



The first 10 years of TIGER Looking after Water in Africa

Benjamin Koetz

Directorate of Earth Observation Programmes
European Space Agency

Zoltán Vekerdy

Faculty of Geo-Information Science and Earth Observation (ITC)
University of Twente



**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

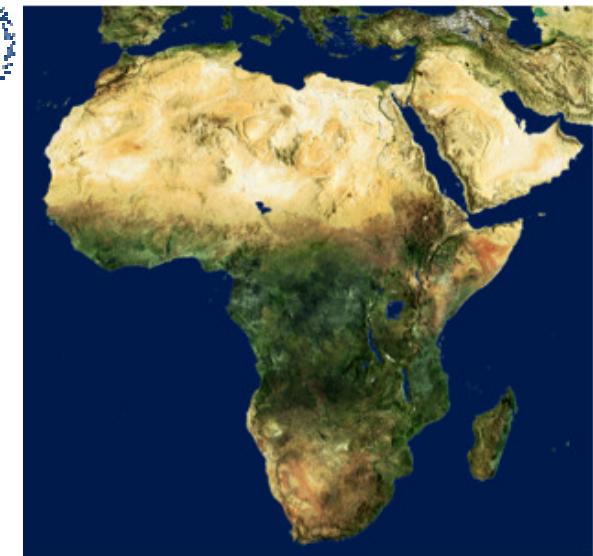


- **ESA launched TIGER in 2002** as a CEOS response to World Summit on Sustainable Development in Johannesburg.



- **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, UN-ECA), DWAF, R. of South Africa, GEOSS*.





TIGER History: Johannesburg to RIO+20



Launch following the WSSD



Endorsement by AMCOW



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

Recommendation at 1st African Water Week



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

AARSE Resolution

Launch of TIGER-NET



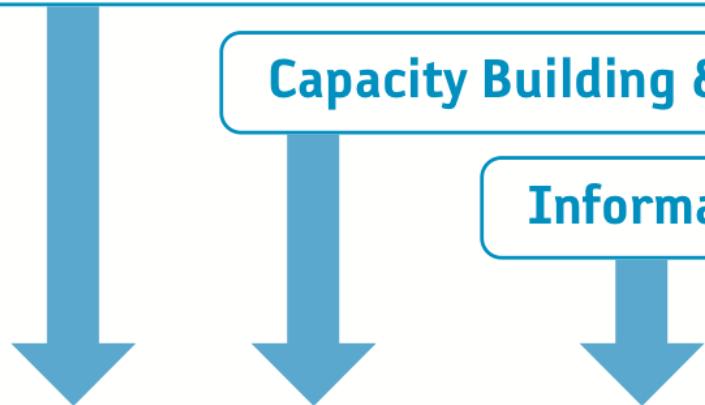
Improving Access to EO data

>10.000 satellite scenes delivered

Capacity Building & Training

200 Africans trained

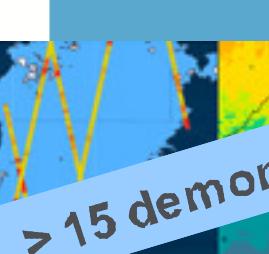
Information and Knowledge Networking



Develop EO-based geo-Information Services for IWRM

Research Stage

70 research projects



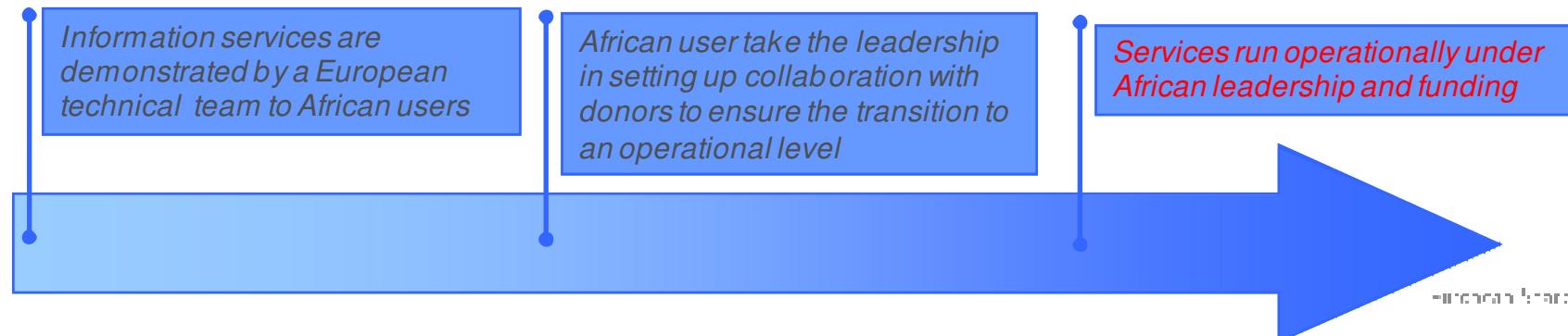
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Operational Stage

- ❖ 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



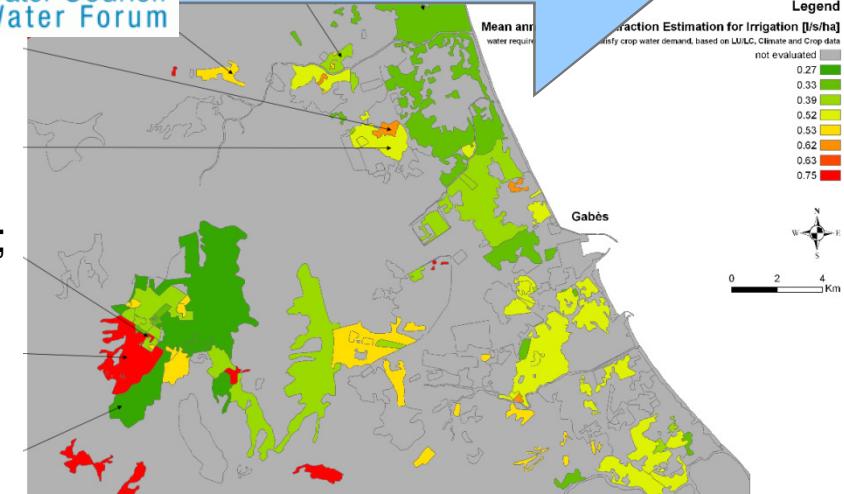


demonstration project within ESA's TIGER initiative

- 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

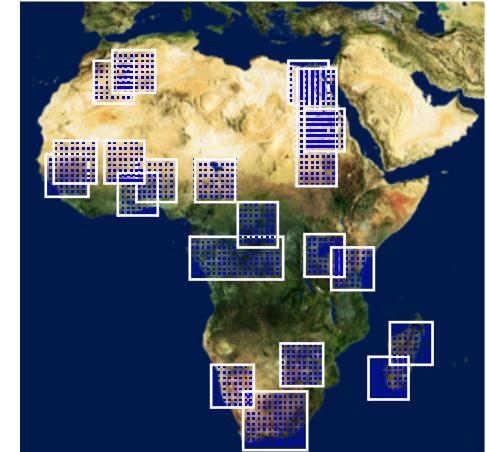




TIGER Capacity Building Facility (TCBF): Developing Knowledge and Scientific Capacity



