ABSTRACT

The Bay of Bengal (BOB) of the North Indian Ocean is unique due to its location, seasonal reversal of surface winds, huge river discharge and high monsoonal precipitation. The BOB is also influenced by remote forcing from the equatorial Indian Ocean (EIO) and western Pacific Ocean. As a part of this study, long-term analysis of Ocean Heat Content (OHC) in BOB, using measurements and model simulations, indicates a positive trend since 1998, and the heat flux diagnosis suggests accumulation of heat in the central BOB. Also, a regional coupled Ocean-Atmospheric model is customised and validated for the BOB region, and the simulations attest the observed increase in upper ocean heat content, which could also intensify cyclones during La Nina years. The intensification of cyclones in BOB is influenced by the changes in upper ocean conditions and the remote forcing. The study shows that coastal eddies are influenced by remote forcing from the EIO, as the simulations exhibit distinct signatures of remote forcing by the positive and negative Indian Ocean Dipole (IOD) events. The model well simulates the track of cyclones with slight underestimation for the minimum central lower pressure and maximum surface winds. This study also finds that the cyclones are intensified by eddies in BOB. The eddy feedback to cyclones as estimated from the model simulations indicates that the structure of eddy and depth of mixed layer affect the amount of energy transfer from the ocean to atmosphere. The eddy feedback factor for the cyclone Phailin is about 101 (45%), Aila is 41 (80%), Laila is 30 (78%) and Hudhud is 87 (84%). These analyses, thus, suggest that model is able to reasonably simulate air-sea interactions over the bay.

Keywords: Bay of Bengal, Air-Sea interactions, coupled model, OHC, cyclone, eddy, IOD