



**"No Water No Future"**  
(Willem-Alexander, Prince of Orange)

# Research Activities in Water Cycle and Climate

**ITC's contribution to African Water Cycle Coordination Initiative**

By Professor Z. Bob Su

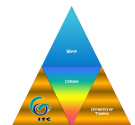
[z.su@utwnete.nl](mailto:z.su@utwnete.nl)

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

On behalf of  
Department of Water Resources

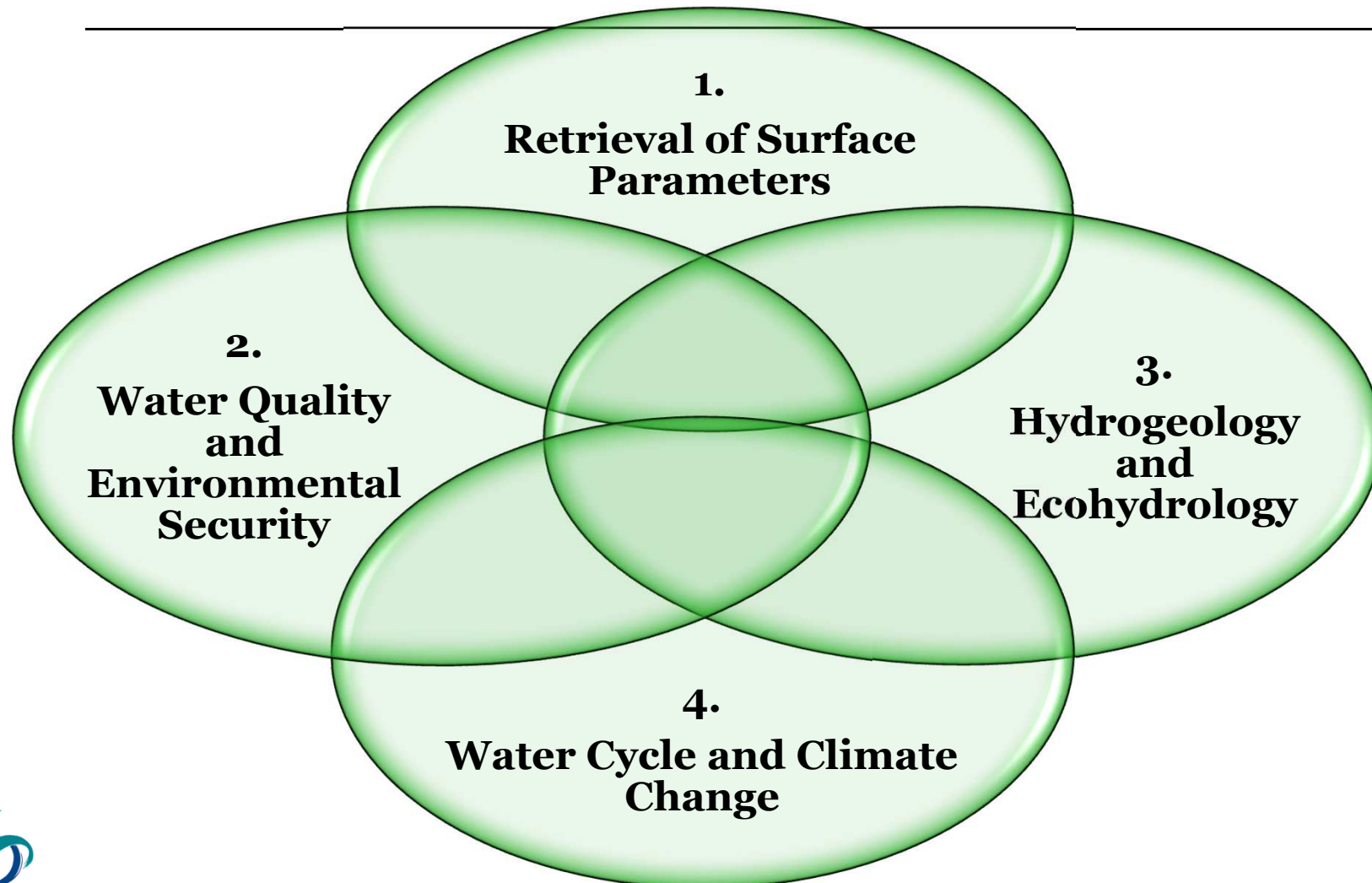


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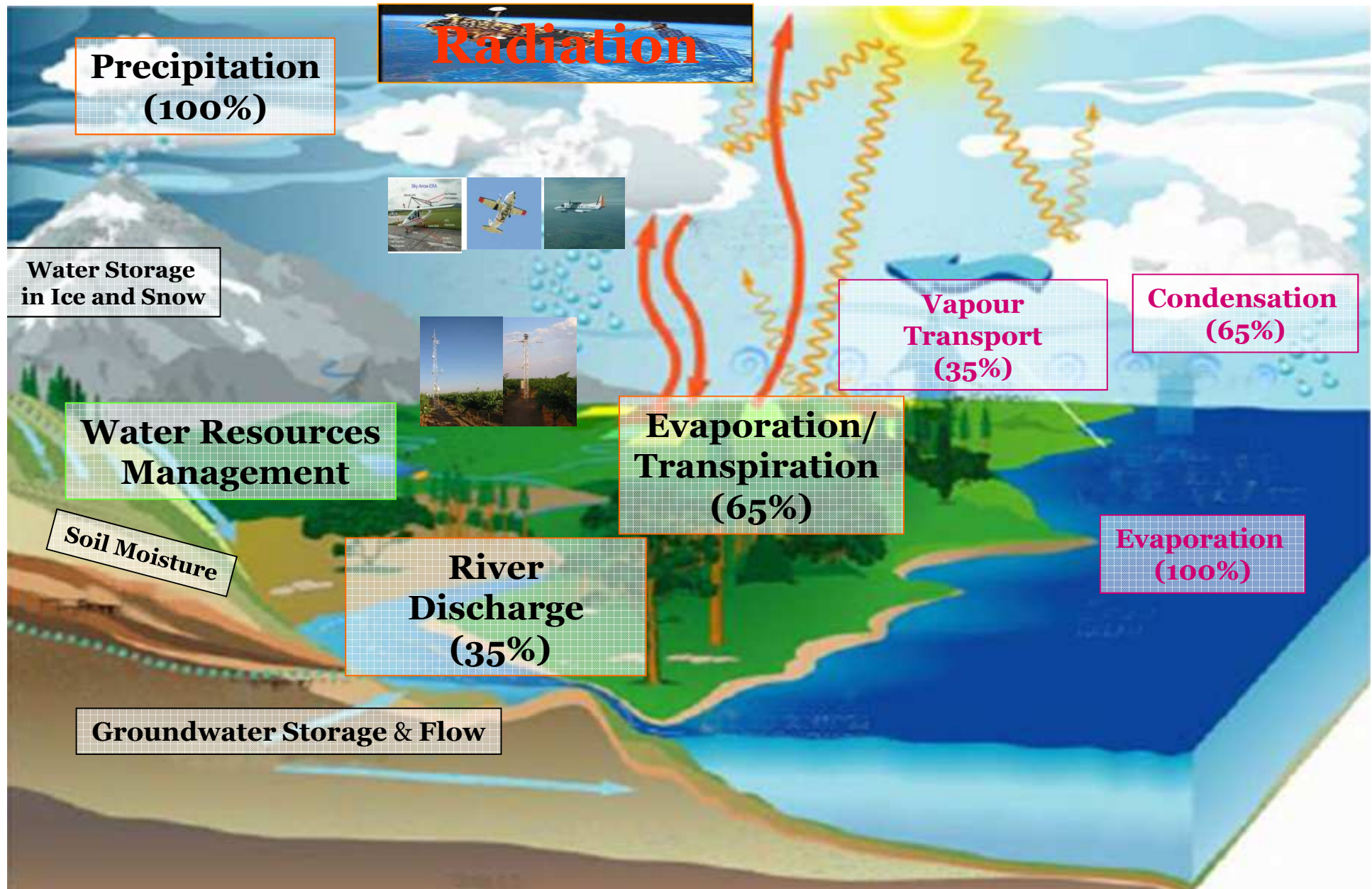


