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Water and energy fluxes from a Phragmites fen in southwest Germany

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Phragmites australis is expected to have a high evapotranspiration (ET) rate due to the large leaf area, open water habitat, and high aerodynamic roughness. Measured ET with the eddy covariance (EC) method in a Phragmites fen was evaluated in perspective of energy partitioning. The measured ET data were used as well to derive crop factors to come from FAO's Penman-Monteith reference ET (ETo) to crop ET (ETc).
During the growing season in 2013 and 2014, measured mean ET from this Phragmites fen (1.3 and 2.0 mm day-1) was much lower than expected from literature. Especially in May and October, when plant activity was low, the dominant energy flux was sensible (H) not latent heat (LE) with an average Bowen ratio larger than 1.5. This can be explained by the dense dead reed that heats up causing a high H. The low evaporation was likely due to the shading of the water layer below the canopy and low wind velocities near the surface.
Crop factors based on measured ET had similar day-to-day fluctuations as crop factors based a regression model with measured air temperature, air relative humidity, and net radiation as input variables (Zhou and Zhou, 2009). Therefore, the model of Zhou and Zhou is an interesting and robust approach to estimate daily crop factors and can be recommended.