

The first 10 years of TIGER

Looking after Water in Africa

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**TIGER
AFRICA**



ESA is an intergovernmental organisation with 20 Member States

ESA purpose: "*...provide for and to promote, for exclusively peaceful purposes, cooperation among European States in **space research and technology and their space applications***"

Article II of the ESA convention

ESA achieves this through:

- Space activities and programmes
- Implementing a long term space policy
- A specific industrial policy
- Coordinating European with national space programmes
- Builder and operator of the GMES space segment





The TIGER Initiative: Origin & Objective

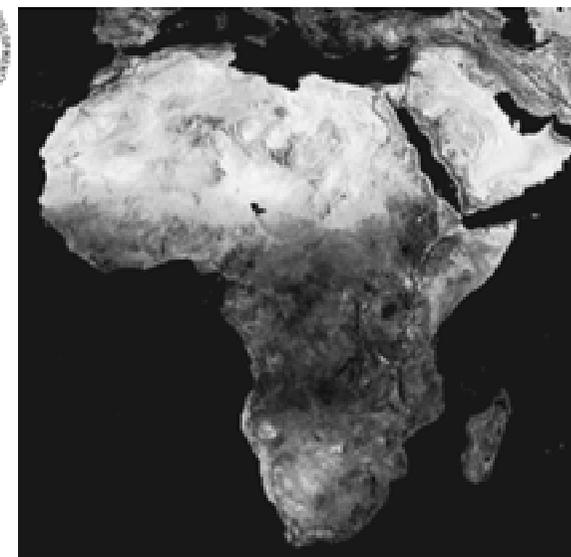


• **ESA launched TIGER in 2002** as a CEOS response to World Summit on Sustainable Development in Johannesburg.



• **TIGER objective:**

“assist African countries to overcome problems faced in the collection, analysis and dissemination of water related geo-information by exploiting the advantages of Earth Observation technology”.



• **TIGER involves more than 200 African experts in 42 countries** who actively participate in **TIGER development projects and capacity building actions;**

• **Key partners** includes CEOS (with a strong support from the CSA), the *African Ministerial Council on Water, the African Development Bank, the African Union Commission and the UN-Africa Water Group (UNESCO, UNECA), DWAF, R. of South Africa, GEOSS.*





TIGER History: Johannesburg to RIO+20



Launch following the WSSD

Endorsement by AMCOW

Recommendation at 1st African Water Week

AARSE Resolution

Launch of TIGER-NET



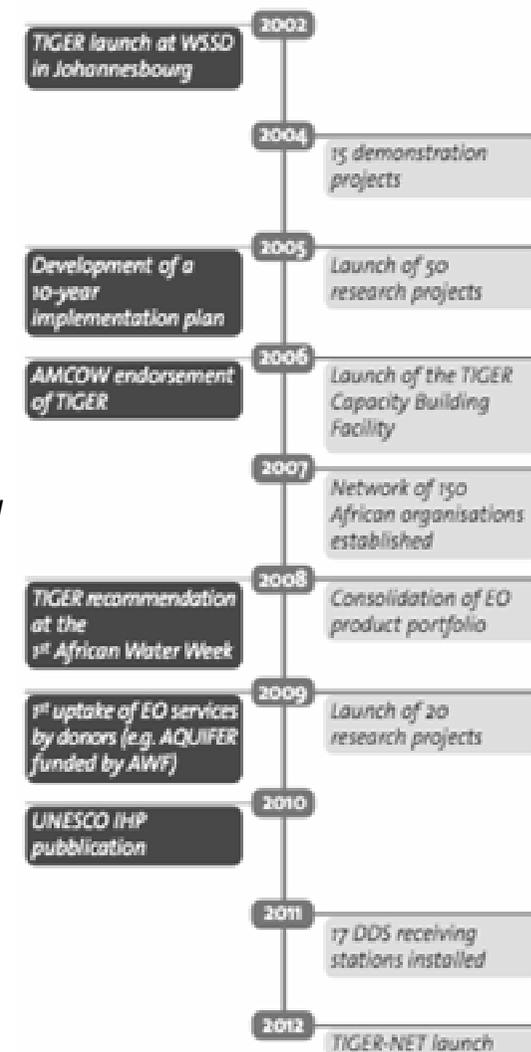
"Initiatives such as TIGER, which will deliver enhanced and timely information for water resource management, are therefore of critical importance to developing nations."

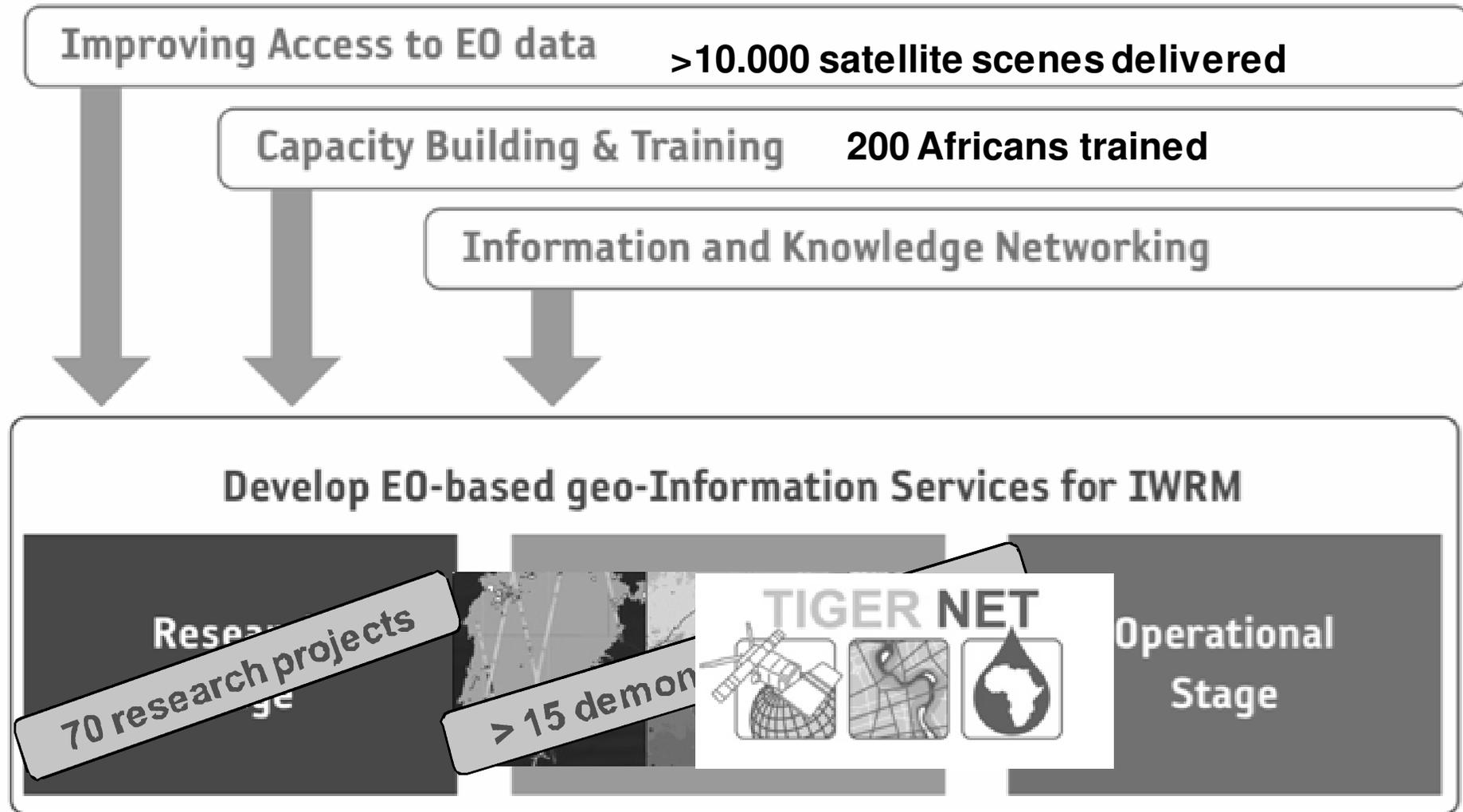


"International initiatives like TIGER which provide useful tools to the countries to strengthen their capacities for ensuring water security should be encouraged and supported"



