



Detection of water stress by means of remotely sensed data in a sensitive forest site

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The exceptional dry and hot summer in Europe 2003 showed apparent effects on forest ecosystems. Thus, especially for the south western part of Germany extensive damages on trees caused by the dry climatic conditions have been reported by the forest services. Particularly spruce reacts sensitive to drought stress. This is of interest since recently published climate models predict an increase of drought periods in Central Europe.

Within this context it is of great interest to study the effects of prolonged drought events on different tree species and tree communities to assess their resilience towards climatic change. This is essential to design and realize sustainable forest management plans. Thereby, remote sensing data offer great potential to derive and evaluate the effect of water stress on forest communities.

In this study well-established methods for deriving leaf water content from satellite imagery were applied to the "Kondelwald", a climate sensitive forest site in Rhineland-Palatinate. The Moisture Stress Index (MSI) and the Leaf Water Content Index (LWCI) were applied to Landsat TM data for the drought year of 2003 and a reference year representing "normal" wet conditions. The results were stratified for different tree species based on a spatial adaptive classification approach, developed by the remote sensing department of the Trier University. It considers the local climatic variability and the geographical characteristics of the heterogeneous low mountain range.

On the basis of the classification results and the detection of forest sites affected by water stress the extent of the reported drought damages is quantified and their spatial distribution is documented.