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Seismic Expression of Deep-water Slope Channel Complex & Frontal Splay Architectural Elements: Calibration with Outcrop & Sea Floor Analogues from Southern and Eastern Turkey & Various Modern Systems

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SUMMARY

Frontal splays and slope channel complexes make up the bulk of deep-water depocentre volume. Slope channel complexes, often fed through a series of gullies of upper slope/shelfal canyons, are well known and exceptional examples are exposed in turbidite-filled basins of southern and eastern Turkey. Frontal splays are located at or beyond feeder channel mouths, of variable dimension and character, they range in grain size from gravel to silt and yet appear to have a predictable and narrow range of geometry. Frontal splays in particular remain one of the most undersampled and unimaged deep-water sedimentary features, are often seen on seismic data where they straddle the resolution limits, and as a result there is no accepted general model for them. The terminology for deep-water depositional bodies that are not in erosionally based features remains highly inconsistent, with terms like 'lobes', 'splays', 'frontal splays', 'mouth lobes', 'distributary lobes', 'channelised lobes', 'suprafan lobes' etc all vying for widespread usage and promoting confusion across the study of modern and outcrop deep-water sedimentary systems and their reservoir equivalents. It is no surprise that general accepted principles of architecture, rock property distribution, body geometry, and even location on the sea floor, are not yet in place.

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Slope channel complexes and deep-water frontal splays from the modern sea floor (Gulf of Cadiz, Rhone Fan, Mississippi Fan, Amazon, Mediterranean), are compared with outcrop examples of slope channel and sheet-style architecture from southern and eastern Turkey and elsewhere, and also with cored and imaged subsurface examples from the Bay of Bengal, the Caribbean, Indonesia and West Africa amongst others. Rather than a review of published examples, most of the channel complexes and frontal splays shown have been worked on by the author.

The presentation is an attempt the range of dimension and composition of deep-water frontal splays and slope channel complexes. The paper is intended for a varied audience with interests in the variability in these types of deep-water systems and how they are expressed seismically.

Bryan Cronin is a freelance academic consultant. He was a senior lecturer at the University of Aberdeen for 10 years where he ran several industry research consortia on turbidite research. He has been on 11 deep-sea research cruises, published 49 research papers, worked extensively on turbidite outcrops from Turkey, Spain, France, Ireland and California. He consults widely in deep-water exploration and production in the Gulf of Guinea, the North Sea, the Bay of Bengal, the South China Sea and the Caribbean. He runs training courses for Petroskills (Sandstone Reservoirs, Turbidite Reservoirs and systems; Outcrop to Simulation; Basic Petroleum Geology; North Sea Petroleum Geology) and field courses through Nautilus (Turkey, California, Ireland). He is joint principal investigator, with Prof Ben Kneller, on the PRACCS research consortium at the University of Aberdeen. He has worked on the Tertiary deep-water basins of southern and eastern Turkey since 1996 and published widely on these exposures