Signatures of Ocean Oxygen-Depleted Waters along the Sumatra-Java Coasts in the Southeastern Tropical Indian Ocean

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Figures

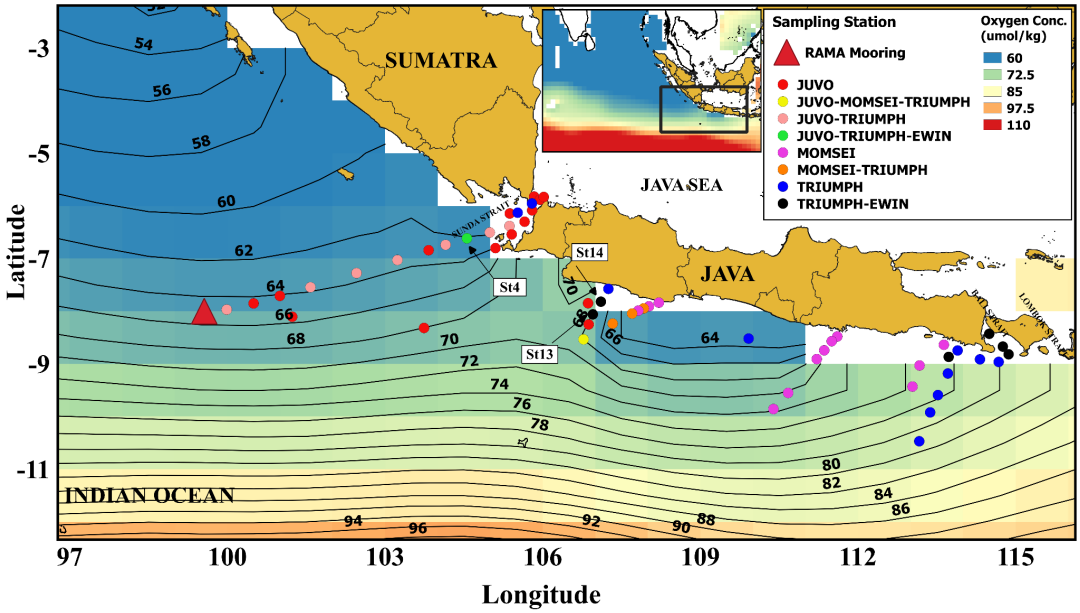


Figure 1. Study area showing sampling stations during international cruise campaigns between 2010-2022 (color dots) and a RAMA buoy (red triangle). DO data from cruise observations measured in 2022 at St. 04, St. 13 and St. 14 are used for the model validation. The contours represent the mark DO concentration (µmol kg-1) at a 600 m depth from WOA23 Annual Mean Data.

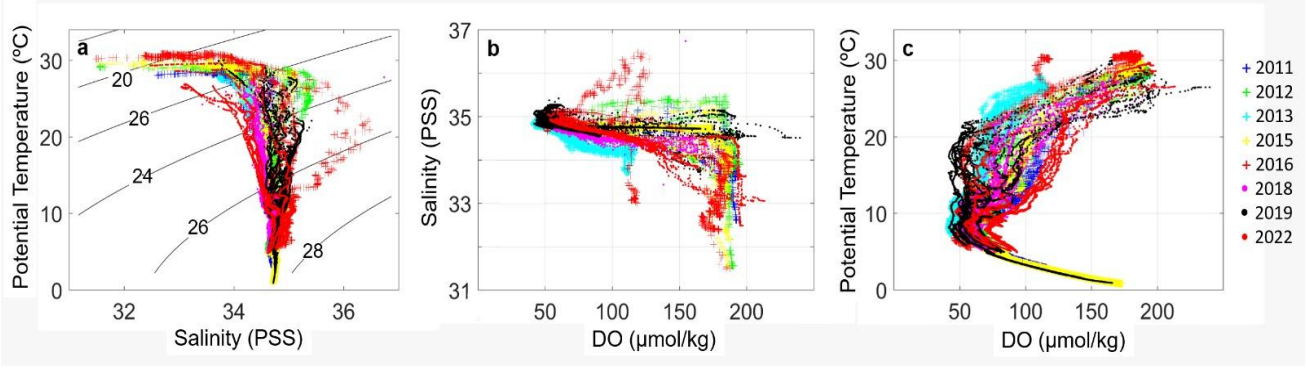


Figure 2. Relationships between potential temperature, salinity and DO at compiled stations of the 2010-2022 cruises.

