EODATASERVICE.ORG

DIGITAL EARTH PLATFORM TO ENABLE MULTI-DISCIPLINARY GEOSPATIAL APPLICATIONS

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MEEO - Italy

SUMMARY

WHAT I AM GOING TO SHOW YOU:

- THE “DIGITAL EARTH” CONCEPT
- TECHNOLOGICAL IMPLEMENTATION
- APPLICATIONS FOR “DATA CUBES”*

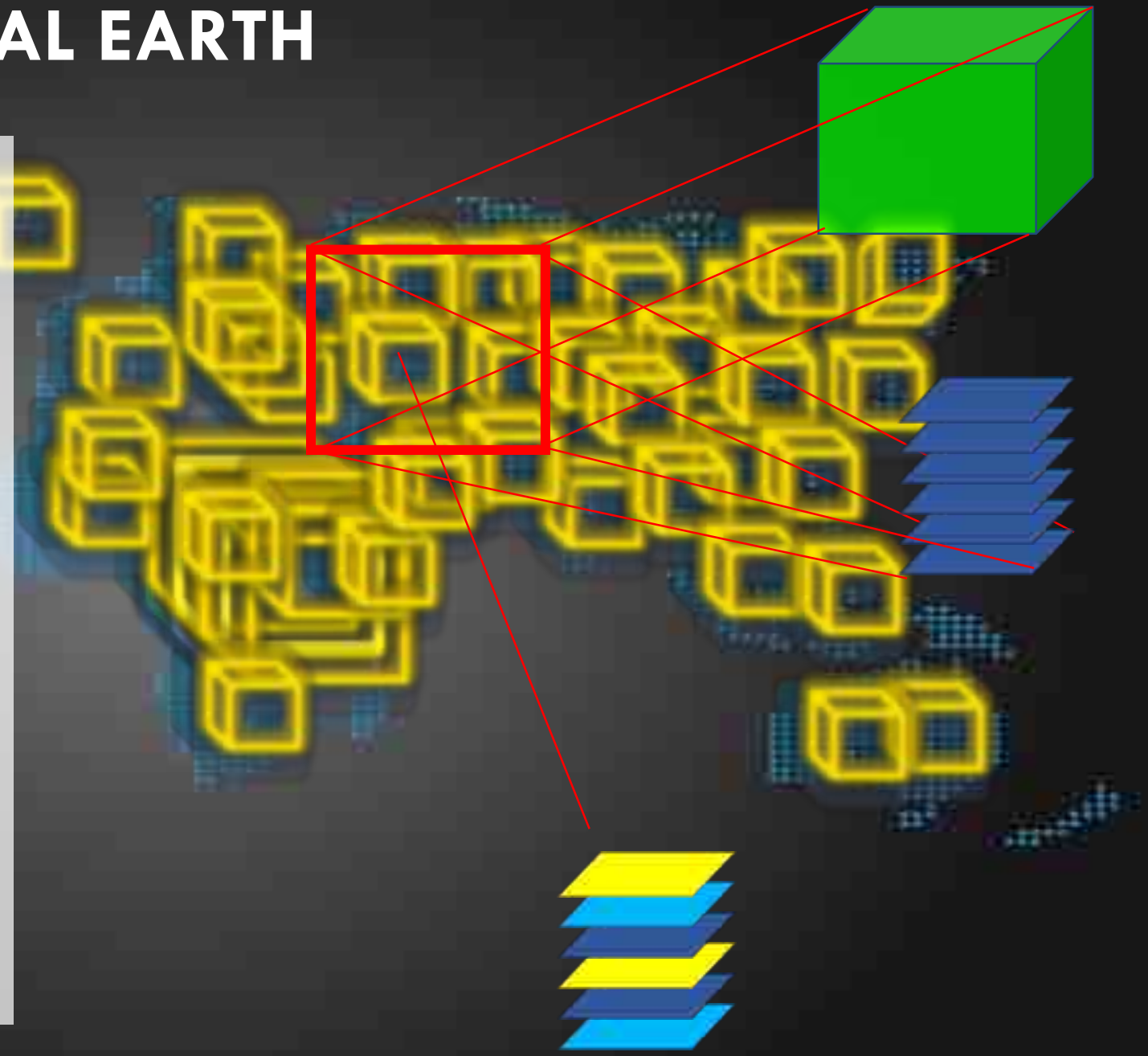
WHAT I AM NOT GOING TO SHOW YOU:

- TECHNICAL DETAILS

*DATA CUBES, ARD, BIG DATA, ….

CONCEPT: THE DIGITAL EARTH

'Digital Earth' *(Gore 1999)* ***multi-resolution three-dimensional*** *representation of the planet that would make it possible to* ***find***, ***visualise*** *and* ***make sense*** *of* ***vast amounts*** *of* ***geo-referenced information*** *on physical and social environments. Such a system would allow users to navigate through* ***space*** *and* ***time***, *accessing* ***historical data*** *as well as* ***future predictions*** *and would support its use by scientists, policy-makers and* ***children alike***



CHALLENGES

- Datasets to be managed are getting huge
  - ~~GB~~, ~~TB~~, PB? EB? ZT? YB?
  - Sentinel2: PB with growing rate ~3TB/day
  - CAMS: 100TB/day
- **Users need fast and FAIR[1] discovery, access, processing an visualization services**

- **Each product has its own**
  - **data specification (format, grid / tiling schema, resolution, …)**
  - **Users community and needs**
- **Veracity relies on**
  - **data owners (ESA, USGS, ECMWF, …)**
  - **service providers**

[1] Findable, Accessible, Interoperable, and Re-usable: https://www.force11.org/group/fairgroup/fairprinciples

EFFECTIVE DATA SUBSETTING

Let’s assume we want to study drought in Eastern Africa in the last 17 years.

