

Seismic forward modelling of dolomite bodies in Cretaceous reservoir rocks, SW Iran

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High temperature dolomitization of limestones is presumed to enhance reservoir quality, particularly with respect to porosity, and it is thus clearly advantageous to identify possible changes in seismic response following dolomitization with the goal of identifying dolomite bodies in seismic data. We present attempts to forward model the seismic response following high temperature dolomitization. Two key aspects were considered: (a) the geometry of the dolomite bodies, and (b) changes in acoustic properties accompanying dolomitization. Field data from SW Iran provided the basic geometric constraints: a deep source of dolomitizing fluids, fracture/fault conduits, bedded platform carbonates (variable facies/porosities), shale seal and internal baffles/barriers. Two geometric end-members were modeled: "Christmas Trees" and "Mushrooms", their form being controlled by precursor porosities, seals and baffles, and geographic /stratigraphic proximity to the dolomitizing source. A critical step in seismic forward modeling is assigning physical properties to the modeled bodies – knowledge of the spatial variation in porosity and texture (influencing rock "stiffness") within the dolomite bodies was found to be crucial and requires detailed field or well analogs, preferably within the basin in question.