Global hydrological monitoring and science support service platform - Investigations into viable concepts for an Earth Observation Data Centre for Water Resources Monitoring

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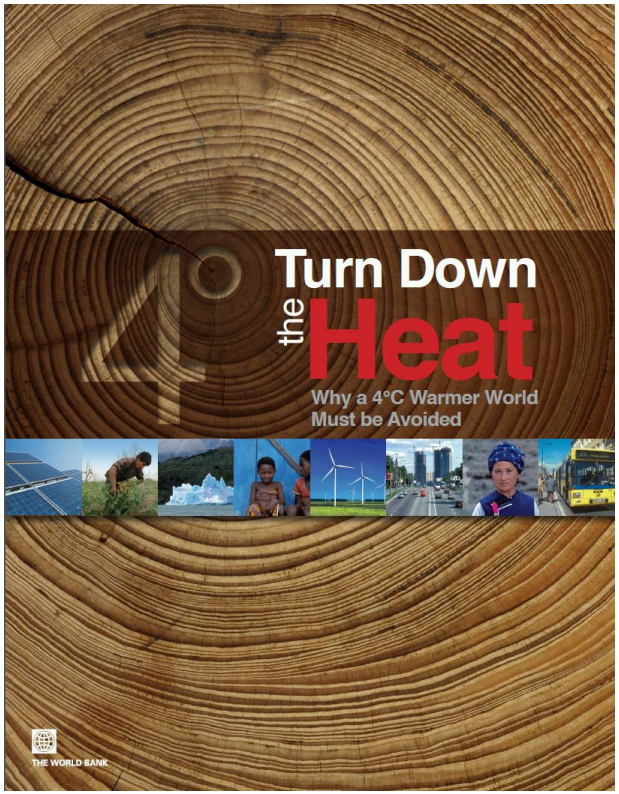
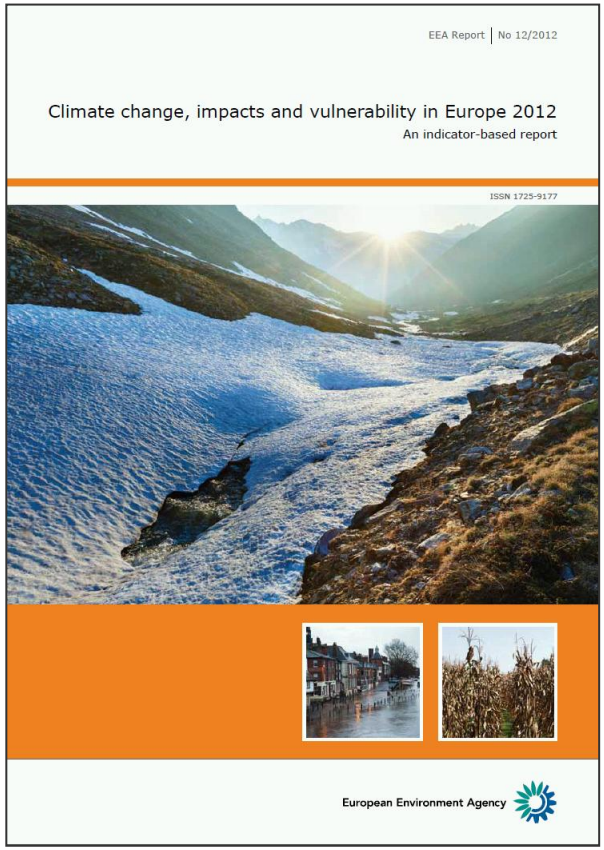
Gerhard Triebnig (EOX), Gerhard Wotawa (ZAMG)
& the EODC Team

