



Issue n.2, December 2005

The TIGER Newsletter

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Edited by:



With the contribution of



TIGER Workshop: 3-4 October 2005

TIGER took a further step forward on a hill slope overlooking Rome early in October. ESRIN, the European Centre for Earth Observation in Frascati near Rome, was the setting for the two-day TIGER Workshop which is being followed by three days of Earth Observation technology training sessions.

ESA's Director of Earth Observation Programmes and Head of ESRIN Volker Liebig began the Workshop on Monday 3 October by welcoming the 95 participants coming from 31 countries: "We consider the TIGER Initiative to be a very important application of our space programmes and Earth Observation satellite data. There are now 50 projects in progress, 70% of which are being headed by African organisations. A dedicated TIGER Office will also be opened in Africa."

TIGER aims at applying Earth Observation to supply water-related geo-information in support of the practice integrated water resource management for sustainable development. Since its initiation two years ago more than 200 African organisations – including water and basin authorities, technical centres, universities and regional organisations - have become involved in different projects around the continent. The hope is to develop a technical, human and institutional capacity to bridge Africa's water information gap using satellite data.

The projects span the African continent as well as the various stages of the water cycle. Presentations at the Workshop included the use of satellite data to chart soil moisture across Southern Africa, monitoring flood plains and humid zones in the Sahel region of Senegal, combining radar and optical Earth Observation data to monitor the environmental state of the northwest coast of Madagascar and modelling the water balance of semi-arid rock watersheds using both satellite imagery and in-situ data.

Providing perspective on the needs of end-users, Eng. Mahmoud Hassan, Acting Director of the National Water Resources Plan Project for Egypt, gave a presentation on the changing approach to water resources management in his country. Egypt has had water plans in place for the last three decades, commencing from the approach of supply management. The current National Water Resources Plan (NWRP) integrates the management of water supply and demand, aiming to guarantee the quantity and quality of water for socio-economic development to 2017.

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LOOKING AFTER WATER IN AFRICA

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This change in approach has been driven by growing demand due to population increase and rising living standards. Available water per head of Egyptian population has halved since 1959, and is projected to further decrease by a third by 2025.



Additional water sources will be needed to meet the NWRP's aim of increasing agricultural land by 35% and create desert living space for 20% of the population, as well as doubling people's access to safe sanitation from its current 30% level. Satellite data has a role to play in both locating and managing water resources, particularly in terms of subsurface desert aquifers but also monitoring irrigation services and the extension of agricultural land.

Hassan gave examples of satellite images being used to chart the morphology of the artificial Lake Nasser, follow the 2004 flood of the Toshky spillway from the Lake into the Toshky Depression in the Western Desert, and track the westerly extension of agricultural land via water from the Nile in the West Delta Project.

Dr. Stephen Donkor of the United Nations Economic Commission for Africa (UNEC-A) is Chairman of the TIGER Steering Committee. He pronounced himself happy that the original objective behind the TIGER Initiative, expressed at the Johannesburg World Summit for Sustainable Development (WSSD) in 2002, is being realised.

"Everything we are doing here comes out of a statement made by global space agencies during Johannesburg that as part of their commitment to sustainable development they would provide tools which can be used to manage

Africa's water resources better," Dr. Donkor said. "Three years on we have got organised and are getting concrete projects started on the ground.

"Now the question is whether the projects reflect African needs. Right now most of the projects are scientifically oriented, and the products of these projects have to be translated into usable information for practitioners in the field. I think we are getting there, judging by some of the questions asked today, especially on finding and managing groundwater, without which Africa will not be able to meet the Millennium Development Goals set by the United Nations."

Dr. Donkor also added that UNEC-A is hosting an Africa Water Information Clearing House, intended to be a 'one-stop shop' for all available data on African water available to everyone who needs it. Results from individual TIGER projects will be added to this Clearing House, on the basis that increasing their visibility and data accessibility will increase their overall effectiveness. It should also be a means of attracting funding from national and international donors to support the continuation of TIGER project activities.

