



# The SEISMOFAULTS Project: first surveys, preliminary results, and the Bortoluzzi Mud Volcano, Ionian Sea, southern Italy

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SAPIENZA  
UNIVERSITÀ DI ROMA

# motivations



## Messina e Reggio Calabria 1908



Messina 1783

Mappe delle aree colpite dal terremoto del 1693



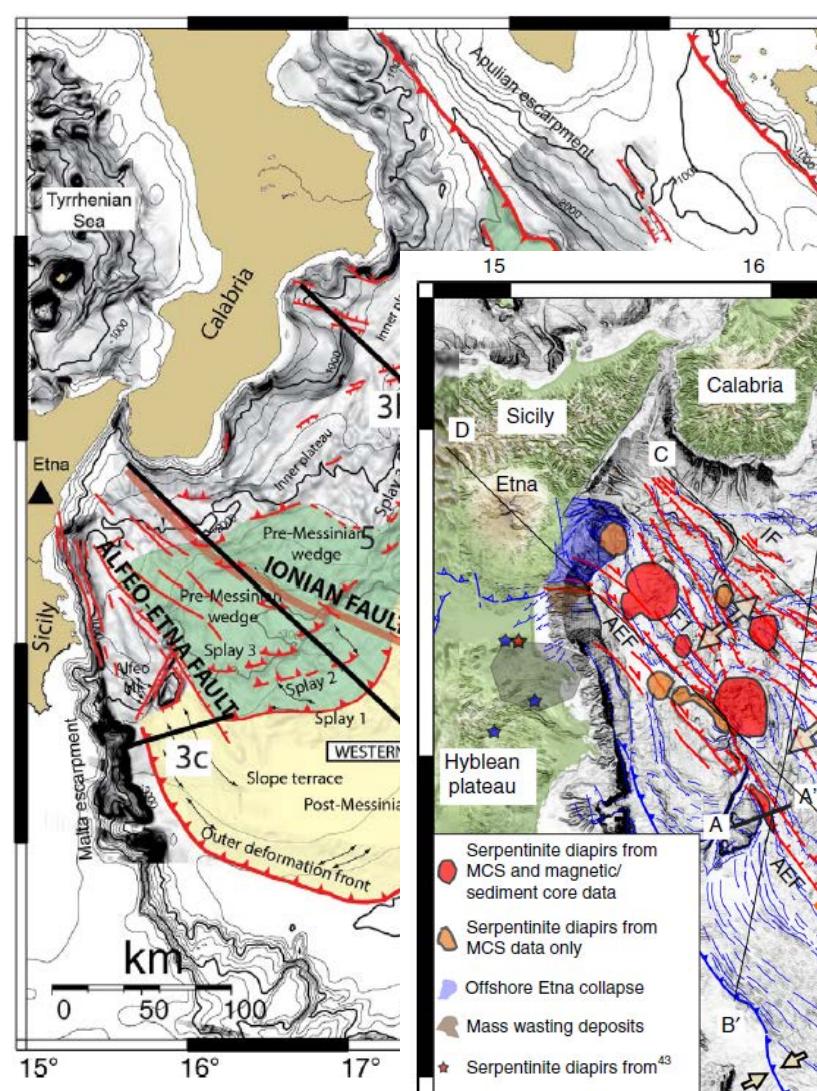
I danni intervenuti, distribuiti nelle quattro contee nelle loro 87 comuni



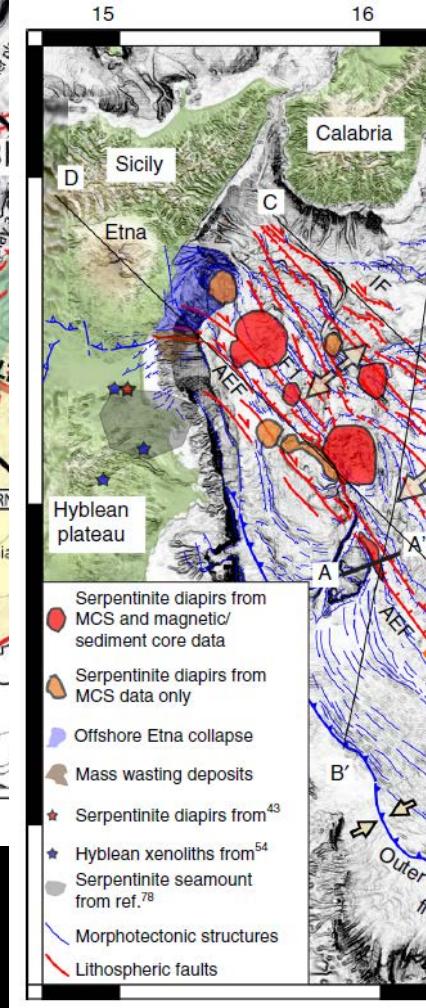
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## Val di Noto 1693





