



Multi-year encoding of daily rainfall and streamflow via the fractal-multifractal method

Mahesh Lal Maskey (1), Carlos E. Punte (1), Bellie Sivakumar (1,2)

(1) University of California, Davis, Hydrological Sciences Graduate Group, Land, Air and Water Resources, Davis, United States (mmaskey@ucdavis.edu), (2) The University of New South Wales, School of Civil and Environmental Engineering

A deterministic geometric approach, the fractal–multifractal (FM) method and faithful in encoding daily geophysical sets over a year, is used to describe records over multiple years. Looking for temporal trends on FM parameters that describes geometry of sets gathered over longer periods of time, this study presents FM descriptions of rainfall and streamflow and rainfall over five consecutive years optimizing deviations on accumulated sets. The results for 105 and 61 years of rainfall and runoff, respectively, near Sacramento, California illustrate that: (a) encoding of both types of data sets may be accomplished with reasonably small errors, and (b) predicting the geometry of both attributes is possible, even five years ahead, training a neural network on FM parameters. It is shown that the FM approach not only captures the accumulated sets over successive five years but also preserves other statistical attributes as well as the overall “texture” of the records.