

The Conditions of Melt Generation during the Rifting and Breakup of Southwest Africa and South America.

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Magma-rich continental rifts and volcanic rifted margins comprise an important end member in the continuum of continental rifting. Critical to the development of such systems is the production of large volumes of magma, yet the generation of such magmas cannot be ascribed to simple decompression melting of ambient asthenosphere - the role of enriched domains within the continental lithosphere, large-scale mantle thermochemical anomalies, and changes in the rate of and location of plate thinning are significant considerations. Southwest Africa and South America provide a crucial example of a magma-rich rifting environment, preserving a sequence of magmatic events that span the time period lasting from the initial influence of a mantle plume to the terminal volcanics associated with post-breakup magmatism. The preservation of such a wide temporal range of extensional-related volcanics is unusual, as rocks associated with the continent – ocean transition are typically buried under thick sediments. However, uplift of the SW African margin has exposed these volcanics. Here we present new data from coastal Angola. We examine on land stratiform sequences that might represent seaward dipping reflectors imaged offshore, as well as post-breakup volcanics. We probe the conditions of melt generation and interpret these data within the broader regional context. We have collated a regional dataset and will apply geochemical models to constrain the pressure and temperature of both melt generation and the point of final mantle equilibration. We present the temporal evolution of these constraints with a focus on establishing the dominant melt-generation mechanisms during rifting of the South Atlantic and examine the role of the continental lithosphere during this process.