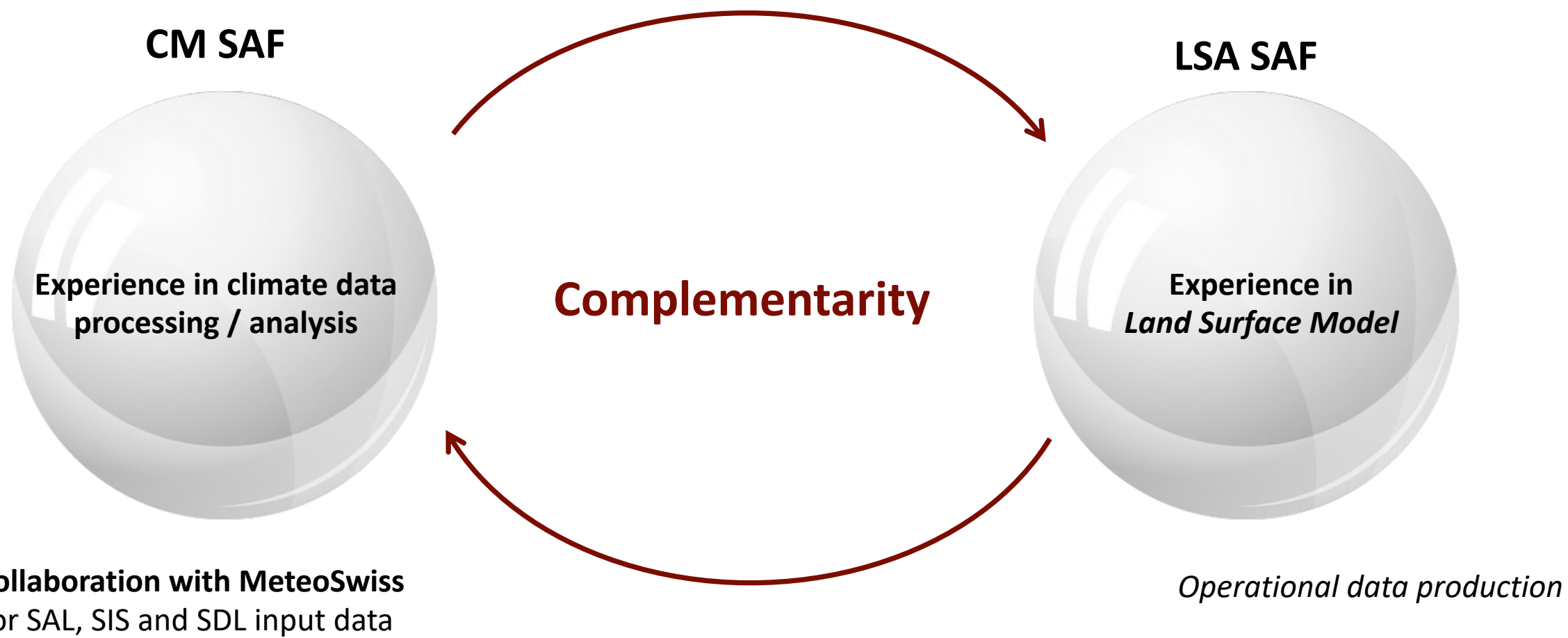
Scientific development and data processing at RMIB

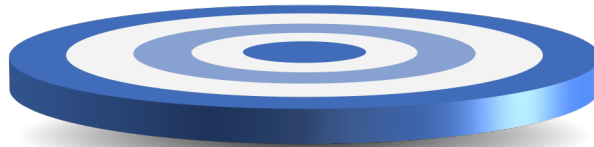
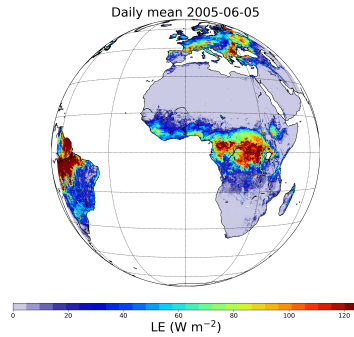
- ☞ Algorithm design
- ☞ Processing center
- ☞ Storage capacity

Dissemination and user engagement

- ☞ Scientific publication / Conferences / Use case
- ☞ Use within the institutes
- ☞ Direct user support

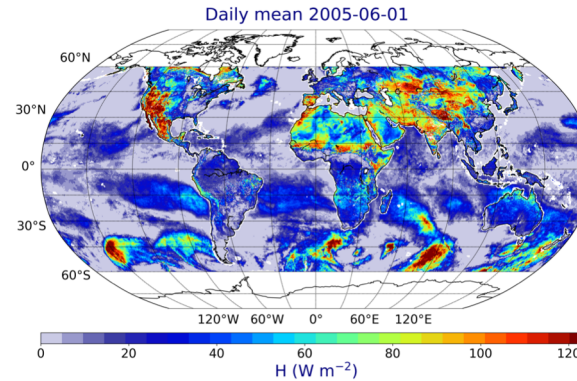
Framework :





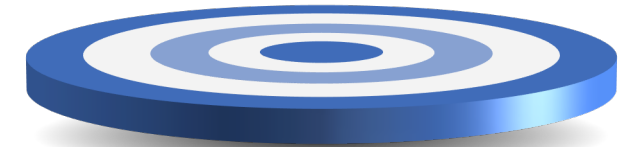
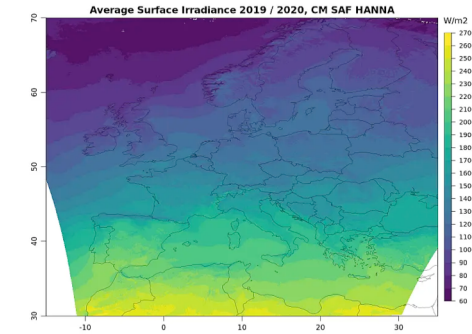
LandFlux ed1

A joint retrieval of the full surface radiance budget, latent (ET) and sensible heat fluxes sub-daily over 38 years.



