



The stratigraphy and crustal structure of the rift shear transition off Argentina

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The southern Argentinean margin has been surveyed during a cruise in 2004 collecting multichannel seismic profiles with a length of ~ 1340 km acquired together with gravimetric and magnetic data. Here, we focus on six selected profiles imaging the area at the transition from the rifted to the sheared margin at the Falkland Agulhas Fracture Zone (FAFZ).

We propose a regional stratigraphic concept composed of six seismic marker horizons. We use the stratigraphy of the North Falkland Graben (NFG) based on observations in the industry well Jacinta to distinguish the sediments on the continental shelf. In the deep sea we interpret the stratigraphy based on a modified concept of earlier studies. A new formation with Barremian age is introduced. This is the oldest postrift formation identified in this part of the Argentine Basin. A widespread unconformity at the Cretaceous/Tertiary boundary is reported in the North Falkland Graben and adjacent DSDP wells. In contrast to earlier studies, we interpret this unconformity as a marker horizon.

Based on structural features the margin can be divided in two segments defined by the N-S trending rifted margin segment and the SW trending sheared margin segment. The sheared margin segment formed by the FAFZ is characterized by a steep escarpment. The FAFZ is a narrow, 15-17 km wide zone, defined by nearly vertical faults with vertical offsets of ~ 2000 m at the main fault. A continuation of the FAFZ in northward direction could not be confirmed. Probably due to the presence of the FAFZ the oceanic crust is highly dissected by steep faults. Tectonic activity of the shear zone is mainly observed until Aptian time. Minor activity of the FAFZ occurred until the Cretaceous/Tertiary boundary. The rifted margin segment in contrast exhibits a slowly inclining continental shelf. The rifted margin segment is not of the volcanic type, as there are no seaward dipping reflectors. The margin has been rather affected by limited/no breakup related magmatism. The transition from continental to oceanic crust (COT) on the rifted margin segment occurs within a 40 km wide zone, while the COT at the sheared margin segment is outlined as a more abrupt transition.

The study area is less affected by synrift grabens than previously suggested. As there are almost no synrift grabens observed along the rifted margin, we suggest that the North Falkland Graben is confined south of 47.5°S , i.e. it does not reach the Argentine margin. However, on the continental shelf north of the Falkland Islands there are several synrift grabens. The early extension resulting in the formation of the NFG thus had a wider E-W extent, but was limited to the North.