Geophysical Research Abstracts
Vol. 19, EGU2017-5197, 2017
EGU General Assembly 2017

Long term accretion history (165-70 Ma) recorded by high-pressure rocks of Diego de Almagro Island (Patagonia, Chile): implications for understanding subduction zone interface tectonic processes

Samuel Angiboust (1), Thais Hyppolito (2), Johannes Glodny (3), Aitor Cambeses (1), Patrick Monié (4), Antonio Garcia-Casco (5), Mauricio Calderon (6), and Caetano Juliani (2)

(1) Institut de Physique du Globe de Paris, 75005 Paris, France, (2) Universidade de São Paulo, Instituto de Geociências, Brazil, (3) GeoForschungszentrum (GFZ) Potsdam, D-14473 Germany, (4) Géosciences Montpellier, Université de Montpellier, France, (5) Dpt Mineralogy and Petrology, Univ. Granada, Spain, (6) Carrera de Geología, Univ. A. Bello, Santiago, Chile

The Diego de Almagro Island preserves one of the rare remnants of the Mesozoic Chilean paleo-accretionary wedge. This complex, formed by MOR-basalts interleaved with metasedimentary rocks, comprises three major tectonic units with distinct P-T-t paths: the HP granulite (Lazaro unit), the garnet amphibolite (GA) and the blueschist (BS) units.

HP granulite-facies metamorphic conditions in the Lazaro Unit are attested by Grt-Cpx-Zo-Prg assemblages associated with trondhjemitic leucosomes (c. 1.3 GPa, 750°C). U-Pb SHRIMP dating of zircon metamorphic rims yields a homogeneous age population of 162 $\pm$ 2 Ma for this HT event, in agreement with Sm-Nd dating of peritectic garnet (163 $\pm$ 2 Ma and 163 $\pm$ 18 Ma). In situ white mica Ar-Ar dating and multi-mineral Rb-Sr dating of LT mylonites (c. 450°C) along the base of the Lazaro Unit reveals partial resetting of HT assemblages during deformation between 115 and 72 Ma. GA unit rocks, structurally below the Lazaro unit, locally preserve eclogite facies parageneses (c. 570°C, 1.7 GPa) that underwent a pervasive stage of amphibolitization during decompression down to 1.3 GPa. U-Pb dating of zircon metamorphic rims and Rb-Sr dating indicate that amphibolitization in GA unit took place at 125-120 Ma. GA unit rocks have been also lately overprinted by another HP-LT assemblage as shown by Si-richer phengite rims and small blue amphibole overgrowths. Conversely, the underlying BS unit does not show strong amphibolite facies overprint as seen in GA and Lazaro units and exhibits slightly cooler peak metamorphic conditions (c. 520°C, 1.7 GPa). Rb-Sr and Ar-Ar dating of these blueschists yield deformation ages between 80 and 70 Ma, i.e. 50 Ma younger than the overlying rocks from the GA unit, and 90 Ma younger than Lazaro unit HP-granulites.

This new report sheds light on the formation of the youngest and deepest HP rocks exposed along the Chilean subduction margin. The Diego de Almagro Island represents a unique window onto long-term tectonic processes rooted below the base of the accretionary wedge (c. 40-50 km). The exceptionally long residence time of the earlier accreted material -almost 100 Ma-, enables the record of multiple thermal gradient fluctuations and highlights the variability of the subduction interface thermal structure over tens of millions yrs.