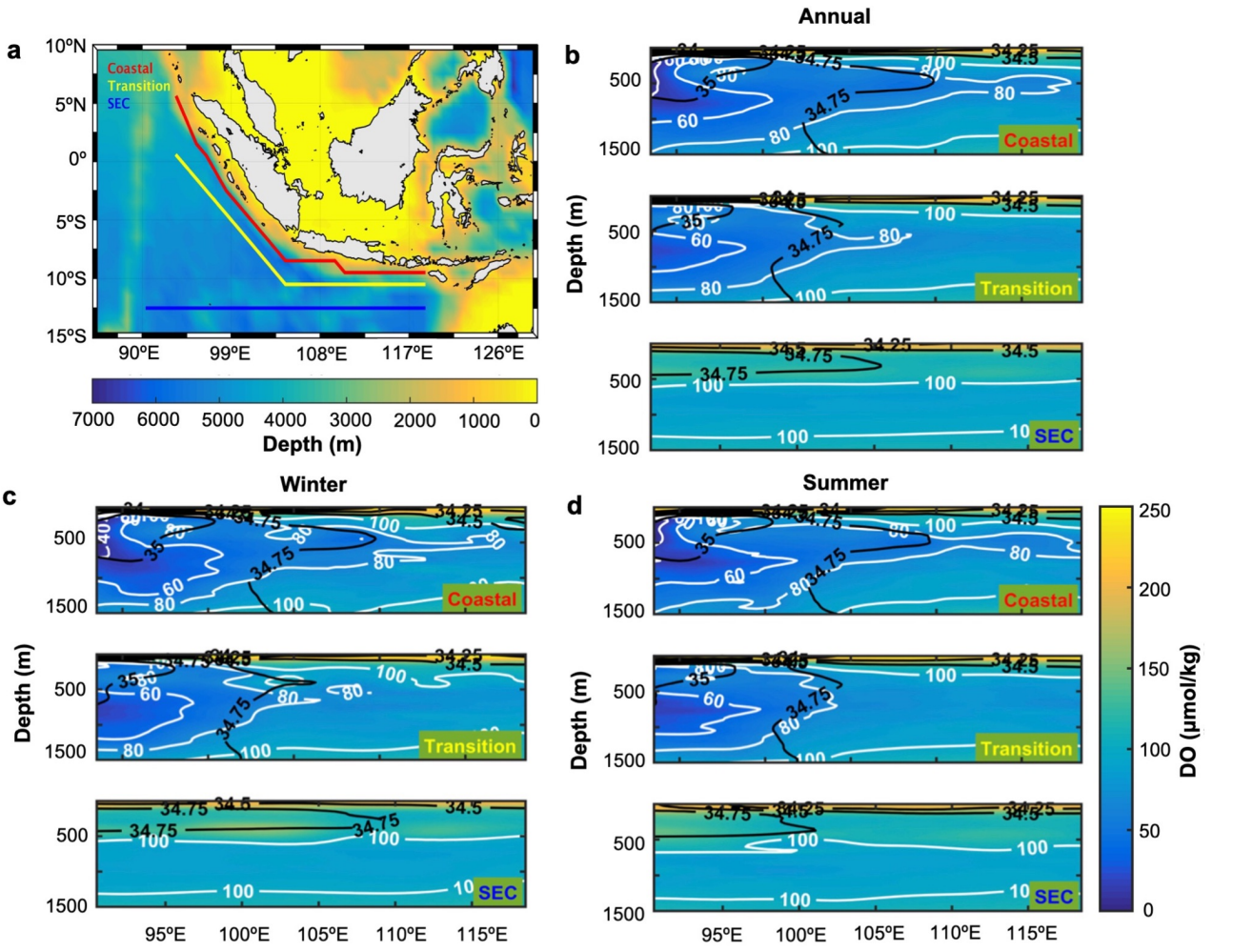


Figure 3. The area of study interest in the SETIO region adjacent to the coasts of Sumatra and Java. **(a)** Red (coastal), yellow (transition), and blue (SEC) lines are cross-sections in which DO concentrations are analyzed. **(b)** Annual climatology DO. **(c)** Boreal winter (Jan-Mar) climatology DO. **(d)** Boreal summer (July-Sept) climatology DO. The white and black contours mark DO and 34-35.5 PSS isohalines, respectively. DO and salinity data of WOA23.