# Water Cycle and Climate (WCC) Research Clusters

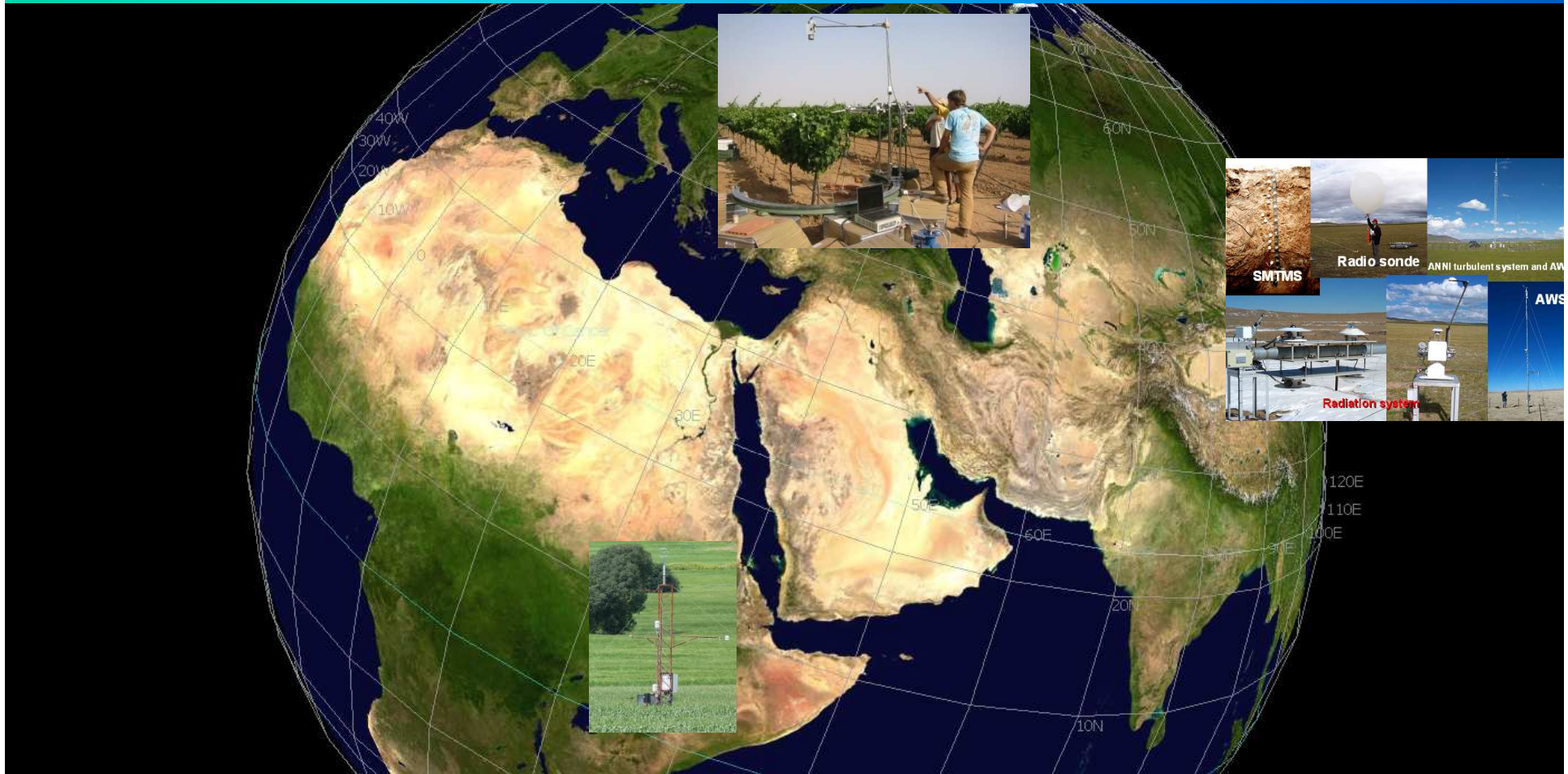
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# Earth Observation of Water Cycle



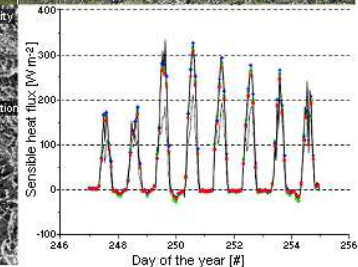
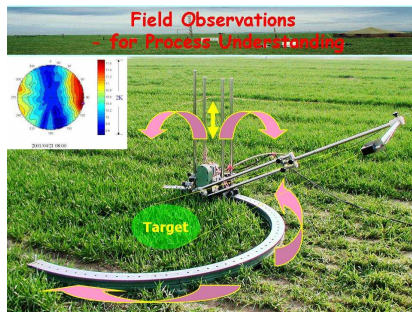
# ITC Earth Observation Research and Education Sites



