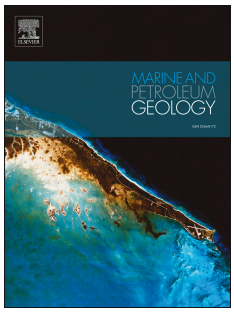
# Accepted Manuscript




Types of mixing and heterogeneities in siliciclastic-carbonate sediments

Domenico Chiarella, Sergio G. Longhitano, Marcello Tropeano

PII: S0264-8172(17)30360-4

DOI: 10.1016/j.marpetgeo.2017.09.010

Reference: JMPG 3068

To appear in: *Marine and Petroleum Geology*

Received Date: 3 July 2017

Revised Date: 7 September 2017

Accepted Date: 9 September 2017

Please cite this article as: Chiarella, D., Longhitano, S.G., Tropeano, M., Types of mixing and heterogeneities in siliciclastic-carbonate sediments, *Marine and Petroleum Geology* (2017), doi: 10.1016/j.marpetgeo.2017.09.010.

# Types of mixing and heterogeneities in siliciclastic-carbonate sediments

DOMENICO CHIARELLA[1], SERGIO G. LONGHITANO[2], MARCELLO TROPEANO[3]

[1] *Department of Earth Sciences, Royal Holloway University of London, Egham, Surrey TW20 0EX, UK*

[2]*Department of Sciences, University of Basilicata, Italy*

[3] *Dipartimento di Scienze della Terra e Geoambientali, Università degli Studi di Bari Aldo Moro, Italy*

**Keywords:** mixed sediments; siliciclastic-carbonate; compositional mixing; strata mixing, heterogeneity, reservoir

## Abstract

Mixed siliciclastic-carbonate deposits consist of a suite of different types of mixing between the two components, from bed (core-plug) to stratigraphic (seismic) scales, producing a high vertical and lateral lithological variability. Mixed deposits results from the interaction of siliciclastic input and coeval carbonate production controlled by temporal and/or spatial factors. Although mixed deposits are very diffuse in the geological record, studies about these deposits are scrappy and not well encoded. Accordingly, mixed deposits represent a labyrinth for researchers who want to investigate them for the first time.

In this paper, different types of mixing (compositional *versus* strata) controlled by different allocyclic (*e.g.* sea-level, climate) and/or autocyclic (*e.g.* depositional processes) factors that operate at different scale are documented. Mixing is recognized and described at three main scales of observation: bed/core-plug scale; lithofacies/well-log scale; and stratigraphic/seismic scale. (i) Compositional mixing reflects the contemporaneous accumulation of the two heterolithic fraction in space and time. This type of mixing is observable at lamina to bed scale, locally producing depositional structures diagnostic for particular depositional environments. (ii) Strata mixing results from the alternation of the two heterolithic fraction in time. This type of mixing is observable at lithofacies to stratigraphic scale and can be related to depositional processes, climatic variations and/or relative sea-level changes.

A correct identification of these different types of mixing and the scale of their occurrence is crucial in revealing (i) physical processes that control the sedimentation, (ii) environmental factors that influence the carbonate factory related to the siliciclastic dispersal mechanisms, and (iii)