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Assessment of the spatial-temporal variability of bio-lithofacies in the offshore of South Caspian Sea (Langroud-Roudsar Coasts)

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A depositional sedimentary environment is defined in terms of physical, biological and chemical variables, thus a change in the environmental conditions and their instability during sedimentation can be followed by a change in the diversity, distribution and abundance of planktonic and benthic organisms. These factors are analyzed in the offshore sediments of the South Caspian Sea (Langroud-Roudsar Coasts). The study is carried out on the six sediment cores (T1-T6), which length varies from 68 Cm to 154 Cm.
Based on the textural properties and fossil content of the sediments, 7 depositional facies are recognized: i) Ostracod-rich mud; ii) Gastropod-rich mud; iii) Fossil-poor mud; iv) Foraminifera-rich mud; v) Foraminifera-rich silty mud contourite; vi) Amalgamated-Fossil Mud; vii) Siliceous silty mud contourite. Thin to very thin lamination with light and dark colours are the most important primary structures in these facies, visible in Ct-Scan images. In the light-coloured laminae, frequency of sand and coarse to medium silts, as current index, is high. The dark coloured laminae have massive and homogenous appearances with high clay content. They are marked by no or low density trace fossils in most Ct-Scan transversal sections.
Investigations of the sedimentological analysis show that the Silty mud interlayers in the sequences are the result of low density turbidity currents, distal high density turbidity currents, hyperpicnal currents and nepheloid layers which intermittently impact the hemi-pelagic deposits. Based on the observation on the Ct images, it appears that ostracod-rich, gastropoda-rich and fossil-poor mud facies are influenced by the rivers input to the studying sites. The interaction between rivers (known as Polroud and Shalmanroud in the South Caspian) and sea water seems the main cause for fauna distribution in the ostracod-rich and gastropoda-rich mud facies.
As expected, the grain size decreases from shoreface to offshore settings is recorded in ostracod-rich, gastropoda-rich mud facies (depth of 51m) and Fossil-poor mud facies (depth of 117m). Conversely, in foraminifera-rich silty mud contourite facies (depth of 117 m) and siliceous silty mud contourite facies (depth of 116 m) the grain size increases by depth and distance from the shoreline. Relative constancy of sorting is a sign of stability of the energy for controlling depositional processes over time, which together with the increase of silt, is a sign of domination of high persistent currents along foraminifera-rich silty mud and siliceous silty mud contourite facies. These currents are known as bottom currents. The existence of bottom currents and their forming factors can be related to organism distribution in foraminifera-rich silty and siliceous silty mud contourite facies (richness of Coscinodiscus radiatus) and fossil-poor mud facies. However, the way such factors impact the organism distribution remains unclear.