- **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)

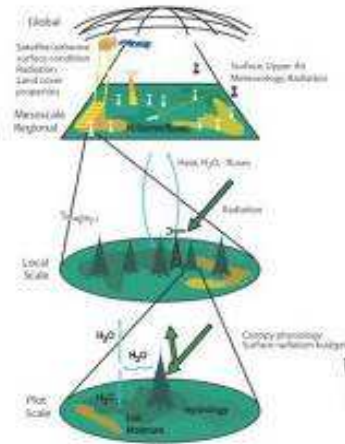


# Water Cycle and Climate – from process understanding to societal relevant applications

## Observe Globally



## Upscale for Prediction



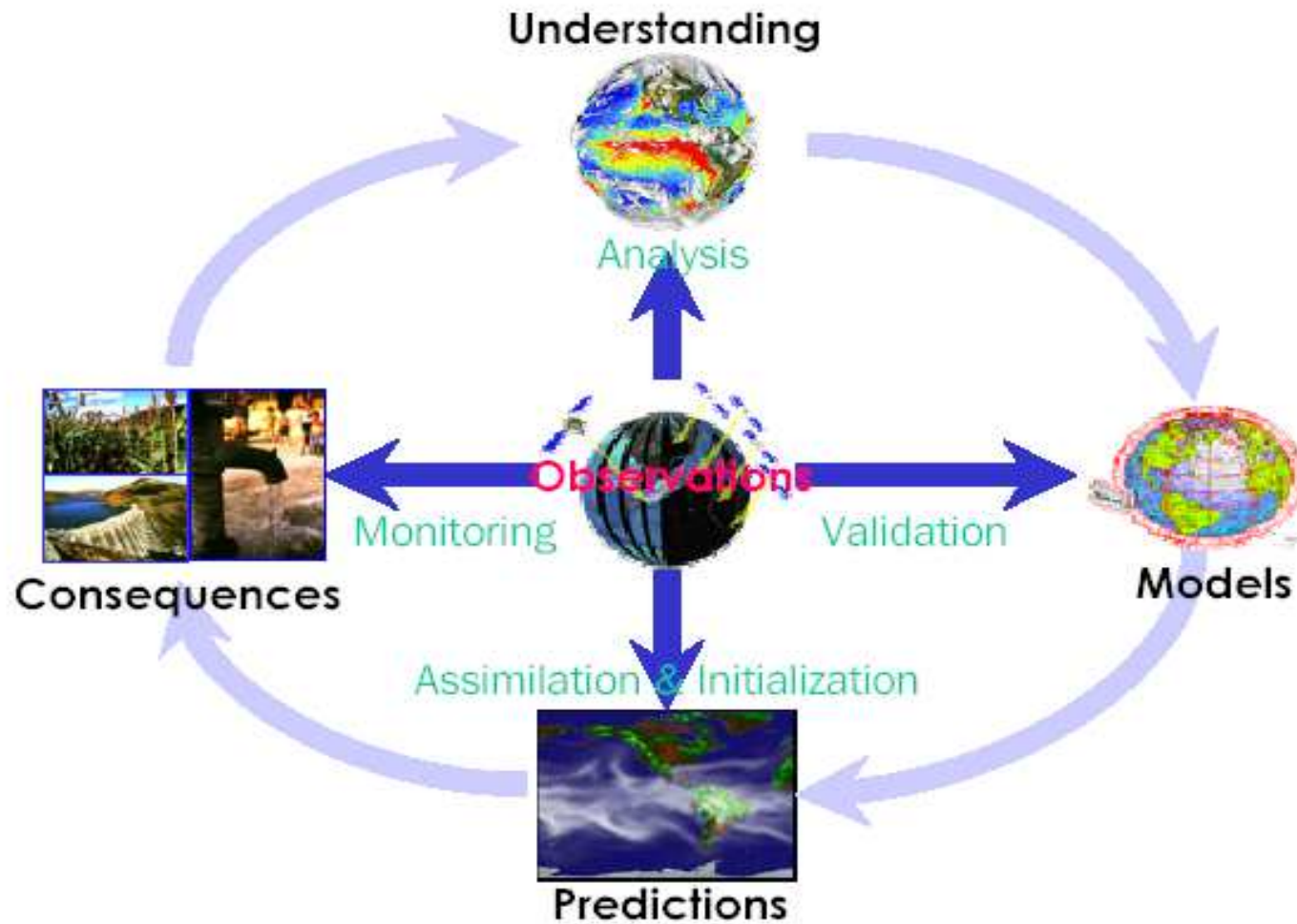
## Continental scale land-atmosphere modelling



