Session: B10 Oral presentation

Climate-soil-vegetation control on groundwater-supplied evapotranspiration in the global modeling context

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Various land surface modeling studies with representation of groundwater (GW) dynamics have indicated an increase in evapotranspiration (ET) due to GW-supplied capillary flux at both the regional and global scales. Response of ET to increase in soil moisture, however, has large spatial variation on the global scale with varying climate, soil, and vegetation characteristics. The controls of climate, soil, and vegetation characteristics on the response of GW-supplied ET are investigated in this study. A representation of water table dynamics is integrated into a LSM, the Minimal Advanced Treatments of Surface Interaction and Runoff (MATSIRO). Globally, groundwater-supplied ET is estimated to be ~5200 km3/yr, which is ~9% of annual ET. The increase in ET is marginal in humid regions with sufficient moisture and high latitudes with limited radiation energy. The arid-to-wet transition regions show the largest increase, with up to ~25% increase in the Indian subcontinent. The increase in ET is primarily controlled by availability of incoming radiation energy and is large in dry season when the moisture is also limited. Variability is further provided by antecedent moisture condition and retention characteristics for a particular soil type, which govern the soil resistance to ET. Also, land cover and vegetation characteristics are found to provide some control on increase in ET. Particularly, grid cells with relatively smaller vegetation cover have larger increase in soil evaporation, while increase in transpiration is quantitatively significant in the growing season.