



Research and Education Activities in Water Cycle and Climate

ITC's contribution to GEO Water Strategy

By Professor Z. Bob Su

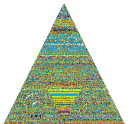
z.su@utwnete.nl

<http://www.itc.nl/wrs>

Department of Water Resources

ITC, University of Twente

Presented by Yijian Zeng



GEO Capacity Building

GEO Water Strategy capacity-building includes considerations of **human, scientific, technological, organizational, and institutional resources and capabilities.**

- **Human capacity-building** refers to the **education and training of individuals** to be aware of and able to access, use, and develop Earth observation data and products;
- **Institutional capacity-building** focuses on developing and fostering an environment for the use of Earth observations to enhance decision-making; and
- **Infrastructure capacity-building** provides the hardware, software, and other technology required to access, use, and develop Earth observation data and products for decision-making.

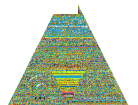


ITC's contribution to GEO Capacity Building

- **Human capacity-building** - education and training of individuals to be aware of and able to access, use, and develop Earth observation data and products;
- **PhD education in Water Cycle and Climate**
- **MSc education in Water Resources and Environmental Management**

- **Institutional capacity-building** - developing and fostering an environment for the use of Earth observations to enhance decision-making;
- **Institutional CB projects (e.g. Dragon and TIGER)**
- **Joint research and education projects (e.g. IWRAP, Incomati projects)**

- **Infrastructure capacity-building** provides the hardware, software, and other technology required to access, use, and develop Earth observation data and products for decision-making.
- **Development of open source software (ILWIS open)**
- **GEONETcast tool box and training kit**



Water Resources (WRS)

The department of Water Resources is a multidisciplinary scientific department specialising in scientific research and education in earth observation and geo-information sciences for the understanding, monitoring, predicting and sustainable use and management of water resources.

Download the evaluation report:
[WRS Annual Report \(2012\) \(PDF\)](#)



Study water resources and environmental management

Education

Courses in the water resources domain facilitate a multi-disciplinary approach to problem solving for development purposes.

- Master of Science degree course
- Master degree course
- Postgraduate diploma course
- Short certificate courses
- Distance education courses
- Joint education

Research

We conduct frontier scientific researches in understanding the water, climate, ecosystem and human interactions in the Earth system. Our aim is to advance scientific knowledge in understanding, monitoring, predicting and sustainable use and management of water resources, by means of earth observation and spatial technologies.

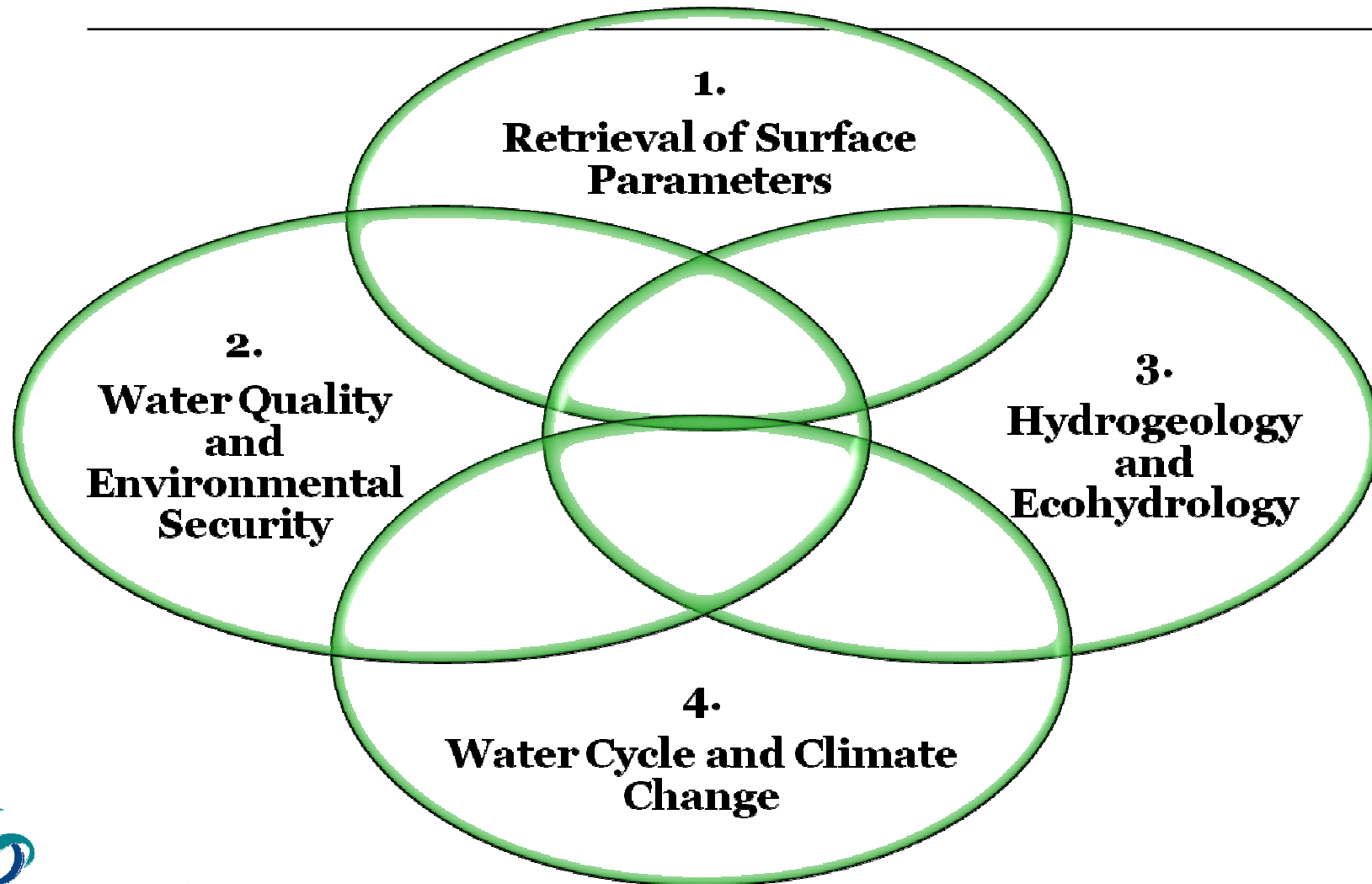
- Research theme: Water cycle and climate
- Research clusters
- PhD research projects
- Academic output

