ABSTRACT

Extreme weather is dominated by the movement of the monsoon phenomenon that occurs due to water vapor transportation, resulting in rainfall anomalies. Currently, machine learning methods, especially Artificial Neural Network (ANN), are widely used for modeling in predicting time series data, one of which is in the field of Meteorology. This research proposes to examine the ability of ANN in modeling rainfall anomalies based on the interconnection of the Australian and Asian monsoons. The study areas in this research are Semarang and Makassar. The data used are BMKG observation rainfall, NASA POWER and CHIRPS satellite rainfall, and 850 hPa layer zonal wind with AUSMI and WNPMI area coordinates from NCEP/NCAR for 33 years from January 1990 - December 2023. This research was conducted by examining the characteristics of rainfall, the Australian monsoon, the Asian monsoon, and the interconnection of the two monsoons using time series plots, spatial analysis, Power Spectral Density (PSD), and wavelets. Rainfall data was converted into rainfall anomalies, then correlated with the interaction of AUSMI and WNPMI, resulting in a simple linear regression equation $\Delta CH=a(AUSMI\text{-}WNPMI)+b$. Furthermore, the rainfall anomaly values obtained from the derivatives of the monsoon interconnection were subjected to composite analysis and modeled using ANN. The results showed that the characteristics of the Australian monsoon, Asian monsoon, and their interconnections have sinusoidal patterns with 12-month periodicity. The rainfall characteristics of the Semarang and Makassar regions also show a 12-month periodicity or monsoonal pattern. Then, the results of the ANN model obtained are able to model rainfall anomalies based on the AUSMI and WNPMI interconnections in the Semarang and Makassar regions with a dataset division of 60% training and 40% testing obtained an R^2 training value of 0,75 while the R^2 testing value is 0,73.

Keywords: Artificial Neural Network (ANN), Interconnection of Australian and Asian monsoon, Rainfall anomaly