Geo-Ring

Generate quasi-global gridded data, merging measurements from geostationary satellites.

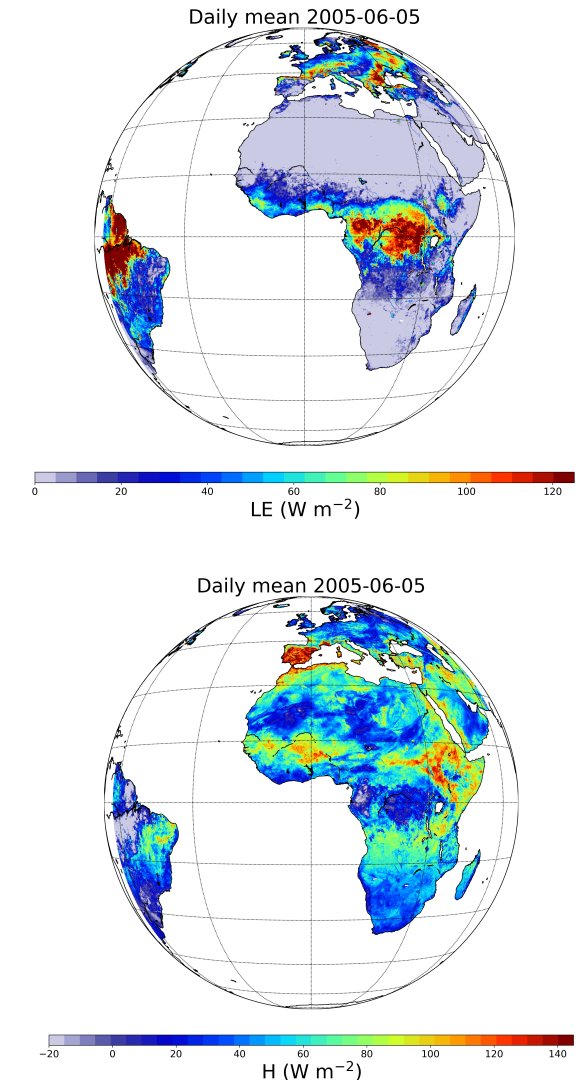


HANNA

High-Resolution European Surface Radiation Data Record (HANNA).
Produce in close cooperation between MeteoSwiss and the DWD at the European Weather Cloud.

Parameters	Latent (LE) and sensible (H) heat fluxes / Evapotranspiration (ET) (+SRB)
Sensor & Coverage	MVIRI & SEVIRI / Meteosat disk (60°N-60°S; 60°W-60°E)
Spatial resolution	0.05° (~5 km)
Temporal resolution	Monthly mean diurnal cycle, hourly, daily and monthly
Period	1983 - 2020

Freely available on the CM SAF website
https://doi.org/10.5676/EUM_SAF_CM/SLF_METEOSAT/V001



Characterize the products in terms of accuracy, precision and stability.

01

Comparisons of CDR outputs with *In-situ* observations at stations :
➤ 30 locations in different climatic and vegetation conditions

02

Comparisons with reanalysis and satellite-based products at 0.25° :
➤ ERA5 & GLDAS V2.0
➤ LSA SAF V3 & **GLEAM** V3.5

03

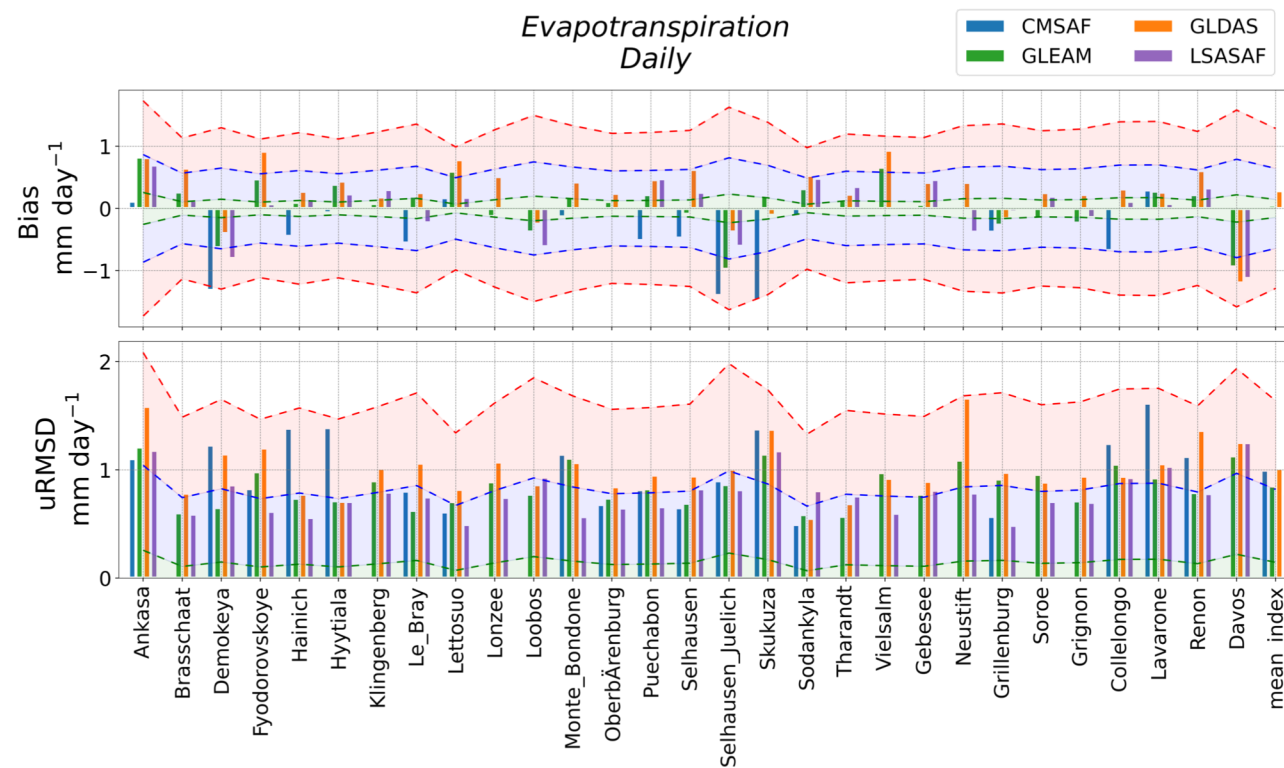
Specific analysis of the stability :
➤ Monthly mean deseasonalized bias