Projects

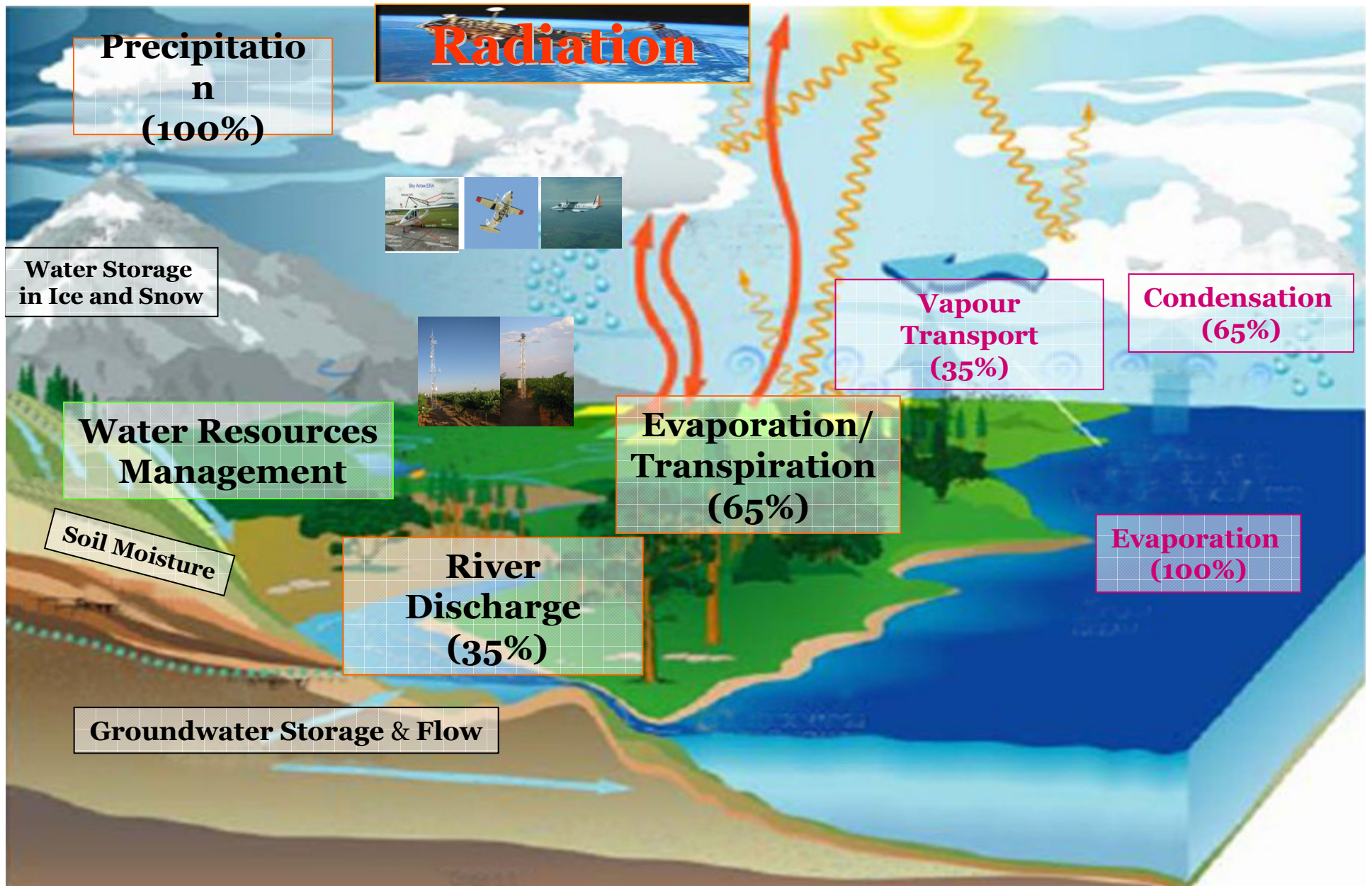
Projects executed by the department.

- CORE-CLIMAX
- FLEX/S3 PARCS
- GEONETCast for Early Warning and Food Security – Ethiopia
- AGRICAB increased EO capacity for better agriculture and forestry management in Africa
- IN PLACE Integrated Network for Production and Loss Assessment in the Coastal Environment
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Water Cycle and Climate (WCC) Research Clusters



Earth Observation of Water Cycle



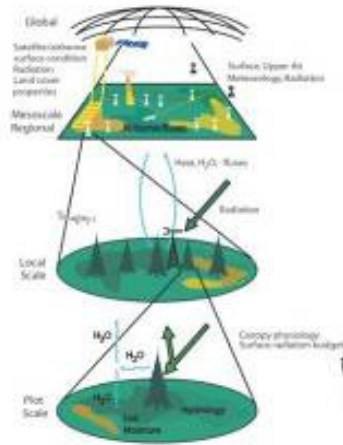
Water Cycle and Climate – from process understanding to societal relevant applications

Observe Globally



**Continental scale
land-atmosphere modelling**

Upscale for Prediction



**Downscale for
Application**

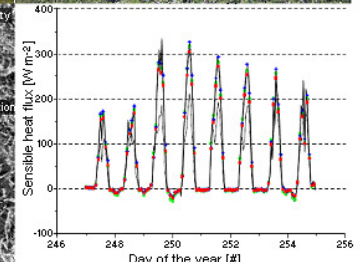
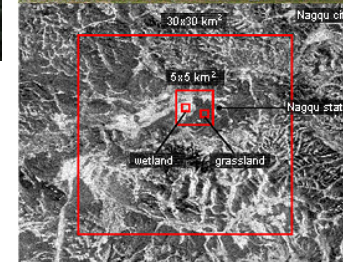
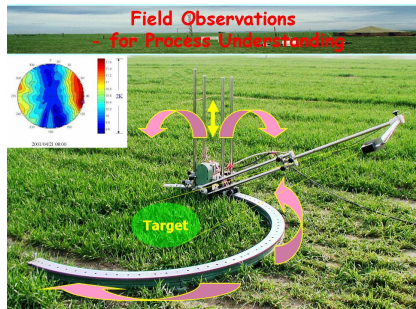
ITC Earth Observation Research and Education Sites



- **Basic Water Cycle and Earth Observation Process Studies**
- **Calibration/Validation of Earth Observation Data and Instrument**
- **PhD & MSc Education**

ITC Earth Observation Research and Education Sites

1. NL Sites (Speulderbos)
2. The Sardon site near Salamanca in Spain
3. Lake Naivasha (RAMSAR site, Kenyan organizations)
4. The Tibetan Plateau (CAS)



Water Resources Management using Geo-Information and Earth Observation

Current Application Activities

- Water Disasters – Floods & Droughts
- Water for Food and Ecosystems
- Integrated River Basin and Water Management
- Groundwater Fluxes - Monitoring, Assessment and Management
- Water Quality, Wetlands and Integrated Coastal Zone Management
- Integrated Water Information Systems

