Geophysical Research Abstracts, Vol. 8, 06512, 2006
SRef-ID: 1607-7962/gra/EGU06-A-06512

Tectonics and paleoceanography of the ocean basins near the Scotia and Antarctic plate boundary during the Cenozoic

A. Maldonado (1) and the SCAN TEAM (F. Bohoyo (1), J. Galindo-Zaldívar (2), E. Gulmezova (3), F.J. Hernández-Molina (4), A. Jabaloy (2), F.J. Lobo (1), E. Puga (1), J. Rodríguez-Fernández (1), A. Schreider (5), L. Somoza (6), E. Suriñach (7), J.T. Vázquez (8))

(1) Instituto Andaluz Ciencias de la Tierra, CSIC/Universidad Granada, 18002 Granada, Spain, (amaldona@ugr.es), (2) Departamento de Geodinámica, Universidad de Granada, 18071 Granada, Spain, (3) Geo LINT Ltd., 4 Lale str., 1421 Sofia, Bulgary, (4) Facultad de Ciencias del Mar, Departamento de Geociencias Marinas, 36200 Vigo, Spain, (5) P.P. Shirshov Institute of Oceanology, Russian Academy of Sciences, Moscow, Russia, (6) Instituto Geológico y Minero de España, Ríos Rosas 23, 28003 Madrid, Spain, (7) Departament de Geologia Dinàmica i Geofísica, Universitat de Barcelona, 08028 Barcelona, Spain, (8) Facultad de Ciencias del Mar, Universidad de Cádiz, 11510 Puerto Real, Cádiz, Spain

Recently acquired swath bathymetry data, multichannel seismic profiles and magnetic anomalies allow analyzing the Cenozoic evolution of the ocean basins near the Antarctic-Scotia plate boundary. Five main seismic units (5 to 1 from bottom to top) were identified. The units are bounded by high-amplitude continuous reflectors, named **d to a** from bottom to top. The two older units (5 and 4) are of different age and seismic facies in each basin. The three youngest units exhibit, in contrast, rather similar seismic facies and can be correlated at a regional scale. The deposits show a variety of sediment drifts that resulted from the interplay between the northeastward flows of the Weddell Sea Bottom Water and from the influence of the Antarctic Circumpolar Current. A major paleoceanographic event was recorded by Reflector **c**, which marks the connection between the Scotia Sea and the Weddell Sea after the opening of Jane Basin. Unit 3 (∼middle to upper Miocene) shows intensified bottom currents and the initial incursions of the Weddell Sea Bottom. Unit 2 (∼upper Miocene to lower Pliocene) comprises abundant high-energy, sheeted deposits in the northern Weddell

Sea, which may reflect a higher production of Weddell Sea Bottom Water as a result of the advance of the West Antarctic ice-sheet onto the continental shelf. The upper boundary of Unit 2 (Reflector **a)** represents the last major regional paleoceanographic change. The timing of this event (∼3.5-3.8 Ma) coincides with the end of spreading in the Phoenix-Antarctic ridge, but it may be also related with global events such as the initiation of the permanent northern Hemisphere ice sheet and a major sea-level drop. Unit 1 (∼upper Pliocene to Recent) is characterized by abundant chaotic, high-energy sheeted facies, in addition to a variety of contourite deposits. Units 1 and 2 show, in addition, a cyclic pattern, more abundant wavy deposits and internal unconformities, all of which attest to alternative periods of increased bottom current energy.

The tectonic reconstructions indicate that the Drake Passage was most likely open to deep water circulation by Eocene or Late Oligocene, whereas our recently acquired magnetic profiles in the western Scotia Sea show older magnetic anomalies than the previously identified, probably up to chron C12. The oceanic crust in the southwestern Scotia Sea is also affected by thrusting below the margin of the South Scotia Ridge, and a portion of the oldest crust was moreover consumed by the subduction process. These data bear evidences for an earlier opening of a full circum-Antarctic gateway through Drake Passage than previously postulated.

Spanish "Dirección General de Investigación" supported this research through Projects REN2001-2143/ANT and CGL2004-05646/ANT