

Evaporation Measured In Situ by Sensible Heat Balance

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Measurement of evaporation independent from evapotranspiration remains a major challenge for quantifying water fluxes in the soil-plant-atmosphere system. Methodology based on soil sensible heat balance (SHB) has been developed to measure in situ, sub-surface soil water evaporation with heat-pulse sensors. Soil sensible heat flux and change in heat storage are measured at multiple depths near the soil surface, and a simple energy balance calculation is applied to determine latent heat flux (i.e. evaporation) as a residual. For bare surface conditions, comparison of SHB to micrometerological (Bowen ratio) and micro-lysimeter approaches indicates strong correlation ($r^2 = 0.96$) with near 1:1 relationship and root mean square error of 0.2 mm/d. Recent efforts to apply SHB methodology in row-crop (maize) and vineyard systems demonstrate the potential for quantifying evaporation separate from evapotranspiration. For the maize system, SHB evaporation estimates differed from micro-lysimeters by < 0.2 mm/d. The SHB approach is one of very few measurement approaches that may be applied to partition evaporation from evapotranspiration.