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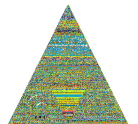
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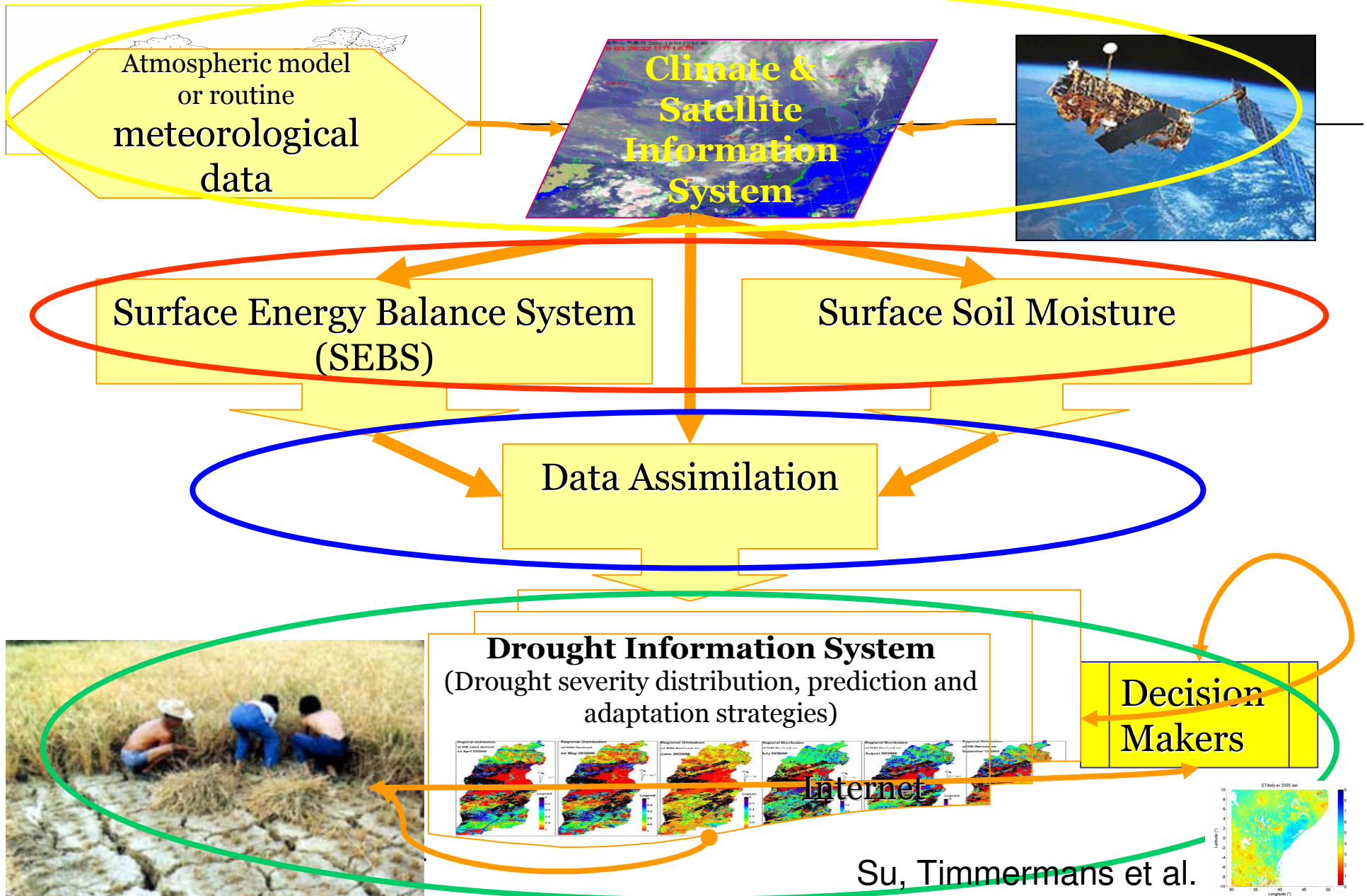
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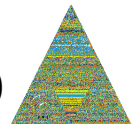
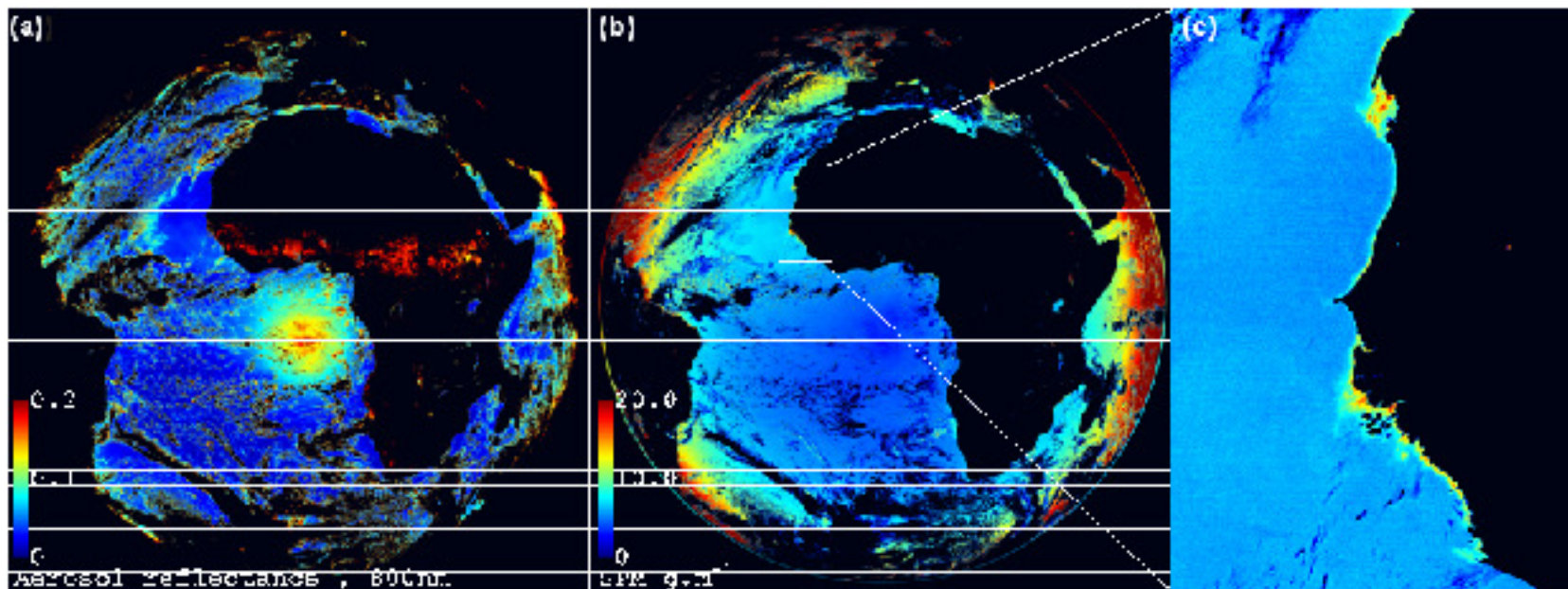


Example 1: Drought Monitoring, Assessment, Prediction and Adaptation under Climatic Changes



Example 2: Global variations of water quality and interrelationship to climate change

