Geophysical Research Abstracts,
Vol. 11, EGU2009-10058, 2009
EGU General Assembly 2009

Combining multi-frequency remote sensing data with geo-statistics for an improved regionalization of soil surface properties

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Land Surface Models (LSM) have become indispensable tools to quantify the most important physical, chemical and biological processes to determine water and nutrient fluxes in support of land management strategies or the prediction of climate change impacts. However, the utilization of LSM requires numerous soil and vegetation parameters which are seldom available in spatial distribution or an appropriate temporal frequency. The quality of these model input parameters, especially the spatial heterogeneity and temporal variability of soil parameters, has a strong effect on LSM simulations. Conventional measurements of soil characteristics (texture, bulk density, moisture) remain time consuming and non cost effective and are therefore continuously reduced.

Thus, the poster focuses on the regionalization of soil physical properties such as surface roughness, texture, bulk density and soil moisture by means of remote sensing products (from optical and active microwave sensor imagery) and geo-statistical approaches combined with extensive in-situ observations of soil properties.

The study aims for an improved identification and spatial mapping of soil properties using airborne optical and SAR data at different frequencies and polarisations and investigates data assimilation techniques for hydro-ecological models. The developed approach is validated with data from field campaigns and will be further applied to simulate future satellite observation products.

The poster shows first results of the spatial distribution of soil properties from two different extensive ground truthing campaigns and their relationship to acquired remote sensing imagery.