Polonia et al., 2016



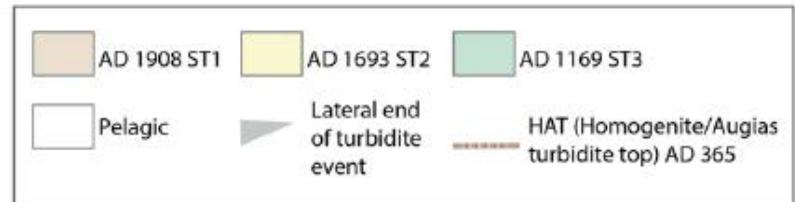
Polonia et al., 2017

Polonia et al., 2017

CQ14\_02



## Un nuovo quadro strutturale



CALA 04



CALA 05



CALA 06



CALA 07





# **SEISMOFAULTS**

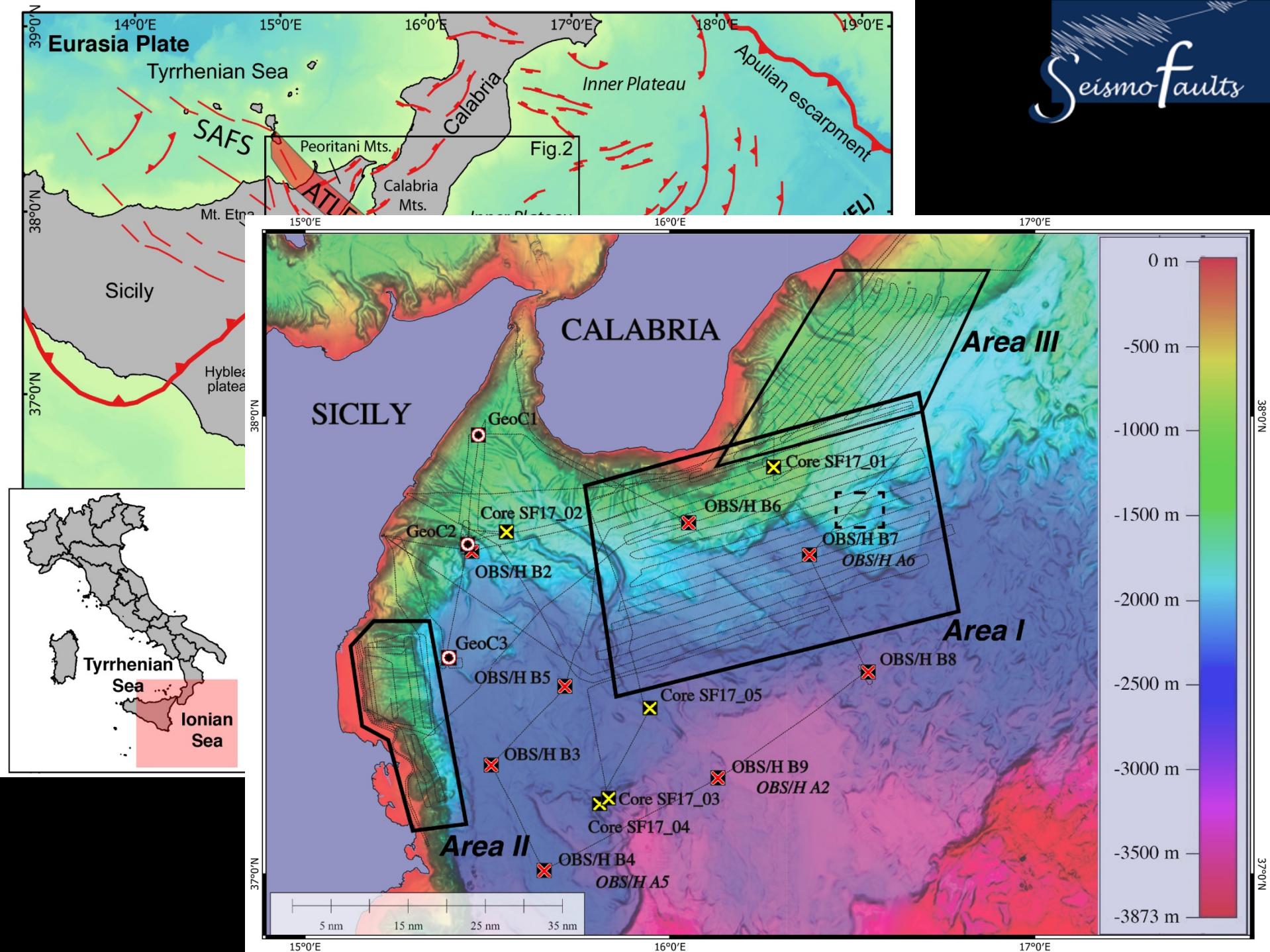
## **the movie:**

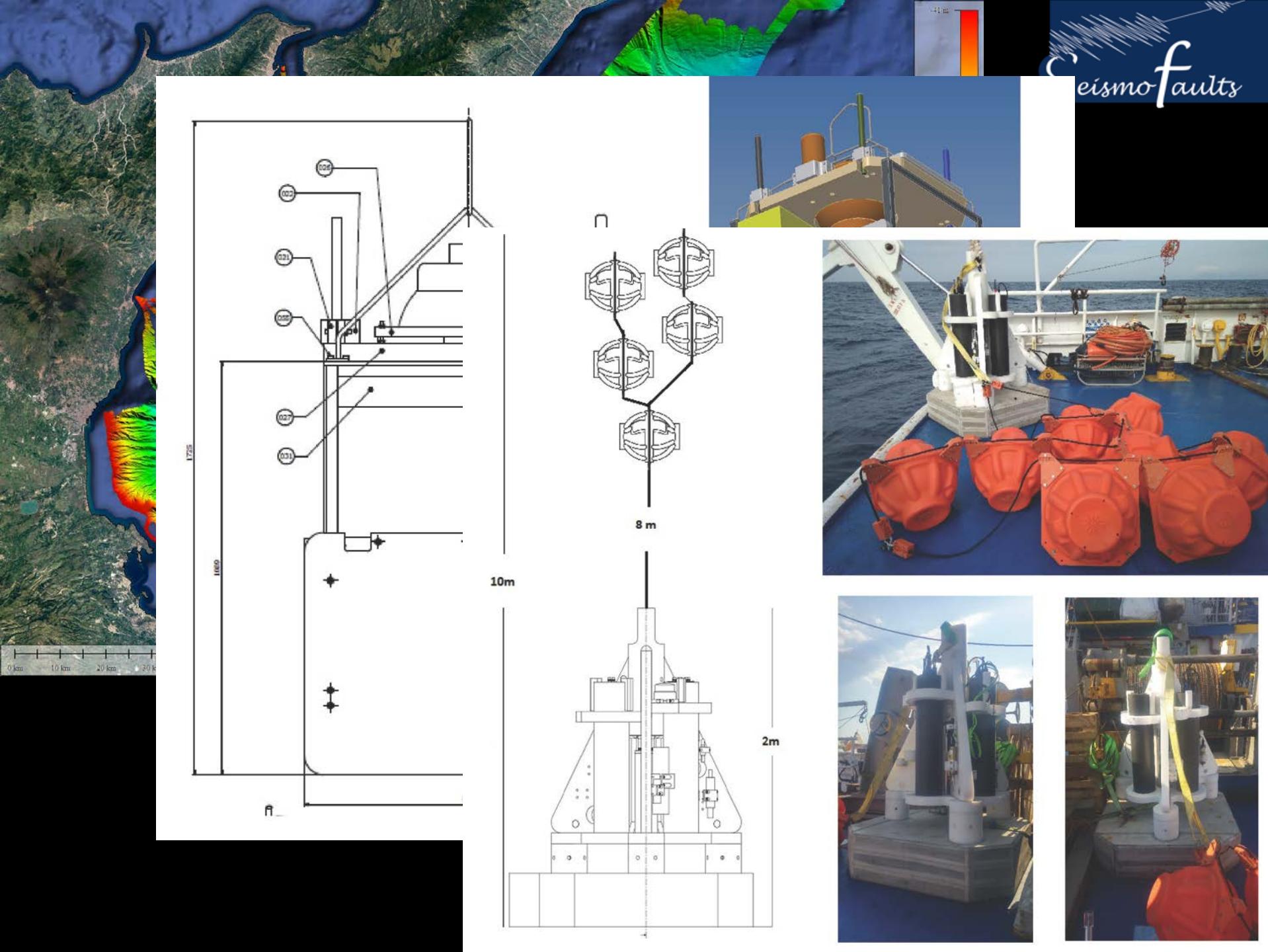
[https://www.youtube.com/watch?time\\_continue=2&v=LK3xw8-fkrY](https://www.youtube.com/watch?time_continue=2&v=LK3xw8-fkrY)



