



Estimation of daily mean air temperature from MODIS Land Surface Temperature data in Alpine areas

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In environmental and hydrological modelling, the daily mean air temperature is an important input. This information is generally measured by meteorological stations. However, in mountainous areas, weather stations are often rare leading to irregularities in the network density. Consequently, an interpolation of the available measures is necessary to obtain information about ungauged areas. Remote sensing data can offer spatially distributed information of temperature also about isolated areas. Radiometers cannot directly measure the air temperature, but provide estimations of the Land Surface Temperature (LST). Coarse/medium spatial resolution sensors like the Advanced Very High Resolution Radiometer (AVHRR) and, more recently, the Moderate-resolution Imaging Spectroradiometer (MODIS) have already been extensively used and tested for the LST retrieval. In particular, MODIS gives twice a day a LST product at 1 Km spatial resolution covering all the Earth's surface. Note that, in previous studies, a strong correlation between LST and the air temperature has been observed and analyzed. In this study we propose a methodology to estimate the daily mean air temperature from MODIS LST products in mountain areas. Our procedure can be conceptually divided in two steps: in the first one the instantaneous air temperature at the moment of the satellite overpass is estimated from the MODIS LST products by means of a linear correlation between LST values and the air temperature in areas monitored by weather stations. Then the instantaneous air temperature estimated is used to calculate a daily mean air temperature value through the analysis of the diurnal temperature cycle patterns in historical series. The methodology is tested in an Alpine region over a period of six months (January-June 2003). This procedure is aimed at overcoming some constraints in the traditional approaches mapping the air temperature from point observations in mountain areas.