Role of the deep North Pacific in overturning circulation and carbon cycling

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At present, the North Pacific constitutes one of the main marine natural carbon sinks and thus helps regulate atmospheric CO\textsubscript{2} concentrations. Understanding past changes in North Pacific deep water circulation and biological productivity are of particular importance, since the region likely changed these characteristics on both orbital and millennial time scales, and may have even undergone switches between being a carbon source and sink. We present a suite of new sediment records retrieved from the subarctic Northwest Pacific along the Emperor Seamount Chain in order to contribute to the Pleistocene stratigraphy and reconstruct changes in the physical and biological carbon pump on millennial to orbital timescales. We used high-resolution AMS 14C-derived benthic-planktic (B-P) foraminiferal ventilation ages, and stable carbon and oxygen isotopes of epibenthic foraminifera along both meridional and water depth transects in order to establish deep water ventilation patterns and reconstruct nutrient concentrations over the last 200 ka. We used X-ray fluorescence (XRF)-scanning records combined with radiocarbon dating to correlate prominent patterns between sediment cores, and to develop a stratigraphic framework for the study area. We used changes in Ba/Ti, Ca/Ti, Si/Ti ratios to assess variations in biological productivity. Biogenic Barium (Ba/Ti) and Calcium (Ca/Ti) ratios generally show high values during interglacials and low values during glacial periods. This pattern resembles subpolar Northwest Pacific ODP Site 882, which shows a good correlation to the global CO\textsubscript{2} record. These results provide evidence for the close link between global climate, the ocean carbon cycle and marine biogeochemistry in North Pacific.