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Ocean-Continent Transition Structure of the Pelotas Magma-Rich Continental Margin, South Atlantic

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Rifted continental margins in the southern South Atlantic are magma-rich showing well developed volcanic extrusives known as seaward dipping reflectors (SDRs). Here we examine the magma-rich continental rifted margin of the Pelotas Basin, offshore Brazil. Deep seismic reflection data displays a large package of seaward dipping reflectors with an approximate width of 200 km and a varying thickness of 10 km to 17 km that have previously been interpreted as volcanic SDRs. We examine these SDRs to explore if they are composed predominantly of basaltic or sedimentary-volcaniclastic material. We also study the thickness of the crustal basement beneath the SDRs. Additionally we investigate if these SDRs are underlain by thin 'hyper-extended' continental crust or if they have been deposited on new magmatic basement. The answers to these questions are important in understanding the structure and formation processes of magma-rich continental margins.

We use gravity inversion to investigate SDR composition by varying the proportion of basalt to sediments-volcaniclastics (basalt fraction) which determines the SDR densities in the gravity inversion. By matching the Moho depth and two-way travel time from gravity inversion and deep seismic reflection data, we determine the lateral variation in basalt fraction of the SDRs.

Our analysis suggests:

1) There is an overall pattern of SDR basalt fraction and bulk density decreasing oceanward. This could be due to increasing sediment content oceanward or it could result from the change in basalt flows to hyaloclastites as water depth increases.

2) The SDR package can be split into two distinct sub packages based on the basalt fraction results, where the proximal side of each package has a higher basalt fraction and density.

3) The inner SDR package contains reflectors that bear a resemblance to the SDRs described by Hinz (1981) corresponding to syn-tectonic volcanic eruptions into an extensional basin, while the outer SDR package has reflectors that appear to prograde similar to the SDRs described by Walker (1965).

4) The SDRs lie above crustal basement between 10 km and 6 km thick, however we are unable to determine the nature of the underlying crust.