- 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



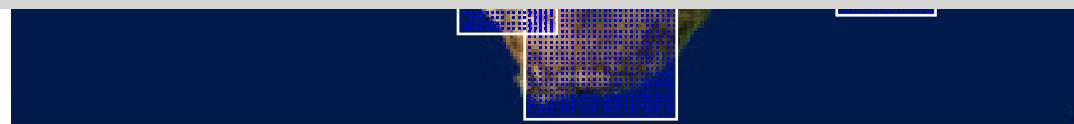




The El Jadida Declaration – outcome of the AARSE2012 conference (2nd November 2012)

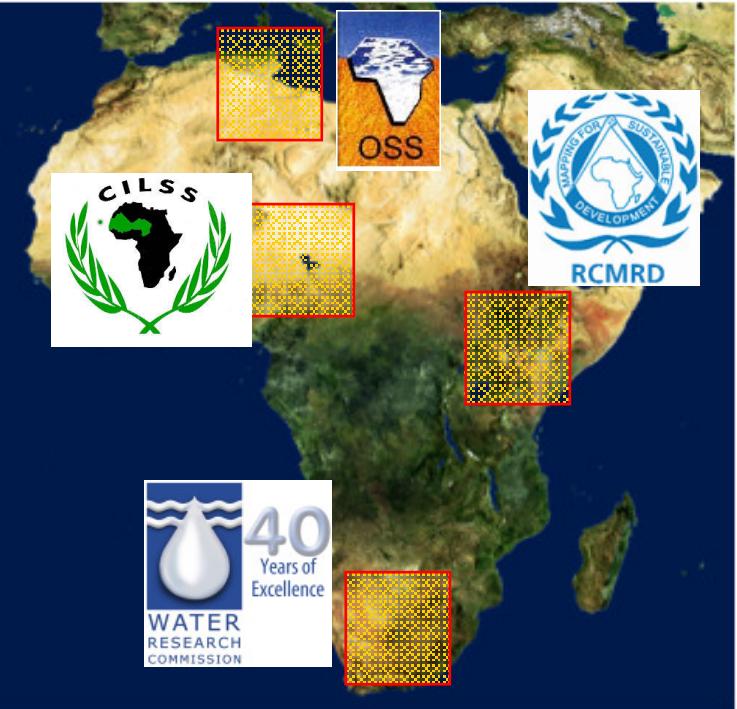
Recognising the importance and success of continued long term **collaboration between European Space Agency and African scientists** within the TIGER initiative on Earth Observation techniques related to water resources management;

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



Empowerment of Regional Centers:

- Focus on the TCBF Regional Centers:
AGHRYMET (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



Zambia Training



EMWIS workshop



Training Kit



Project Extension:

- 350 k€ budget
- KO July 2012

International Research Studies

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



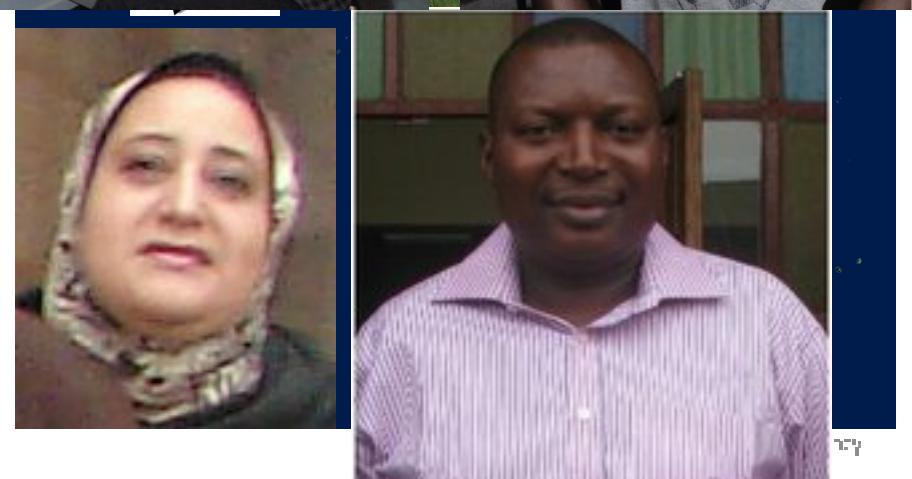
Water Management Focus:

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

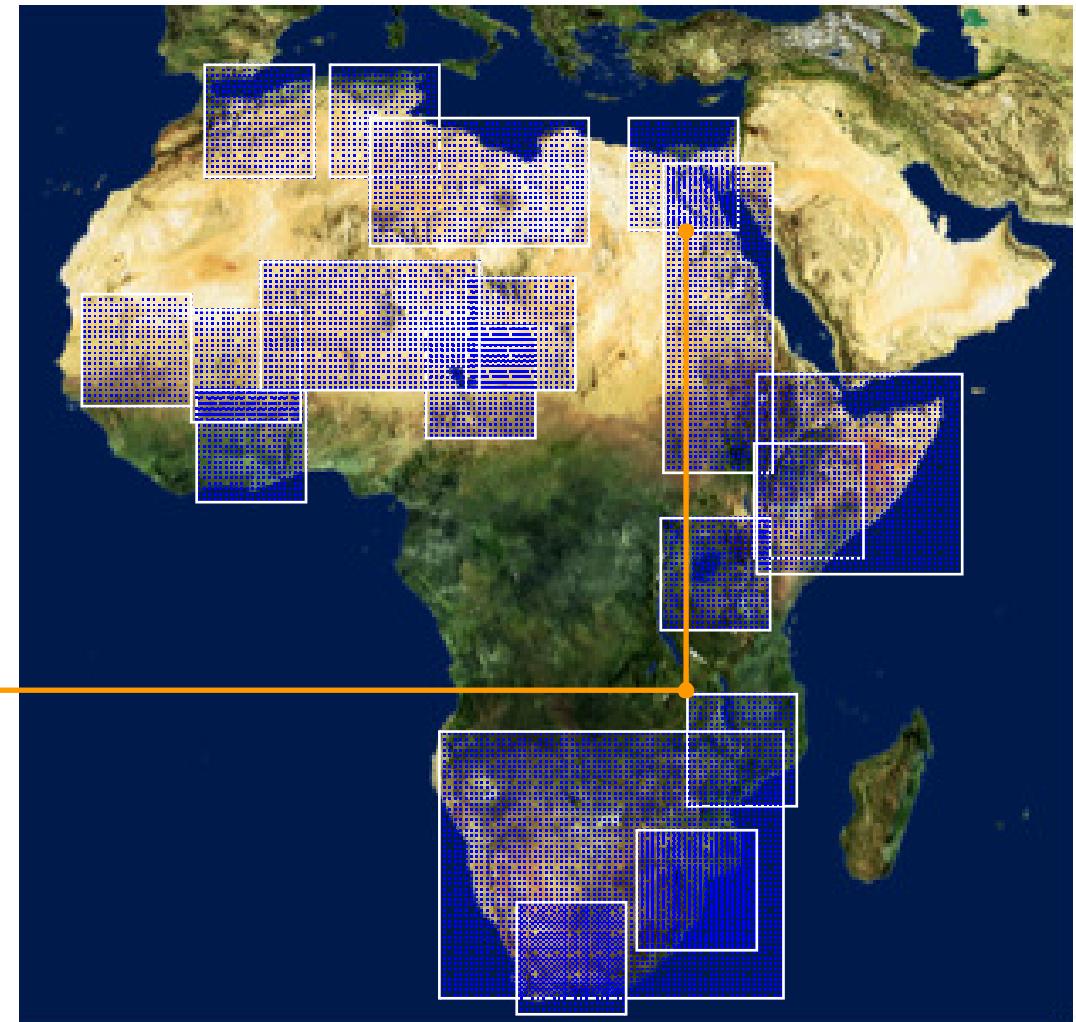
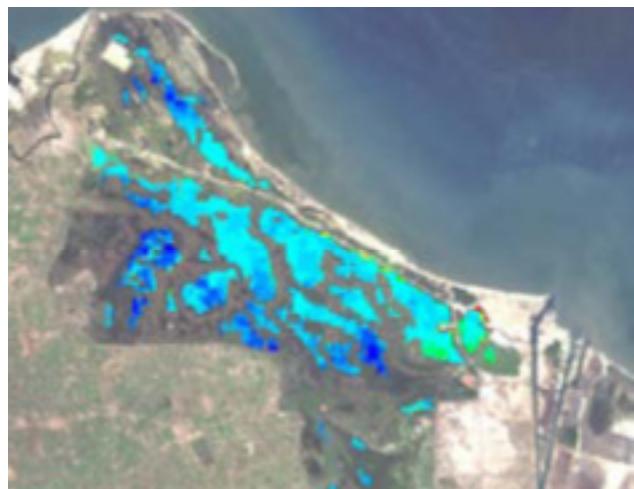


Implementation:

- 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;



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:



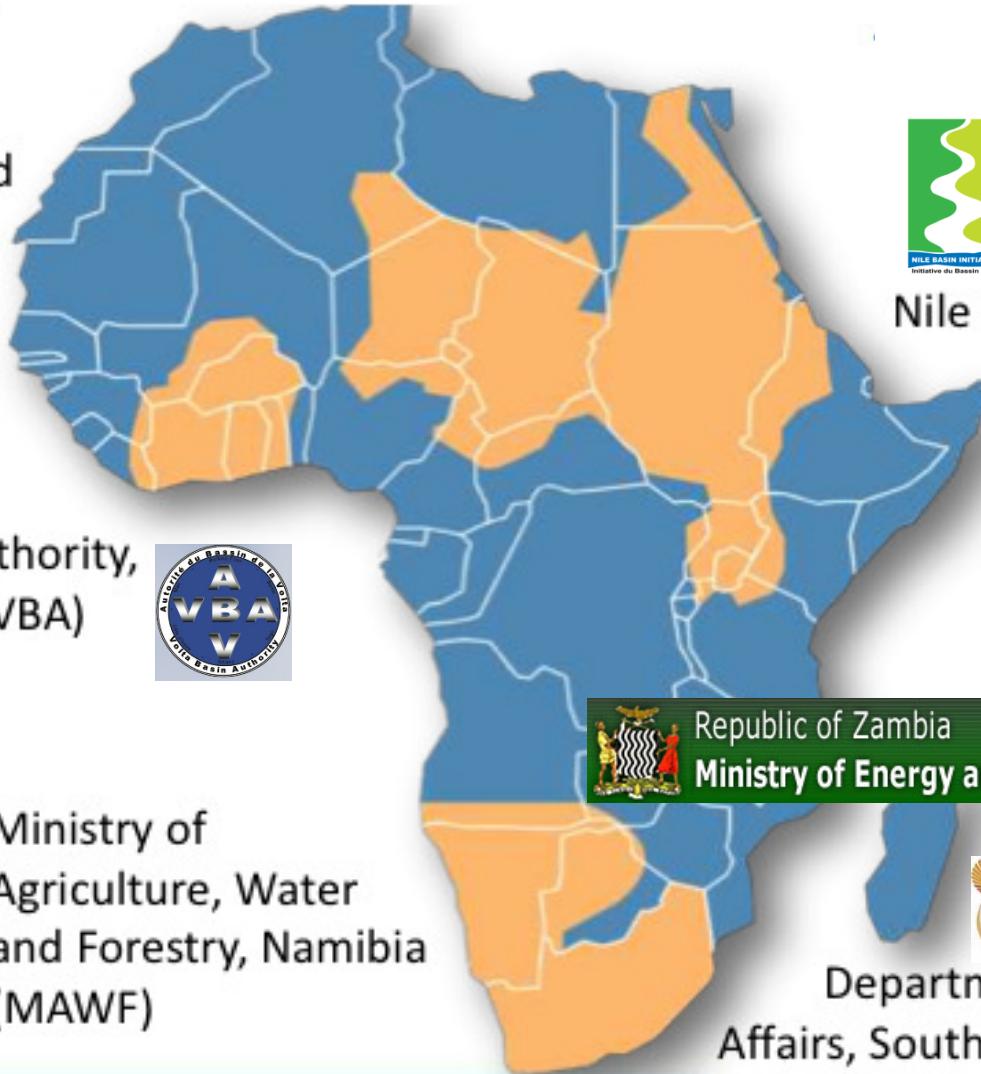
Lake Chad Basin
Commission, Chad
(LCBC)