Global Warming & Hydrometeorological Risks

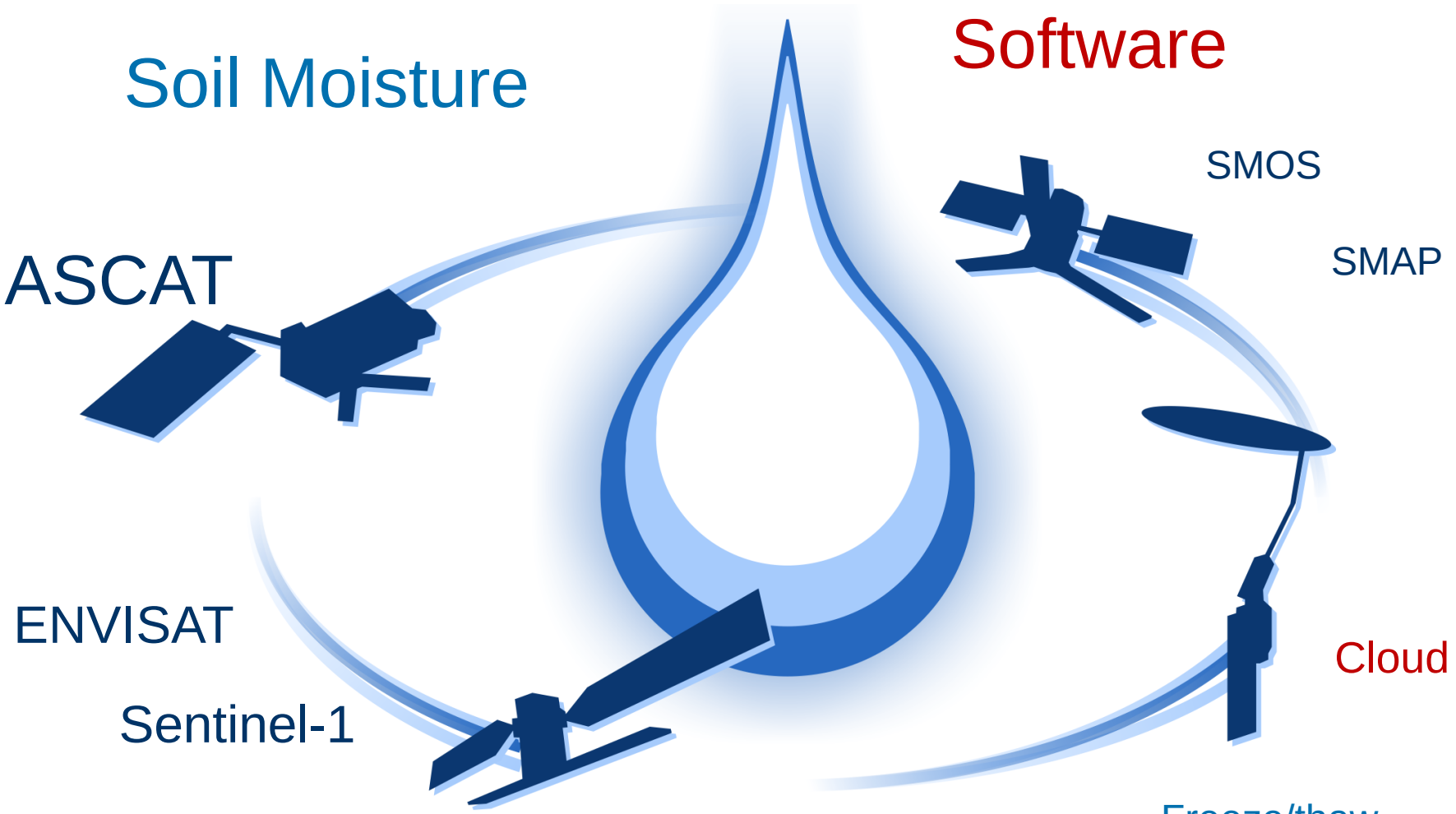


A report for the World Bank by the Potsdam Institute for Climate Impact Research and Climate Analytics. 11/2012



A report by the European Environment Agency on the situation in Europe. 11/2012

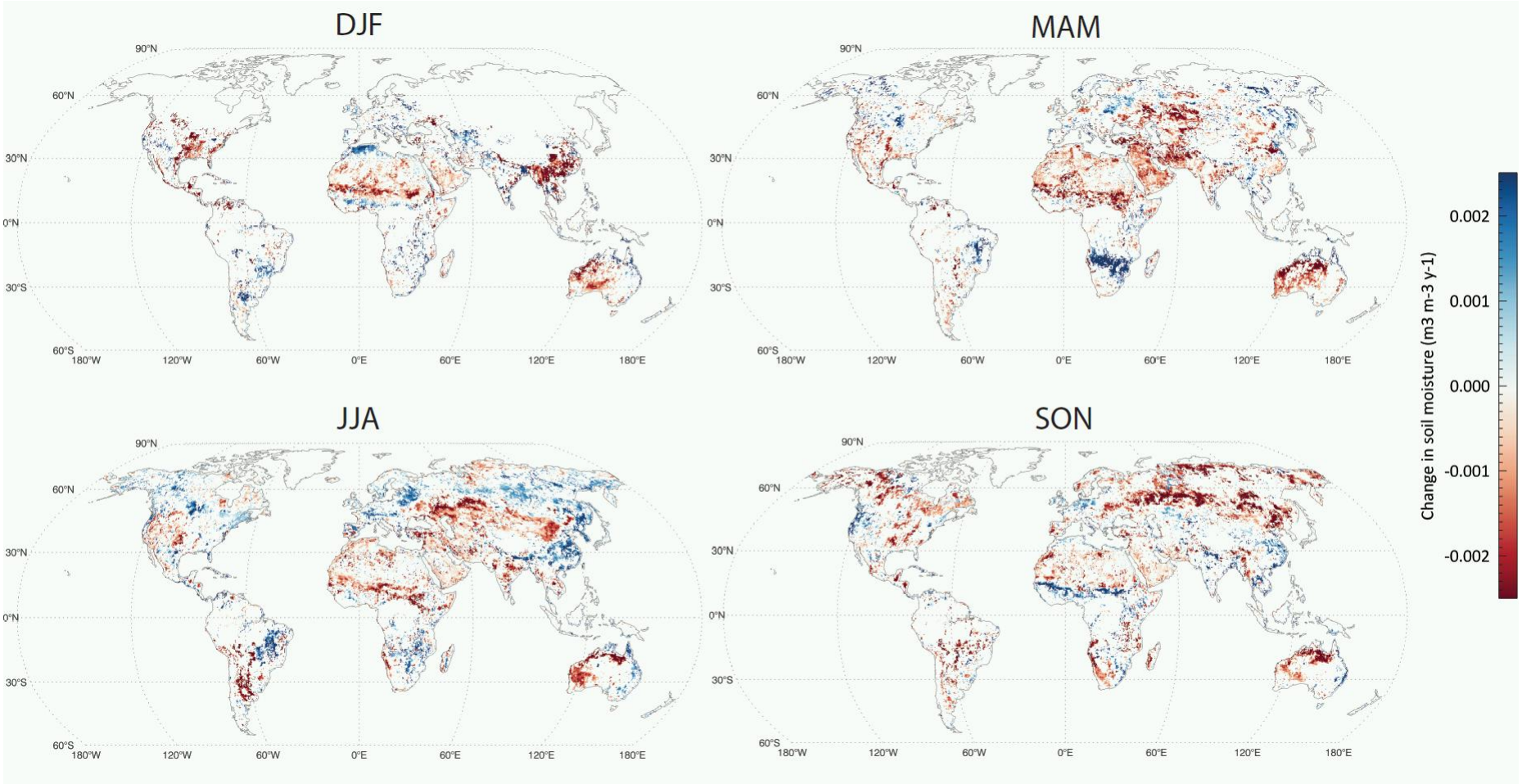
Microwave Remote Sensing Team at TU Wien