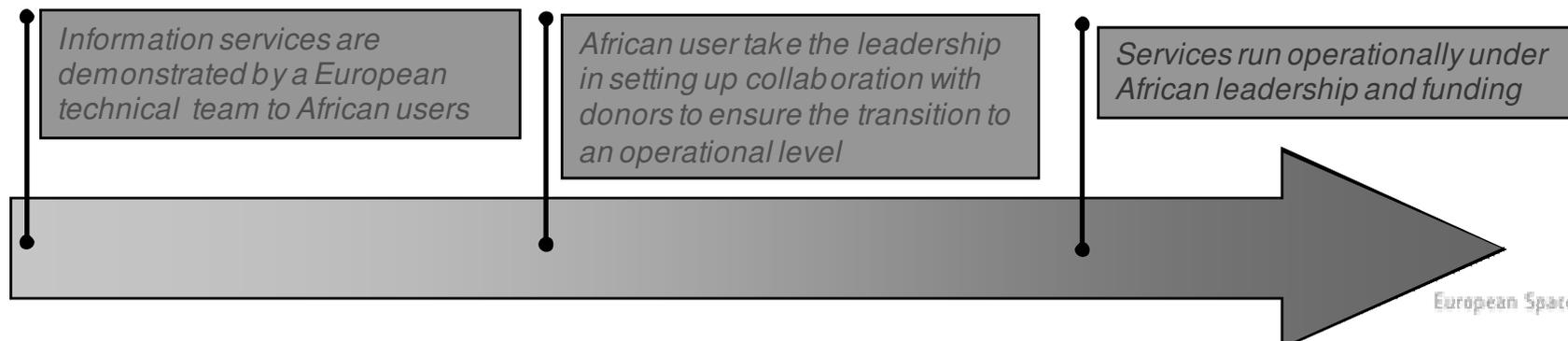
THE TIGER INITIATIVE MILESTONES AND ACHIEVEMENTS





- ◊ TIGER is based on a **user driven approach under African leadership**
 - ◊ The African Ministerial Council On Water (AMCOW) endorsed the initiative in 2006
- ◊ Assist African scientist, technical centres and water authorities to **develop the tools, the knowledge and the capacity** to exploit EO technology for the monitoring and management of water resources;
 - ◊ Enable African water authorities at national and trans-boundary basin scale to lead the transition from a demonstration stage **towards operational EO information services**;

Towards Operation under African Leadership



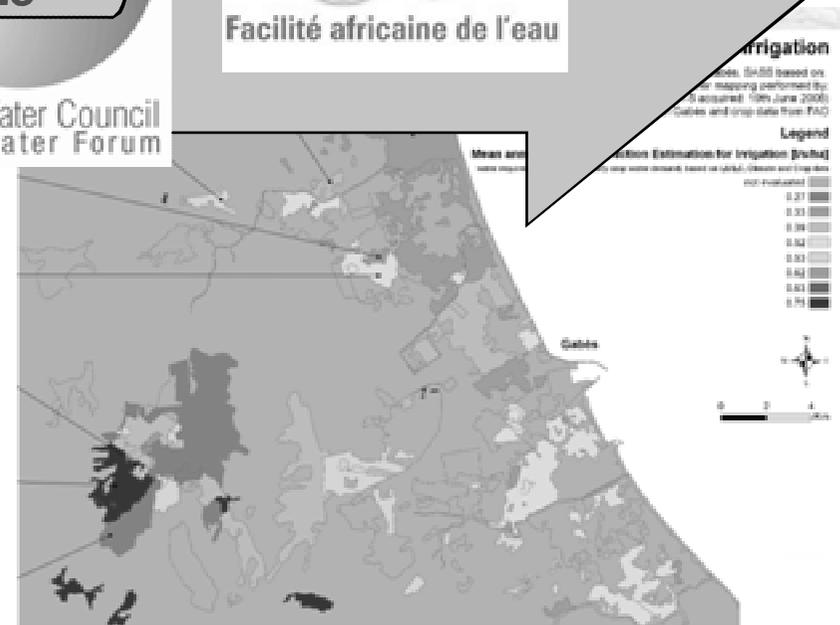


demonstration project within ESA's TIGER initiative

- Develop and demonstrate **EO products to support the management of trans-boundary aquifers in Africa** (SASS North-Western Sahara Aquifer System area);
- Users: Ministries in Algeria, Libya, Mali, Niger, Nigeria, Tunisia; OSS



- Co-funded by AWF (African Water Facility) & executed by OSS (Sahara and Sahel Observatory)
- Transfer the EO based decision making system to local service providers and promote local operations;
- Follow-on grant of 487.800 € by the AWF

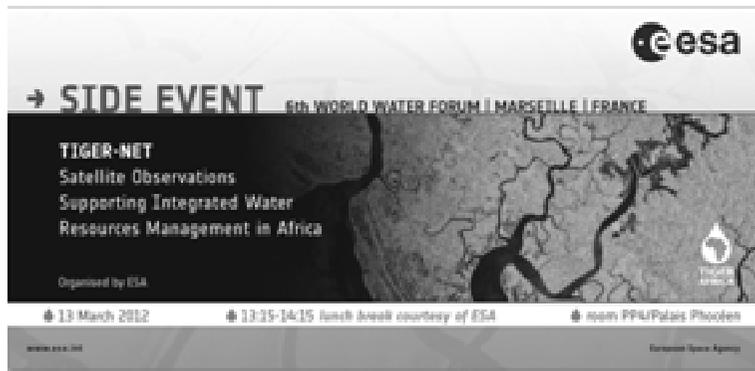
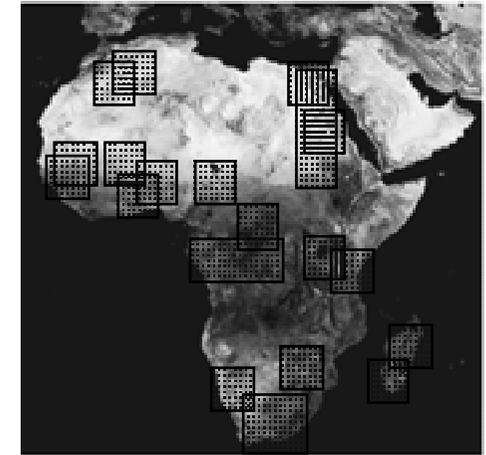




TIGER Capacity Building Facility (TCBF): Developing Knowledge and Scientific Capacity



- TCBF (lead by ITC) created in 2006 offering:
 - Dedicated courses (at ITC and in Africa) & E-learning;
 - Tailored technical support and research stages;
- Water Research Component
 - Support to 50 & 20 selected research projects in Africa
 - Regional Centres: AGHRYMET (Niger), RCMRD (Kenya), WRC (SA), OSS (TU);
 - Free EO data



