Geophysical Research Abstracts
Vol. 12, EGU2010-14653, 2010
EGU General Assembly 2010

Sensors and OBIA synergy for operational monitoring of surface water

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This contribution will focus on combining Object Based Image Analysis (i.e. OBIA with e-Cognition 8) and recent sensors (i.e. Spot 5 XS, Pan and ALOS Prism, Avnir2, Palsar) to address the technical feasibility for an operational monitoring of surface water. Three cases of river meandering (India), flood mapping (Nepal) and dam's seasonal water level monitoring (Morocco) using recent sensors will present various application of surface water monitoring. The operational aspect will be demonstrated either by sensor properties (i.e. spatial resolution and bandwidth), data acquisition properties (i.e. multi sensor, return period and near real-time acquisition) but also with OBIA algorithms (i.e. fusion of multi sensors / multi resolution data and batch processes).

In the first case of river meandering (India) we will address multi sensor and multi date satellite acquisition to monitor the river bed mobility within a floodplain using an ALOS dataset. It will demonstrate the possibility of an operational monitoring system that helps the geomorphologist in the analysis of fluvial dynamic and sediment budget for high energy rivers.
In the second case of flood mapping (Nepal) we will address near real time Palsar data acquisition at high spatial resolution to monitor and to map a flood extension. This ALOS sensor takes benefit both from SAR and L band properties (i.e. atmospheric transparency, day/night acquisition, low sensibility to surface wind). It's a real achievement compared to optical imagery or even other high resolution SAR properties (i.e. acquisition swath, bandwidth and data price). These advantages meet the operational needs set by crisis management of hydrological disasters but also for the implementation of flood risk management plans.
The last case of dam surface water monitoring (Morocco) will address an important issue of water resource management in countries affected by water scarcity. In such countries water users have to cope with over exploitation, frequent drought period and now with foreseen climate change impacts. This third case will demonstrate the efficiency of SPOT 5 programming in synergy with OBIA methodology to assess the evolution of dam surface water within a complete water cycle (i.e. 2008-09).
In all those three cases image segmentation and classification algorithms developed with e-Cognition 8 software allow an easy to use implementation of simple to highly sophisticate OBIA rulsets fully operational in batch processes.
Finally this contribution foresees the new opportunity of integration of Worldview 2 multispectral imagery (i.e. 8 bands) including its "coastal" band that will also find an application in continental surface water bathymetry. Worldview 2 is a recently launch satellite (e.g. October 2009) that starts to collect earth observation data since January 2010. It is therefore a promising new remote sensing tool to develop operational hydrology in combination high resolution SAR imagery and OBIA methodology.

This contribution will conclude on the strong potential for operationalisation in hydrology and water resources management that recent and future sensors and image analysis methodologies are offering to water management and decision makers.