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Departamento de Geología – Universidad de Chile – Santiago

EVOLUCION DEL MARGEN CONVERGENTE ANDINO EN EL PALEOZOICO INFERIOR ENTRE LAS LATITUDES 15° Y 34°S

THE EVOLUTION OF THE ANDEAN CONVERGENT PLATE MARGIN IN THE EARLY PALEOZOIC BETWEEN LATITUDES 15° S AND 34° S

A.P. WILLNER, H. MILLER & U.S. LOTTNER.
University of Münster, W. Germany.

Different geodynamic evolution of various segments of the Andean chain especially during the Mesozoic and Cenozoic has already been recognized for a long time. The tectonic segmentation of the Central Andes was correlated with a segmentation of the underthrusting plate (e.g. Jordan et al., 1983). Such differences may already be detected in the Lower Paleozoic. From southernmost Peru to NW-Argentina four principal segments can be identified for that time:

- The segment north of the Argentine-Bolivian border is characterized by a huge intracontinental trough filled with more than 10000 m of clastic sediments from Cambrian to Devonian times. It was underlain by continental crust between the Precambrian Arequipa Massif in the W and the Brazilian Shield in the E. Deformation and magmatism in the Early Paleozoic only occurred in the Arequipa Massif (Ordovician Atico event; Shackleton et al., 1979).
- In the segment between 22° S and approximately 26° S a weakly metamorphosed and moderately deformed basement (Puncoviscana Formation) with few Cambrian granitoids is bordered to the E by a backarc shelf sea with continuous sedimentation from Late Cambrian to Devonian. W of the basement Ordovician volcanics and intrusives of the "Faja eruptiva de la Puna" form the eastern margin of a vast forearc basin of Ordovician flysch sediments.
- In a third segment further S (26° S to 30° S) considerable more extensive outcrops of medium to high grade metamorphic equivalents of the Puncoviscana Formation and widespread calcalkaline plutonic rocks are present. In the Sierra de Famatina further W, deposition of Ordovician clastic sediments and volcanics was synchronous with strong magmatic and tectonic activity in the E and is bound to the W by basement rocks with intermediate pressure metamorphism and basic to ultrabasic intrusives.
- In a fourth segment S of 30° S deeper tectonic levels of the basement are confined to the W by a large carbonate platform and flysch basin of Cambrian to Devonian age. In gneissic and migmatitic regions granulite belts with Precambrian isotopic ages occur, which probably represent underlying older crust.

Studies of selected areas in the NW-Argentine basement on magmatism, deformation and crystallization in the Lower Paleozoic provided some key information on the geodynamic evolution of the early Andes (Lottner & Miller 1985; Willner & Miller 1985). Summarizing, four principal geodynamically relevant processes were identified in the basement: during Late Precambrian to Early Cambrian a huge pile of greywackes was deposited on a passive continental margin. The real change to an active margin took place in the Middle Cambrian, in the southernmost segment perhaps already in the Late