6th World Water Forum, 2012 - France



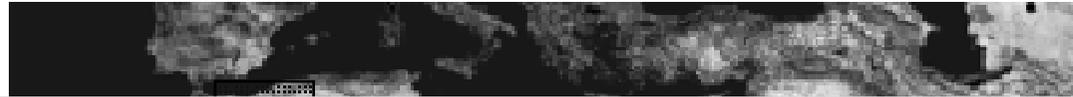
TIGER workshop 2011, South Africa







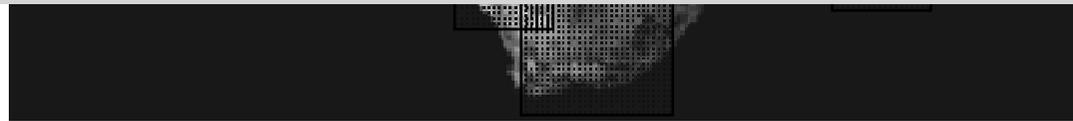
TIGER Phase - Research Component: 20 Research Projects



The El Jadida Declaration – outcome of the AARSE2012 conference (2nd November 2012)

Recognising the importance and success of continued long term **collaboration between European Space Agency and African scientists** within the TIGER initiative on Earth Observation techniques related to water resources management;

To support the dedicated activities in the TIGER Capacity Building Facility and within the new TIGER-NET project as essential component to **prepare the African water resources expert for the exploitation of African National satellites and the upcoming SENTINEL satellite fleet** of the European Space Agency





TIGER Capacity Building Facility:



TCBF activities for 2012-13

Empowerment of Regional Centers:

- Focus on the TCBF Regional Centers: AGHYMET (Niger), RCMRD (Kenya), WRC (South Africa), OSS (Tunisia)
- Partnership with Cap-Net/UNDP for Training of the Trainers
- Preparation for an African Capacity Building programme for EO in collaboration with the African Water Facility



- Project Extension:
- 350 k€ budget
 - KO July 2012



Zambia Training



EMWIS workshop



Training Kit





TIGER Fellowships

African – European research collaboration



International Research Studies

- Collaboration between African scientists and European research institutes
- 1 year scientific visits

Water Management Focus:

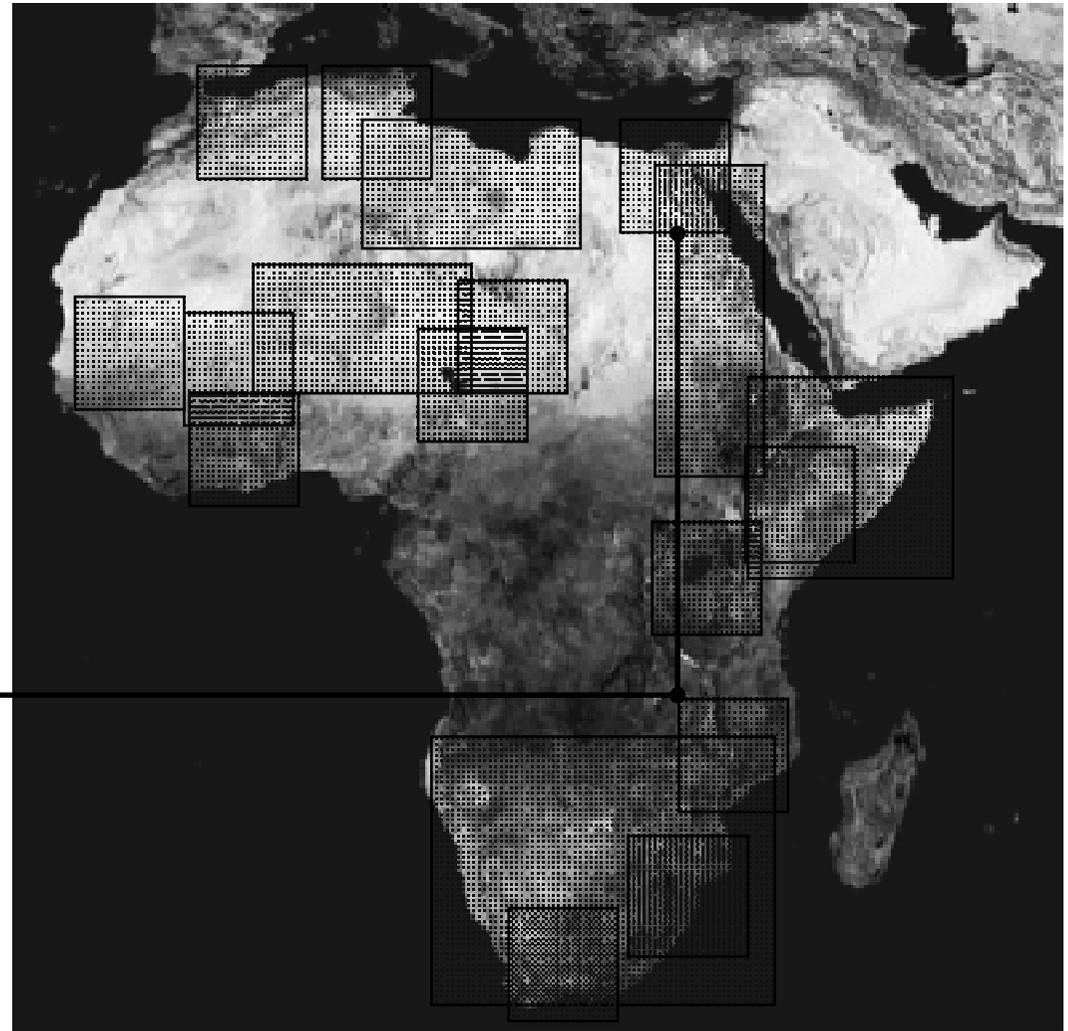
- Water quality & reservoir monitoring
- Irrigation monitoring
- Ecological & hydrological modeling
- Integrated Water Resource Management

Implementation:

- Funded by the ESA Alcantara studies
- In 2012 6 studies funded each 100k€



- *Base mapping: e.g., surface waters;*
- *Water quality;*
- *Soil moisture information service*
- *Water levels information service;*
- *Catchments characterisation;*
- *Ground water exploration;*
- *Water consumption: e.g., irrigation;*





EO for Integrated Water Resource Management in Africa



Objective:

- **Enable African institutions to improve Integrated Water Resource Management (IWRM) by exploiting the advantages of Earth Observation (EO) technology**

Main Activities:

- Develop and complement **Water Observation and Information Systems** for monitoring water resources with EO
- **Capacity building and training of African water authorities** and technical centres

Steering Group:



