

Smart Basin - Quantitative monitoring of surface water resources using innovative technology (spatial altimetry)

PROJECT TITLE:

Smart Basin - Quantitative monitoring of surface water resources using innovative technology (spatial altimetry)

COUNTRY :

Uganda

AN INCUBATION PROJECT SUPPORTED BY:

BRL Ingénierie : <https://brli.brl.fr/>



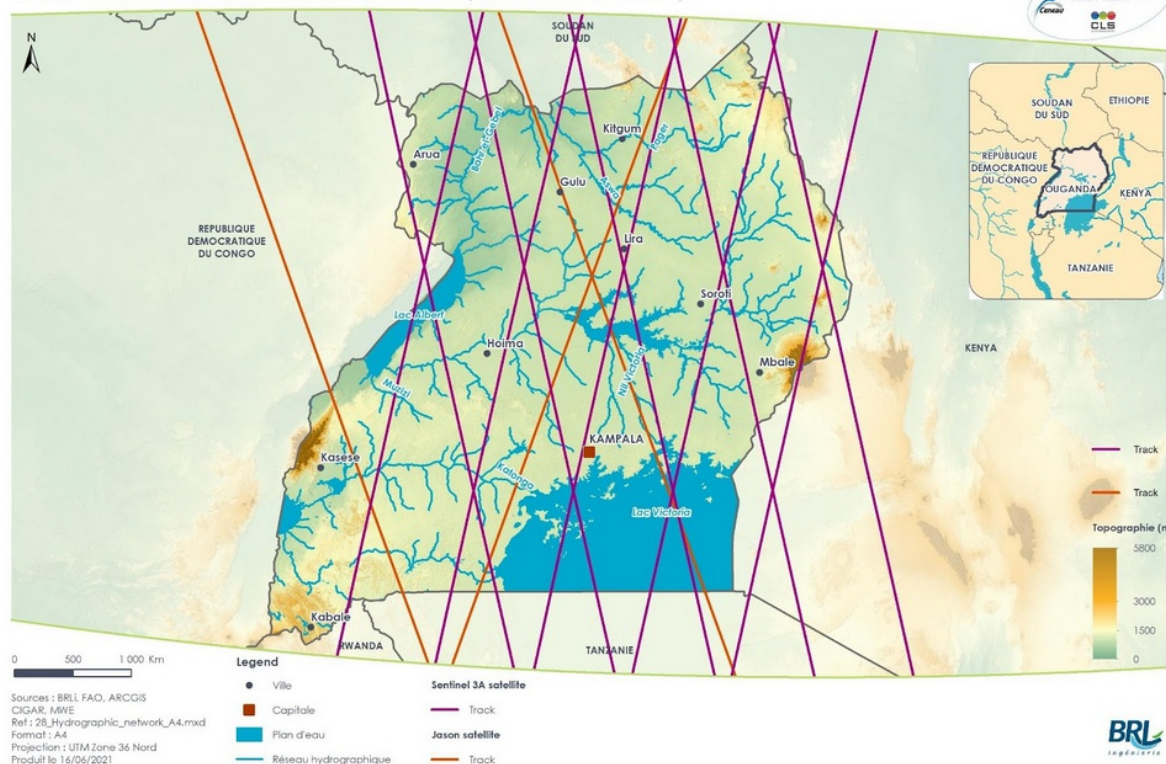
VETBATIM OF THE PROJECT LEADER:

« Knowledge of water resources is essential for their management. Until recently, continental water resources were monitored exclusively by using in-situ equipment. However, it is now possible to consider the use of satellite data to improve this monitoring. The SMART BASIN project proposes methods for using space-based data in Uganda, and analyses their relevance. »

SCALE OF INTERVENTION:

The entire hydrographic network of Uganda

SMART BASIN : SUIVI QUANTITATIF DES RESSOURCES EN EAU DE SURFACE PAR UTILISATION DE TECHNOLOGIE INNOVANTE (ALTIMÉTRIE SPATIALE)



CONTEXT AND ISSUES OF THE TERRITORY:

Water resources management in Uganda addresses several issues, in particular:

- Water use for different purposes (drinkable water, agricultural water, hydropower...),
- Flood risk management,
- Wetlands management,
- Transboundary water management (especially in the Nile basin).

Water resources management requires the use of hydrometric and meteorological data: river flow and height, rainfall, evapotranspiration, etc. These data currently come from in situ stations.