Characterize the products in terms of accuracy, precision and stability.

01

Comparisons of CDR outputs with *In-situ* observations at stations :
➤ 30 locations in different climatic and vegetation conditions

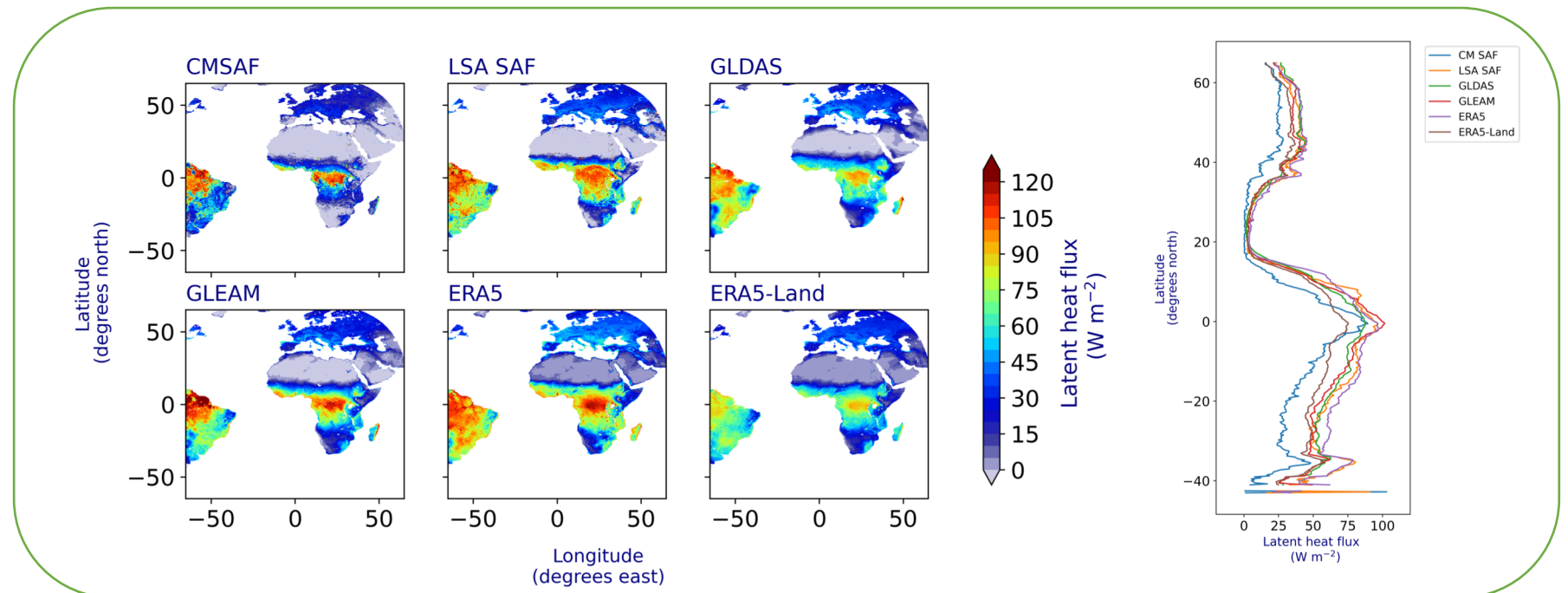


Characterize the products in terms of accuracy, precision and stability.

02

Comparisons with reanalysis and satellite-based products at 0.25° :

