What was the Agullhas Current System like During the Mid-Pleistocene Transition?

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The Mid-Pleistocene Transition was a geological time period that lasted about 500,000 years (0.7 Ma-1.2 Ma). This transition is named for the change in the dominant period of glacial to interglacial cycles from 41,000 years before 0.7 Ma to 100,000 years after 1.2 Ma. Researchers have been searching for the cause of this event and signs are pointing to the Earth system. Southeast Africa is home to the Agulhas Current, which is the largest western boundary jet current located in the Southern hemisphere. At the southernmost point of Africa, the Agulhas Current retroflects on itself, causing warm, salty water to create eddies before joining the Atlantic Ocean's thermohaline circulation (THC). Researchers are able to track leakage from the Agulhas through geochemical analysis of radiogenic isotopes. Potassium (K) and argon (Ar) were used in this project as tracers. K and Ar are abundant in nature and also may be processed quickly in a lab (Hemming et al, 2019). Once the samples generated data, the model ages were found using a radiometric dating equation which requires K's half-life as well as the concentrations of K and Ar. Dually, site U1474 works to determine flux of terrigenous sediment into the Agulhas Current and also works as an endmember for U1479. Site U1479 is primarily used to track how much of the warm salty water is leaking out into the Atlantic Ocean. Results show that U1479 has variability in levels of K ranging from 2 to 3.6 %K, while U1474 is more consistent ranging from 1.5 to 2 %K. U1474 is close to the average value for global sediments; containing about 2% K, possibly implying another endmember for site U1479 which would need to be researched in further detail. According to our data, U1474 has considerably lower ages than what was expected. While U1474 still contributes to U1479's provenance, it is not as strong as was thought before this project's research.