

EXTENDED ABSTRACT ONLY

Can models be used to determine if the hydrologic cycle is intensifying?

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Abstract: Whether the hydrological cycle is intensifying in response to climate change is a key question with relevance to impact assessment, feedbacks with climate, and policy-making. With global warming, the expectation is that droughts will intensify and last longer, and precipitation will become more intense with knock-on effects to flooding. Observational data show some evidence that this is happening for some variables in some regions, but data limitations, human influences and natural variability ensure that a definitive picture has not emerged globally. We show how land surface modeling can be used to address some of the observational limitations to provide global, long-term estimates of the terrestrial hydrological cycle. We focus on drought as a global natural hazard in an increasingly connected world and present recent updates on global and regional drought changes. Despite our ability to provide continuous and consistent estimates of the terrestrial hydrological cycle, there are multiple sources of uncertainty that ensure that the derived changes in the hydrological cycle, and drought in particular, are dependent on the modeling and data choices that we make. We discuss where and when these are important.

Keywords: *Hydrological cycle, intensification, drought, global, uncertainties*