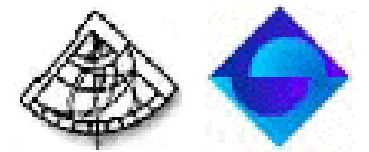


High resolution seismicity catalog of the Marmara Sea region during the 2009-2014 period using template matching

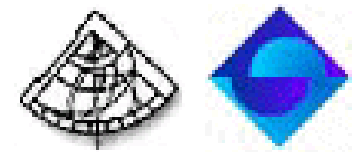
Hayrullah Karabulut, Olivier Lengliné, Jean Schmittbuhl, Emanuela
Matrullo, and Michel Bouchon

KOERI, Bogazici Univ. Istanbul
CNRS/Strasbourg Univ.
CNRS/Grenoble Univ.



- **Seismicity in the Marmara Sea Region**
 - 4 domains: Tekirdag basin, Central basin, Kumburgaz basin, Cinarcik basin
- **Tekirdag and Central Basin segment: deep creeping**
 - Seismicity below the locking depth
 - Small b-value
 - A significant inferred seismic slip rate (x300 compared to KB and CB)
 - Hosting long term repeaters
 - Hosting the Sept 2019 seismic activity at the transition to the Kumburgaz basin
- **Kumburgaz basin segment (Central high): locked (40-50 km)**
 - « locking » depth (i.e. seismogenic depth) of 16km (M7.4 event)
 - consistent with GPS measurements [Ergintav, et al GRL, 2014]
 - very linear and simple geometry (candidate for super-shear rupture)
- **Cinarcik basin:**
 - Depth distribution of the seismicity consistent with locking depth at 10km
 - MMF (Princess Island) weakly loaded (distribution over fanned out structures)

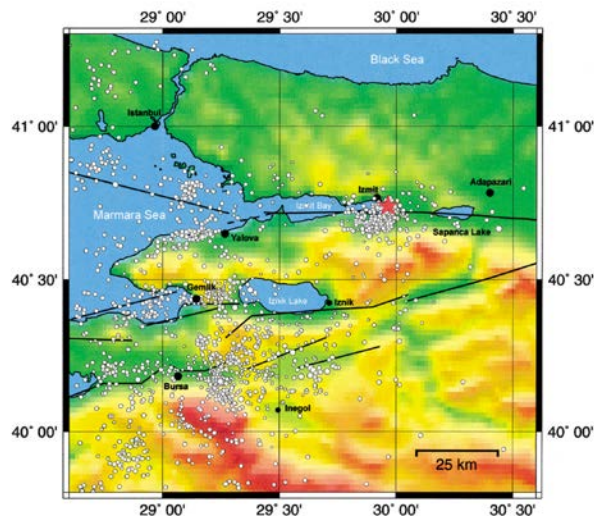
Related publications



BU Kandilli Observatory

- Karabulut, H., Schmittbuhl, J., Özalaybey, S., Lengline, O., Kömeç-Mutlu, A., Durand, V., Bouchon, M., Daniel, G. and Bouin, M. P. (2011). Evolution of the seismicity in the eastern Marmara Sea a decade before and after the 17 August 1999 Izmit earthquake. *Tectonophysics*, 510(1-2), 17-27.
- Schmittbuhl, J., H. Karabulut, O. Lenglin, and M. Bouchon (2016), Seismicity distribution and locking depth along the main Marmara fault, turkey, *Geochemistry, Geophysics, Geosystems*, 17 (3), 954-965,
- Schmittbuhl, J., H. Karabulut, O. Lengline, and M. Bouchon (2016), Long-lasting seismic repeaters in the central basin of the main Marmara fault, *Geophysical Research Letters*, 43 (18), 9527-9534.
- Matrula, E, Lengliné, O., Schmittbuhl, J., Karabulut, H., Bouchon, M., Long term monitoring of the micro-seismicity along the Main Marmara Fault, Turkey using template matching, (2020) in preparation

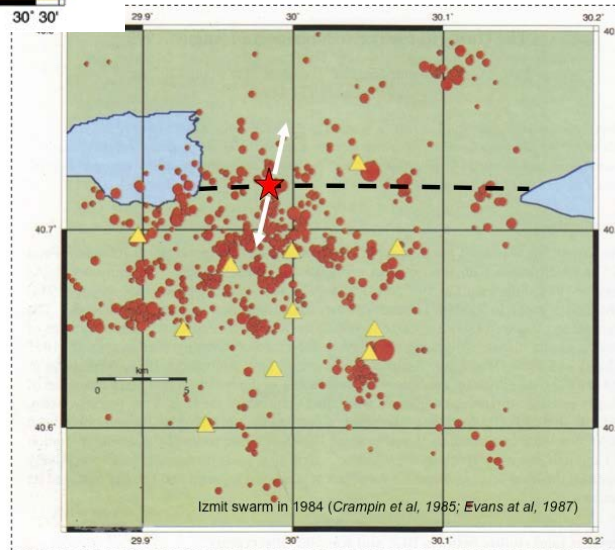
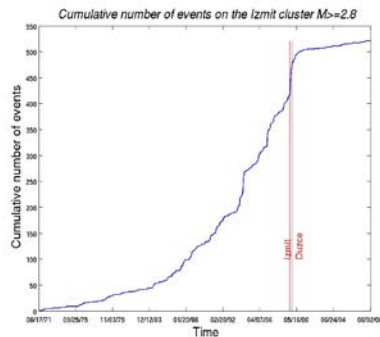
Long term seismic activity in the Marmara Sea region after the 1999 Izmit EQ