Volta Basin Authority,
Burkina Faso (VBA)



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



Nile Basin Initiative,
Uganda (NBI)

Republic of Zambia
Ministry of Energy and Water Development



Department of Water
Affairs, South Africa (DWA)



TIGER NET



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

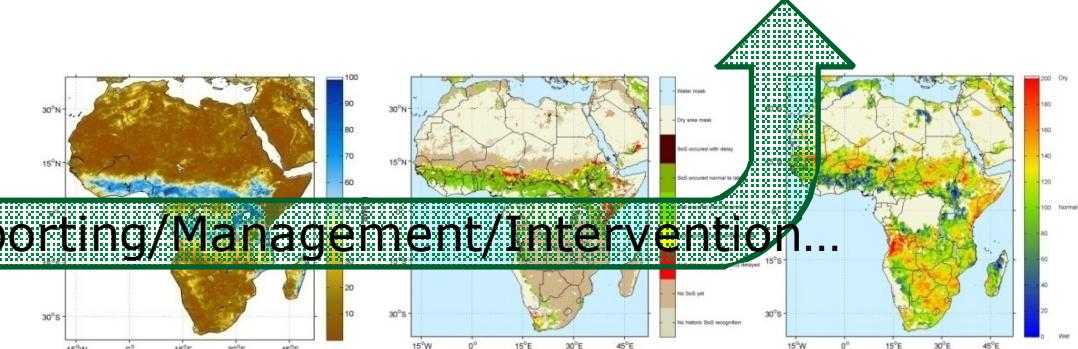
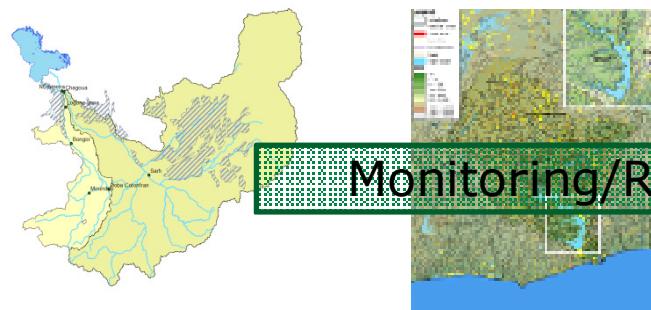


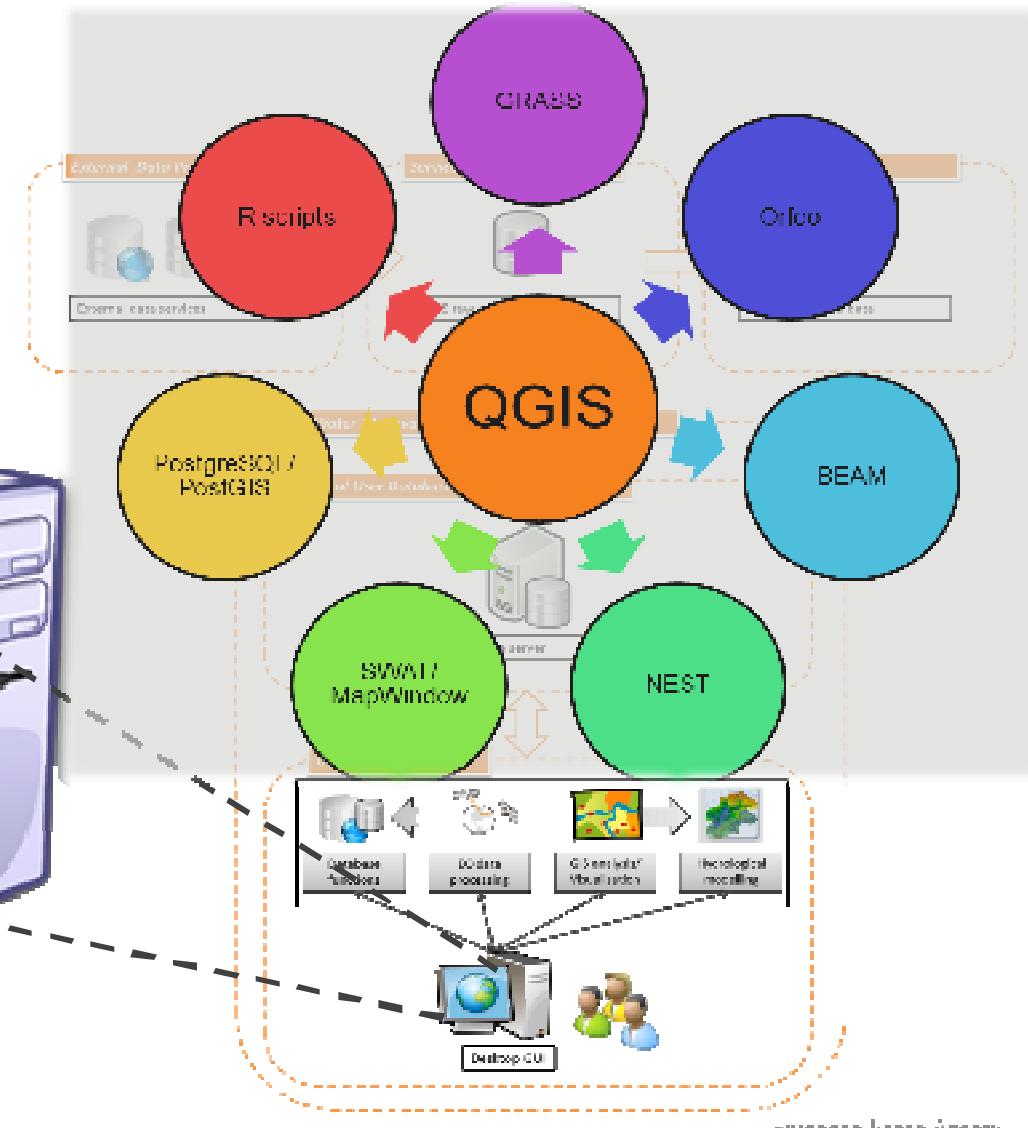
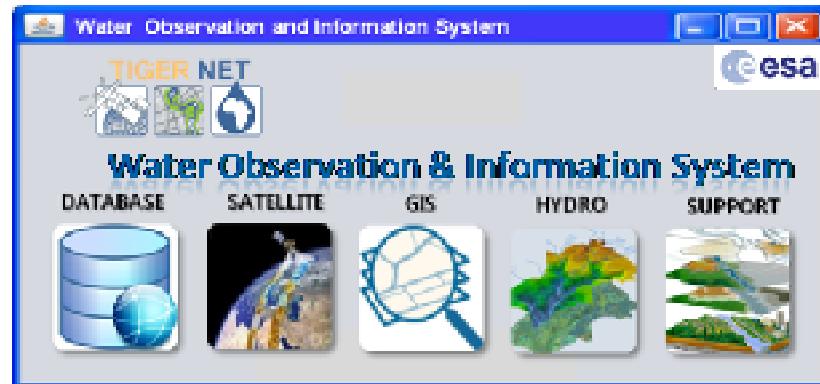
LAKE CHAD BASIN CHARACTERIZATION

