Seaward Dipping Reflector Composition of the Pelotas Magma-Rich Rifted Continental Margin

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ABSTRACT

Deep seismic reflection data from the Pelotas Basin, offshore Brazil displays a large package of seaward dipping reflectors (SDRs) with an approximate width of 200 km and a varying thickness of 10km to 17km that have previously been interpreted as volcanic SDRs, a feature of magma-rich rifted continental margins. We examine these SDRs to explore if they are composed predominantly of basaltic or sedimentary-volcaniclastic material. We also investigate the thickness of the crustal basement beneath the SDRs. The answers to these questions are important in understanding the structure and formation processes of magma-rich continental margins and the subsequent effect on deep-water petroleum systems. 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 resemble 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 10km and 6km thick, however we are unable to determine the nature of the underlying crust.