Mixed Siliciclastic-Carbonate Deposits: Scales and Heterogeneities*

D. Chiarella¹, S.G. Longhitano², and M. Tropeano³

Search and Discovery Article #51477 (2018)**
Posted April 9, 2017

*Adapted from extended abstract based on poster presentation given at AAPG/SEG International Conference and Exhibition, London, England, October 15-18, 2017

**Datapages © 2018 Serial rights given by author. For all other rights contact author directly.

1Department of Earth Sciences, Royal Holloway University of London, UK (domenico.chiarella@rhul.ac.uk)
2Department of Sciences, University of Basilicata, Italy
3Dipartimento di Scienze della Terra e GeoAmbientali, University of Bari, Italy

Abstract

Mixed siliciclastic-carbonate deposits represent 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 (Figure 1) (Chiarella et al., 2017).

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 (e.g. Chiarella and Longhitano, 2012; Longhitano et al., 2014).

Characterisation of the type of mixing is important to better understand (i) the interaction between siliciclastic and carbonate particles and the sedimentary processes, (ii) birth and demise of the carbonate factory with 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 is 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 patterns than pure siliciclastic or carbonate systems.
References Cited


Figure 1. Different scales of mixing in siliciclastic-carbonate deposits. (A) Mixed siliciclastic-carbonate ripples (Acerenza Basin, Southern Italy). (B) Close-up view from the previous photograph showing the siliciclastic-carbonate segregation among lamina-sets. (C) Alternation between siliciclastic and carbonate beds (Baltic Basin, Eastern Europe). (D) Stratigraphic scale alternation between reservoir-prone and non-reservoir units (Enna-Caltanissetta Basin, Italy).