



Subject offered for a contract starting October 2018

SUBJECT TITLE: Along-strike growth of the Andean subduction orogen

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Second Advisor/ Supervisor:

Host lab/ Team : **IPGP- Tectonics, mechanics of the Lithosphere – UMR7154**

Financing: Doctoral contract with or without teaching assignment

For more information go to <http://ed560.ipgp.fr>, section: Offres de these (PhD offer), You must apply on the Doctoral School website

Presentation of the subject: (1 or 2 pages)

Plate convergence leads mountain belts to increase their width by progressively integrating units of their forelands, ultimately forming wide elevated plateaus fringed by high relief regions, like in the Tibet-Himalayas or the Altiplano-Andes orogenic systems. Across-strike growth appears to be a universal orogenic process that has been demonstrated for, e.g., the Alps, the Himalayas and Tibetan plateau, or Taiwan. For example, if we focus on the Central Andes at 18-20°S, where the Andes-Altiplano system is the widest, the growth and widening of the orogen is well established to have occurred by mainly W to E propagation from ~60-50Ma to present, as deduced from structural and basin analyses, as well as thermochronology. In contrast to this well-known process of across-strike orogenic wedge propagation, the way orogens grow along their strike is less well studied. In this doctorate project, we propose to address this question by quantifying the structure, timing of the tectonics and exhumation history in the two arms of the orogen, north (southern Peru) and south (northern Chile) of the Arica bend at ~18.5°S. The first objective of this doctorate will be to define at different scales the structure and kinematics of the W Andean fold and thrust belt and of the West basement backbone of the Central Andes as well as their North-South variability. One key stretch of the orogen to study in detail will be the Sierra Moreno of N Chile, from ~20°S to 24°S, where we have recently uncovered a major thrust of the Paleozoic basement culmination onto the fold and thrust belt affecting Mesozoic series. The tectonic study of this part of the orogen in the field and with satellite data (imagery, high resolution DEM) will be an important part of this doctorate project. Then, using the rich geological database provided by our S American colleagues and additional field surveys, the doctorate will extend her/his conclusions to other parts of the orogen, with the aim to build quantitative tectonic models (structure, kinematics, amount of shortening and slip on major faults) at each section we will select for sampling. Samples will be used for a thermochronology study aiming to quantify the exhumation history and the timing of orogenic onset. Part of the (U-Th)/He thermochronological analyses and modeling, more specifically in the Sierra de Moreno, will be done by the doctorate student in collaboration with a post-doc and researchers in Nancy and Orsay. Field work in S. America will be done in collaboration with colleagues from Univ. de Chile in Santiago (Chile) and Ingemet (Peru). An ANR project (preselected by ANR) is presently under review with the aim to fund field work and analytical costs.

More infos on our team's recent results on the Andean orogen:

http://www.ipgp.fr/~lacassin/RL-TectoniqueIPGP/Andean_Orogeny.html