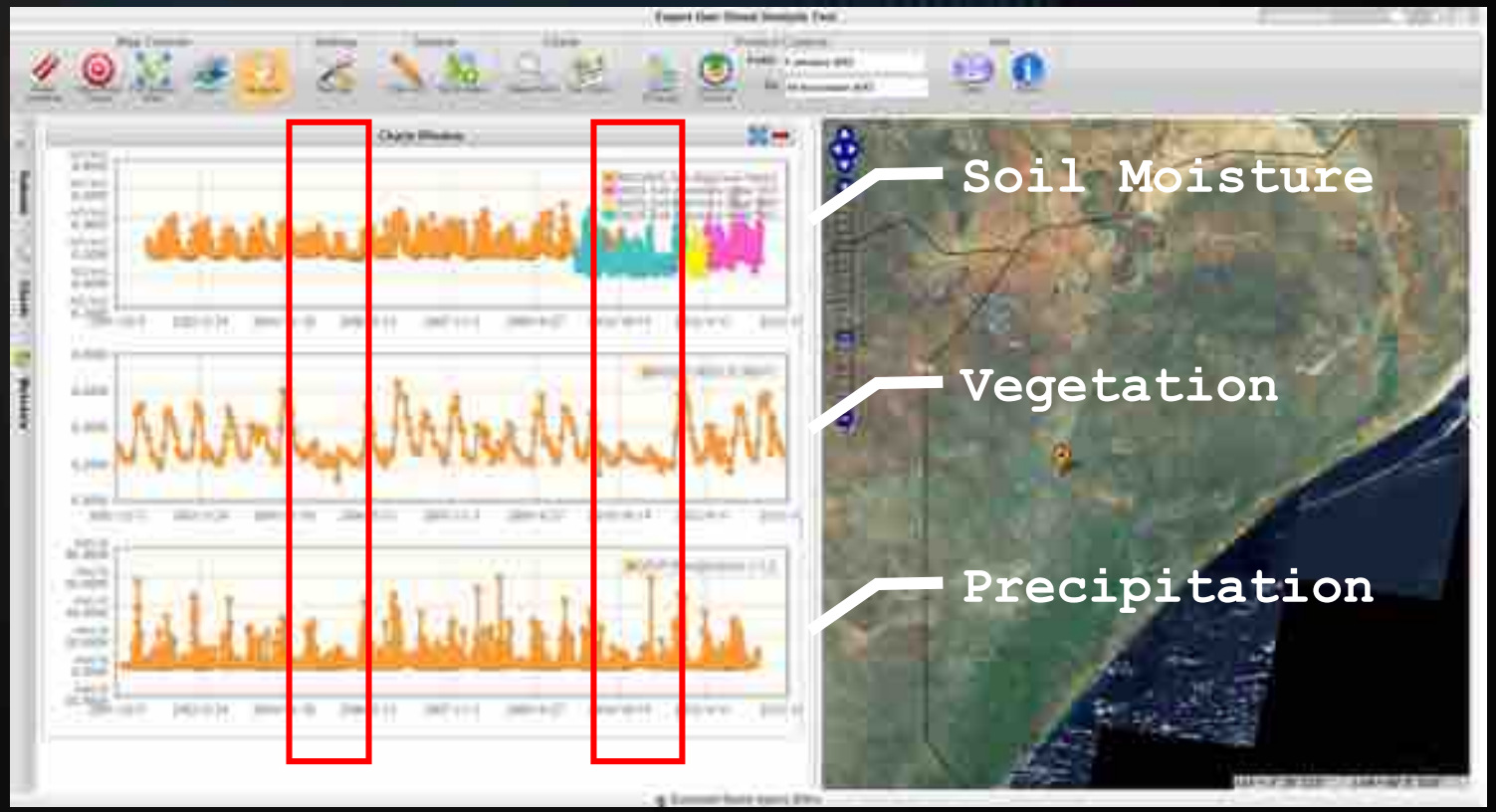
We want to use time series of Vegetation Index (NDVI), Precipitation (P) and Soil Moisture (SM).

Full collection
(NDVI + P + SM) > 5 TB

17 years, one point
(NDVI + P + SM) < 1MB

- Identification of anomalies
- Cross-fields correlation
- Identification of similar areas

