Interpreting watershed scale hydrological alterations from widespread mountain pine beetle infestation using stable isotopes

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Abstract. A recent infestation of the mountain pine beetle (MPB) in the Rocky Mountain West has resulted in unprecedented land cover change. While deforestation is known to affect tree-scale hydrologic processes by increasing water and energy transmission to the forest floor and decreasing transpiration, increases in peak flow timing and water yield at the watershed scale are less predictable as these perturbations combine non-uniformly across larger scales. Tree-scale alterations also have the potential to change the partitioning of water, with implications for biogeochemistry and transport. In this study, stable isotope ($\partial^{18}O$ and ∂D) datasets from four watersheds in Rocky Mountain National Park are compared to investigate MPB influence on water partitioning. In addition, spectral techniques are used to estimate residence times and trends in surface water isotopic compositions. Preliminary $\partial^{18}O$ analyses from the summer of 2012 found offsets between the peak $\partial^{18}O$ signal of precipitation, shallow well water, and streamwater, suggesting differences in groundwater residence times and potentially water sources between streamwater and shallow groundwater.

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