A comprehensive compilation of the seismic stratigraphy markers along the Adriatic Sea

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Abstract

The Mediterranean Sea is a natural laboratory for addressing questions on the formation and evolution of continental margins and the relationship between surface and deep processes. The evaporites deposited during the Messinian Salinity Crisis strongly impact its sedimentary and geomorphology evolution. We present here a compilation of the main regional seismic stratigraphic markers throughout the Central and South Adriatic Sea (CAB and SAB). The following original (uninterpolated) interpretations are provided in *xyz* format (*z* in second twt): i) Top of the Mesozoic formation, ii) Base and Top of the Gessoso Solfifera along the CAB, iii) Base and Top of the MSC detrital formation along the SAB, iv) Top of the Upper Unit, v) Base and Top of the middle Pliocene unit, vi) Seafloor. The available reflection seismic dataset the data set is compiled of processed vintage seismic profiles from the Videpi database.

Brief dataset history

Since the 1960s the West Mediterranean Sea has been investigated by reflection seismic surveys, with both academic and industrial objectives. Although some surveys are relatively old, new processing techniques have improved the quality of data acquired.. The results provide a wide diversification of data, with great differences in resolution and quality. Along the Italian peninsula (Fig. 1), the first industrial and academic reflection seismic data and borehole data compilation was accomplished by the Videpi project (https://www.videpi.com/videpi/videpi.asp). From this database, some of the seismic lines located along the western part of the Adriatic Sea were digitalized. This data set made it possible for us to undertake a multidisciplinary study along the Central Adriatic Sea (Pellen et al., 2017) to compare the Neogene sedimentary evolution between the Central Adriatic Sea (CAB) and the South Adriatic Sea (SAB). One of the main objectives was to better understand the processes that control the formation and evolution of continental margins, and the vertical motion and evolution of perched basins during the Messinian Salinity Crisis (5.97-5.33 Ma).

This work provides the interpretation of several stratigraphic markers (Figs. 1, 2), below briefly explained and referred. We provide *xyz* files, where *x* is the longitude, *y* the latitude and *z* the depth in second twt. The coordinates are not projected and the datum/ellipsoid is the WGS84.

Stratigraphic markers presentation

Figure 2 shows data distribution and an example of the stratigraphic section of the main markers in both CAB and SAB.

The **Base of the Tertiary Unit (S0)** (Fig. 3) is interpreted from borehole interpretation in all the geomorphological domains, from the shelf to the deep basin and along the CAB and SAB. On the shelf, it coincides with a strong unconformity, which becomes conformable towards the slope and basin domain.

