UNIVERSITY OF TWENTE.

GEONETCAST:

OPEN SOURCE TOOLBOX FOR REAL - TIME SATELLITE OBSERVATIONS OF LARGE BASINS.

MSG Meteosat-9 day color composite - ITC real time reception

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Something being observed for us…?

SORCE

Envisat

Aura/Aqua/Terra

QuikScat

Sage

IKONOS

CBERS

SeaWiFS

SPOT 4, 5

SPIN-2

SeaWinds

Orbview 2, 3

TRMM

DMC

ERBS

ACRIMSAT

Radarsat

EROS A1

ALOS

Toms-EP

QuickBird

Grace

UARS

Jason

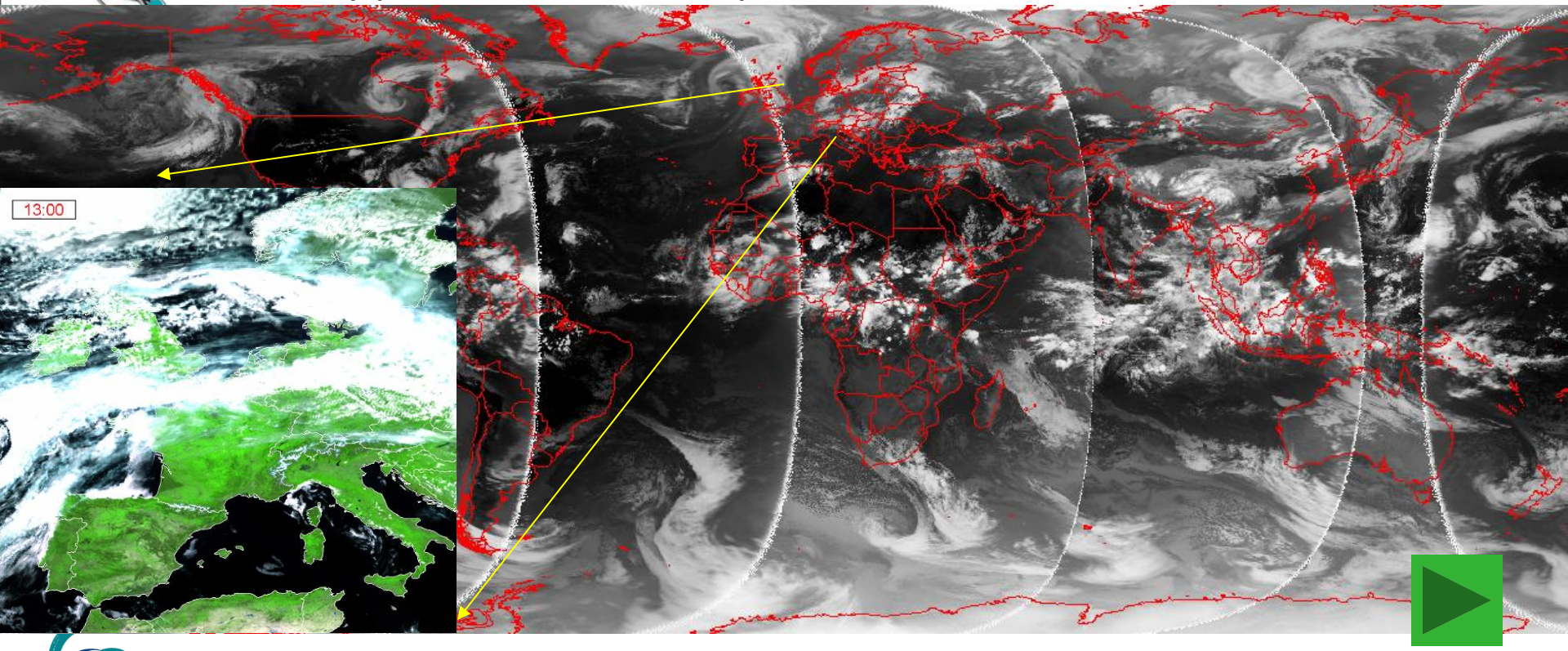
Landsat 7

Overview: Problems

- Developments in EO for Water
- What can GEONETCast Toolbox contribute
- Changes and repercussions for the water sector
- The way forward..

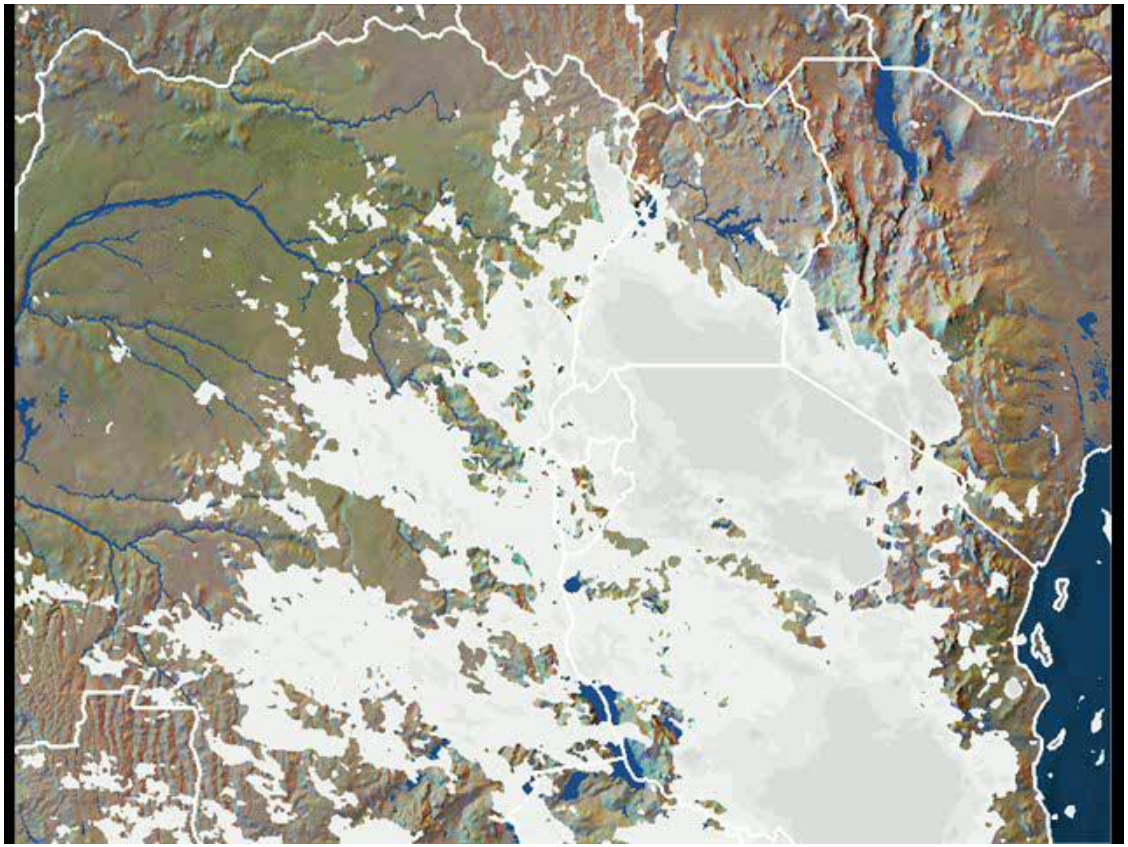
Near real time data over Africa recorded every 15 minute

- Global near real time satellite coverage from geostationary meteorological platforms (1 to 5 km resolution; time frequency: 30'-1 hr; 15 min for MSG)
- Nicely positioned above the Equator

