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Greatest point rainfall related to duration: Scaling and multifractal analysis in climate model simulations

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Abstract

The world's greatest observed point rainfall over land P(d) to duration d reveals power law scaling in the d-range of minutes to years, $P \sim d^b$ with exponent $b \sim 0.5$. This scaling law analysis is revisited using grid-point data from a state of the art global climate model with different resolution (ECHAM5/MPI-OM T63- and T31-control runs). The following results are noted: (i) the scaling is larger and resolution dependent; the higher resolution is closer to the observed data; (ii) there is almost no land-sea difference in scaling; (iii) a multi-fractal analysis is applied to estimate the related parameters. Causes of the simulation-observation difference are discussed.

Keywords: rainfall, scaling law, multifractal analysis, climate simulations