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Late Cretaceous rapid arc growth in the Arequipa area of southern Peru : the birth of the Andes?

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During the Late Cretaceous and Paleocene, intense activity along the Toquepala magmatic arc (also named arc) resulted in the building of a continuous relief along the Peruvian margin, and thus in the emergence of a proto-Andean relief, with no evidence of coeval tectonic shortening.
Since the Late Paleozoic, the margin had undergone major tectonic stretching, leading to the development of an overall marine backarc basin that deepened to the southwest. In the Late Cretaceous ($\sim$90 Ma), this backarc basin rapidly turned continental, being fed by the relief constructed along the arc. (Callot et al., 2008): a $\geq$700 m-thick succession of continental, coarse-to fine-grained reddish deposits directly overlies the Albian-Turonian carbonate succession that had slowly accumulated in the backarc until then (Sempere et al., 2002). The growth of the Toquepala arc also coincided with the only-known significant uplift along coastal southern Peru (Wipf, 2006) and can thus be considered to have been a major factor in this tectonic uplift. The Central Andean margin thus underwent major changes both in terms of magmatic activity, relief construction (reflecting crustal thickening), and related backarc sedimentation at $\sim$90 Ma.
Magmatic activity along the Peruvian arc resulted in building the Coastal Batholith. Our study in the Arequipa area has focused on a batholith segment extending over 100x40 km, where the batholith thickness is estimated to $\geq$5 km. We confirm that a significant part of the batholith was emplaced during the Late Cretaceous-Paleocene, namely between 84 and 60 Ma, into both the $\sim$1.0 Ga basement (Arequipa Massif; Martignole & Martelat, 2003) and Jurassic (188-175 Ma) arc plutons, which had been described so far only northwest of our study area (Mukasa, 1986). This segment consists of numerous plutons, dykes and sills with compositions varying from gabbro to granite. In the northeast Late Cretaceous plutons intrude the Jurassic part of the batholith, and both intrude the $\sim$1.0 Ma basement. In the southwest, a cluster of Paleocene plutons was emplaced into strata (fine-grained sandstones to mudstones) of Late Jurassic age.
The strontium, neodymium and lead isotopic signatures obtained on these lithologies are similar to literature data and interpreted as mantellic signatures slightly contaminated by the Arequipa continental basement (Barreiro & Clark, 1984). Therefore, we considered that the corresponding magmas represented significant contributions to crustal thickening at the arc.
We are now developing a larger isotopic study, which, combined with the new geochronological and field data will allow us to better understand the geological processes that were involved in rapid crustal growth in southern Peru and to assess its possible consequences regarding the birth of Andes.

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