- ERA5 & GLDAS V2.0
- LSA SAF V3 & **GLEAM** V3.5

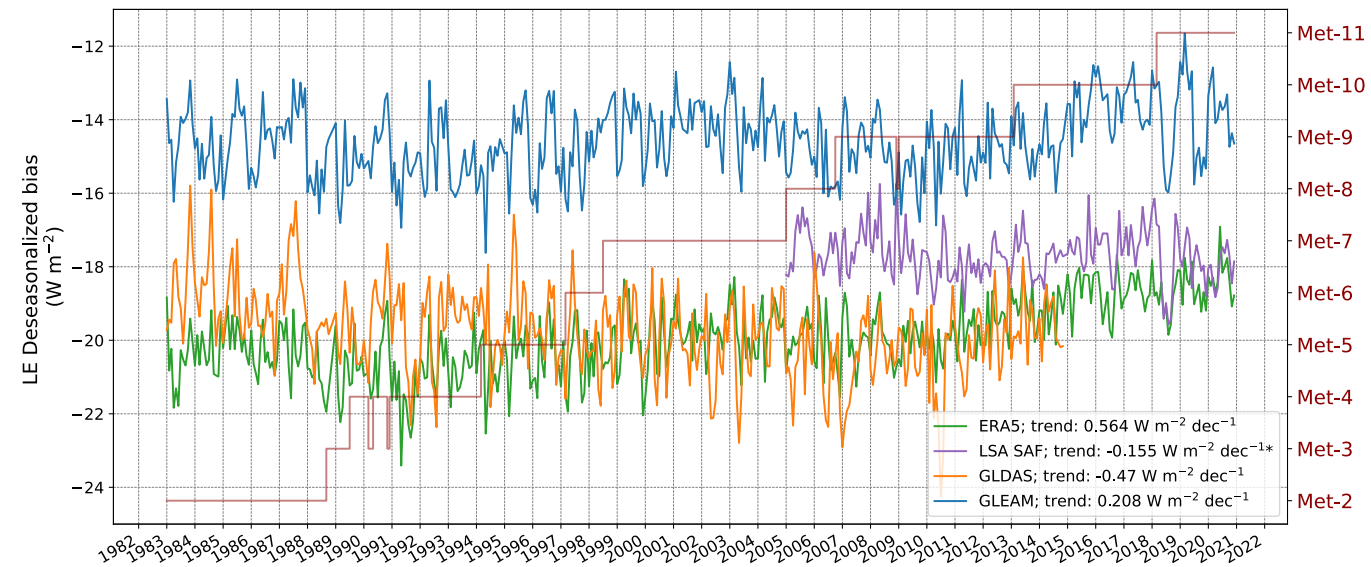


Characterize the products in terms of accuracy, precision and stability.

03

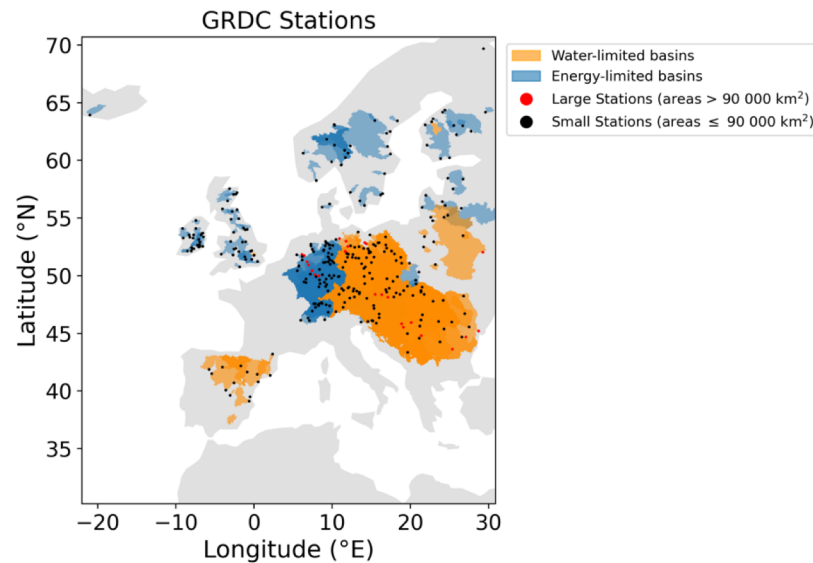
Specific analysis of the **stability** :