# SEISMOFAULTS

2017 and 2018 surveys

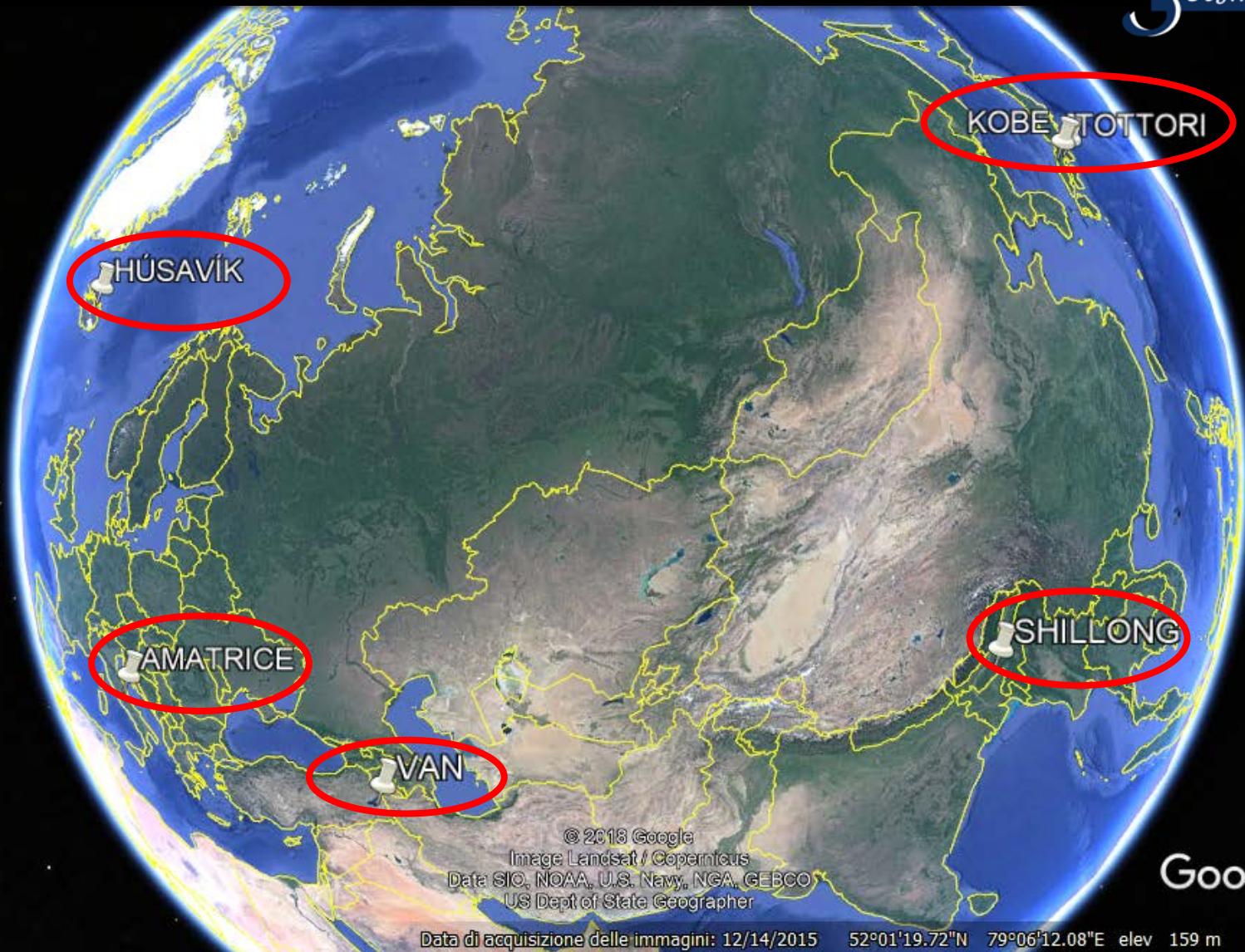




# The Bortoluzzi Mud Volcano (BMV)

# why studying mud volcanoes: geochemical precursors of earthquakes (?)

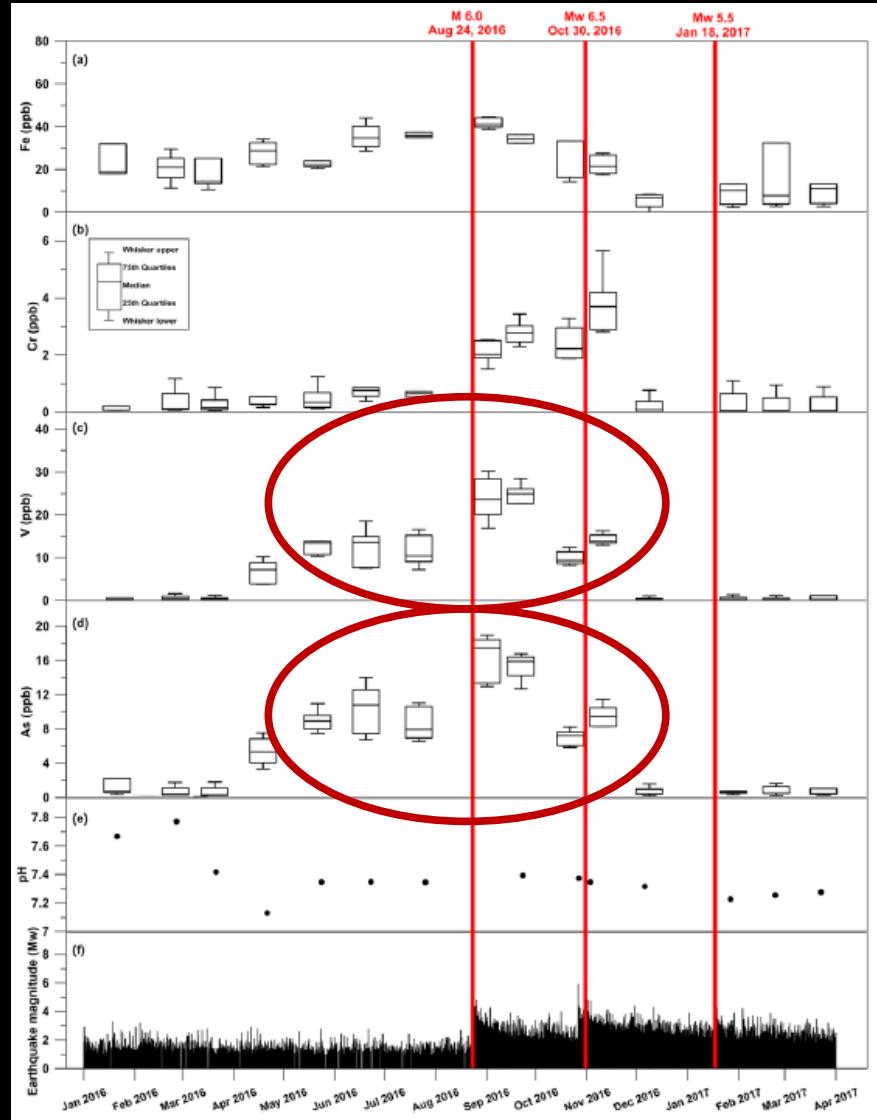
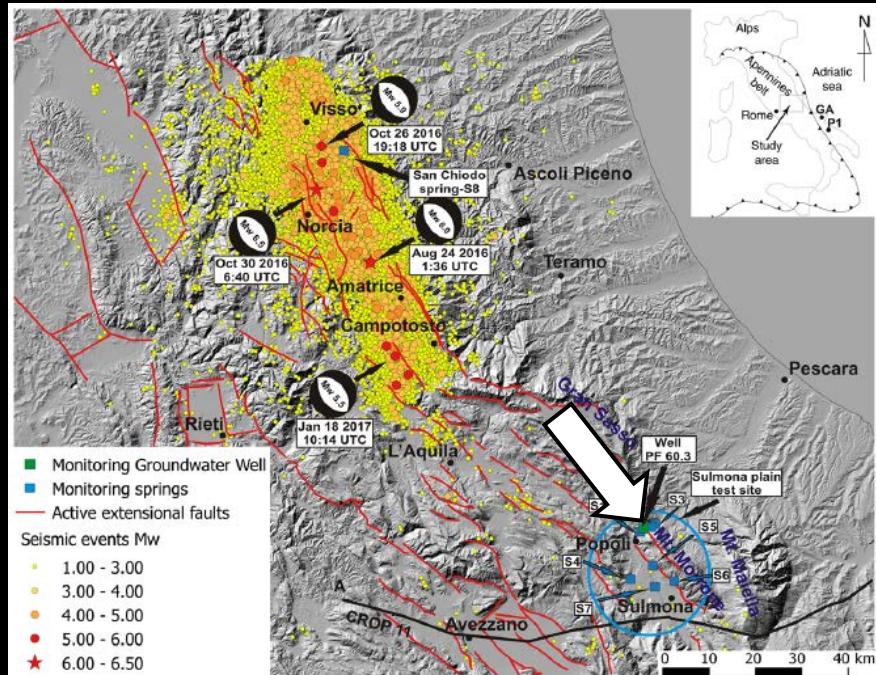
# recent studies



