



35 Ma of climate and ocean gateway history, archived in the Transkei Basin off South Africa

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The southern ocean off South Africa represents a crucial gateway for global thermohaline circulating water masses. The global heat transfer is mainly controlled by these currents, which shows their importance for the Earth's climate. Two of these large scale thermohaline currents, the North Atlantic Deep Water (NADW) and eastward flowing branches of Antarctic Bottom Water (AABW) have to pass this region. Due to the submarine Agulhas Plateau south of South Africa, the eastward flow path into the Indian Ocean for deep and bottom water masses is blocked. The Agulhas Passage, which is located between the African continental slope and the Agulhas Plateau, is the only gateway between the Indian and the Atlantic Ocean in this region. With less than 50 km in width, the eastward flowing currents have to rush through this constriction into the deep sea Transkei Basin, which is located between the Agulhas Plateau and the Mozambique Ridge off South Africa. In fact, the Transkei Basin is a tremendous archive for ocean current circulation on the southern hemisphere since at least Oligocene times. Only little information about the Transkei Basin sediments exists, due to the lack of any drill holes and only sparse reflection seismic data of this area. In 2005 we gathered more than 2800 km of high resolution reflection seismic data within the Transkei Basin and mapped its sedimentary deposits precisely. On the basis of these data we reconstructed palaeocurrent flow paths since the opening of the Drake Passage gateway in late Eocene times. A detailed analysis of the central Transkei Basin sediments reveals various stages of depositional and erosional processes within the past 90 Ma. In fact, we could reconstruct recurrently changing flow paths and flow strengths for both the AABW and the NADW around South Africa. Furthermore, the seafloor topography and accumulation centres within the Transkei Basin for five different time stages since the upper Cretaceous could be determined. The reasons for the

changing current attributes that formed the Transkei Basin sediments have to be determined exactly, whereas tectonic events as well as climatic variations play significant roles.