"This abstract (talk / poster) is intended for the special session on Time Series Analyses revealing Land Surface Dynamics"

Title: Mapping of ecosystem functioning change from global scale earth observation based trends in total and recurrent vegetation

Global scale greening or browning trends of the Earth land surfaces can be derived from the long-term continuous Earth Observation (EO) datasets covering more than three decades. However, such trends do not reveal any information on the underlying drivers of change and offers also little insights into how observed changes in greenness are related to changes in vegetation ecosystem composition or functioning. We test the hypothesis that novel information on changes in ecosystem functioning can be mapped at regional/global scale from a new way of analyzing dense time series of global coverage Earth Observation (EO) data. We analyze if the combination of trends from vegetation metrics with different sensitivity to recurrent and persistent vegetation can reveal new information on changes in vegetation ecosystem functioning governed by land use land cover changes (LULCC). This study takes advantage of the different phenological cycles of recurrent vegetation (herbaceous vegetation) and persistent vegetation (woody/shrub cover) in combining global scale vegetation trend analyses based upon different annual/seasonal NDVI (Normalized Difference Vegetation Index) metrics. Spatial patterns of combined vegetation trends derived from the AVHRR (Advanced Very High Resolution Radiometer) based GIMMS3g (Global Inventory Modeling and Mapping Studies) NDVI (1982-2011) are analyzed as a function of land cover information (GLC2000). By combining satellite based vegetation trends of two NDVI metrics (with different sensitivity to recurrent and persistent vegetation) it is demonstrated that trends of the majority of global terrestrial ecosystems agree, but also that there is a pronounced divergence for

trends of the different NDVI metrics for certain regions across the globe. These areas of diverging trends are shown to be dominated by land cover classes of deciduous forest in tropical/subtropical areas and areas of cropland. We find that the proposed method of combining global scale EO-based vegetation metrics of different sensitivity to recurrent and persistent vegetation is able to reveal novel information on changes in ecosystem functioning. Areas of diverging trends are observed to be predominant for specific land cover classes and our approach offers insights into how changes in vegetation greenness are related to changes in vegetation ecosystem composition or functioning.