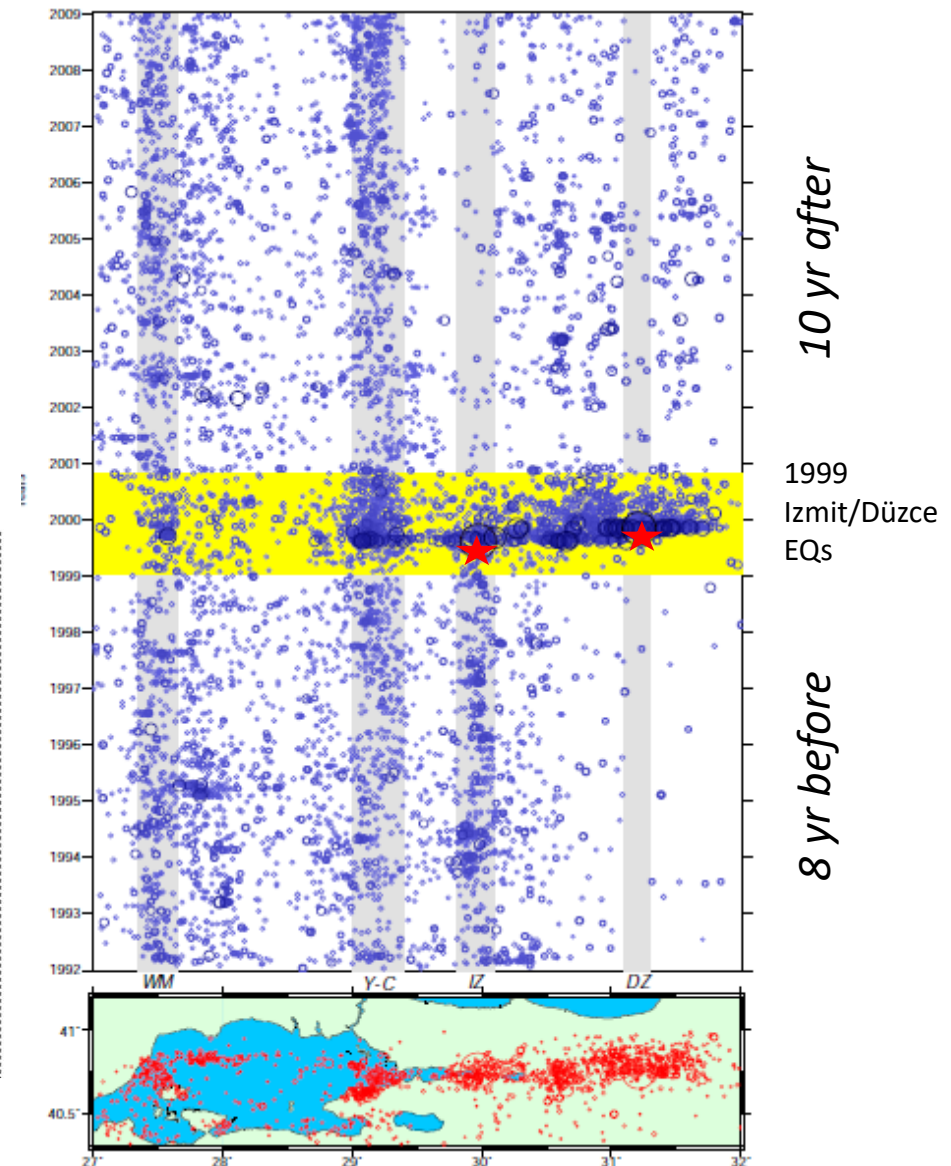
Long term pre-Izmit activity

- Cluster independent of the fault
- Cluster above the hypocenter zone
- Strong change of the cluster activity

1993-17/08/99
[Baris et al, 2002]

