TIGER - Water Resources Management in Africa


Koetz, Benjamin (1); Billa, Mohammed (2); Chibuye, H. (3); Halilu, Ephraim (4); Mufut, Paulina (5); Palazzo, Francesco (1); Phiri, Zebediah (6); Rajah, Carry (7); Tettro, Christian (8); Tumbulo, Jacob (9); Vekerdy, Zoltan (10); Wall, Andreas (11); ESA - ESA/IPI, Italy; 2: Lake Chad Basin Commission; 3: Zambian Ministry of Mines, Energy and Water Development, Zambia; 4: Nile Basin Initiative; 5: Ministry of Agriculture, Water and Forestry, Namibia; 6: Zambian Watercourse Commission; 7: Department of Water Affairs, South Africa; 8: DHI GRAS; 9: Volta Basin Authority; 10: ITC Faculty of the University of Twente, The Netherlands; 11: GeoVille, France

15:40 Supporting Rural Sub-Saharan Africa Farmers through Satellite-based Water Level Gauging

Annor, Frank Ohene (1,2); Abbasi, Ali (1); van de Giesen, Nick (1); Eilander, Dirk (3); Faculty of Civil Engineering and Geosciences, Water Resources Section, Delft University of Technology, Netherlands; 2: Ghanshyam Prem Prakash, Ghansa; 3: Deltares, Delft, Netherlands

Show abstract

[Authors] [ Overview programme] [ Keywords]
Supporting Rural Sub-Saharan Africa Farmers through Satellite-based Water Level Gauging

Frank Ohene Annor¹,², Ali Abbasi¹, Nick van de Giesen¹ and Dirk Eilander³.

¹Faculty of Civil Engineering and Geosciences, Water Resources Section, Delft University of Technology, Delft, Netherlands
²Civil Engineering Department, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana
³Deltares, Delft, Netherlands

Abstract
More than 80% of farms are operated by smallholder farmers in rural Sub-Saharan Africa with 70% of them being women (AGRA, 2014). Again a large percentage (more than 70%) relies on rainfed farming which makes their work risky with a changing and uncertain climate. The few who use small reservoirs for irrigation as a means of increasing their resilience to climate induced stresses are not always sure about the quantity of water they have and how many acreages could be cultivated with it at any given time. Since 2002, the small reservoirs project (www.smallreservoirs.org) has been developing tools and methods to estimate the volume of water stored in these reservoirs using a combination of bathymetric analyses and remotely sensed surface areas of the reservoirs. In 2014, the Small Reservoirs Team developed a Bayesian Classifier (Eilander et al., 2014) for improved classification of water bodies for flood mapping, runoff estimation and reservoir water balance assessment. These activities took place in the framework of the European Space Agency’s (ESA) TIGER and Alcantara projects, and the Canadian Space Agency’s SOAR Africa project using Radarsat-2 Images. There is the continuous need for a dedicated effort of using a combination of in-situ data and new Earth Observation (EO) systems, such as the Sentinels, to monitor small inland water bodies used for irrigation. Through the Spot5-Take5 initiative by ESA a time series of 27 Level-2A products was developed over a pilot area in Ghana (Upper East Region). These Spot5 images were acquired from 11-April 2015 to 13-September 2015. These images had a 10m and 5-day spatial and temporal resolutions for monitoring small reservoirs dynamics. We show in this research that Sentinel-1 images (acquired from 01-April 2015 to 06-August 2015) and Sentinel-2 here simulated with the Spot5 images are great additions to the satellite constellations available for near-real-time water monitoring for operational water management (flood & drought) in ungauged basins. Establishing these sound scientific time series and trends is required for reducing the risks associated with farming by developing effective adaptation and mitigation measures in agriculture to alleviate rural Sub-Saharan African farmers (especially women) from poverty.

Keywords: TIGER initiative, Take 5, Water Resources, Agriculture, Inland Waters.
Figure 1: Spot5-Take5 Image over the Vea Dam in the Upper East Region of Ghana