Provide operational capacity to establish water related information / summary reports (Map and Tabular) per sub-watershed for IWRM:

- hydrological network
- Land cover, seasonal and long-term map of changes
- Drought condition and water stress anomaly
- other operational EO products (precipitation, etc.)

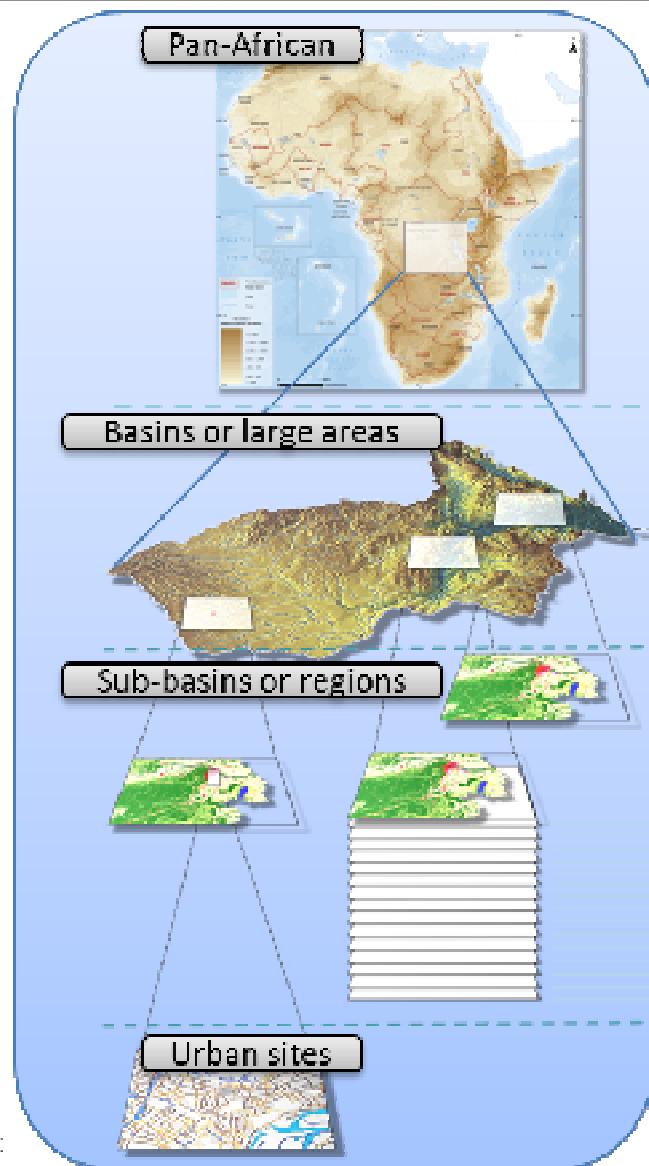
	Lake Chad Basin	Lake Chad Monitoring	River Chari Sub-basin	River Logone Sub- Basin	Ndjamena City	Kano City	Total	ESA consumed for all	7 users	Discrepancy
Land degradation and desertification	1,293,589	22,965	516,157	89,680			1,293,589	1,053,585		
Medium resolution land cover and land use	1,293,589	22,965	516,157	89,680			1,292,391	1,200,000	1,750,582	
Seasonal land cover changes and landscape dynamics	1,293,589	22,965	516,157	89,680			1,292,391	6,000,000	1,065,248	
Long-term full basin change analysis	1,293,589	22,965	516,157	89,680			1,292,391	6,000,000	1,065,248	
Drought condition	1,293,589						1,293,589	6,000,000	-436,446	
Water quality							22,965	1,200,000	ok	
Lake water level		22,965					22,965	1,200,000	ok	
Hydrological model		22,965					22,965	1,200,000	ok	
Hydrological model							516,157	605,837	1 x Basin per user	ok
Dynamic flood mapping							516,157	89,680	5,000,000	NAM
Mapping of flood affected areas							516,157	89,680	1,500,000	-391,551
Open Water bodies and seasonal changes							516,157	89,680	25,000	-602,266
Sanitation planning map							516,157	110	110	600
Water supply planning map								110	110	na ?







TIGER NET



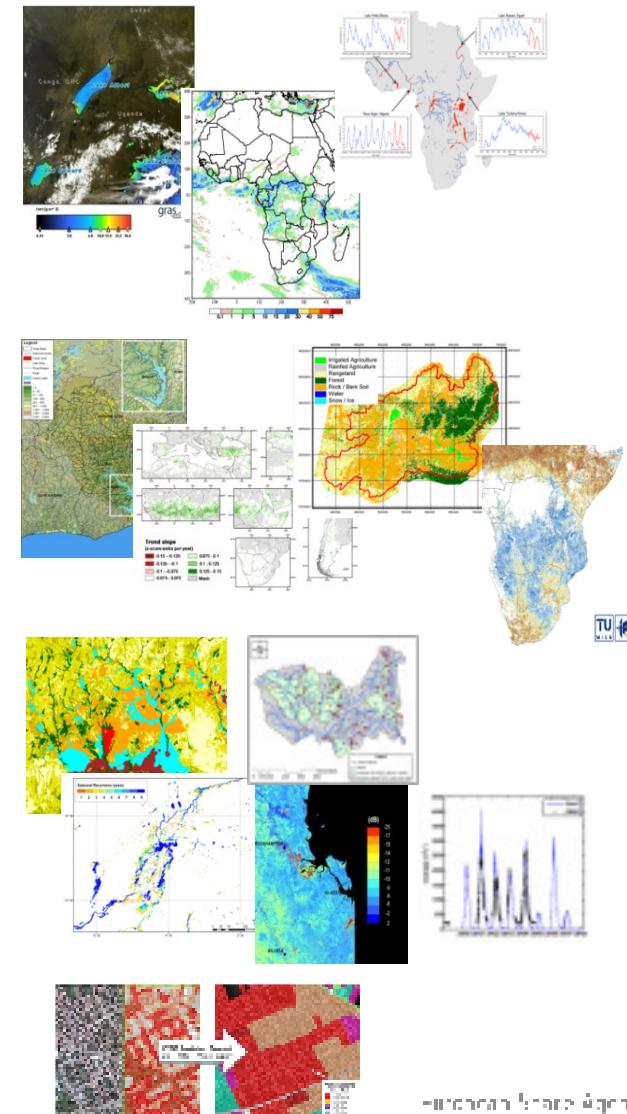
EO products

- Large lakes water quality and water levels
- Evapotranspiration
- Precipitation
- Soil moisture

