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Investigating the tail behaviour of surface temperature on global scale using K- moments

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Temperature, as one of the most important hydroclimatic variable, affects all aspects of human life. Agriculture, trade, transportation, energy production and consumption, all depend to some degree on surface temperature and its probability distribution. This distribution is commonly assumed as Gaussian but little research has been done to investigate whether this assumption is appropriate for the distribution tails. The aim of this work is to investigate the surface temperature's tail behaviour, in order to better comprehend the occurrence of extremes. Maximum and minimum temperature datasets, on daily scale, from thousands of stations throughout the world are used to perform various tail performance tests based on Knowable (K-)moments and comparison to classical and L-moments. This type of moments are chosen for this study, as they enable reliable estimation from samples and effective description of high (and very high) order statistics, useful for characterizing marginal and joint distributions of stochastic processes. The results of the K-moments' application are used as input to a Monte-Carlo analysis, so as to evaluate if the stochastic tools used, accurately imitate tail uncertainty of temperature's distribution.