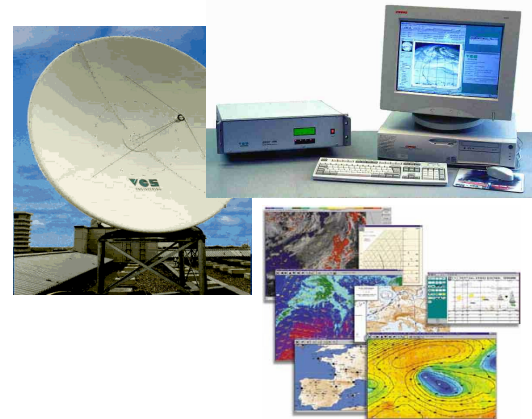
- Satellite observation of suspended sediment and phytoplankton green pigment (chlorophyll-a) - radiative and carbon exchanges between the water surface layer and the atmospheric boundary layer
- Marine geo-biophysical quantities from MSG satellite





Example 3: Creating societal relevant EO applications anywhere anytime

low cost, real time data retrieval via DVB (digital video broadcast), and open source tools and information technologies

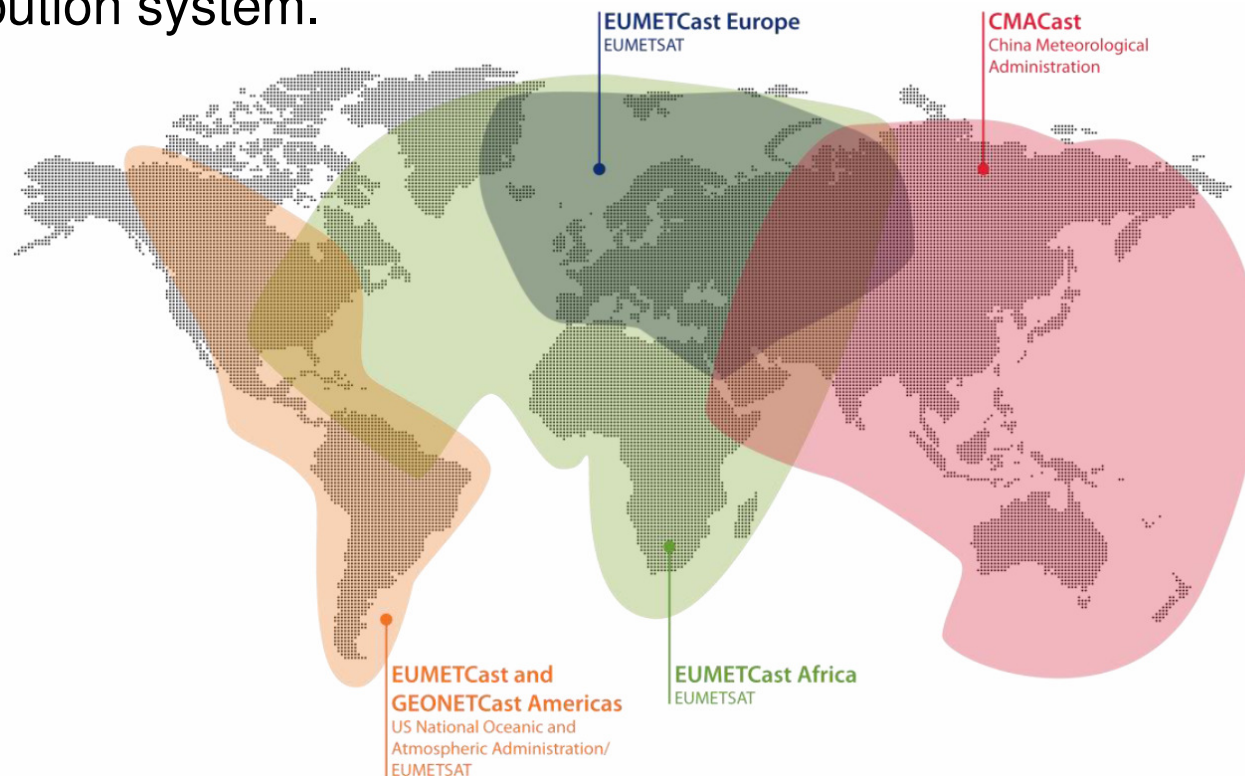


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(B. Maathuis & C. Mannaerts)

GEONETCast as backbone for data provision (Part of GCI)

GEONETCast provides free near real-time environmental and Earth observation data and derived products to a worldwide user community using a telecommunication satellite based data distribution system.



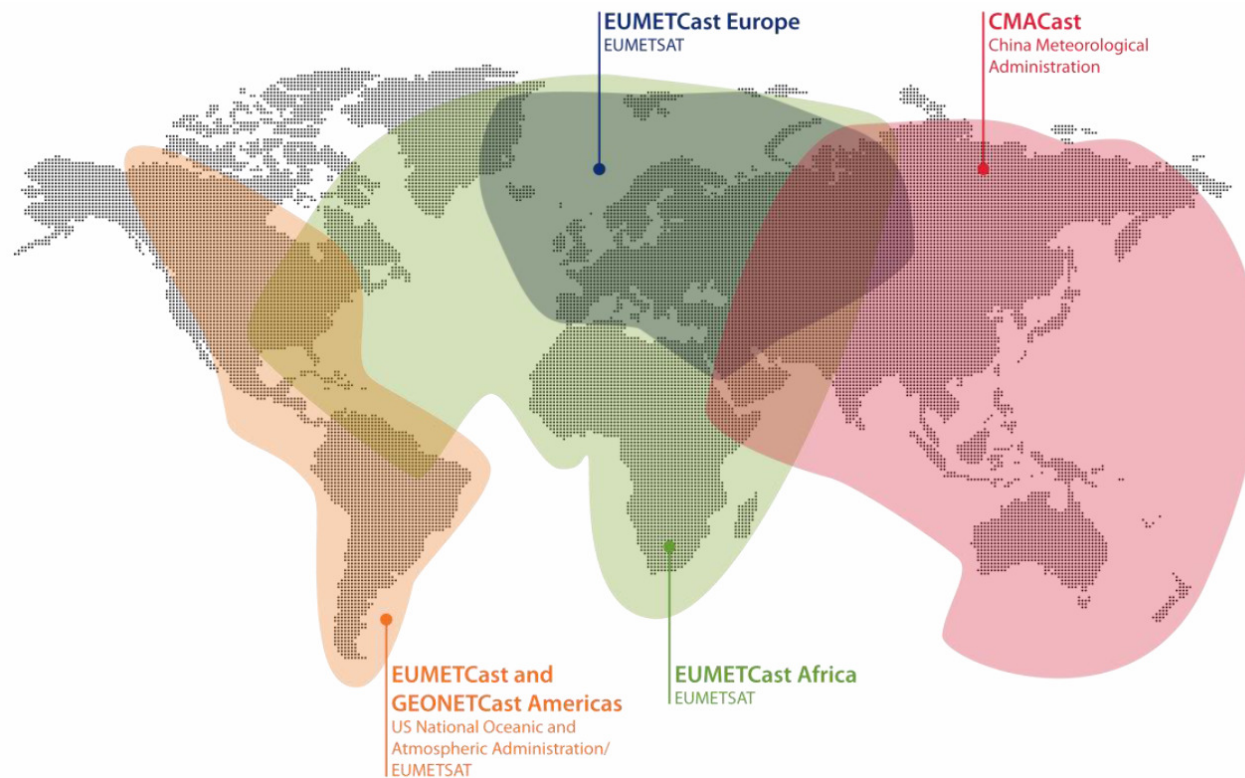


GEONETCast

Delivering Environmental Data to Users Worldwide

GEONETCast services

- EUMETCast: operated by the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), covering Europe, Africa, parts of Asia and the Americas;
- CMACast: operated by the China Meteorological Administration (CMA), covering Asia and parts of the Pacific (a considerable upgrade of the formerly called FengYunCast);
- GEONETCast-Americas: operated by the US National Oceanic and Atmospheric Administration (NOAA), covering North, Central, and South America and the Caribbean.



