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Evolution of deepwater nutrient and oxygen concentrations in the Southwest Pacific Ocean across Termination V: evidence from benthic foraminifera Cd/Ca, U/Mn and carbon stable isotope records

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Changes in biogeochemical cycles are tightly related to past climate variations. Fluctuating transfers between the different reservoirs of the climate system, and especially between the ocean and the atmosphere, are thus explored. However, reconstructions of those fluxes are poorly documented, partly due to the difficulty in recording the nutrient content of the ocean. In this study, we propose to use various elemental ratios coupled to the carbon stable isotope signature ($\delta^{13}C$) in benthic foraminifera from core MD97-2115 - Southwest Pacific Ocean (43°6'30"S, 171°29'7.8"W, 2160 m) - over MIS12-MIS10, including Termination TV. The Cd/Ca ratio is able to reconstruct the Cd concentration of seawater (Cd_{sw}) and is related to global nutrient concentrations; the U/Mn ratio is a proxy for past oxygen content of deep-water masses. The ratios have been measured on *Cibicidoides kullenbergi* (sensu lato and sensu stricto morphotypes, Cd-cleaning[1]) and combined with the $\delta^{13}C$ obtained on *C. wuellerstorfi.* Comparable Cd/Ca and U/Mn data are obtained for both *C. kullenbergi* morphotypes. Our main results are: i) a Cd/Ca increase from an average of 0.07 µmol/mol during MIS12 to reach a plateau at about 0.14 µmol/mol during MIS11, giving calculated Cd_{sw} values lower than the coeval Cd_{sw} obtained in the South Atlantic[2] and East Equatorial Pacific[1] oceans; ii) an abrupt rise in the $\delta^{13}C$ values from -0.2‰ during MIS12 to 0.4‰ during TV; iii) a high plateau in the U/Mn signal (~ 622 µmol/mol) during MIS12, and a sharp decrease (~ 219 µmol/mol) during TV, followed by a gradual increase over MIS11 (~ 700 µmol/mol). The abrupt depletion during TV concurs with the U/Mn records recently obtained from the East Pacific Rise[3] and the South Atlantic Ocean[4], corroborating the circum-Antarctic extent of the deep-water ventilation. Overall, our results suggest a large shift in the nutrient budget and ventilation history of the Southwest Pacific Ocean across TV.

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