

## EARLY PALAEOZOIC GEOCHRONOLOGY AND OROGENIC EVENTS IN NW ARGENTINA

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### INTRODUCTION

For several years a lively discussion is in progress, whether the Early Palaeozoic orogenic events occurring at the South American active continental margin are due to the collision between Laurentia and Gondwana (e.g. DALZIEL et al. 1994) or not. Already published and new isotope data aim at a better understanding of the timing of intrusive, metamorphic and deformational events in NW Argentina. These age data are substantial for recognition of a potential Laurentia-Gondwana interaction during the Early Palaeozoic.

### AGES OF MAGMATISM AND METAMORPHISM

BACHMANN et al. (1986) described Rb-Sr thin slab ages of 554 Ma for gneisses from the Sierra de Ancasti and the Sierra de Aconquija (Catamarca, Tucumán). Similar K-Ar ages occur near Tucumán (ADAMS et al. 1989). These data document a strong late Vendian to Early Cambrian subduction of an accretionary wedge along the Gondwana/Pacific margin (WILLNER et al. 1987). The high velocity of burial and subsequent rising is further clearly proved by the very late Vendian to Early Cambrian age of some of the subducted sediments (DURAND & AZEÑOLAZA 1990, MILLER et al. 1994). At about 515 Ma sedimentation and metamorphism are followed by plutonism, which is acid in the north (BACHMANN et al. 1987) and basic in the south of the considered area (GRISSOM 1991; SCHALAMUK et al. 1983).

After this first stage of plutonism orogenic activity ceased and only reappeared at 480 Ma with widespread intrusions of granitic to trondhjemitic magmas (LORK et al. 1991, KNÜVER & MILLER 1982, RAPELA et al. 1992). This stage of magmatism is particularly important in the Sierra de Cachi (unpublished data by A. LORK). Magmatism and accompanying metamorphism continued till the end of the Ordovician and partly up to the Early Carboniferous. Hence, for NW Argentina the following Late Precambrian to Early Palaeozoic history is documented:

A Vendian to Early Cambrian passive continental margin (JEZEK & MILLER 1987) changed to an active one in the Middle Cambrian, when Laurentia probably was far off the margin of Gondwana (GRUNOW 1995).

Back-arc basins were filled up with volcanic and sedimentary rocks in the Early and Middle Ordovician, but a second phase of actual orogeny did not occur before the Middle and Late Ordovician (Famatina orogeny). The composition of magmas developed continuously from mantle source to strongly crustal contaminated (SCHÖN 1991, REISSINGER 1983, RAPELA et al. 1992).

Between 515 and 480 Ma magmatic, metamorphic and deformational events are remarkably scarce. However, in this time span magmas evolved within the crust becoming more acid and K-rich. Zircons which had formed in the first magmatic phase (volcanic events within the uppermost, Early Cambrian parts of the Puncoviscana Formation) are found in Middle Ordovician granitoids of the Sierra de Cachi (LORK et al. 1991). They can be deduced from the melting of Puncoviscana Formation volcano-sedimentary rocks within the Middle Ordovician magmas, but they can be simple relics of the Middle Cambrian magmas as well.