Jean-Marc Chouinard of the Canadian Space Agency (CSA) reaffirmed his organisation's commitment to TIGER, and said that the seven projects being supported by CSA would all be receiving free Radarsat-1 data, including a high-resolution radar mosaic of the African continent. He also extended the offer to ESA projects requiring supplementary data.

Information was also given on a new class of project called TIGER-Innovators which seeks proposals for African teams to develop novel water-related services. Several proposals have been received so far, with up to five projects due to be selected at the end of this year.

Following the conclusion of the two-day Workshop, the rest of the week was taken up with training sessions in specialised software applications for processing data known as the Basic ERS & Envisat AATSR and MERIS (BEAM) toolbox. Participants were also supplied with Training Tool Kit software and dedicated TIGERWorks software for beginner training.

More information about the Workshop is available at the address:

<http://www.tiger.esa.int/ws2005program.asp>

In the context of the TIGER initiative, the European Space Agency (ESA) launched an Invitation To Tender (ITT) for a set of new small-size projects to support the use of EO technology for water resource management in Africa. The ultimate objective is to implement and demonstrate innovative information services that give a practical and concrete respond to specific user needs expressed by African water organizations.

Recently, ESA, after a long review process, has awarded five north-south consortiums with contracts, amounting to 100,000 Euro each, to develop, implement and demonstrate innovative information services to support Integrated Water Resource management in Africa and contribute to the TIGER objective. In the following a description of the five new TIGER projects is provided:

Satellite Monitoring of Lake Water Quality in Egypt:

The main objective of this project is to design, develop and implement an Earth Observation (EO)-based capacity for the operational monitoring of water quality in Lake Manzalah, Egypt. Lakes are a precious source of freshwater in Egypt, and the usage of lake water must be carefully managed to satisfy a variety of different, and often competing, domestic, agricultural and industrial uses. Key to the formulation of adequate water management scenarios is accurate and reliable information on the occurrence and distribution of water quality indicators, such as turbidity, algal blooms or areas infested with invasive plant species. The project will provide a set of comprehensive water quality products derived from EO data in a regular manner. The extraction of water quality information from satellite imagery will make use of the existing in-situ monitoring network for data calibration and validation.

Responding to urgent user information requirements, the EO-based water quality products will represent an up-scaling in space and time of the conventional field measurements and will capture the spatiotemporal variability of critical lake water quality parameters more accurately than the current monitoring program. The final products will be made available to a wide range of local stakeholders. Weekly products to be generated include turbidity, chlorophyll-a concentration and suspended sediment concentration, while aquatic vegetation cover and reclaimed areas will be available on a monthly and quarterly basis, respectively.

The project team includes partners from Egypt, Canada and Finland: C-CORE (Canada), Finnish Environment Institute (Finland), Water Resources Management Division, Newfoundland and Labrador Department of Environment and Conservation (Canada), Drainage Research Institute (Egypt) and Survey Research Institute (Egypt).

IWAREMA: The overall goal of the project "IWAREMA Zambia" in the context of the TIGER initiative is to develop spatial data inputs for an integrated management

concept for Zambia's water resources that is set up by Zambian government. The specific objectives are to provide the end-user team - consisting of the Ministry of Energy and Water Development (MEWD) through the Department of Water Affairs (DWA), the University of Zambia and specific departments of other responsible Ministries - with the following service products:

- *Mapping of water resources in the Zambezi/Kafue River Basin from satellite images;*
- *Dam location in the Zambezi/Kafue River Basin;*
- *Land cover maps, provided at a regular interval, and specific change indicators; and*
- *Regular information bulletins for decision- and policy makers as an outcome of the integrated analysis of the products.*

The products are derived from earth observation data (MERIS and Landsat) and shall enable the end-users to increase their capabilities in the management of their water resources.

The prime contractor is G.I.M. - Geographic Information Management nv, a Belgian SME establishing its place in the GEO-ICT service market and a proven provider of information management and consultancy in the selected areas of Geographic Information Systems (GIS), Earth Observation (EO), Information Technologies (GEO-ICT) and Applications Development (AD). The end user team, as listed above, is set up of the most important Zambian water authorities and the University of Zambia. The involved technical centre of expertise is the SADC Regional Remote Sensing Unit, with high expertise in facilitating training programmes and technical support in the field of Remote Sensing and GIS in support of early warning for food security and natural resources management.

