METEOSAT SECOND GENERATION DATA FOR ASSESSMENT OF SURFACE MOISTURE STATUS

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Remotely sensed surface temperature, Ts, carry important information about the moisture conditions at the land surface, which has been widely acknowledged for decades. Extensive studies on the subject has been carried out and reported in the literature, and it has been shown that the surface temperature and a vegetation index (eg. NDVI) in combination can be used as drought indicator, for fire risk assessment, for irrigation management, and not the least, for assessment of surface water status and evapotranspiration. The approach is theoretically justified, and straightforward to implement using remotely sensed observations as the only input. A parameterization of the information in the Ts/NDVI space is the Temperature Vegetation Dryness Index (TVDI) suggested by Sandholt et al. (2002).

Successful studies based on NOAA AVHRR, Landsat and lately, MODIS data have been performed. However, many applications rely on information of very dynamic surface moisture conditions in the form of time series, which unfortunately often is hampered by the high sensitivity of the infrared signal to the atmosphere. Using the polar orbiting satellites, only snapshots of surface moisture conditions are accessible despite daily image acquisitions, due to the influence of cloud cover and the atmospheric water vapour on the measured infrared signal of the surface by the satellite sensor. More robust methods have to be sought, either by using more suitable data, or by using other algorithms.

In this study, the potential of using Meteosat Second Generation SEVIRI data for assessment of surface water status is explored for West Africa. MSG data have the great advantage to data from the polar orbiting satellites, that the frequency of observations is so much higher (15 min interval versus one time a day acquisitions), thus the chances to avoid cloud cover is much improved, and the diurnal variation and the relation to the thermal inertia of the surface can be exploited. SEVIRI data are used in this study to derive TVDI for six days in the 2003 growing season, and comparison with concurrent MODIS scenes are performed. An analysis of the effect of time of day is evaluated against hourly field observations of soil moisture, surface temperature and vegetation indices from an automatic station in the Northern, semi arid part of Senegal.