

Comparing evapotranspiration partitioning after different types of rain events using stable isotopes and lagrangian dispersion analysis

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The eddy covariance method has become one of the standard methods for measuring evapotranspiration (ET) at the field scale, however it cannot separate transpiration from evaporation and it is also limited within plant canopies due to distortion of the turbulent wind fields. Possible solutions to these limitations include combining EC measurements made above the canopy coupled with either source/sink distribution models or stable isotope ET partitioning models. During the summer of 2014 the concentration and isotopic ratio of water vapour within the canopy of a growing maize field at the Hydrological Open Air Laboratory (HOAL) catchment was measured using a Picarro field sampling device. A tripod mounted eddy covariance device was used to calculate the ET value for the field. The first objective of this experiment is to compare the ET partitioning results made using the stable isotope Keeling Plot method within a canopy to two different lagrangian dispersion analysis methods, the Localised Near Field theory of Raupach (1989a) and the Warland and Thurtell (2000) dispersion model. Preliminary results show good agreement during dry conditions with the dispersion methods overestimating the fraction of transpiration directly after a rain event. The second objective is then to analyse and compare the soil evaporation response for two different kinds of rain events using the stable isotope results.