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Methodological analysis for large-scale spatio-temporal drought development

Gerald A Corzo P, Marjolein H.J. van Huijgevoort , and Henny A.J. van Lanen

Wageningen University, Hydrology and Quantitative Water Management Group, Centre for Water and Climate, Wageningen, Netherlands (gerald.corzoperez@wur.nl)

Development of large-scale hydrological models has led to new challenges to explore global behavior and patterns of drought. So far, methodologies to characterize spatio-temporal patterns of large-scale drought are still limited. This research presents the technical and physical considerations taken for the development of tools to describe the spatio-temporal analysis of droughts. This research focuses on the development in methodologies used for analyzing a gridded dataset with forcing data that has been compiled through the EU-FP6 WATCH project (0.5o, daily, 1958-2001). Two new methodologies are proposed based on the different characteristics of the drought phenomena and the difference between the hydrological variables involved. These methodologies are the Standardized Clustered Precipitation Index (SCPI), which quantifies precipitation changes, and the Cluster Precipitation Distributions (CPDs) which consider the spatial reduction of continuous period without rain. Both methods are used to characterize meteorological drought. Next, comparative results of applying these two methodologies to precipitation and discharge are presented. The two methodologies provide important information about principles that can be used to develop methods to evaluate meteorological and subsequently hydrological drought from different types of large-scale grid-based models.