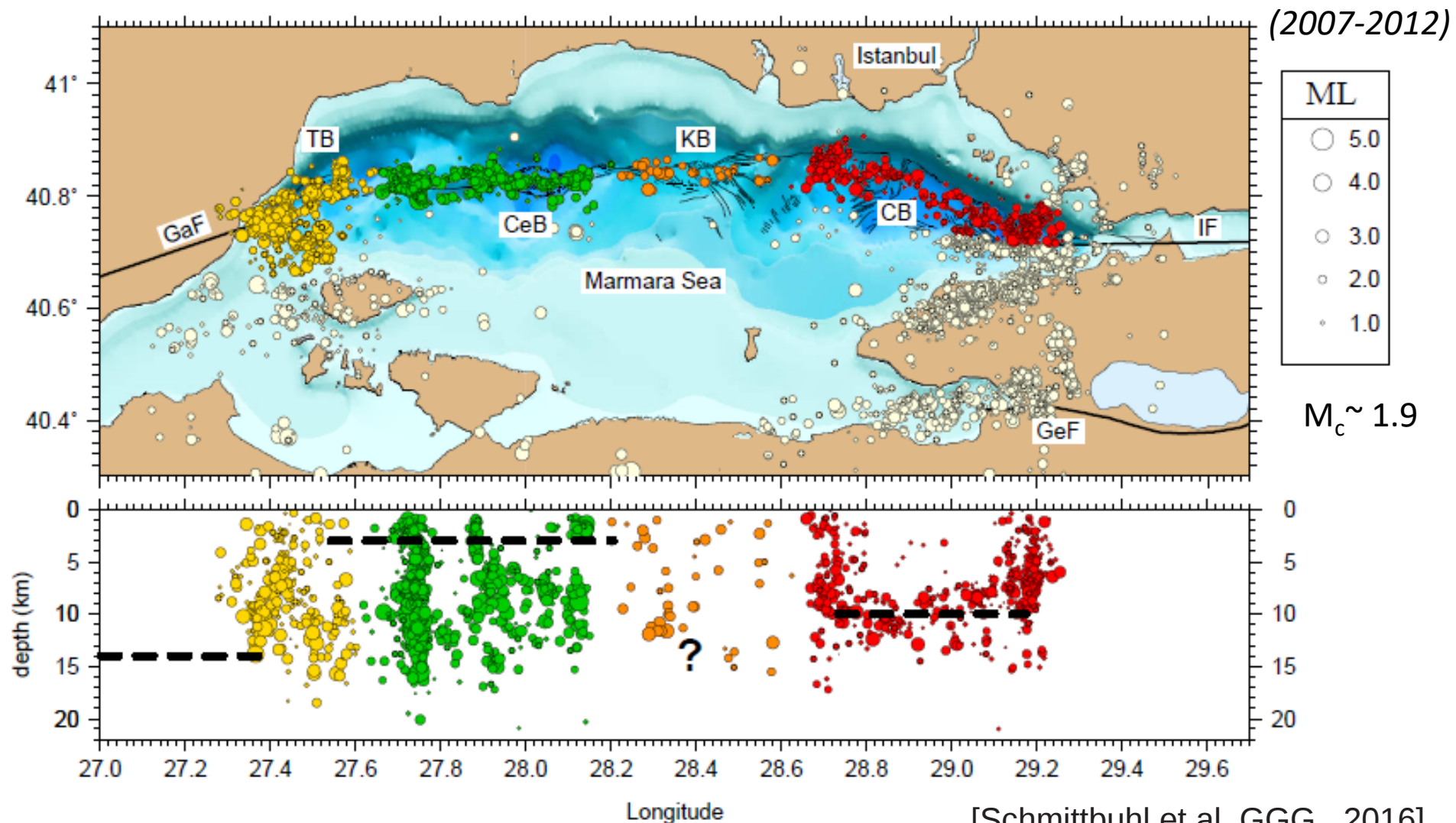


[Crampin et al, 1985 (Turkish Dilatancy Project);]

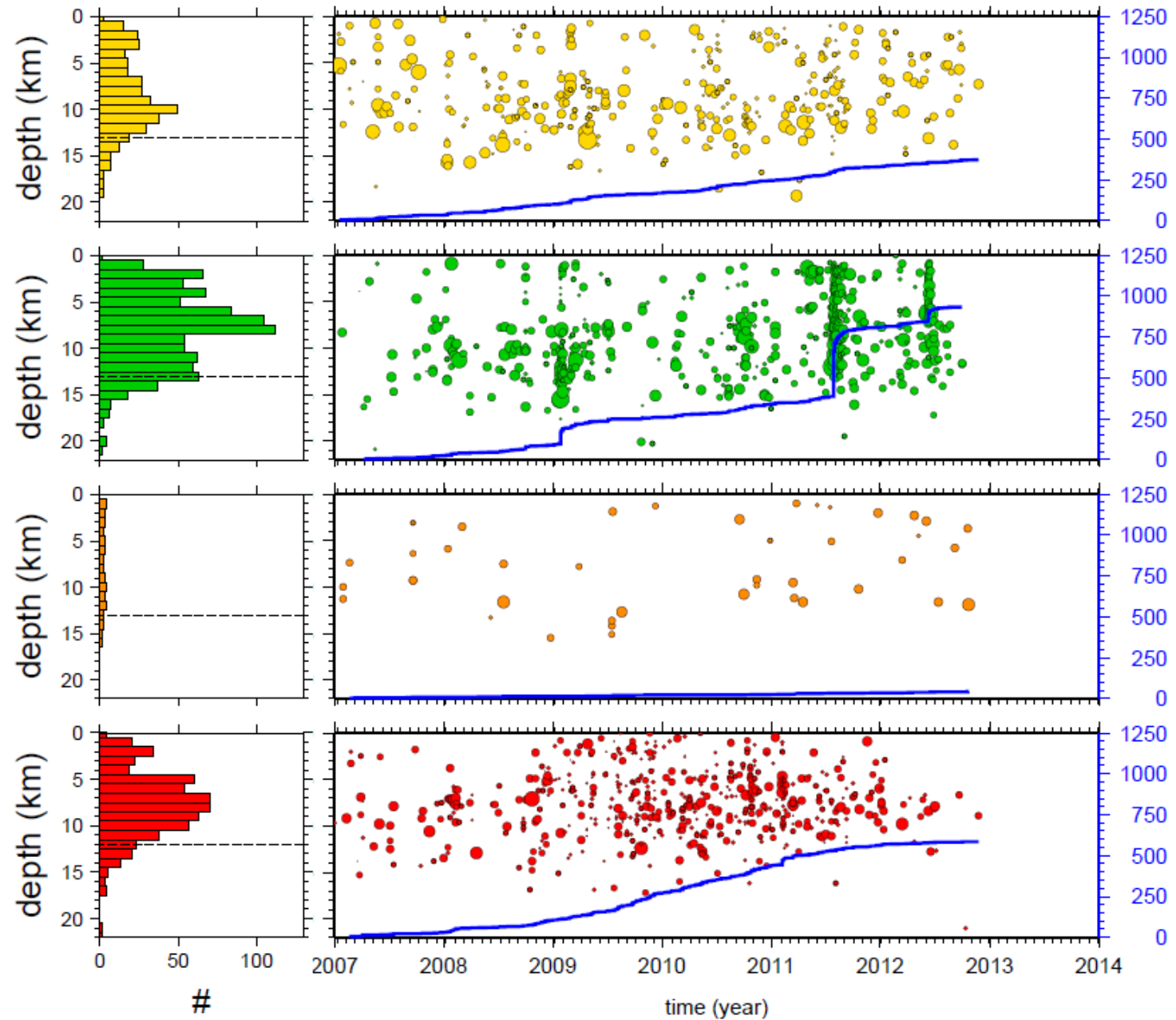
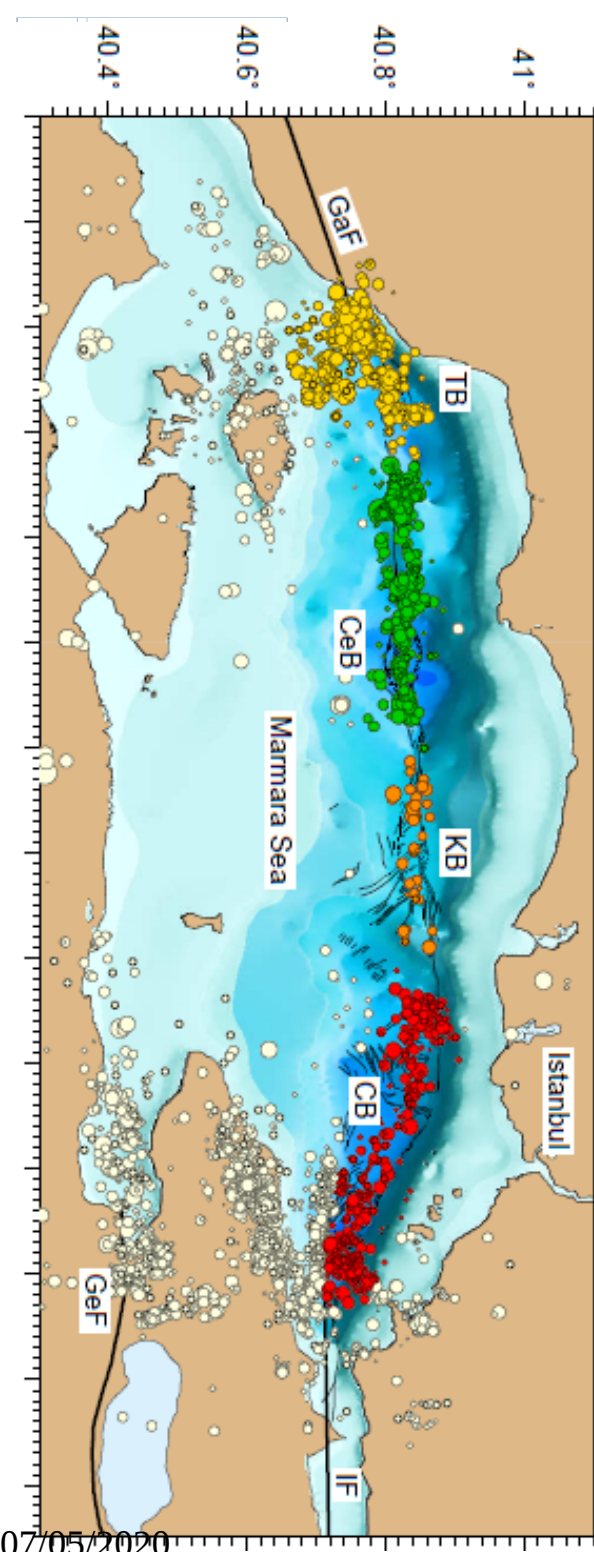
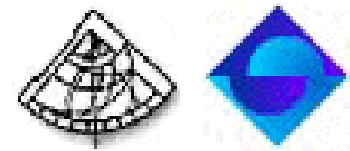


