A validation and intercomparison of Ocean Forecasting and Analysis Systems in the southern African region

The dynamic southern African region, where three oceans converge, offers a unique opportunity for comprehensive validation and intercomparison of multiple global ocean reanalysis and forecast products. We assess key parameters such as temperature, salinity, sea surface height (SSH), and eddy kinetic energy (EKE) across various domains of the larger Benguela and Agulhas Current Systems, including the Agulhas retroflection; one of the most energetic regions in the world. Special attention is given to seasonal biases in sea surface temperature (SST) along regions of the South African shelf where upwelling dynamics are crucial to the local fishing industry. The reanalysis products evaluated in this study are Mercator's Global Ocean Reanalysis (GLORYS), the First Institute of Oceanography's Climate-Ocean Model Reanalysis (FIOCOM), the Fleet Numerical Meteorology and Oceanography Center's Hybrid Coordinate Ocean Model (HYCOM) reanalysis and the Commonwealth Scientific and Industrial Research Organisation's Bluelink Reanalysis (BRAN). Using regional observational data, we then assess the forecast skill of the operational Mercator Global Ocean Analysis and Forecast product with class 4 metrics. In the Algoa Bay region, we contrast the Mercator product's forecast skill against a high-resolution operational Coastal and Regional Ocean Community (CROCO) forecast product, providing critical insights into the quality of forecast products available to various South African stakeholders.

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