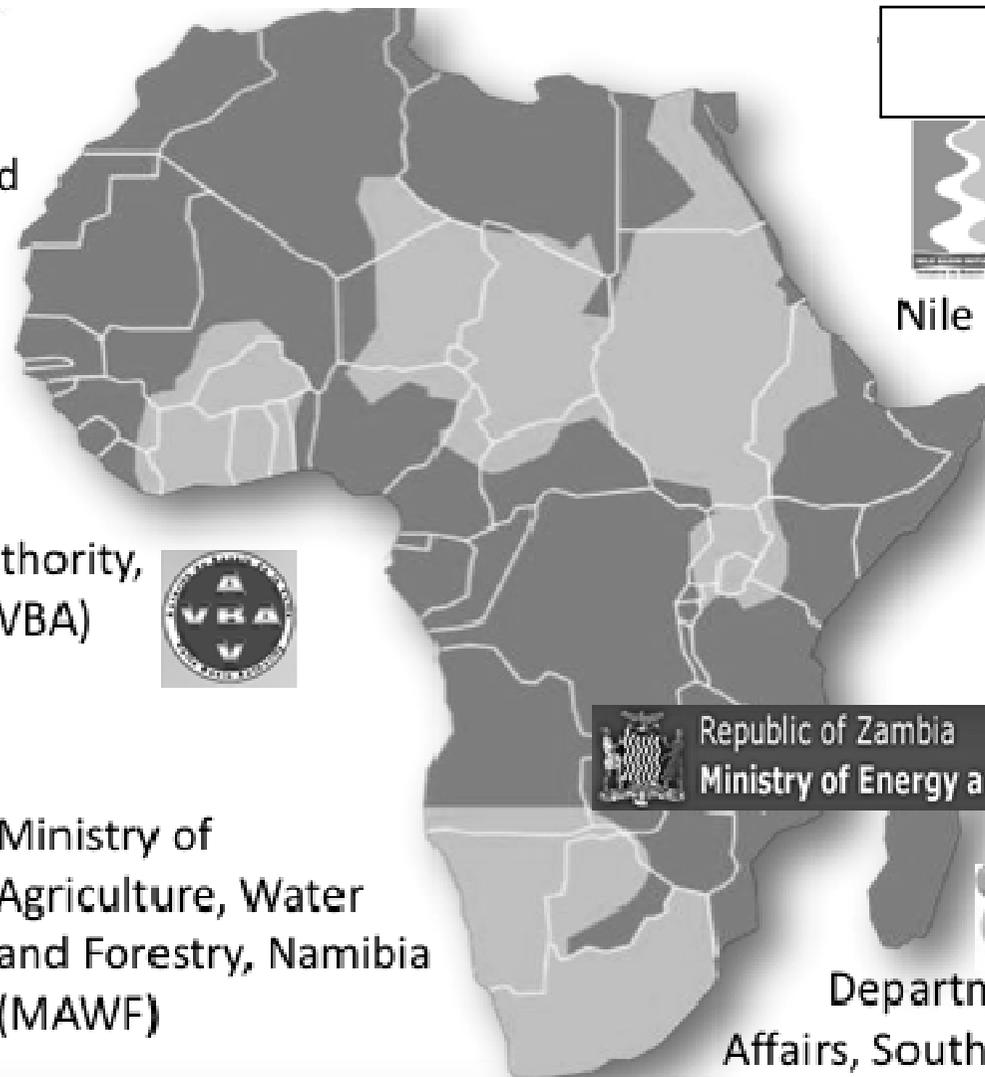
Project:

- 36 months, 2 project cycles
- 1.5 M € total budget
- Started in 2012
- Technical Team:

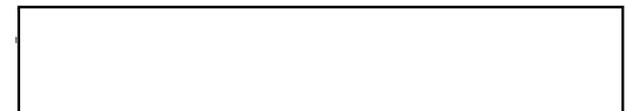




TIGER-NET Users: African Water Authorities



Lake Chad Basin
Commission, Chad
(LCBC)



Nile Basin Initiative,
Uganda (NBI)

Volta Basin Authority,
Burkina Faso (VBA)



Republic of Zambia
Ministry of Energy and Water Development



Ministry of
Agriculture, Water
and Forestry, Namibia
(MAWF)



water affairs
Department
Water Affairs
REPUBLIC OF SOUTH AFRICA

Department of Water
Affairs, South Africa (DWA)



User Requirements Consultation



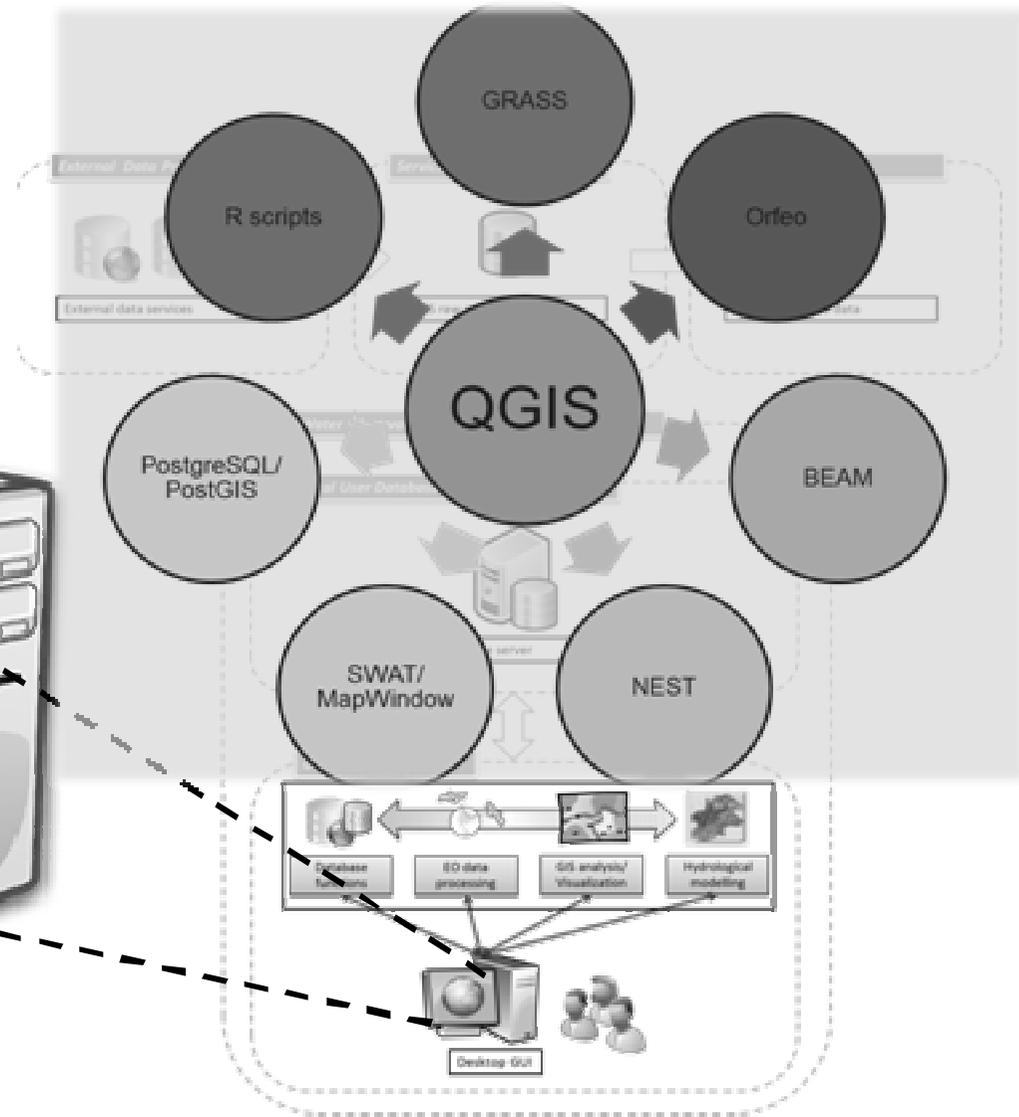
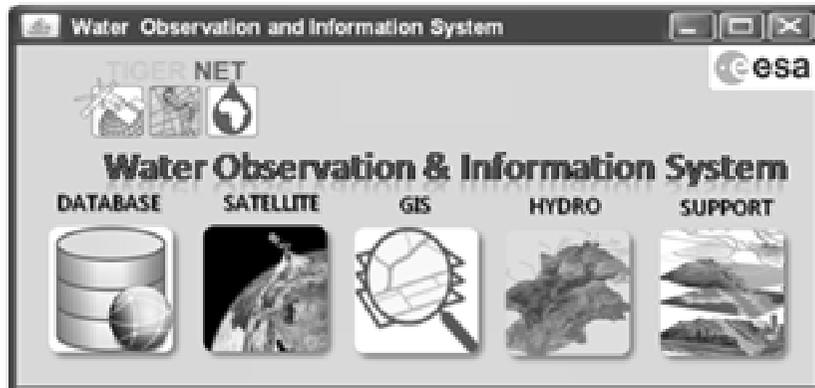
Collection of user requirements:

