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Changing sediment physical properties at the Agulhas Plateau (IODP Site U1475): indications for the long-term variability of deepwater circulation over the last 7 Ma

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The gateway south of South Africa constitutes an integral inter-ocean link in the global thermohaline circulation (THC) since it allows the exchange of shallow- and deepwater masses between the Indian and the Atlantic. Thus understanding past variations of this current system is important for improving our knowledge of the global climate. The long-term changes in deepwater flow in the Atlantic-Indian gateway during the Cenozoic have been initially studied using reflection seismic profiles. But in many cases the seismic stratigraphy is poorly constrained and not further resolved within the time period from the late Miocene to present. In particular, there are limited Pliocene records that can be used to investigate the influence of climatic (e.g. Antartic ice volume) and tectonic (e.g. closure of the central American seaway) on the deep-water variability.
Here we focus on the bottom water flow around the Agulhas Plateau, a location proximal to the entrance of North Atlantic Deep Water (NADW) to the Southern Ocean and South Indian Ocean. IODP Expedition 361 (SAFARI) Site U1475 was drilled in 2669 m water depth into a sediment drift that is deposited on the southwestern flank of Agulhas Plateau and comprises a complete stratigraphic section of the last ∼7 Ma. We present cleaned, edited, and spliced high-resolution data sets of sediment physical properties measured at Site U1475. Synthetic seismograms generated from the velocity and bulk density core scanning records allow a detailed correlation oft the drilling results with the Site survey seismic reflection profiles. Seismic reflectors at 3.75 and 3.87 s (two-way-traveltime) correspond to major increases in acoustic impedance at ∼110 and ∼216 meters below seafloor. Based on the preliminary shipboard biostratigraphic age model sediments at these depths have ages of ∼4.0 and ∼5.1 Ma, respectively. Furthermore spectral analyses of physical property records such as natural gamma radiation and colour reflectance reveal climate variability on orbital and suborbital timescales.