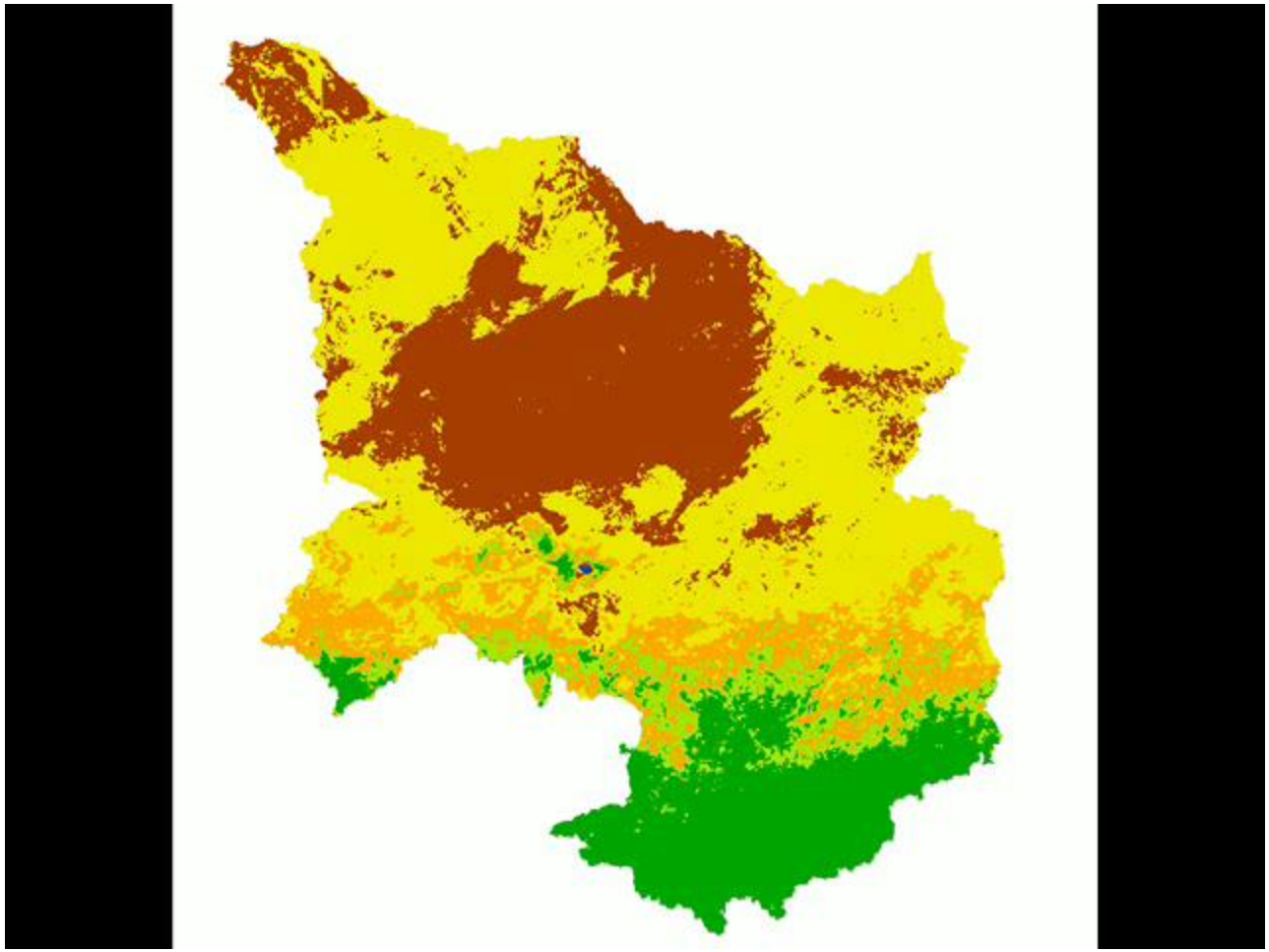


Cloud cover / rainfall

Every 15 minutes another image is animated -> 96 / day



Vegetation Monitoring from Space

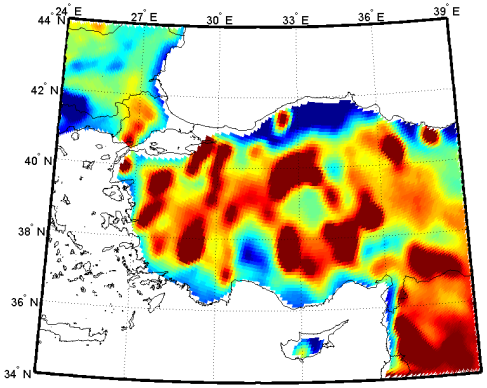


Vegetation development monitoring over Large River Basins (Lake Chad).

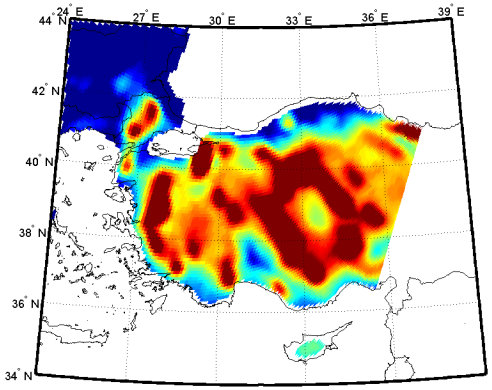
(WACMOS) Soil Moisture Dynamics over Turkey

AMSR-E Soil Moisture in m^3m^{-3} (VUA product)

