



ON THE RECONSTRUCTION OF AGULHAS RINGS AND AGULHAS LEAKAGE INTO THE SOUTH ATLANTIC: FROM PLANKTON TOWS TO PALEOCEANOGRAPHY

F. Peeters (1), R. Acheson (2), G.-J. Brummer (3), G. Ganssen (1), D. Kroon (1), R. Schneider (4)

(1) Faculty of Earth and Life Sciences, Vrije Universiteit, De Boelelaan 1085, 1081 HV Amsterdam, The Netherlands / (peef@geo.vu.nl), (2) Grant Inst. of Geology, Univ. of Edinburgh West Main Road, Edinburgh EH9 3JW, Scotland, UK., (3) Dept. of Marine Chemistry and Geology, Royal Netherlands Inst. for Sea Research (NIOZ), P.O. Box 59, 1790 AB Den Burg, Texel, The Netherlands, (4) Fachbereich Geowissenschaften Universitaet Bremen, Postfach 330 440, 28334 Bremen, Germany.

Off South Africa, surface and intermediate waters flow from the Indian- to the Atlantic Ocean in the form of Agulhas rings and/or as direct Agulhas leakage. The inter-ocean exchange of water plays a crucial role in the global thermohaline circulation due to the contribution of heat and salt from the Indian to the South Atlantic Ocean. We use the shells of different species of planktic foraminifera to reconstruct the late Pleistocene paleoceanography and the history of inter-ocean exchange off South Africa. Our geological archive from the Cape Basin, is located on the continental slope southwest off Cape Town, exactly underneath the pathway of Agulhas rings and direct Agulhas leakage. Observations on living planktic foraminifera, collected with depth stratified plankton tows in this area (years 2000 - 2001), show that Agulhas ring waters are characterised by a distinct faunal composition. Based on these observations we are able to select those species that are strictly associated to waters that have originated from the Agulhas current, thus excluding signals from other water masses. Our reconstruction suggests that greatest Agulhas transport into the South Atlantic occurred in inter-glacial periods, with maxima during MIS 1, 5, 7, 11 and 15. During the glacial periods MIS 2, 6, 8, 10, 12 and 14, however, the Agulhas transport was strongly reduced as indicated by low abundances of species associated with Agulhas waters. The

most extreme paleoceanographic/climatic event over the last 600 kyrs occurred during MIS 12; a period characterised by a total closure of the Agulhas transport into the South Atlantic. Remarkably, the closure of the Agulhas gateway during MIS 12 coincides with the collapse of the global thermohaline circulation during this period as indicated in the $\delta^{13}\text{C}$ of benthic foraminifera in North Atlantic deep water records. Our observations point towards a causal relationship between the formation of North Atlantic Deep Water and the inflow of warm and saline Indian Ocean waters into the South Atlantic on glacial/interglacial time scales.