[Karabulut et al, Tectonophysics, 2011]

Depth distribution of seismicity and locking depth



Different domains along the MMF

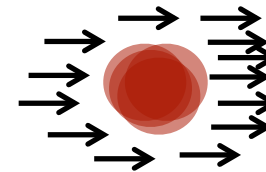
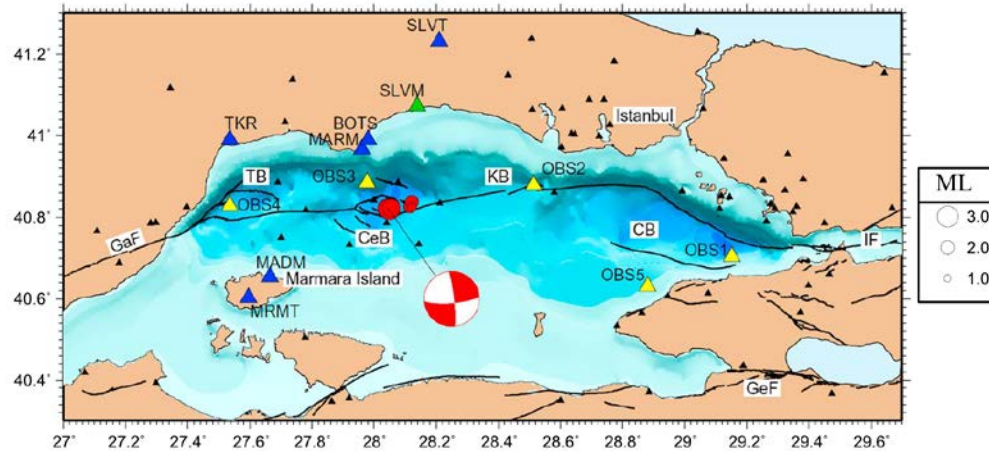


[Schmittbuhl et al, GGG., 2016]

