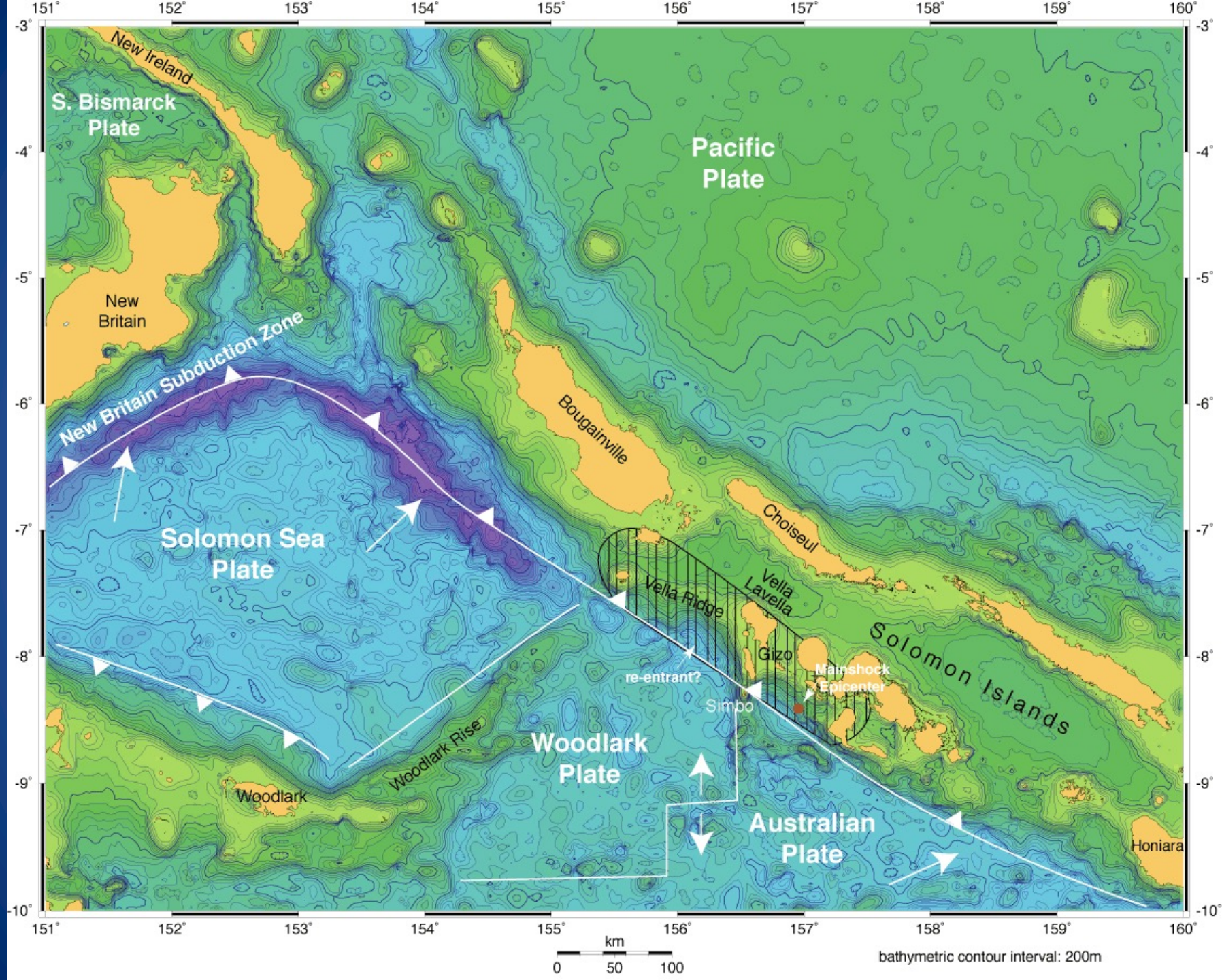