## Downscale for Application

# Observation, Modelling and Data Assimilation

in Water and Food Security, Climate Change and Environment,  
Ecosystem and Green Energy

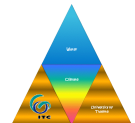


# Water Resources Management using Geo-Information and Earth Observation

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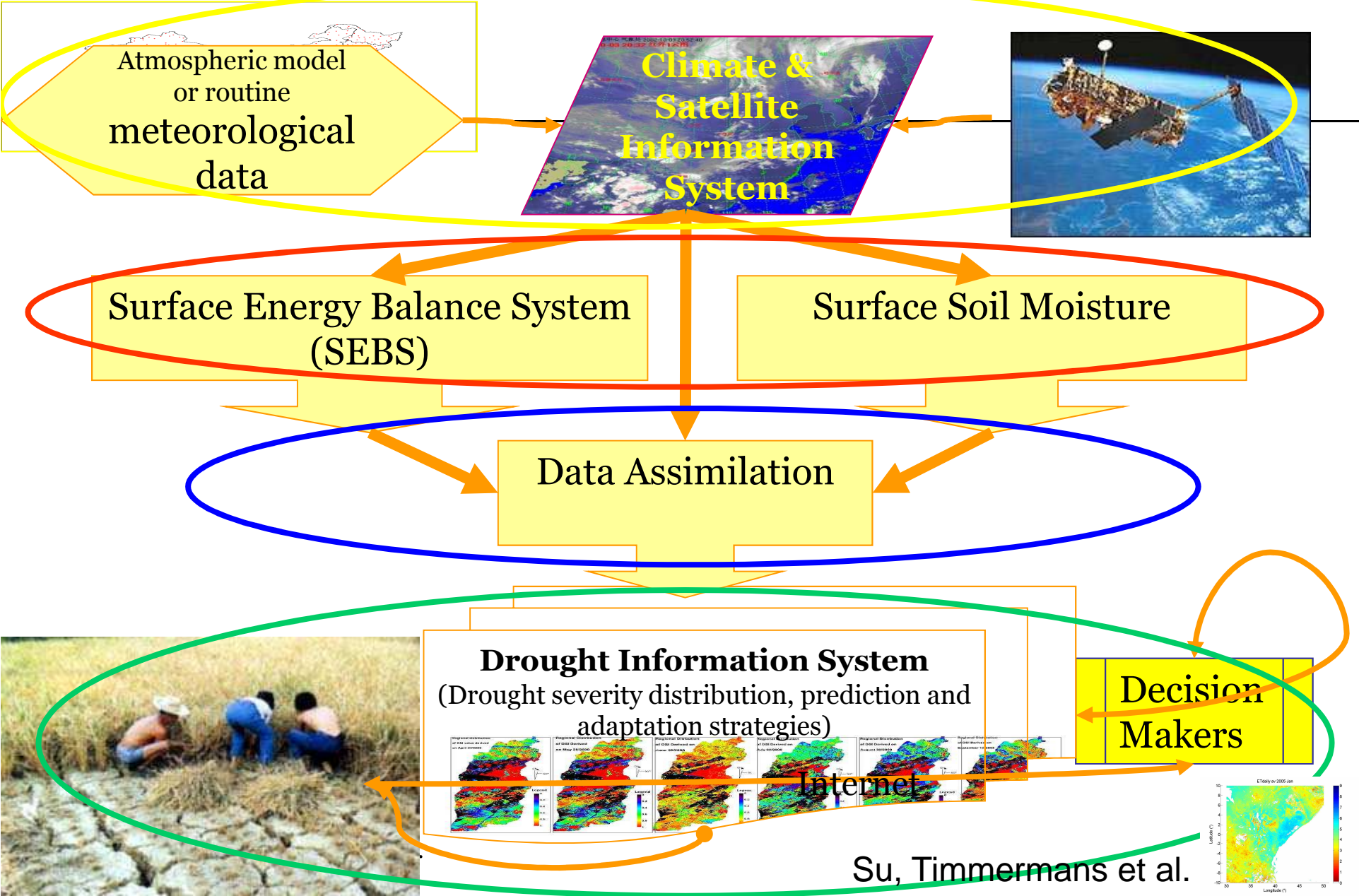
## Current Application Activities

