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SSeismic imaging of Messinian Evaporites in the Ionian Basin

Angelo Camerlenghi (1), Anna Del Ben (2), Edy Forlin (1), Riccardo Geletti (1), Arianna Mocnik (2), Marco Saule (1,2)

(1) OGS Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, Geophysics, Trieste, Italy (acamerlenghi@ogs.trieste.it), (2) Department of Mathematics and Geosciences, University of Trieste, Italy

The understanding of the Messinian Salinity Crisis (MSC) as a Mediterranean basin-wide event requires an improved knowledge of the stratigraphy in the deep basins and continental margins. The seismic markers of the deposition of Messinian evaporites in the deep Mediterranean basins identify two end-members in the Western Mediterranean basins and in the Levant Basin. In the Western Mediterranean a consistent succession of three seismo-stratigraphic units in the deep basins, the so called seismic trilogy, can be correlated across thousands of kilometers in the Algero-Balearic and Provençal basins with a fairly constant distribution of the Lower Unit, the Mobile Unit, and the overlying Upper Unit. In the Levant Basin, one single seismostratigraphic unit defines the MSC, composed of up to 6 alternations of a transparent and layered seismic units. The causes of the these different seismic expressions of the MSC are presently under investigation. Here we report on the seismic signal analysis performed on vintage multichannel seismic reflection profiles from the Ionian Basin, that is located immediately down-flow from the sill separating the Western Mediterranean Basins and the Levant Basin during the postulated re-flooding of the Mediterranean at the end of the MSC. Given the intense post-Messinian tectonic deformation induced plate convergence below the Calabrian and Hellenic margins, the challenge in this area is the identification of an undisturbed deep sea evaporitic sequence where the data quality allows a reliable reconstruction of the seismic units. With the aid of a extensive velocity analysis and pre-stack migration in time and depth domains, we have been able to define a third type of deep basin Messinian seismic sequence characterizing the Ionian Basin. This is composed by a very thin (one or two high amplitude reflectors) and discontinuous Lower Unit, that makes up basal lens-shaped bodies overlain by a nearly 1 km-thick Mobile Unit, typically composed of a transparent seismic appearance, overlain by a relatively thin Upper Unit composed of regular package of high-amplitude reflectors.
The existence of this seismic expression of the MSC in the deep basins reinforces the evidences for a longitudinal differentiation of the MSC across the Mediterranean basin, the causes of which cannot be fully understood without sampling the deep Mediterranean evaporites in different locations.