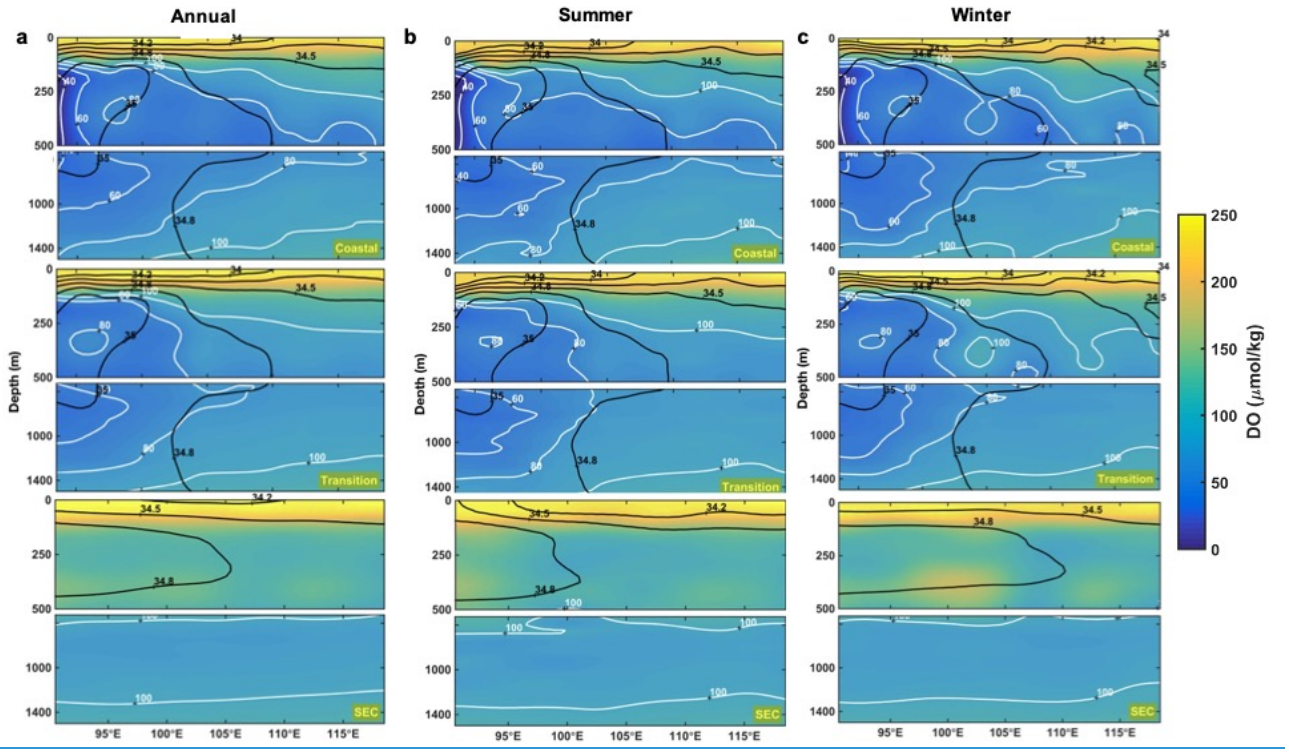


Figure S1. Showing in the upper 150 m, DO concentration and salinity are slighlty homogeneous.

