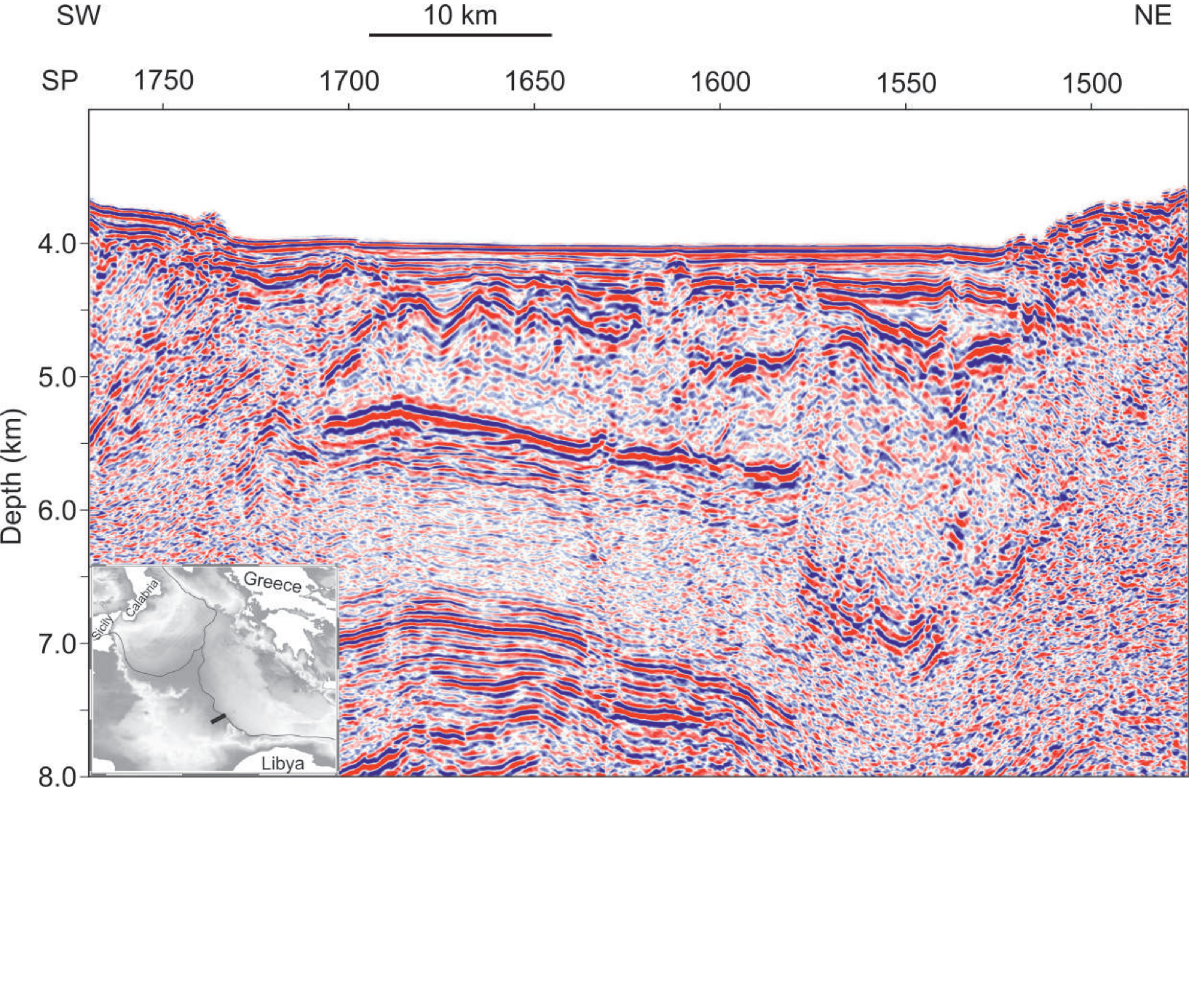
SW
10 km
NE
SP
1750
1700
1650
1600
1550
1500
4.0
5.0
6.0
7.0
8.0
Depth (km)
Greece
Sicily
Calabria
Libya

