Diagenetic vs. sedimentary systems: two different approaches for reservoir modelling applied to hydrothermal dolomite and storm-deposits.

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Populating a reservoir model with lithology is an essential step in reservoir modelling workflows. In order to produce a realistic distribution of different rock types, a good understanding of the geology is required. This can for example be based on conceptual models, outcrop analogue observations and subsurface data or other. Two case studies will be presented that use outcrop analogues to understand the formation mechanism and extract the lithology distribution for reservoir modelling but use a very different approach.

The first case covers a hydrothermal dolomite analogue study of the Latemar. Over the past 25 years, three different dolomitization mechanisms have been proposed with distinctly different geometries, ranging from a huge mushroom-shaped dolomite to dolomite fingers. The mechanism of dolomitization that was uncovered, suggested a close relationship to magmatic dike occurrences. Independently the dolomite distribution was extracted from a digital outcrop model and analysed by 3D variography. The resulting distribution is clearly different from previous studies, confirms the spatial relationship to dikes and allows easy implementation into existing reservoir modelling workflows.

The second case study covers a storm-dominated reservoir analogue. This sedimentary system has a much better developed conceptual model with a more limited range of potential geometries. The scale, dimensions, orientation and clustering of these geometries are quantified on outcrop and are translated into boundary representations. These boundary representations can be implemented in existing grid-based modelling workflows. However, to take full advantage of the boundary representation, we are working on surface-based modelling, using fully-unstructured dynamic tetrahedral meshes, that put the computing effort where needed while preserving the geometries.