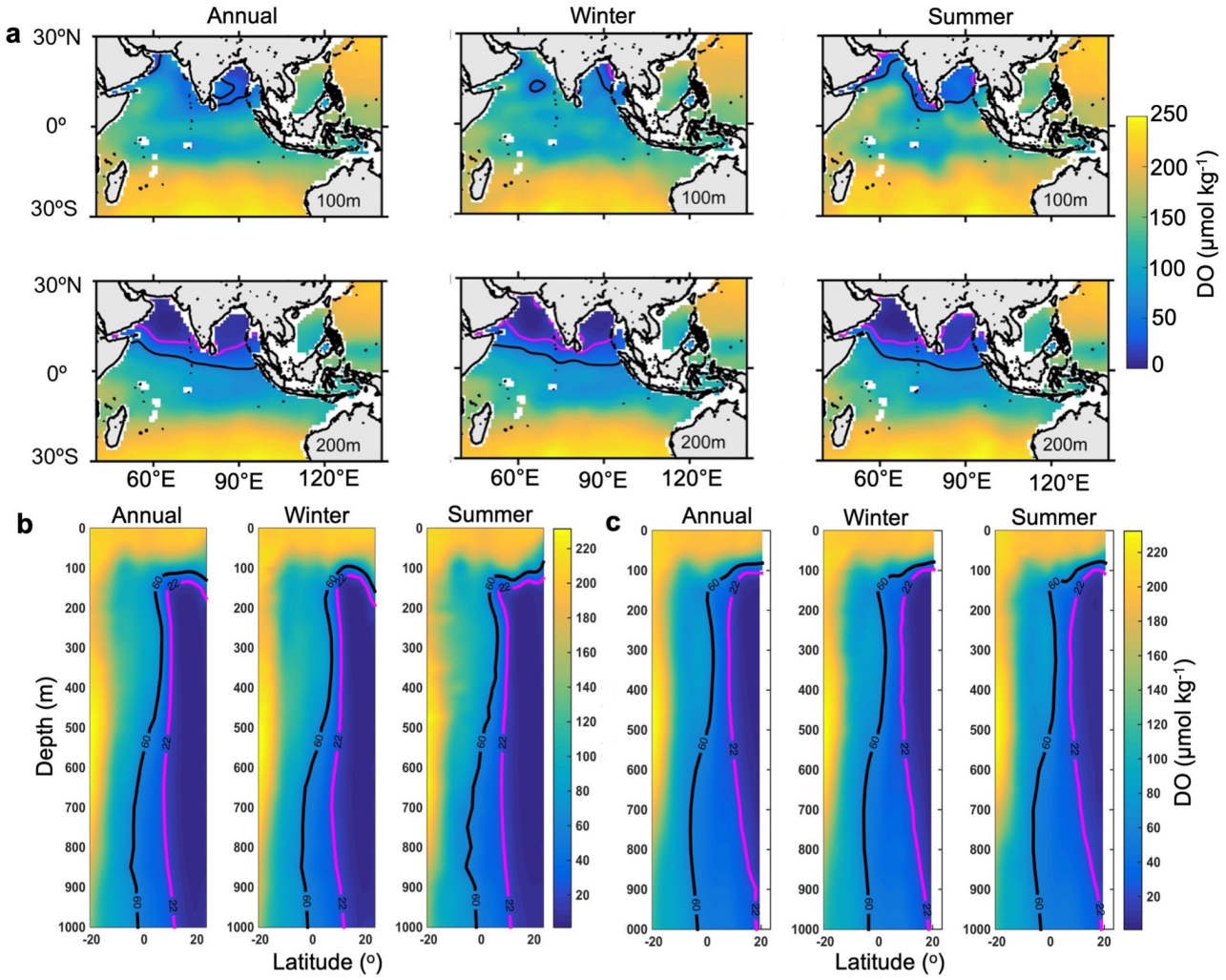


Figure 4. (a) Annual, Boreal winter (Jan-Mar), and Boreal summer (July-Sept) climatology DO concentrations across depths at 100 and 200 m. Meridional transect of DO in the upper 1000 m of Indian Ocean at **(b)** 65°E, 23°N-20°S and **(c)** 90°E, 23°N-20°S. The black and purple lines in all panels denote the OLZ (DO=60 μmol kg^{-1}) and the OMZ (DO=22 μmol kg^{-1}), respectively. DO data of WOA23 .

