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Seismic Sedimentology of Deep-Water Channel Complexes

The role of sedimentology in reservoir modelling is to substantiate and validate seismic interpretation by eliminating less likely hypotheses. Modern 3-D seismic data from submarine channels and canyons provide images that resolve features, which often appear to show sedimentological detail; channel fills, channel margins, levees, and overbank complexes may all be inferred. This paper addresses the issue of validation of the sedimentary interpretation of seismic data.

We present a workflow that is designed to integrate outcrop analogue data into subsurface models. Our outcrop description targets the identification of temporal correlation between sedimentary units, and validation of geometric features by comparison with modern seafloor data. Sedimentary descriptions of outcrops are used to define correlation templates for the sedimentary architecture and to generate synthetic geophysical logs. From these, synthetic seismograms are integrated with the correlation templates to create synthetic seismic sections. Hence, we create a seamless linkage between outcrop description and seismic data.

To demonstrate the importance of establishing temporal correlation, as opposed to inference of spatial relationships, between reservoir units we use outcrop examples from eastern Turkey. These data are converted into synthetic geophysical data, which in turn are applied to support the interpretation of high-resolution seismic data from offshore west Africa. Validation of the seismic sedimentological interpretation is made more robust by iteration integration of the data - if one cannot validate the interpretation of features on at least two of the data sets the validity of an interpretation must be questioned.