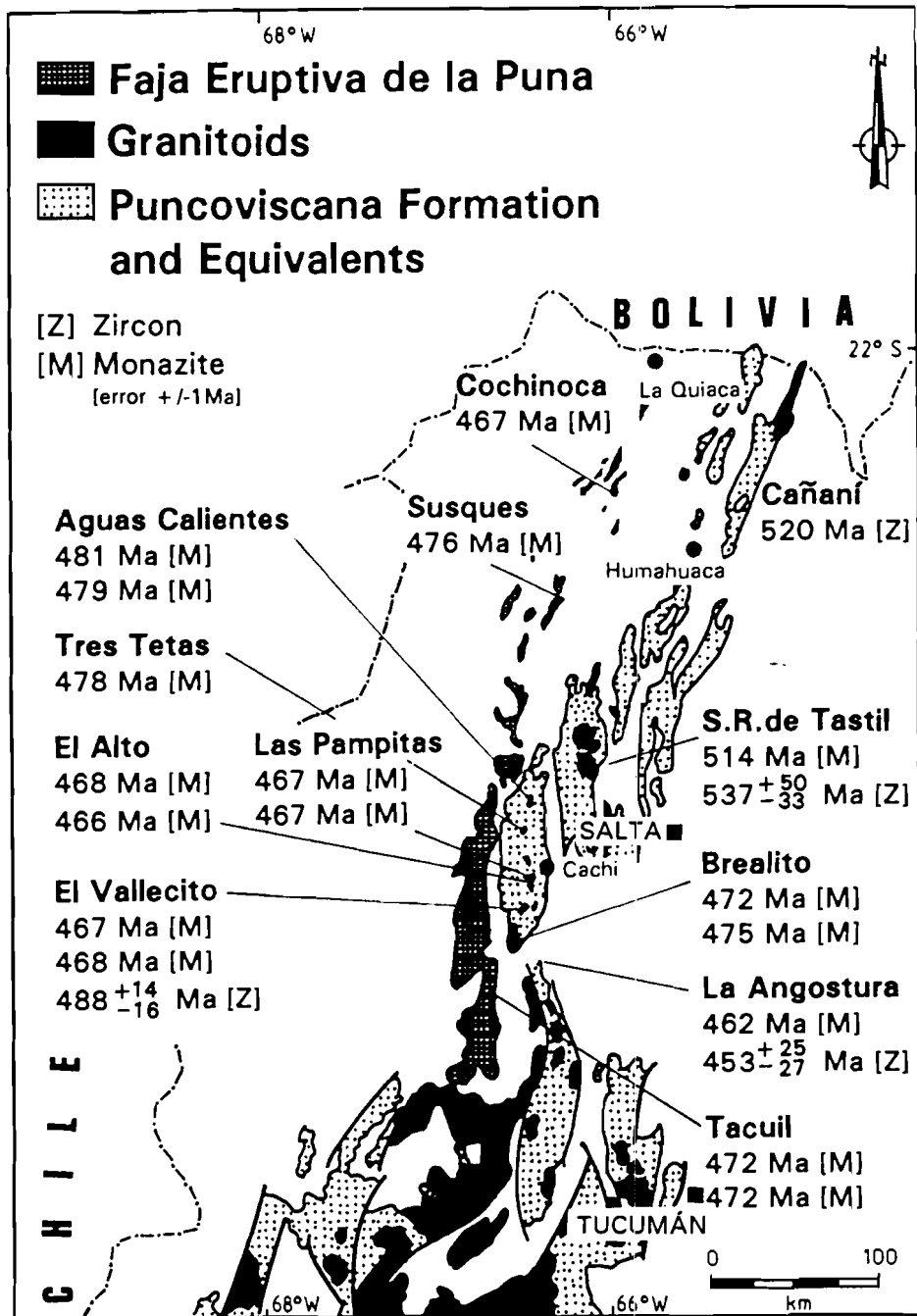


Fig. 1. U-Pb ages of the Cordillera Oriental and Faja Eruptiva de la Puna; partly unpublished data by kind permission of A. Lork.

## CONCLUSIONS

Following isotope geochronology, the history of the NW Argentinian Gondwana margin in the Early Palaeozoic is mostly governed by a discontinuous ocean/continent subduction regime. An interruption of orogenic events occurred just at the time, when Gondwana may have been on the way to meet Laurentia (GRUNOW 1995). It is not clear, why during that time of very rapid moving together of both continents (several tens of m/a?) orogenic events in the Andean basement are lacking or at least unimportant. On the other hand they continued from the Middle Ordovician up to the Silurian, much time after the supposed collision of Laurentia with Gondwana had occurred (DALLA SALDA et al. 1992), and when Laurentia yet had moved away to find its Permian position. Hence, Laurentia may have indirectly influenced the history of the Andean basement, but not by an actual continent/continent collision.

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