- Medium resolution land degradation index
- Medium resolution land cover characterization

- High resolution land cover characterization
- Small water bodies
- Flood mapping system
- Hydrological modeling

- Water supply and sanitation planning support



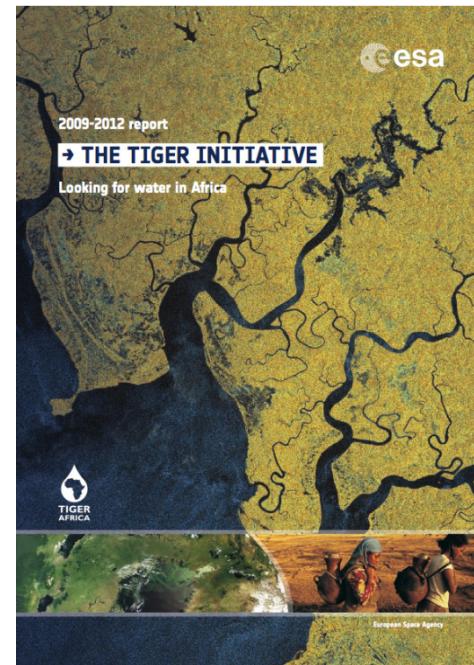
- ❖ Capacity building of EO know-how within an African wide network of water authorities, universities & technical centres
- ❖ Development & Demonstration of EO products & applications for water resource management
- ❖ Facilitation of EO data access (bottleneck) & processing
- ❖ **Good Basis for the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



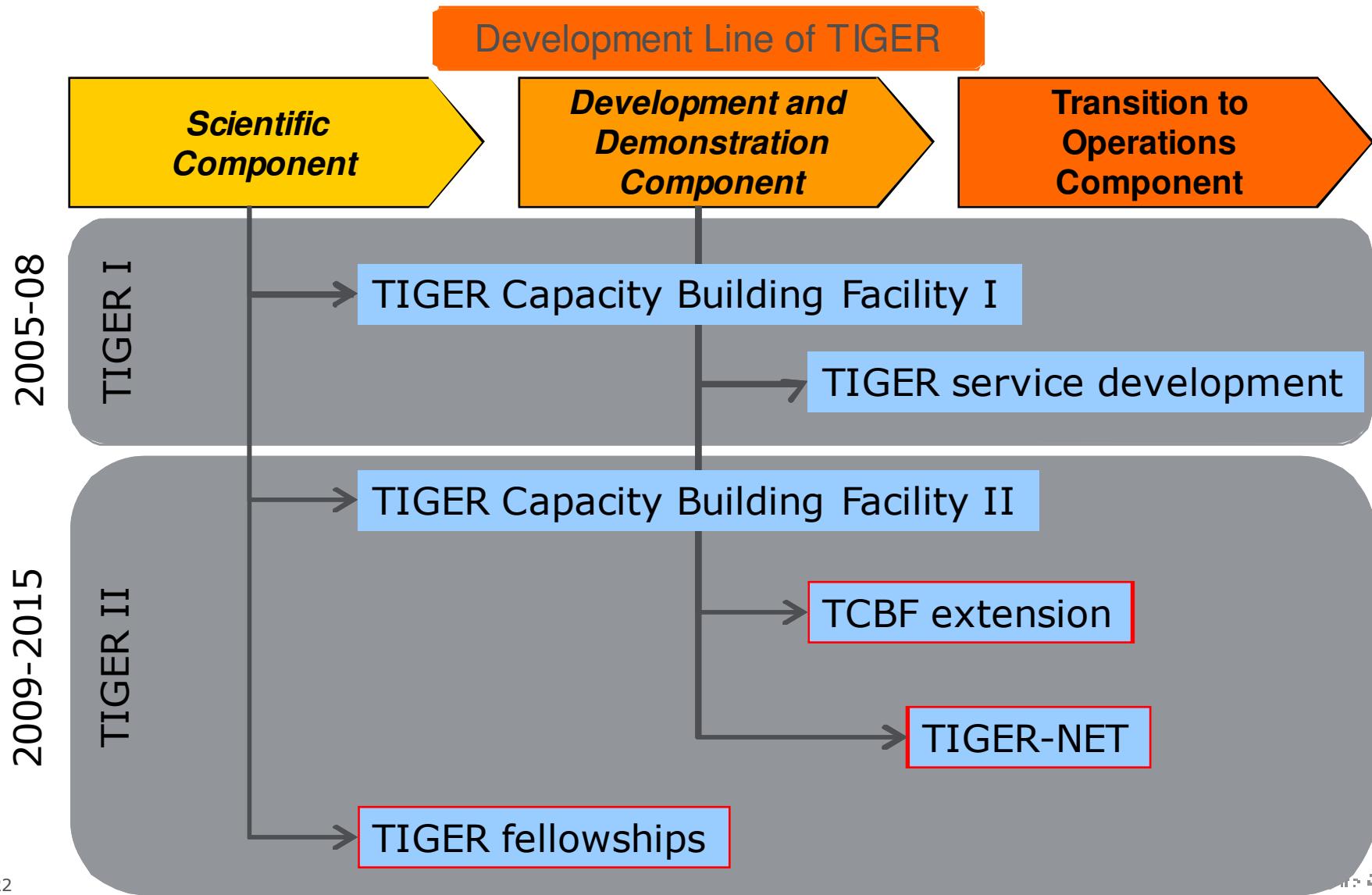
ESA point of contact: Benjamin.Koetz@esa.int

