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A new dipole index of the salinity anomalies of the tropical Indian Ocean

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With the increased interest in studying the sea surface salinity anomaly (SSSA) of the tropical Indian Ocean during the Indian Ocean Dipole (IOD), an index describing the dipole variability of the SSSA has been pursued recently. In this study, we first use a regional ocean model with a high spatial resolution to produce a high-quality salinity simulation during the period from 1982 to 2014, from which the SSSA dipole structure is identified for boreal autumn. On this basis, by further analysing the observed data, we define a dipole index of the SSSA between the central equatorial Indian Ocean and the region off the Sumatra-Java coast. Compared with previous SSSA dipole indices, this index has advantages in detecting the dipole signals and in characterizing their relationship to the sea surface temperature anomaly (SSTA) dipole variability. Finally, the mechanism of the SSSA dipole is investigated by dynamical diagnosis. It is found that anomalous zonal advection dominates the SSSA in the CEIO region, whereas the SSSA in the SJC region are mainly influenced by the anomalous surface freshwater flux. This SSSA dipole provides a positive feedback to the formation of the IOD events.