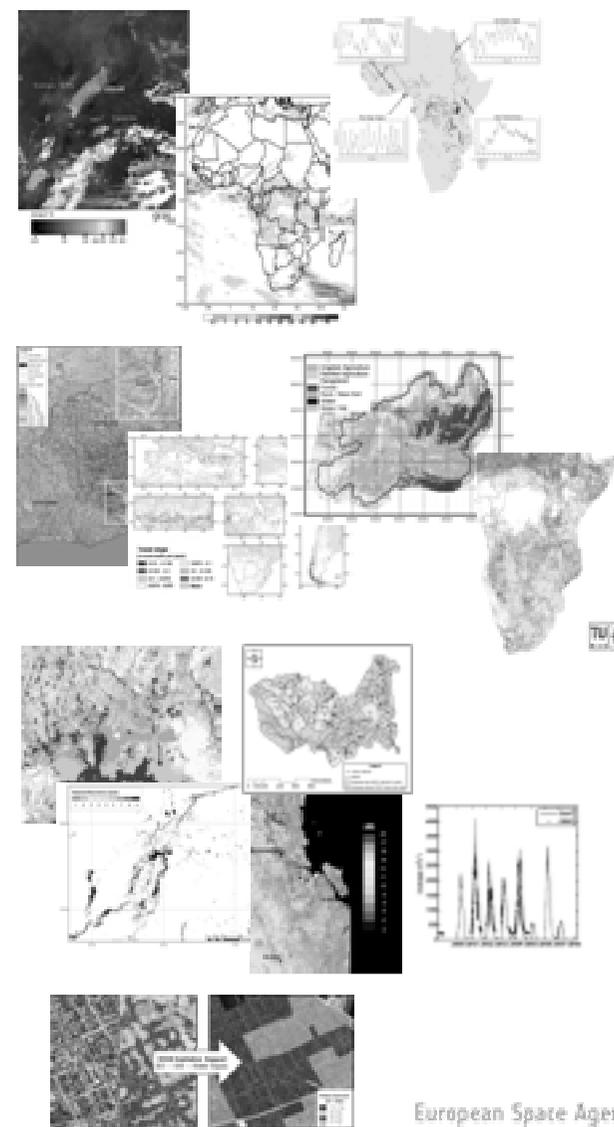
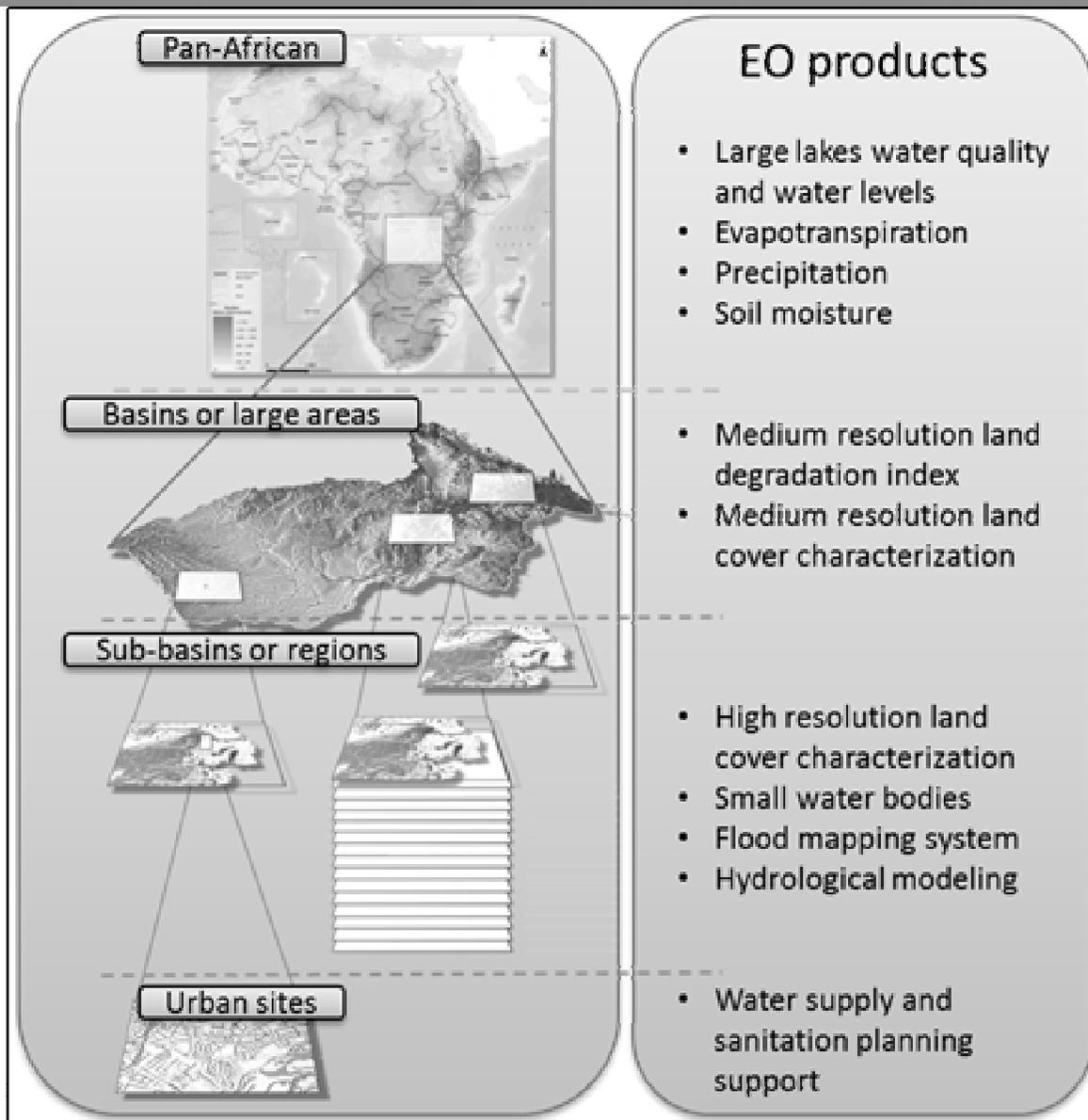
- ◊ Dedicated visits and workshops at each user premises:
 - ◊ Understanding current practices, information needs, decision process
- ◊ Intensive common workshop for consolidation (hosted by SANSA)
 - ◊ Defining EO products, WOIS functionalities
- ◊ Development of **demonstration cases** for each user





