The role of pre-existing structure on determining the geometry and evolution of multiphase rifts: Case studies from the small to the large scale, offshore S. Norway

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Many physical and numerical models of rift evolution assume a simplified, relatively homogeneous continental lithosphere. However, it is widely known that the continental lithosphere contains a wealth of pre-existing structures and heterogeneities across a range of scales; from large crustal sutures and lineaments, through continental shear zones and orogenic belts, to pre-existing fault networks and smaller. Such structures may exert a significant influence over the geometry and evolution of rift systems during later tectonic events. However, the extent to which, and the mechanisms of how these structures may reactivate and influence later rifts remains poorly understood; primarily due to difficulties in constraining the three-dimensional geometry and nature of these pre-existing heterogeneities, particularly those within crystalline basement.

During this presentation I will examine two case studies, located offshore southern Norway, looking at how pre-existing structures, across a range of scales, may affect the evolution of overlying rifts. First, we examine a series of enigmatic intrabasement structures, spectacularly imaged on 2D and 3D seismic reflection data, located within the Egersund Basin, which are correlated to the onshore Caledonian thrust belt and Devonian shear zones. Secondly, we move eastwards to the Farsund Basin, where we use interactions between non-colinear fault populations to examine the evolution of the Farsund Basin and determine the expression of the deep-seated Sorgenfrei-Tornquist Zone within the overlying rift.

Biography

Tom Phillips is currently a PhD student within the Basins Research Group at Imperial College London. His research primarily uses seismic reflection data to look at the effects of basement structure and multiple rift phases on the geometry and evolution of rift systems.

Tom received a first class Earth Science degree from Oxford University in 2013; where his final year MSci project looked at the evolution of the UAE foreland basin, in conjunction with the Abu Dhabi Petroleum institute. Last year, he worked as an intern within the hydrocarbon industry at Petrolia Norway in Bergen, and at BG Group.