➤ Monthly mean deseasonalized bias



$$ET_{WB} = P - Q - \Delta S / \Delta t$$

$$ET_{PQ} = P - Q$$



332 stations

307 “small” vs. 25 “large” basins

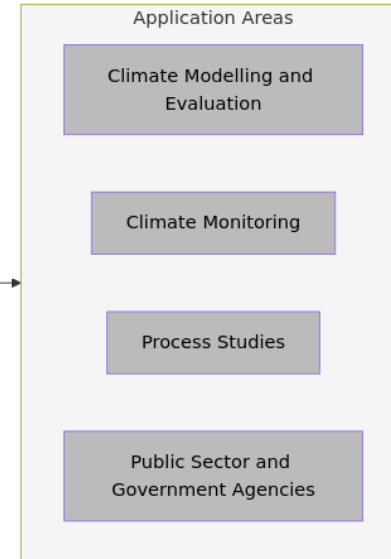
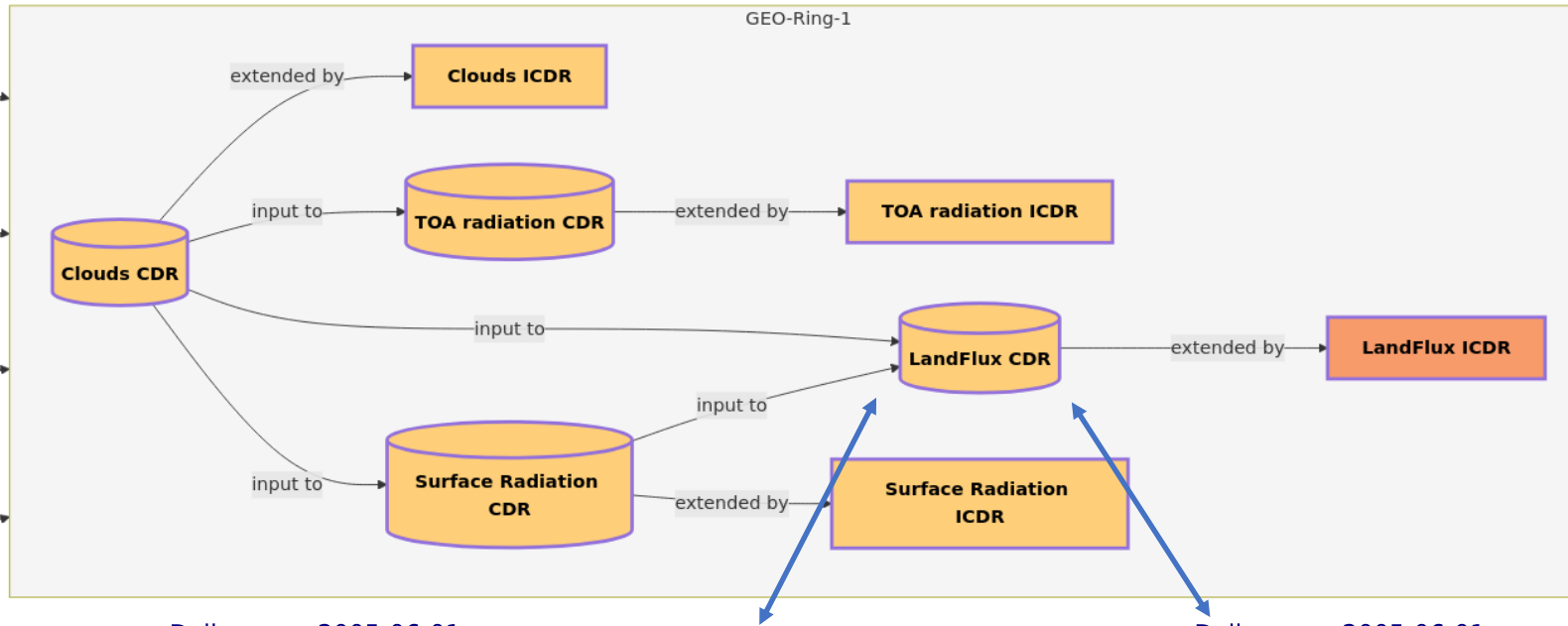
238 water limited (dry; $AI^* > 1$) vs. 94 energy limited basins (wet; $AI \leq 1$)



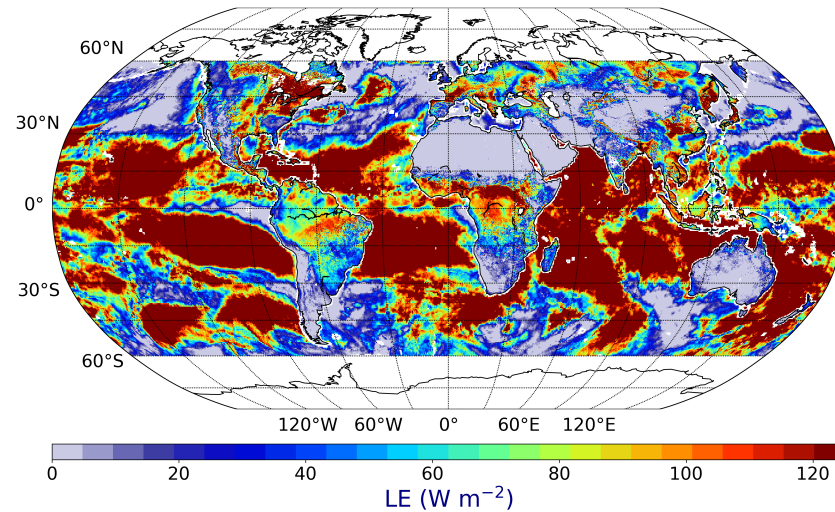
$$* \text{Aridity Index} = \text{Median} \left(\frac{ET_{ref}^{LSA SAF}}{P_{GIRAFE}}, \frac{ET_{ref}^{LSA SAF}}{P_{E-OBS}}, \frac{ET_{ref}^{LSA SAF}}{P_{MSWEP}} \right)^2$$