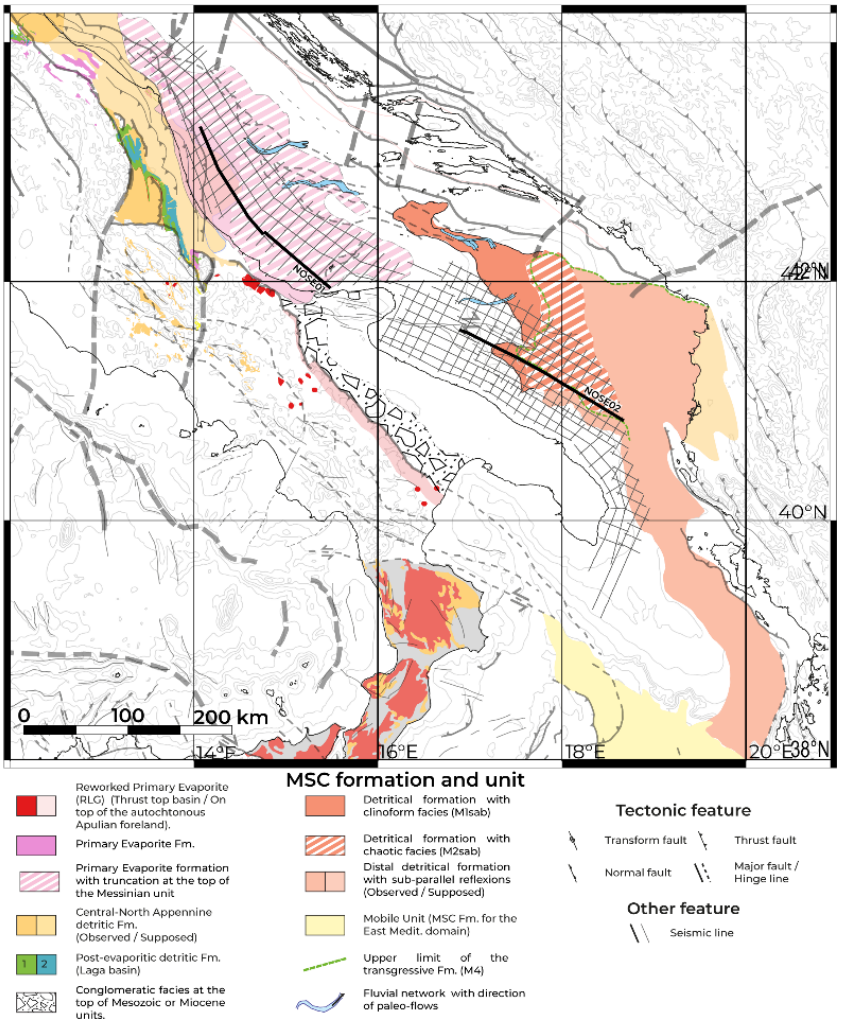
The **Base and Top of Gessoso Solfifera (N10a and N10b)** (Fig. 4) markers are interpreted in the CAB. The basal surface is defined as an erosive surface on the shelf, which may evolve laterally to a high amplitude and continue the seismic reflection. The Gessoso Solfifera formation is defined by one to two high amplitude continuous seismic reflections along the CAB and corresponds to the development of the primary evaporate (e.g. Roveri et al., 2004).

The **Base and Top of the detrital Gessoso Solfifera (S20 and S22)** markers (Fig. 5) areinterpreted along the SAB and have been identified on boreholes. Borehole observation reveals the alternating reworked evaporate and marl/argilious layers and have been associated with the Messinian Gessoso Solfifera formation. On the shelf, the basal surface is associated with a correlative surface and is sometimes erosive. The development of the M3 unit is associated with the development of a prograding clinoform, which evolves laterally to a strong chaotic seismic facies. This chaotic facies evolves towards the SE to a more continuous reflection. The basal surface remains unclear and represents a first attempt to circumscribe the MSC mass transport deposit. The Top detrital Gessoso Solfifera horizon marks the upper limit of the mass transport deposit.

The **Top of M4 unit (S30)** (Fig. 6) onlaps the top of the Gessoso Solfifera formation towardsthe northern part of the SAB. It corresponds to the top of the Upper Unit from Lofi et al., (2011). It is imaged as a medium-strong continuous reflector overlying medium continuous reflections (and defined as the M4 unit in this study) onlapping the top of the detrital Gessoso Solfifera formation along the SAB.

The **seafloor** (Fig. 7) marker is interpreted for the whole dataset. It is imaged as a strong reflectors characterized by high amplitude and positive polarity.

Figure 1. Physiographic map of the Adriatic Sea with location of sub-basins and domains and associated Messinian deposits and formations.



