A probabilistic approach to the concept of Probable Maximum Precipitation

S.M. Papalexiou, D. Koutsoyiannis

Department of Water Resources, Faculty of Civil Engineering, National Technical University, Athens, Greece

The concept of Probable Maximum Precipitation (PMP) is based on the assumptions that (a) there exists an upper physical limit of the precipitation depth over a given area at a particular geographical location at a certain time of year, and (b) that this limit can be estimated based on deterministic considerations. The most representative and widespread estimation method of PMP is the so called moisture maximization method. This method maximizes observed storms assuming that the atmospheric moisture would hypothetically rise up to a high value that is regarded as an upper limit and is estimated from historical records of dew points. In this paper, it is argued that fundamental aspects of the method may be flawed or illogical. Furthermore, historical time series of dew points and "constructed" time series of maximized precipitation depths (according to the moisture maximization method) are analyzed. The analyses do not provide any evidence of an upper bound either in atmospheric moisture or maximized precipitation depth. Therefore, it is argued that a probabilistic approach is more consistent to natural behaviour and provides better grounds for estimating extreme precipitation values for design purposes.