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Improvement of ground sampling schemes via hydrotopes – first results from an observation campaign in the Volta Basin, West Africa.

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Several satellite missions planned for the near future, such as SMOS, HYDROS, ALOS, and MetOp, hold promise for regional observation of soil moisture. The resolution of all these satellites is relatively coarse ($>$100 km^2), which brings with it the need for large scale soil moisture information for calibration and validation purposes. Especially in West Africa, an extremely moisture limited region, soil water information plays a vital role in hydrologic and meteorologic modeling that aim towards an improvement of food security. Soil moisture fields obtained via remote sensing have to be validated with ground truth campaigns to provide useful moisture information.

Hydrotope analyses help to ensure statistically sound spatial validation and to improve sampling schemes for current and upcoming satellite data. In 2005 a soil sampling ground campaign in the Volta Basin, West Africa based on a hydrotope analysis was conducted.

Hydrotopes are landscape units with internally consistent hydrologic behavior such as upland areas, slopes, and lowland or wetland areas. Earlier results by Flügel (1995) and Park (2001) rely on detailed datasets of elevation, soil type and properties, and land cover. The following hydrotope approach relies on detailed knowledge of local hydrologic processes, and globally available elevation and land cover datasets.

Based on extensive knowledge of the local hydrology of the Volta Basin, hydrotope maps delineating the most prominent hydrotopes within the sampling area are gen-

erated using elevation and land cover data. Sound hydrotope analysis helps (i) minimizing sampling biases due to oversampling of hydrotope units, and (ii) minimize the overall variance in sampling schemes. Other advantages of this method are the possibility of ex post analysis to minimize the overall variance, and the calculation of minimum sampling sizes based on the required estimate precision.