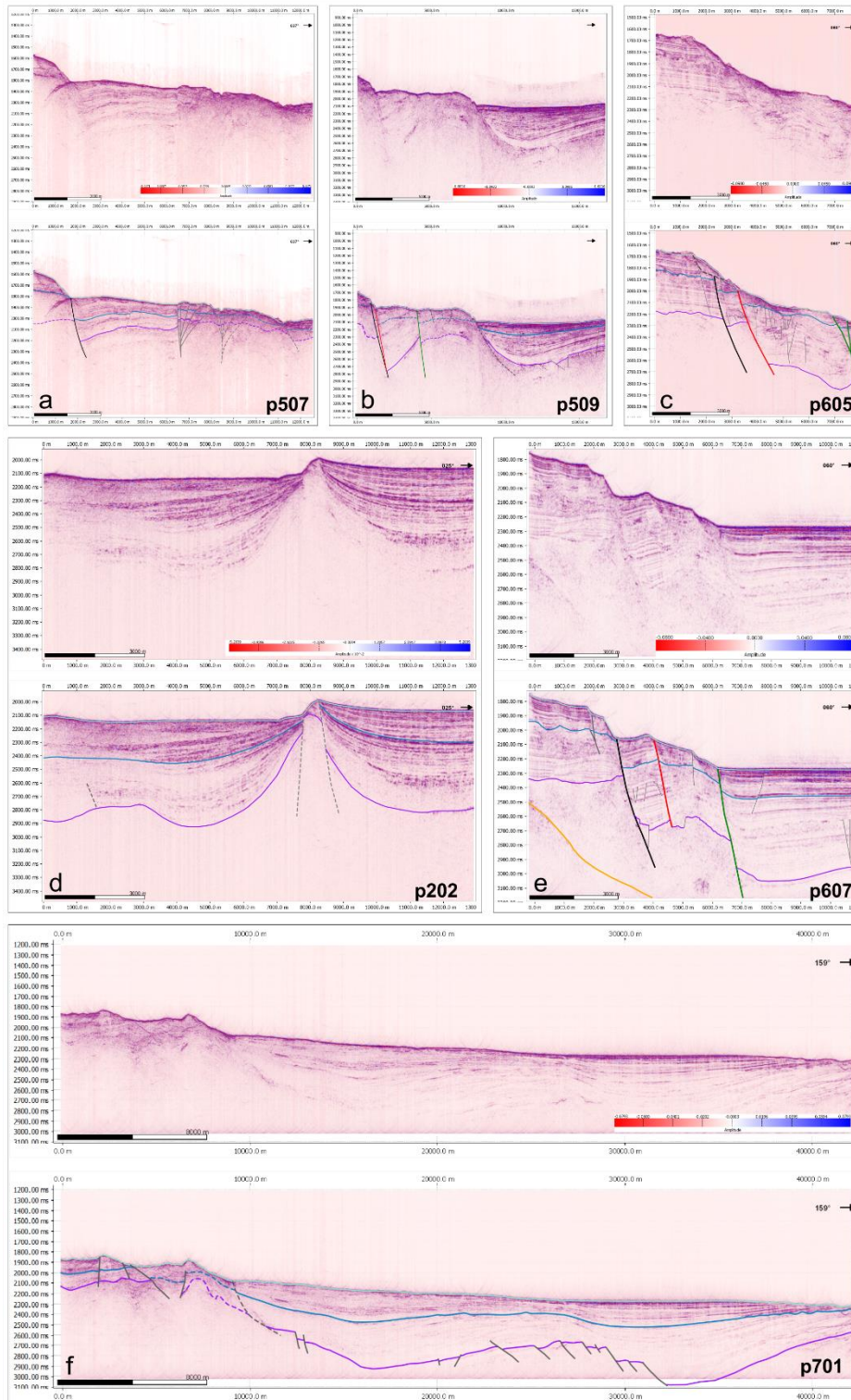
