Geophysical Research Abstracts, Vol. 8, 06588, 2006
SRef-ID: 1607-7962/gra/EGU06-A-06588

Land Surface Temperature (LST) estimations in the Pannonian Basin using MODIS satellite data

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16 of the all 29 channels of the MODIS instrument with 1 square km surface resolution are measuring in the 3.5-15 micron wavelength interval, where the emitted terrestrial radiation is dominating. The regions of 3-5 microns and 8-12 microns are athmospheric windows, where radiation has little interaction with athmostpheric gas particles.

The amount of emitted radiation of an ideal black body can be calculated using the Planck's function. In the reverse case, measuring the emitted radiation in a certain wavelength region we can calculate the temperature of a black body. For satellite instrument measurements, the observed radiances in a certain channel (in a wavelenght interval) can be converted to temperatures using this method. Since surface materials are not black bodies and atmospheric attenuation should be also taken into account, the calculated temperature is called brightness or apparent effective/equivalent temperature.

Conventional methods use regressional formulas for converting apparent temperatude data of each channels into single LST value. Formulas were determined considering real surface material emissivities (i.e. non-black body) and atmospheric attenuation for clear sky conditions. Since the number of measured data (i.e. channels) is greater than the number of possible paramethers (i.e. LST, surface emissivity, aerosol optical depth) in radiation transfer equations, these parameters can be estimaded by multi-parameter function minimalization. Actual surface emissivity in the calculation is considered to be a composition of typical surface (vegetation, soil, sedimentary rock, water) emissivities and their proportion is also estimated. Atmospheric attenution is calculated using a multiple scattering model, where aerosol optical depth and

air temperature are also parameters to be determined. Preliminary results are shown for some test sites located in the Pannonian Basin. Estimated surface temperature maps with estimated errors are presented.

The reseach was supported by the Ministry of Informatics and Communication and the Hungarian Space Office projects TP198 and TP277, and the Hungarian Research Fund OTKA (T037611).