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Land surface temperature estimation and monitoring within the framework of CEOP-AEGIS project

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The CEOP-AEGIS (Coordinated Asia-European long-term Observing system of Qinghai–Tibet Plateau hydrometeorological processes and the Asian-monsoon systEm with Ground satellite Image data and numerical Simulations) project focuses on the water cycle on the Tibet Plateau and its surroundings. This region provides water to half of the human kind, and the understanding of its water cycle is therefore of utmost importance in the light of global warming. A key element in the study of the water cycle is the Land Surface Temperature (LST) since it characterizes the evapo-transpiration regime of the vegetation. To that end, LST retrieval algorithms were developed and adapted for the estimation of LST from various sensors: ERS (European Remote Sensing satellite)/ATSR2 (Along Track Scanning Radiometer), ENVISAT (Environmental Satellite)/AATSR (Advanced Along-Track Scanning Radiometer), TERRA/MODIS (MODerate resolution Imaging Spectroradiometer), AQUA/MODIS, NOAA-07 (National Oceanic and Atmospheric Administration)/AVHRR (Advanced Very High Resolution Radiometer), NOAA-09/AVHRR, NOAA-11/AVHRR, NOAA-12/AVHRR, NOAA-14/AVHRR, NOAA-15/AVHRR, NOAA-16/AVHRR, NOAA-17/AVHRR, NOAA-18/AVHRR, NOAA-19/AVHRR, MetOp-A/AVHRR3, Fengyun3A/VIRR (Visible and InfraRed Radiometer). These algorithms are based on a common formulation of the split-window algorithm in order to facilitate the implementation of a generalized algorithm for multiple sensor integration into LST near-real time mapping. Additionally, historical time series of LST were analyzed in combination with NDVI (Normalized Difference Vegetation Index) to monitor Asian land cover during the past decades. In a first step, NDVI and LST anomalies were estimated from PAL (Pathfinder AVHRR Land) dataset (1981-2000) and analyzed. However, due to the orbital drift which influences observations through a later retrieval of LST for afternoon NOAA satellites, local LST anomalies due to vegetation conditions are masked by the orbital drift effect, and therefore cannot be retrieved by anomaly analysis. Then, dynamic land cover maps were produced on a yearly basis (1981-2000), based on the YLCD (Yearly Land Cover Dynamics) approach applied to PAL NDVI and LST data. These maps allow the observation of known drought events over Asia, overcoming the orbital drift influence on LST data.