VERIFICATION OF HYDROLOGIC LANDSCAPE DERIVED BASIN-SCALE CLASSIFICATIONS IN THE PACIFIC NORTHWEST

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The interaction between the physical and climatic attributes of a basin (form) control how water is partitioned, stored, and conveyed through a catchment (function). Hydrologic Landscapes (HLs) were previously developed across Oregon and are comprised of components describing climate, seasonality, aquifer permeability, terrain, and soil permeability for over 5,000 assessment units; they therefore represent hydrologic form throughout Oregon. This approach was then extended to the three Pacific Northwest (PNW) states of Washington, Oregon and Idaho to over 10,000 assessment units. The PNW assessment units were developed using the National Hydrography Dataset Plus V2 catchment boundaries. Hydrologic landscapes have the advantage of describing how water should flow through and out of each HL in continuous space. However, HLs are unable to be verified without stream flow information. Hydrologic function was investigated through the extraction of characteristics of the long-term climatic and streamflow signals (hydrologic signatures) for 199 basins in the PNW. Hydrologic signatures include Runoff Ratio, Baseflow Index, Snow Ratio, and Recession Coefficients. To compare the PNW HL classification to hydrologic signatures, we developed 5 methodologies to aggregate and interpret information provided by HLs to the basin scale. These methodologies use the areal fraction of HL composition within each basin to cluster basins together into similar classes with respect to both the underlying HL composition and hydrologic signature values. For HL aggregation to be considered successful, it must show similarity in hydrologic signatures within basin clusters and distinctness between basin clusters. We hypothesize that we will find: 1) a way to aggregate HLs that form homogeneous and distinct classes 2) strong relationships between HL derived basin clusters and hydrologic signatures; 3) signatures related to water balance are explained by climatic conditions; and 4) signatures describing flow paths are predicted by terrain, soil, and aquifer permeability. Preliminary findings suggest that basins clustered using HLs that contribute most to moisture excess and deficit provide basin classes that best separate combined hydrologic signature properties.

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