Paper Number: 346

Transition from the Cretaceous ocean to Cenozoic circulation in the western South Atlantic - a twofold reconstruction

Uenzelmann-Neben, G.[1], Weber, T.[2], Thomas, M.[2], and Gruetzner, J. [1]

[1]Alfred-Wegener-Institut, Bremerhaven, Germany, Gabriele.Uenzelmann-Neben@awi.de
[2]GeoForschungsZentrum, Potsdam, Germany

The Cretaceous oceanic circulation has been quite different from the modern with a different distribution of the continents on the globe. This has resulted in a much lower temperature gradient between poles and equator. We have studied seismic reflection data and used numerical simulations of atmosphere and ocean dynamics to identify important steps in modifications of the oceanic circulation in the South Atlantic from the Cretaceous to the Cenozoic and the major factors controlling them. Starting in the Albian we could not identify any traces of an overturning circulation although a weak proto-Antarctic Circumpolar Current (ACC) was simulated. No change in circulation was observed for the Paleocene/early Eocene, which indicated that this period has witnessed a circulation similar to the Cretaceous circulation. The most drastic modifications were observed for the Eocene/Oligocene boundary and the Oligocene/early Miocene with the onset of an ACC and Atlantic meridional overturning circulation (AMOC) and hence southern sourced deep and bottom water masses in the western South Atlantic. A modern AMOC, which intensified in strength after closure of the Central American Seaway (CAS), and a strong ACC have resulted in current controlled sedimentary features and wide spread hiatusses in the South Atlantic since the middle Miocene. The opening of Drake Passage in early Oligocene times and the closure of the CAS at ~6 Ma, i.e., tectonic processes, have been identified as the key triggers for the observed most severe changes in oceanic circulation.