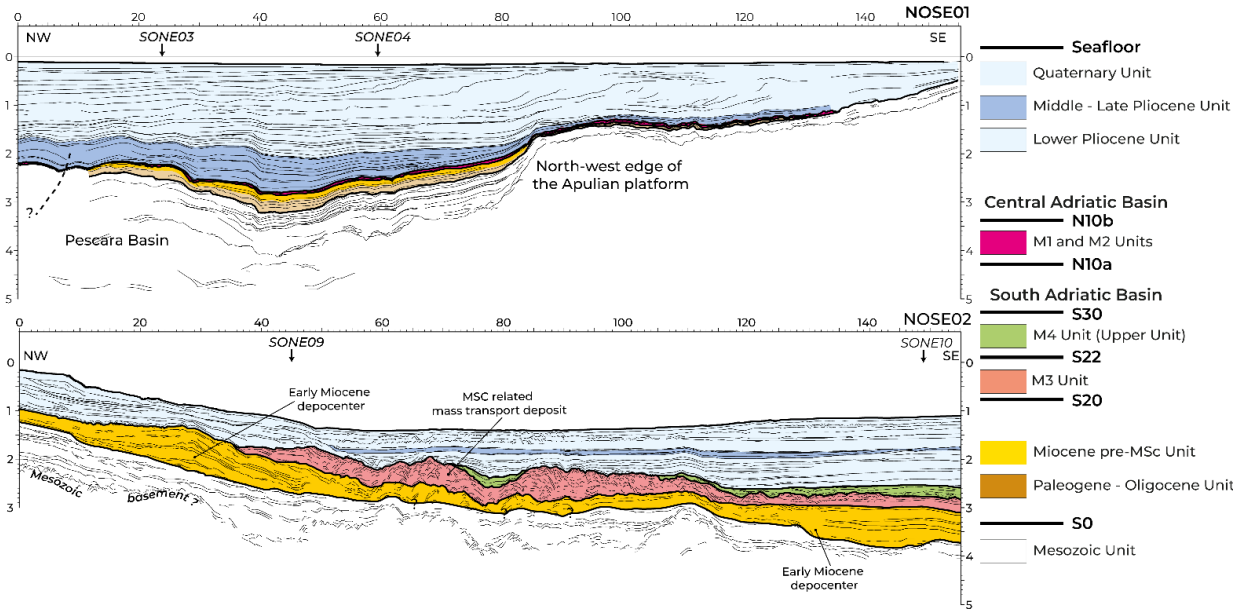


Figure 2. Example of two stratigraphic sections showing the main markers in the Central Adriatic Basin (CAB) (NOSE01) and South Adriatic Basin (SAB) (NOSE02) (location Fig. 1). Thick Black reflectors show the markers interpretation provided in this work, including: - Seafloor; -Top UU (S30); -Top Detrital Deposit (S22); -Basal Detrital deposit (S20); Top Gessoso Solfifera Fm. (primary evaporite (N10b) ; Basal Gessoso Solfifera Fm. (N10a); -Basal Tertiary Unit (S0).

Isobath maps

Figures below show the isobath map for each stratigraphic marker. The maps are projected in WGS Mercator. The data comes from seismic line interpretations and digitalization from Kingdom Suite. Interpretation of data under Kingdom Suite was done with the projection system "Coordinate System of Italy - Zone 2" and the datum Roma 1940. The horizons were then exported and converted to an unprojected system Lat/Lon WGS1984.

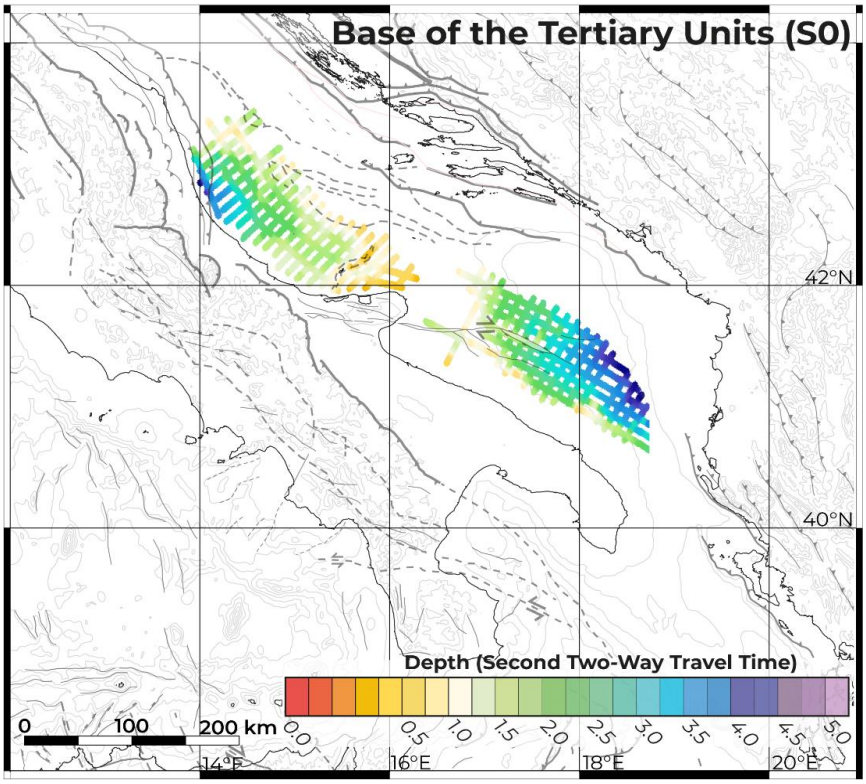


Figure 3. Base of the Tertiary Unit isobath map.

