Influence of a multi-layered salt stratigraphy on rift-basin development; Insights from the Slyne and Erris basins, offshore NW Ireland

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This study uses a combination of 2D and 3D seismic reflection surveys coupled with borehole data from the Irish Atlantic margin to map the distribution of salt in the Slyne and Erris basins and understand its influence on basin development throughout the Mesozoic.

The north-western European Atlantic margin is populated by a framework of rift basins stretching from the Barents Sea offshore northern Norway to the south of Portugal. Several of these basins contain significant quantities of salt, which plays an important role in basin development and structural evolution. While salt is present on the Irish Atlantic margin, its distribution and role in basin development is poorly understood. The Slyne and Erris basins, off the northern coast of Ireland, contain two proven layers of salt; the Upper Permian Zechstein Group and the Upper Triassic Uilleann Halite Member of the Currach Formation.

Where present in their salt-dominated forms, both layers act as décollements, mechanically detaching pre-, intra- and post-salt stratigraphy. The Zechstein Group is present throughout the Slyne and Erris basins, while the Uilleann Halite Member is only developed in the northern Slyne Basin and the southern Erris Basin. Both salt layers have undergone significant halokinesis during basin development, and their original thicknesses are unclear. This halokinesis has played a significant role in the formation of hydrocarbon traps in these basins: the Zechstein Group forms salt pillows and salt rollers, causing folding and rafting in the overlying Mesozoic section, driven by active faulting in the pre-salt Palaeozoic basement. The Uilleann Halite Member caused thin-skinned crestal collapse and delamination of the overlying Jurassic section above anticlines cored by Zechstein salt. Both layers of salt play a key role in the development of the Corrib gas field and are responsible for trap formation in the Corrib North and Bandon discoveries. Understanding the genesis of these salt-related structures in a multi-layered salt system will provide insight into future exploration activities in salt-prone basins offshore Ireland, as well as their suitability for storage of sequestered $\text{CO}_2$.

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