soil moisture cci

Trend 1988-2010

wacmos
support to science element



Dorigo et al. (1988-2010) in harmonized multi-satellite surface soil moisture, Geophysical Research Letters, 39, L18405, 1-7.

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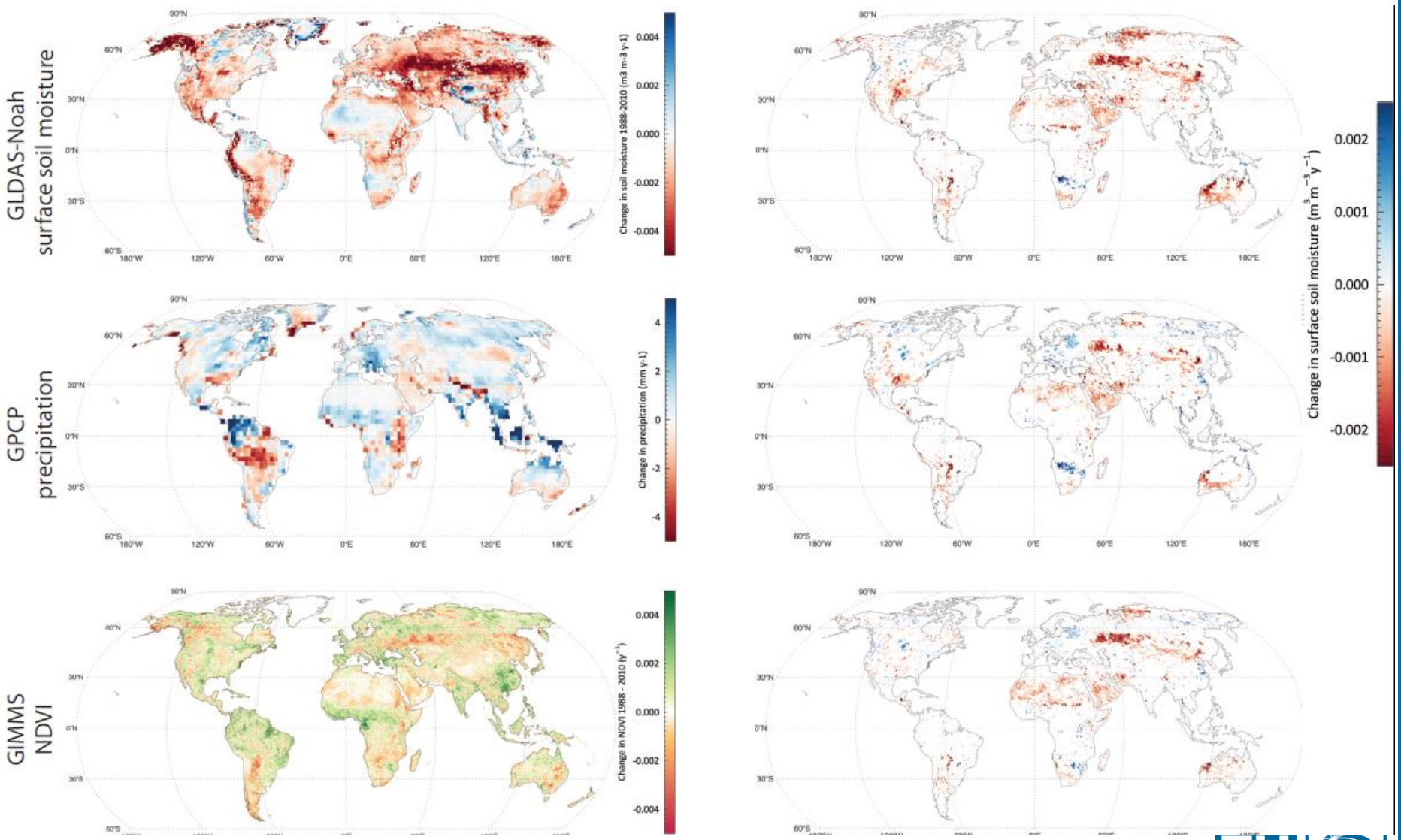
Conistent Trends in Modelled Soil Moisture (top), Precipitation (middle) and NDVI (bottom) Time Series