- 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



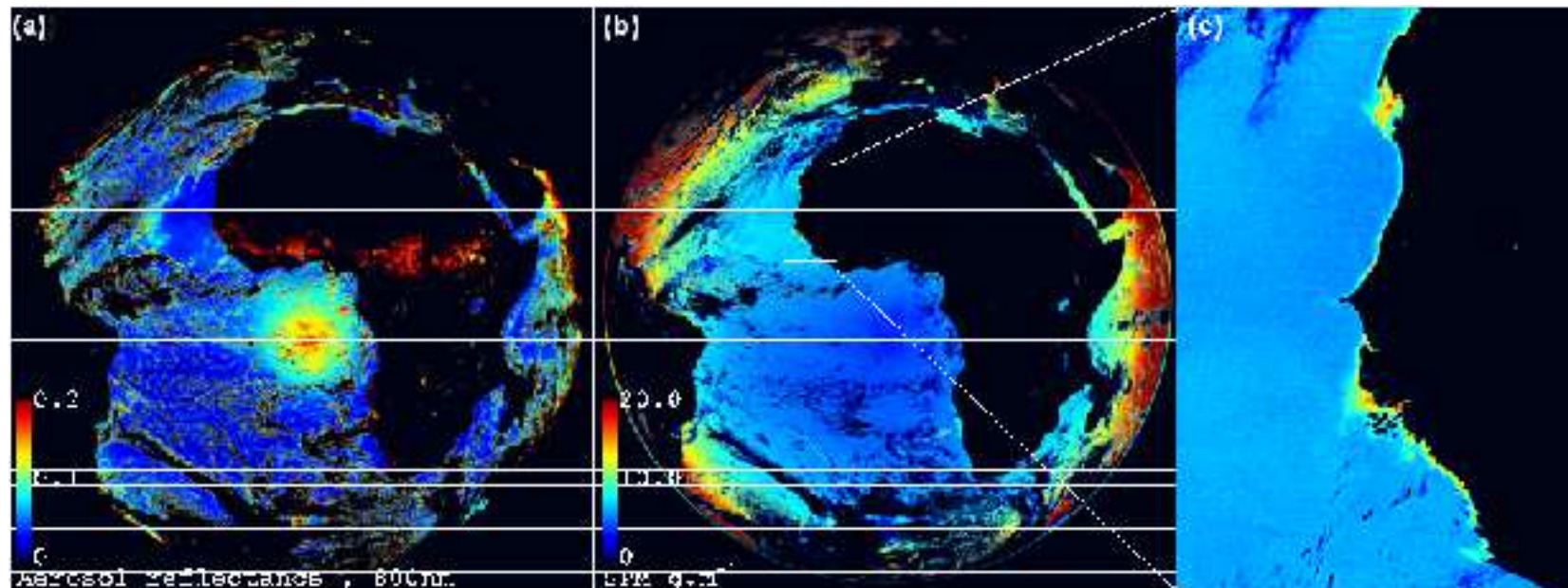


# Example 1: Drought Monitoring, Assessment, Prediction and Adaptation under Climatic Changes



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

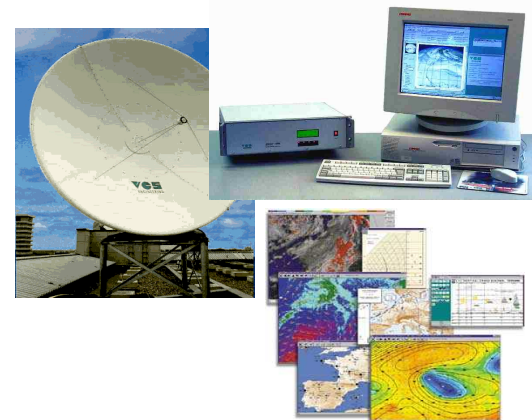
- Satellite observation of suspended sediment and phytoplankton green pigment (chlorophyll-a) - radiative and carbon exchanges between the water surface layer and the atmospheric boundary layer
- Marine geo-biophysical quantities from MSG satellite