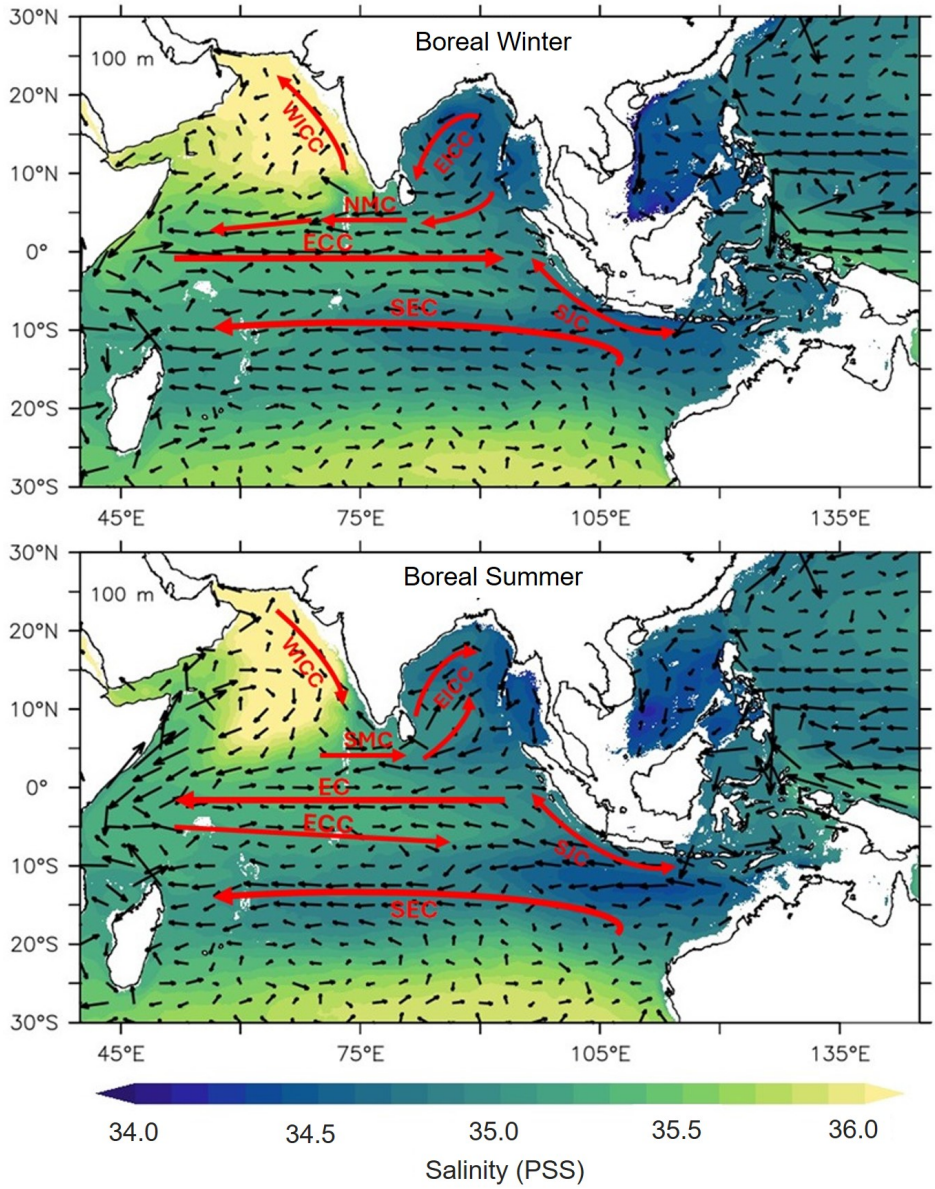


Figure 5. (Upper) Salinity (color) and currents (arrows) in the Indian Ocean across depths at 100 m the boreal winter (Jan-Mar). **(Below)** Similarly for the boreal summer (July-Sept). Ocean currents in the northern Indian Ocean are shown in the upper and below panels (red arrows): the Eastern Indian Coastal Current (EICC), the Western Indian Coastal Current (WICC), the Equatorial Current (EC), the Equatorial Counter Current (ECC), the South Equator Current (SEC), the Southwest Monsoon Current (SMC), the Northeast Monsoon Current (NMC), and South Java Current (SJC). The ocean current adapted Shankar et al. (2002). Salinity and current data of CMEMS.