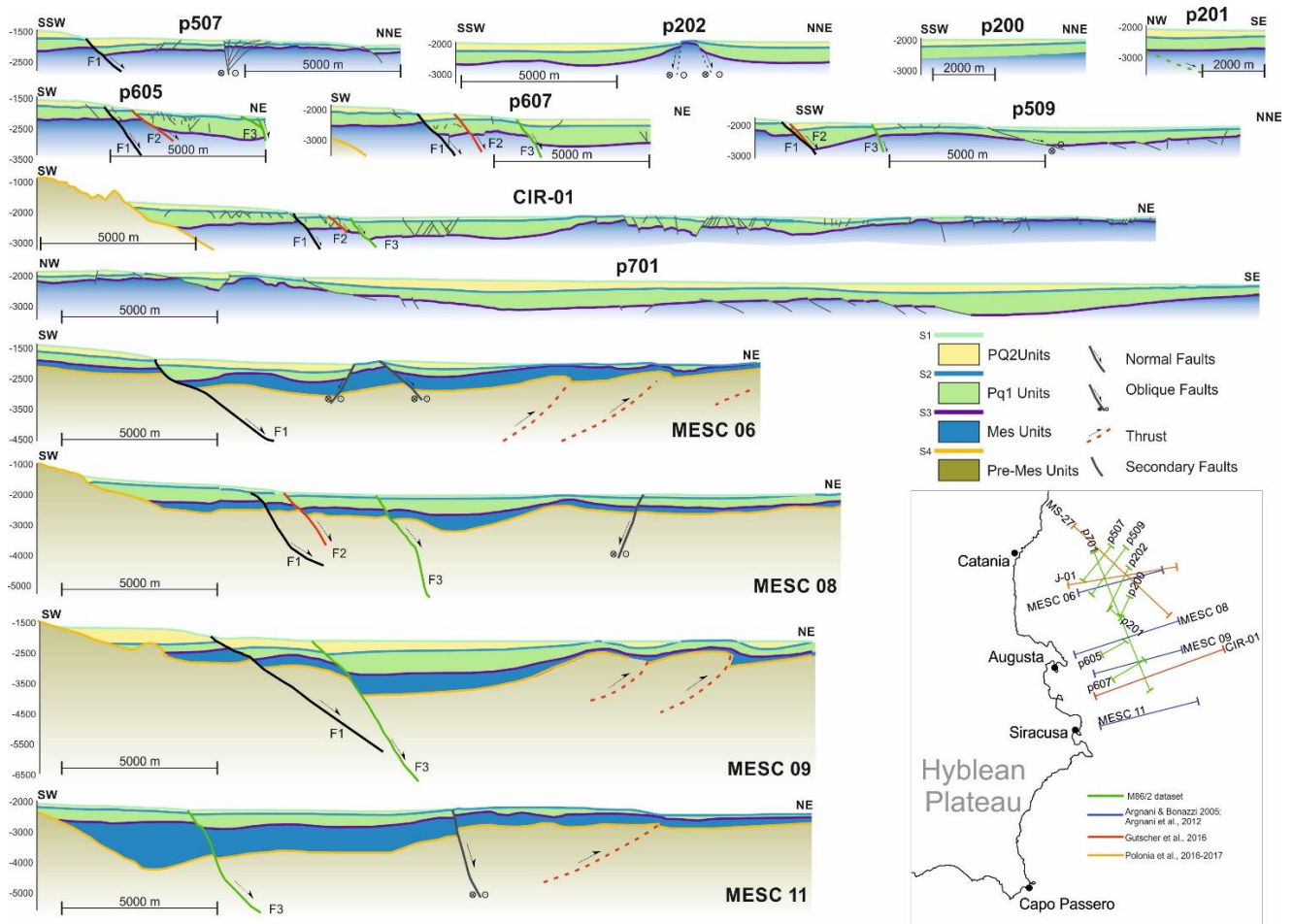


