

## PhD project

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# Delineation and Differentiation of a tropical flood-plain wetland using Multi-temporal, Multi-polarized SAR images; A case study of Ifakara, Tanzania

**Keywords: Synthetic Aperture Radar Remote Sensing, Soil Moisture, Classification, Multi-temporal, Multi -polarization**

Wetlands are under pressure and are undergoing degradation due to human induced activities. The wetland fringes are dynamic and influenced by the seasonal changes. Delineation and differentiation is important in the knowledge of extents and composition. Soil moisture is a key parameter in wetland studies, particularly in agricultural practices and driving the temporal patterns of evaporation and transpiration. This subsequently influences the dynamics of vegetation systems including the sowing seasons, identifying agricultural lands experiencing stress due to insufficient moisture, flood prediction and irrigation management.

SAR remote sensing is ideal in soil moisture retrieval due to its vast coverage, repeat cycles, all weather capability, independence from solar illumination and its sensitivity to dielectric constant. The SAR images record backscatter coefficient  $\sigma^{\circ}$  which is dependent on sensor and target characteristics. Determining the backscatter contribution due to vegetation, surface roughness and soil moisture is essential in determination of soil moisture. Various inversion models including theoretical, semi empirical and empirical are used in retrieving soil moisture.

In this PhD work, delineation and differentiation of the wetland will be carried out using multi-temporal, multi-polarized SAR images and will aid in soil moisture retrieval since water content, biomass and phenology influence the recorded backscatter. Other soil moisture products to be explored include a Soil Vegetation Atmosphere Transfer model and global products, Sentinel I and SMAP. The deliverables include classified land use maps and soil moisture maps of the Ifakara wetland. In addition, findings on spatial and temporal soil moisture variation will be presented. The soil moisture retrieved will aid in implementation of production techniques which will ensure maximum yields while minimizing wastage and unsustainable use of the natural resources within the wetland.



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Work Package	D3 – Quantification in space and time
Countries of work	Tanzania
1 <sup>st</sup> Supervisor	Prof. Dr. Gunter Menz
Subject	Geography, Remote Sensing
Faculty	Faculty of Mathematics and Natural Science
University	University of Bonn
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