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Southern Patagonian foreland (~ 44 - 48° S) evolution: insight from low-temperature thermochronological approach

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The Andes are a natural laboratory for investigating coupling between surface evolution and deep mantle processes due to its variation in terms of deformation timing and expression. In the northern foreland of the Patagonian Andes, a recent study has demonstrated the link between slab dip and deformation propagation (Savignano et al., 2016), whereas in the southern part there is in addition the influence of Chile ridge subduction. Comparison of vertical evolutions through different sectors of the Patagonian foreland represents an opportunity to understand their response to deep geodynamics modification. The Patagonian Andes shows a segmentation characterized by a mountain range morphology controlled by recent glacial erosion and a broken foreland composed by a succession of Mesozoic massif and inverted Cenozoic basins, whose timing and formation mechanism are little known. In this study we investigate the surface evolution of the Deseado Massif (44 – 48°S) through the Meso-Cenozoic period. Deseado Massif represents a 350 per 200 km area divided into two blocks: (i) the western part with a mean elevation around 800 m and plateaux above 1000 m and (ii) the eastern part at low elevation (<400 m). Both parts are mainly composed by the same massive Jurassic formation (Bahia Laura formation) described as a 1–3 km homogenous acid ignimbrite formation, with local rhyolitic domes and partially covered by Cretaceous and Cenozoic continental to marine deposits. This study focuses on a low temperature thermochronological approach, based on the (U-Th)/He method (applied to apatite and zircon) and on the apatite fission tracks method (AFT). Those methods allow us to determine the rocks thermal evolution, from 180° to 40°C, which corresponds to the exhumation and burial history from 10 km depth to the subsurface. This data will provide useful information to reconstruct the building period of the Deseado, therewith to determine the event that conducted to the actual morphology. AFT first results give one cooling age of 120 Ma for the Bahia Laura Fm and three ages between 55 to 70 Ma for the associated basement. We interpret these ages as basement burial, produced by the Bahia Laura Fm deposits, followed by slow cooling from 90 to 30. Fission track length show one population with a mean tracks length around 13 µm, that highlights the overprint of the Jurassic burial. Using a classical gradient, this burial shows that the eastern part of the Deseado was covered by more than 3 km sedimentary cover reaching AFT reset temperature. These preliminary results highlight the questions about the origin of Jurassic subsidence, the mechanisms for Cenozoic uplift and the deposit area of this eroded materials.