Poster #218

Sensitivity of Transpiration to Subsurface Properties

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The amount of moisture transpired by vegetation is critically tied to the moisture supply accessible to the root zone. In a Mediterranean climate, integrated evapotranspiration (ET) is typically greater in the dry summer when there is an uninterrupted period of high insolation. We present a 1D model to explore the factors that may sustain ET. The model includes a stochastic parameterization of hydraulic conductivity, root water uptake efficiency and hydraulic redistribution by plant roots. Model experiments vary the precipitation, the seasonality of ET demand, and rooting profiles and rooting depths of the vegetation. The results show that the amount of subsurface moisture remaining at the end of the wet winter is determined by the competition between abundant precipitation input, fast infiltration and winter ET demand. In a Mediterranean climate, weathered bedrock provides a not-insignificant reservoir that may sustain ET of deep-rooted (>8m) trees through the dry season. A small negative feedback exists in the root zone, where the depletion of moisture by ET decreases hydraulic conductivity and enhances the retention of moisture. Hence, hydraulic conductivity is impactful in a dry season or a dry year when hydraulic conductivity is reduced, or at a location with less permeable lithology.