

**Poster# 88**

**Assessing Development Needs in Earth System Models by Hydrological Modeling in the Asu Catchment Using a Hierarchy of Hydrological Models**

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Current Earth System Models (ESMs) have limited ability to represent key features of tropical hydrology, such as spatial variability in water flows and water available for plant use. To identify development needs for modeling surface and subsurface hydrology in ESMs, hydrological simulations are performed over the Asu catchment, 80 km northwest of Manaus in the Amazon. Models including the ACME Land Model (ALM), DHSVM, CLM-PAWS, h3D, tRIBS, CLM-ParFlow, CLM-PFLOTTRAN, and Amanzi/ATS, with soil hydrology representation from one dimensional to three-dimensional, respectively, are applied to simulate hydrologic variability. 3D model results showed the flow system at the catchment is topography controlled local flows which have the greatest interchange with surface water. Simulation differences were found across models in terms of the temporal and spatial variability of ET, soil moisture, groundwater table and runoff. Comparison of one to three-dimensional models provides an opportunity to elucidate the importance of lateral flow. Sensitivity experiments were performed by varying soil depth, rooting profile, atmospheric driving force, and hydraulic anisotropy ratio to evaluate the hydrologic response to drought.