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Publication date:
2015

Document Version
Peer reviewed version

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A bi-weekly actual evapotranspiration dataset derived from NOAA-AVHRR images across the Iberian Peninsula and the Balearic islands, 1981-2015

Sergio M. Vicente-Serrano[1], Natalia Martín-Hernández[1], Miquel Tomás-Burguera[2], Cesar Azorin-Molina[1], Mª Angeles Domínguez-Durán[3], Fergus Reig[1], Arturo Sanchez-Lorenzo[1], Santiago Beguería[2], Ahmed El Kenawy[4,5] and Mónica García[6]

[1]Instituto Pirenaico de Ecología, Spanish National Research Council (IPE-CSIC), Campus de Aula Dei, P.O. Box 13034, E-50059, Zaragoza, Spain
[2]Estación Experimental de Aula Dei, Spanish National Research Council (EEAD-CSIC), Zaragoza, Spain;
[3]Instituto Nacional de Tecnica Aeroespacial Esteban Terradas (INTA), Las Palmas de Gran Canaria, Spain;
[4]Hydrological Modeling & Earth Observation Group, WDRC, King Abdullah University of Science and Technology, Saudi Arabia.
[5]Department of Geography, Mansoura University, Mansoura, Egypt
[6]Department of Environmental Engineering, Denmark Technical University, Køngens Lyngby, Denmark

Using the complete set of diurnal NOAA-AVHRR images from 1981 to 2015, in this study we developed a bi-weekly high-spatial resolution (1.1-km) actual evapotranspiration (ETa) dataset covering the Iberian Peninsula and the Balearic islands. Daily ETa was estimated by applying the algorithm developed by Sobrino et al. (2007), which is based on the S-SEBI model. The 35-year NOAA-AVHRR images were geometrically and radiometrically corrected, including a topographic correction of visible and near-infrared spectral channels. Satellite changes and orbit drifts were also corrected using post-launch calibration coefficients, and surface temperature (Ts) estimated using a split-window algorithm by optimized coefficients according to the corresponding sensor effective wavelength (Lahraoua et al., 2013). Relative normalization for solar-zenith and sensor-view angles was applied to the Ts daily time-series. For an accurate quantification of daily ETa, cloud cover was removed applying the algorithm developed by Azorin-Molina et al. (2013), and the evaporative fraction estimated by means of the "triangle method", using the spatial relationship between Ts and albedo for each daily image. The daily time series were transformed to a bi-weekly temporal resolution and bi-weekly images were smoothed using a temporal filtering approach to reduce the observed noise. For validation purposes, annual series of ETa were compared with water balances in hydrological basins with different vegetation, water use and management conditions. Finally, the resulting bi-weekly ETa time-series were compared with reference evapotranspiration series for Spain to detect periods and regions affected by an evapotranspiration deficit. The created dataset can be useful to identify drought extent and to characterize land cover changes characterized by abrupt and progressive modifications in the evaporation conditions.

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Lahraoua, M. et al. (2013): Split-Window LST Algorithms Estimation From AVHRR/NOAA Satellites (7, 9, 11, 12, 14, 15, 16, 17, 18, 19) Using Gaussian Filter Function. International Journal of Information & Network Security (IJINS), 2: 68-77.

Sobrino, J.A. et al. (2007): Application of a simple algorithm to estimate daily evapotranspiration from NOAA-AVHRR images for the Iberian Peninsula. Remote Sensing of Environment 110: 139-148.