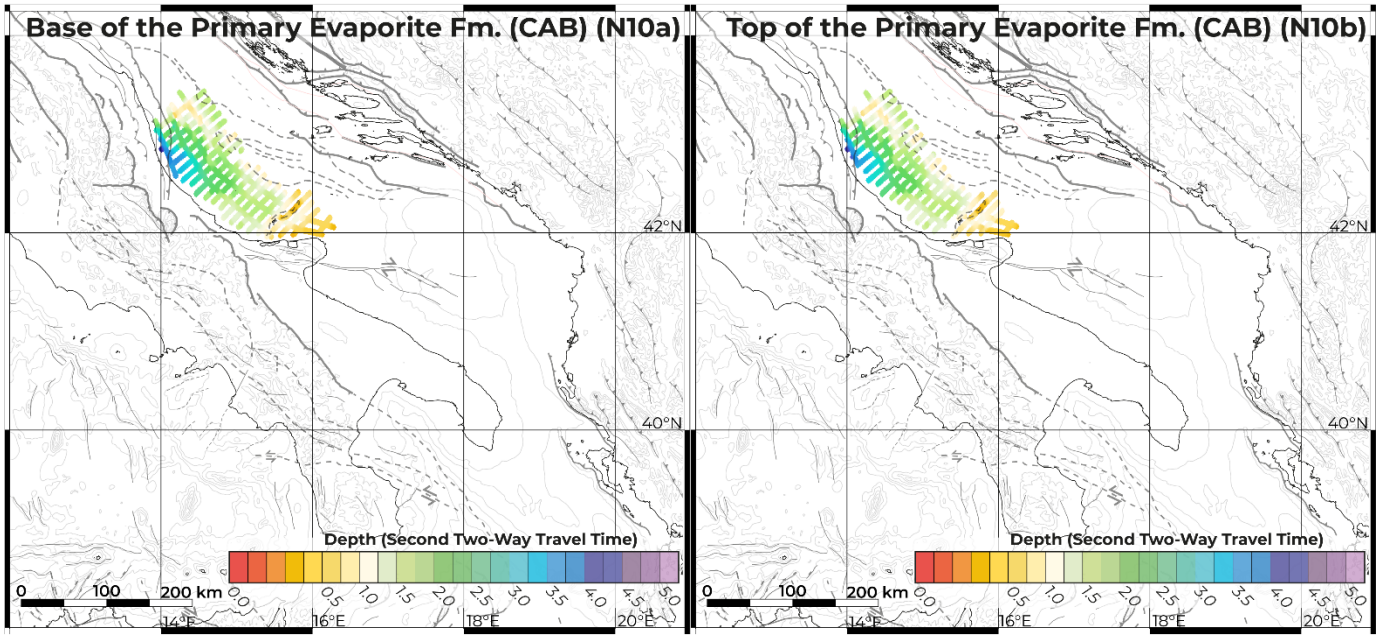


Figure 4. Base and Top of the Gessoso Solfifera Fm. Along the CAB (Primary Evaporite Fm.) isobath map.