In real time

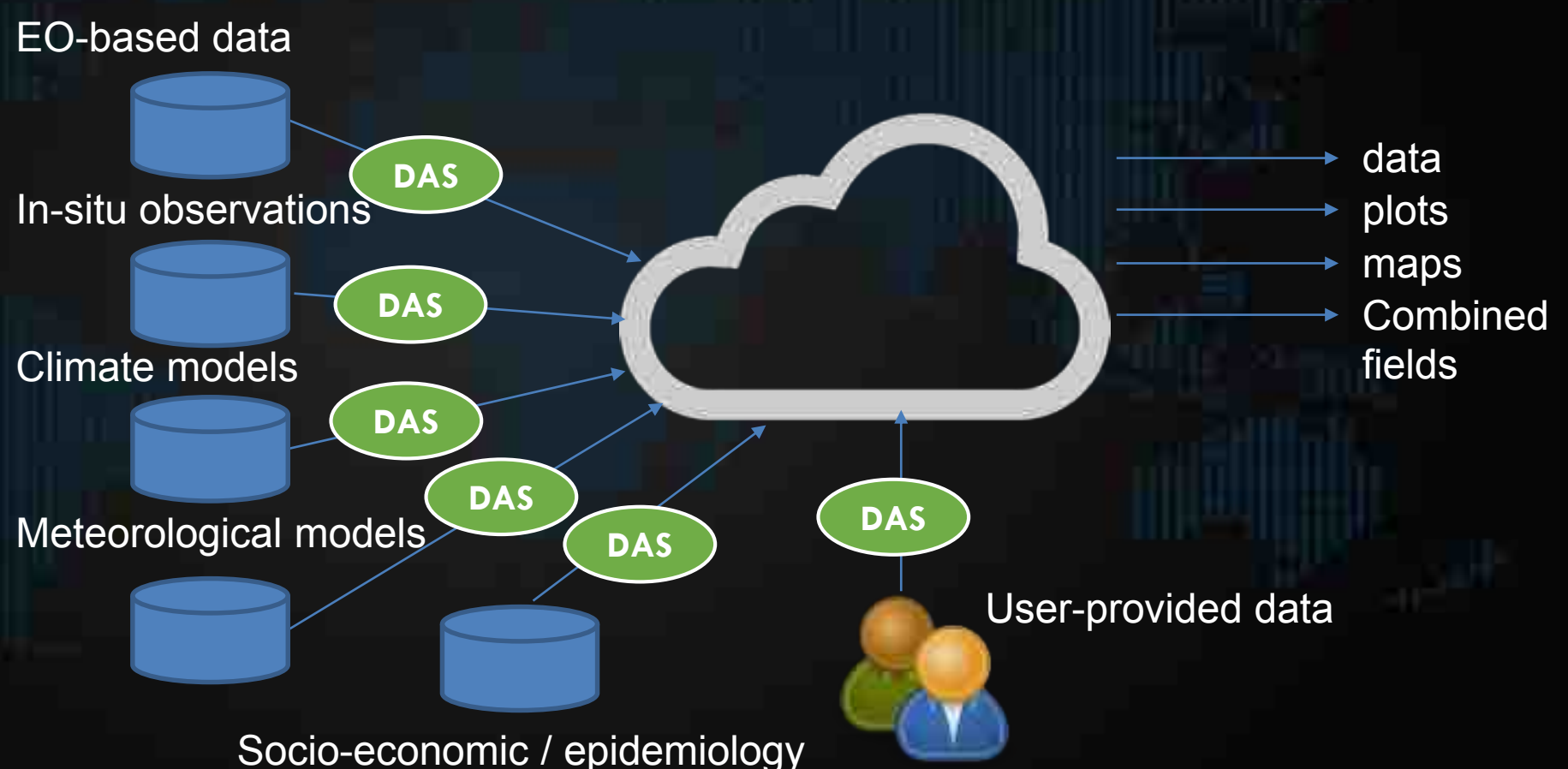


THE ENABLING TECHNOLOGY
SINGLE PLATFORM FOR GEOSPATIAL DATA

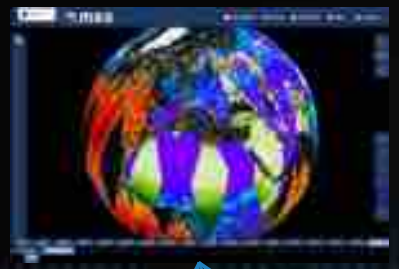
The technology allows managing a **large set of geospatial information** deploying a standardized Data Access System (**DAS**) in front of the data sources

It allows accessing, visualizing, subsetting, combining, processing, downloading **all data sources simultaneously**

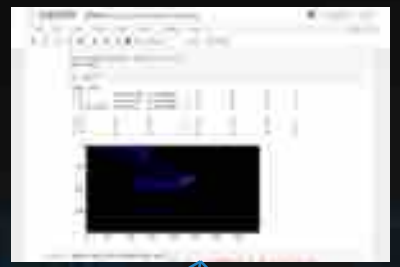
Only <u>one requirement</u>: each dataset shall feature **position and time tags**



Web based GUI



Jupyter Notebook



GIS tools (Arcgis, qgis, …)

Standardised data access interfaces allow connecting a wide range of user interfaces

DIGITAL EARTH

(Virtual Datacube)

DAS DAS DAS DAS DAS DAS DAS

SMOS | Landsat | … | Sentinel 1/2/3

Atmosphere, CAMS, C3S | Vegetation | …

Health data | Population distribution | …

Mission-specific data

Thematic data

Other geospatial data

The deployment of a DAS in front of each data source enables standardised data access

Data remain at their own location (multiple data centers) with the original data format

CloudFerro ZAMG ECMWF NCI AWS

EODATASERVICE

https://eodataservice.org

*eodataservice is a **interdisciplinary / cross domain** platform*

climate health

land cover

pollution

ocean

High Resolution optical satellite data

Sentinel-2

Landsat

Land Products

Vegetation Indexes (from 10m, NRT)

Land Surface Temperature (NRT)

Soil Moisture (1978, present)

Land Cover type (MODIS)

Atmospheric products

Airt Temperature (NRT)

Precipitation (NOAA Hydro Estimator) NRT

Aerosol Optical Thickness @ 1Deg NRT, 10Km, 1Km

Ocean products

Sea Surface Salinity NRT

Chlorophyll data

Sea Surface Height

Sea Surface Velocity

...

Discovery

Exploration

Visualization

Processing

agriculture

weather

ENABLING TECHNOLOGY – THE CLIMATHON CASE

"CLIMATHON IS A **GLOBAL** 24-HOUR CLIMATE CHANGE HACKATHON THAT BRINGS TOGETHER THE CHALLENGES OF THE WORLD'S CITIES WITH THE PEOPLE WHO HAVE THE PASSION AND ABILITY TO SOLVE THEM"

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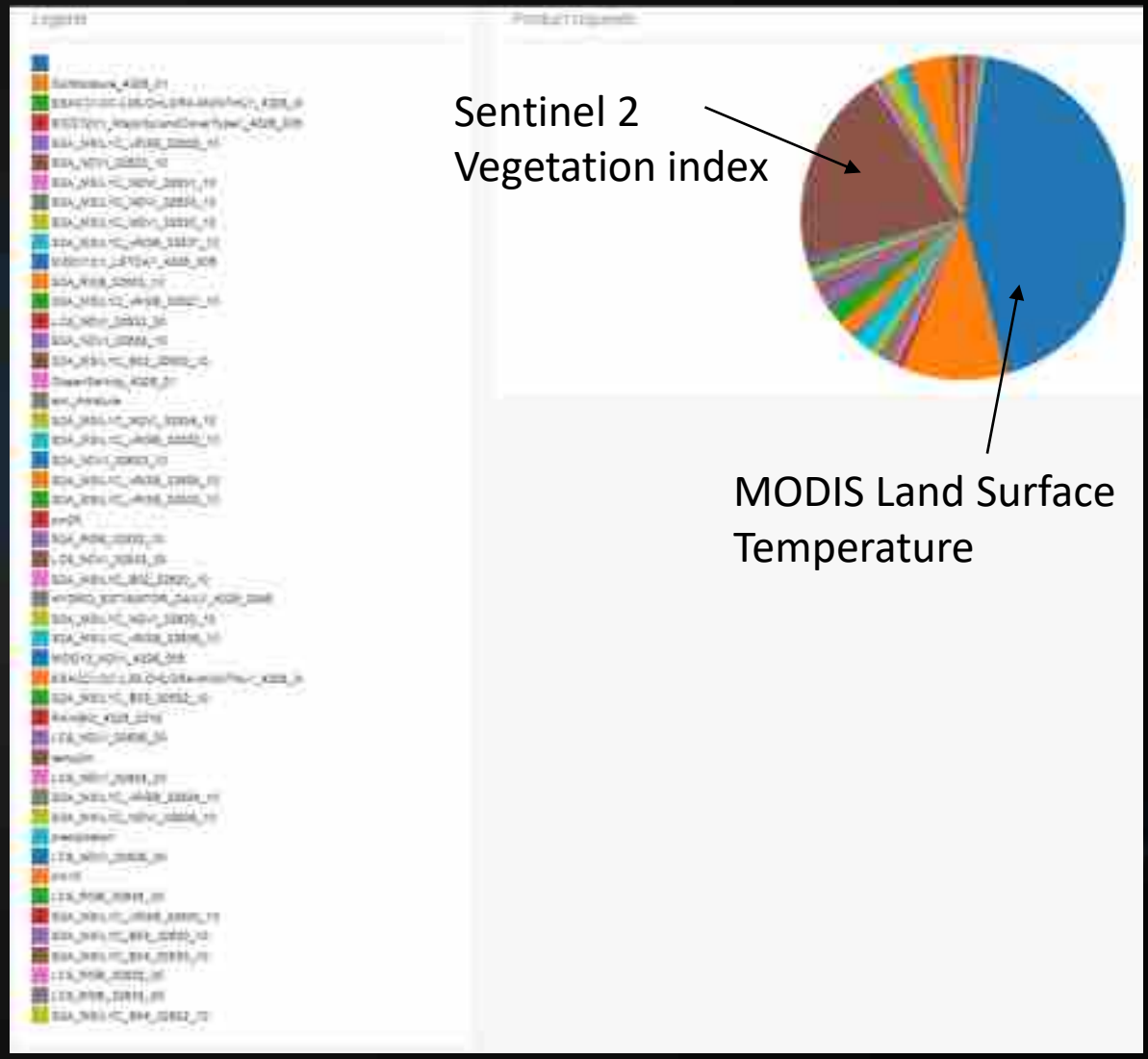
MORE THAN **100 USERS** WITH NO EARTH OBSERVATION BACKGROUND