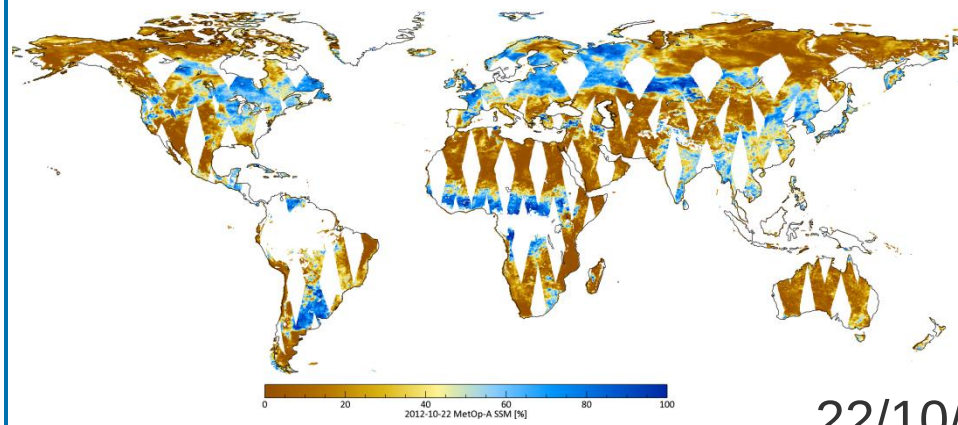


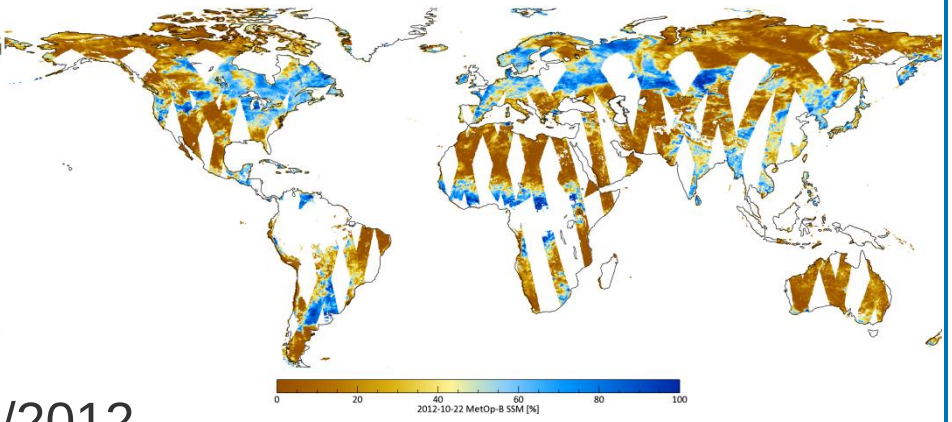
Dorigo et al. (1988-2010) in harmonized multi-satellite surface soil moisture, Geophysical Research Letters, 39, L18405, 1-7.