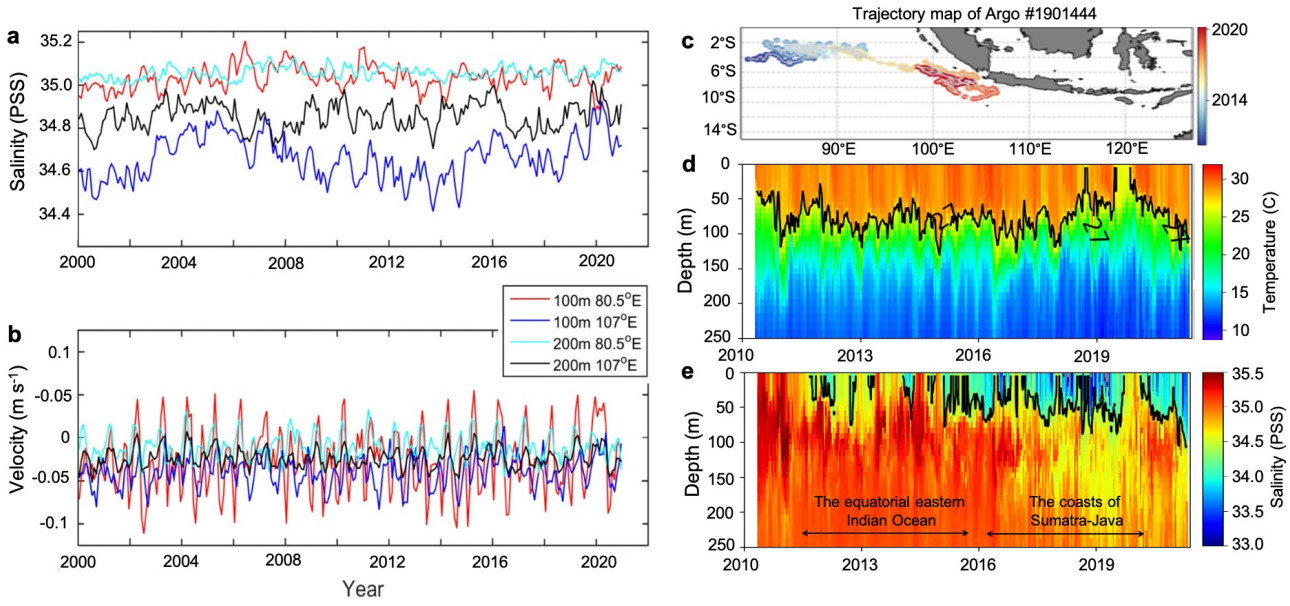


Figure 6. (a) The averaged salinity (PSS) and **(b)** meridional velocity (m s^{-1}) in the equatorial Indian Ocean (3°N-3°S, 80.5°E) and southern Java (7.75-9.5°S, 107°E) at 100 m and 200 m depths. **(c)** Trajectory map of Argo float ID #1901444 in the eastern Indian Ocean. **(d)** *In situ* temperature and **(e)** salinity (PSS) of Argo. The black line in panels (d) and (e) denote the 27℃ isotherm and 34.3 PSS isohaline, respectively. Salinity and current data in panels (a) and (b) of CMEMS.

