



## **Fault linkage and continental breakup**

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The magma-poor rifted margin off the west coast of Galicia (NW Spain) has provided some of the key observations in the development of models describing the final stages of rifting and continental breakup. In 2013, we collected a  $\sim 68 \times 20$  km 3D seismic survey across the Galicia margin, NE Atlantic. Processing through to 3D Pre-stack Time Migration (12.5 m bin-size) and 3D depth conversion reveals the key structures, including an underlying detachment fault (the S detachment), and the intra-block and inter-block faults. These data reveal multiple phases of faulting, which overlap spatially and temporally, have thinned the crust to between zero and a few km thickness, producing 'basement windows' where crustal basement has been completely pulled apart and sediments lie directly on the mantle. Two approximately N-S trending fault systems are observed: 1) a margin proximal system of two linked faults that are the upward extension (breakaway faults) of the S; in the south they form one surface that splays northward to form two faults with an intervening fault block. These faults were thus demonstrably active at one time rather than sequentially. 2) An oceanward relay structure that shows clear along strike linkage. Faults within the relay trend NE-SW and heavily dissect the basement. The main block bounding faults can be traced from the S detachment through the basement into, and heavily deforming, the syn-rift sediments where they die out, suggesting that the faults propagated up from the S detachment surface.

Analysis of the fault heaves and associated maps at different structural levels show complementary fault systems. The pattern of faulting suggests a variation in main tectonic transport direction moving oceanward. This might be interpreted as a temporal change during sequential faulting, however the transfer of extension between faults and the lateral variability of fault blocks suggests that many of the faults across the 3D volume were active at least in part simultaneously. Alternatively, extension may have varied in direction spatially if it were a rotation about a pole located to the north.