Lake Victoria: Lake Victoria the largest fresh water lake of Africa. It is well-known for its environmental problems and for its economic value to the riparian countries. The national fisheries research institutes of Uganda, Kenya and Tanzania and other water management authorities are committed to both monitor the threats that face the lake as inventory the riches. The involved countries seek to manage the lake in a sustainable way. Thus far they have hardly used information that has been derived from satellite data. Vexcel the Netherlands and the Nairobi based Regional Centre for Mapping of Resources for Development (RCMRD) have engaged in a project that aims to further the use of this kind of information in the fisheries research institutes. Goals are to develop dedicated products and services and to build capacity at the three institutes to ensure that expertise is available to implement these data structurally.

Team: Vexcel the Netherlands and RCMRD
Users: FIRRI (Uganda), KMFRI (Kenya), TaFIRI (Tanzania), Lake Victoria Fisheries Organization and other water management authorities

SHARE: The objective of SHARE is to enable an operational soil moisture monitoring service for the region of the Southern African Development Community (SADC). With this service SHARE will address today's most severe obstacle in water resource management which is the lack of availability of reliable soil moisture information on a dynamic basis at a frequency of a week and less. The proposed soil moisture information system will be based on synergies of the ENVISAT ScanSAR Global Mode and the ERS-2 scatterometer products. The combination of both systems will allow the resolution of temporal and spatial patterns in regional soil moisture dynamics. Specifically SHARE will: 1) Build up the capacity and competence in African institutions to use and disseminate medium and coarse resolution soil moisture products derived from radar sensors; 2) Provide an experimental soil moisture indicator based on ENVISAT ASAR Global Mode data for the SADC region; and 3) Derive a downscaling layer based on ENVISAT ASAR Global Mode data which will allow the interpretation of coarse resolution soil moisture information as provided by the ERS-2 scatterometer at 1 km resolution. The long-term vision of SHARE is to supply soil moisture information for the entire African continent, at a resolution of 1 km, run by African partners, posted on the web, freely accessible to all. The project team combines the expertise of the Vienna University of Technology (Austria) in the field of soil moisture remote sensing and of the University of KwaZulu-Natal (Durban, South Africa) in the field of hydro-meteorological applications. The prime users of the proposed service will be the South African Weather Service and the South African Agricultural Research Council. It is however also an emphatic objective of the SHARE team to involve other organisations of the SADC region with an explicit requirement for soil moisture information.

WADE: Water resources Assessment using SAR in Desert and arid lands in West African Ecosystems

WADE is a project proposed by ACS spa (Italy) in collaboration with AGRHYMET (Niger), a regional centre of excellence in combating desertification representing 9

countries in the region. The project aims at exploring underground and superficial water resources in arid and semi arid regions in Africa using Synthetic Aperture Radar (SAR) imagery. SAR has a great potential due to its limited cost and high spatial resolution; the availability of an advanced technological tool for water resources detection and mapping can represent a significant improvement for sustainable water management. Specific project goals are to map in the selected study area permanent water-related human artefacts (foggara, wells, channels), to map natural seasonal water resources understanding their dynamics through multi-temporal analysis, to transfer advanced technologies and tools to the User.

Special attention will be devoted to map surface water bodies, wetlands and small superficial natural seasonal waters, including inundated vegetation, at a detailed spatial resolution (20 to 30 meters). This effort will permit to collect information on limited water resources which are of paramount importance for biodiversity conservation. Strong links are foreseen with data users, such as local water authorities and institutions involved in conservation efforts. Two vectorial products will be developed, to be included in the User GIS:

1. A layer of subsurface human-made water features, geometrically detectable by radar, searched over a ~ 400,000 km² area. This is principally accomplished by exploiting the geometric regularity of emerged elements associated to the underground tunnels, such as wells, sinks etc.
2. A multi-temporal analysis of seasonal surface waters, aimed at understanding distribution and dynamics of these resources. This analysis will be carried out over a ~ 100,000 Km² area. To understand seasonal natural water dynamics, 5 months a year for 3 consecutive years will be assessed, providing also a classification of this natural water resources according to their characteristics with respect to meteorological and land cover existing information.

