

Mixed Siliciclastic-Carbonate Deposits: Scales and Heterogeneities

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ABSTRACT

Mixed siliciclastic-carbonate deposits represents the result of the interaction between a siliciclastic sediments source and a carbonate factory. Mixing between the two heterolithic siliciclastic and carbonate fractions can occur at different scales, from bed (core-plug) to stratigraphic (seismic) scales, producing a high vertical and lateral lithological variability. In this study, we characterise mixed deposits according to the main geological factor typifying different types of mixing (allocyclic versus autocyclic). In particular, allocyclic and autocyclic factors operate at different scale of observations producing a (i) particles mixing where the two heterolithic fractions accumulate contemporaneously, and (ii) strata mixing resulting from the alternation of the two heterolithic fractions in time. Characterisation of the type of mixing is important to better understand (i) the interaction between siliciclastic and carbonate particles and the sedimentary processes, (ii) born and demise of the carbonate factory respect to the siliciclastic dispersal mechanisms, and (iii) the distribution in space and time of the two heterolithic fractions. Furthermore, the petroleum geologists are interested to unravel new insights about the internal properties (e.g., porosity and permeability) of such complex systems and to reconstruct predictive 3D models. This because they can have an important impact on hydrocarbon exploration and exploitation phases. However, proper understanding of mixed deposits is challenging because they provide more sensitive records and complex sedimentation pattern than pure siliciclastic or carbonate systems.