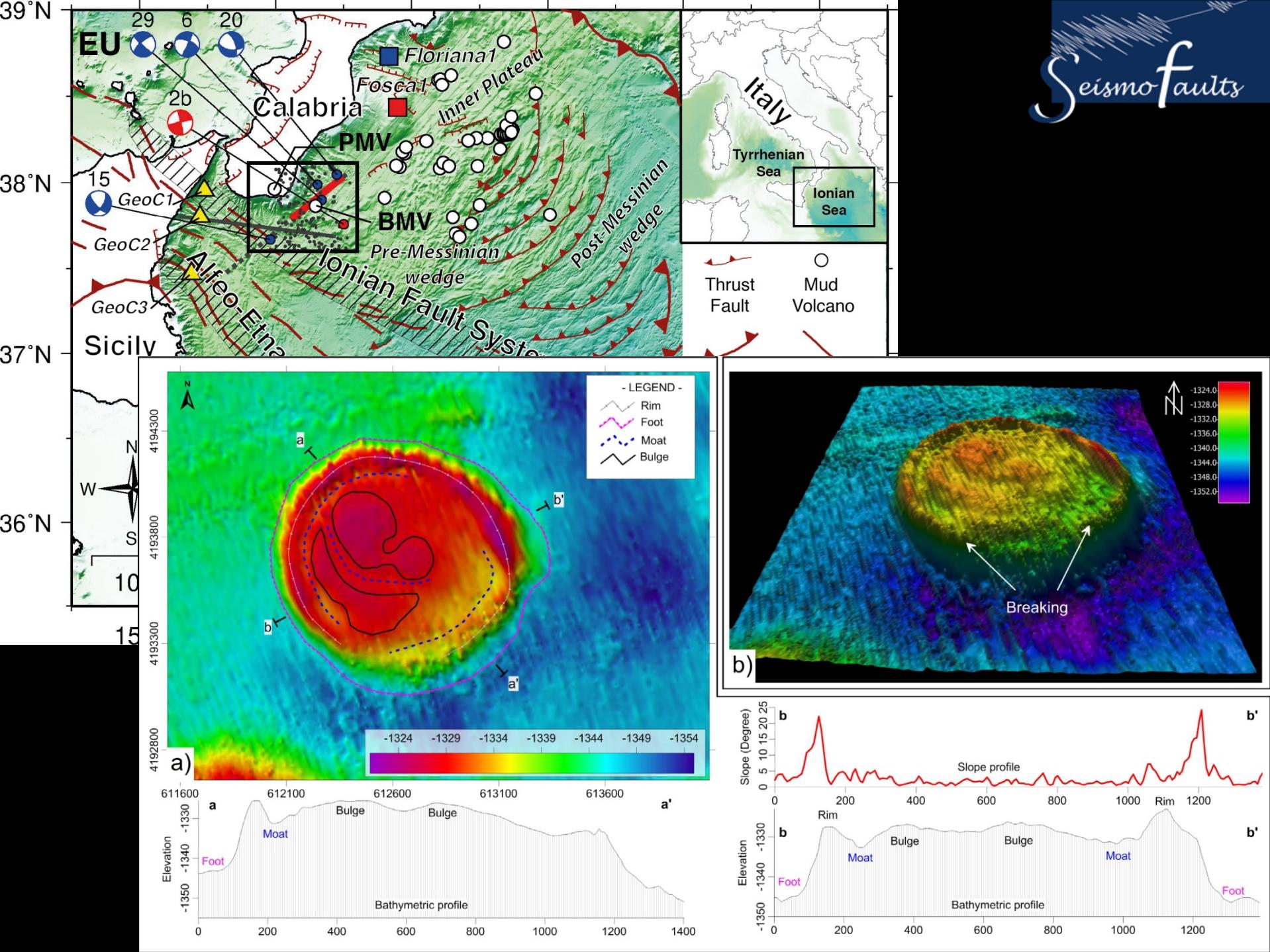
WHERE	MAGNITUDE	PRECURSORS	WHEN
<b>KOBE – JAPAN (1995)</b> Igarashi et al., 1995; Tsunogai & Wakita, 1995	Mw 7.2	increase in Cl and $\text{SO}_4^{2-}$	several <u>months</u> before
		increase in Radon concentration in groundwater	several <u>months</u> before
		sudden decline in Radon concentration in groundwater	one <u>week</u> before
<b>HUSAVÍK – ICELAND (2002)</b> Claesson et al., 2004	Mw 5.8	peaks in the concentrations of Cu, Zn, Mn, and Cr	1, 2, 5, and $\geq 10$ weeks before
<b>SHILLONG PLATEAU – INDIA (2004-2005)</b> Skelton et al., 2008	Mw $\geq 5.0$	increase in $[\text{Na}+\text{K}]/\text{Si}$ , $\text{Na}/\text{K}$ , and $[\text{Na}+\text{K}]/\text{Ca}$ ratios	3-5 <u>weeks</u> before the M <sub>W</sub> 5.3
		increase of conductivity, alkalinity, and Cl concentration	3-5 <u>weeks</u> before the M <sub>W</sub> 5.3
		decrease of Ba/Sr ratio	3-6 <u>days</u> before the M <sub>W</sub> 5.0
<b>VAN – TURKEY (2011)</b> Inan et al., 2012	Mw 7.2	increase in Ca, Mg, K e Cl	one <u>month</u> before
		decreasing in Na and $\text{SO}_4^{2-}$	one <u>month</u> before
<b>HUSAVÍK – ICELAND (2012-2013)</b> Skelton et al., 2014	Mw $\geq 5.5$	groundwater chemistry altered	4-6 <u>months</u> before
<b>AMATRICE/NORCIA – ITALY (2016-2017)</b> Barberio et al., 2017	Mw $\geq 6.0$	higher concentrations of As, V and Fe and pH variations	3-4 <u>months</u> before
<b>TOTTORI – JAPAN (2017)</b> Onda et al., 2018	Mw 6.6	+0.24‰ oxygen isotopic ratio	few <u>months</u> before

