Geophysical Research Abstracts
Vol. 16, EGU2014-1826, 2014
EGU General Assembly 2014

The Onset of the Messinian Salinity Crisis along the offshore Betic Range

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During the latest Miocene tectonic-driven processes triggered the closure of the gateways connecting the Atlantic and the Mediterranean seas. Consequently, the Mediterranean Sea experienced major changes on sea level, water chemistry, faunal assemblages, and sedimentary patterns. The extended presence of thick evaporitic sequences on both marginal and deep areas indicates the magnitude of this event and its basin-wide nature. However most of the evidence explaining the origin, nature and system responses to this crisis, also known as the Messinian Salinity Crisis (MSC), comes from continental/shallow marine areas. Hence, responses of deep marine environments to the MSC and their correlation with marginal regions are still poorly understood. In this work, we aim to provide a chronostratigraphic framework for sediments located along the offshore Betic Range (Valencia basin and Alicante shelf). This area, which is the offshore extension of the Betic gateway, potentially can help to correlate onland sedimentary successions with seismic stratigraphic sequences recognized at intermediate-depths. Thus, moving a step further on the marginal-deep basin correlation across Western Mediterranean.

An age model was built by using several planktonic foraminifera events that have been astronomically dated in other Mediterranean sections. In addition, sonic and resistivity well logs were tuned to the astronomical target curves. Well log patterns allow us to identify a cyclical sequence of gypsum on the Alicante shelf, which is very similar to the one present onshore in the Sorbas basin. Our preliminary results suggest that the first gypsum bed is conformable overlying Messinian marls. These results support the idea of a synchronous precipitation of the Lower Primary Gypsum across the entire Mediterranean basin. Finally, well-logging and micropaleontological data is being integrated with recently gathered 2D-seismic data (SIMBAD cruise), intentionally tied to some of our studied wells. Seismic data allowed identification on the Balearic Margin of a thin, shallower and disconnected Bedded Unit (BU) and a thicker, deeper and more continuous Upper Unit (UU) observed in the Valencia basin. Well-to-seismic tie shows that the BU on the Alicante shelf corresponds with the Primary Lower Evaporites. Thus, it questions the correlation between the UU and BU, although their seismic facies strongly resemble each other.