MORE THAN **345.000 PRODUCTS** ACCESSED IN LESS THAN 36 HOURS



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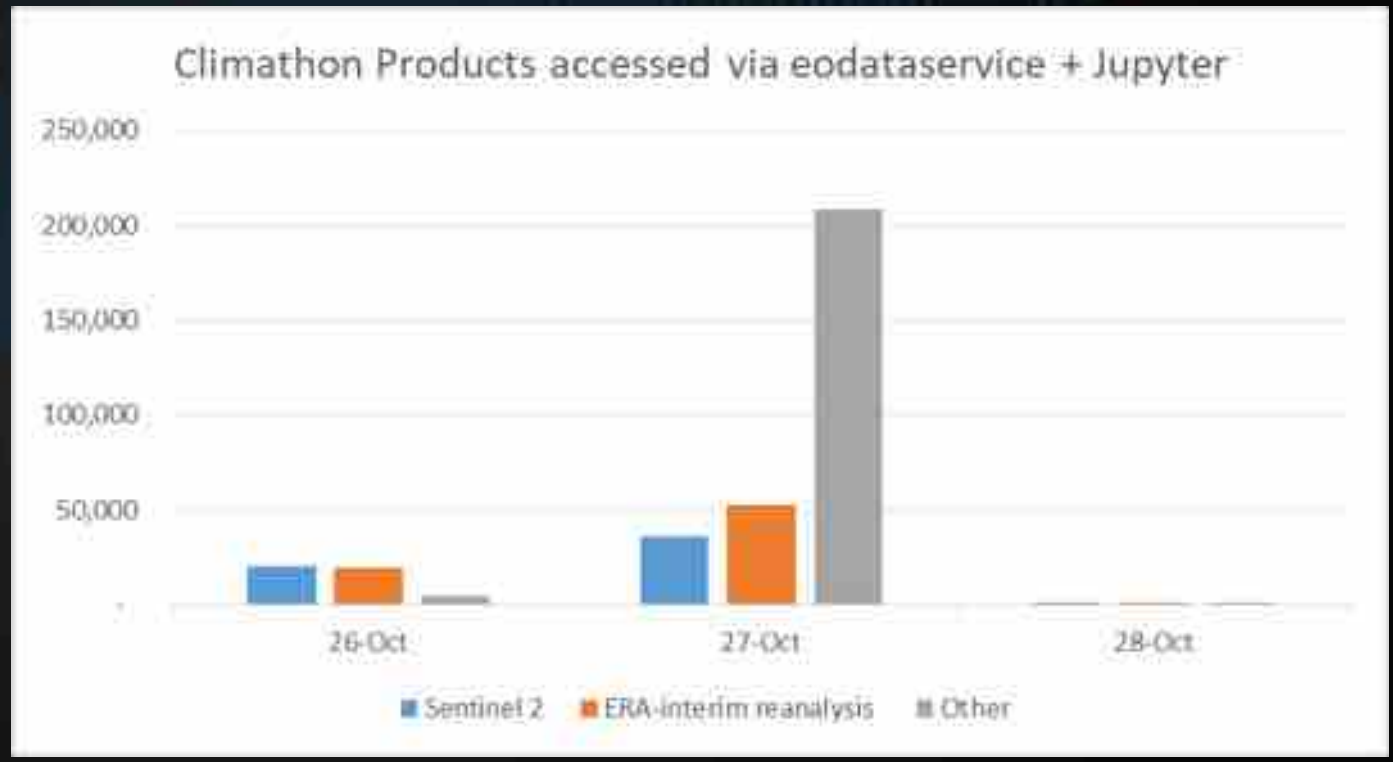

EODATASERVICE LOWERS / REMOVES THE BARRIER TO ACCESS GEOSPATIAL DATA

APPLICATIONS

DATA ACCESS / DISTRIBUTION
(EODATASERVICE, EODATACUBE, INSARITALY)

EARTH OBSERVATION FOR CLIMATE-RELATED
HEALTH RISK IN AFRICA (EOCHA)

ATMOSPHERIC SCIENCES VRE

MARINE SCIENCE VRE

ILLEGAL IRRIGATION

(RE-)INSURANCE SUPPORT IN AGRICUL

URBAN ENVIRONMENT MONITORING
(URBMOBI)

RENEWABLE ENERGIES (WAT-ENER-CAS

SUPPORT HERITAGE RESILIENCE AGAIN
CLIMATE EVENTS (HERACLES)