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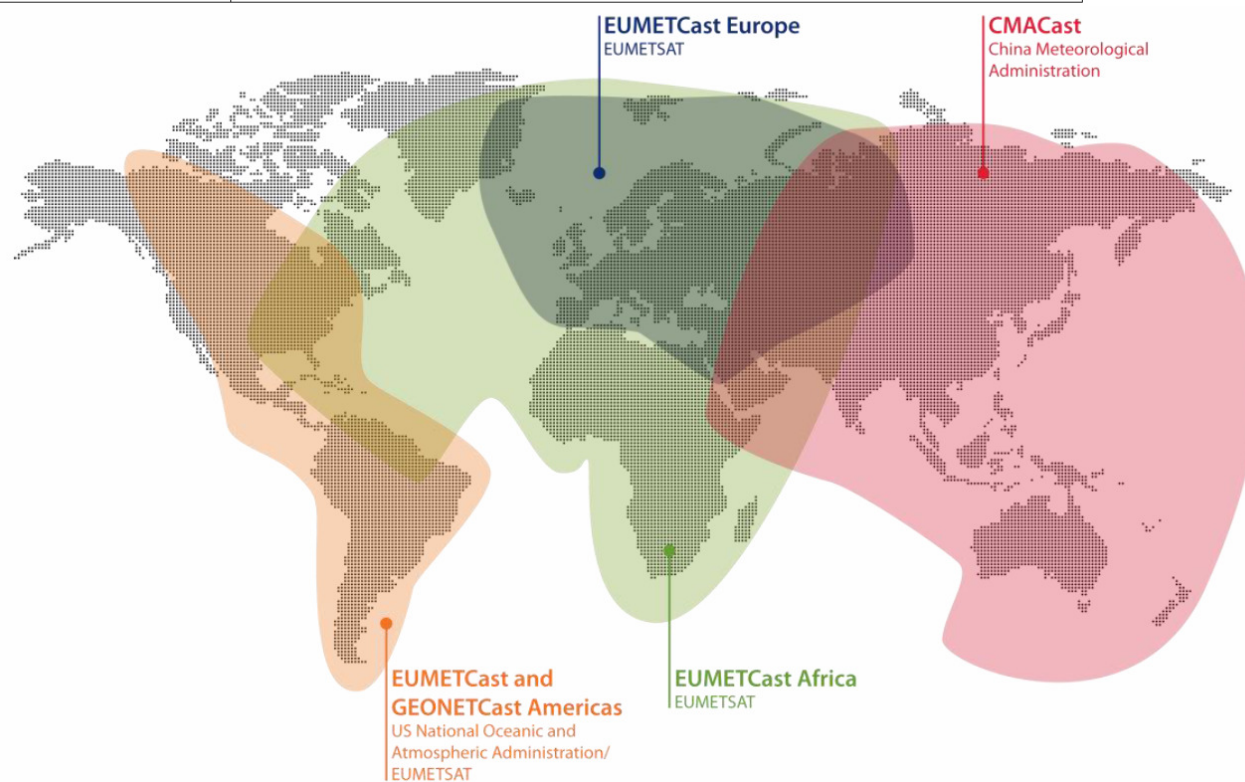


GEONETCast

Delivering Environmental Data to Users Worldwide

GEONETCast services

EUMETSAT and its network of Satellite Application Facilities (SAFs)	Meteosat (every 15 minutes), Jason and MetOp (per local satellite pass) satellite data Meteorological products for atmospheric, land and marine applications
NOAA	GOES and POES satellite data and NOAA-NESDIS products for atmospheric and marine applications
CMA	FengYun satellite data (FY 1/2/3)
VITO	Various products derived from SPOT-Vegetation for land applications.
ECMWF/ U.K. Met Office, Deutscher Wetterdienst, Météo-France	Observational and forecast products for atmospheric, marine and land applications

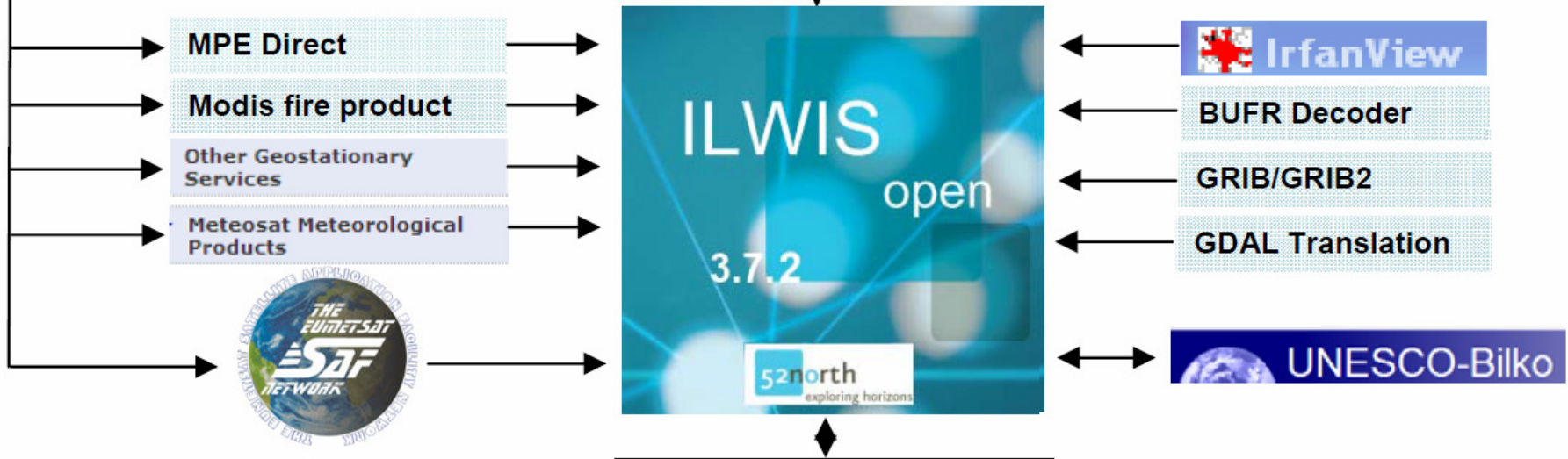


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The ITC GEONETCast Toolbox Approach using Open Source and Freeware