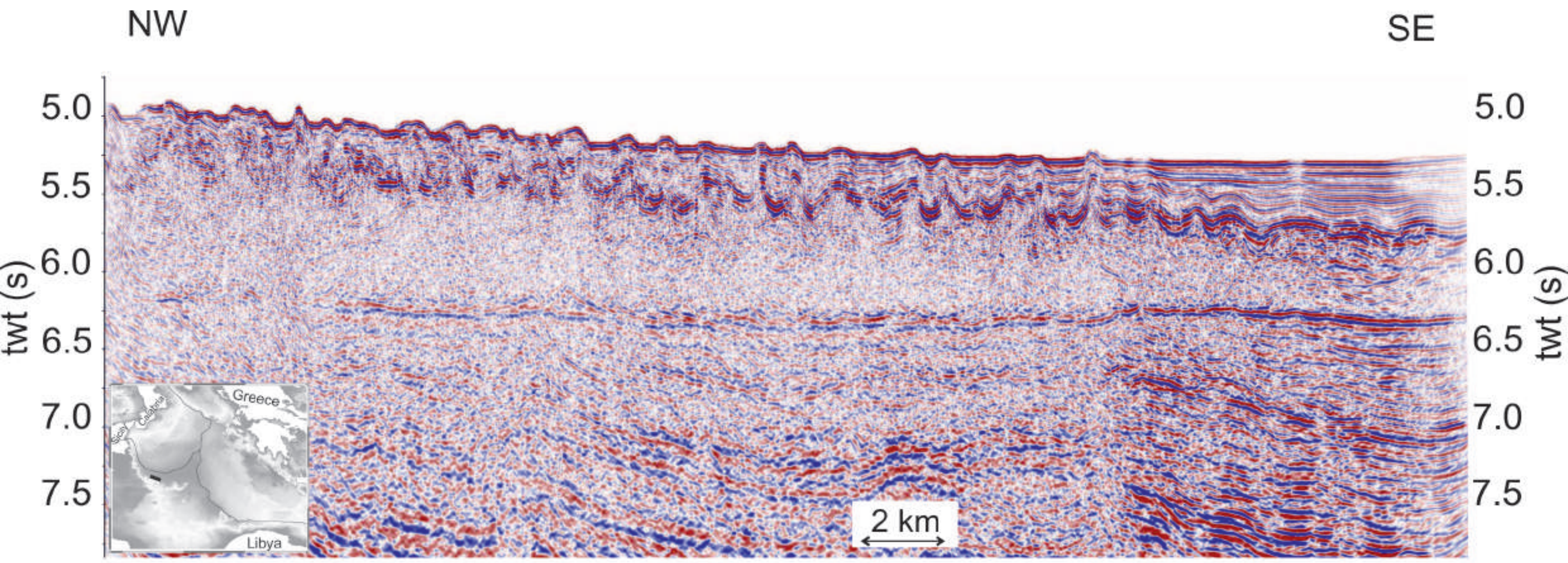

Fig.9

Supplementary material

Seismic Data and Methods

Vintage seismic data acquisition parameters. See Table I

Table I - Acquisition parameters of the vintage multichannel seismic profiles used in this study

PROJECT NAME	MS		CROP
LINE NAME	MS-27, MS-33	MS-112	CROP-M2B
VESSEL	Marsili	Marsili	OGS-Explora
RECORDING DATE	1971	1980	1991
SAMPLE RATE (ms)	4	4	4
RECORD LENGTH (s)	13	12	21
FOLD (%)	600	1200	3600
RECORDING FILTERS	10 - 72 Hz	8 - 62 Hz	8 - 77 Hz
ENERGY SOURCE	Flexotir	Flexotir	Air Guns
SOURCE ARRAY	3 guns, microcharges of 50g	2 guns, microcharges of 50g	32 guns, 80.4 liter volume
STREAMER (m)	2400	2350	4500
CHANNEL	24	48	180
GROUP INTERVAL (m)	100	50	25
SHOT INTERVAL (m)	200	100	62.5

Seismic data processing

Vintage, deep-penetration seismic dataset (CROP and MS data)

For the purpose of this paper, selected parts of the available seismic profiles were re-processed at OGS using Paradigm Echos and GeoDepth software from Emerson. In particular, we considered the portions intersecting the areas of the Ionian Sea where the Messinian sequence is undeformed or weakly deformed (Fig. 1).

