

Assessment of Indian Ocean Dipole influence on rainfall and temperature in the Southern coast of Sri Lanka

T. Vinith Steeban^{1*} and K.W. Indika²

¹Department of Oceanography and Marine Geology, Faculty of Fisheries and Marine Sciences and Technology, University of Ruhuna, Sri Lanka

²National Aquatic Resources Research and Development Agency (NARA), Crow Island, Colombo 15, Sri Lanka

The Indian Ocean Dipole (IOD) plays an important role as the major climate driver in the tropical Indian ocean. IOD is defined as the Sea Surface Temperature (SST) anomaly difference between tropical West Indian ocean and tropical Southeast Indian ocean (Saji et al., 1999). This forms around June and reaches the peak in October, then strats to fade (Saji et al., 1999). Sri Lanka is experiencing a significant change in precipitation and atmospheric temperature with the influence of IOD. The high resolution in-situ time series data of rainfall and atmospheric temperature in 2019 was obtained from Mirissa meteorological station and the monthly Dipole Mode Index (DMI) was used from National Oceanic and Atmospheric Administration (NOAA). The regression and co-relation analysis were conducted to determine the relation between DMI and rainfall/temperature. Month lead analysis reveals that the significance between the IOD phase and the rainfall is prominent ($r=0.7420$) two months after the IOD phase occurs. Hence current IOD state will affect rainfall of Southern coast of Sri Lanka after two months. At the same time atmospheric temperature shows prominent ($r = 0.7500$) significance with the IOD phase after three months. Hence current IOD state will affect temperature of Southern coast of Sri Lanka three months later. The last quarter of 2018 and 2019 were indicated positive IOD. The IOD peak recorded in October 2019 was synchronized with the signal of rainfall recorded during December 2019. According to the outcomes of the positive IOD peak in October 2018, the coldest monthly temperature (26.35°C) was observed in January 2019. IOD shows positive (negative) relation with cumulative monthly rainfall (temperature), hence rainfall increases (decreases) during positive IOD (negative IOD), and the temperature increases (decreases) with negative IOD (positive IOD). The results of this study can be used to improve productivity in agriculture, tourism, disaster prevention, mitigation, and rainfall forecasting.

Keywords: atmospheric temperature, IOD, month lead analysis, rainfall

*Corresponding Author – email: steebanvinith7@gmail.com