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GEOSUR: Mesozoic to Quaternary evolution of Tierra del Fuego and neighbouring austral regions II

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This second thematic issue on Tierra del Fuego geology and geophysics, as the first one (Menichetti and Tassone, 2007) resulted from the new and profuse available information presented at the November 2004 **Geosur International Symposium** (Buenos Aires, Argentina). The aim of the organizing committee of **Geosur 2004** was to provide sets of synthetic papers supplying a comprehensive review of the geological and geophysical knowledge on the Tierra del Fuego region; and also more specific papers focused on subjects still under study and debate, including original contributions from Tierra del Fuego and some neighbouring areas of the Patagonian Andes and Scotia plate.

From the Chile trench to the transform boundaries of the western Scotia Sea, Tierra del Fuego Island shows a complex geological and structural architecture. Its geodinamic history includes a Mesozoic extensional phase in the southern Gondwanaland margin that was followed by the Late Cretaceous collisional events that led to the Andean Cordillera upbuilding and the Magallanes and Malvinas foreland basin generation. The opening of the Scotia Sea, with the separation from the Antarctic Peninsula and with superposition of important transform faults, influenced largely on the Cenozoic evolution of this orogenic segment. The last glacial events modelled and contributed to the present landscape.

The first thematic issue on Tierra del Fuego Mesozoic to Quaternay evolution contents contributions from a wide disciplinary scope (Geodesy, Paleomagnetism, Gravimetry, bathymetric studies and Geomorphology) by authors as Rappalini (2007), Bujalesky (2007), Chávez et al. (2007), Del Cogliano et al. (2007), Lodolo et al. (2007), Polonia and Torelli (2007). This second issue also presents contributions from a variety of disciplines including Petrology, Stratigraphy, Structural Geology and Seismostratigraphy.

Olivero and Malumián (this issue) provide an updated and exhaustive synthesis of the Mesozoic-Cenozoic Stratigraphy of the Fuegian Andes. Within the Cretaceous-Cenozoic record the authors recognize distinct sedimentary cycles in the northern cratonic areas of Tierra del Fuego and in the southern fold-and-thrust belt. In the cratonic areas four major sedimentary cycles evolved in a shallow marine platform setting mainly controlled by eustacy; whereas in the southern orogenic areas the propagation of the thrust front controlled the generation and migration of successive depocenters in the inner, central, and outer fold belt.

On the basis of new acquired and already published data Menichetti et al. (this issue) present a comprehensive synthesis of the structural geology of the Tierra del Fuego

Island. During the Mesozoic-Cenozoic evolution three complex tectonic stages are distinguished: extensional in the Upper Jurassic, compressional in the Late Cretaceous onward, and left lateral strike-slip from the Oligocene onwards, with the latter phase being superimposed and possibly reactivating the oldest structures. The structural characteristics and associated geodynamic events of each stages are exhaustively reviewed. At the same time, the authors detail a number of remaining topics related to Tierra del Fuego geology, which require further work.

The petrology, P-T evolution, geochronology and geodynamic meaning of the metamorphic complexes of the Patagonian and Fuegian Andes are presented in Hervè et al. (this issue). The authors distinguish metamorphic complexes located to the East of the Meso-Cenozoic South Patagonian Batholith and the so-called western complexes. The former correspond to the mostly low grade late Paleozoic Eastern Andes Metamorphic Complex (EAMC), which likely represents a passive margin metasedimentary sequence, later locally submitted to Late Jurassic high metamorphic conditions. The Cordillera Darwin Metamorphic Complex could be a higher grade equivalent of the EAMC. The western accretionary complexes point to the existence of a subduction zone environment near the Triassic - Jurassic boundary (Chonos Metamorphic Complex) up to the Middle Jurassic-Cretaceous (Diego de Almagro Complex) at least. The former comprises both allochtonous and autocthonous components, whereas the latter would postdate the southward drifting of Antarctic Peninsula.

On the basis of offshore multichannel seismic reflection profiles, combined with exploratory wells, the sedimentary architecture of the southern Malvinas foreland basin and the structural framework of its deformed inner and outer front are presented (Tassone et al., this issue). The basin infilling and the structure imprint record the main tectonostratrigraphic stages of the Fuegian Andes: the earliest Jurassic to Cretaceous extensional tectonics, the main compressional phase related to the Andean orogeny since Late Cretaceous, with the development of a thick-skinned tectonic style and the Mid-Tertiary to present influence of strike-slip activity, which has contributed to the subsidence of the foredeep. Restricted Neogene pull-apart basins formed by transcurrent motion occur superimposed to the Magallanes fold-and-thrust belt.

Rossello et al. (this issue) present a summary of the hydrocarbon exploration history and petroleum potential of Tierra del Fuego. Within the thick Late Cretaceous to Tertiary sedimentary and volcanoclastic sequence of the Austral-Magellan Basin, the sandy levels of the Springhill Formation host -in onshore as well as in offshore areas- productive hydrocarbon deposits.

Original information on the submerged stratigraphy and structure along the Magellan Strait, which bounds the Tierra del Fuego Island, is presented by Bartole et al. (this issue). On the basis of multichannel seismic profiles the authors distinguish three segments with specific sedimentary and tectonic architectures: the eastern Atlantic foreland domain characterized by nearly undeformed very thick Cretaceous to Tertiary sedimentary package, the central fold-and-thrust belt province with seismic evidence of deformations of the foreland units and the Cordillera province (Pacific segment) where the Magallanes-Fagnano transform fault exerts an important morpho-tectonic control that strongly conditions its bathymetric profile. Additionally, the seismic profiles also highlighted some depositional features of the glacial cycles in southernmost South America and present evidences of Miocene activity of the Magallanes-Fagnano fault in western Magellan Strait.

Finally, the paper by Waldmann et al. (this issue) includes the first seismic reflection profiles of Lago Fagnano that combined with sediment cores are presented in a preliminary succession of the depositional processes, which characterize the last deglaciation in Lago Fagnano. The authors recognize three major seismostratigraphic units: the oldest corresponds to glacially derived sediments; the overlying unit is interpreted as proglacial turbidite sequences that reflect sediment pulses released by the retreating Fagnano glacier during the last deglaciation. A major environmental change occurred during deposition of the uppermost unit when the pelagic style of sedimentation is interrupted by intercalated sequences of downslope mass flow events probably triggered by tectonic pulses along the Magallanes Fagnano system. The authors also provide important tools for the paleoclimate change analysis.

We would like to remind the readers that, as mentioned in the first Geosur thematic issue (Menichetti and Tassone, 2007), the terms Fuegian and Fueguian are synonymous and both are used as adjective meaning “of Tierra del Fuego” or “pertaining to Tierra del Fuego”.

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