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Comparison of calculated ET0 to measured lysimeter grass ET

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The evapotranspiration rate from a reference surface, not short of water, is called the reference crop evapotranspiration or reference evapotranspiration and is denoted as ET0. The reference surface is a hypothetical grass reference crop with specific characteristics. The only factors affecting ET0 are climatic parameters. Consequently, ET0 is a climatic parameter and can be computed from weather data. Numerous methods have been introduced for computing ET0, causing confusion as to which method to select for ET0 estimation.

In 2006 a monolithic lysimeter has been implemented in the Wagna agricultural test field in southern Austria to measure the water balance parameters precipitation and evapotranspiration as exact as possible. The lysimeter has a surface of 1 m^2 and a depth of 1 m. The precision load cells on the concrete fundament measure the lysimeters weight with a resolution of 35 g (0.035 mm water equivalent). The lower boundary condition of the lysimeter is realized as a suction cup rake. The soil water tension measured in 0.9 m below surface in the undisturbed soil profile is transferred via an automatic controlled vacuum pump to the suction cups. The weight of the lysimeter and of the seepage water container is registered with a time interval of 1 minute. Precipitation amount and evapotranspiration may be determined with a very high resolution in time. The lysimeters surface is cultivated by grassland which is cut during the vegetation period once a week to a length of 12 cm - as the reference height for calculating reference crop evapotranspiration. The principal weather parameters affecting evapotranspiration are radiation, air temperature, humidity and wind speed. Beside the lysimeter a standard weather station has been installed where these parameters are

measured at a height of 2 m in time intervals of 10 Minutes.

In this paper the measured grass evapotranspiration during the year 2007 is compared to calculated reference evapotranspiration using different formulas (FAO-Penman-Monteith, Tayler-Priestly, Blaney-Criddle) on a daily basis. Continued development of electronic weather stations has increased the availability of weather data for calculating ET0 on short time interval basis. There has been question and debate as well as studies on the appropriate expression and parameterization for the surface resistance parameter of the Penman-Monteith (PM) equation and the associated coefficient for the reduced form FAO-PM equation when applied hourly. Therefore measured reference evapotranspiration data are compared to calculated values resulting from Penman-Monteith calculation using different time steps at research station Wagna. The crop coefficient of grass in a humid climatic region using the double coefficient method is validated.