Understanding Fold-Thrust Belt Architecture to Identify New Plays

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Onshore fold-thrust belts (FTBs) are regularly explored for hydrocarbons. However, since most shallow plays have been worked, identification of new, often deeper, plays in existing structures is required to satisfy the ongoing global energy demand.

In an onshore setting, data from bore holes, field measurements and seismic imaging need to be combined to create a geological model. These models are often based on sparse data for which there is more than one valid geological interpretation, and for which model certainty decreases away from hard data points (e.g. field/bore hole). In FTBs, geological models are generally less constrained at depth. This lack of constraint is compounded by the difficulties in seismic imaging of steep or overturned beds common to all FTBs. We have applied forward modelling techniques to a previously explored area to reassess FTB architecture at depth and to help identify new plays.

In this example, data from multiple sources has been integrated into a single visual environment. In this 3D space we have created different geological models that honour all available data. Forward modelling has been used to test the validity of these geological models. The final geometries that are recreated depict the range of potential structural traps at depth.

The study demonstrates that forward modelling scenarios based on different structural concepts can help identify deeper plays in previously explored FTBs. Modelling multiple scenarios also helps increase the understanding of uncertainty in structural architecture at depth, which feeds directly into prospect risking.