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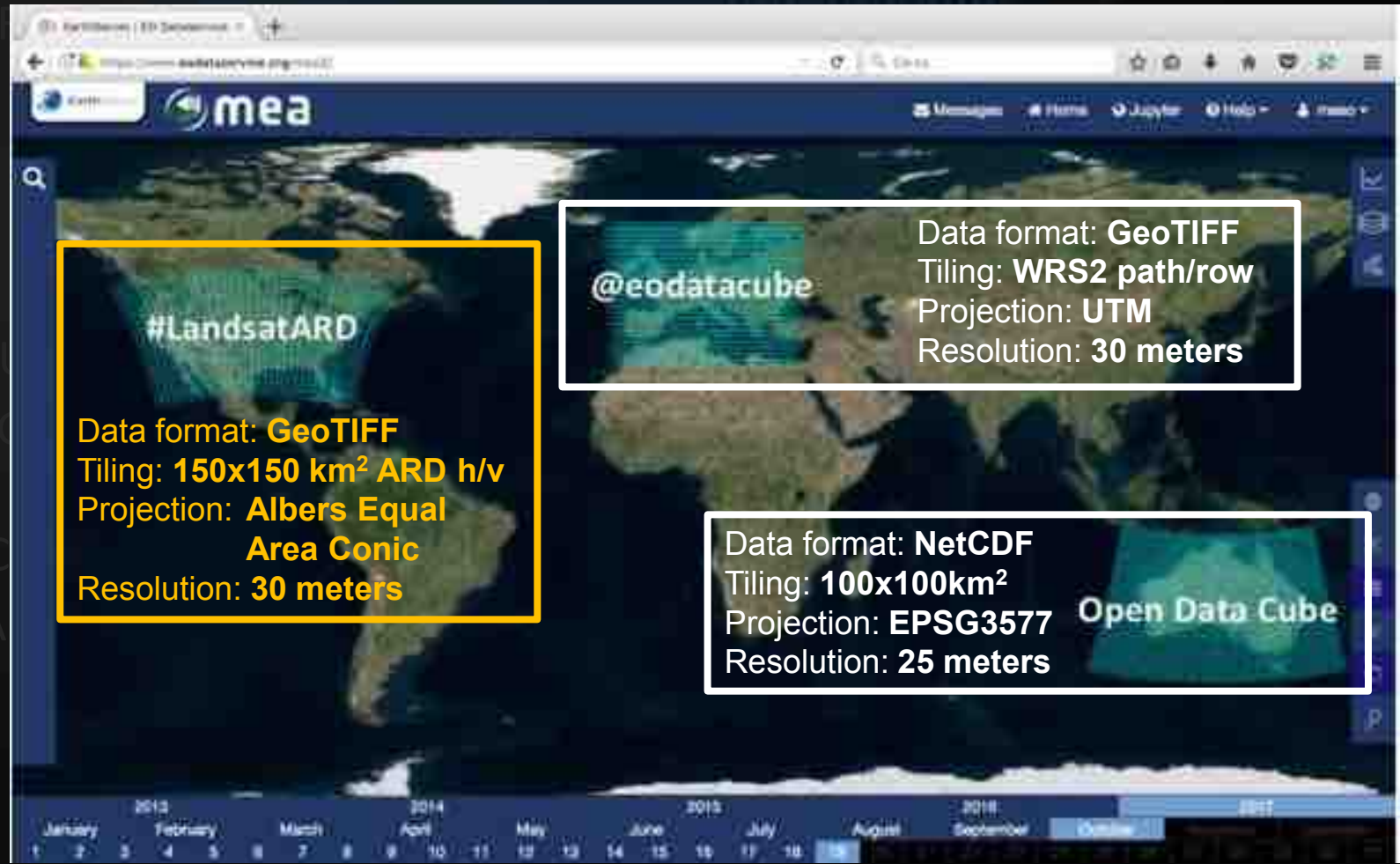

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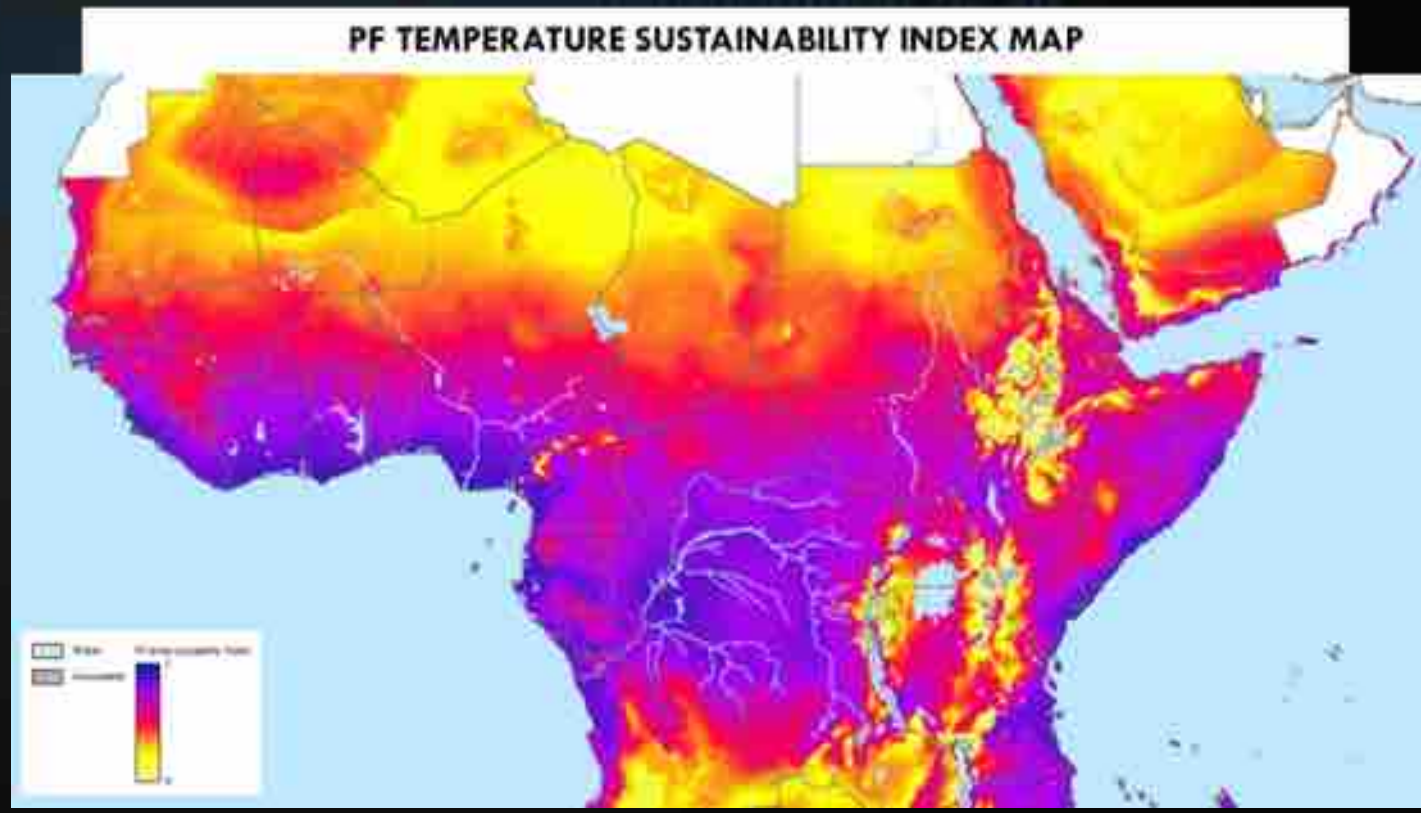