Operational Near-Real-Time ASCAT Service

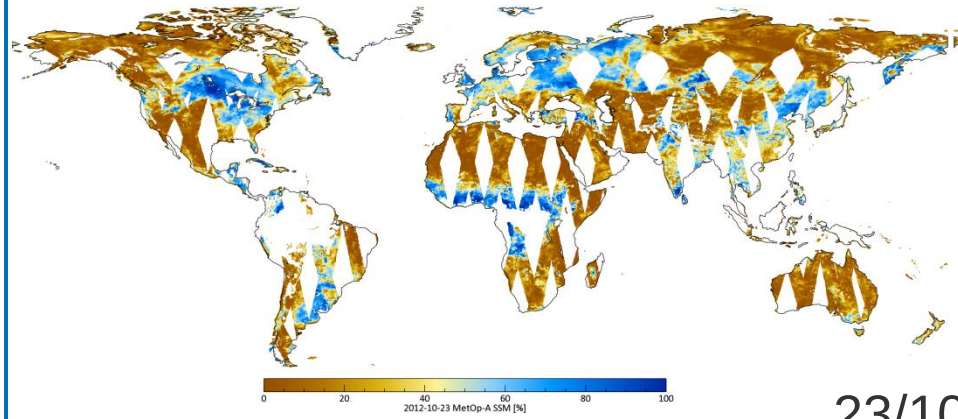
MetOp-A ASCAT

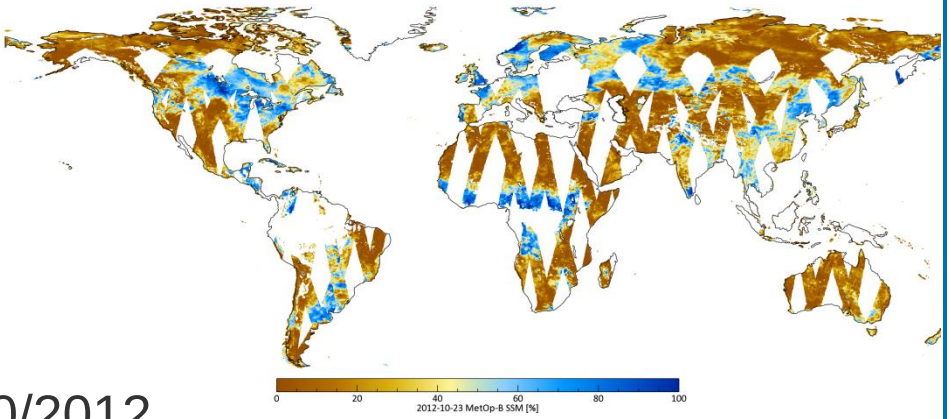
MetOp-B ASCAT