# Amatrice-Norcia 2016

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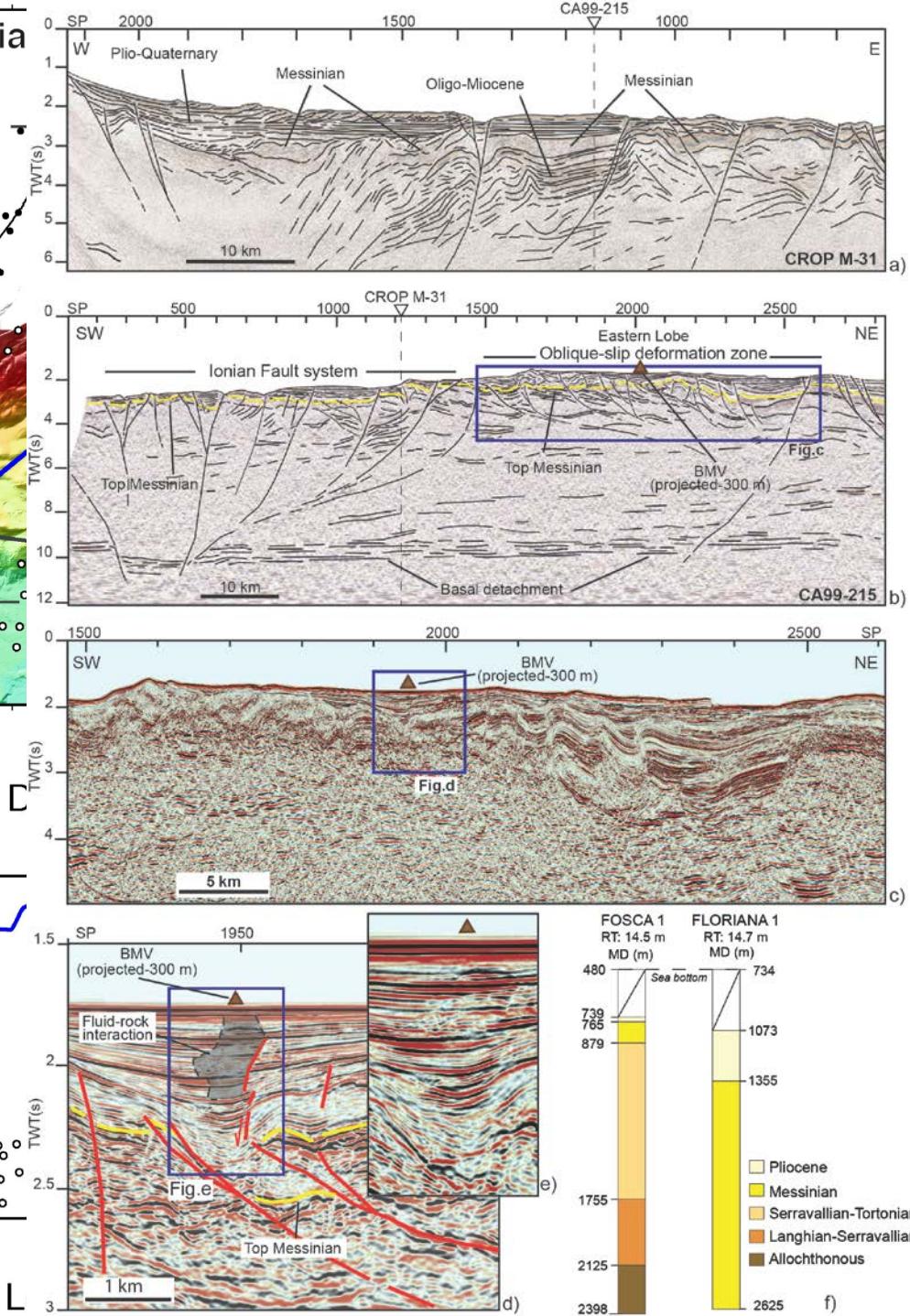
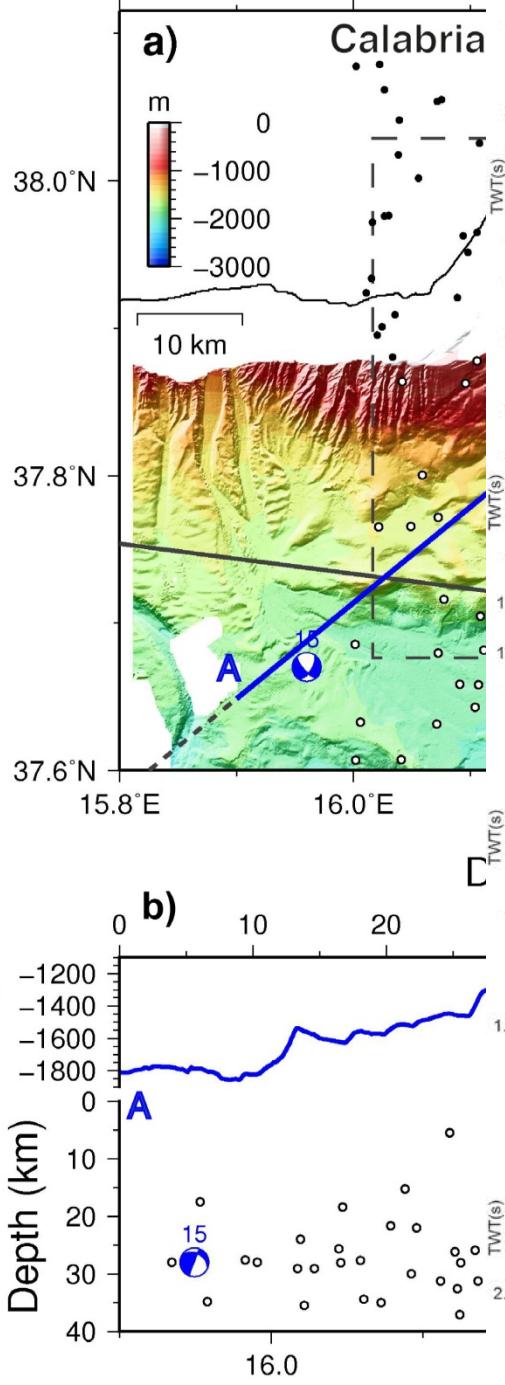
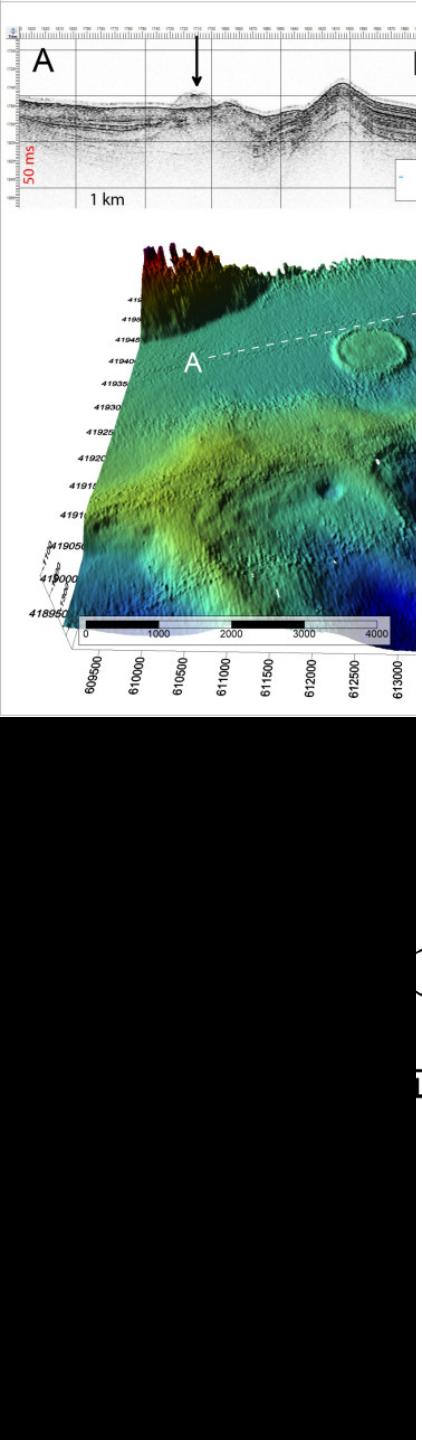