The Ugandan hydrometric network comprises 60 hydrometric stations in operation.

Of these 60 stations, 35 are used to monitor water level and flow in rivers, and 25 stations are used to monitor water levels in wetlands.

The management of the hydrometric network involves significant human and financial resources (construction, calibration, monitoring and maintenance of the stations). In addition, the hydrometric network faces many problems:

- The location of the stations is not optimal. Although rules exist for the sizing of a network, the installation of stations is often dictated by practical considerations (accessibility for example).
- The number of stations is insufficient. The budget allocated to the sizing of a measurement network does not allow for the development of a satisfactory network.
- The stations are deteriorated (vandalism, deterioration) and do not allow quality data to be obtained over a sufficiently long period.

Such problems can be observed in Uganda. As an example, the following pictures show 3 non-functional hydrometric stations.



Figure 1: non-functional hydrometric stations, 2016. BRL Ingénierie

GOAL(S) OF THE PROJECT:

Spatial applications include

- **Monitoring the water level of certain rivers**
Satellites equipped with altimeters are commonly used to measure the height of the world's waters (Geosat, Topex/Poseidon, JASON 2 & 3, Sentinel 3A & 3B, etc.). However, this technology is currently mainly used for large bodies of water (seas and oceans). In 2021, a satellite mission called "SWOT" for Surface Water and Ocean Topography will be launched. The SWOT satellite will carry out a global survey of the Earth's surface water every 21 days and will measure land surface water bodies (every 4 to 7 days depending on latitude).
- **Climate monitoring**
For several years, satellites have been used to produce climatological information (rainfall, potential evapotranspiration, temperature) on a global scale.

The objective of the "Smart Basin" project is to demonstrate the relevance of space altimetry for monitoring continental water resources at the scale of Uganda.

The presence of large lakes and rivers (e.g. the Nile), makes Uganda a good pilot area to study the potential of space altimetry. In addition, the country is currently developing its integrated water information system, which could benefit from the integration of innovative technologies, such as space altimetry, to build on the work undertaken.

ODD TARGETED BY THE PROJECT:



The SmartBasin project aims to develop the use of satellite data to reinforce hydrometric and climatological networks in situ. By generating information in places of the hydrographic network where the manager has no data, the project aims to develop new methods for sustainable management of water resources, whether for flood risk prevention or low water management. Thus, the project is indirectly in line with the framework of SDG 6 "Clean water and sanitation", in particular through the following targets:

- **6.4** - By 2030, significantly increase the efficient use of water resources in all sectors and ensure the sustainability of withdrawals and freshwater supplies to address water scarcity and significantly reduce the number of people who suffer from water scarcity
- **6.5** - By 2030, implement integrated water resources management at all levels, including through transboundary cooperation
- **6.6** - By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
- **6.a** - By 2030, increase international cooperation and support for capacity building in developing countries on water and sanitation activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment,

recycling and reuse technologies

- **6.b** - Support and strengthen local participation in improved water and sanitation management
- **SDG 13** : Climate change

PROJECT ISSUES:

Hydrometric network - Spatial altimetry - Integrated Water Resources Management - Water Information System - Uganda - Nile Basin - Hydrological modelling

SECTORS CONCERNED:

Monitoring of water resources - Integrated Water Resources Management - Land use planning - Environment, drinking water - sanitation - agriculture - hydropower - industry

EXPECTED RESULTS:

The SmartBasin project demonstrates the value of space altimetry for monitoring continental water resources and proposes methods for using space data.

STAKEHOLDERS OF THE PROJECT:

Actors involved:

Ministry of Water and Environment of Uganda

Project Operator(s):

BRL Ingénierie

Technical partner(s):

Collecte Localisation Satellite (CLS), <https://www.cls.fr/>

CENEAU : company specialised in hydrometry, <https://ceneau.com/accueil.htm>

Financial partner(s) :

Ministry of Economy and Finance (FASEP)

National centre for spaces studies (CNES), <https://cnes.fr/fr>

ESTIMATED COST OF THE PROJECT:

600,000 €

SHORT-TERM ACTIONS (3 YEARS):

- Implementation of an operational system for the use of spatial data by the Ugandan Ministry of Water and Environment for monitoring water resources (completion of the Smart Basin project);
- Promulgation of the implemented system;
- Adaptation of the method to other territories.

LONG TERM ACTIONS (10 YEARS):

- Improvement of the method;
- Integration of data from the SWOT satellite;
- Promulgation of the method.