Geonetcast Data Manager



Web Mapping Services

(B. Maathuis & C. Mannaerts)

Newest research results taught in MSc course

STUDYING AT ITC

There is more to life at ITC than only education. You study at a faculty of the University of Twente with more than 500 students from over 70 countries. Furthermore, ITC staff is originating from more than 25 countries: a truly international environment where you will be able to meet colleagues from all over the world. ITC is organizing all sorts of social, cultural and sports activities. Well known are the International Food Festival and the International Cultural Event. For more



OUR VISION

'Safe water resources for all'

OUR MISSION

'Create and transfer knowledge in water resources and environmental management using earth observation and spatial information technology'



Droughts

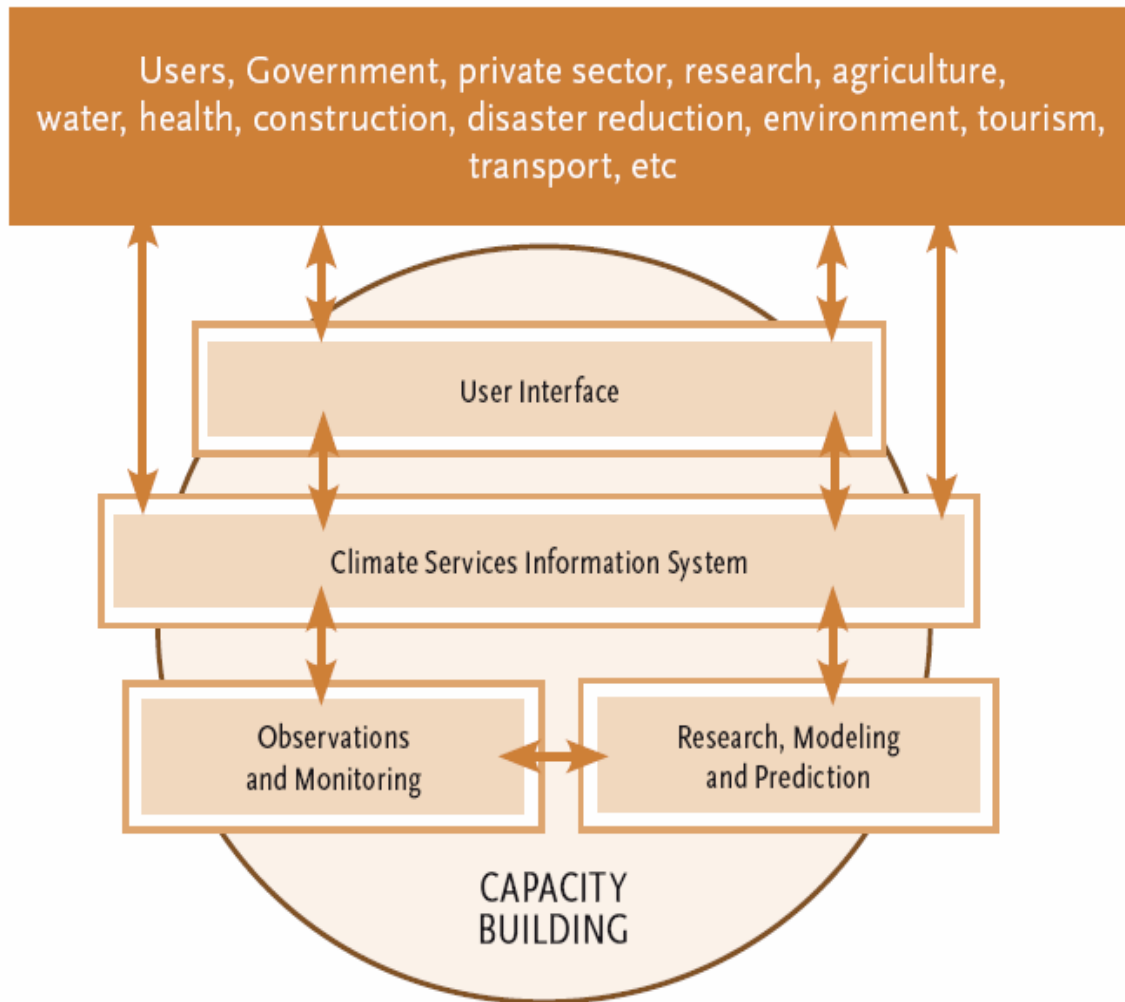


Floods



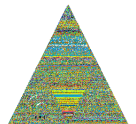
Eutrophication and pollution

Global Framework of Climate services



Our response

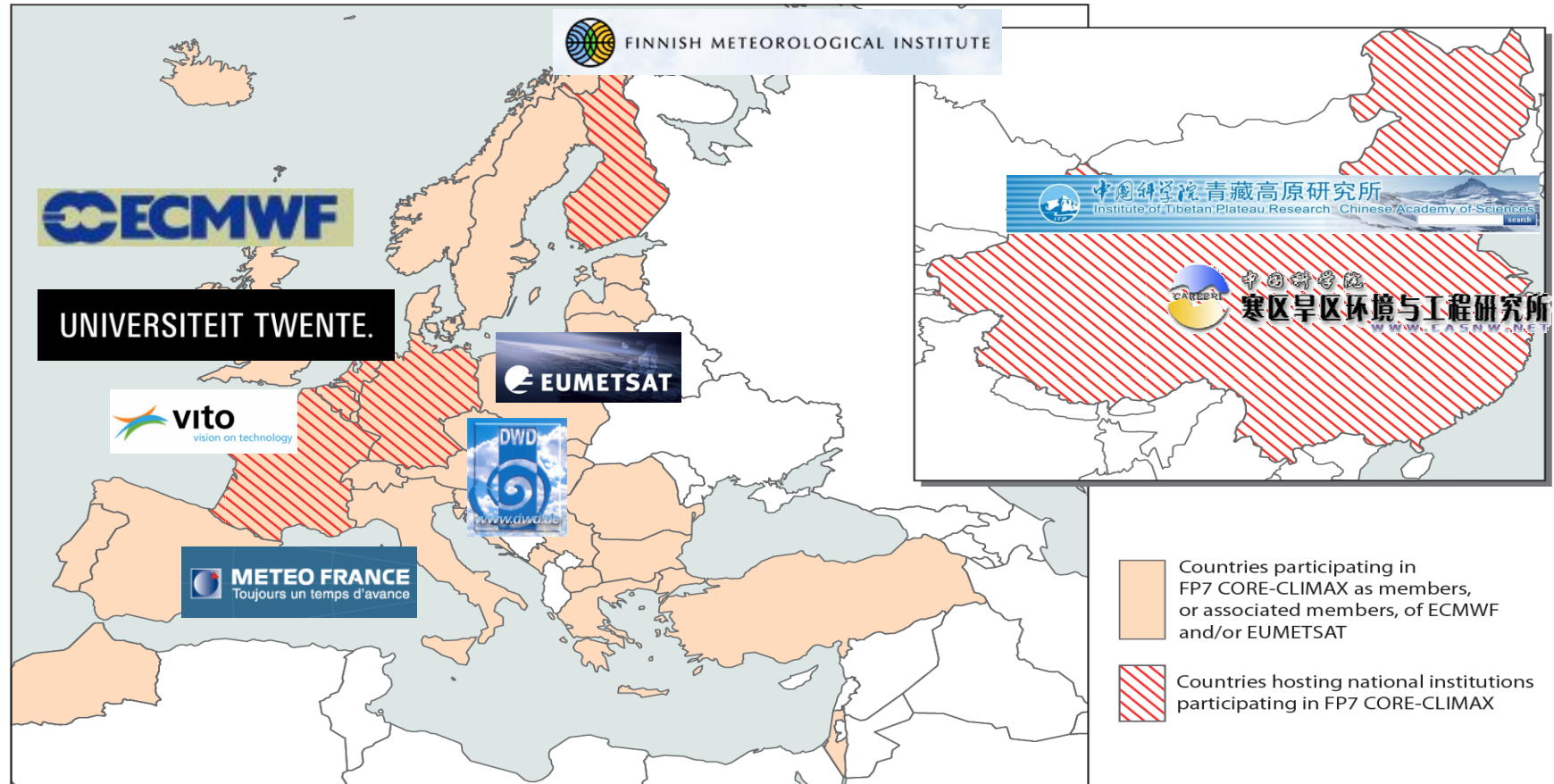
FP 7 CORE-CLIMAX:
COordinating Earth
observation data validation
for RE-analysis for CLIMate
ServiceS