Barberio et al., 2017

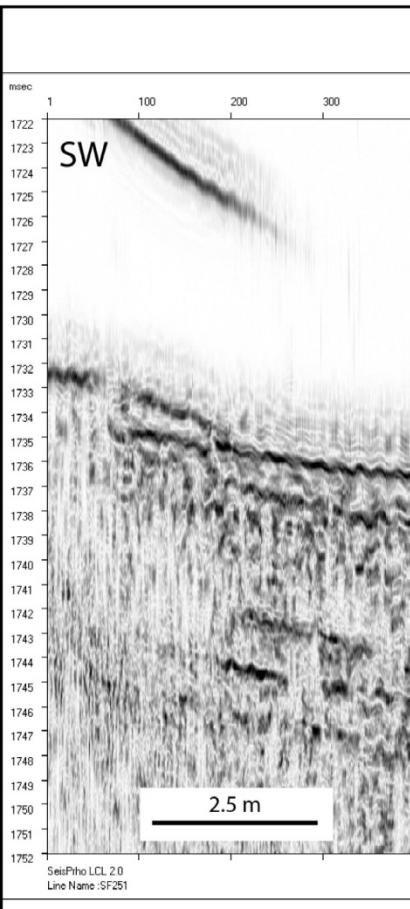




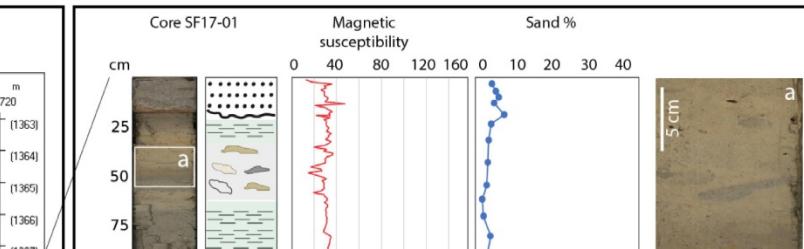




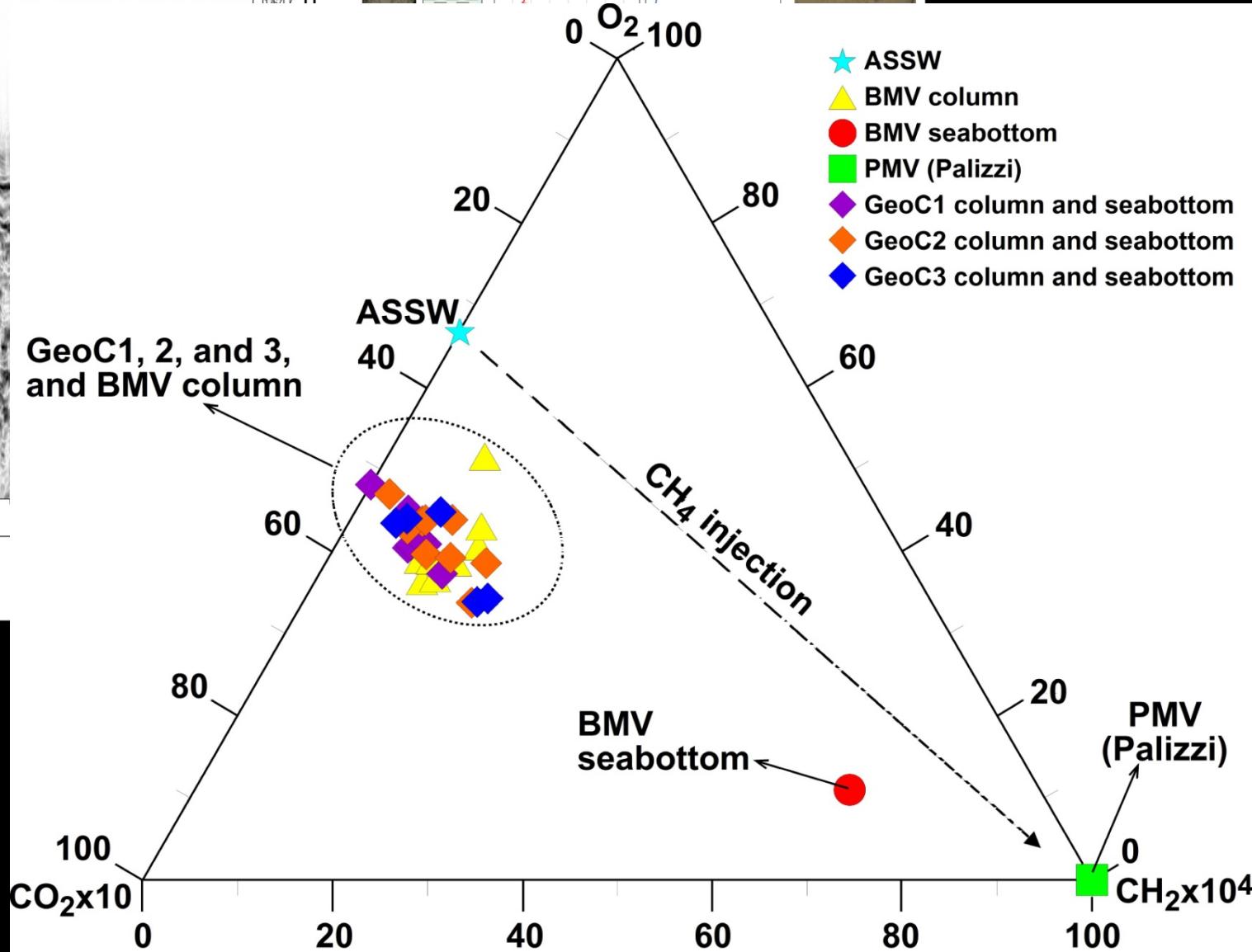
# Chirp profile, Line 251

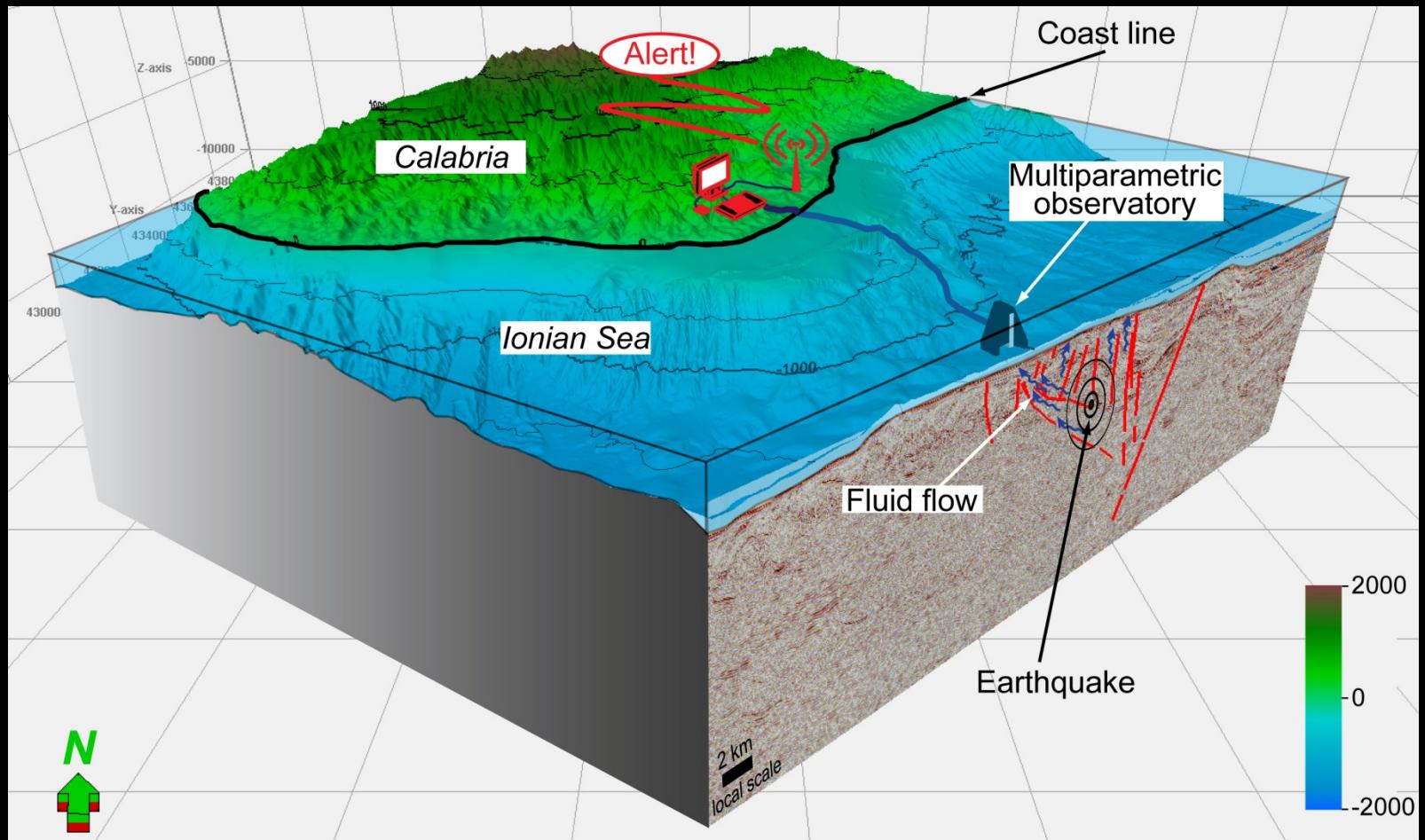


# Core SF17-01 data



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# Conclusions

- 1.** SEISMOFAULTS, a cooperative project involving 4 institutions, 35 geoscientists, 2 vessels, 11 OBS/H, 2 geochemical modules ...
- 2.** A new set of seismological and geochemical data from the Ionian Sea ...
- 3.** The Bortoluzzi Mud Volcano: an open conduit along active faults

