Recognition of flooding patterns in the Okavango Delta using ASAR images

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The Okavango Delta is one of the world's largest inland deltas. Due to a distinct rain-season in the catchment area of the Okavango the delta is flooded annually. Most of the incoming water is lost by evapotranspiration and infiltration. The suspended sediments settle down in the inundated area.

In order to calibrate a hydrological model which has been developped by the ETH Zurich during the precedent years seasonal flooding patterns are derived from satellite data. The disadvantage of common satellite images is that it is not possible to obtain data when the region is covered by clouds. In this study an algorithm to detect flooding patterns from ASAR satellite images of the european satellite *ENVISAT* has been developped.

The first task was to identify flooded zones on the basis of the variability of pixel values over a year. A high variability is a consequence of the seasonal changes of reflectance of the earth surface. In zones with a high variability pixels are classified in flooded and dry areas by means of the pixelvalue, the temporal variability and the neighbourhood. Inundated areas are differentiated in open water surface, represented by low pixelvalues, and flooded vegetation, represented by higher pixel values.

The used algorithm is appropriate to identify open water surfaces. The classification of flooded vegetation entails difficulties. Superposition of the characteristics of open water surfaces and sparse vegetation overtopping the water level lead to medium pixel values. This effect can be observed not only at the transition from open water surface to flooded vegetation, but also caused by seasonal changes where open water surfaces are slowly coverd by vegetation. Nevertheless, the seasonal progression of the flood wave can be reproduced.

The measured flooding areas of ASAR images compared to the areas obtained from NOAA satellite images show a good correlation. Smaller areas in ASAR images are mostly caused by differences in the method of measurement.

To achieve a precise identification of the flooded areas it is essential to include reference data. Possible reference data are satellite images of other instruments as well as air photographs or records of the progression of the flood wave. Higher frequency of ASAR satellite images should allow to include temporal criterias to improve classification.