Source: ESA
 Contact: tiger@esa.int
 For more information: www.tiger.esa.int



TIGER at the Ramsar COP in Uganda

Last November ESA joined around a thousand participants from 146 countries at the main policy making forum of the Ramsar Convention on Wetlands in Kampala, Uganda. Today sees the presentation of results from an Agency-led initiative to develop a global wetland information service using satellites.

National delegates along with representatives from international organisations and non-governmental organisations (NGOs) have met in Uganda's capital for the eight-day Ninth Meeting of the Conference of the Contracting Parties (COP 9) to the Ramsar Convention on Wetlands, which began on 8 November. The theme of this COP is 'Wetlands and water: supporting life, sustaining livelihoods'.



Lake Naivasha, Kenya, one of the sites mapped in GlobWetlands.

The abundant waters of the wetlands scattered across our planet make them zones of rich biological diversity. Provided wetlands remain intact, they provide a range of additional services and benefits to local communities including flood and erosion prevention, water storage and purification, nutrient recycling and the provision of food and animal fodder, improving the livelihoods of millions of people and making a major contribution to sustainable development.

For much of the 20th Century wetlands were drained or otherwise degraded. However increased understanding of the vital importance of wetlands led to the signing of Ramsar in 1971. Among the activities of the current Ramsar COP is deciding new additions to the 1524 wetlands so far designated as Wetlands of International Importance – making up a total of 129 million hectares listed worldwide, with national signatories pledged to preserve the ecological character of sites on their territory and report on their status.

The Globwetland project (one of the demonstration project funded by ESA within the context of the TIGER initiative) employs satellite imagery to provide detailed wide-area views of individual wetlands and their surrounding water catchments, and show changes over

time. The intention is for Globwetland products to serve as tools of local wetland managers as well as a means to aid Ramsar reporting.

Mr. Anderson Koyo, member of the Kenyan delegation to the Ramsar Convention presented the first results of the project in a side event organised by ESA. Mr. Koyo showed some of the Globwetland core products including base maps, land-use-land-cover (LULC) maps and change detection maps, with historical satellite images being compared with current acquisitions to highlight shifts that have occurred during the past decade or more. Water cycle regime monitoring maps were also showed, using Envisat and Radarsat radar data to show flood and retreat patterns.

The next step of the project foresees the production of the planned maps over the remaining sites over Africa and their validation in close collaboration with the user community.

Source: ESA
 Contact: tiger@esa.int
 For more information: www.globwetland.org



1st Canadian TIGER Round-table Meeting

Canadian TIGER activities are ongoing. Last October 13-14, the Canadian Space Agency hosted the 1st Canadian TIGER roundtable meeting. These two days was a unique opportunity to bring at the same table for the first time the 7 companies who won a contract under the "TIGER request for proposals" of the Earth Observation Application Development Program (EOADP).

The president of CSA, Dr. Marc Garneau, inaugurated the meeting, by welcoming the 12 officials of African embassy (Algeria, Burkina Faso, Egypt, Nigeria, Gabon, Ghana, Kenya and Morocco) and the 30 participants present for this event: "Africa is a priority for the government of Canada. With an aim to realize this political commitment, the Canadian Space Agency actually prepare a space strategy for Africa. While waiting to finalize this strategy, the CSA decided to do concrete actions within the framework of the TIGER initiative, initiated by the European Space Agency".

The first day of the program set the scene on three perspectives: Coordination, Industry and Community of Practice. Dr Adigun Ade Abiodun, Chairman of the UN-Committee of the Peaceful Uses of Outer Space (COPUOS) start the discussion by presenting the African Challenge related to sustainable development of Water followed by Ms. Isabelle Bérard, Director of Canadian International Development Agency Policy & Strategic Planning, who inform participants on the CIDA priorities related to Africa. Mr. Lucien Bradet, president of the Canadian Council for Africa completed this session providing insight related to opportunities for trade and

investment in Africa, key challenges in exporting or investing in the region and recommendations to facilitate trade and investment in Africa.



