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Initiation of continental accretion in the Betic-Rif domain

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The Betic - Rif cordillera in southern Spain and northern Morocco, respectively, form one of the tightest orogenic arc on Earth. The formation of this arcuate orogenic belt resulted from the westward migration of the Alboran crustal domain, constituted by the internal zone of the orogeny and the basement of the Alboran back-arc basin, that collided with the rifted margins of Iberia and Africa at least since the early Miocene. This collision is intimately linked to the post-35-30Ma regional slab roll-back and back-arc extension in the western Mediterranean region. The geodynamics of the Betic-Rif domain, which is of great importance for the paleogeographic reconstructions of the Tethys-Altantic and the Mediterranean sea, is still largely debated. Answers will come from a more detailed structural analyses, including refinement of the time-temperature paths and kinematics of the main structural units, which is one of the main objectives of the OROGEN research project, co-financed by BRGM, TOTAL & CNRS.
In this study, we focus on the well-developed flysch-type sediments now accreted in the Betics-Rif but initially deposited in a basin, north of the african margin and on the iberian margin from the Early Cretaceous to the Early Miocene. Using low-temperature thermochronology (fission-track and (U-Th)/He analyses) combined with zircon U-Pb geochronology on the flyschs deposited on the most distal part of the margin, we aim to constrain the thermal history of both the source rocks and accreted thrust sheets at the earliest stages of continental accretion. Sample have been collected in flyschs series ranging from Mesozoic, Paleogene to Neogene ages. Additional samples have been collected in the Rif where Cretaceous series are more developed. Combined with a detailed structural analysis, LT thermochronological constraints will refine the kinematics of thrust units when continental accretion started before the final thrust emplacement occurred in the Early Miocene. Considering a selection of regional geological cross-sections from which a minimum amount of shortening will be derived, our results will be integrated in a tectonic reconstruction of the region.