GEO-Ring Datasets

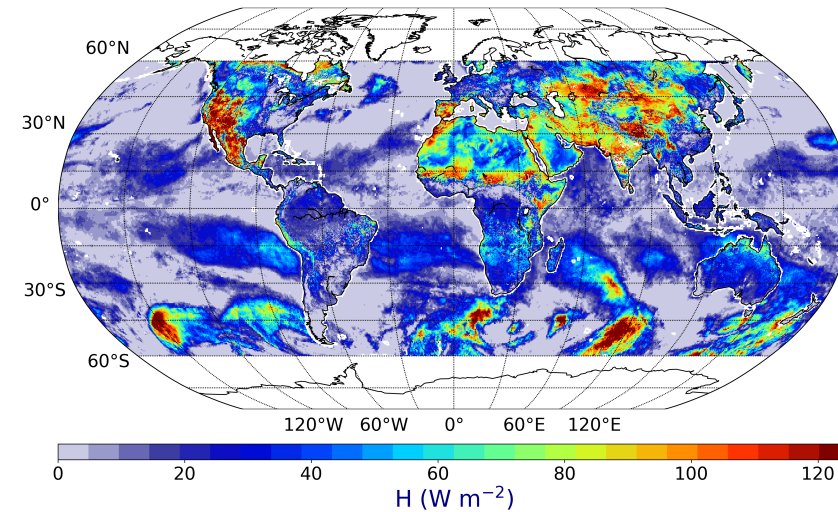
GEO-Ring-1



Daily mean 2005-06-01



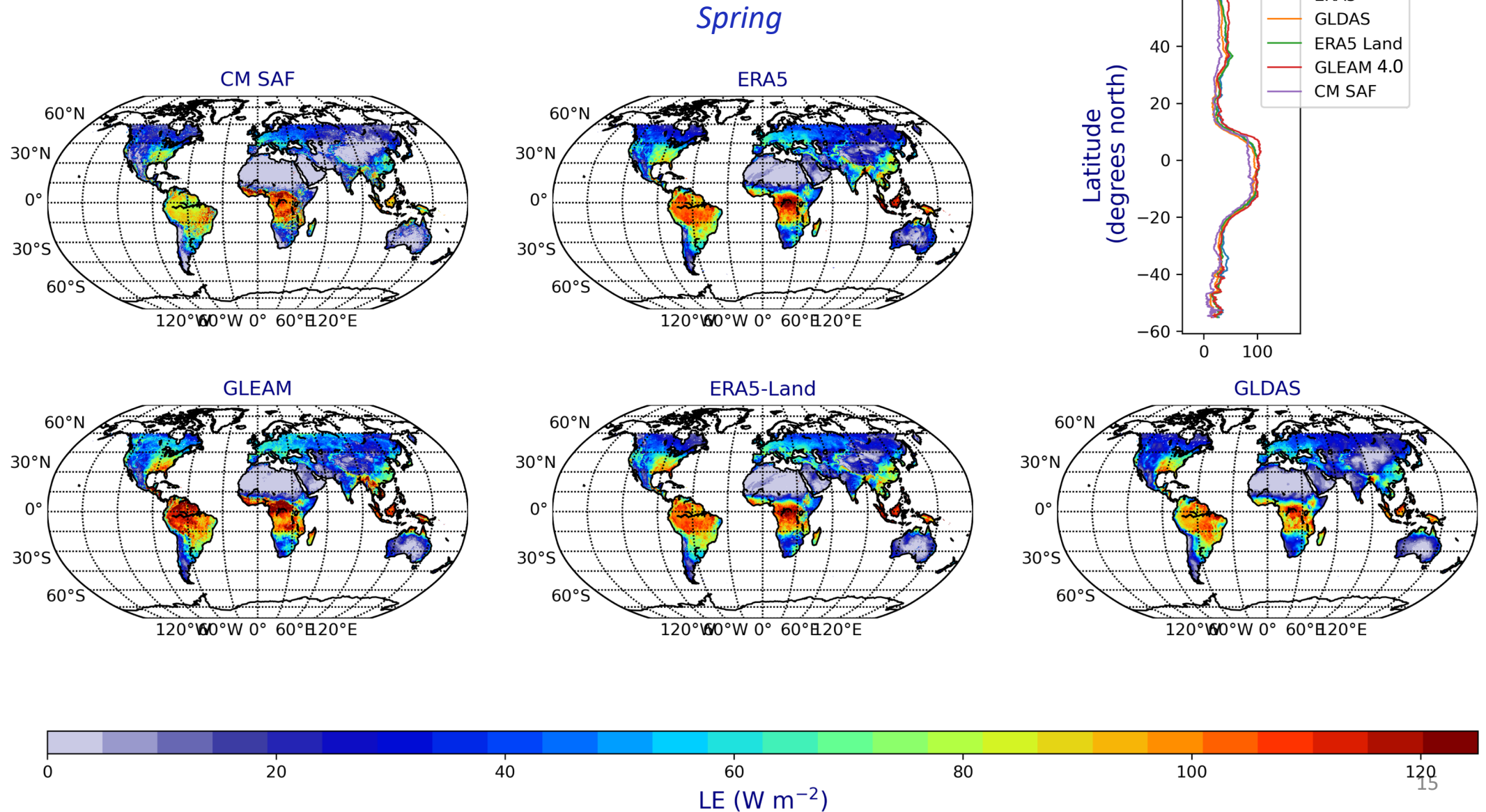
Daily mean 2005-06-01



Parameters	Latent (LE) and sensible (H) heat fluxes Evapotranspiration (ET) + others
Sensor & Coverage	Meteosat MVIRI & SEVIRI FCDR, GEOS-E, GEOS-W, HIMAWARI (60°N-60°S; 180°W-180°E)
Spatial resolution	0.05° (Land) <i>0.5°(HOAPS; Daily and Monthly)</i>
Temporal resolution	Monthly mean diurnal cycle (Land), hourly (Land), daily and monthly
Period	2019->onward with ICDR

Schedule

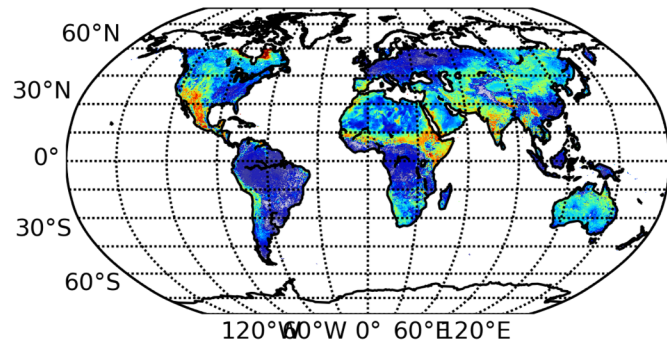
- Prototype 1 year (2026-2027)
- Full GeoRing product (~2030)



