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Reference Crop Evapotranspiration obtained from the geostationary satellite MSG (METEOSAT).

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Among others, the scope of the Land Surface Analysis Satellite Applications Facility (LSA SAF) is to increase benefit from the EUMETSAT geostationary Satellites MSG data related to land, land-atmosphere interactions and biophysical applications. This is achieved by developing techniques, products and algorithms that will allow an effective use of MSG data, if needed, combined with data from numerical weather prediction models (e.g., ECMWF). Although directly designed to improve the observation of meteorological systems, the spectral characteristics, time resolution and area coverage offered by MSG allow for their use in a broad spectrum of other applications, for instance in agro- and hydrometeorology. This study concerns a method to determine how much water is needed for irrigation. Note that this is complementary to the actual evapotranspiration LSA SAF product.
The objective of this study is to present a novel semi-empirical method to determine the Reference Crop Evapotranspiration (ET0) from the down-welling shortwave radiation and air temperature obtained through LSF SAF. ET0 is defined in the FAO Irrigation and Drainage report 56 (FAO56) and it is used to determine water requirements of agricultural crops in irrigated regions. It is evaluated with a special version of the Penman-Monteith equation (PM_FAO56) using data of a weather station installed over non-stressed grass. Such stations are expensive and very labor consuming. We developed our method for semi-arid regions where appropriate weather stations needed for FAO56 ET0 are missing. This concerns huge areas in the world. High-quality FAO-grass station near Cordoba, Spain were used, where, besides all input for PM-FAO56, independent lysimeter data are collected. In addition, it will be shown that significant errors in ET0 can occur if meteorological gathered over dry terrain will be used as input of PM-FAO56. For this purpose data sets obtained in different semi-arid regions will be analyzed.