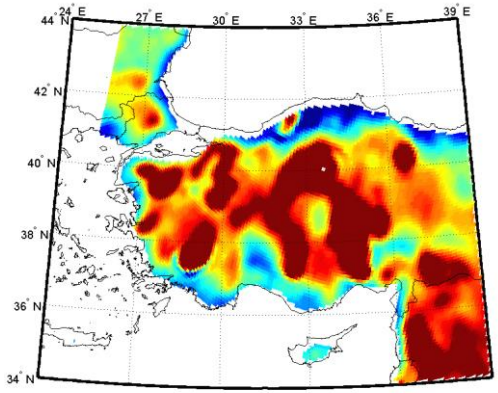
02/09



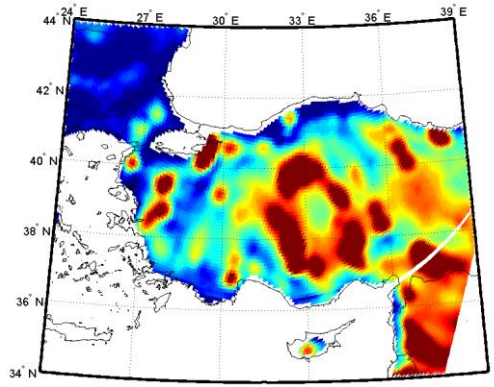
07/09



04/09



09/09



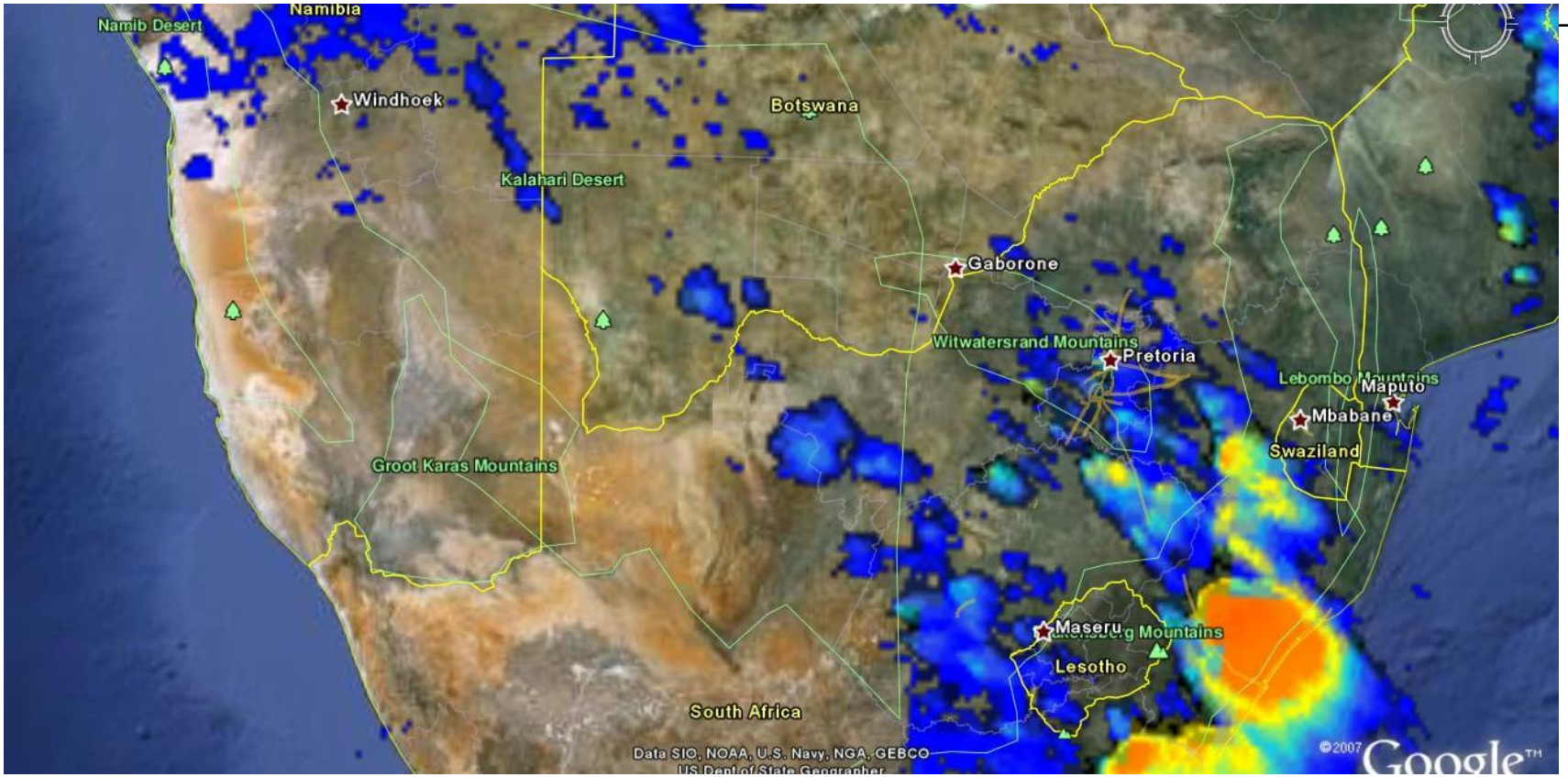
vrije Universiteit amsterdam

TU WIEN

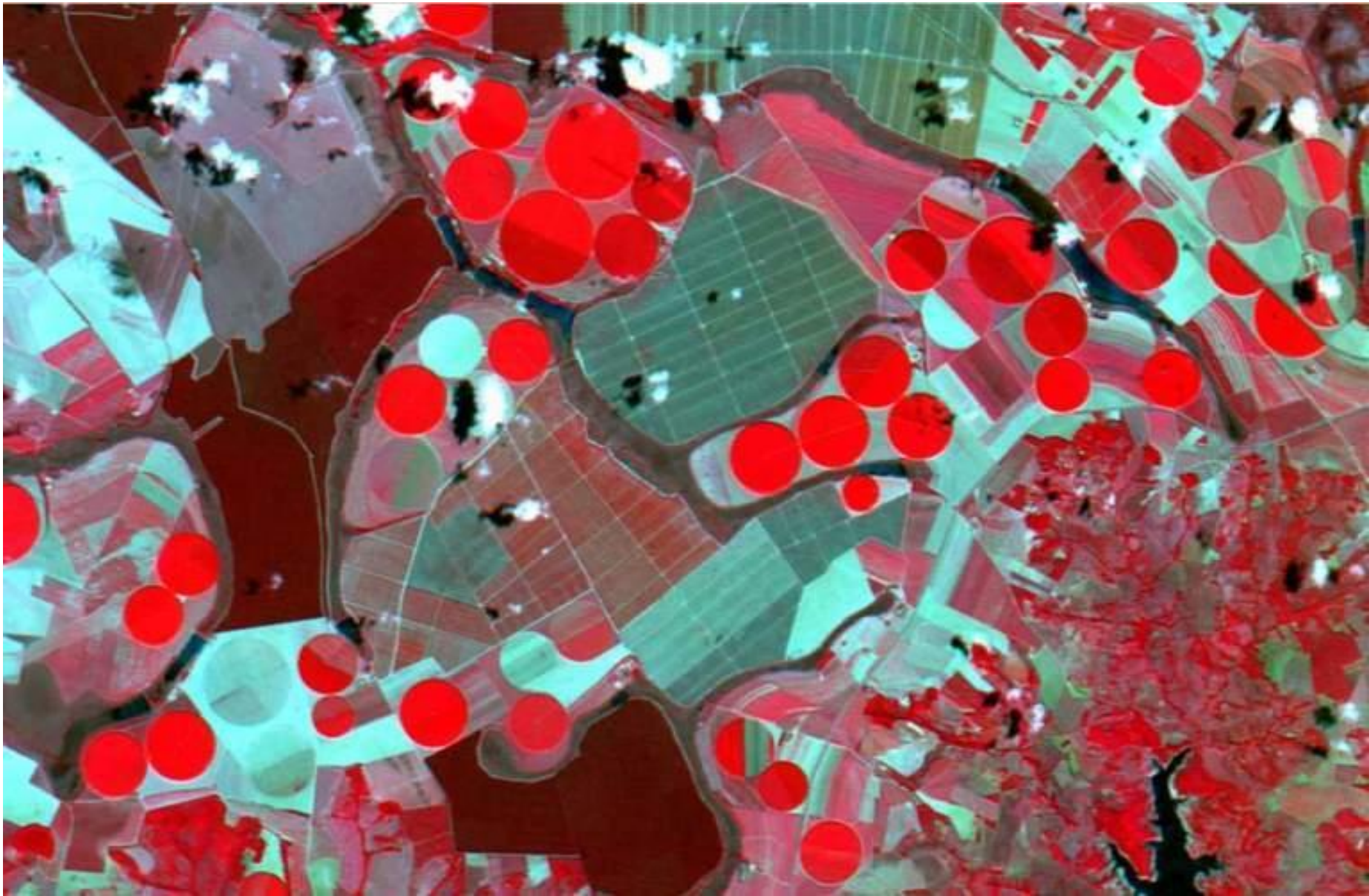
ITC UNIVERSITY OF TWENTE.

wacmos
support to science element

RAINFALL OVER SOUTHERN AFRICA (23 JANUARY 2013)



CBERS-2 CCD, Irrigation development



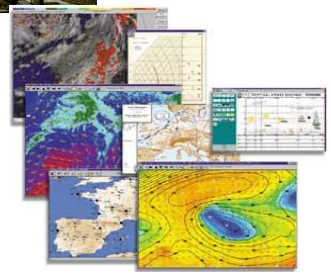
Earth Observation for Africa

- Satellite data is available but:

- Problem 1: How to get it?
- Problem 2: How to analyse?
- Problem 3: Linking to existing spatial models?

NEEDED:

© AMESD



- <u>Open & fast access to:</u>
  - EO & *in situ* data
  - Data Integration and Analyses Tools

<u>Capacity building</u>

- Learning materials
- Training and Support
- Knowledge exchange in S-N, E-W, S-S directions

GEONETCast data reception in Africa and Latin America using C-band dish antennas

- GEONETCast African Service received in Africa

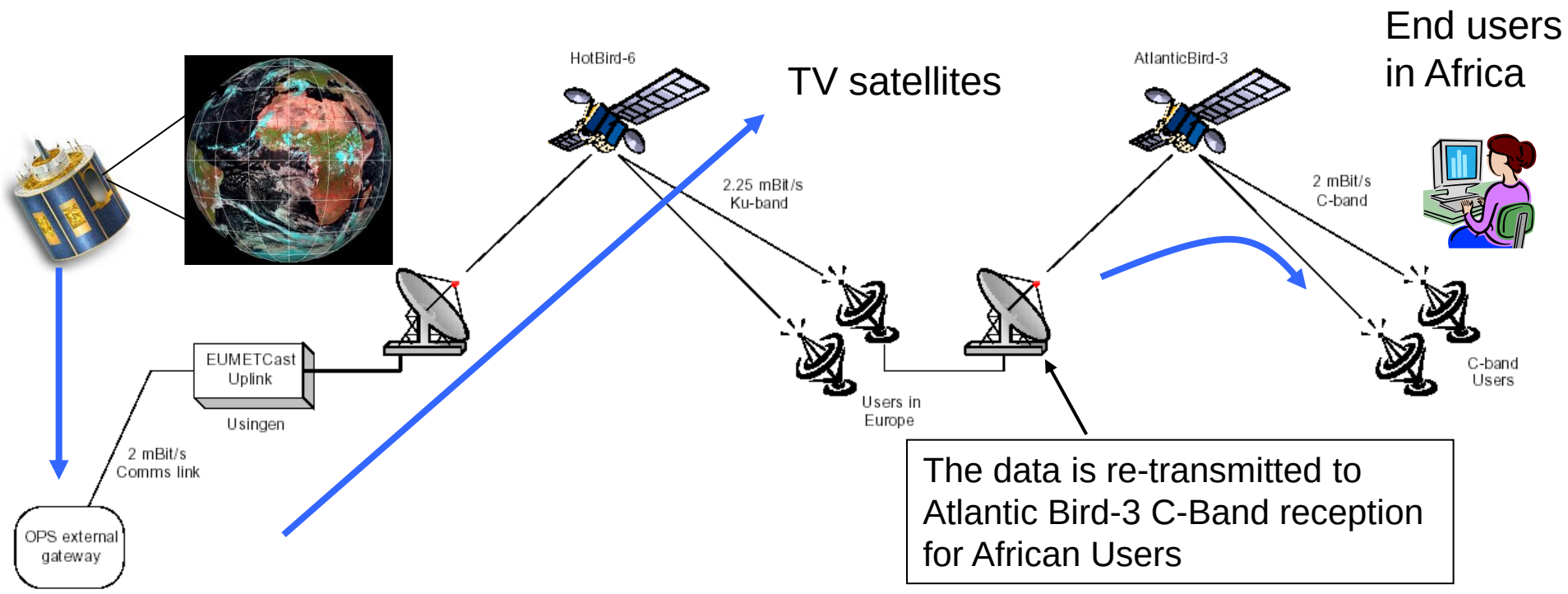
Atlantic Bird 3 C-band dBW footprint

Satellite Dish installed at CGIS-NUR, Rwanda

Satellite Dish installed at RCMRD, Nairobi

Data: Open and fast access
Geonetcast real-time satellite reception

After central ground processing at EUMETSAT, images in full resolution are transmitted within < 2 minutes of observation and then….



Before the (data) signal is received by an end-user, it has travelled: approximate distance is 5 * 36.000 km!!)