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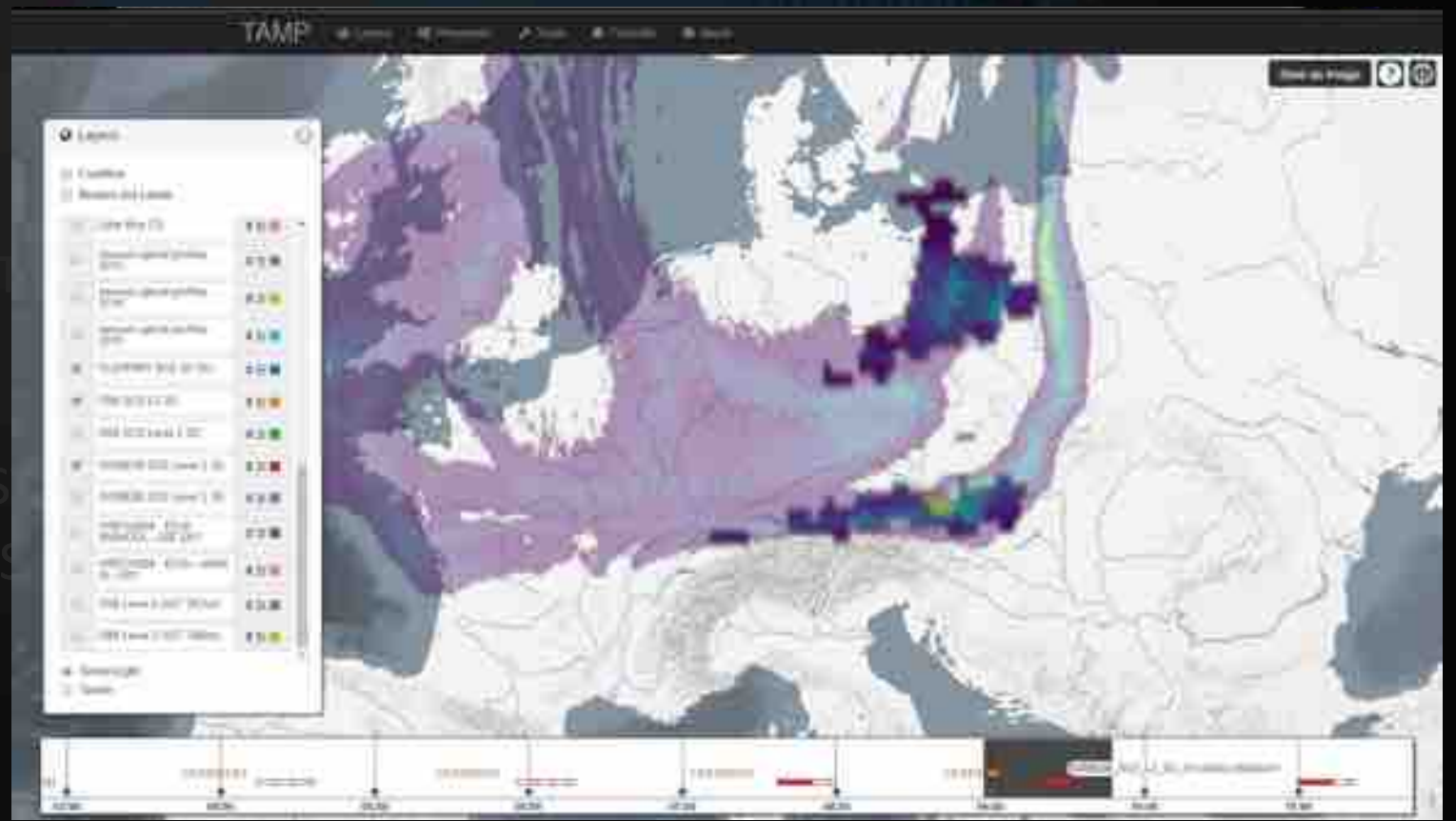

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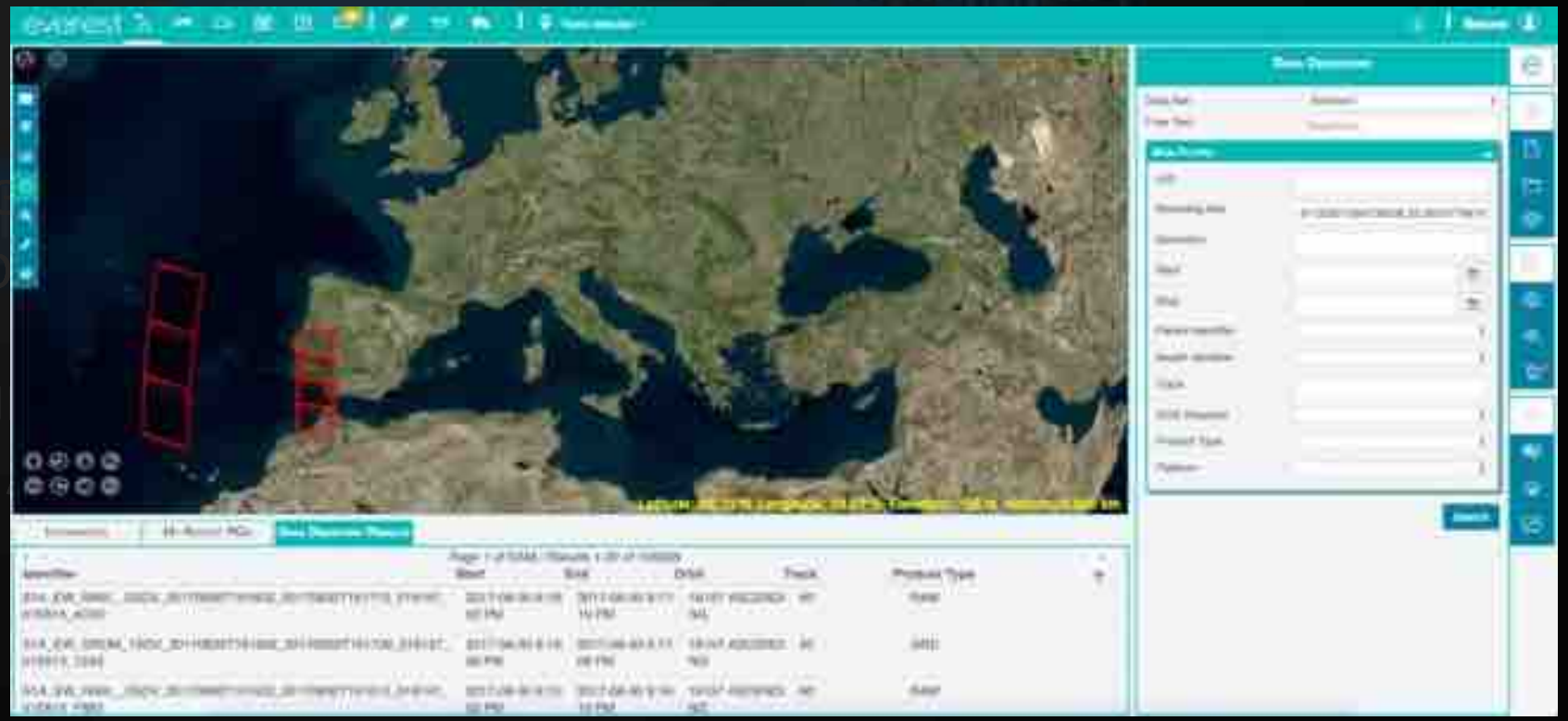