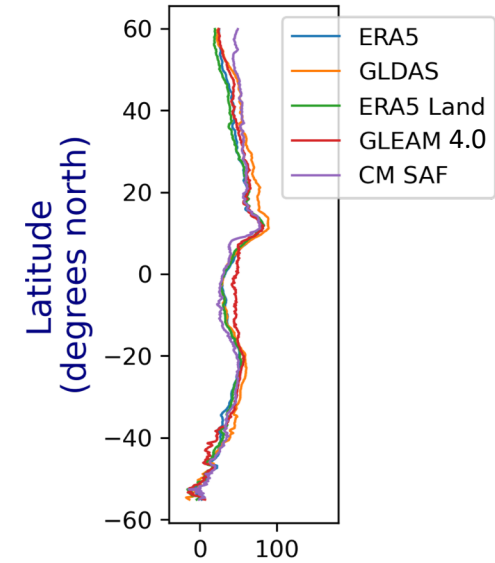
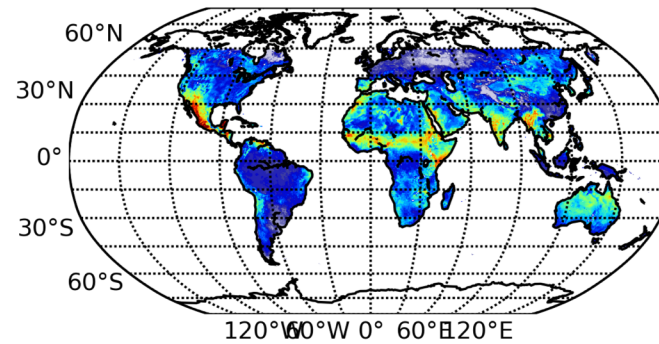
Preliminary results (H)

Spring

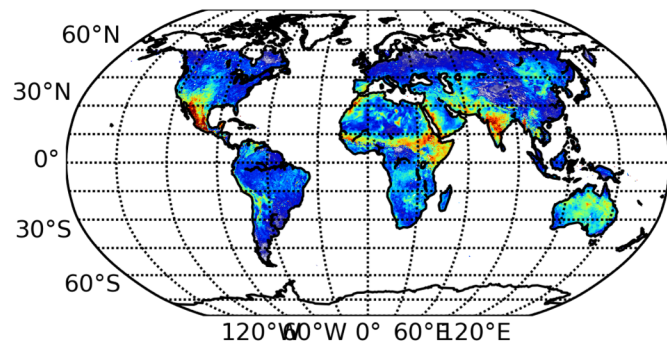
CM SAF



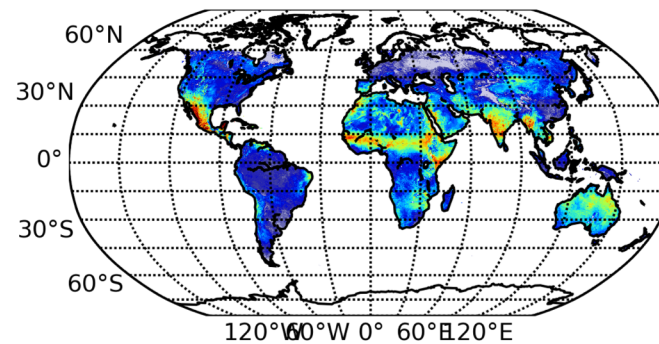
ERA5



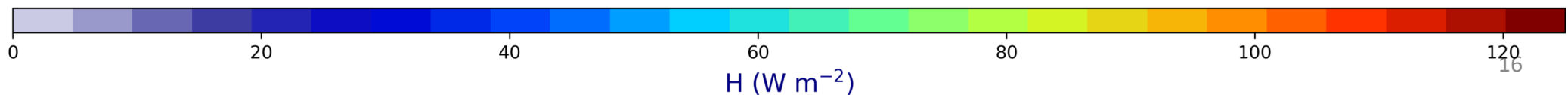
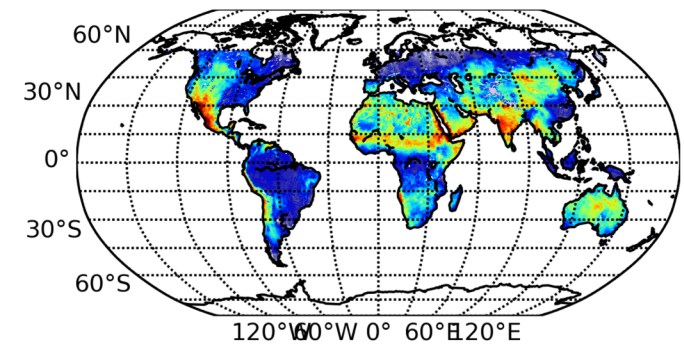
GLEAM