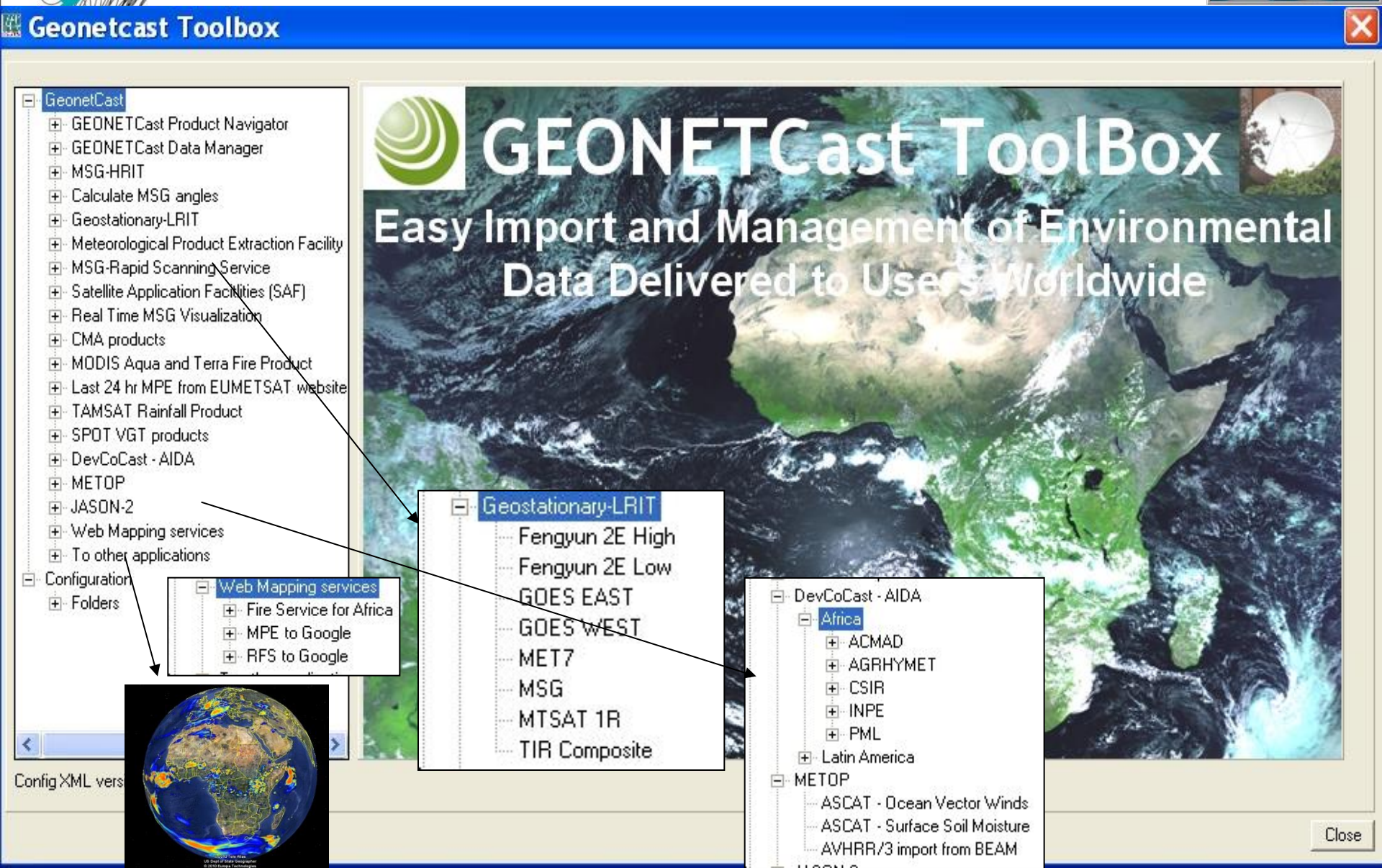
CONFIGURATION BASED ON OFF-THE-SHELF EQUIPMENT

- A standard PC with either Digital Video Broadcasting card,

- C-band a satellite antenna fitted with a digital universal V/H LNB,

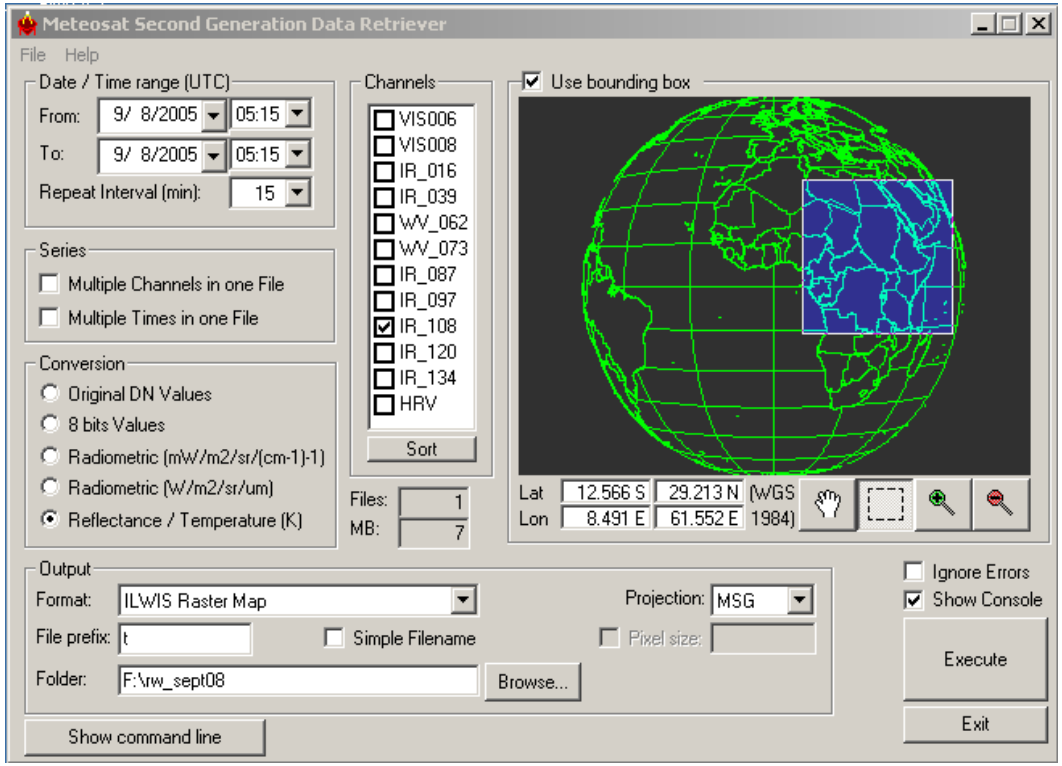
- EUMETCast Client Software and the EUMETCast Key Unit,
- 2 PCs – one for DVB reception (and FTP/file serving to the network) and the other for processing.
- Minimum PC requirements are I: 2.0 GHz Pentium™ IV; 1Gb RAM, 36Gb internal disk (or more); USB port for EKU; 5 volt PCI bus (compatible with recommended DVB PCI card); 100/10
- Processing and visualization based on open-source ILWIS-GEONETCast software
- Online registration https://eoportal.eumetsat.int

ILWIS Open GEONETCast ToolBox v.3.8



GEONETCast Toolbox functionality: MSG data retriever

- Automated MSG image retrieval & pre-processing



Key-features:

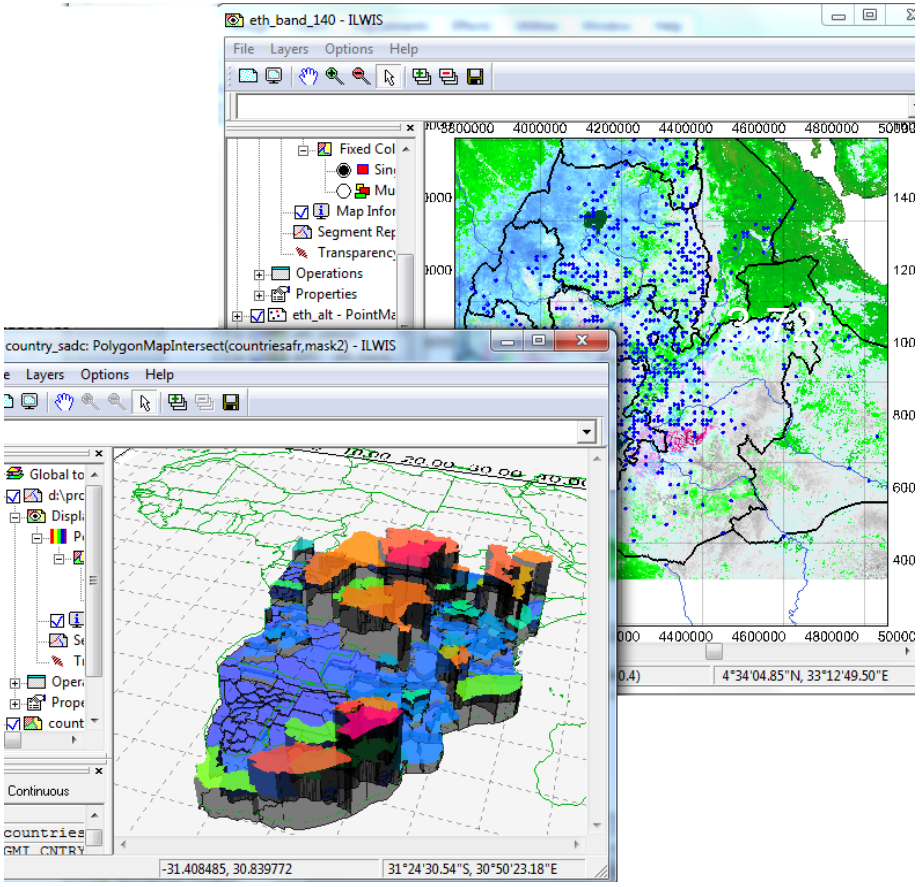
- Fully controlled geometry & radiometry, conversions to diff. data formats: DN, radiances, reflectance, temperature;
- Easy date/time range selection and series construction.

