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Hydrology and Earth System Sciences
Discussions



# *Interactive comment on* "Hydrologic landscape classification assesses streamflow vulnerability to climate change in Oregon, USA" *by* S. G. Leibowitz et al.

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The Hydrologic Landscape (HL) model is interesting and offers a promising venue for modelling. However, it is not completely new. The presented model includes information about climate, seasonality, aquifer permeability, terrain, and soil permeability. For topography, the authors classified into three classes: mountain, transitional, and flat. The classification is based on relief (maximum elevation minus minimum elevation) and total percentage of flatland (slope <1%). After the landscapes classification, the authors evaluate the hydrological change in 2041-2070. We agree with the authors' statement: "A major strength of the HL approach is that results can be applied to simi-



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larly classified, ungauged basins." To our knowledge, this approach is reasonable and useful in practice. However, we would like to raise several issues:

1. The model may be over-parameterized. Since too much information (5 categories, including 5 climate classes, 3 seasonality classes, 3 aquifer permeability classes, 3 terrain classes, 3 soil permeability classes) has been considered. In principle, there could be 486 landscapes classes. This makes the model too complicated, and hard to calibrate.

2. Land cover information has not been included in the HL model, which is odd. We think this information is essential, as it affects hydrological processes directly.

3. The authors apparently missed relevant literature on landscape-based hydrological modelling. We think the HL model is based on the same idea as FLEX-Topo (Savenije, 2010;Gharari et al., 2013;Gao et al., 2013), but with a different classification approach, since the HL model divided the catchment by climatic, seasonal, geologic, topographic and soil information. FLEX-Topo uses essentially topographic information and land cover for hydrological landscape classification. We suggest reference is made to the mentioned publications, as well as to Winter, (2001).

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