The 7 project teams were then invited to make a presentation showing the context of their project, its objectives, activities, and expected results:

- **Vexcel Canada:** *Aquifer and River basin resource evaluation (ARBRE).*
- **Golder Associates:** *Satellite Hydrogeology for Water Resource Management – Northern Ghana*
- **Hatfield Consultants Ltd.:** *Nile River Awareness Kit.*
- **Info-Electronics Systems Inc.:** *Development of an Integrate Decision Aid System for water resource management based on satellites data for the Sous-Massa basin in Morocco.*

- **IUCN Canada:** *Remote Sensing and GIS Application in Integrated River Basin Management Vulnerability Assessment and Formulation of Adaptation Strategies in the Zambezi Delta and Medium Limpopo Basin.*
- **Noetix Research Inc.:** *Development and Demonstration of EO Technology for Identifying Natural Mosquito Habitats and Predicting Malaria Risk in Africa.*
- **Viasat Geo-Technologies:** *An operational solution using satellite stereoscopy to provide assistance for sustainable water management in the Volta River Basin.*

The second day introduces participants with the three TIGER pillars: Sustainability, Appropriateness and Capacity Building. After discussion and exchange on how these 3 elements should be implemented into their respective projects, audience were divided into 3 breakout sessions to address regional issues.

Africa is a very large continent with many ecosystems. In assessing what role new technologies such as space-based information technologies of the TIGER programme can play, a good understanding of the African water sector, its problems and potentials, is essential.

Based on background information made available to the participants and on their own knowledge of the three sub-region: Northern Africa and River Nile Basin, West and Central Africa, East and Southern Africa, the purpose of the session was to exchange information by sub-region, on the context, challenges, opportunities, activities and progress in order to better coordinate their action within the scope of the TIGER program.

Source: CSA
Contact: Steve.Iris@space.gc.ca



Short News

FAO's Technology for Agriculture Portal

FAO's Research and Technology Development Service has just launched a new "Technology for Agriculture" (TECA) portal. It aims to improve "access to information and knowledge about available proven technologies in order to enhance their adoption in agriculture, livestock, fisheries and forestry". The portal offers an array of tools including the TECA database currently containing over 500 entries organised in eight different categories.

Source: EIS-Africa Newsletter
For more information:
http://www.fao.org/sd/teca/index_en.asp

START Fellowship/Visiting Scientist Programme

This programme, funded by DGIS, the Netherlands, is designed to increase the number of developing country scientists who will conduct research, and contribute to START regional research networks and the Joint and Core Projects of the Earth System Science Partnership (IGBP, WCRP, IHDP, and DIVERSITAS). Research bearing on policy issues and sustainable development is encouraged.

START Fellowships are offered at the graduate and post-graduate levels to young scientists (under 35 years of age at the time of application) from Africa, Asia, and Oceania.

Source: GTOS News
For more information:
www.fao.org/gtos/news36.html

Upcoming events

Seminar Sustainable Development of Mountainous Regions, Moroccan Association of Agricultural Economics, Morocco, 1-2 December 2005. For more information see: <http://aiea2.stat.unibo.it/callAMAECO.pdf>

International Conference and Exhibition on Water in the Environment, 20-22 February 2006, Stellenbosch, South Africa. For more information see <http://www.envirowater.de/>

5th FIG Regional Conference 9-12 March 2006 Accra, Ghana. For more information see <http://www.fig.net/accra/>

1st International Conference on ICT for Development, Education and Training, 24-26 May 2006, UNCC, Addis Ababa, Ethiopia. For more information, see: <http://www.elearning-africa.com/>

6th African Association of Remote Sensing of the Environment (AARSE) Conference. Cairo, Egypt, 30 October to 2 November 2006. For more information, see <http://www.itc.nl/~aarse/>

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