# Evaluation of EVASPA, a tool for mapping evapotranspiration from space

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# EVALUATION OF EVASPA, A TOOL FOR MAPPING EVAPOTRANSPIRATION FROM SPACE

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Evapotranspiration is a fundamental variable of the hydrological cycle and plays a major role in surface water and energy balances. The estimation of evapotranspiration is required for water resources management and climate studies. At the local scale evapotranspiration can be accurately determined from detailed ground observations (eddy covariance towers, lysimeters) but these measurements are too time-consuming and costly to assess the evapotranspiration variability at the regional scale. Therefore, remote sensing provides cost-effective methodologies to assess the spatial distribution of evapotranspiration at regional scale. EVASPA (EVapotranspiration Assessment from SPAce) is a tool that has been developed to produce evapotranspiration maps at relevant spatial and time scales for hydrological or agronomical purposes. The tool includes several evapotranspiration estimation methods (S-SEBI method, the triangle approach and aerodynamic equations from SEBAL and SEBS) and various equations for estimating the required input information (e.g. albedo, net radiation and ground heat flux). Highlighted features of this tool are: (i) the

possibility of integrating and comparing data from various remote sensing sensors, (ii) a flexible design which allows easily adaptation to new sensors, (iii) options to evaluate the uncertainties related to the evapotranspiration estimates obtained through the different approaches and (iv) the provision of continuous daily evapotranspiration maps including for days without available remote sensing images (by means of interpolation procedures).

Using MODIS data (freely available since 2001), EVASPA makes it possible to provide long time series of daily evapotranspiration with a 1km spatial resolution over areas of 1000 to 10000 square kilometres. In this study, evapotranspiration estimations by EVASPA are being evaluated against surface energy balance data acquired (using flux towers) over different ecosystems, mainly in semi-arid areas, several of them in the Mediterranean area. The spatial distributions produced by EVASPA are also compared with global remote sensing products, such as MOD16 or WACMOS, and against evapotranspiration maps obtained in earlier studies at higher resolution (using Landsat and ASTER data). Evaluation sites include (in brackets land use with flux tower) the Crau-Camargue area, south-east France (saltmarsh scrubs, dry grassland, irrigated grassland, agricultural area); the Campo de Cartagena in Murcia region, south-east Spain (citrus orchards); the Yaqui valley in the state of Sonora, north-west of Mexico (vegetable and arable crops); the Merguellil watershed near Kairouan, north-east Tunisia (cereals and olive trees); central and north Argentina (forest, dry woods, agricultural area); several network flux sites in monsoon Asia (e.g., rice paddy, upland crop fields, grassland). The EVASPA tool is a software currently in the prototype phase and is developed with support of CNES through the TOSCA research calls and within the frame of the European FP7 project SIRRIMED.

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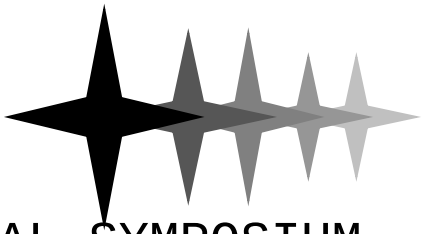

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