



Machine learning algorithm reveals deoxygenation in the Agulhas Current due to warming

We utilized the random forest regression algorithm to predict near-surface dissolved oxygen concentrations ([O₂]) from multiple predictors in the Agulhas Current and present the first analysis of the dynamics in this region. The algorithm (Agulhas-RFR) predicts [O₂] exceptionally well, and permutation importance from the ensemble show sea surface temperature (SST) as the highest-ranking predictor. Seasonal changes in solubility, wind, and productivity drive [O₂] and the [O₂] flux in the Agulhas Current. The seasonal [O₂] flux to the atmosphere reaches 1.84 mol m⁻² yr⁻¹ during Austral winter across the Agulhas Current. A decreasing [O₂] trend of up to -7 μmol kg⁻¹ yr⁻¹ due to warming is revealed for the period 2000 to 2023 in the Agulhas Current. Strengthening westerlies contribute to [O₂] draw-down South of the Agulhas Return Current. The Agulhas-RFR reveals a declining [O₂] trend of -2.29±0.61 μmol kg⁻¹ yr⁻¹

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