



Developing remote sensing tools for monitoring the condition of forests in the Pannonian basin: Classification of the forest types using MODIS QKM and HKM bands

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The condition of the natural and planted forests in the Pannonian basin has considerably changed and is in continuous change due to the societal and political transition and economical changes in the involved countries. The (re)privatization of the forested areas, the energetic issues of renewable resources, and the increasing demand on wood by the booming construction activity have been playing a role in the various processes influencing the forestry. Furthermore, natural processes and events, like meteorological and biological damage of the forests are to be assessed for decision making. All these circumstances define an imminent need for monitoring the extent and condition of the forested areas by remote sensing.

The continuous monitoring requires high resolution both in time and space. As a compromise between these two somewhat contradictory conditions, the powerful MODIS (MODerate resolution Imaging Spectroradiometer) imagery has been selected for this purpose. The data are received by the satellite receiving station of the Eötvös University.

The climate of the Pannonian basin is influenced by 3 climatic domains: the Atlantic, the Continental and the Mediterranean. This unique climatologic multitude is reflected in the potential vegetation as well: the temperate deciduous forest and the forest steppe

biome are both present there. The spatial distribution of deciduous vs. forest steppe forests is also influenced by the elevation pattern of the basin. The central part of the area consists of alluvial lowlands intercalated with hilly areas and middle mountain ridges. Accordingly, temperate deciduous forests are typical in the hilly areas, while forest steppe characterizes natural vegetation of the lowlands and the foothills like Mátraalja, Bükkalja and Cserhát.

This natural complexity and the typically high percent of cloud cover require multi-temporal classification of MODIS data. Deciduous and conifer forests of higher mountains are distinguished as well as different deciduous forest types (mainly *Quercus* and *Fagus*) of the middle mountain ranges and hills of the central parts of the basin. Riparian forests and *Robinia* plantations are also well distinguishable on the plains. The classification methods optimal in different seasons are shown, also by some cross-plots of the quarter-kilometer (QKM) and half-kilometer (HKM) channel sets of the MODIS data. Some disastrous deforestation effects, like the severe storm in the Tatra Mts. of November 2004 or damages by wormbite (*Lymantria* sp.) in 2005, are also identified and mapped.

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