Zoltán Vekerdy: Z.Vekerdy@utwente.nl

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



Latest Publication:
TIGER report 2012



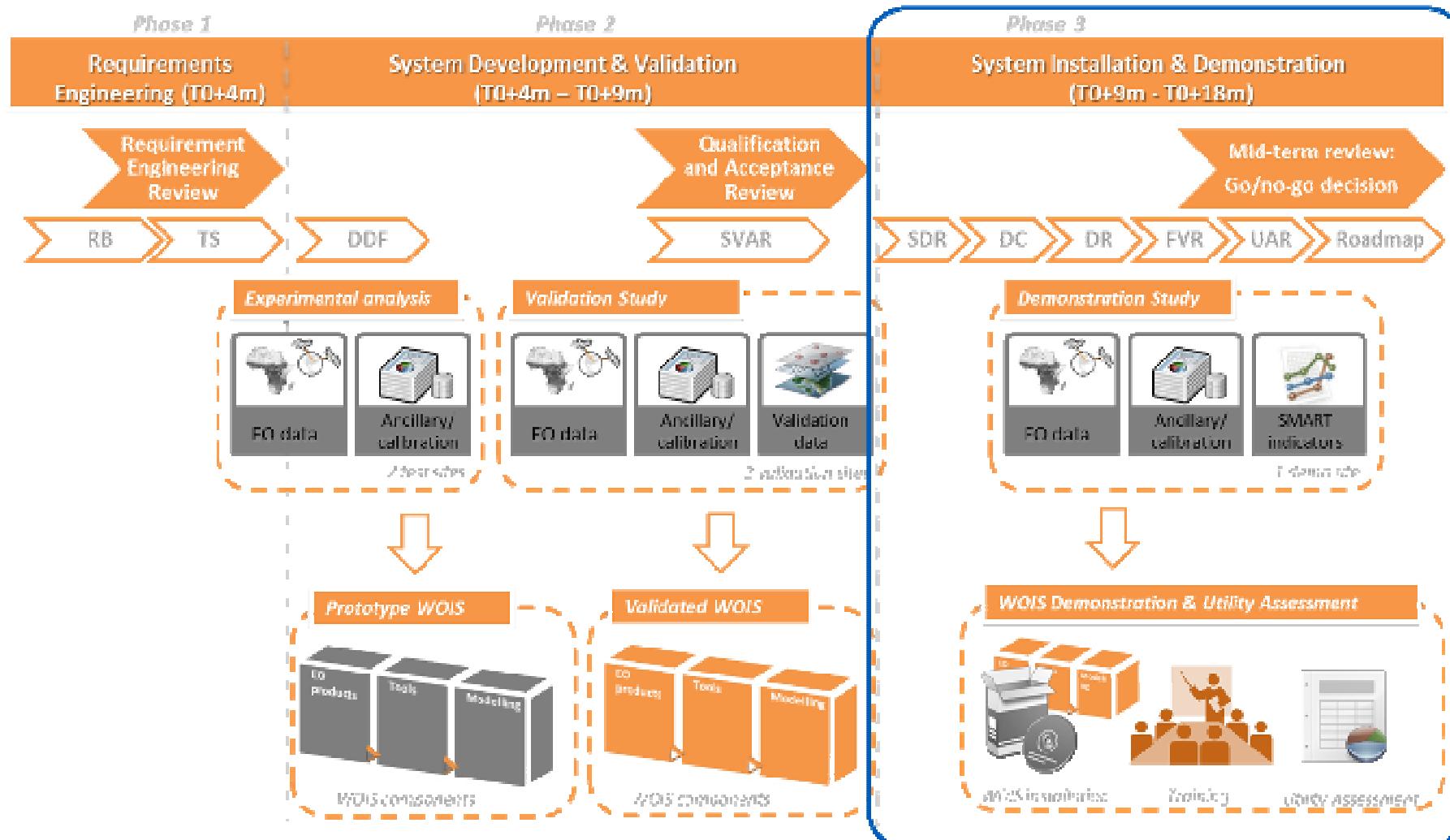
System Installation and Demonstration

- Start: March 2013 – ongoing

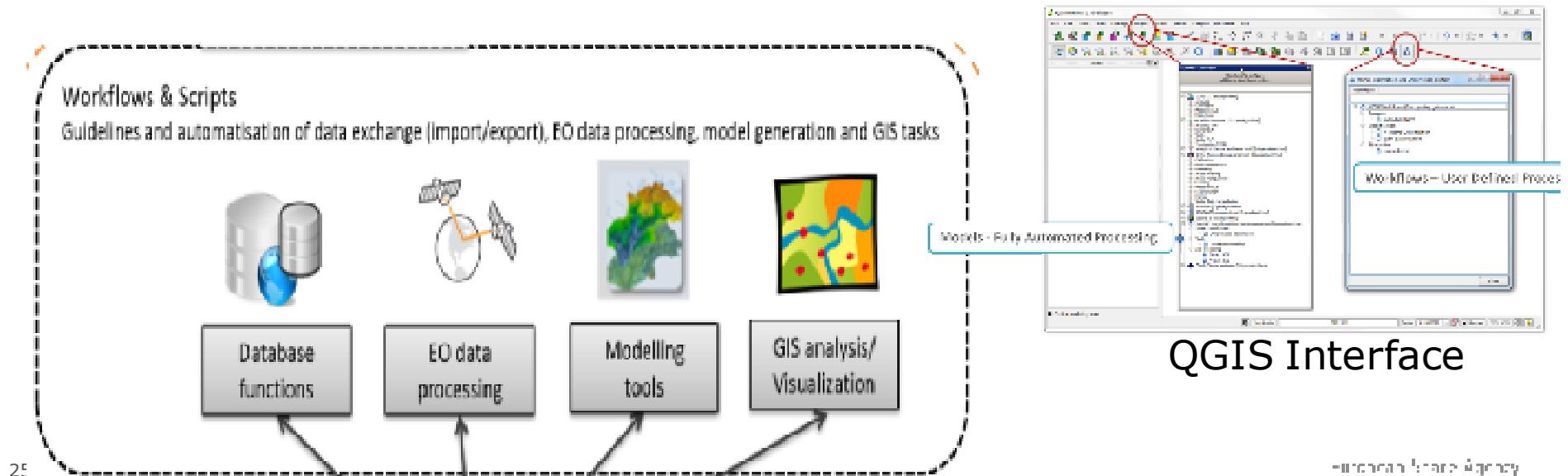
Tasks

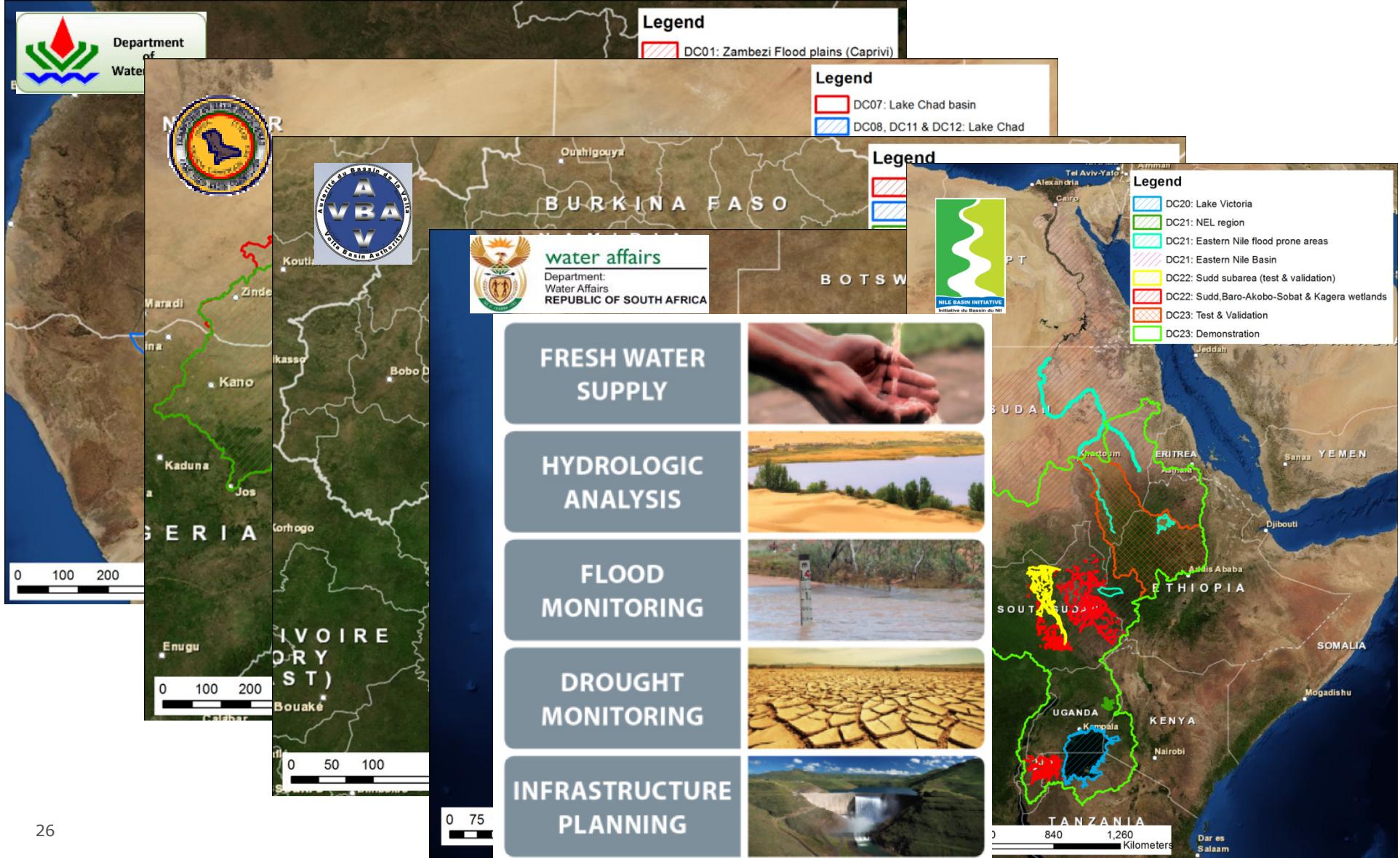
- System Installation and training;
- Demonstration Cases Execution, Validation, Training
- Utility Assessment & Training;

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
VBA																				
LCBC																				
NBI																				
DWA																				