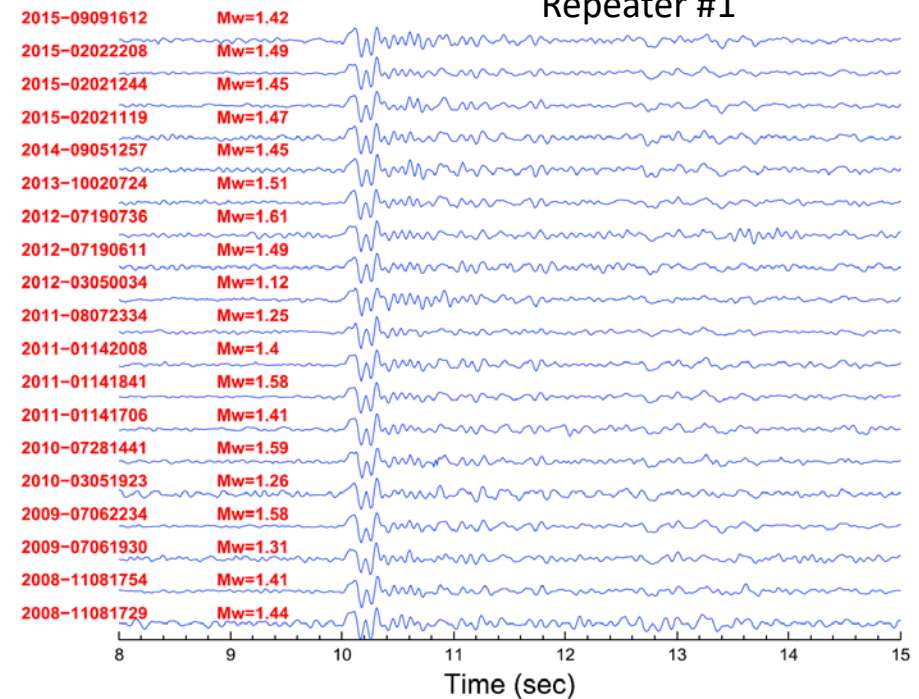
EGU2020

Repeaters in the Marmara Sea

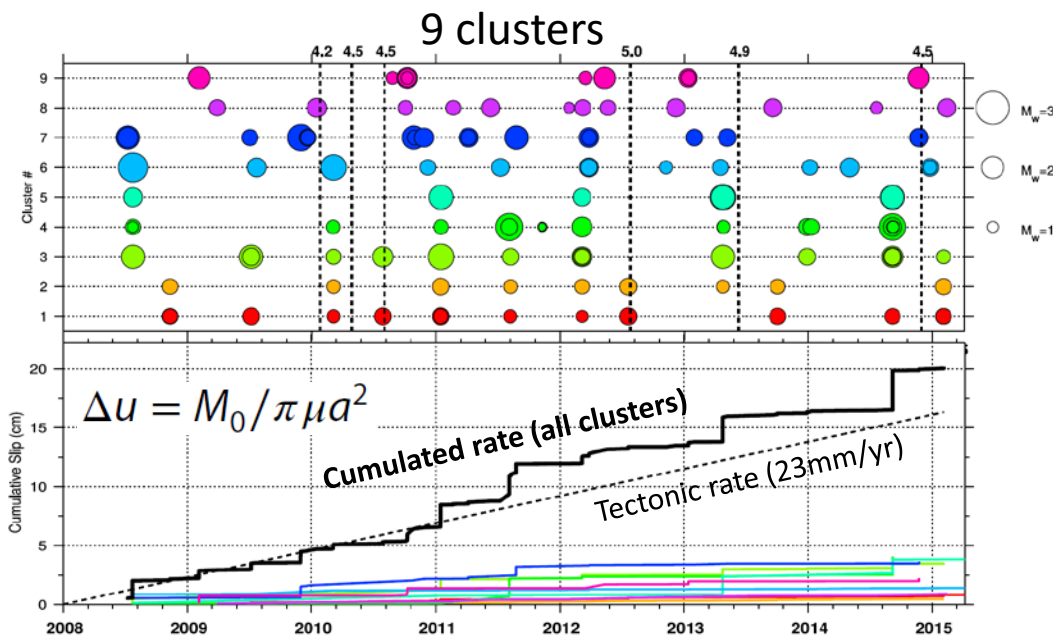
[Schmittbuhl et al, GRL, 2016]



Repeater #1

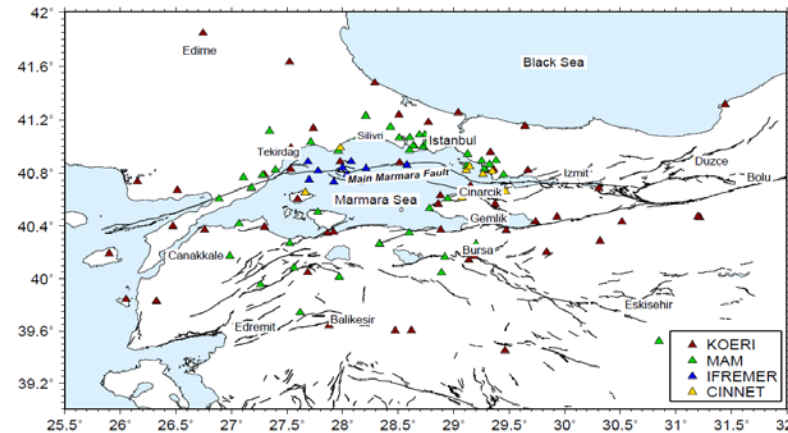


SLVM station

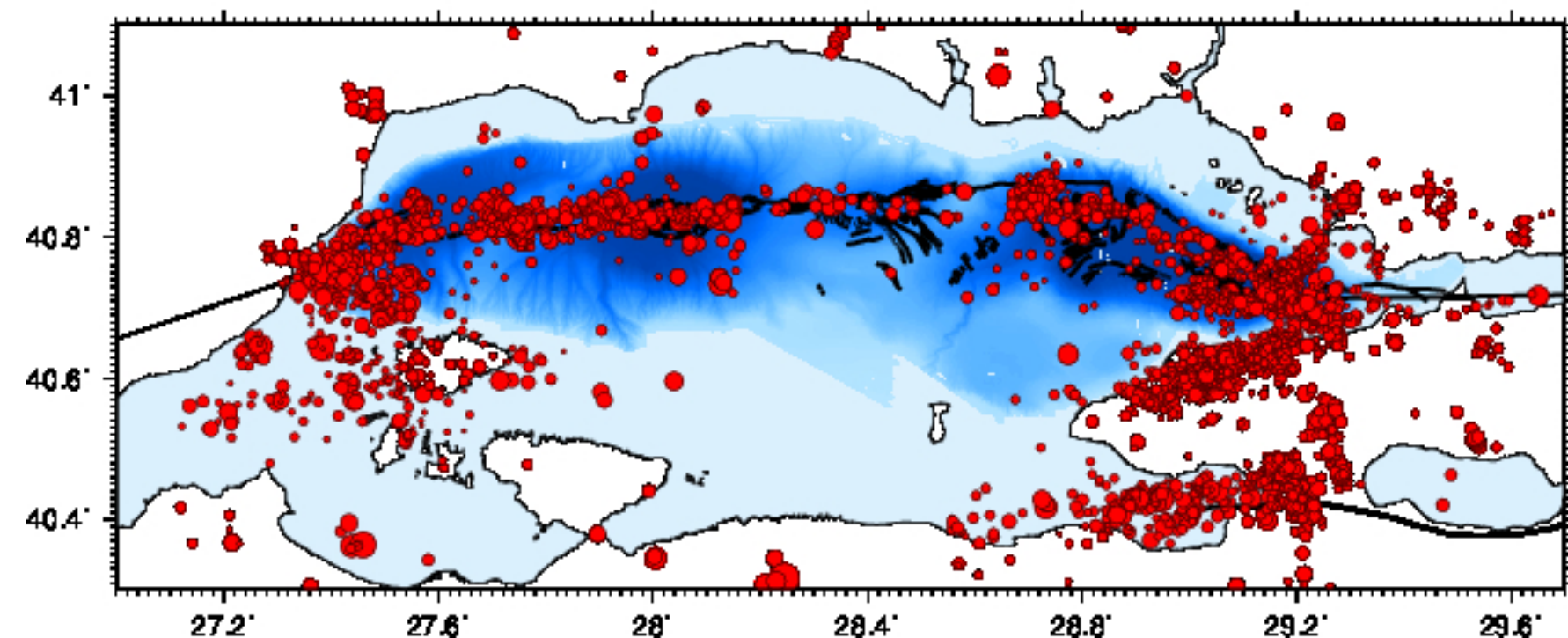
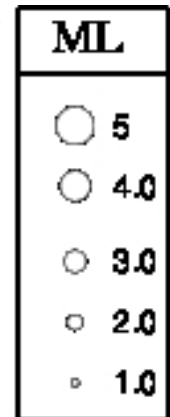


