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Crop drought stress monitoring by remote sensing

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In this contribution we would like to present the project “crop drought stress monitoring by remote sensing” (DROSMON), which started in January 2005. The goal of the project DROSMON is to adapt and to advance remote sensing based methods of drought stress detection and monitoring on agricultural crops exploiting the potentials of present-day satellite-based optical sensors. The overall hypothesis of this project is: drought stress levels can be recognized and mapped from satellite image data also in areas of fine-structured agricultural land use patterns, if data from different sensors are being combined, making synergistic use of high spectral resolution, high spatial resolution and high temporal resolution. Within the scope of this project we want to develop and test crop drought stress recognition methods for selected cultivars of wheat and maize by using ground truth data obtained by field experiments in Austria and in Germany. Reliable ground truth data on drought stress conditions will be obtained from biophysical measurements in connection with crop growth modelling. Remotely sensed data from Hyperion, MODIS, MERIS, ASTER, LANDSAT, ALI, IKONOS, QuickBird and OrbView3, will be selected for this purpose depending on the availability of these data at the time of project execution. In addition, the use of airborne hyperspectral data is considered to account for the capabilities of future hyperspectral satellite systems. Image analysis methods for drought stress classification will be based on physical models of canopy reflectance and on statistical models of canopy thermal emission. Both direct inversion of physical reflectance models and statistical methods including artificial neural networks will be studied. Subpixel anal-

ysis and image information fusion methods will be employed to obtain drought stress level information also for fine-structured land use patterns. The expected results of the project include improved knowledge on the reflectance and thermal emission properties of agricultural crops under drought stress conditions, a spectral library of reflectance characteristics of crops under different conditions, and improved knowledge and methods of image analysis of remotely sensed image data including subpixel and fusion techniques to exploit the potential of state-of-the-art satellite data.