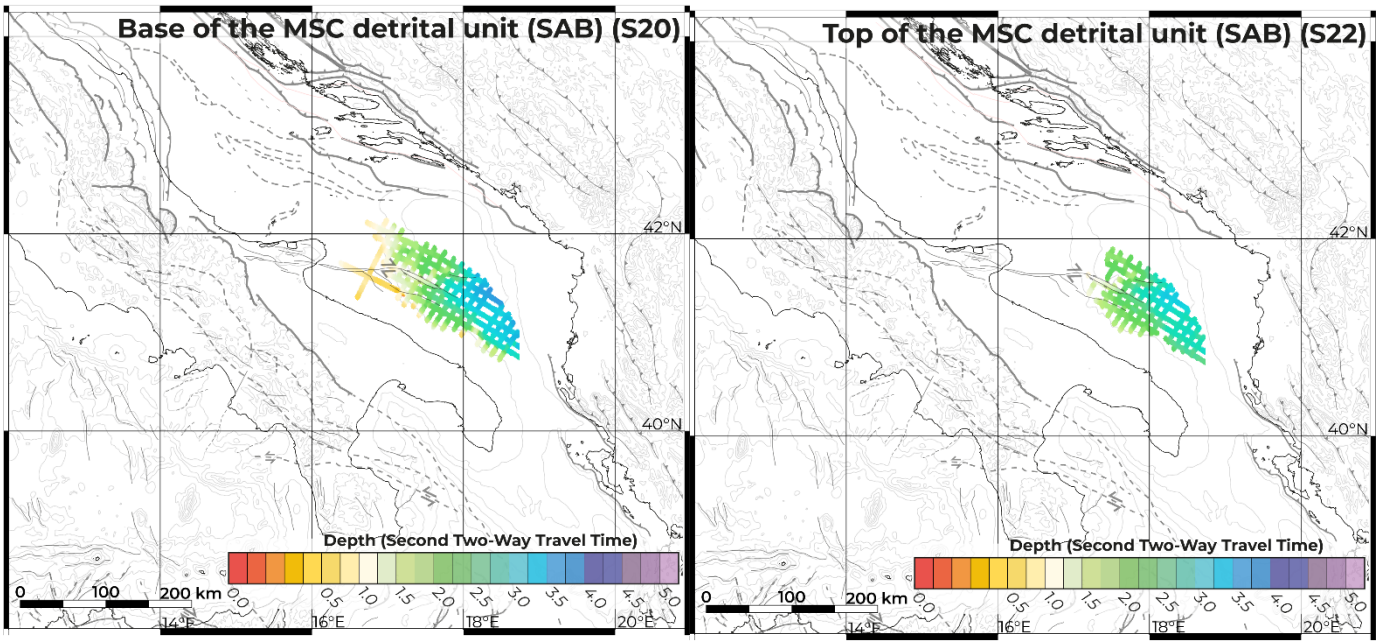


Figure 5. Base and Top of the Detrital MSC unit isobath map along the SAB.