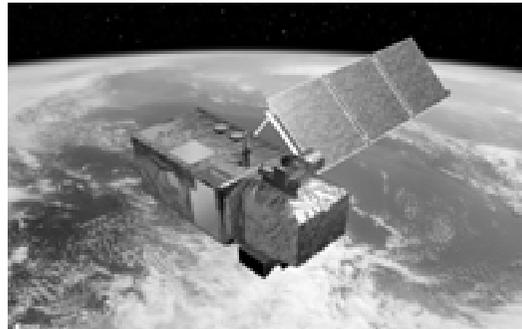
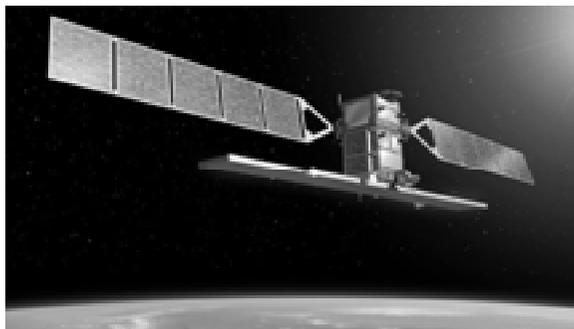
Water Observation & Information System





Conclusions: after 10 years of TIGER

- ◊ Capacity building of EO know-how within an African wide network of water authorities, universities & technical centres
- ◊ Development & Demonstration of EO products & applications for water resource management
- ◊ Facilitation of EO data access (bottleneck) & processing
- ◊ **Good Basis for the development of EO applications under African Leadership**
Specifically with operational & free observations coming from the Sentinels...

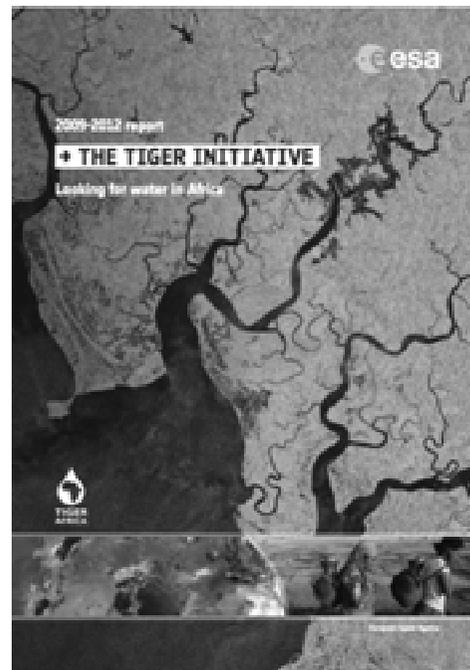


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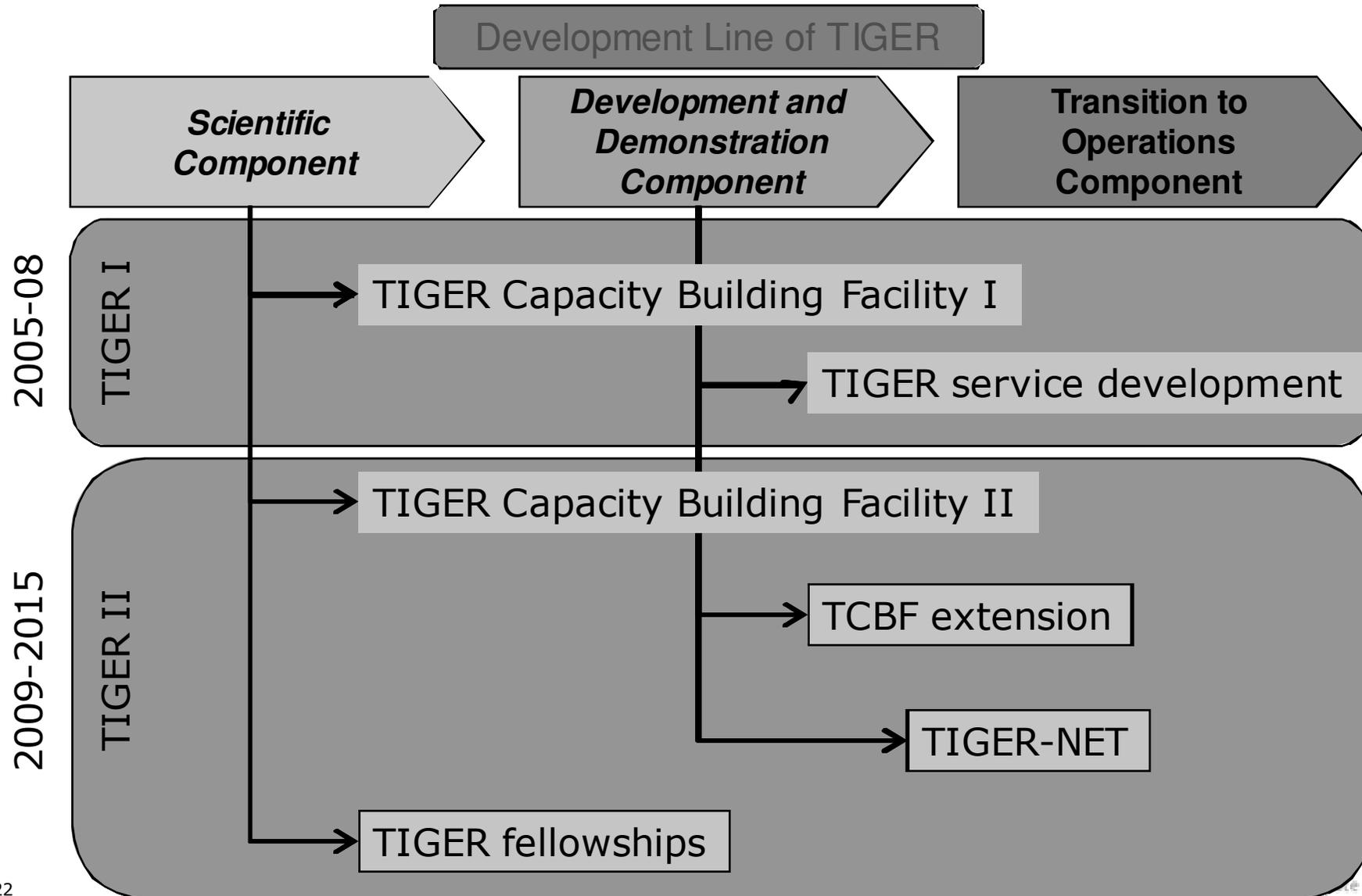
Zoltán Vekerdy: Z.Vekerdy@utwente.nl

Website:

