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MAPPING ECOSYSTEM TRANSITIONS WITH ENMAP DATA AND MACHINE LEARNING ALGORITHMS

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THEME: New approaches and platforms in space based Earth observation **(**Special session: The EnMAP Imaging Spectroscopy Mission and its science perspectives).

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ABSTRACT:

Global environmental change is occurring at unprecedented rates. Triggered by climate change impacts, population growth, changes in life style and, thus, increasing demands for food, feed, fiber and fuel, rapid changes in global land use can be observed. A better understanding of change processes on the land surface, e.g. land degradation and abandonment, land use intensification or urbanization, and their underlying causes is required for a more sustainable land management. However, ecosystem gradients or gradual changes in ecosystems are not trivial to analyze from space.

Opportunities arising from future space-borne Earth observation systems appear promising in this respect, with new sensor constellations guaranteeing high frequent coverage at moderate to high spatial resolutions. At the same time, imaging spectroscopy missions such as the German Environmental Mapping and Analysis Program (EnMAP) play an important role in such a constellation. While global data sets cannot be derived at high spectral detail, additional information content from imaging spectrometers helps to gain better process understanding for specific regions.

Quantitative maps on gradual environmental changes, e.g. spatial expansion or increase in density of urban areas, vegetation succession on abandoned agricultural land, etc., mark a first step in this direction. Such gradual changes often occur along transects that simultaneously illustrate different stages of change. We here present transects of gradual changes for an urban to peri-urban gradient (Berlin, Germany) and a gradient of shrub encroachment in a semiarid region (Southern Portugal). Both transects are derived from quantitative maps, which result for support vector regression analysis on simulated EnMAP data at 30 m pixel size. Results show that the approach allows accurate maps at this scale. The different land cover compositions along the transects can be well attributed to ongoing processes at the land surface. This way, the potential of EnMAP data in global change studies is demonstrated.