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EVALUATION OF SPATIAL AND SPECTRAL RESOLUTIONS OF SATELLITE IMAGERY FOR MAPPING PERENNIAL ARID VEGETATION: CONSIDERATIONS FOR MONITORING AND ASSESSMENTS

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ABSTRACT

The use of remote sensing techniques to extract vegetation cover information used in the assessment and monitoring of land degradation in arid and semi-arid environments expanded in interest in the past decades. However, such a task can be challenging, especially for medium spatial resolution satellite sensors, due to soil background effects, the distribution and structure of perennial desert vegetation. Many methods in remote sensing are insensitive to non-photosynthetic xerophytic vegetation and most classification techniques are applied to low to medium resolution multispectral imagery. In this presentation, I discuss some of the findings from a PhD study with specific focus on the spatial and spectral considerations when applying remote sensing methods for mapping arid vegetation. In my study, I utilised low-resolution Landsat 8 multispectral (30m), medium-resolution Rapideye multispectral (5m), Pleiades high-resolution multispectral (2m) and panchromatic (0.5m) imagery, and applied classification methods that included vegetation index (VI) threshold analysis, object-oriented image analysis and contextual re-classification. At higher-spatial resolutions, it was possible to extract significant information such as structure and distribution of arid vegetation which play an important role in stabilizing the soil and are essential parameters in land degradation assessment and monitoring studies. As the spatial resolution decreases, information on individual trees start to diffuse in the mixed pixel effect leading to a less accurate representation of the desert environment. Lower to medium spatial resolution satellite sensors may be feasible for global and regional analysis, but for assessment and monitoring of local ecosystems, high-spatial resolution sensors are required to diagnose the state of the land. Such approaches can help policy makers to develop action plans at the local scale and use high-spatial resolution images to assess the accuracy of regional and global monitoring and assessment methods.