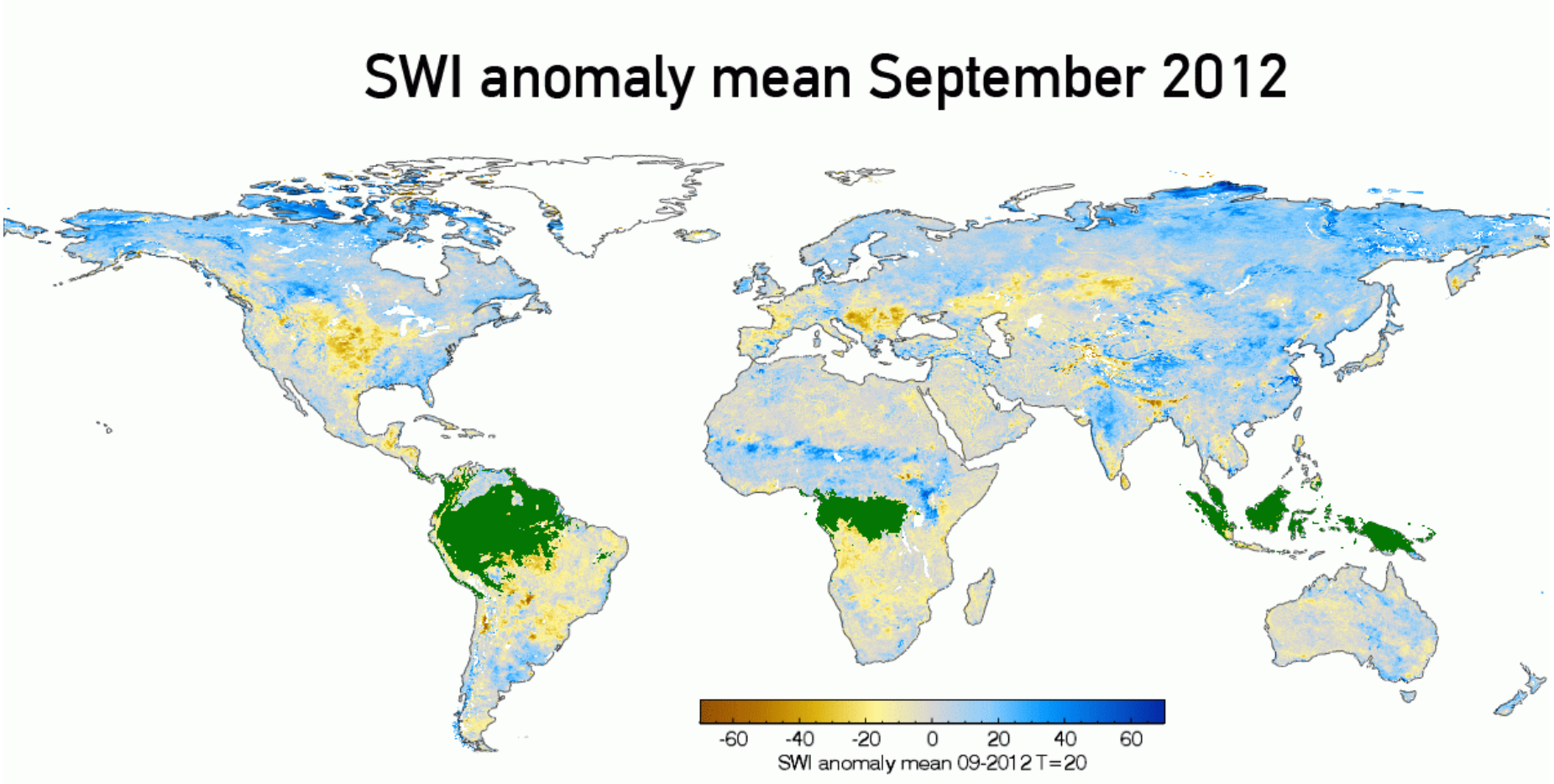
22/10/2012





23/10/2012

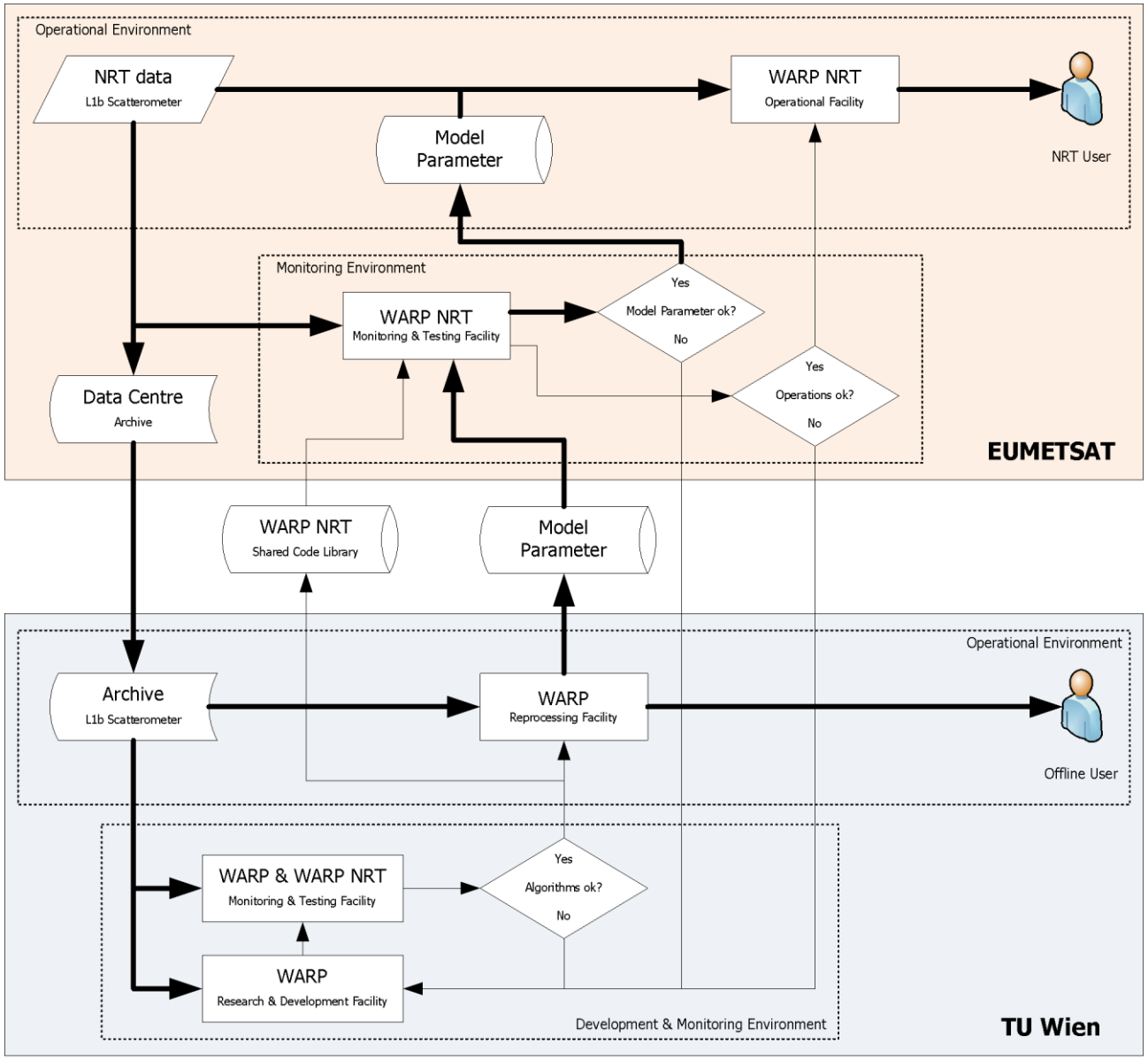
2012 WMO Statement on the State of Climate