PROBLEM 1: HOW TO GET IT…

PROBLEM 2: HOW TO ANALYSE IT…

ILWIS OPEN V.3.8

MODULAR PC-BASED REMOTE SENSING & GIS PACKAGE



Key features:

- integrated raster and vector design
- import - export of widely used geospatial data formats
- on-screen digitizing
- comprehensive image processing tools
- orthophoto, image georeferencing, transformation and mosaicking
- advanced modeling and spatial data analysis
- 3D visualization & animation (optional 3D)
- auto resampling of different spatial geometries
- rich projection and coordinate system library
- geo-statistical analyses & interpolators
- Spatial Multiple Criteria Evaluation
- Web Mapping & Processing Services
- Hydrological digital terrain modeling
- Surface Energy Balances (SEBS) functionality
- Application Plug-in architecture (Toolboxes)

Compact main package: 20 Mb only!

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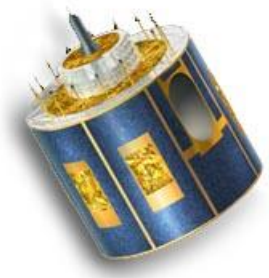
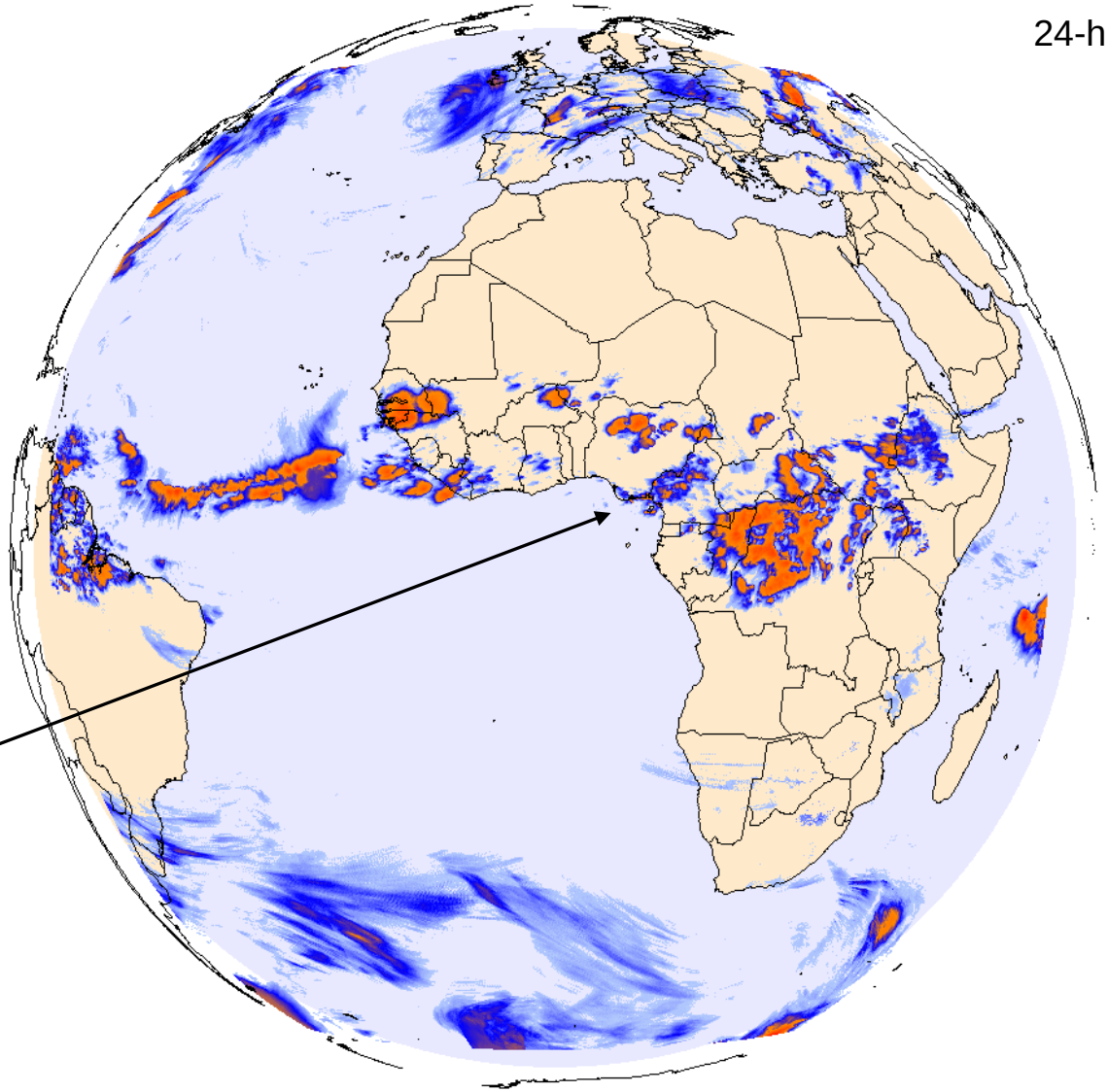
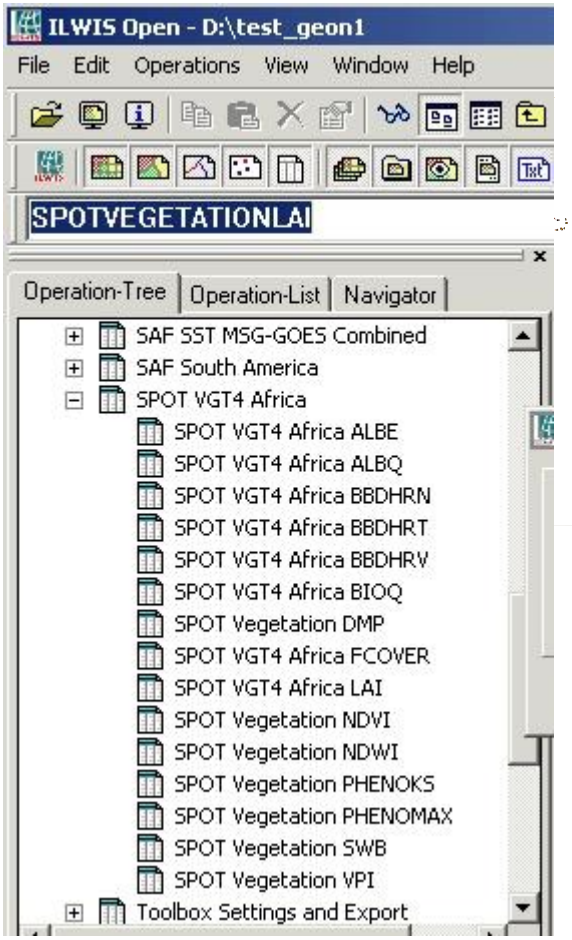
Easy open script language (ASCII) for file Import from Eumetsat Archive MPE time series

- Time serie processing rainfall
  - Import from archives
  - export to e.g. Geotiff or any other format

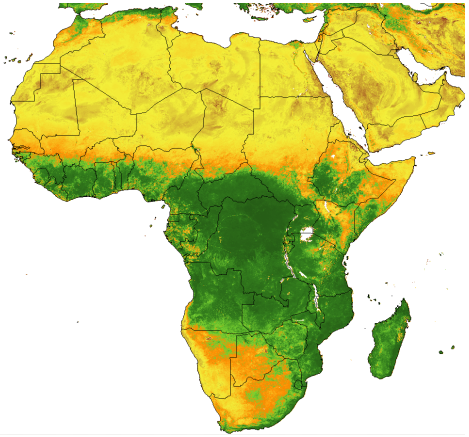




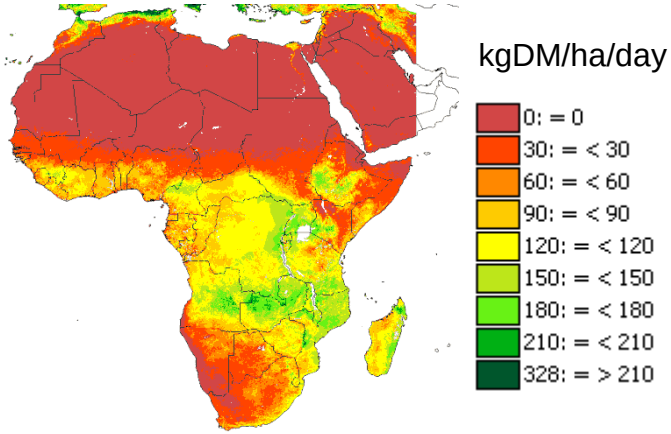
Direct import & use of SPOT_VGT 10-day products



