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Drought forecast using an artificial neural network for three hydrological zones in San Francisco River basin, Brazil

CELSO AUGUSTO G. SANTOS, BRUNO S. MORAIS & GUSTAVO B. L. SILVA

Federal University of Paraíba, Department of Civil and Environmental Engineering, 58051-900 João Pessoa, Brazil
celso@ct.ufpb.br

Abstract Three homogeneous rainfall areas were identified within San Francisco River basin, located in Northeast Brazil, by analysing the rainfall frequencies through the global wavelet power spectra that provide an unbiased and consistent estimation of the true power spectrum of the time series. Such study was accomplished using data from 248 raingauges provided by the Brazil National Water Agency (ANA), for several years between 1938 and 2005, based on their geographical distribution. For each identified region, the standardized precipitation index (SPI) was forecast using a feed-forward artificial neural network (ANN) trained by the back-propagation algorithm. The results obtained show that: the ANN is a suitable tool for this type of forecast; the accuracy is improved when the time scales of the SPI index, as well as the lead times, are increased; and the final result was not influenced by the different hydrological zones.

Key words wavelet; fuzzy; ANN; drought; hydrological zones