Variability of the fault rheology along the Main Marmara Fault?

High resolution location (2007-2012)

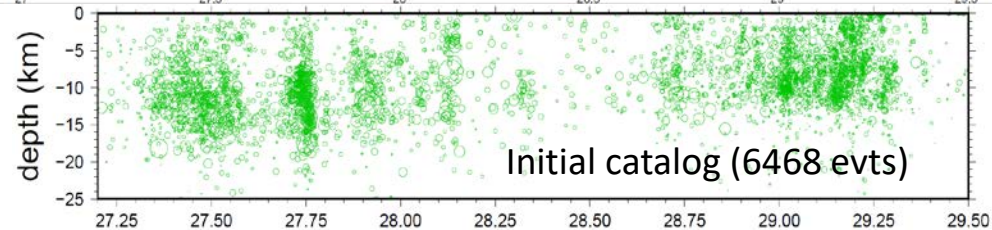
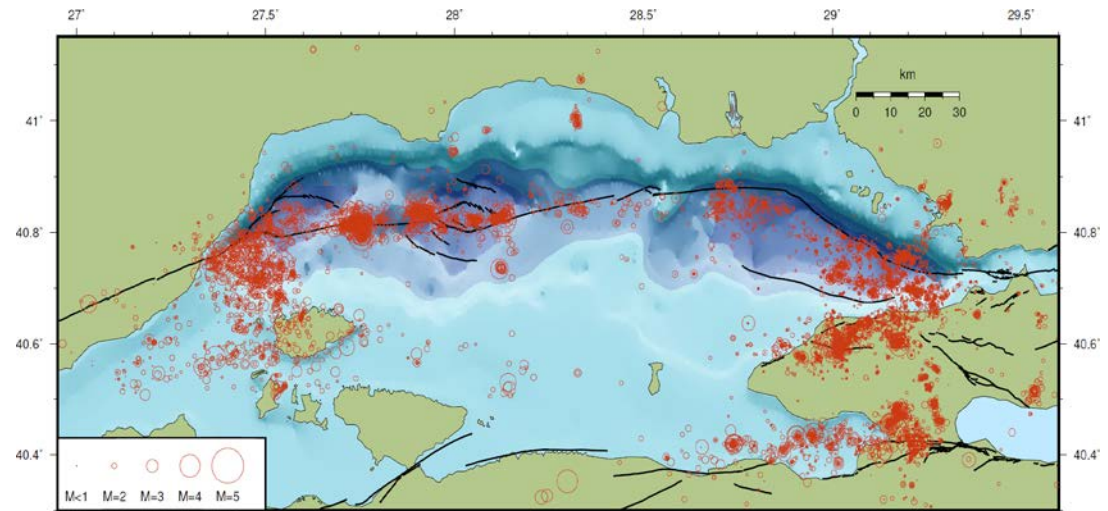
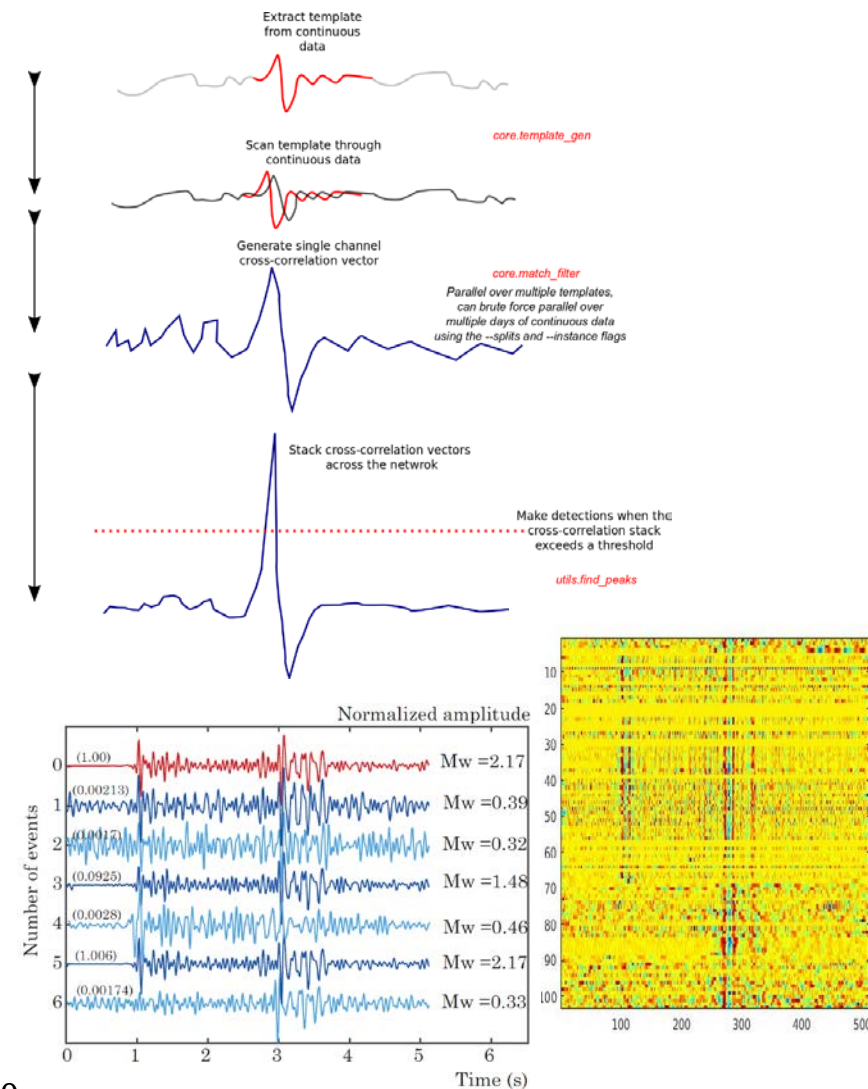