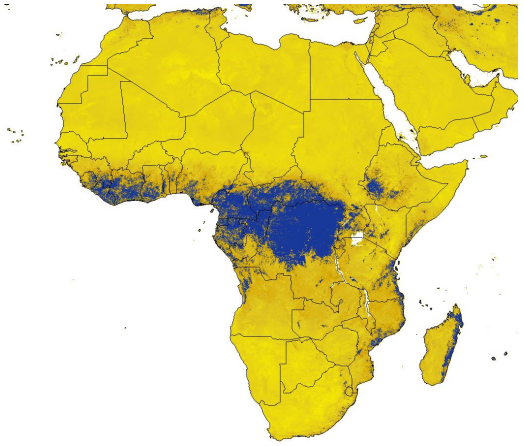
Normalized Difference Vegetation Index



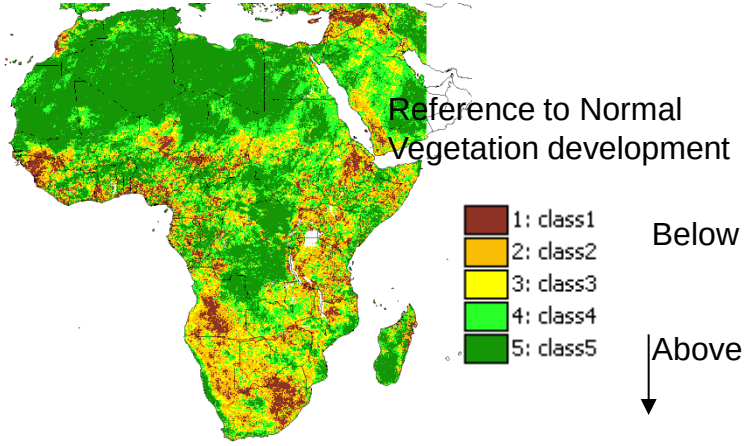
Dry Matter Productivity



Normalized Difference Water Index

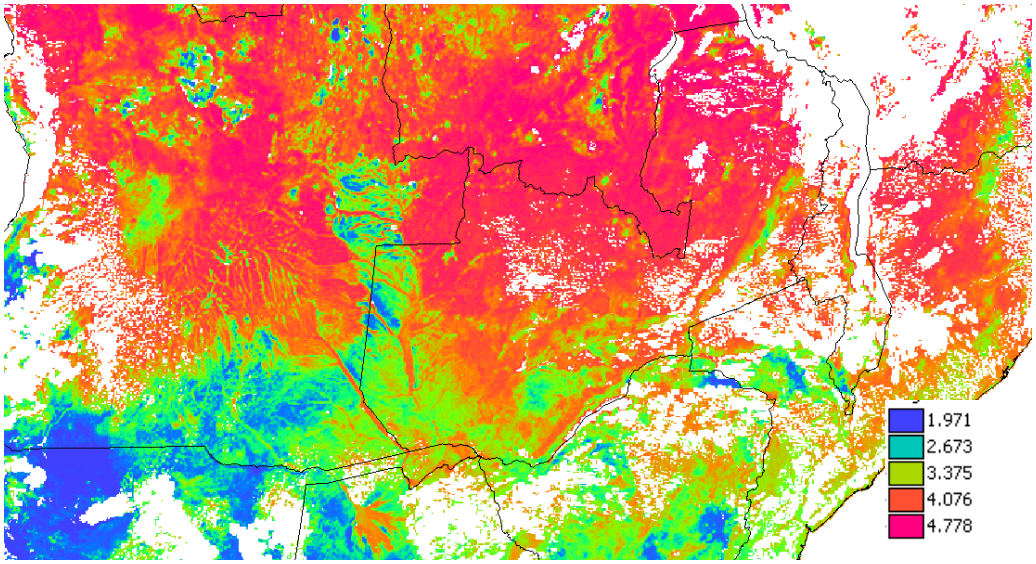


Vegetation Production Indicator

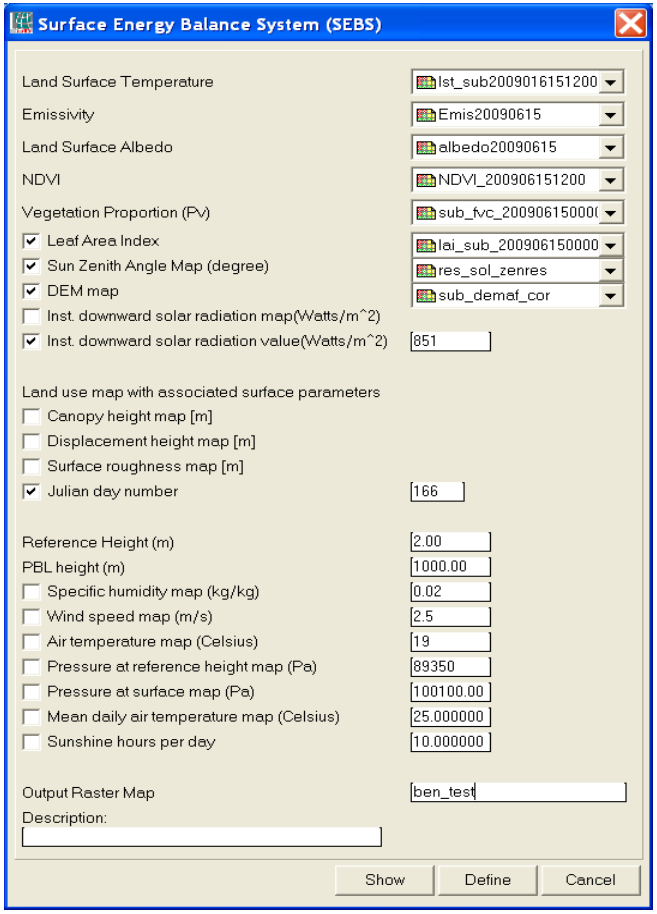


GEONETCast Toolbox Land applications: Monitoring land surface water cycle components

ET: Evapotranspiration (example below)



Daily ET estimate - Zambezi basin – region using SEBS - SURFACE ENERGY BALANCE SYSTEM – ILWIS Open Plug-in



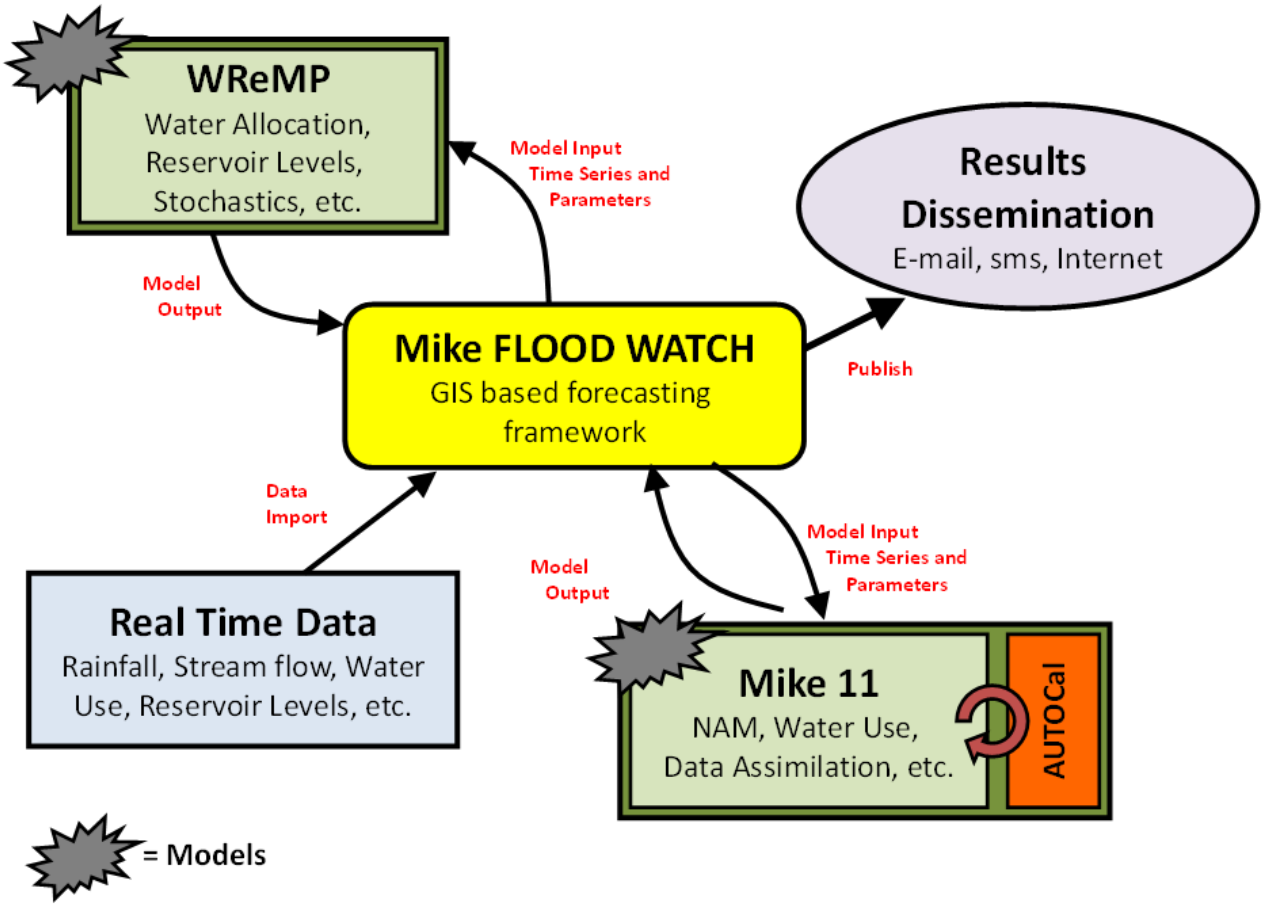
Ps. most of the data can be obtained from GEONETCast

