



Understanding the link between aridity and hydrological extremes: Lessons from hyper-arid climates

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Precipitation over arid and hyper-arid regions represents “per se” an extreme event, often resulting in surface-hydrologic impacts comparatively more catastrophic than in temperate climates. The spatio-temporal distribution of precipitation through arid climates is in fact characterized by intense and short-lived patterns and intimately related to the local availability of water and energy.

However – given the scarcity of data and the limited number of research contributions analyzing rain extremes in hyper arid environments – is still an open question whether rainfall sporadically falling on hyper-arid regions, and in particular its convective component, presents peculiar features connected with the endemically water-limited regime of these regions. If so, understanding the link between aridity and rainfall variability could turn out a precious tool to investigate not only the climate of arid regions but also more global trends of precipitation under global warming and aridification.

In this contribution we analyze the connection between rainfall variability, its temporal scaling laws and aridity in a climatological prospective. Through a wide dataset of precipitation time series covering most Continental US (CONUS) we explore the local dependence of classic intermittency measures on aridity, finding evidence of a well-defined variability patterns across a wide range of water-limited climates. We also explore the connection between different intermittency features of arid climates as contrasted with “wet” regions and briefly discuss the links between clustering, water-availability thresholds and hydro-climatic extremes. Our findings provide a framework to better understand the link between intermittency, rainfall scaling and climate in water-limited regions of the world, with possible extension to global aridification studies.