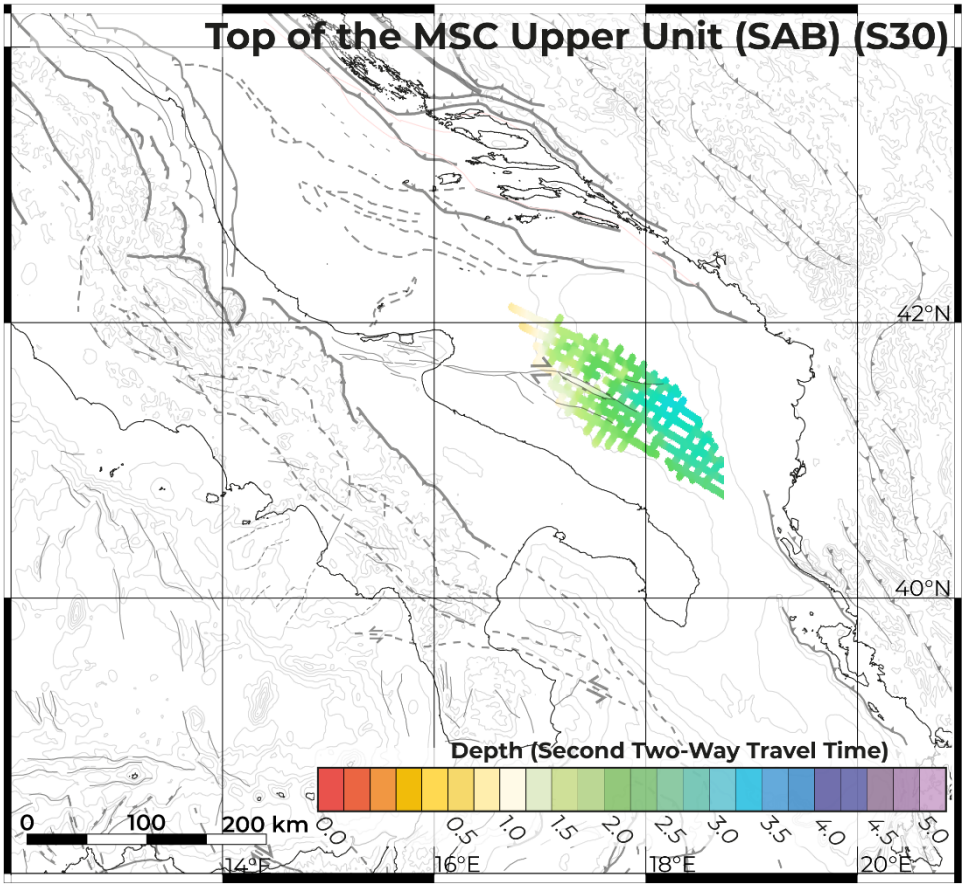


Figure 6. Top of the Upper Unit isobath map along the SAB.

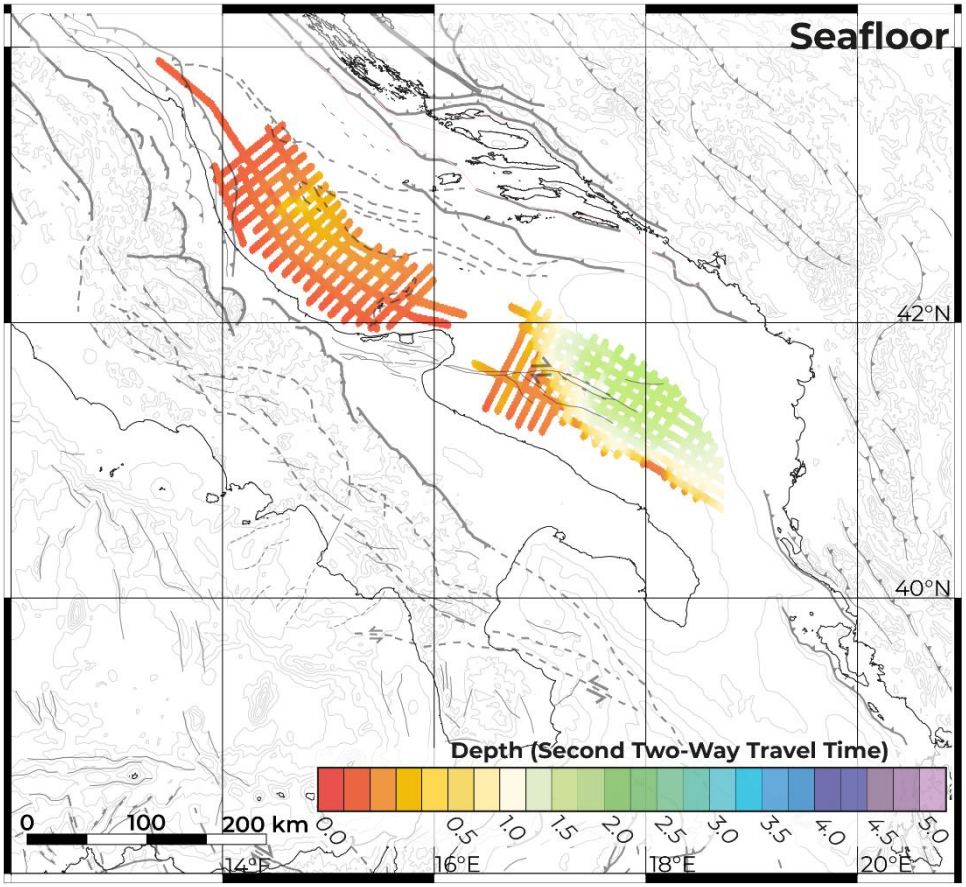


Figure 7. Seafloor isobath map.

Author contribution:

This project was designed by DA-MR and performed by RP. The data were organised and set-up by RP. Seismic interpretation for the data compilation was carried out by RP with participation of DA-MR. the authors are grateful for the help of Alison Chalm (Ifremer) in correcting the English grammar and structure

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