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ABSTRACT

The ability to accurately characterise fault zone properties is of major importance as operating companies seek to develop reservoirs that are increasingly structurally complex. Ideally, fault properties should be predictive, verifiable and consistent with all available data. However they must not be 'tuned' beyond the realms of geological realism just to achieve a production history match. A number of commercial software tools aim to provide answers to these problems, but it is our experience that there are often significant differences in the results from different tools, even for "standard" fault properties such as throw and SGR. This is related to a number of key issues: i) Are the data of the correct type and density for the case under consideration? ii) Is the fault zone adequately represented, or is refinement needed? iii) Is the level of detail sufficient to capture a representative volume for each fault? iv) Is throw computed accurately? v) Do factors other than lithology affect the fault properties? Seismic attribute data can increasingly be used in the prediction of fault zone properties. The accuracy of any such prediction relies on the availability of sufficiently high quality seismic data, in which case it can help to reduce uncertainty associated with populating fault zones in reservoir models. Fault zone permeability has received significant attention in recent years producing several different algorithms. These aim to predict the fault zone permeability from various factors, typically including an Shale Gouge Ratio (SGR) type component. Care is required, however, when applying these algorithms to reservoirs not considered during their formulation, particularly carbonate systems or very-deeply buried reservoirs, as the results may be meaningless.

Typically fault properties are predicted at the scale of the earth model, but the results may then have to be upscaled for use in a reservoir simulator. A potentially more important issue is the representation of faults in simulation grids. In certain complex cases, non-traditional gridding methods may be required to accurately represent the fault geometry. Fault characterisation has become routine over the past few years with many tools available that aim to predict fault zone properties. However, caution is required, particularly with complex reservoirs. The importance of honouring all available static and dynamic data should not be forgotten.