

ABSTRACT

The Western Boundary Current (WBC) in the Bay of Bengal (BOB), also known as East India Coastal Current (EICC), is continuous and northward (southward) during pre- (post-) Indian Summer Monsoon (ISM), but discontinuous during ISM (June– September). Firstly, the study investigates the features and mechanism of this discontinuity using high resolution Regional Ocean Modelling System (ROMS) simulations. The study shows that the EICC discontinuity during ISM is driven by various westward and southwest ward propagating cyclonic and anticyclonic eddies between two opposite facing flows along the boundary, a northward flow from 10°N and a southward flow from 21°N. This northward flow from north of Sri Lanka is influenced by local winds (June–August) and lately by southern lateral open boundary forcing (September), while the southward flow from the head BOB is forced by summer monsoon current (June–August) and then by local winds (July–September). Secondly, the study examines the individual and combined effect of river discharge and tidal forcing on the EICC discontinuity using ROMS sensitivity experiments with river input, tidal forcing, and both. The analysis shows that the southward reversal of EICC from head bay is enhanced by river discharge, while tidal forcing strengthens the northward EICC from north of Sri Lanka. Again, the river discharge distributes the eddy activity throughout the western BOB, whereas the eddy activity and the discontinuity are well confined near and along the western boundary in tide forcing. Lastly, the study examines the interannual variability of EICC discontinuity in connection to the Indian Ocean Dipole (IOD). The interannual study (2007–2014) indicates a positively related remote link between the IOD index and the volume transport along the western boundary of the bay. The analysis of the ISM period during contrasting IOD events of 2008 and 2010 indicates an intensification of the EICC discontinuity in presence of weak Kelvin wave signals in 2008 compared to 2010. Further, year 2008 accumulates high eddy kinetic energy along the western boundary and the eddy activities are mostly restricted near to the boundary, while during 2010, the eddy genesis and movement are distributed over the western BOB.

Keywords: Bay of Bengal, WBC, EICC discontinuity, ROMS, eddy, IOD