Wet (blue) and dry (brown) soil moisture anomalies for September 2012 based on METOP ASCAT

EO Service Development Models

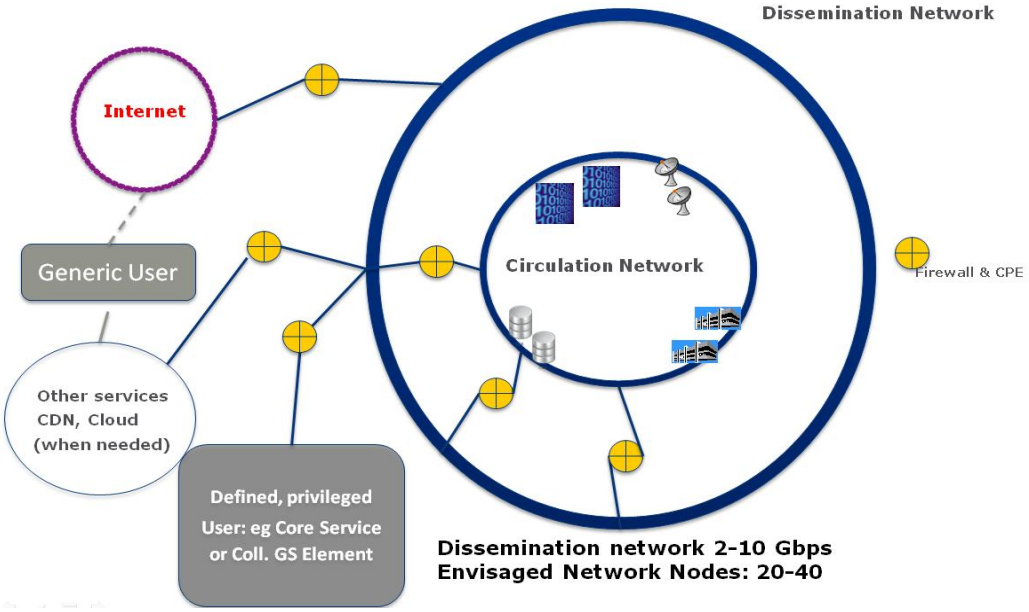
- In earth observation a „common“ service development model is
  - ATBD and scientific prototype are developed by the scientist
  - Operational software is written by software engineers
  - Service is run by operational agency
- This approach might work well if abundant funding is available
- In case of limited resources the problems are
  - Very long development cycles (several years)
  - Neither the software engineers nor the operational agency can build up enough expertise about the algorithms and products
  - Scientists do not know whether their algorithms run correctly or not
  - In case of problems responsibilities are not clear
  - Development teams may quickly break up under new funding schemes
- EO service programmes designed with the vision „to get rid of the scientists“ in the operational phase are bound to fail!


Operational Environment
NRT data
L1b Scatterometer
WARP NRT
Operational Facility
NRT User
Model
Parameter
Monitoring Environment
WARP NRT
Monitoring & Testing Facility
Yes
Model Parameter ok?
No
Yes
Operations ok?
No
Data Centre
Archive
EUMETSAT
WARP NRT
Shared Code Library
Model
Parameter
Operational Environment
Archive
L1b Scatterometer
WARP
Reprocessing Facility
Offline User
WARP & WARP NRT
Monitoring & Testing Facility
Yes
Algorithms ok?
No
WARP
Research & Development Facility
Development & Monitoring Environment
TU Wien
Legend
Data Flow
Software Flow

Large Data Volumes: Rethinking EO Service Models

- New EO satellites will acquire an unprecedented data volume
  - Sentinel-1
    - 1.2 Terabyte per day just for Level 0 for one satellite
    - Tens of Petabyte required for complete mission
- Challenges
  - Data distribution
  - Reprocessing
  - Quality control
  - Visualisation
  - etc.
- New approaches are required
  - Bringing the software to the data
  - Massive parallel processing
  - New cooperation models between science, industry, and users

Planned dissemination network for the Sentinel satellites (ESA)



Wrapping Up

- The high technological potential of EO is still only partially tapped
- Successful EO missions must not stop short of delivering just „images“
- With the US system of environmental satellites being at the risk of collapse, Europe has now a window of opportunity to become the agenda setter in this domain
- In order to seize this opportunity Europe must address the current structural deficits in the governance of GMES and planning of the EO data processing capabilities
- As of today Europe lacks the processing infrastructure to cope with the huge data volumes generated by novel satellite missions such as Sentinel-1
- Processing facilities must offer tens of Petabytes storage, massive parallel processing capabilities and high speed communication networks.
- New EO service development models are urgently needed → GPOD, CEMS & Co are the pathfinders

