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Validation of ASTER derived surface temperatures and emissivities with ground measurements

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Land surface temperature (LST) and emissivity are necessary for monitoring the longwave radiative balance between the surface and the atmosphere. The Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) on board of the EOS/Terra satellite provides thermal infrared data in 5 channels between 8 and 12 μm, which can be used to retrieve surface emissivity spectra and LST at a ground resolution of 90 m. The objective of this work is to evaluate ASTER derived LST and emissivity with ground measurements made concurrently in a test site close to Valencia, Spain, for to two recent ASTER acquisitions (August 3 and 12, 2004). The test site is a large (>1 km^2) and homogeneous area of rice crops showing full cover of vegetation in summer. Together with ground measurements of LST and emissivity, radiosonde data were obtained at the study area near-simultaneously to the satellite overpass. Radiosonde profiles were used as inputs of the MODTRAN 4 atmospheric transmittance/radiance code for correcting at-sensor radiances to at-surface radiances. Then, several temperature-emissivity separation methods (such as NEM and TES) have been applied to the at-surface ASTER radiances from which emissivity spectra and LST have been derived. The comparison of these ASTER estimates with ground measurements will allow us to evaluate the accuracy of the ASTER on-board calibration and of the atmospheric correction, and the performance of the temperature-emissivity separation methods applied to ASTER data.