



Revisiting Berghuijs et al (2014) Using CAMELS Hydrology Data for the USA

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Berghuijs et al. (2014) showed that a temperature-induced shift from snow towards rain led to a reduction in annual streamflow. That result was based on the analysis of the MOPEX hydrological data set in the USA (Schaake et al., 2004), focussing on 97 snow-influenced catchments. The study suggested a new and possibly significant impact of climate change on water resources which had not been widely recognised. The finding that a shift from snow towards rain led to a reduction in annual streamflow was primarily founded in the empirical result that in years with a low fraction of precipitation falling as snow, river flows were, on average, lower. With warmer temperatures and lower snow fractions expected in future, the implication is that, unless there are compensating changes (e.g., more precipitation), annual river flows in snow-influenced catchments will reduce in future.

However, many questions remain unanswered, including whether the effect is observed beyond the MOPEX catchments, how hydrological processes interact to produce this effect in different snow-influenced environments, and whether the magnitude of the effect can be reliably predicted under future climates.

Since the publication of Berghuijs et al. (2014) a new US-wide hydrological data set has been published (CAMELS, Addor et al., 2017). Here we report the results of applying the Berghuijs et al. (2014) methodology to the CAMELS data set. Our null hypothesis is that CAMELS and MOPEX results will be not significantly different from one another. However, CAMELS includes a substantial collection of catchments in the snow-dominated western USA, a region which was under-represented in MOPEX but is vitally important for regional water resources.

We will present results for the sensitivity of annual river flow to changes in the fraction of precipitation that falls as snow when derived from the CAMELS data, make a comparison of the CAMELS and MOPEX results, and explore implications of this comparison for further research.

References

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