Supplementary Material for the article “*Deformation pattern of the northern sector of the Malta Escarpment (offshore SE-Sicily, Italy); fault dimension, slip prediction and seismotectonic implications*” by Salvatore Gambino, Giovanni Barreca, Felix Gross, Carmelo Monaco, Sebastian Krastel, and Marc-André Gutscher



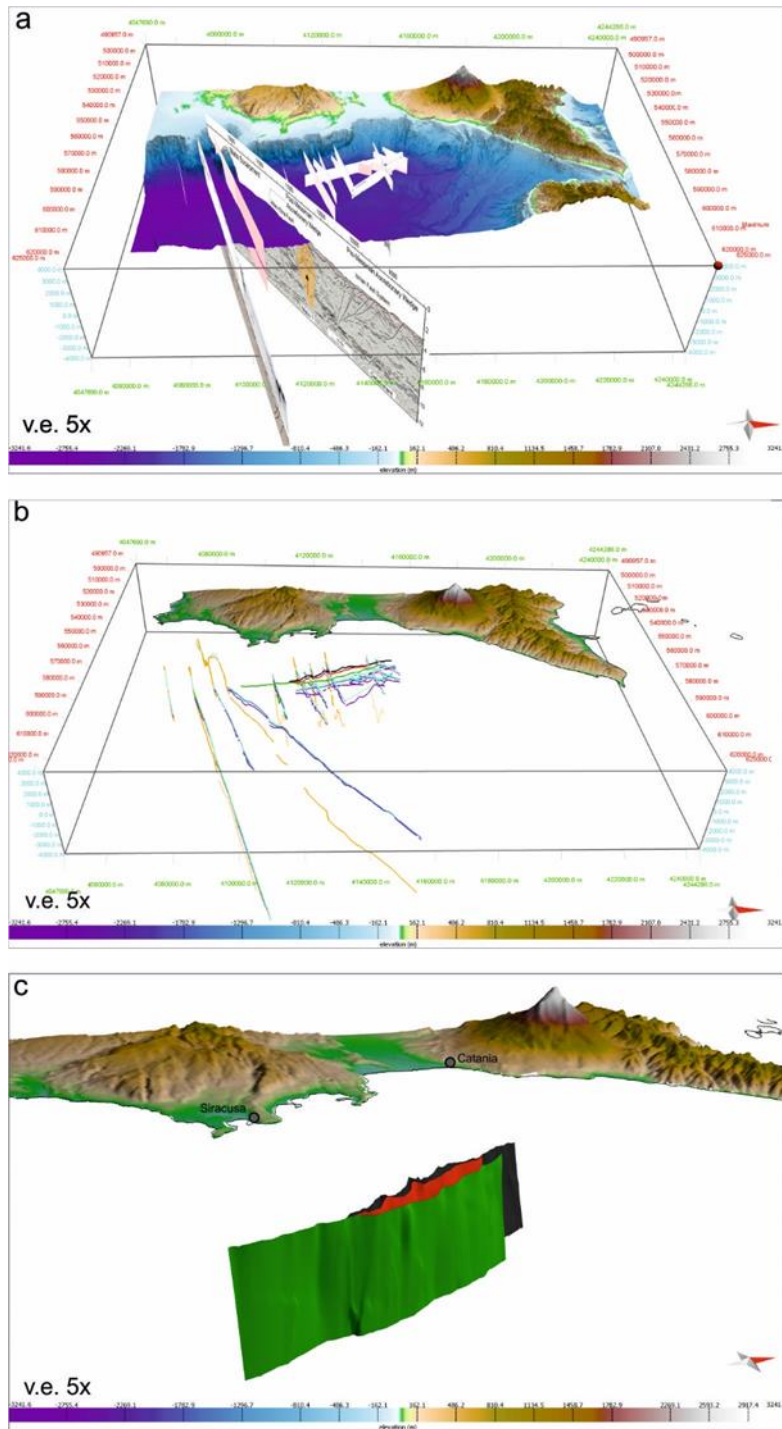
Supplementary Figure 1 –POS496 Seismic lines (T.W.T.) and interpretations of main stratigraphic boundaries and tectonic structures. a) p507. b) p509. c) p605. d) p202. e) p607. f) p701.



Supplementary Figure 2 - Time to depth-converted (see Table 1 in this section) interpreted seismic profiles highlighting major (e.g. F1, F2 and F3) and minor detected faults and the recognized seismic units (PQ2, PQ1, Mes and Pre-Mes) and their bounding reflectors (S1, S2, S3 and S4).

Seismic Units	Interpreted age	Time interval (Myr)	Seismic velocity (m/s)	References
PQ2	Middle Pleistocene-Holocene	0.65- 0.0117	1760	Micallef et al., 2018
PQ1	Pliocene	5.33-2.58	2280	Micallef et al., 2018; Camerlenghi et al., 2019
MES	Messinian	7.246-5.33	4000	Butler et al., 2015; Maesano et al., 2017
Pre-MES	Pre-Messinian	>7.246	3250	Gallais et al., 2011; Kokinou et al., 2013; Micallef et al., 2018

Supplementary Table 1 – Acoustic velocities adopted to depth-convert the entire seismic dataset.