124 permanent
(KOERI, Tubitak-MAM)
and temporal
stations
(CINNET, IFREMER)

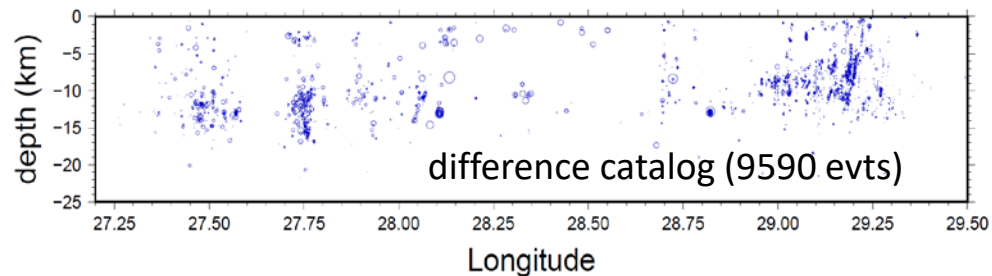
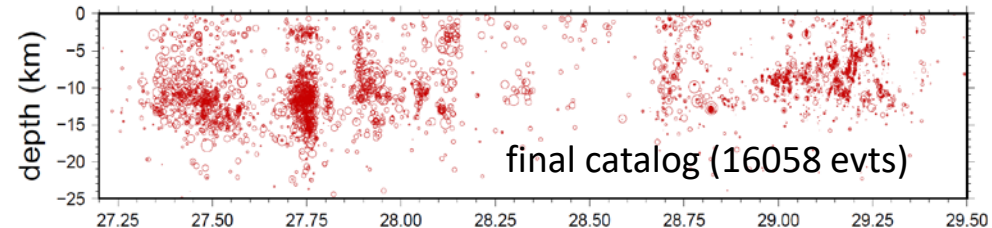


Improving locations with template matching

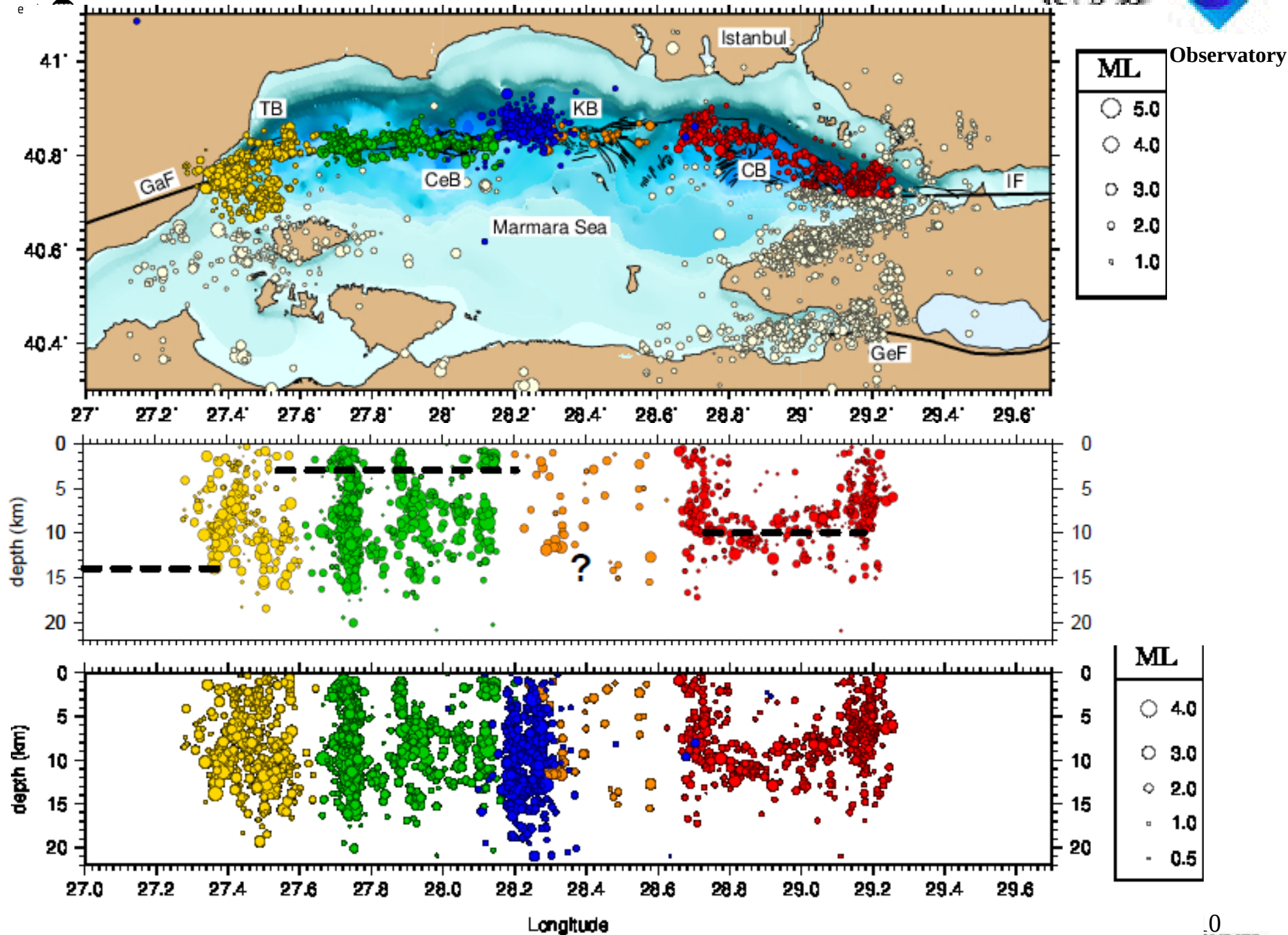
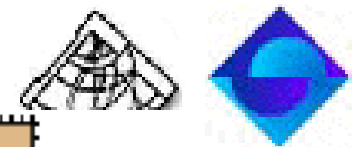
2009-2014