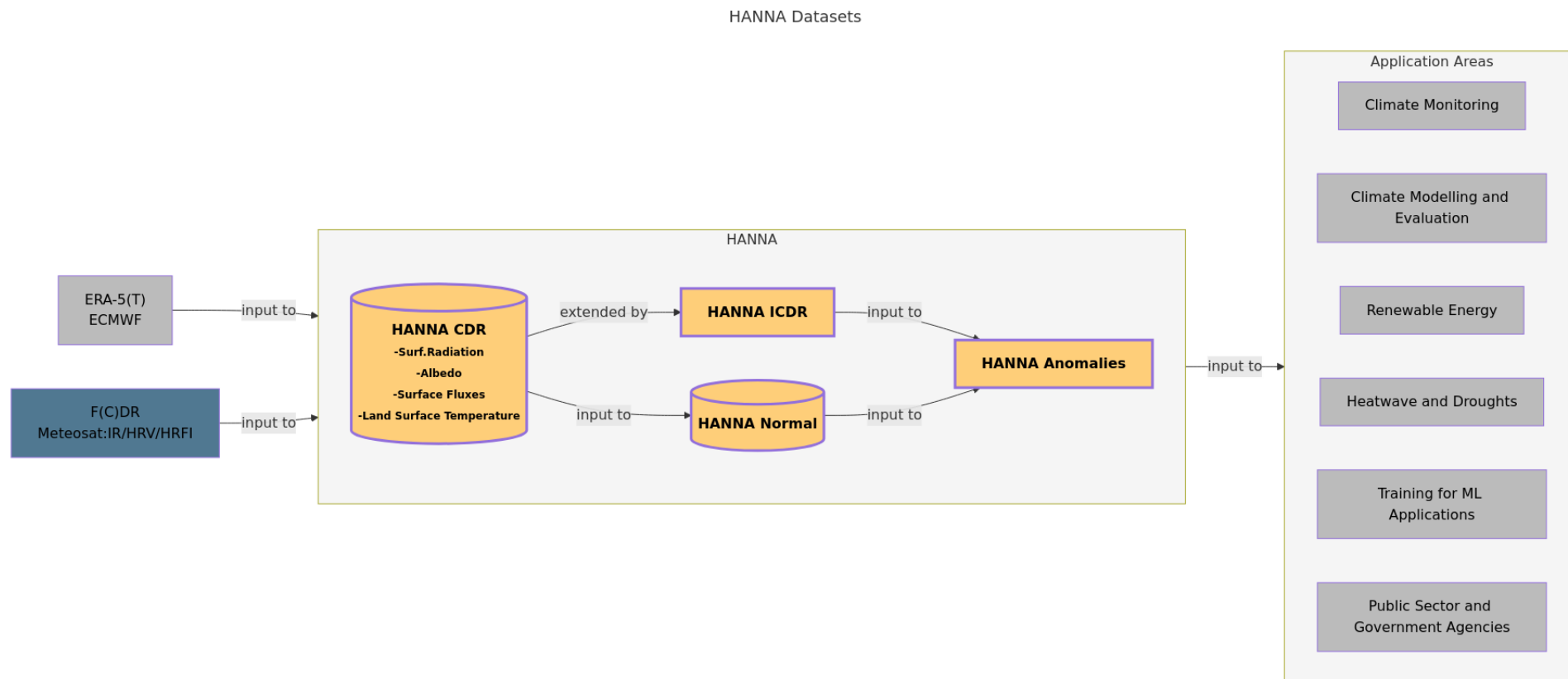


ERA5-Land



GLDAS

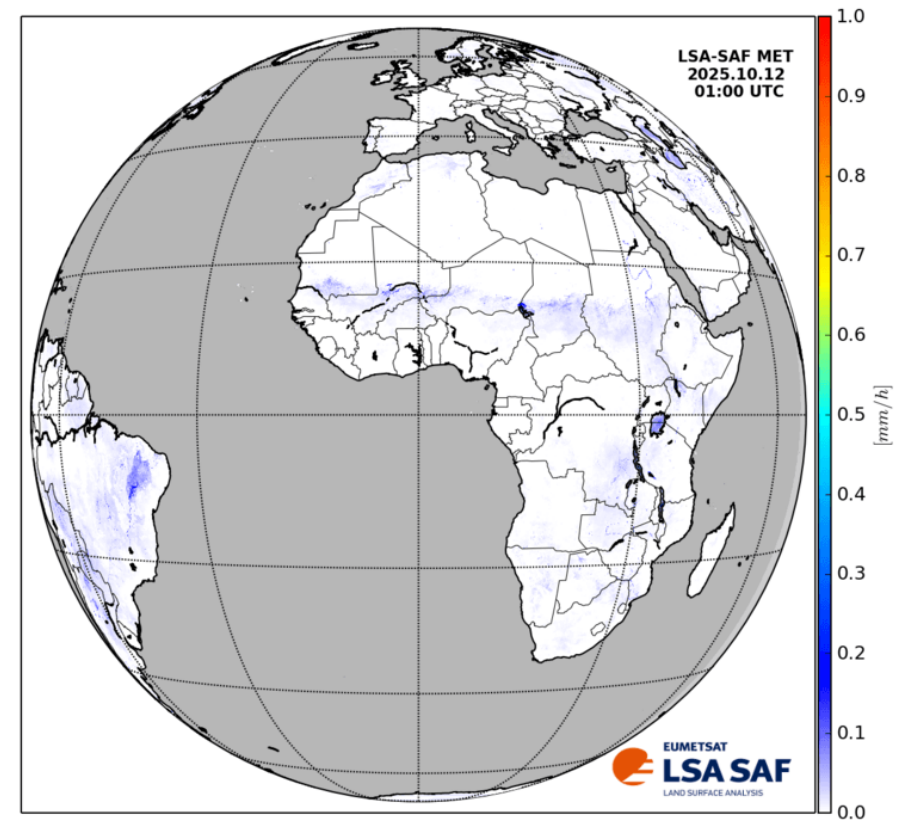




Parameters	Latent (LE) and sensible (H) heat fluxes Evapotranspiration (ET) + SRB
Sensor & Coverage	Meteosat SEVIRI (Europe)
Spatial resolution	0.01°
Temporal resolution	Monthly mean diurnal cycle (Land), hourly (Land), daily and monthly
Period	2004->2028 + ICDR

Potential inter-comparison with the ESA dataset

- Transition to MTG
- Development drought index
- Copernicus ET : Validation



- **CM SAF**
 - ☞ Visiting scientist
- **Proposal**
 - ☞ ESA proposal using AVHRR data (not yet open)
 - LEH/ET as variables to show the potential of the 1 km channel.
 - Experience in using AVHRR data for TOA CDR.
- **User request**
 - ☞ Multi-modal approach



Thank you for your attention