Paleo-Hydrography south of Africa: How did the position of the Subtropical Front (STF) change and what is its role in regulating Agulhas Leakage since the Last Glacial Maximum?

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While climate variability throughout the late Pleistocene and Holocene is linked to changes in insolation and atmospheric CO_2, differences in the intensity of this variability indicate that other mechanisms are at work in the perturbation and stabilization of global climate. A proposed cause for glacial terminations - the rapid transition from glacial to warm interglacial climate - is the change in ocean circulation associated with a shift in westerly wind belts and corresponding oceanic fronts. Understanding the mechanisms behind such rapid events is critical to our prediction of future climate responses to anthropogenic global warming. This project reexamines the hypothesis that southward migrations of the Subtropical Front (STF) south of Africa allowed for increased Agulhas Leakage, which is recognized as a key component of the warm return route of Global Thermohaline Circulation, and is a possible prerequisite for North Atlantic overturning. We present new $\%CaCO_3$, Mg/Ca and stable oxygen isotope ($\delta^{18}O$) records using planktonic and benthic foraminifera for two sediment cores, VM34-158 (-41.25˚S) and VM34-155 (-42.17˚S), off the flank of the Agulhas Plateau. Benthic $\delta^{18}O$ and $\%CaCO_3$ provide a framework for stratigraphy and the extent of dissolution throughout the cores. Planktonic Mg/Ca and $\delta^{18}O$ of *G.bulloides* serve as proxies for sea surface temperature (SST) and salinity (SSS), and will be used to constrain the position of the STF with respect to changes in Agulhas Leakage. We observe a clear signal of the LGM and Holocene horizons and the Last Glacial termination ~18ka in all proxies. Higher $\delta^{18}O$ and lower Mg/Ca ratios characterize the LGM, with the inverse situation for the early Holocene. Mg/Ca averages are 1.32±.21 and 1.04±.02 mmol/mol during the LGM, with $\delta^{18}O$ averages of 3.17±.32‰ and 3.46±.28‰ for VM34-158 and VM34-155 respectively. The early Holocene features increased Mg/Ca averages of 1.52±.18 and 1.318±.12 mmol/mol, and reduced $\delta^{18}O$ averages of 2.17±.35‰ and 2.21±.28‰. There is a strong similarity in SST changes between and within the two cores, however, the change in SST proxies is greater at -42.17˚S. While there is increased dissolution seen in $\%CaCO_3$ and Mg/Ca data during the LGM, like trends in the extent of dissolution indicate that the cores were similarly affected, and that temperature gradients should be preserved. We therefore affirm the suitability of these cores in demonstrating changes in surface ocean hydrography since the Last Glacial Maximum. More high-resolution down-core records and increased resolution records of these cores in the Agulhas Region are necessary to completely constrain the position(s) of the STF over the past 25ka.