



3D Seismic Reflection Experiment Over the Galicia Deep Basin

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In June thru September, 2013, a 3D reflection and a long offset seismic experiment were conducted at the Galicia rifted margin by investigators from the US, UK, Germany, and Spain. The 3D multichannel experiment covered 64 km by 20 km (1280 km²), using the RV Marcus Langseth. Four streamers 6 km long were deployed at 12.5 m hydrophone channel spacing. The streamers were 200 m apart. Two airgun arrays, each 3300 cu in, were fired alternately every 37.5 m, to collectively yield a 400 m wide sail line consisting of 8 CMP lines at 50 m spacing. The long offset seismic experiment included 72 short period OBS's deployed below the 3D reflection survey box. Most of the instruments recorded all the shots from the airgun array shots.

The 3D seismic box covered a variety of geologic features. The Peridotite Ridge (PR), is associated with the exhumation of upper mantle rocks to the seafloor during the final stage of the continental separation between the Galicia Bank and the Grand Banks of Newfoundland. The S reflector is present below most of the continental blocks under the deep Galicia basin. S is interpreted to be a low-angle detachment fault formed late in the rifting process, and a number of rotated fault block basins and ranges containing pre and syn-rift sediments.

Initial observations from stacked, but not yet migrated, 3D seismic data show that the PR is elevated above the present seafloor in the South and not exposed through the seafloor in the North. The relative smoothness of the PR surface for the entire 20 km N-S contrasts with the more complex, shorter wavelength, faulting of the continental crustal blocks to the east. The PR does not seem to show offsets or any apparent internal structure. However, migration will be required to see internal structure of the PR.

Between the PR and the western most rifted continental crustal blocks, is a sedimentary basin about as wide as the PR and very different from the sedimentary basins bounded by the continental crustal blocks. The unusual basin is the deepest and thickest of the basins, and is characterized by a very bright reflector with reverse polarity relative to that of the seafloor. This reverse polarity bright reflector might be caused by the presence of water and perhaps overpressure below the reflector. This material may have sloughed off the PR as it was emplaced at the seafloor during syn- and post-rift time.