MAWF																				



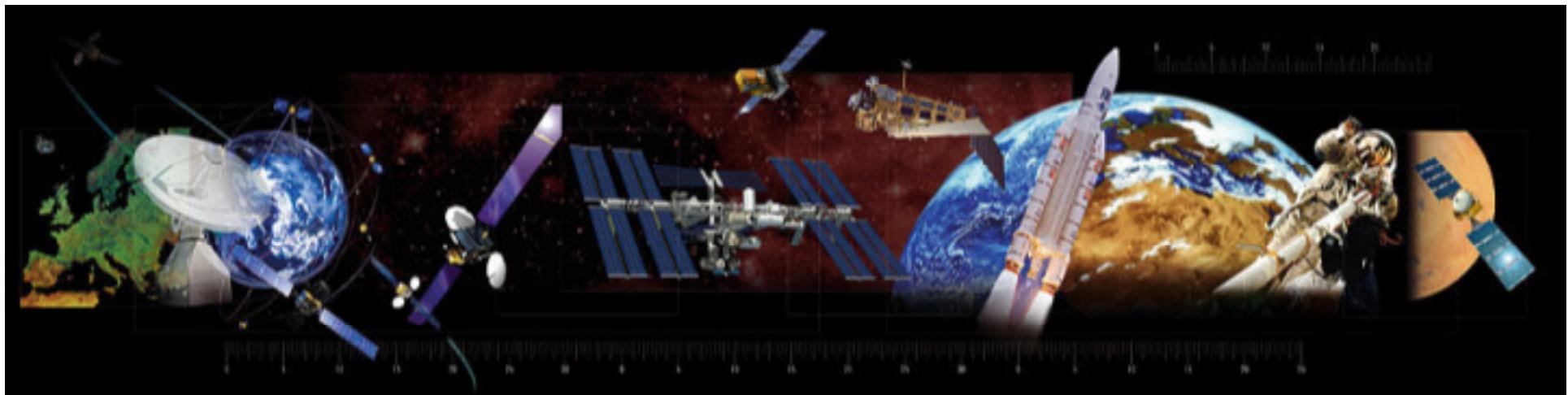
- Provide step-by-step guidance for the processing of the TigerNet EO product portfolio
- One stop resource for integrated EO processing and GIS analysis
- Works seamlessly with various algorithm providers





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

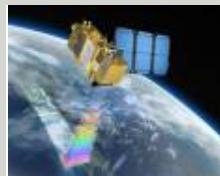
- Navigation
- Telecommunications
- Technology
- Operations



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

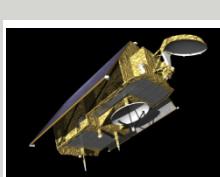
2019/2027



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

