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On the evaluation of climate model simulated precipitation extremes

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Precipitation extremes represent a global threat for human and natural systems, especially considering that exposure and vulnerability to climate extremes are both dynamic and determined by several socio-economic and political factors. In a climate change context, therefore, there is a need of better understanding and evaluating climate model simulations as well as their projected changes. Here, we propose a statistical approach (based on a modified 2-sample Anderson-Darling statistic) that can be applied to address these issues. Statistical simulations as well as an application to observations and eight global climate model runs done in the framework of the Coupled Model Intercomparison Project Phase 5-CMIP5 (historical and scenarios RCP8.5 and 4.5) show the features and the performance of the proposed method. Furthermore, this analysis reveals a lack of simple scaling relation between models and observations. The inter-model comparison shows a better agreement among models although significant differences affect the extremes. As for the projections for the 21th century, the majority of the investigated models shows an increase of the risk associated with precipitation extremes for large areas, especially at the end of the century.