Tectonics of the Argentine and Chilean Andes: An introduction

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Editors

This Special Issue gathers a series of contributions derived from presentations at the 19° Congreso Geológico Argentino held in Córdoba in 2–6 June 2014. Specific subjects cover a wide variety of topics and regions of the Argentine and Chilean Andes, varying from sedimentological analyses and U/Pb dating of detrital zircons in different rocks to determine source areas for different times and regions along the southern Andes; satellite gravity data for monitoring earthquakes at the subduction zone to understand their complex rupture structure; fission track data from the Andes to the foreland region; use of seismic tomographies and conventional seismic reflection data for analyzing crustal structure; to paleomagnetic data and structural and morphological analyses (Fig. 1).

From north to south, the work of *Arriagada* et al. located in the forearc analyzes the pattern of rotations of northern Chile using paleomagnetic data. They note anomalous rotations in Permian to Cretaceous rocks that are not consistent with magnitude of rotations associated with the oroclinal bending of the Central South American margin.

Alvarez et al. analyze a series of rupture zones associated with large interplate earthquakes in northern and southern Chile using satellite and field gravity data. This work correlates rupture zone slip with changes in the gravity field. *Gianni* et al. analyze in a review two different zones through the Andean retroarc, to understand the linkage between the growth of the internal sectors of the fold and thrust belt, in the first case the uplift of the Domeyko System in Chile, and the opening of rift systems oblique to the orogenic front in the foreland. Magmatism and sedimentation in the Olmedo rift branch of the Salta rift system is concurrent with the main uplift pulses of the innermost sector of the fold and thrust belt. Martínez et al. analyze the structural controls of the Lautaro Basin in northern Chile as part of the Frontal Cordillera and obtain U/Pb ages in detrital zircons on synorogenic sections, giving clues about timing and mechanics of deformation that led to the initial structuration of the axial Andean zone in the northern Pampean flat slab zone by Late Cretaceous times and subsequent reactivation events in the K-T and the Early Neogene.

Pérez Lujan et al. image the seismic structure of the Precordillera and western Sierras Pampeanas crust in the central sector of the Argentine foreland region. They show anomalously high P wave velocities in the deeper Precordilleran crust that are consistent with an ophiolitic sequence involving allochthonous Laurentia rock affinities that collided with Gondwana in the Early Paleozoic. *Ortiz* et al. have obtained (U–Th)/He data for the northern part of the Sierra de Valle Fértil in the western Sierras Pampeanas. New and existing thermochronology data show that younger ages are associated with lower relief in this seismically active range overlying the Pampean flat slab zone. Victor Ramos et al. discuss the last episodes of the Pampean orogeny recorded in the basement of the Eastern Sierras Pampeanas, associated with a suite of post-deformational granites and rhyolitic rocks. These rocks are related to the slab break-off and orogenic collapse that affected the orogen in the latest Neoproterozoic-Early Cambrian that led to crustal delamination. Litvak et al. analyze the chemistry of calc-alkaline volcanic rocks in the San Rafael region, far from the main arc, interpreted as an anomalous-eastern arc in response to slab shallowing. This arc developed in the foreland in the middle of the Payenia volcanic province achieving its maximum expansion in late Miocene times. Andrés Folguera et al. obtained fission track data from the orogenic front area of the southern Malargüe fold and thrust belt showing that Cretaceous exhumation has produced an orogen with similar amplitude to the Neogene one. Sánchez et al. analyze the structure of the Chos Malal fold and thrust belt using field and seismic data, showing the complex interaction between thin- and thick skinned structures in this sector with different orogenic shortenings. Rojas Vera et al. make a structural and thermochronological analysis of the Chos Malal and Agrio fold and thrust belts to the south identifying two important episodes of uplift and exhumation during the Late Cretaceous to Paleogene and during Miocene times. *Naipauer* et al. dated by U–Pb in detrital zircons two continental episodes in the Neuquén Basin associated with local extension. The analyses of the Early and Late Jurassic deposits and associated volcanic rocks show different provenance and paleogeography through time, marking the waning of Choiyoi rifting and the inception of the subduction system at the beginning of the Jurassic.

Alicia Folguera et al. analyze subsidence mechanisms in the retroarc zone between 34° and 41°S in late Miocene to Pliocene depocenters. This work describes a complex pattern in the development of the broken foreland region, and the associated flexural subsidence, isolating a component linked to dynamic subsidence in the foreland region.

Miguel Ramos et al. identify the synorogenic sedimentation for the early Miocene uplift of the North Patagonian Precordillera, discussing age and source regions from U–Pb dating of detrital components. Thus, they identify a stage of retraction of the orogenic activity and out-of-sequence growth of the eastern Patagonian Precordillera. *Navarrete* et al. analyze localized inversion of the Río Mayo Sub-basin as part of the western San Jorge Gulf Basin from industrial seismic lines, showing that some structures have absorbed several stages of deformation while others were only active at

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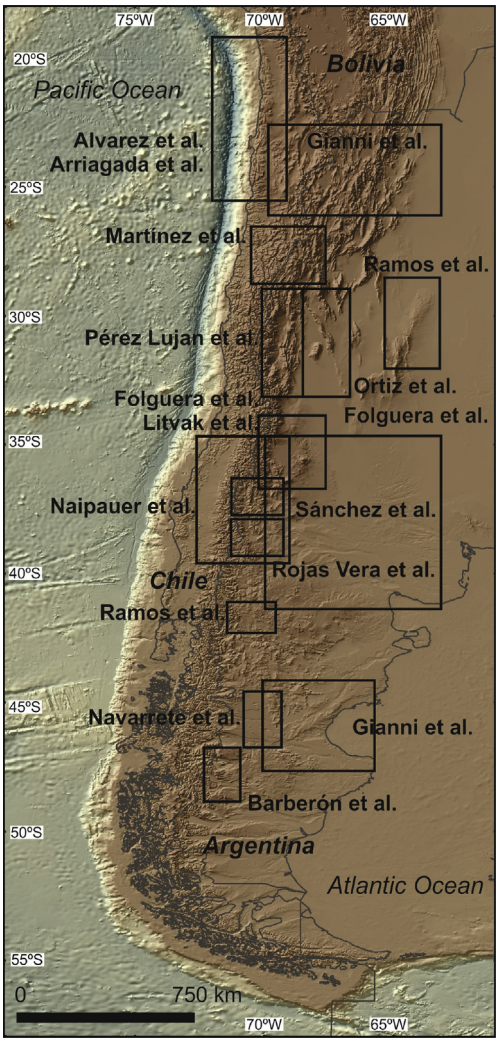

Fig. 1. Location map of regions analyzed in this special issue.

single phases, explaining the present topography through the foreland zone. The work of *Gianni* et al. has a second part dedicated to a review centered in the San Bernardo fold and thrust belt and its interaction with the Golfo San Jorge Basin in the Atlantic passive margin. *Barberón* et al. determine the synorogenic character of Barremian-Albian regressive sequences in southern Patagonia in the northern Austral Basin, through a petrographic study analyzing and determining source regions. Finally, *Andrés Folguera* et al. present a review of the recent hypotheses regarding how relief is produced in southern South America in the last 5 My from the Central Andes and Brazilian passive margin to Patagonia.

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