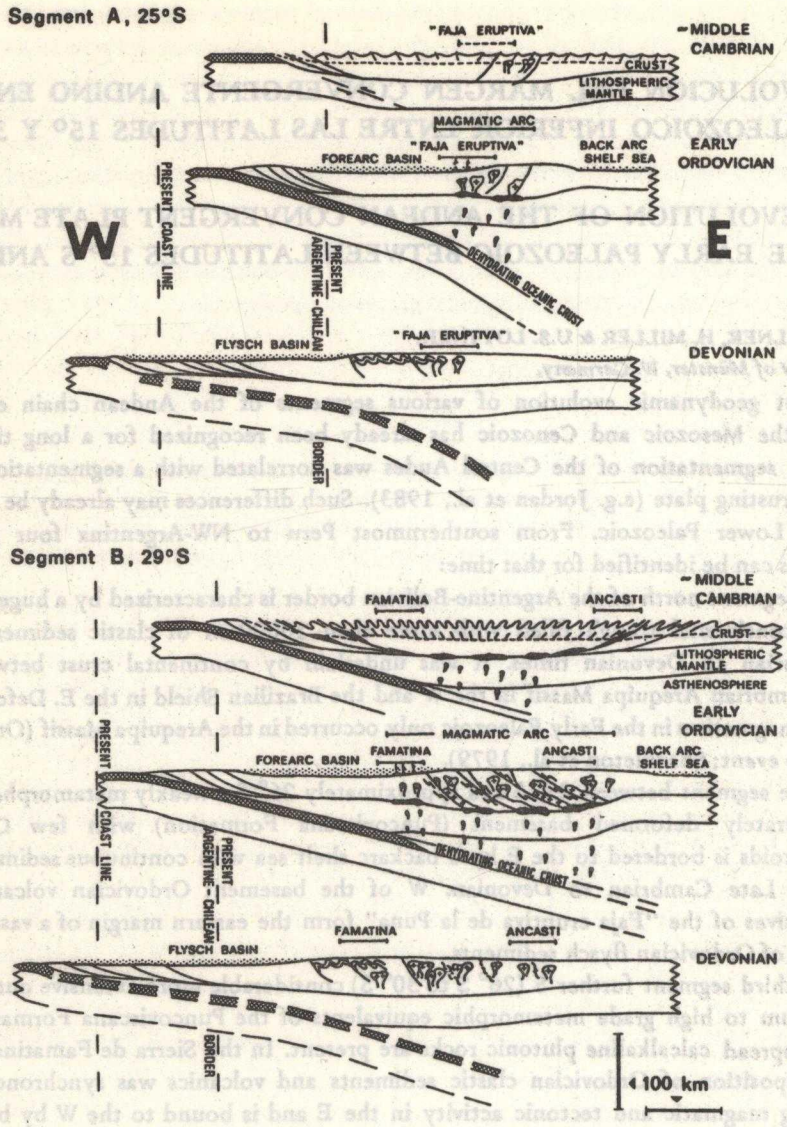

Fig. 1. Geodynamic evolution of the Andes in the Lower Paleozoic on sections at 25° S and 29° S.

Fig. 1. Evolución geodinámica de los Andes en el paleozoico inferior en secciones a 25° S y 29° S.

Precambrian. During this Pampean orogeny strong shortening and flattening occurred within the entire basement. From N to S the depth of exposed tectonic level increases. Early basic intrusions of mantle provenance are bound to associated shear belts. In the Ordovician large scale imbrication of crustal blocks prevails along huge shear belts with syntectonic tonalitic intrusives. Although magmatism had started with a basic to intermediate sequence of tholeiitic character, it later changed to a calcalkaline trend. Apart from the contaminated syntectonic intrusives also contamination-free acid end members with low Sr-initials intruded at that time. The early mantle derived sequence

probably caused contemporary static heating, which gave rise to a crustal anatectic-granitic magma sequence intruding from the Late Ordovician to the Early Carboniferous as posttectonic stocks along wrench faults.

The geodynamic evolution is demonstrated by two models true to scale (Fig. 1) on selected sections at 25° S and 29° S. A flat subduction slab is proposed (Willner et al., 1985), that continuously developed during the Cambrian, while during the Early Ordovician all paleogeographical elements typical for such a geotectonic setting are present. A somewhat steeper slab is proposed for the northern section, as its magmatic arc is considerably shorter. Further N it might have been even steeper, because magmatism developed in the Arequipa Massif closer to the coast. The backarc basin in this northern segment was extremely wide, shortening continuosly onto the southern segments, while the forearc basin width and the amount of crustal thickening increase from N to S. Deformation moved continuously westward and subduction decreased in the Devonian, when the magmatism became entirely of anatectic origin and a concomitant vast flysch basin developed in the Coastal Cordillera. Late Paleozoic magmatism is known from regions nearer to the present coast, when a new steep subduction slab was formed.

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