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Validation of a simple evaporation-transpiration scheme (SETS) to estimate evaporation using micro-lysimeter measurements

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Several methods exist to estimate E and T. The Penman-Montieth or Priestly-Taylor methods along with the Jarvis scheme for estimating vegetation resistance are commonly used to estimate these fluxes as a function of land cover, atmospheric forcing and soil moisture content. In this study, a simple evaporation transpiration method is developed based on MOSAIC Land Surface Model that explicitly accounts for soil moisture. Soil evaporation and transpiration estimated by SETS is validated on a single column of soil profile with measured evaporation data from three micro-lysimeters located at Ferdowsi University of Mashhad synoptic station, Iran, for the year 2005. SETS is run using both implicit and explicit computational schemes. Results show that the implicit scheme estimates the vapor flux close to that by the explicit scheme. The mean difference between the implicit and explicit scheme is -0.03 mm/day. The paired T-test of mean difference (p-Value = 0.042 and t-Value = 2.04) shows that there is no significant difference between the two methods. The sum of soil evaporation and transpiration from SETS is also compared with P-M equation and micro-lysimeters measurements. The SETS predicts the actual evaporation with a lower bias (= 1.24mm/day) than P-M (= 1.82 mm/day) and with R2 value of 0.82.