Recent discoveries (e.g., Cambriol and Cappahayden) at the Grand Banks, offshore Newfoundland reconfirm the increasingly promising hydrocarbon potential along the shelf and slope sections of this emerging North Atlantic basin. These discoveries, along with proven petroleum systems, evolving play concepts and ongoing 3D seismic acquisition campaigns, open up exciting new areas for hydrocarbon exploration and potential to capture step-out opportunities for near-field developments. The new multisensor 3D seismic acquisition and processing technologies enabling effective demultiples, offer complete imaging of the rift-related petroleum systems and reveal new opportunities in the overlying Tertiary passive margin sequences.

The Grand Banks shelf platform offshore Newfoundland was affected by three major divergent plate tectonic systems associated with the progressive opening of the Central and North Atlantic, respectively. The eastern Grand Banks shelf edge marks an intermediate stage in the northward migration of the Atlantic system. It is dominated by the separation of Iberia from Avalonia, which completed after a Jurassic to Cretaceous rift stage, documented throughout the Grand Banks subsurface. Regional seismic data from the outer Orphan Basin, provides tectonic evidence for a pull-apart basin that is transient into Riedel-shear dominated arrays of extensional faults, towards the prolific hydrocarbon domain of the Grand Banks distal shelf.
Three-dimensional seismic control systems control the offshore Grand Banks shelf platform. The north, the Newfoundland–Gulf of St Lawrence region limits the Triassic to Jurassic–but the central of the Grand Banks margin and thin beneath the separation of the Iberia micro-plume from Avalonia, which completed after a terrane to Cretaceous rift stage. The Cretaceous–tertiary continental is considered throughout the Grand Banks subcrustal (Figure 1) and underneath present-day strips. Extensional structures are the major element of the proven petroleum systems in terms of source rock presence and its maturation, due to the variable overburden in extensional systems. In further control the reservoir distribution relative to structural highs and is a potential trap of extensional systems. Reliable seismic data significantly contributes to reservoir risk mitigation and improves the success rate for exploration drilling.

Subsurface Integration with Modern 3D Seismic Data

Structural seismic data analysis, based on 3D line and extensive 3D multidisciplinary broadband seismic imaging, suggests that the Orphan Basin formed in a pull-apart arrangement that is translated into Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckle–

Buckl...