SORS: Assessing projected changes and prediction skill of hot and dry extremes over global land regions

Objectives

Abstract: Climate extremes in recent years gained a lot of attention from governments, stakeholders and funding agencies worldwide given their destructive impacts on human societies, economies and ecosystems. Hot and dry extremes, for instance, are affected by natural climate variability and anthropogenic forcing, with the latter playing a significant role in exacerbating their frequency, intensity and duration. Such extremes can also interact, creating a compounding effect that can eventually generates more losses than the single hazards alone. It is therefore important to anticipate the occurrence of such events with skillful climate predictions.

The focus of this talk is on univariate and compound hot-dry extremes over global land regions. First, I will present a study on CMIP6 projected changes of univariate and compound hot-dry extremes under historical simulations and four different Shared Socioeconomic Pathways (SSPs) from 1950 to 2100. Here, we compute hot extremes by making use of five Climpact indices and dry extremes by using two common drought indices derived from precipitation only and precipitation along with potential evapotranspiration. Then, I will show the global land regions where prediction skill of univariate hot and dry extremes is improved when constraining decadal climate variability from observations. Here, we use a large ensemble of both historical and SSP2-4.5 simulations from 1961 to 2019, along with observational datasets such as BEST and GPCC. Lastly, I will present my latest results showing the capability of a large CMIP6 ensemble to correctly reproduce compound hot-dry extremes globally within the 1961-2019 period. These findings can be relevant for stakeholders willing to adapt to (near-term) climate change.

Short Bio: Paolo is currently a Marie Sk?odowska-Curie Postdoctoral Fellow at the Department of Earth Sciences of the Barcelona Supercomputing Center. His research focusses on improving the multi-decadal prediction skill of univariate and compound hot and dry extremes over global land regions. Paolo started his career studying Environmental Science in Italy and then completed a NERC PhD in Physical Geography at Loughborough University (UK). Then he was visiting researcher at Uppsala University and before joining the BSC as researcher he moved to a postdoc position at VU Amsterdam. Paolo’s career is dedicated to the understanding of extreme meteorological phenomena, such as heatwaves, drought, extreme precipitation and storms. He uses different methods, from pragmatic to more complex dynamical systems approaches to disentangle the statistical characteristics, prediction skill and physical mechanisms driving such extremes. He is also conducting research on exoplanets’ mean and extreme climate. At present, he is visiting the Max Planck Institute for Meteorology where he is investigating multi-decadal prediction of compound hot-dry extremes.

Speakers

Speaker: Paolo de Luca, Marie Sk?odowska-Curie Postdoctoral Fellow at the Department of Earth Sciences, BSC
Host: Markus Donat, Climate Variability And Change Coleader, ES, BSC

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