PROBLEM 2: HOW TO ANALYSE IT…

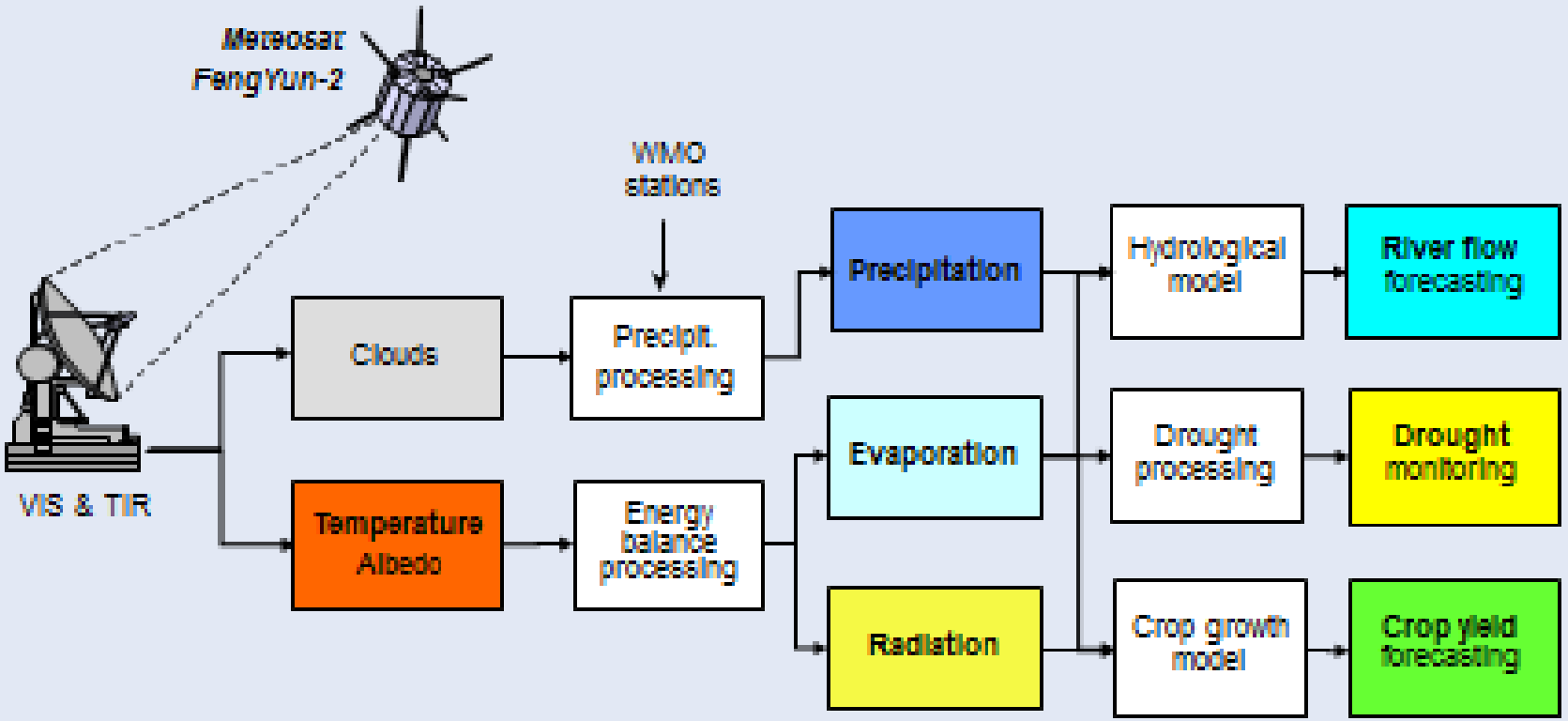
- `

PROBLEM 3: LINKING TO EXISTING SPATIAL MODELS ?