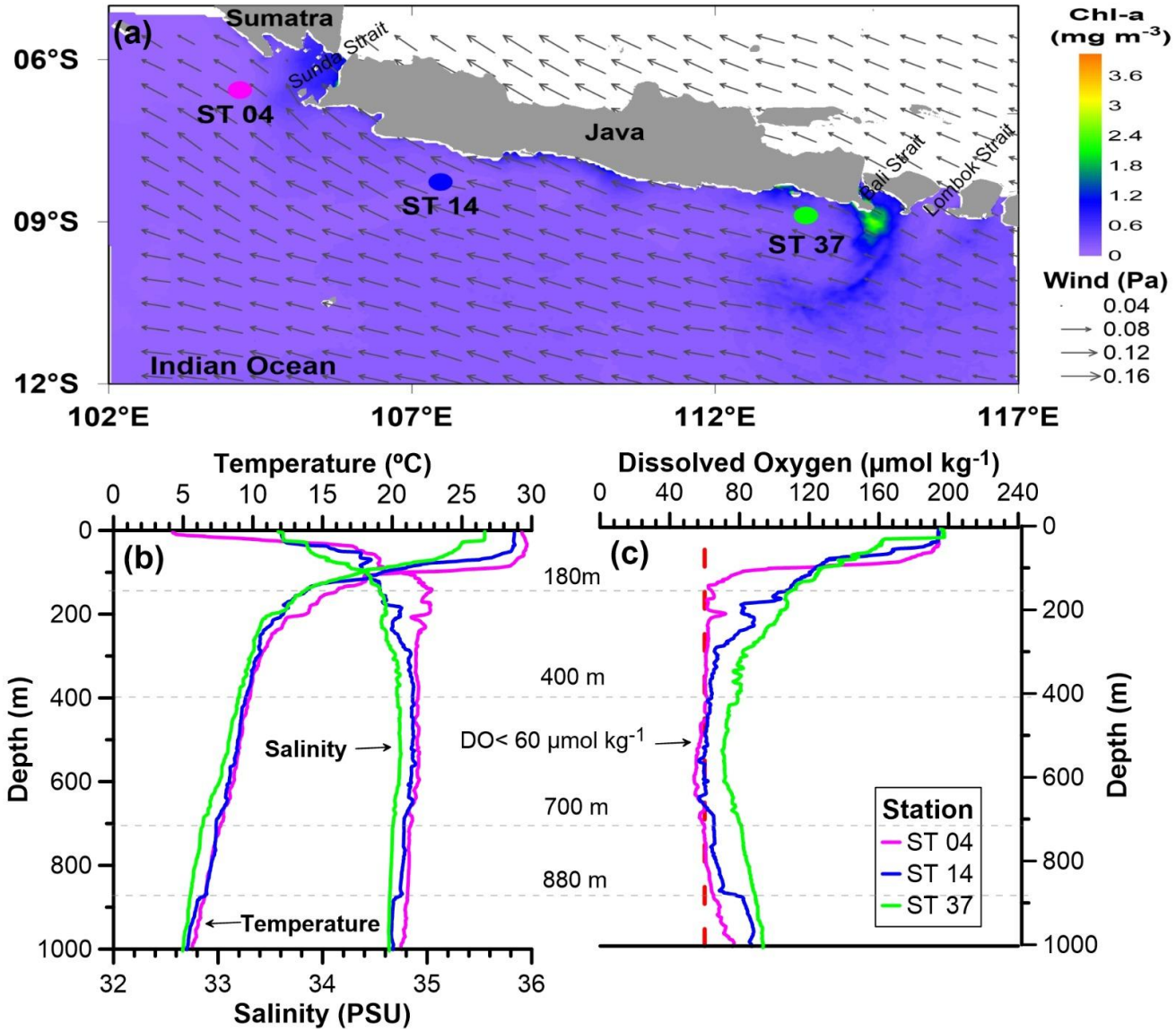
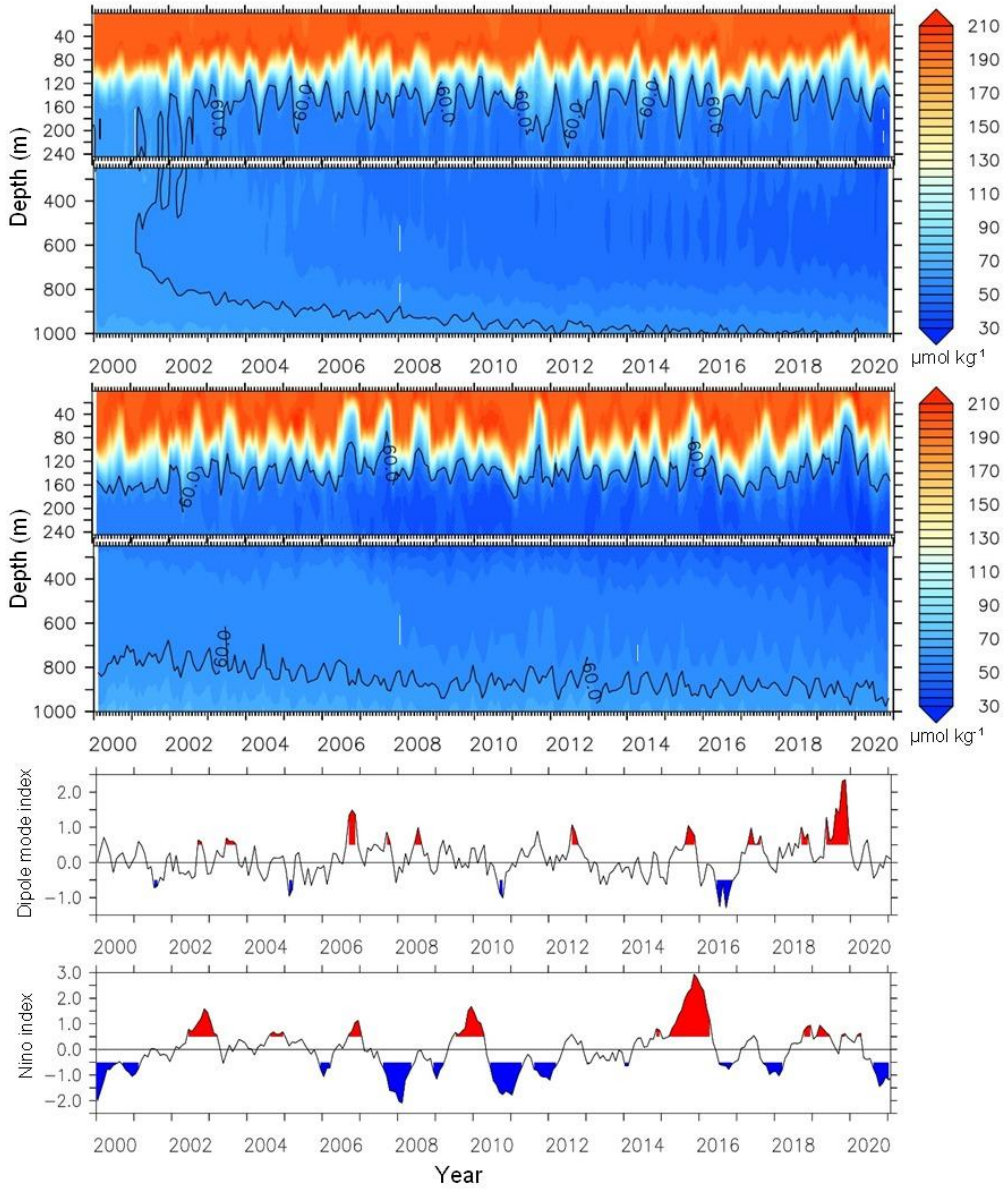


Figure 8. (a) Locations of observational stations 04, 14 and 37 in southern Java during the July 2022 cruise with mapped chlorophyll-a (mg m-3,colors) and westward wind stress (arrows). **(b)** Vertical profiles of temperature (^{o}C) and salinity (PSS). **(c)** Vertical profile of DO (µmol kg-1). The chlorophyll-a and westward wind stress data of NOAA.



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78 **Figure 9. (a)** Comparison of DO (µmol kg^{-1}) in western Sumatra (3°S, 98°E) between 2000-2020
79 against the IOD and ENSO shown in panels **c** and **d**, respectively. **(b)** Similarly in southwestern Java
80 (7.75ºS, 107ºE). Black lines mark the OLZ (DO=60 µmol kg^{-1}) thresholds. IOD and Niño 3.4 indices
81 apply the ± 0.5^{o}C thresholds.