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# The temperatures and cooling rates recorded by ultramafic rocks during mantle exhumation at passive margins: the example of the Diamantina Zone, SW Australia

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Lithospheric breakup has been defined as the process that separate continents, produce a new plate boundary and generate the mid-ocean ridge system. However, how the continental lithosphere breaks and new oceanic crust forms remains one of the least understood processes in Plate Tectonic theory. Here, the role of magmatic processes is of primary importance but many first order questions remain, particularly how, when and where magma is produced during final rifting, and what are the conditions and controlling processes of magma production? One fundamental parameter controlling the magma production is the rate of extension, but so far, only little is known about the rate of subcontinental mantle exhumation during rifting.

This study presents preliminary results of the temperatures and cooling rates recorded by exhumed mantle rocks along the Diamantina zone (SW Australia). The sample set contains relatively fresh peridotites and pyroxenites dredged along the Australia margin during two oceanographic cruises (MARGAU MD80 and MD110). Our approach combines µ-X-ray fluorescence mapping, in-situ major and trace element concentrations of minerals from ultramafic rocks, various geo-thermo-barometers and pyroxene speedometer. Our results illustrate the disparate thermal regime of the two distinct mantle domains observed at rifted margins, i.e., inherited vs. refertilized. The temperatures and cooling rates at the Diamantina Zone are similar to those recorded in Alpine Tethys ophiolites, suggesting that the nature of the subcontinental mantle (Precambrian vs. Phanerozoic) has no effects on extension processes during the rifting.