## 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)

# 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

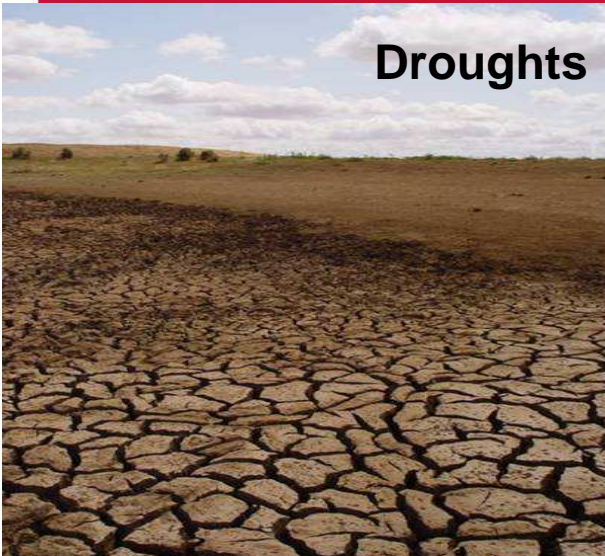
'Safe water resources for all'

## OUR MISSION

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



## Droughts



## Floods



## Eutrophication and pollution



# What we can offer for African Water Cycle Coordination Initiative

## MSc WREM (Water Resources and Environmental Management)

- Master of Science (MSc)
  - 18 Months (courses + MSc Thesis)
- Postgraduate course
  - 9 months
- Modular set-up ('blocks chosen')
- Distance education courses



## PhD research (Water Cycle and Climate)

## Tools and Institutional Strengthening

# Country Focus of Dutch Development Cooperation Policy – financial instruments

International Education programme  
(2013-2017)

**NICHE** (Netherlands Initiative for Cooperation in Higher Education)  
(Institutional strengthening)

**NFP** (Netherlands Fellowship Programme)  
(individual scholarships)

(2013-2015)

**MSP** (Middle East and North Africa Scholarship Programme)  
(individual scholarships)

Demand driven, in 4 areas **Water Safety, Food Security (35%), Sexual Transmittable Diseases and Health, Rule of Law**

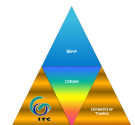
# Country Focus of Dutch Development Cooperation Policy

International Education programme  
(2013-2017)

**NICHE** (Netherlands Initiative for Cooperation in Higher Education)  
*(Institutional strengthening)*

- NICHE II: 15 partner countries:

Afghanistan, Bangladesh, **Benin**, **Burundi**, **Ethiopia**,  
**Ghana**, Indonesia, Yemen, **Kenya**, **Mali**,  
**Mozambique**, Palestine regions, **Rwanda**, **Uganda**,  
**South Sudan**



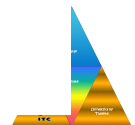
# Country Focus of Dutch Development Cooperation Policy

International Education programme  
(2013-2017)

**NFP** (Netherlands Fellowship Programme)

*(Individual scholarships for PhD, MSc & short course)*

- **NFP II countries (37)**
- Afghanistan, Iran, **Rwanda**, Bangladesh, Yemen, **Senegal**, **Benin**, Jordan, Sri Lanka, Bhutan, **Kenya**, Surinam, Burma, **Mali**, **Tanzania**, **Burundi**, Mongolia, Thailand, Colombia, **Mozambique**, **Uganda**, **Egypt**, **Namibia**, Vietnam, **Ethiopia**, Nepal, **Zimbabwe**, Philippine, **Nigeria**, **South Africa**, **Ghana**, Pakistan, **South Sudan**, India, Palestine Regions, Indonesia, Peru





# Country Focus of Dutch Development Cooperation Policy

(2013-2015)

**MSP** (Middle East and North Africa Scholarship Programme)  
*(Individual scholarships for short course)*

## ▪ **MSP II countries**

**Algeria**, Lebanon, Syria, **Egypt**, **Libya**, **Tunisia**, Iraq,  
**Morocco**, Jordan, Oman

**Demand driven**, in 4 areas

**Water Safety,**

**Food Security (35%),**

**Sexual Transmittable Diseases and Health,**

**Rule of Law**

# Department of Water Resources, ITC

21 staff, 27 PhD candidates (Jan 2013)