Supplementary Figure 3 – Adopted workflow to model fault surfaces a) Unpublished (POS496 and CIRCEE-HR seismic dataset) and published seismic profiles (Polonia et al., 2016;2017; Argnani and Bonazzi, 2002, 2005, 2012) and a high-resolution bathymetry (Gutscher et al., 2016;2017) interpreted by picking the main reflectors and faults. b) Reference lines interpolation and 2 ½ D-modelling of fault surfaces (c).

	Strike (RHR)	Dip	Striae trend	Striae plunge	Type	Sense of Slip
Brucoli	298	81	114	24	Fault	NR
	138	76	248	75	Fault	NR
	126	86	265	84	Fault	NR
	318	87	10	86	Fault	NL
	350	70	53	68	Fault	NL
	133	67	233	67	Fault	NR
	154	85	194	82	Fault	NL
Capo Campolato	133	68			Joint	E
	45	78			Joint	E
	32	73			Joint	E
	129	85			Joint	E
	326	85			Joint	E
	131	87			Joint	E
	142	87			Joint	E
	48	85			Joint	E
	15	75			Joint	E
	130	81			Joint	E
	126	82			Joint	E
	321	80			Joint	E
	51	75			Joint	E
	205	87			Joint	E
	41	80			Joint	E
	125	84			Joint	E
	51	83			Joint	E
	54	84			Joint	E
	317	90			Joint	E
	119	84			Joint	E
43	79			Joint	E	
124	89			Joint	E	
128	74			Joint	E	
34	79			Joint	E	
Sbarcatore dei Turchi	92	68	141	62	Fault	NL
	79	81	156	81	Fault	NL
	108	79	141	70	Fault	NL
	92	80	147	78	Fault	NL
Capo S.Croce	340	76	100	74	Fault	NR
	335	74	65	74	Fault	NR
Magnisi	230	81	230	0	Fault	NL
	151	72	331	0	Fault	NR
	142	52	232	52	Fault	NL
	232	90	232	0	Fault	NL
Plemmirio	133	67	233	67	Fault	NR
	40	75	160	73	Fault	NR

NR=Normal-Right, NL=Normal-Left, E=Extension

Supplementary Table 2 - Mesostructural data (faults and Joints) collected according to the RHR convention with related geometric and kinematic fault/fractures parameters (strike, dip, striae). For station location refer to Fig.6.

no data
Throws are in mm
Rates are in mm/yr

a

Vertical and along-dip fault displacement (Throw and dip-slip)

Along-strike distance (m)	seismic Profiles	Faults	S4 Throw	S4 Total Throw	S3 Throw	S3 Dipslip	S3 Total Throw	S2 Throw	S2 Dipslip	S2 Total Throw
12942	MESC 11	F1		45200			48600			149800
		F2								
		F3	45200		48600	58900		149800	257600	
22857	CIR-01	F1	68300	123800	162100	167800	264300	223900	373800	607000
		F2	24100		46300	77200		121600	146800	
		F3	31400		55900	62900		261500	314800	
26232	p607	F1	68200	148500	235500	281700	352700	404700	596400	736400
		F2	50400		61800	79100		76900	106800	
		F3	29900		55400	73800		254800	310300	
28726	MESC 09	F1	146200	212200	259100	429300	349000	460900	1020300	670600
		F2								
		F3	66000		89900	132500		209700	321900	
34282	p605	F1	80200	179200	86300	104800	268400	90500	129600	396000
		F2	44700		122200	174500		305500	569800	
		F3	54300		59900	114100				
36183	MESC 08	F1	69500	145800	78800	84300	212800	129700	156400	470100
		F2	59200		90900	112300		266800	290800	
		F3	17100		43100	52000		73600	80000	
51786	p509	F1	41100	64300	241000	323000	374600	460000	665400	688000
		F2	5100		64600	82400		117000	148100	
		F3	18100		69000	77000		111000	125500	
52903	MESC 06	F1	100400	100400	127400	128300	127400	441900	504000	441900
		F2								
		F3								
56927	p507	F1	110000	110000	240800	314900	240800	282600	440400	282600
		F2								
		F3								

b

	Mean Displacement (m)			Maximum Displacement		
	S2	S3	S4	S2	S3	S4
F1	249.42	143.1	68.39	460.9	259.1	146.2
F2	147.9667	64.3	30.58333	305.5	122.2	59.2
F3	151.3	46.8667	29.11111	261.5	89.9	66
Tot	417.4909	203.509	102.6727	736.4	374.6	212.2

