



Negative bias of dissolved oxygen measurements by profiling floats

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We report the performance of dissolved oxygen (DO) measurements by profiling floats deployed in the North Pacific by Japan Agency for Marine-Earth Science and Technology (JAMSTEC) and Tohoku University, Japan. Compared with the shipboard bottle sampling observations at the deployments, the first DO profiles of floats show negative biases systematically: the biases on isothermal surfaces are about 0-10 $\mu\text{-mol kg}^{-1}$ in the deep layer and then they increase in the upper layers. The maximum value of the biases exceeds 40 $\mu\text{-mol kg}^{-1}$ in surface layer. These features are found in all floats and both Optode and SBE43. It is concluded that the negative biases of the sensors be greater than their nominal measurement errors even though a part of them must be caused by ocean variations. The larger biases are found in the layers with strong vertical gradient of DO, which suggests one of the major causes of these biases be slower response of DO sensor. These biases are comparable with estimated values of the annual DO consumption rates there, thus DO measurements by profiling floats with the current DO sensors should be used for water mass analysis with further consideration of absolute accuracy. It is necessary to develop data correction procedures for DO data measured by profiling floats, and also to improve the DO sensor itself to enhance its measurement accuracy.