Geophysical Research Abstracts, Vol. 9, 03067, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-03067

Ambient air temperature parameterization from remote sensing data

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Ambient air temperature is measured on meteorological stations in order to understand its spatial and temporal distribution. Especially in the case of inhomogeneous areas, the density of the meteorological network is often too spare to determine an ambient air temperature field of a sufficient quality at any time for the whole area of interest. Some applications require the ambient air temperature data in the high spatio-temporal resolution, partly even in near-real-time. Thus a parameterization, which determines the ambient air temperature from remote sensing data, was developed.

Since the ambient air temperature is not driven directly by the Sun but indirectly by the under laying ground, land surface temperature used in many past studies. All these studies dealt with the same problem – the transfer function between the ambient air temperature and the land surface temperature. The present study is based on a multiple regression of Spinning Enhanced Visible and InfraRed Imager data (on board Meteosat Second Generation). The input parameters land surface temperature, albedo, downwelling surface short- and long-wave fluxes were processed by Land Surface Analysis Satellite Applications Facility. It was observed that the difference between these parameters varies systematically over a day together with a dependency on wind speed. Since the land surface temperature varies significantly over time and space, a simple downscaling procedure to 1000 m spatial resolution was performed using a regression analysis between the land surface temperature and normalized differential vegetation index acquired by MODIS.

The method has been successfully tested for two areas (Slovenia and southern Germany) during the second half of the 2005. The results are slightly better in Slovenia (RMSE = 1.9 K) as for Germany (2.1 K), which is a promising result especially con-

sidering the high temporal (30 min) and spatial resolution (1000 m) of the results.