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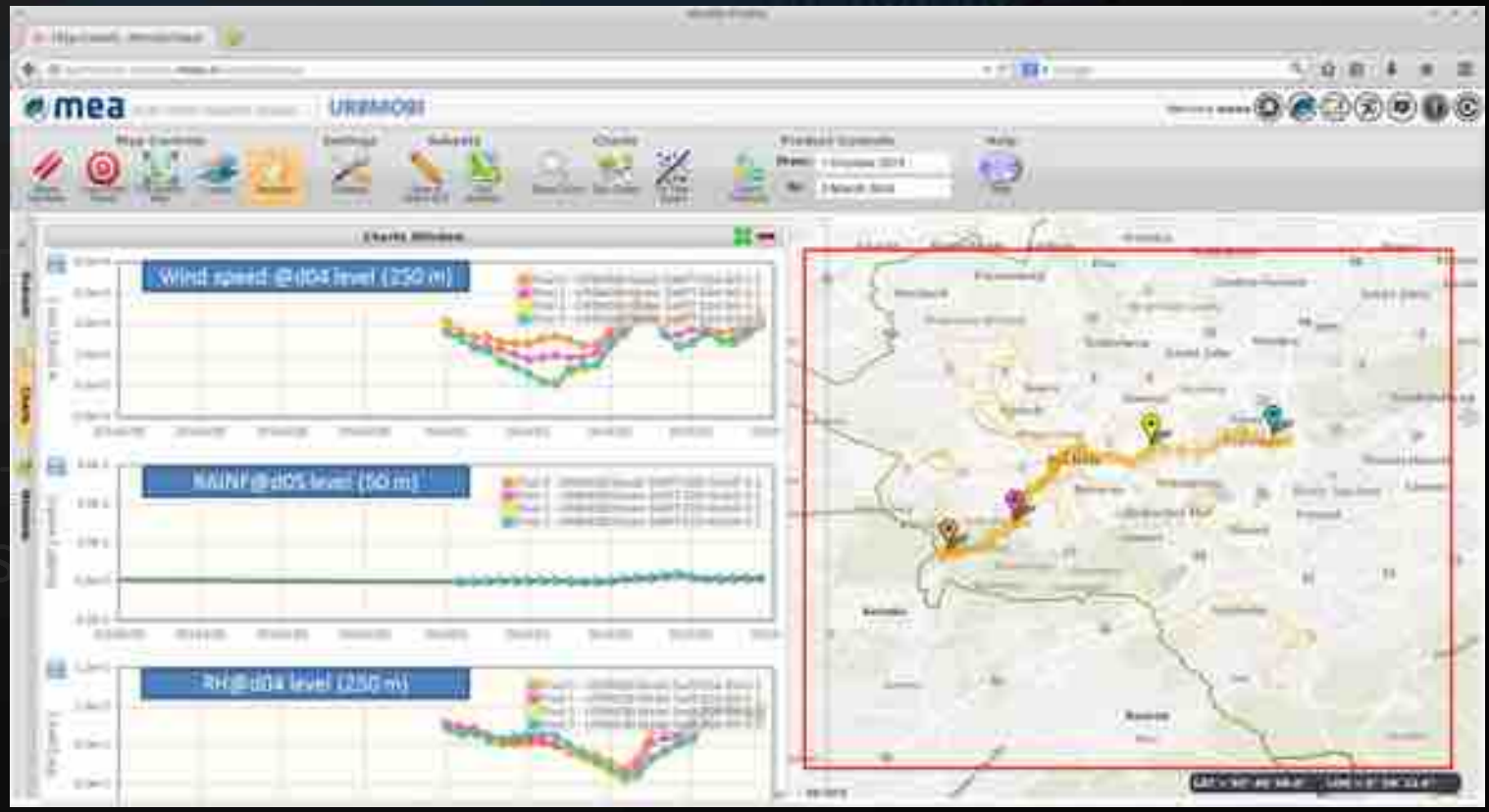

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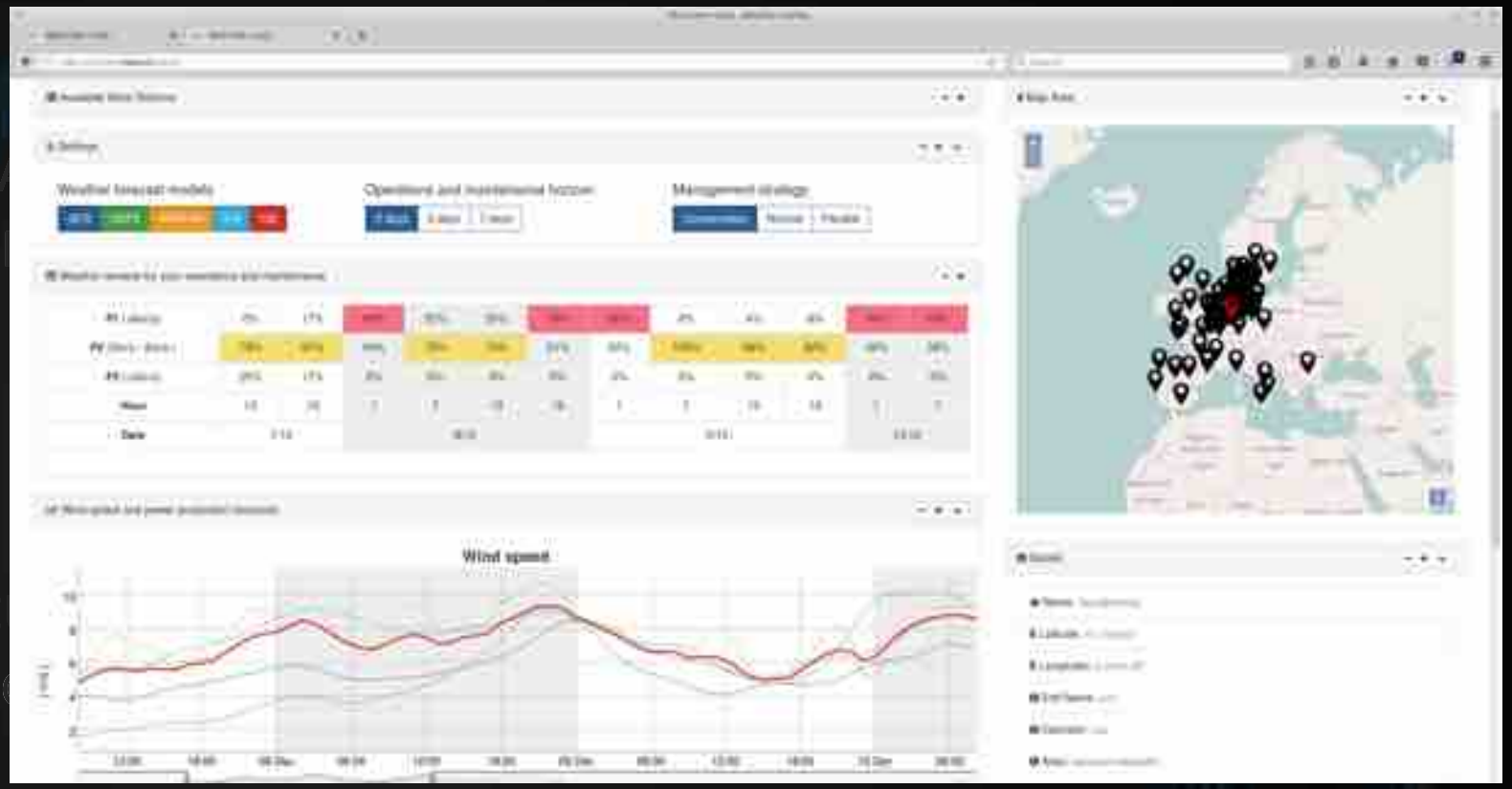

