



## **Complex patterns of faulting revealed by 3D seismic data at the West Galicia rifted margin**

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The west Galicia margin is characterised by crust thinning to less than 3 km, well-defined fault blocks, which overlie a bright reflection (the S reflector) generally interpreted as a tectonic Moho. The margin exhibits neither voluminous magmatism nor thick sediment piles to obscure the structures and the amount of extension. As such it represents an ideal location to study the process of continental breakup both through seismic imaging and potentially through drilling. Prestack depth migration of existing 2D profiles has strongly supported the interpretation of the S reflector as both a detachment and as the crust-mantle boundary; wide-angle seismic has also shown that the mantle beneath S is serpentinised.

Despite the quality of the existing 2D seismic images, a number of competing models have been advanced to explain the formation of this margin, including sequential faulting, polyphase faulting, multiple detachments and the gravitational collapse of the margin over exhumed mantle. As these models, all developed for the Galicia margin, have been subsequently applied to other margins, distinguishing between them has implications not only for the structure of the Galicia margin but for the process of rifting through to breakup more generally. To address these issues in summer of 2013 we collected a 3D combined seismic reflection and wide-angle dataset over this margin. Here we present some of the results of ongoing processing of the 3D volume, focussing on the internal structure of some of the fault blocks that overlies the S detachment.

2D processing of the data shows a relatively simple series of tilted fault block, bound by west-dipping faults that detach downwards onto the bright S reflector. However, inspection of the 3D volume produced by 3D pre-stack time migration reveals that the fault blocks contain a complex set of sedimentary packages, with strata tilted to the east, west, north and south, each package bound by faults. Furthermore, the top of crustal basement appears in places to have acted as an extensional slip surface. We interpret the complex pattern of faulting and internal block deformation as the results of several phases of faulting, coupled with internal deformation and some late gravitational collapse, all components of some of the various models that have been applied to this margin.