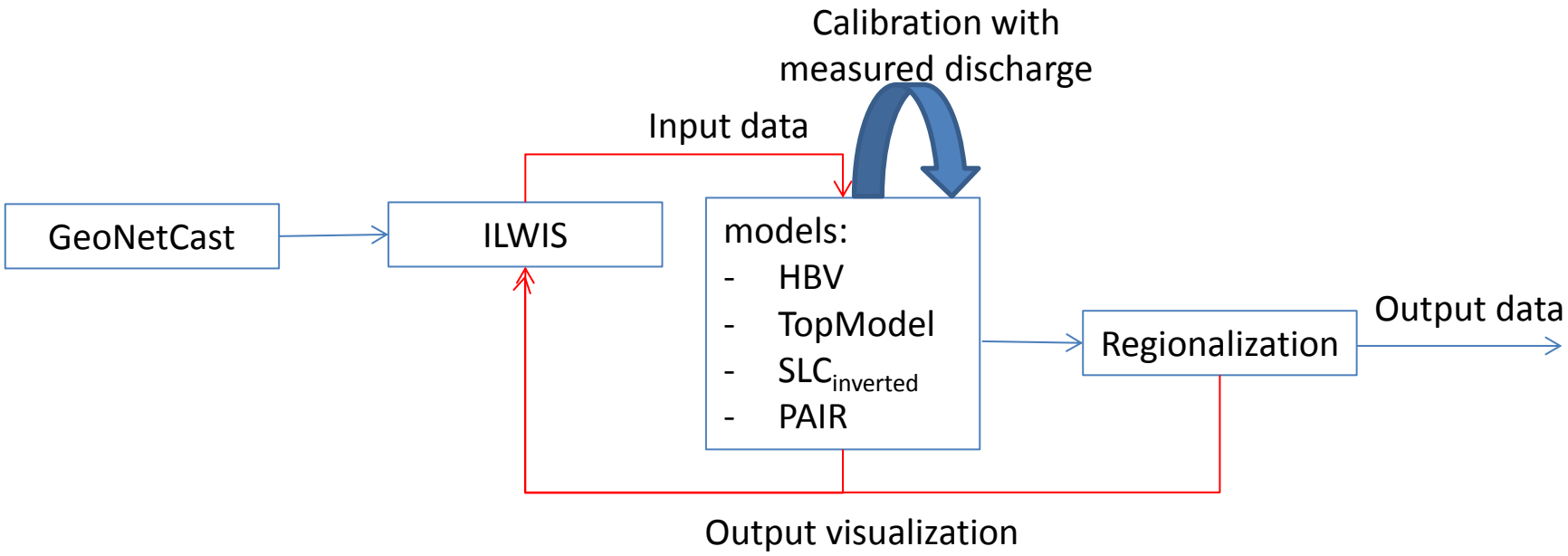
…



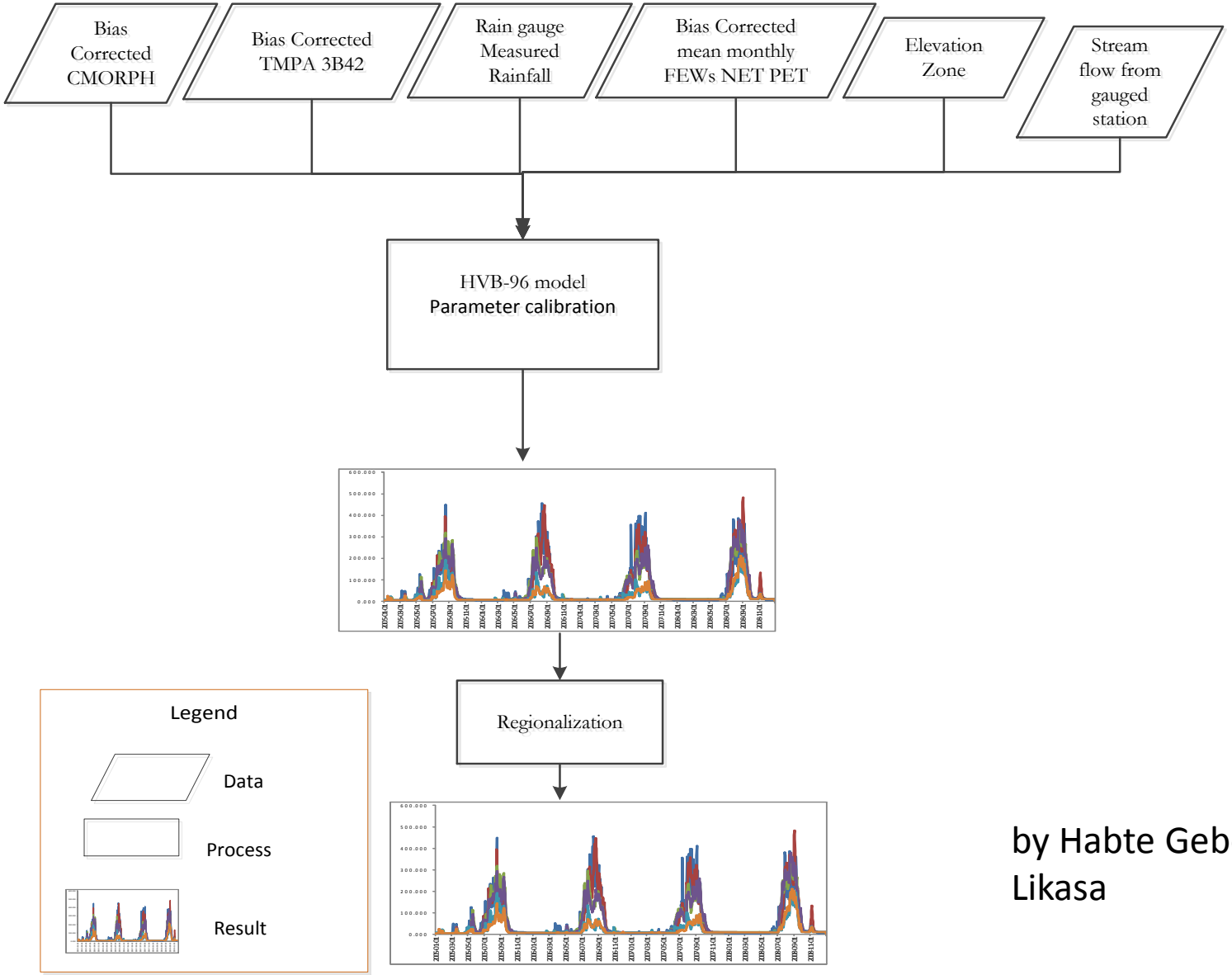
Energy and Water Balance Monitoring System (EWBMS)



Coupling of RS data with hydrological model(s)



Pilot study in Awash basin, Ethopia



by Habte Gebeyehu Likasa

Satellite rainfall data:

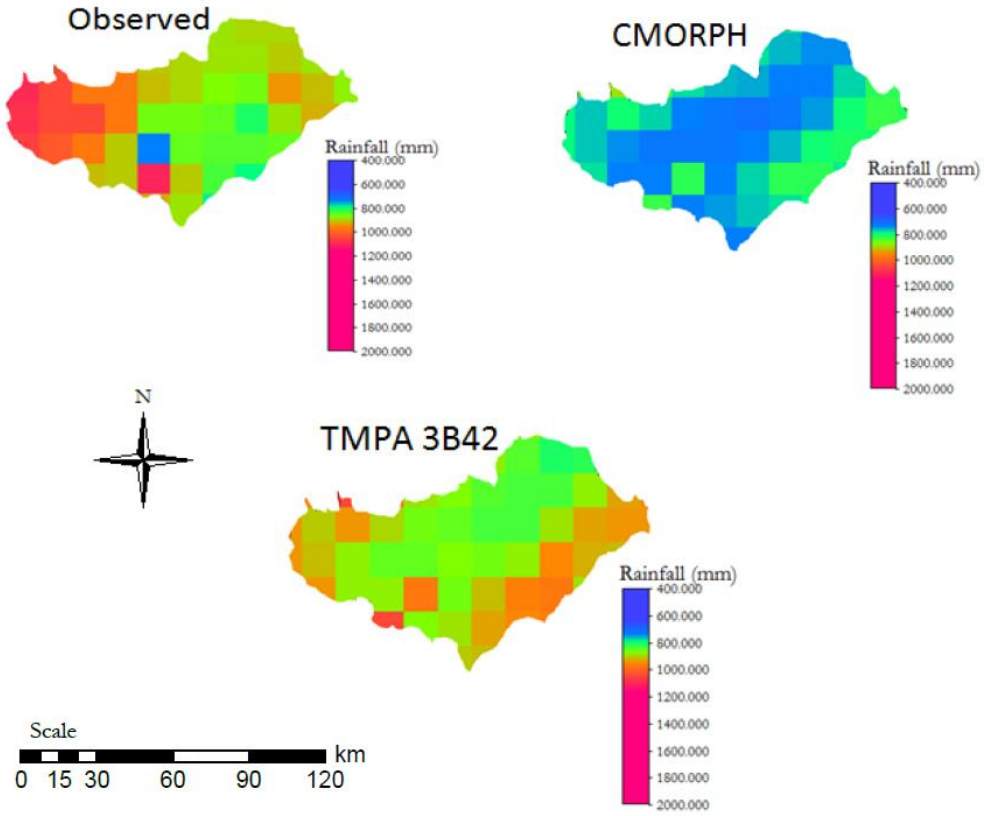
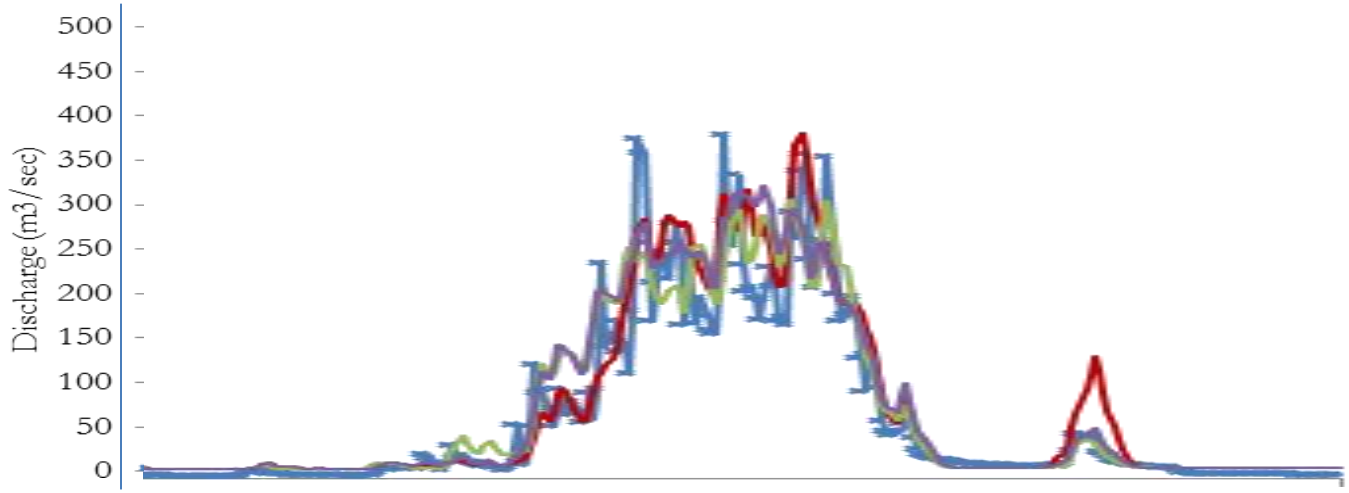


Figure 6.2 Annual Mean Rainfall of Observed, CMORPH and TMPA 3B42 in Upper and Middle Awash River Basin

HBV model output with gauge data and satellite rainfall products



PROBLEM 3: LINKING TO EXISTING SPATIAL MODELS – SOLVED ???

…

- Solved to a some extent but:
  - Evaluation Satellite products on basin scale needed – Multi….
  - Improve integration (corrected) satellite data with models
  - Forecasting
  - Anticipate:
    - Shift to open source models
    - Coupled data capture using ground stations and remote sensors
    - develop strategy to timely water inform <-> public (e.g. rainfall forecasts, flood risk, health risk) using e.g. web-based or mobile com

ITCs' role could be….

- On the spot workshops/training – including establishment of EO receiving station,
- Joined research on linking GEONETCast with models for Operationalization
- Joined workshop/training with other BASIN /Catchment Authorities
- Tailor-made trainings
- Participation in regular ITC courses on EO for WRM
-
- Participation in short course in Kenya (9 weeks)
- Participation in Distance Education


Thank you