

EGU2020-9828

<https://doi.org/10.5194/egusphere-egu2020-9828>

EGU General Assembly 2020

© Author(s) 2023. This work is distributed under the Creative Commons Attribution 4.0 License.



The Role of Changing Indian Ocean Salinity in shaping Pleistocene Climate

Sophie Nuber^{1,2}, James W. B. Rae², Morten B. Andersen¹, Bas de Boer³, Xu Zhang^{4,5}, Ian R. Hall¹, and Stephen Barker¹

¹Cardiff University, United Kingdom

²University of St. Andrews, United Kingdom

³Vrije Universiteit Amsterdam, The Netherlands

⁴Alfred Wegener Institute, Germany

⁵Lanzhou University, China

Indian Ocean surface salinity dynamics are thought to play an important role in shaping glacial-interglacial climate through controlling Agulhas leakage efficiency. It is proposed that a strong Agulhas leakage supplies warm and salty Indian ocean surface waters to Atlantic surface currents influencing convective potential at North Atlantic deep-water formation sites. Here, we present new planktonic foraminiferal Mg/Ca and stable isotope-derived salinity reconstructions for the last 1.2Ma from the northern Mozambique channel. We find salinity increases well before terminations, followed by early decrease before glacial inception. We present a possible link between the hydrography in the northern Mozambique channel and whole ocean salinity changes due to unique surface circulation in the Indian ocean. Despite being a mostly tropical and subtropical ocean, salinity in the modern tropical Indian Ocean is fresher than at comparable latitudes in the Atlantic or Pacific. This is due to the inflow of freshwater from the Indonesian throughflow and recycling via an active Agulhas leakage. We show that salinity in the glacial western Indian Ocean was significantly higher due to a reduced ITF and a weaker Agulhas leakage. We hypothesise that opening and closing of these two gateways influences the development/diminishment of a strong subtropical Indian Ocean gyre which controls sea surface salinity and temperature of tropical Indian Ocean water masses and subsequently the efficiency of the Agulhas Leakage.