Poster #167

Characterization of Groundwater Flow and Associated Geochemical Fluxes in Mineralized and Unmineralized Bedrock in the Upper East River and Adjacent Watersheds, Colorado

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This project is just beginning in 2017. We intend to combine multi-scale interdisciplinary strategies for improving the state of knowledge regarding the influence of deep-circulating groundwater on stream flows and stream-water chemistry in mountain watersheds. Like many rivers with alpine headwaters, the East River watershed contains several zones of exposed mineralized and hydrothermally altered bedrock. Surface and groundwater draining these mineralized zones commonly contains high concentrations of metals and other solutes due to an abundance of metal sulfide minerals in the aquifers, and can contribute substantially to stream chemical loads. We will compare how the fluxes of metals and other solutes to the surface varies between mineralized and unmineralized areas within the upper East River watershed and adjacent areas near Crested Butte, Colorado. This work will complement the ongoing ecohydrologic Science Focus Area (SFA) project led by the Lawrence Berkeley National Laboratory (LBNL) that includes extensive sampling and analysis of near-surface materials and surface waters by: (1) collecting new data in mineralized areas to contrast with the unmineralized East River study area, and (2) focusing on the contribution of deep-circulating groundwater and its geochemical composition to the shallow flow system. The aim of the proposed work is to develop a conceptual model of the deep bedrock hydrogeochemical system in both mineralized and unmineralized areas of the upper East River that could provide the foundation for incorporating the deeper subsurface into the numerical reactive transport model being developed for the watershed by LBNL. Our results will enrich the ongoing LBNL studies by providing a more robust understanding of the hydrogeologic system and help forecast the effects of perturbations such as climate change. We will combine new borehole installations with geologic, geophysical, geochemical, and hydrologic characterization of the deeper subsurface that extends 10s to 100s of meters below ground to better understand and quantify fluxes of water, metals, and other solutes from deeper to shallower environments.