Goldschmidt 2024 Abstract
https://doi.org/10.46247/gold2024.24087

Mantle inheritance and its link to magma-poor rifting along the southern N-Atlantic.

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The study of dredged and drilled magmatic and mantle rocks from the Western Iberia and conjugate Newfoundland margins together with those from the fossil Alpine Tethys and the present-day Australia-Antarctica margins (Ballay et al., in prep), allowed to propose models for the tectono-magmatic evolution of magma-poor rifted margins. However, it remains unclear to what extend nature, origin, and history of the subcontinental mantle lithosphere (SCLM) controls the magmatic budget and mantle-melt reactions during mantle exhumation and what are the pressure-temperatures (P-T) conditions and rates of exhumation in these systems.

In my current PhD thesis, I use a set of yet little explored dredged samples from the Northwestern Iberia margin. I will combine in-situ major, trace element and isotopic analysis (Hf-Nd) of minerals from ultramafic and mafic rocks, various geo-thermo-barometers and pyroxene speedometers and compare these results with those of previously published samples from the Western Iberia and conjugate Newfoundland margins and the Lion and Dragon seamounts from the Tore-Madeira ridge (SW Iberia margin). These preliminary results will bring new constrains on the nature of the SCLM, the recorded mantle-melt interactions and on P-T exhumation histories recorded in these rocks. The aim of this study is to understand and characterize the nature of pre-rift SCLM at the scale of the southern North Atlantic, to define the tectonic and magmatic processes occurring at these magma-poor rifted margins to understand the link between nature of inherited mantle and the low-magmatic budget during rifting.

In my presentation, I will show first preliminary results including textural observations and mineral geochemical data that will allow to distinguish between inherited and refertilized mantle rocks and to define the distribution of these mantle types along the margin. Moreover, diffusion modeling of sub-solidus major element and REE re-equilibration between pyroxenes will allow to characterize and compare temperatures and cooling rates recorded during mantle exhumation along and across the Iberia margin and to compare with data from the Alpine Tethys and the Antarctica-Australia margins. These data will be complemented with Nd-Hf isotope data that will allow to identify the melt nature and estimate model ages for the involved mantle lithosphere.