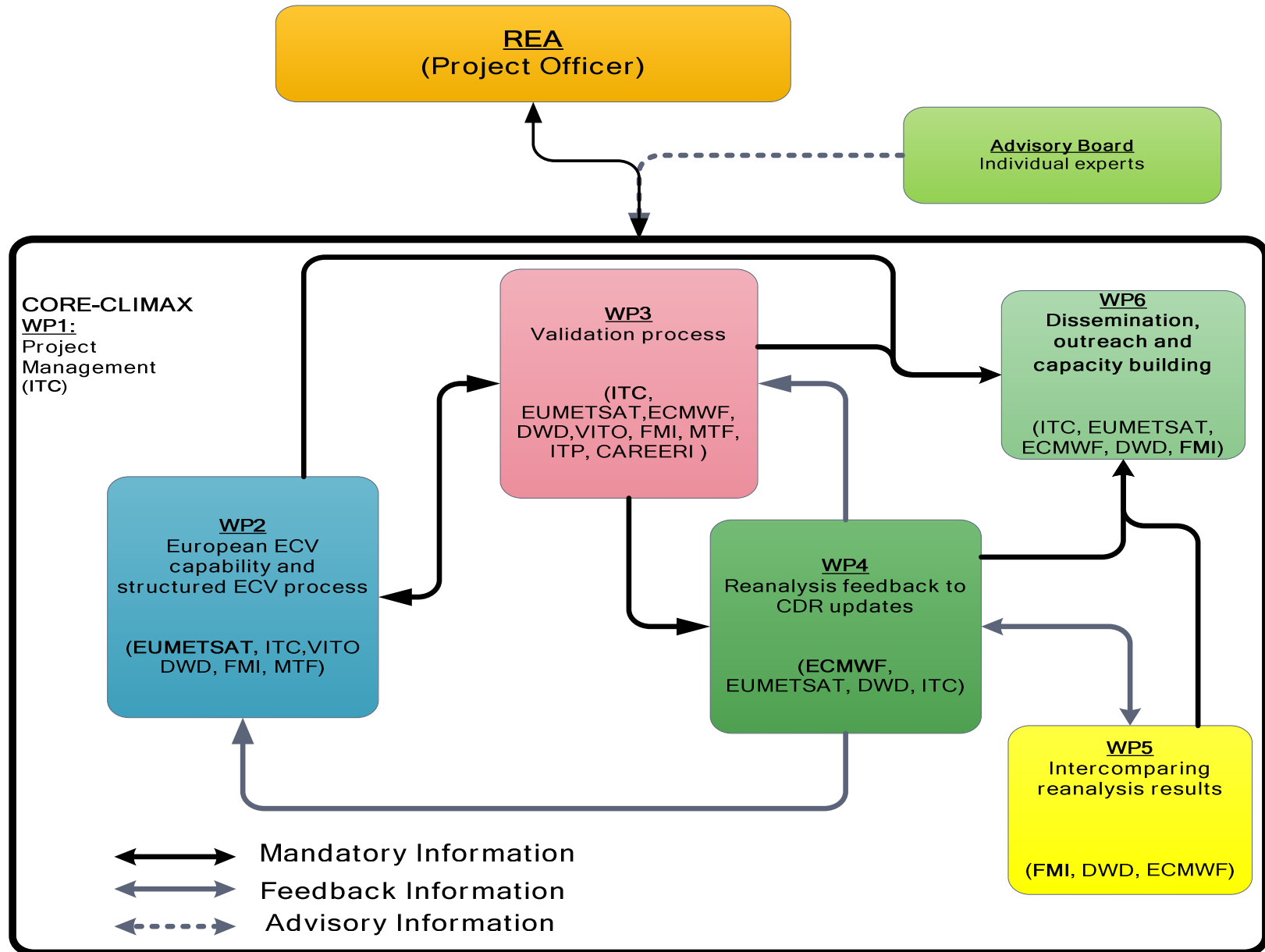
EU FP7 Project: CORE-CLIMAX

COordinating Earth observation data validation for RE-analysis for CLIMAtE Services

Coordinator: Professor Bob Su, z.su@utwente.nl,
ITC, University of Twente, The Netherlands