<http://www.tiger.esa.int>



**Latest Publication:
TIGER report 2012**



System Installation and Demonstration

- Start: March 2013 – ongoing

Tasks

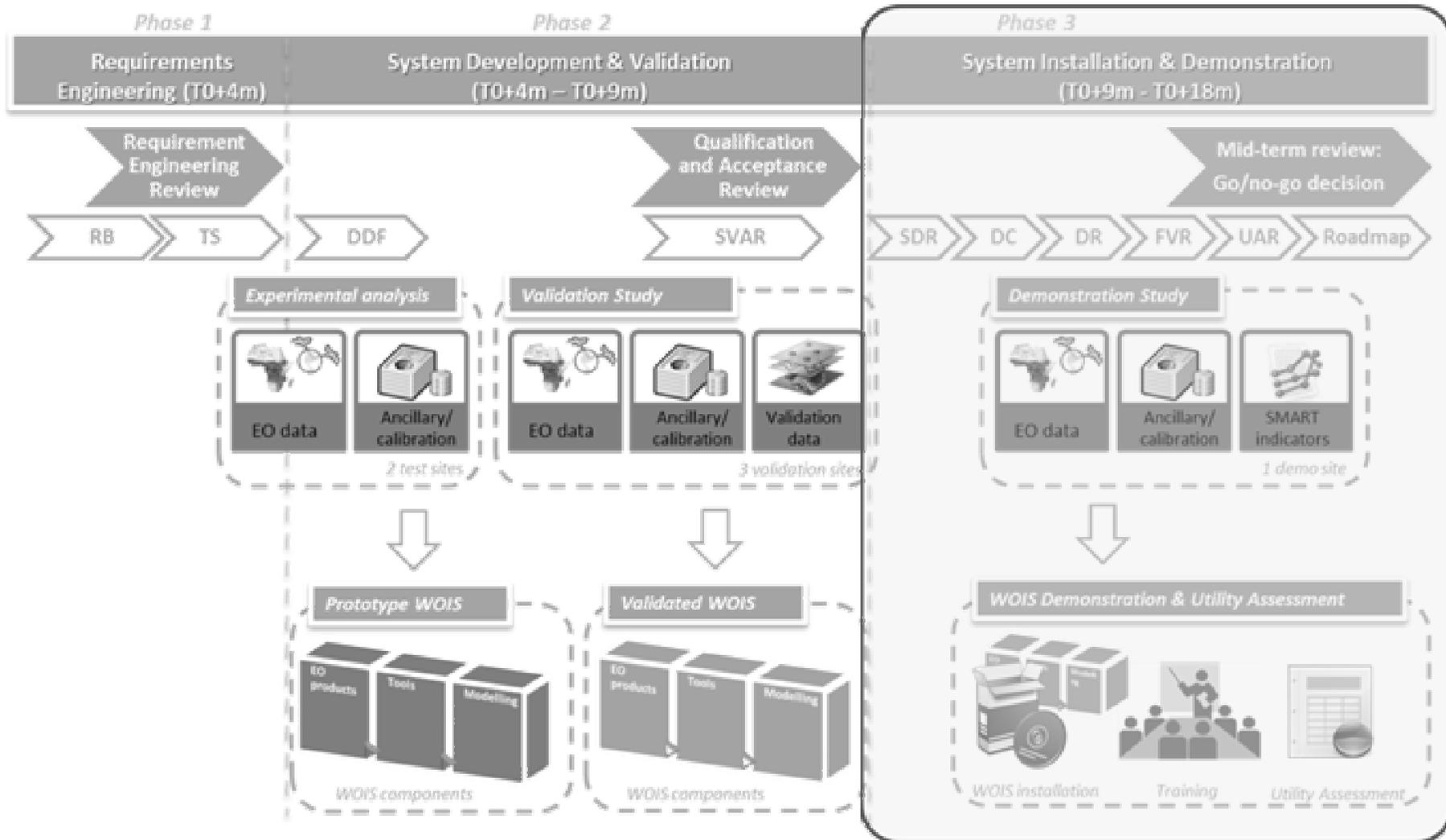
- System Installation and training;
- Demonstration Cases Execution, Validation, Training
- Utility Assessment & Training;

Year	2013																											
Month	April				May				June				July				August				September							
Week#	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
VBA		■											■												■			
LCBC			■											■											■			
NBI				■												■									■			
DWA							■											■								■		
MAWF								■											■								■	

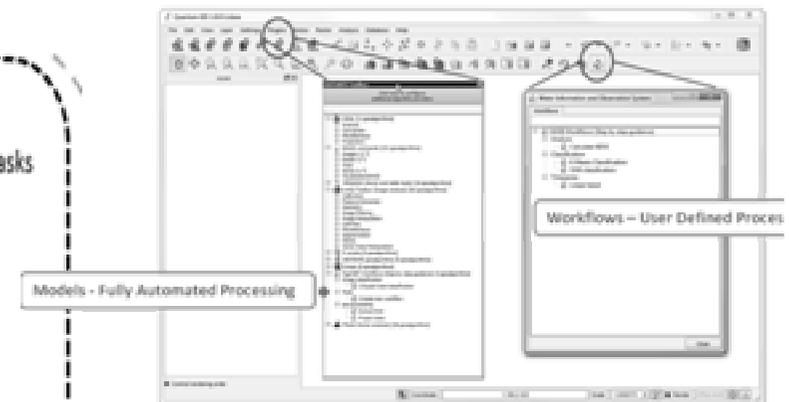
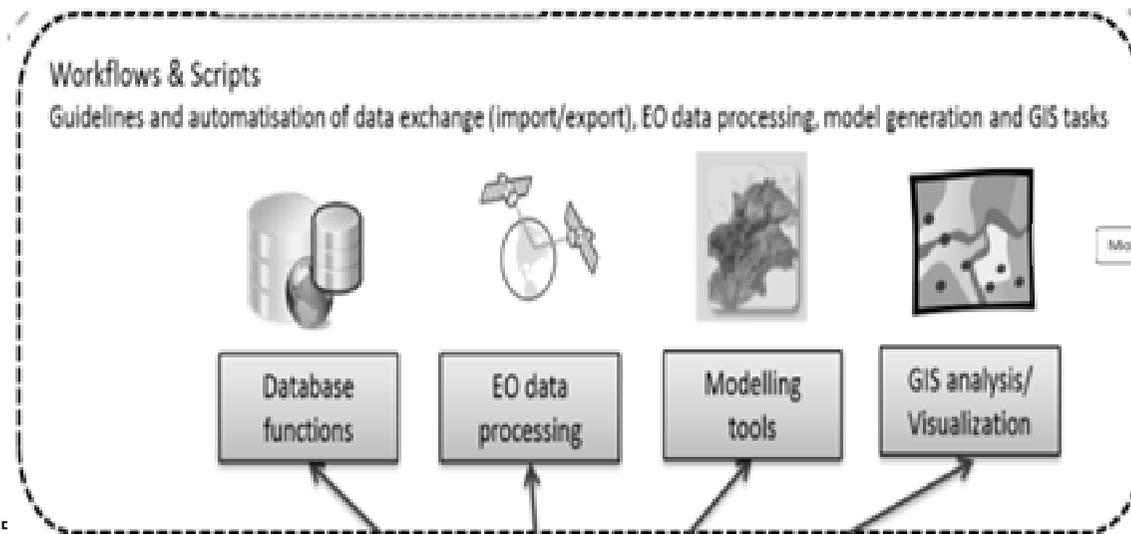
■ Installation