An Austrian Initiative

Earth Observation Data Centre for Water Resources Monitoring

EODC Water

a cooperation initiated by

TU WIEN

JOANNEUM RESEARCH

GeoVille Group

TU Graz

EOX

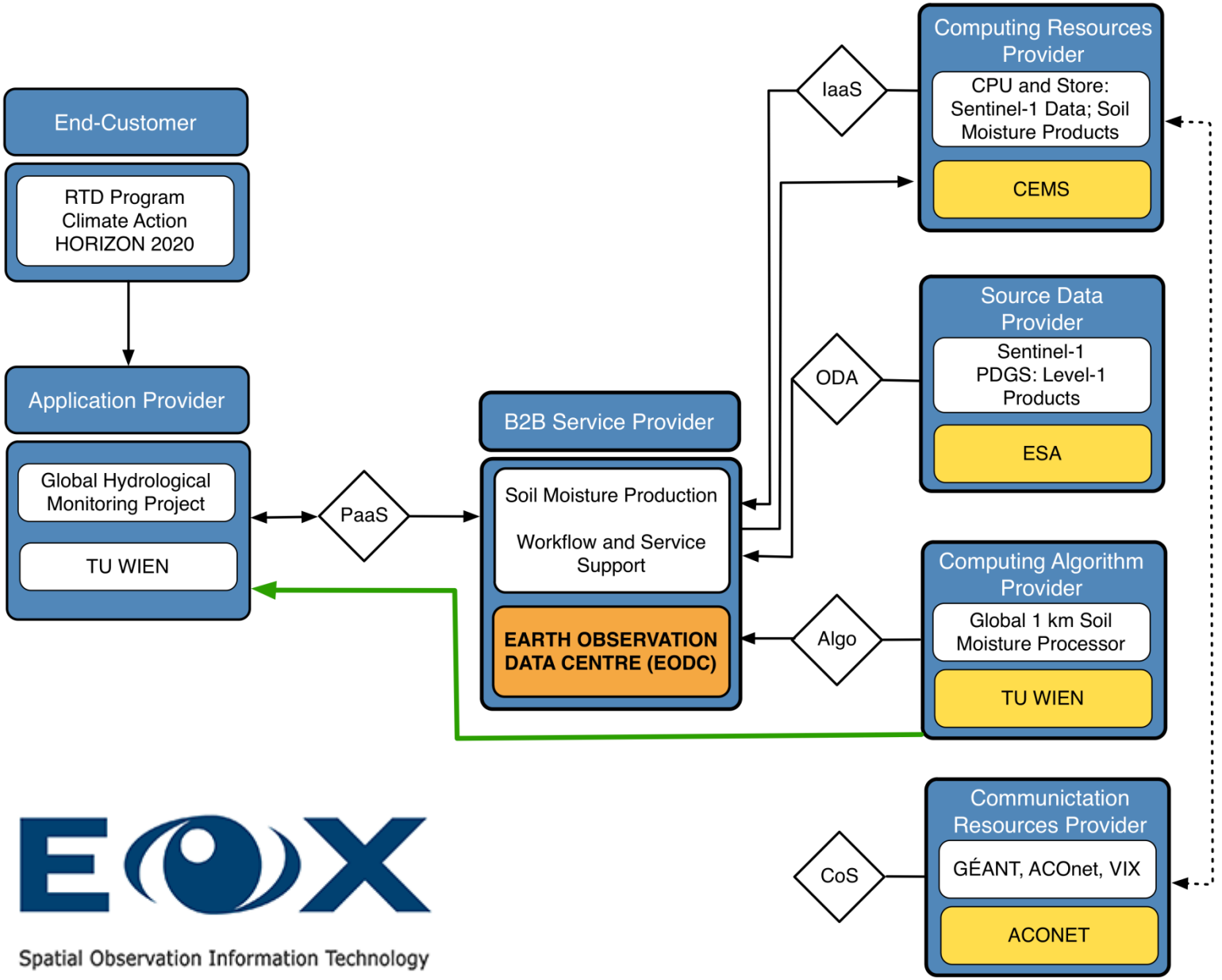
enveo

ZAMG

TU WIEN GEO

EODC-Water Objectives

- Strategic goals
  - Establish Austria as a player in the EO ground processing segment
  - Strengthen its academic, institutional and commercial organisations by coordinating, focusing, and reinforcing their expertise and capabilities
- Overall aims
  - Provide unique EO products for improved monitoring of water resources
  - Operate Collaborative Ground Segment components for the Sentinel satellites
  - Apply service standards as commonly employed by the meteorological community
  - Focus on fully automatic and continental to global scale products
  - Establish the logistics and seamless IT infrastructure system
- Key products & services
  - Pre-processing products for Sentinel-1, Sentinel-2 and Sentinel-3
  - Global medium-resolution hydrological parameters
    - Soil moisture, snow, water bodies, glaciers, …
  - Service & Support



Spatial Observation Information Technology