

Antarctic impact on ocean circulation during late Messinian ocean circulation, insights from IODP Exp. 361 sites.

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Different models indicate a marked increase in ice-volume in Antarctica (approx. 50%) during the late Messinian, that culminate in large glaciations (TG22, 20 and 18) when the Antarctic ice-sheet was probably larger than today. Until recently there were only limited late Messinian records that could be used to investigate the influence of these Antarctic ice-sheet expansions on paleoclimatic and palaeoceanographic variability. A key location where this influence is poorly known is the boundary between the Indian and the Atlantic Ocean, which is an integral inter-ocean link in the global thermohaline circulation. In 2016 the International Ocean Discovery Program (IODP) Expedition 361 ("SAFARI") recovered a complete high-resolution Messinian sedimentary succession at 3 drilling locations on the southeast African margin and in the Indian-Atlantic Ocean gateway. Here we present results from Site U1475 (Agulhas Plateau), a location proximal to the entrance of North Atlantic Deep Water (NADW) to the Southern Ocean and South Indian Ocean. The site is located over sedimentary drift deposits in 2669 m water depth and comprised of carbonate-rich sediments (74 – 85 wt % CaCO₃). Based on high-resolution data sets of density, velocity, natural gamma radiation, X-ray fluorescence (XRF) core-scanning data, colour reflectance, grain size distributions and planktonic foraminifera oxygen isotope data, we reconstruct major circulation changes in bottom current as well variations in orbitally-controlled climate variability that can be linked to the Antarctic ice-sheet expansions.