



Delineation of small reservoirs using radar imagery in a semi-arid environment:

A case study in the Upper East Region of Ghana

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Abstract

The importance of small reservoirs during droughts for the local population in most semi-arid environments cannot be over estimated. Water stored in these reservoirs allow for all-year-round irrigated agriculture for some farmers and ensures there is little or no domestic and drinking water shortages for the local population during the dry periods. In order to manage the water effectively for competing uses, the water level or storage capacity of these reservoirs need to be correctly estimated. Recent attempts to delineate these reservoirs using remote sensing with Landsat imagery have been quite successful especially in the Upper East region of Ghana, West Africa. This was done to determine the number; spatial distribution and storage volumes of reservoirs for effective water management and reservoir planning. However, the accuracy of the lateral delineation of these reservoirs needs further studies since it is paramount for its monitoring especially for purposes such as forecasting of crop failure in the dry seasons.

This paper explains how radar images (ENVISAT-ASAR and ALOS) can be used

to provide year-round monitoring. Radar has the important advantage that it is independent of cloud cover. Here, we show how a monthly regional inventory of storage in small reservoirs can be obtained. The case presented is the Upper East Region of Ghana. In comparing ground data with ENVISAT data, it becomes clear that reeds, which often can be found in the shallow tail-ends of reservoirs, can not be readily distinguished from the surrounding vegetation. The new ALOS satellite uses a longer wavelength than ENVISAT and is not susceptible to reeds. The first results of the use of ALOS for the delineation of small reservoirs will be presented. A comparison between ground data, ENVISAT, and ALOS will be made.

Keywords: Dams; ENVISAT-ASAR; ALOS; Small Reservoirs; Ghana; Africa