A strategy for identification of areas of consistent hydrologic character by means of dimensionless numbers

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The prediction of the hydrologic response of a landscape is of critical importance to water resource and hazard planning. For these purposes it is not practical, nor we believe necessary, to gauge each stream in a basin. Rather, with the extensive knowledge of climate, soils, geology, topography, and ready access to long-term gauges in hydrologically similar conditions, it should be practical to develop accurate predictions of hydrologic response. The goal of this work is to lay out an approach to achieve these ends illustrated using data from the Willamette Valley in Oregon. A number of dimensionless indexes (here called predictands), obtained from the combination of geomorphological and climatic characteristics of the basin, has been used to infer the "signature" of 156 subcatchments i.e. some features of the hydrograph (called predictors) such as the annual average runoff, some percetiles of the duration curve, the parameters of the hydrograph recession curve. On this purpose a linear and log-linear regression analysis has been performed. Some predictand/predictor plots show interesting threshold relations. For each plot the threshold behaviour is identified, and apparent threshold values are computed. The identification of these thresholds is approached graphically here, though ultimately this process should be made completely objective through statistical measures of the degree of parameter control. Being the overall objective of the work to identify subcatchments of consistent hydrologic character, a classification three-shaped scheme has been filled on the basis of the thresholds defined on the predictors. The leaves of the three result to be group of hydrologically similar catchments. In conclusion, rather than attempting to present a final taxonomic

system, we suggest a strategy and the roadmap for how this approach could be alternatively developed.