■ Demonstration

■ Utility assessment

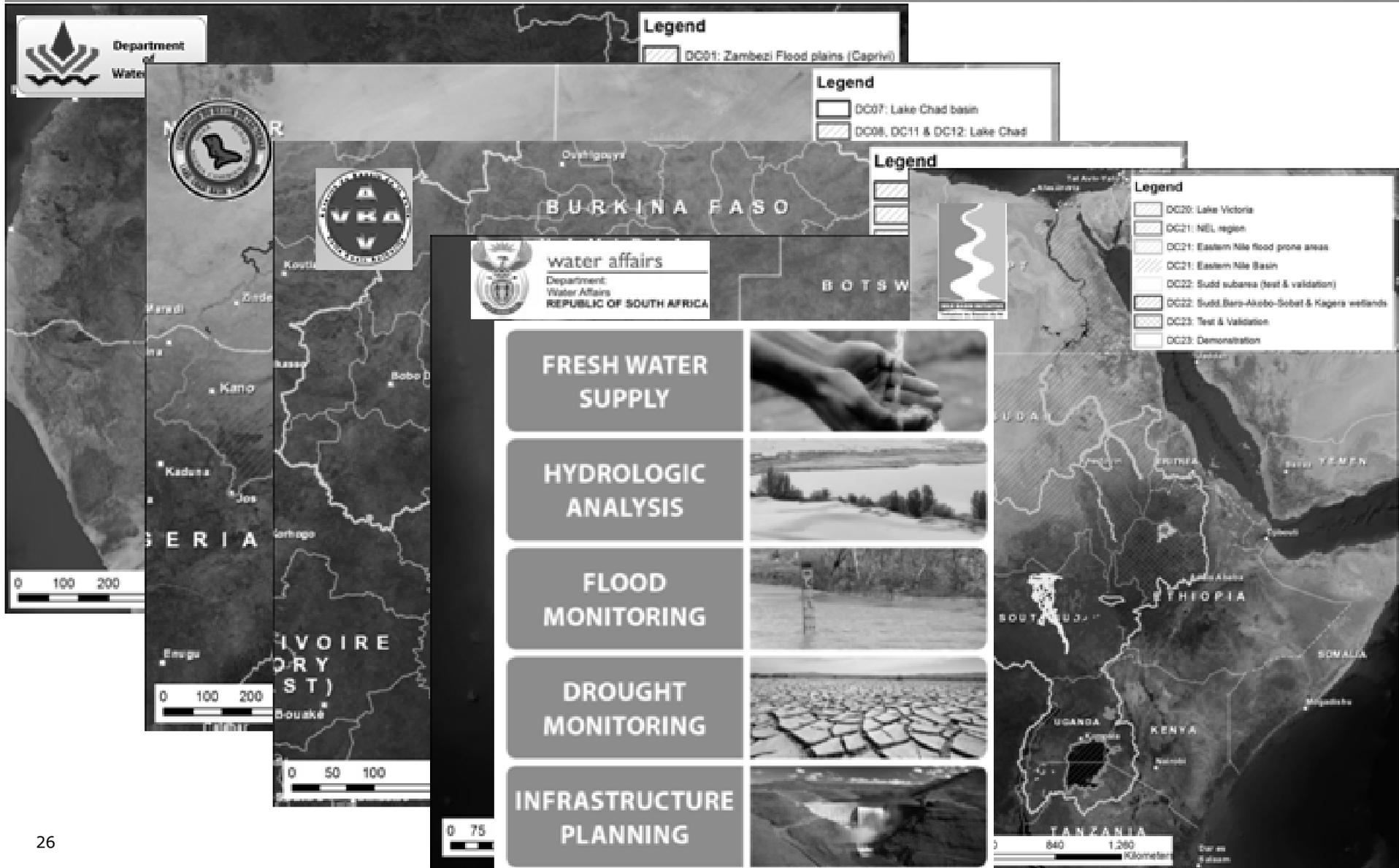


- ❖ Provide step-by-step guidance for the processing of the TigerNet EO product portfolio
- ❖ One stop resource for integrated EO processing and GIS analysis
- ❖ Works seamlessly with various algorithm providers



QGIS Interface

Developed Demonstration Cases



Department of Water Affairs

water affairs
 Department of Water Affairs
 REPUBLIC OF SOUTH AFRICA

Legend
 DC01: Zambezi Flood plains (Caprivi)

Legend
 DC07: Lake Chad basin
 DC08, DC11 & DC12: Lake Chad

Legend
 DC20: Lake Victoria
 DC21: Nile region
 DC21: Eastern Nile flood prone areas
 DC21: Eastern Nile Basin
 DC22: Sudd subarea (test & validation)
 DC22: Sudd, Baro-Akobo-Sobat & Kagera wetlands
 DC23: Test & Validation
 DC23: Demonstration

FRESH WATER SUPPLY 

HYDROLOGIC ANALYSIS 

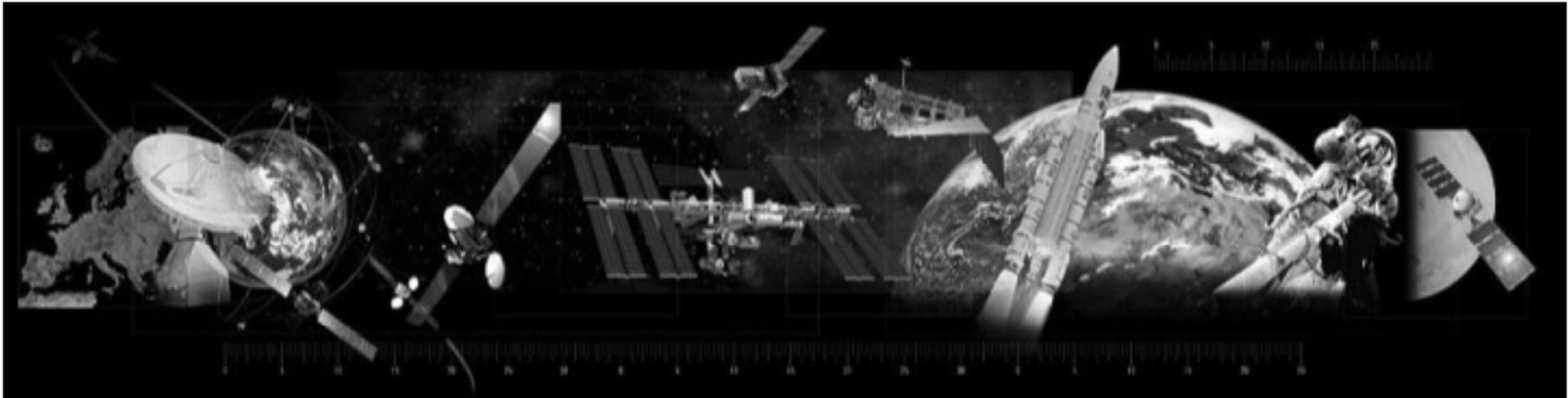
FLOOD MONITORING 

DROUGHT MONITORING 

INFRASTRUCTURE PLANNING 

40+ years experience
5 centres in Europe
2200 staff members

4 billion Euro per year
70+ satellites developed
20+ satellites in operation



- **Space science**
- **Human spaceflight**
- **Exploration**
- **Launchers**
- **Earth observation**

- **Navigation**
- **Telecommunications**
- **Technology**
- **Operations**



GMES dedicated missions: Sentinels ESA/EC co-funded programme



Sentinel-1 (A/B) – SAR imaging

All weather, day/night applications, interferometry

2013/2015



Sentinel-2 (A/B) – Multi-spectral imaging

Land applications: urban, forest, agriculture,...
Continuity of Landsat, SPOT

2014/2016



Sentinel-3 (A/B) – Ocean and global land monitoring

Wide-swath ocean color, vegetation, sea/land
surface temperature, altimetry

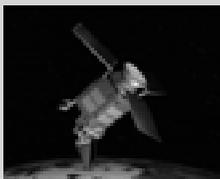
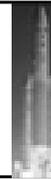
2014/2017



Sentinel-4 (A/B) – Geostationary atmospheric

Atmospheric composition monitoring, trans-
boundary pollution

2019/2027



Sentinel-5 precursor/ Sentinel-5 (A/B) – Low-orbit atmospheric

Atmospheric composition monitoring

2015/2020/2027



Jason-CS (A/B) – Low inclination Altimetry

Sea-level, wave height and marine wind speed

2018/2023

