

Using Provenance of Terrigenous Sediment to Reconstruct the Agulhas Leakage During the Early and Late Pleistocene

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The Agulhas Current, the strongest western boundary current in the southern hemisphere, is uniquely characterized by its strong retroflexion. The current carries water southward from the Indian Ocean toward the cape of South Africa, before turning back on itself. At this point of retroflexion, some of the current's flow escapes into the southern Atlantic Ocean. The eddies and rings that feed Indian Ocean water into the Atlantic Ocean make up the Agulhas Leakage. The Leakage is located in the Cape Basin south of the African continent, and fed by the Agulhas Current as well as water from the South Atlantic Current. Scientific literature demonstrates that relatively buoyant leakage water has been a determining factor varying strength of the Atlantic Meridional Ocean Current (AMOC), during glacial-interglacial cycles. In 2016, on the International Ocean Discovery Program Expedition 361, sediment cores were drilled at 6 sites in the Greater Agulhas region. The goal of the expedition was to expand knowledge of the relation between changes in the Agulhas System and changes in paleoclimate, southern African climate, and AMOC. We analyzed sediment from Expedition 361 Site U1479 (coordinates 35° 03.53'S; 17° 24.06'E; water depth of 2615 mbsl) located where the Agulhas Leakage occurs. Calcium carbonate and ferromanganese were dissolved from the samples, before isolating the <2 micron clay fraction. Column chemistry and Argon mass spectrometry were performed on the fine fraction sediment, representing only terrigenous sources. We expect K-Ar ages, major and trace element concentrations to show older terrigenous sediment provenance during warmer periods of deposition and younger terrigenous sediment provenance from colder periods. This would correspond to more input from southeastern African end members, and thus a stronger Agulhas Current, during warming periods in the paleoclimate record.