Geophysical Research Abstracts
Vol. 17, EGU2015-9116-1, 2015
EGU General Assembly 2015

Assesment of disaggregation methods to downscale MODIS land surface temperature to high spatial resolution VIS/NIR sensors

Mar Bisquert (1), Juan Manuel Sánchez (1), Raquel Niclòs (2), and Vicente Caselles (2)

(1) Applied Physics Department, University of Castilla-La Mancha, Almadén, Spain (juanmanuel.sanchez@uclm.es), (2) Department of Earth Physics and Thermodynamics, University of Valencia, Burjassot, Spain (raquel.niclos@uv.es)

The different components of the surface energy balance are used in hydrological, climatic and meteorological models. The use of earth observation systems for estimating surface energy fluxes at regional scale has become essential. The key input in these models is the Land Surface Temperature (LST). The retrieval of LST from satellite is limited due to the sensor spatial and temporal resolution. Thermal infrared bands (TIR) on earth observation systems offer lower spatial resolution than visible/near infrared (VIS/NIR) channels. Agricultural areas are frequently composed of crop fields smaller than 1 ha. Moreover, hydrological and meteorological models usually need nearly daily monitoring of the surface energy fluxes. However, nowadays none of the operating satellites offer the spatial and temporal resolution of TIR bands needed for these applications.

Several disaggregation techniques have been developed for downscaling information of TIR bands using the higher resolution VIS/NIR bands available on board the same satellite. Moreover, some operating satellites (SPOT, DEIMOS, FORMOSAT, etc), and others coming soon (Sentinel-2), offer, or will offer, high resolution VIS/NIR images (10-20 m) combined with high revisit cycles (5 days or lower) but they do not include TIR bands. In this work we use some of the disaggregation methods recently published, and explore their application to two different sensors. The objective is to assess the performance of these disaggregation techniques when applied to a sensor with no TIR bands (e.g. Sentinel-2). This will allow providing LST information at 10-20 m spatial resolution with 5 days revisit cycles. In this context, pairs of MODIS-Landsat images were used to simulate LST at Landsat TIR and VIS/NIR spatial resolution. Observed Landsat LST values were used to assess the different disaggregation methods. The area selected for this study is the well-known ESA experimental site of Barrax, Albacete (Central Spain). Ground measurements of LST, biophysical parameters, and local surface energy fluxes have been registered during several periods for the past few years at different locations and crop fields. These measures were also used to test the performance of the disaggregation techniques applied.