Abstract

This exhaustive investigation seamlessly integrates CMIP6 models to unravel the intricate dynamics of the Bay of Bengal (BoB). The pivotal role of the Coupled Model Intercomparison Project (CMIP) within the World Climate Research Program (WCRP) is underscored in providing Atmosphere-Ocean General Circulation Models (AOGCMs) through CMIP6. The study meticulously analyzes Sea Surface Temperature (SST), Sea Surface Salinity (SSS), and carbonate parameters, leveraging CMIP6 models alongside other reference datasets. The challenge of simulating salinity in the BoB, attributed to a substantial influx of freshwater and intricate water mass mixing, is addressed by identifying CIESM as the optimal model based on skill scores. Employing CIESM to scrutinize freshwater spread (FWS) correlations with pH and utilizing artificial neural networks, the study pioneers a methodology that significantly enhances salinity predictions. This innovative analysis contributes to refined data curation, advancing our profound understanding of the BoB's intricate dynamics and responding to the alarming increase in seawater acidity by investigating Dissolved Inorganic Carbon (DIC), partial pressure of carbon dioxide (pCO2), pH, and Total Alkalinity (TALK) using CMIP6 models. Noteworthy findings include monsoon-induced pCO2 oscillations and low CaCO3 saturation levels, with Ωcal and Ωarg reaching approximately 6.0 and 4.0, respectively, in the western bay, indicating an ongoing increase in acidity.

Keywords: CMIP6, Ocean acidification, ANN, Deep Neural networks, Freshwater plume spread, Upwelling