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A first look at global flash drought: long term change and short term predictability

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"Flash drought" became popular after the unexpected 2012 central USA drought, mainly due to its rapid development, low predictability and devastating impacts on water resources and crop yields. A pilot study by Mo and Lettenmaier (2015) found that flash drought, based on a definition of concurrent heat extreme, soil moisture deficit and evapotranspiration (ET) enhancement at pentad scale, were in decline over USA during recent 100 years. Meanwhile, a recent work indicated that the occurrence of flash drought in China was doubled during the past 30 years, where a severe flash drought in the summer of 2013 ravaged 13 provinces in southern China. As global warming increases the frequency of heat waves and accelerates the hydrological cycle, the flash drought is expected to increase in general, but its trend might also be affected by interannual to decadal climate oscillations. To consolidate the hotspots of flash drought and the effects of climate change on flash drought, a global inventory is being conducted by using multi-source observations (in-situ, satellite and reanalysis), CMIP5 historical simulations and future projections under different forcing scenarios, as well as global land surface hydrological modeling for key variables including surface air temperature, soil moisture and ET. In particular, a global picture of the flash drought distribution, the contribution of naturalized and anthropogenic forcings to global flash drought change, and the risk of global flash drought in the future, will be presented.
Besides investigating the long-term change of flash drought, providing reliable early warning is also essential to developing adaptation strategies. While regional drought early warning systems have been emerging in recent decade, forecasting of flash drought is still at an exploratory stage due to limited understanding of flash drought predictability. Here, a set of sub-seasonal to seasonal (S2S) hindcast datasets are being used to assess the short term predictability of flash drought via a perfect model assumption.