Exploring the transition from continental breakup to a passive margin during the opening of the South Atlantic

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The Early Cretaceous opening of the South Atlantic (SA) Ocean resulted from lithospheric extension and the breakup of the Pangaea supercontinent, leading to a major tectonic reconfiguration that had a significant impact on Earth's oceanographic and climate evolution. This rifting was accompanied by extensive intrusive magmatism and extrusive flood basalts, identified as seaward dipping reflectors (SDRs) and lava flows, forming the South Atlantic (SA) Large Igneous Province (LIP). Nonetheless, the nature of the processes that led to continental breakup remains controversial, and the environmental impact of these events is not yet fully understood. Only a handful of sites have cored SA Cretaceous and volcanic rocks, and none have drilled the Argentine Continental Volcanic Margin (ACVM).

In this context, we have mapped out the extensive distribution of the volcanic complexes on the ACVM based on a regional grid of industry and academic seismic reflection data. As a result of the interpretation of the new seismic data, we propose to sample the volcanic complex through scientific drilling. The drilling will sample the SDRs at two sites to determine their age and composition, aiming to better understand the chronology of South Atlantic opening, sources, and magmatic processes involved during breakup. This will help test the active vs. passive rifting hypotheses. Additionally, we will further investigate evidence for magma/crust interaction and the impact volcanism had on climate through delivery of gases to the ocean and atmosphere.