

Glacial-interglacial variability in Indian Ocean Antarctic Intermediate Water circulation

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It has been hypothesized that Antarctic Intermediate Water (AAIW) may have been a key ventilation pathway transporting respired carbon and nutrients stored in deep waters during the last glacial period to shallow subsurface equatorial waters during deglaciation. While study of past AAIW has primarily focused on the Atlantic and Pacific sectors of the Southern Ocean, both of which have regions of AAIW formation, little is known about past AAIW in the Indian Ocean sector of the Southern Ocean. The composition of Indian Ocean AAIW is influenced by key gateways (ie Agulhas and Tasman gateways) with the Atlantic and Pacific. Reduced exchange along these gateways during periods of reduced overturning circulation could result in divergence of AAIW composition across different sectors of the Southern Ocean. Here, we utilize benthic (mixed) and planktic (*Globorotalia inflata*) foraminifera $^{14}\text{C}/^{12}\text{C}$ ratios ($\Delta^{14}\text{C}$), ratios of Cd to Ca (Cd/Ca) in the aragonitic benthic foraminifera *Hoeglundina elegans*, along with *Cibicidoides lobatulus* carbon isotope ($\delta^{13}\text{C}$) values from AAIW depth Southern Indian Ocean sediment core TT1811-50GGC (38.344°S, 77.715°E, 1,116 m) to unravel glacial-interglacial AAIW variability. We use paired measurements of Cd/Ca and $\delta^{13}\text{C}$ to estimate water mass nutrient properties and isolate the influence of air-sea gas exchange on $\delta^{13}\text{C}$ ($\delta^{13}\text{C}_{\text{as}}$). We find that the composition of Indian Ocean AAIW was more enriched in both Cd/Ca and $\delta^{13}\text{C}$ relative to Atlantic AAIW, suggesting reduced inter-ocean mixing among AAIW endmembers. Elevated preformed Cd in Indian Ocean AAIW could also occur as a result of increased phytoplankton uptake of PO_4 relative to Cd due to the alleviation of Fe-limiting conditions.