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ADVANTAGES

Optimised data collection and preparation

save work time

Human / artificial intelligence

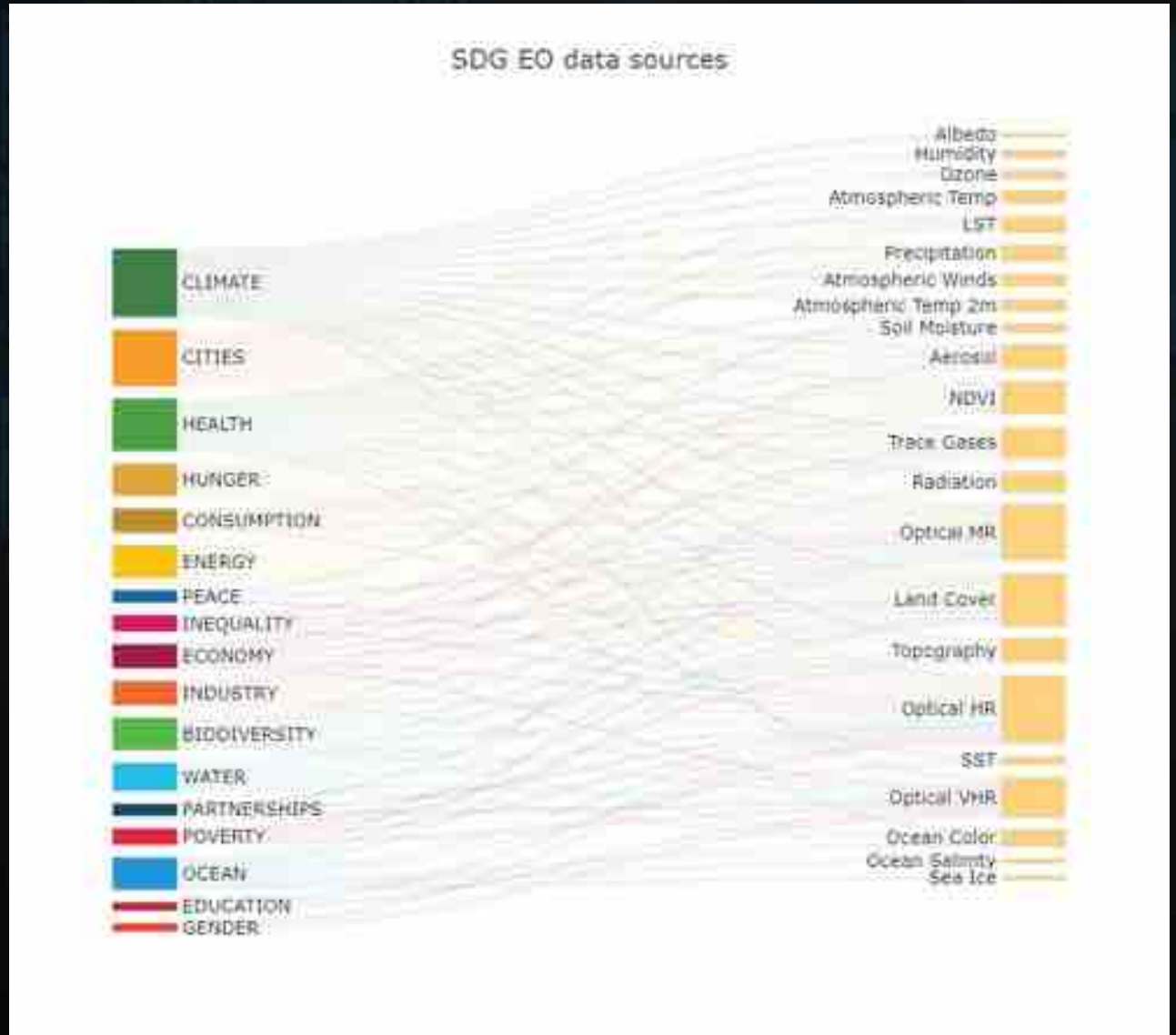
Improved quality and reliability **with less / same investment**

Reduced storage and computation investments

Save $

Multiplication of Value added (more time, more heads)

SUPPORT TO CLIMATE CHANGE, DISASTER RISK REDUCTION AND SDGS



CONCLUSIONS

OUR “INDUSTRY” VIEW IS RATHER SIMPLE: WE WANT TO FACILITATE THE ACCESS TO GEOSPATIAL ENVIRONMENTAL DATA (MAINLY EO DATA) REMOVING DATA ACCESS BARRIERS

→ TRIGGER INFORMATION EXTRACTION (BASED ON SMART DATA ACCESS)
→ TRIGGER MULTI-DISCIPLINARITY
→ MAKE GEOSPATIAL DATA AS A COMMODITY
→ IMPLEMENT A NEW TECHNOLOGY TRANSFER MODEL

FROM DATA AVAILABILITY TO DATA USABILITY!

WE ARE OPEN FOR COOPERATIONS

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