Poster #21-50

On Sub-grid Scale Variations of Transpiration

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BER Program: SBR
Project: University Award

In a climate model in which the land surface is resolved typically at 25 km or more, the focus has been on bulk properties of ecosystem function and structure as they affect the atmosphere. Such a gridbox typically comprises a large number of plant species with various traits, as well as subsurface properties such as porosity and depth to bedrock (DTB). With DOE support, we have developed a stochastic parameterization of hydraulic conductivity that takes into account preferential flow through weathered bedrock (Vrettas and Fung, 2015), and applied the Richards Equation with the new parameterization to investigate the impact of subsurface water storage capacity (especially in the weathered bedrock) and rooting structure on the timing and magnitude of transpiration (Vrettas and Fung, 2017). Here we present an application of the approach to a landscape, using a compilation of DTB at 30 arcsec resolution (Pelletier et al., 2016) and distribution of tree species and associated properties. Rooting depth is calculated using estimates of crown volume of each tree species and climate variables (Schenk and Jackson, 2002); species-specific transpiration dependence on climate is taken from Link et al. (2004). Strategies for upscaling the heterogeneous structure and function to gridbox level will be discussed.

References:

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