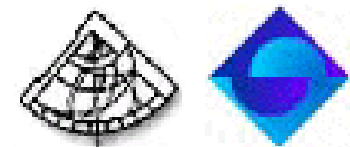


2009-2011
 (manual cat)
 2012-2014
 (KOERI cat)

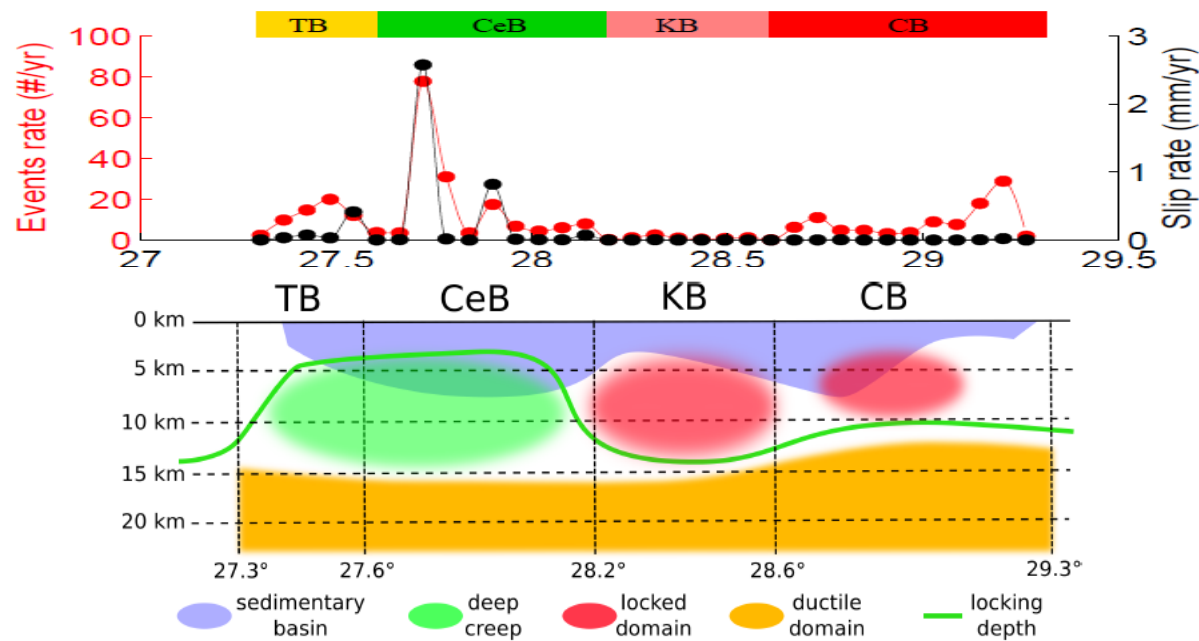
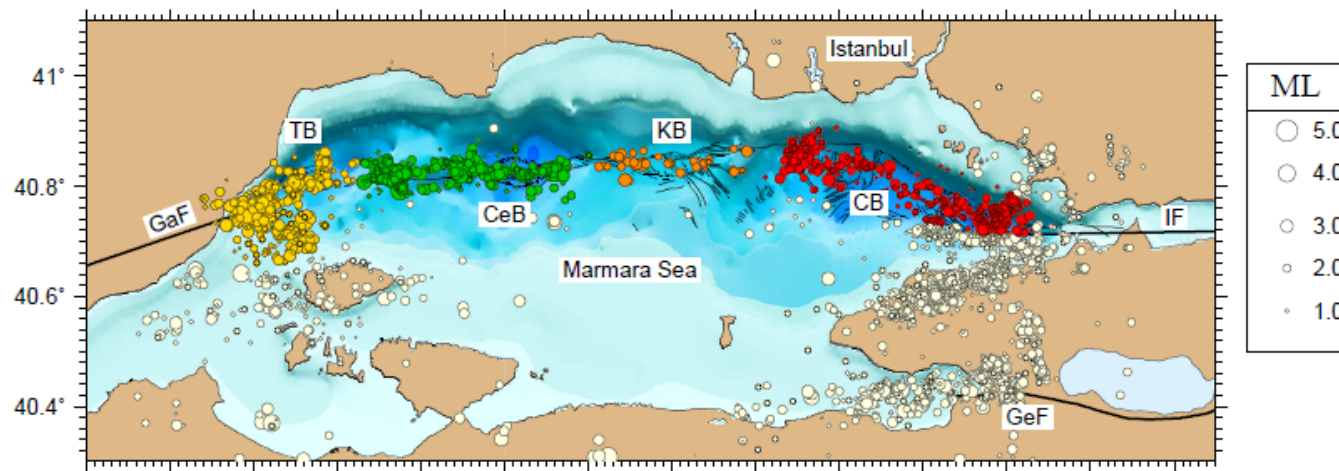


Location of the M5.7 2019 EQ





RI Kandilli Observatory



[Schmittbuhl et al, GGG, 2016]