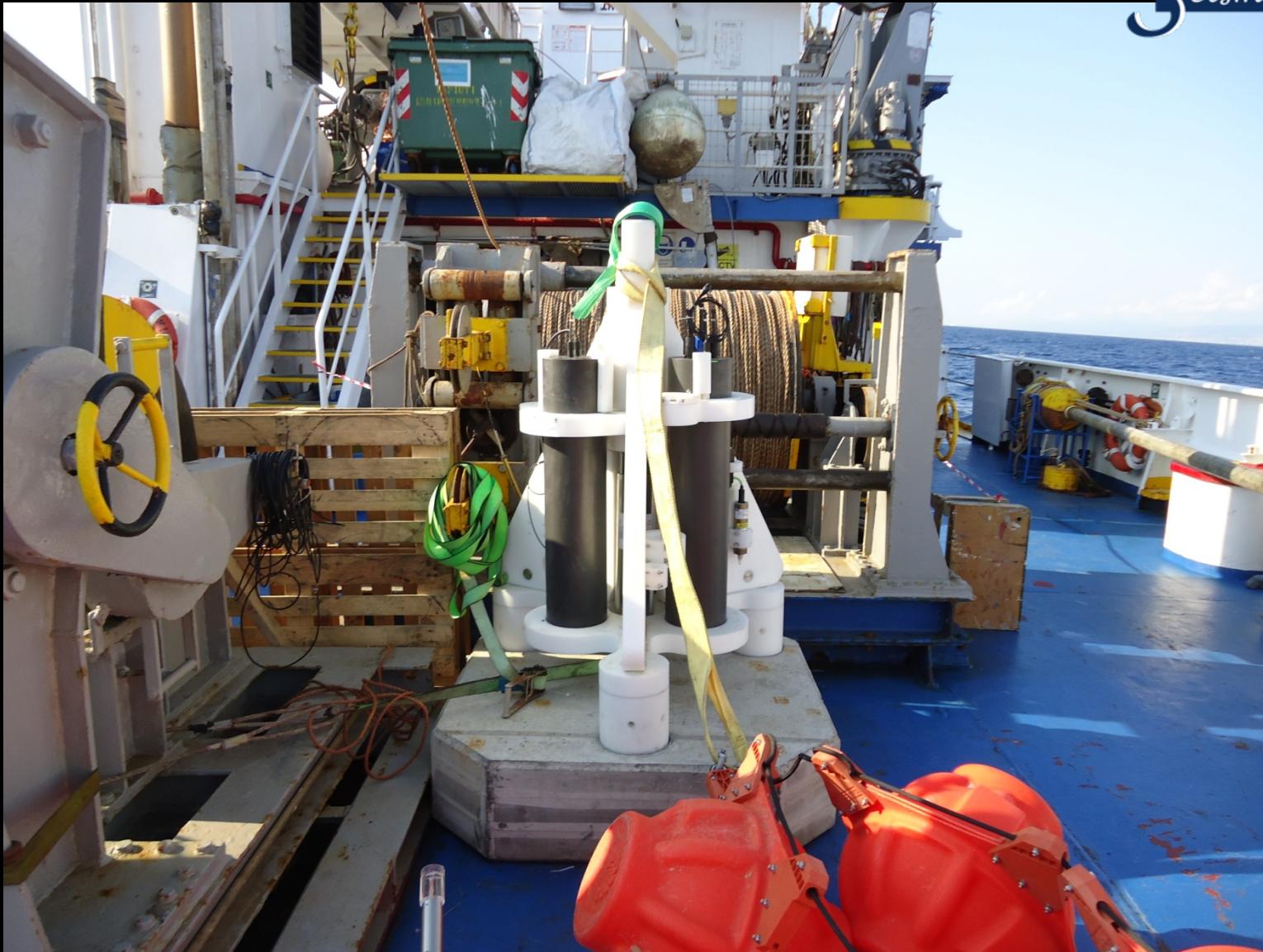


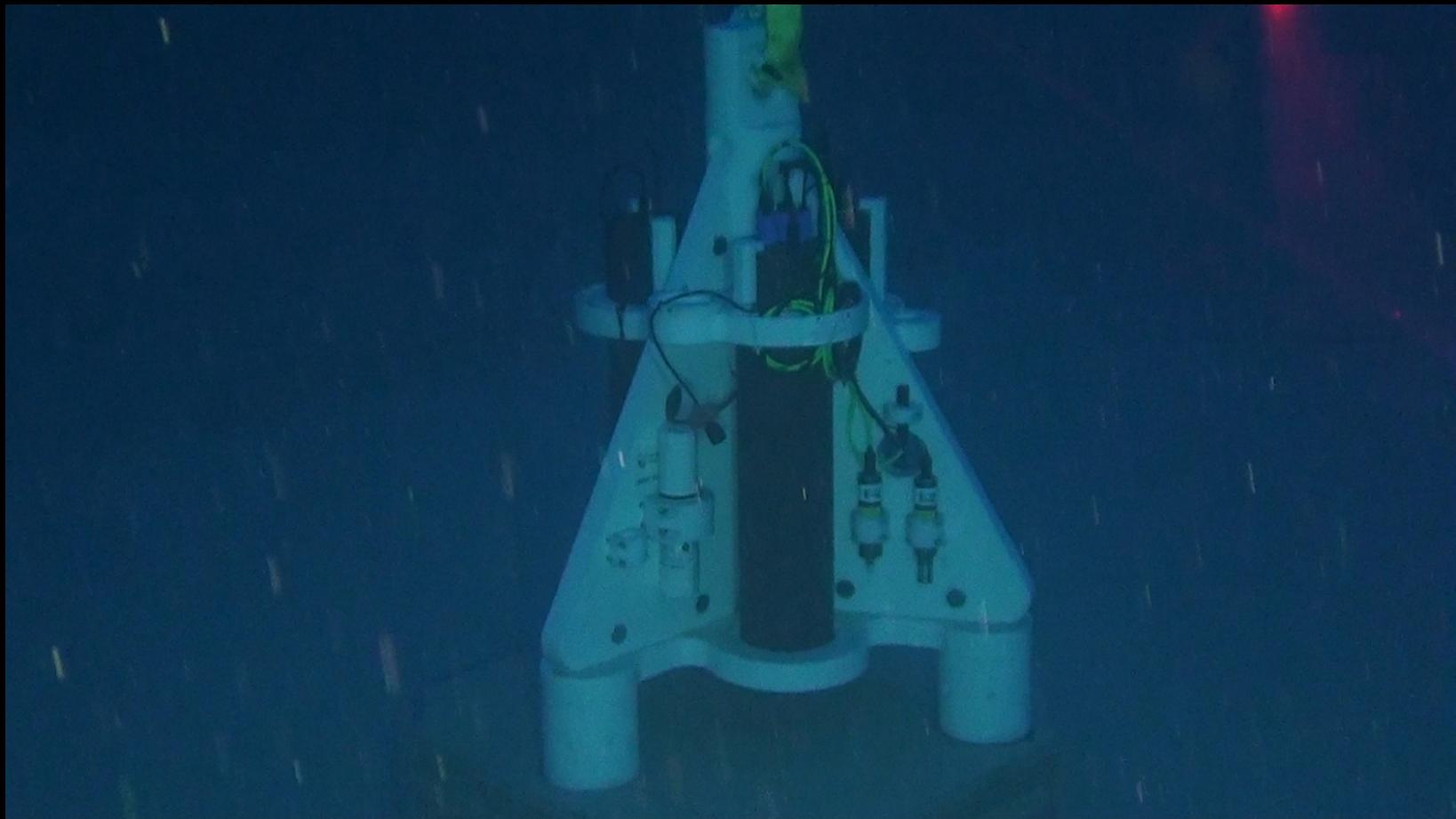




























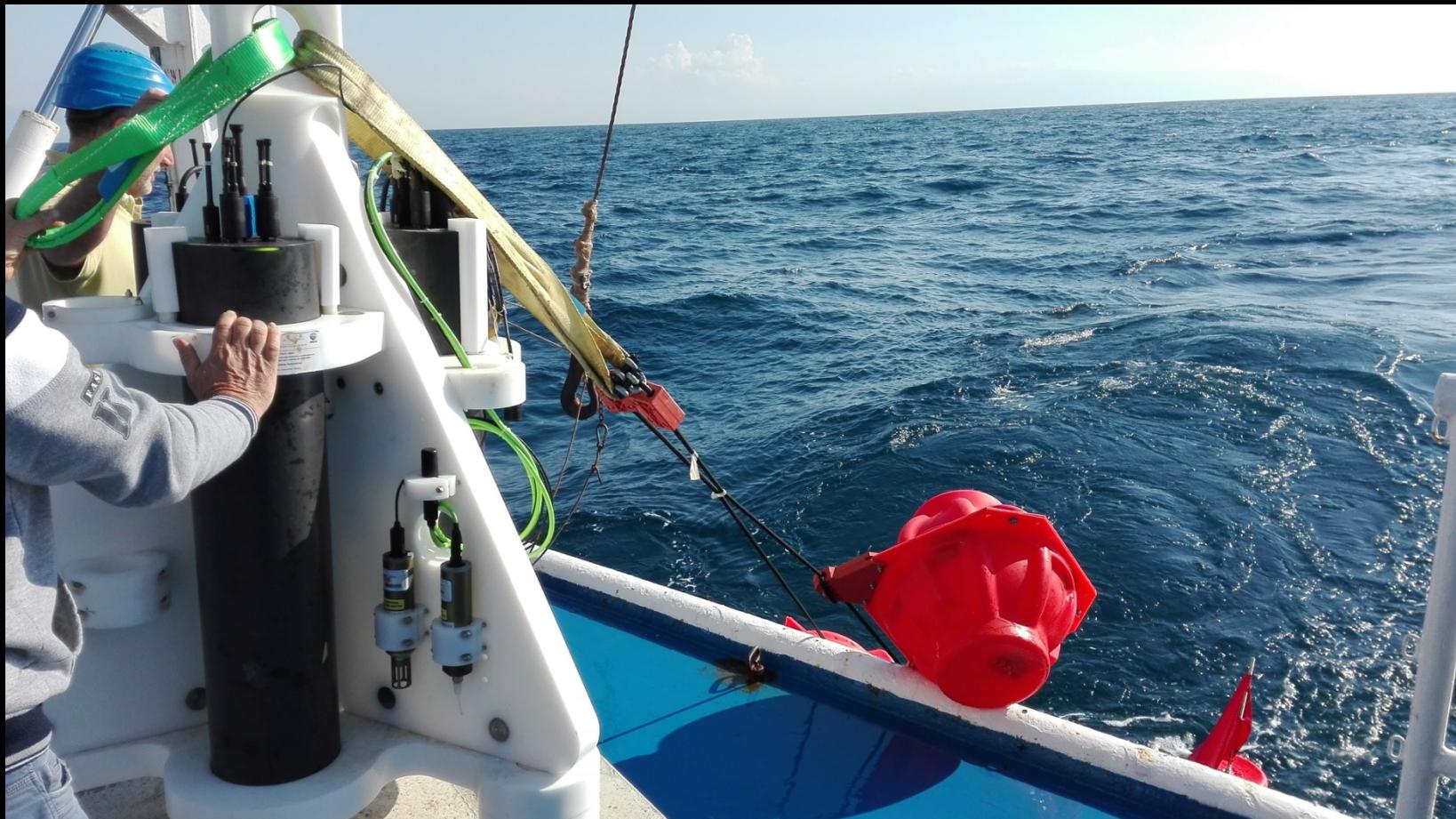


















