Understanding Full-Depth Steric Sea Level Change in the Southwest Pacific Basin using Deep Argo

Ratnaksha Lele¹ and Sarah G. Purkey¹

¹Scripps Institution of Oceanography, University of California San Diego

May 22, 2024

Abstract

Using nine years of full-depth profiles from 55 Deep Argo floats in the Southwest Pacific Basin collected between 2014 and 2023, we find consistent warm anomalies compared to a long-term climatology below 2000 m ranging between 11±2 to 34±2°C, most pronounced between 3500 and 5000 m. Over this period, a cooling trend is found between 2000-4000 m and a significant warming trend below 4000 m with a maximum rate of 4.1±0.31 m°C yr⁻¹ near 5000 m, with a possible acceleration over the second half of the period. The integrated Steric Sea Level expansion below 2000 m was 7.9±1 mm compared to the climatology with a trend of 1.3±1.6 mm dec⁻¹ over the Deep Argo era, contributing significantly to the local sea level budget. We assess the ability to close a full Sea Level Budget, further demonstrating the value of a full-depth Argo array.