For all the considered lines, the processing steps include trace editing, de-ghost, surface related multiple elimination (SRME), amplitude recovery and predictive deconvolution. We adopted a modern broadband processing flow, using a de-ghost algorithm to recover lost frequencies (due to source and streamer depth) and to increase bandwidth and resolution. Therefore, we implemented a procedure to apply modern processing steps to vintage data with low fold coverage (MS seismic dataset). In order to mitigate the effects of data sampling aliasing, the fold coverage of the MS lines was increased to 2400% before the surface related multiple elimination (SRME) step interpolating shots and receivers as suggested by Verschuur (2006). The interpolated traces were then removed to return to the original records. Pre-stack Kirchhoff time migration was performed applying the algorithm iteratively while updating the velocity field. For each iteration, common distance stack was used as quality control of the velocity field.

Pre-stack Kirchhoff depth migration was carried out on the MS and on the CROP M2B profiles in order to optimize the imaging of the seismic sections and to provide information on interval velocities of MSC units.

In order to highlight the presence of different seismic facies, seismic attributes of reflection strength and relative acoustic impedance were calculated using the Schlumberger Petrel interpretation software.

Modern, high-resolution multi-channel seismic data set

CUMECS-3 seismic survey

The data processing was performed using Vista7 software by Schlumberger. After trace editing and gain correction, the data were band-pass filtered and re-sampled to 1 ms. Velocity analyses and stacking where performed every 500 CDP. Post stack Spiking Deconvolution was applied before Finite Difference post-stack time migration.

M144/2 seismic survey

Data processing has been carried out with VISTA software provided by Schlumberger. The processing flow included the following main steps: 1) Bandpass filtering (150 -700 Hz), 2) trace editing and scaling, 3) 3-step de-bursting, 4) tau-p forward transformation, surgical mute and subsequent inverse tau-p transformation, 5) phase rotation, 6) predictive deconvolution and bandpass filtering, 7) velocity analysis and NMO-correction, 8) residual static corrections, 9) coherency filtering, 10) super-gather stacking, 11) Finite Difference post-stack time migration, 12) migration related noise suppression applying coherency methods, 13) de-swell, 14) top-mute.

<u>Seismic data interpretation</u>

In this work, the seismic interpretation intends to provide the 2D geometries of the interpreted horizons and the spatial distribution of the MSC evaporite thickness, integrating all available data.

DSDP Site 374 in the Ionian Abyssal Plain (Shipboard Scientific Party, 1978) allows the calibration of the Plio-Quaternary (PQ) reflectors down to the Miocene-Pliocene boundary, which can be recognized along the high-resolution profiles. The MSC units and surfaces were identified on the basis of seismic facies analysis, geometry, internal configuration, and seismic characters of prominent reflector, following the criteria identified by Lofi et al. (2011b).

Detailed information on interval velocities within PQ, MSC and pre-MSC units, provided by the velocity spectra analysis, have been used to estimate the MSC thickness. The top and bottom of the evaporites have been traced in the entire seismic data set available in the Ionian Sea (Fig. 1B). A certain degree of extrapolation had to be applied in tracing the bottom of the MSC evaporites below the inner parts of the Calabrian and Mediterranean accretionary wedges. A depth-converted thickness map has been produced using the average interval velocity of 4000 ms^{-1}. A single velocity for the entire MSC Section has been used in order to compensate for the uncertainty in the discrimination between intra-MSC units in highly deformed areas. Some manual correction of the contour lines had to be introduced in areas with the coarsest spacing of the seismic profiles. It is not possible to estimate the error in the process.

In order to highlight the presence of different seismic facies, seismic attributes of reflection strength and relative acoustic impedance were calculated using the Schlumberger Petrel interpretation software.