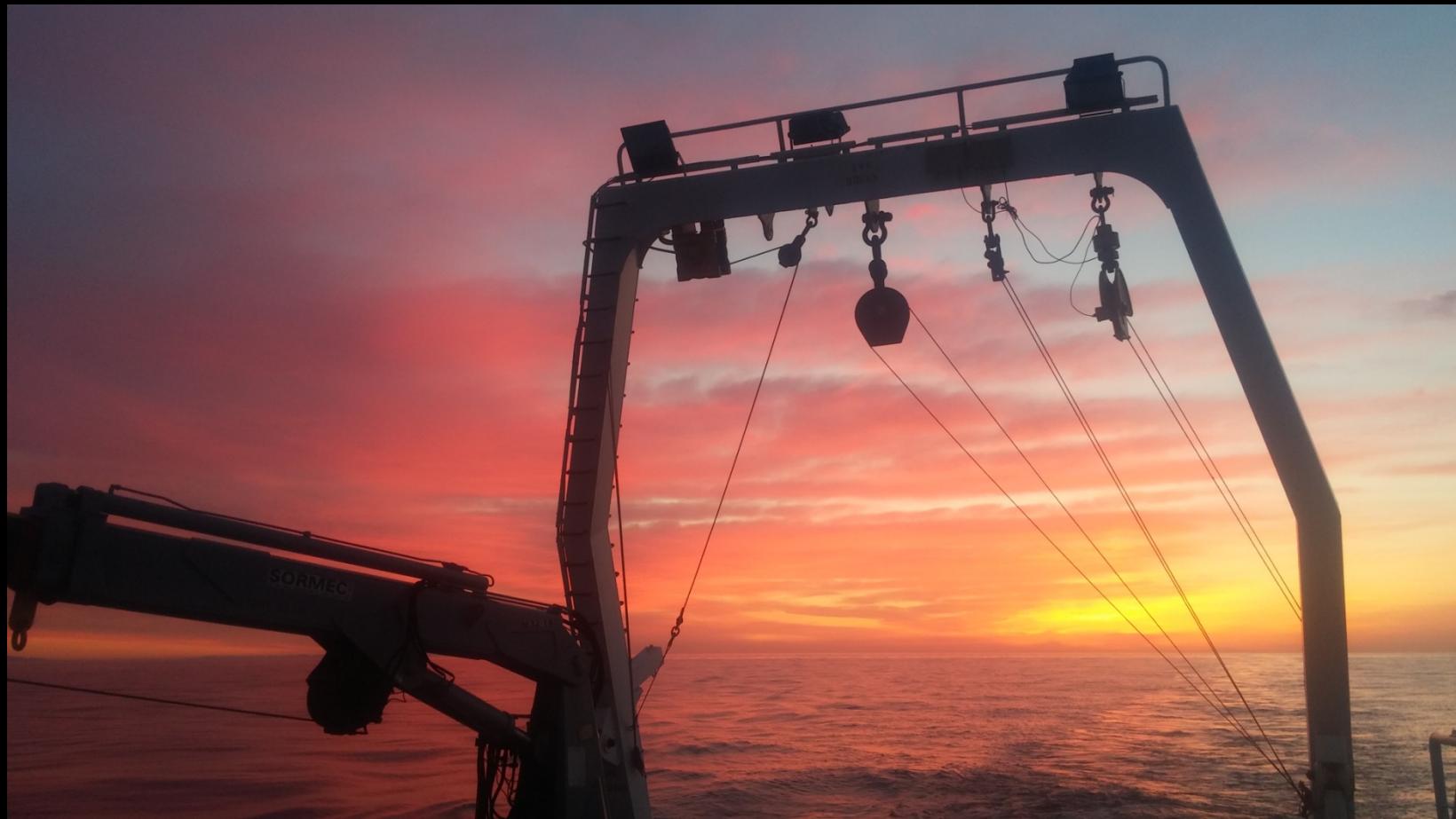






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Seismofaults