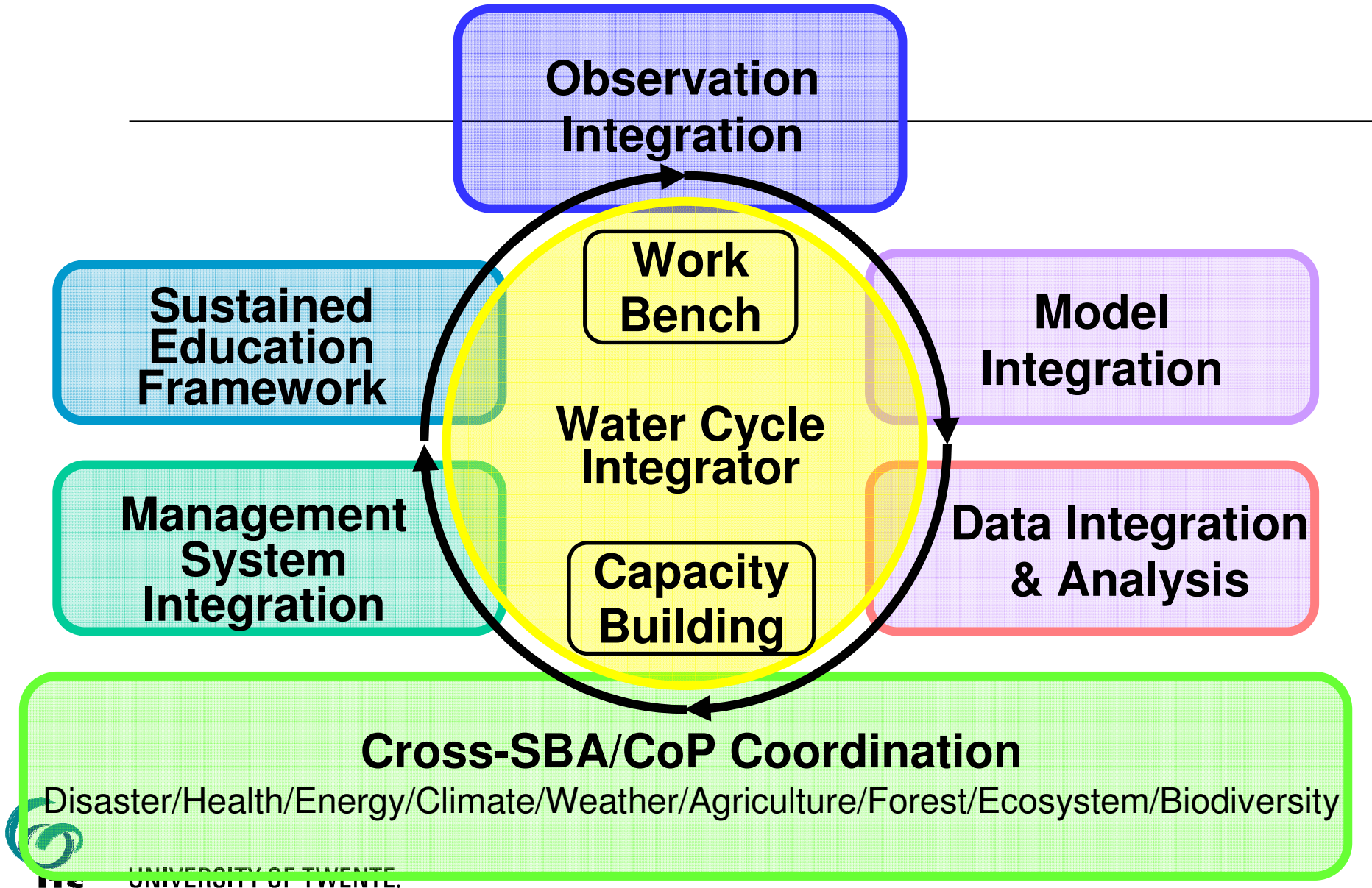


CORE-CLIMAX work packages



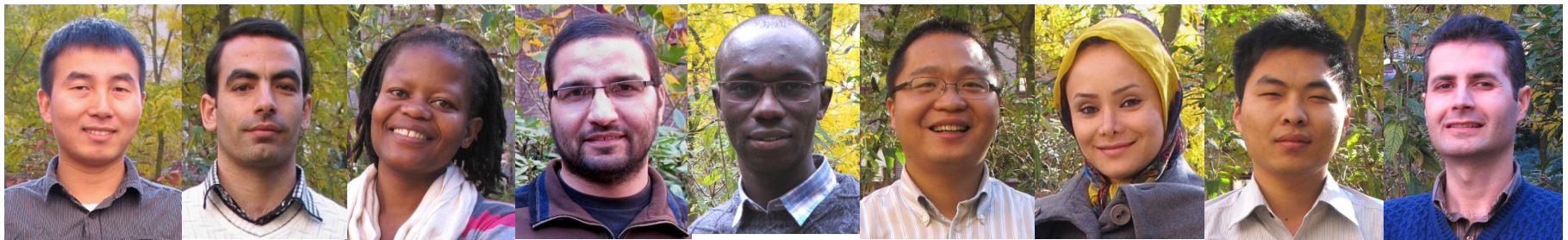
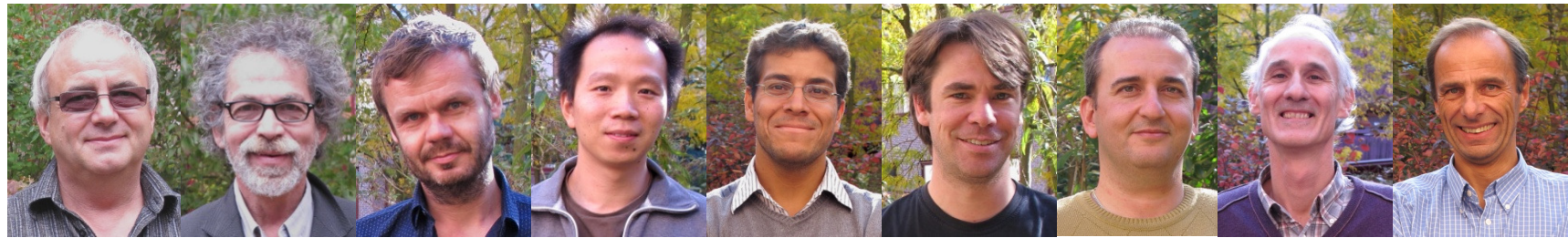
Contribution to GEO Africa Water Cycle Initiative

Integrated & Coordinated Approach



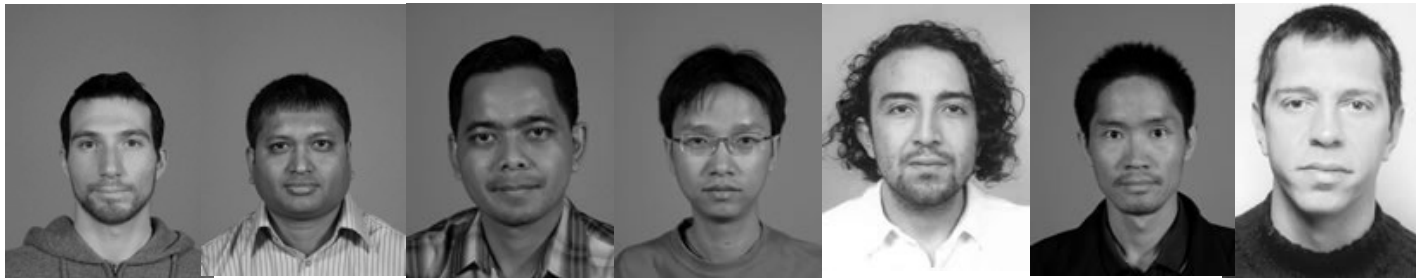
Department of Water Resources

21 staff, 40 PhD candidates (Jan 2014)



Department of Water Resources

21 staff, 40 PhD candidates (October 2013)



Graduation (expected) 2014 /2015



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For more information:

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