Supplementary Table 3 – a) Vertical and along-dip fault displacement (throw and dip-slip) affecting the main detected boundaries (S2, S3, S4) measured on the time/depth converted seismic profiles. **b)** Mean and maximum vertical displacement (throw) for the considered faults.

a

Along-strike distance (m)	Sea-floor rate (mm/yr)				Middle-Pleistocene rate (mm/yr)					Pliocene rate (mm/yr)				
	Seismic lines	Faults	T _r	Cumulative T _r	Faults	T _r	Cumul. T _r	P _r	Cumul. P _r	Faults	T _r	Cumul. T _r	P _r	Cumul. P _r
12942	MESC 11	F1		3.86	F1		0.07		0.09	F1		0.04		0.07
		F2			F2			F2						
		F3	3.86		F3	0.07		F3		0.04				
22857	CIR-01	F1	5.84	10.58	F1	0.25	0.41	0.26	0.47	F1	0.02	0.12	0.07	0.19
		F2	2.06		F2	0.07		0.12		F2	0.03			
		F3	2.68		F3	0.09		0.10		F3	0.07			
26232	p607	F1	5.83	12.69	F1	0.36	0.54	0.43	0.67	F1	0.06	0.14	0.11	0.21
		F2	4.31		F2	0.10		0.12		F2	0.01			
		F3	2.56		F3	0.09		0.11		F3	0.07			
28726	MESC 09	F1	12.50	18.14	F1	0.40	0.54	0.66	0.86	F1	0.07	0.12	0.21	0.28
		F2			F2					F2				
		F3	5.64		F3	0.14		0.20		F3	0.04			
34282	p605	F1	6.85	15.32	F1	0.13	0.41	0.16	0.61	F1	0.00	0.10	0.01	0.15
		F2	3.82		F2	0.19		0.27		F2	0.07			
		F3	4.64		F3	0.09		0.18		F3	0.03			
36183	MESC 08	F1	5.94	12.46	F1	0.12	0.33	0.13	0.38	F1	0.02	0.09	0.03	0.10
		F2	5.06		F2	0.14		0.17		F2	0.06			
		F3	1.46		F3	0.07		0.08		F3	0.01			
51786	p509	F1	3.51	5.50	F1	0.37	0.58	0.50	0.74	F1	0.08	0.11	0.12	0.17
		F2	0.44		F2	0.10		0.13		F2	0.02			
		F3	1.55		F3	0.11		0.12		F3	0.02			
52903	MESC 06	F1	8.58	8.58	F1	0.20	0.20	0.20	0.20	F1	0.11	0.11	0.14	0.14
		F2			F2					F2				
		F3			F3					F3				

56927	p507	F1	9.40	9.40	F1	0.37	0.37	0.48	0.48	F1	0.02	0.02	0.05	0.05
		F2			F2						F2			
		F3			F3						F3			
b	Throw rates (mm/yr)													
	Mean				Max									
	S2	S3	S4	S2	S3	S4								
	F1	0.05	0.28	7.31	0.11	0.40	12.50							
	F2	0.04	0.12	3.14	0.07	0.19	5.06							
	F3	0.04	0.08	3.20	0.07	0.14	5.64							
Tot	0.10	0.38	10.73	0.14	0.58	18.14								

c	Propagation rates (mm/yr)			
	Mean		Max	
	S2	S3	S2	S3
F1	0.09	0.35	0.21	0.66
F2	0.05	0.16	0.14	0.27
F3	0.06	0.13	0.09	0.20
Tot	0.15	0.50	0.28	0.86

Supplementary Table 4 – a) Throw and propagation rates for F1, F2 and F3 faults. Pliocene rates (vertical and propagation) are calculated on the difference between the S2 and S3 displacements. Middle-Pleistocene rates (vertical and propagation) are calculated on the difference between the S3 and S4 displacements. Holocene rate is calculated only for the throw based on the scarp height; b) Mean and Maximum throw rates based on the fault-displaced S2, S3 and S4; c) Mean and Maximum propagation rates based on the fault-displaced S2 and S3.