ABSTRACT

Rainfall in the Indonesian is generally dominated by several phenomena such as El Niño-Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD) which are two major climatic phenomena in the Pacific and Indian Oceans that affect the variation of phenomena in the Pacific Ocean and Indian Ocean that have an impact on variations in rainfall intensity so that predictions need to be made to anticipate extreme events in the research area, namely DKI Jakarta. The purpose of the study is to determine the characteristics of ENSO, IOD, and the interaction of the two and their influence on rainfall using time series plots¸ Power Spectral Density (PSD), wavelets, and correlation coefficient. In addition, ENSO, IOD and their interactions are modelled with Long Short-Term Memory (ARIMA), Long Short-Term Memory (LSTM) and hybrid ARIMA-LSTM, so that prediction results are obtained. Rainfall characteristics have a monsoonal pattern with a 12-month periodicity, ENSO has a 60-month periodicity, IOD has a 36-month periodicity, while the interaction between the two has a 60-month periodicity. IOD has a stronger correlation with rainfall in October with R of -0,78, while ENSO has R of -0,66. The results showed that the hybrid ARIMA-LSTM model higher accuracy than the single ARIMA and LSTM models. The results of testing the ENSO ARIMA-LSTM hybrid model get the best R^2 of 0,99, IOD gets an R^2 of 0,96, and the interaction of the two gets an R^2 of 0,98. The prediction results for the next 12 months on ENSO are in accordance with the prediction results from other sources which show a downward trend towards the La Niña phase but still in normal conditions until the end of the year. IOD prediction results are less in accordance with the prediction results from other sources because there are differences in trends. IOD prediction results are in the positive IOD phase under normal conditions until the end of the year. The prediction results of ENSO and IOD interactions experienced a downward trend towards the weak La Niña phase until the end of the year.

Keyword : ENSO and IOD interaction, ARIMA, LSTM, hybrid