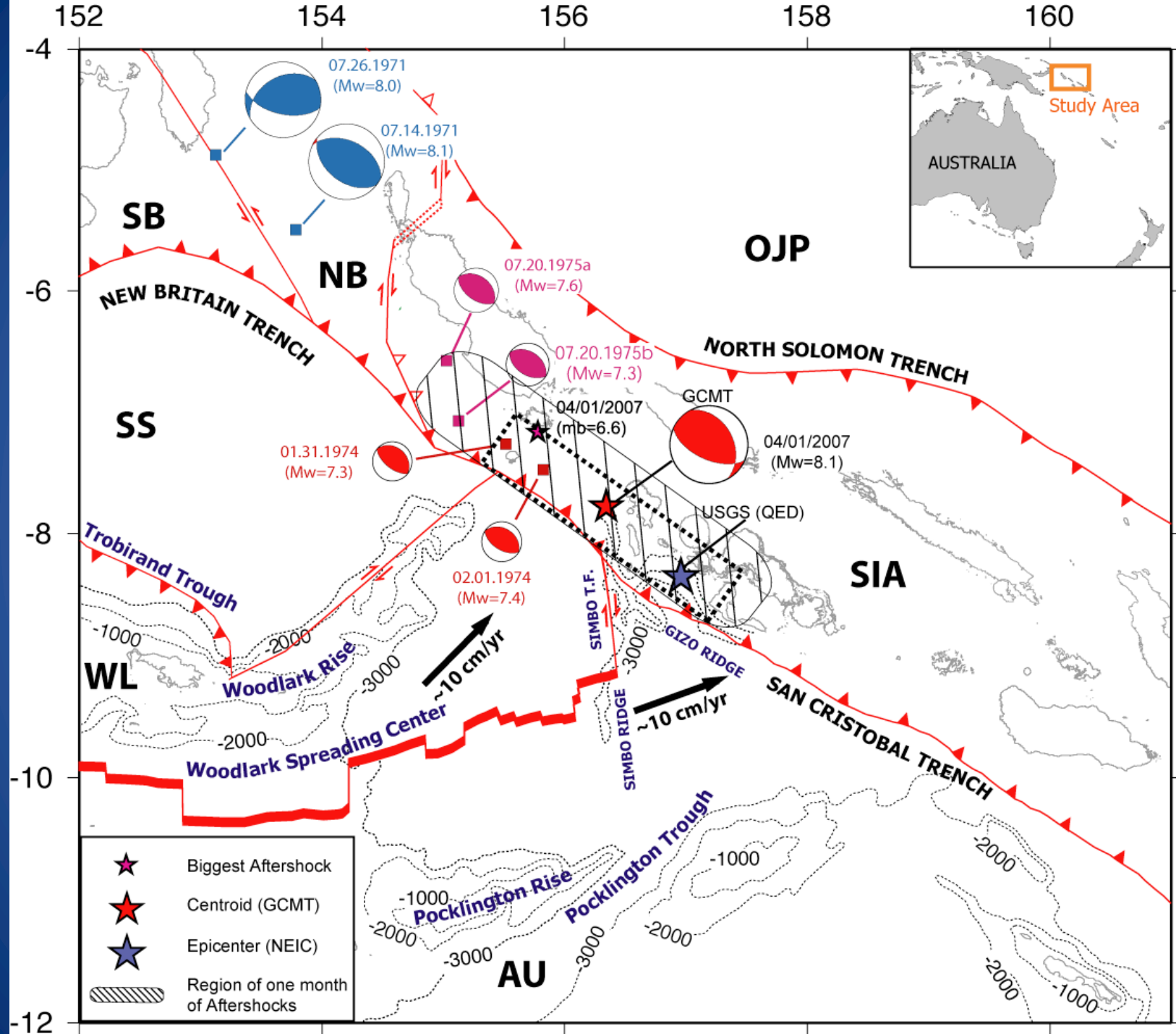
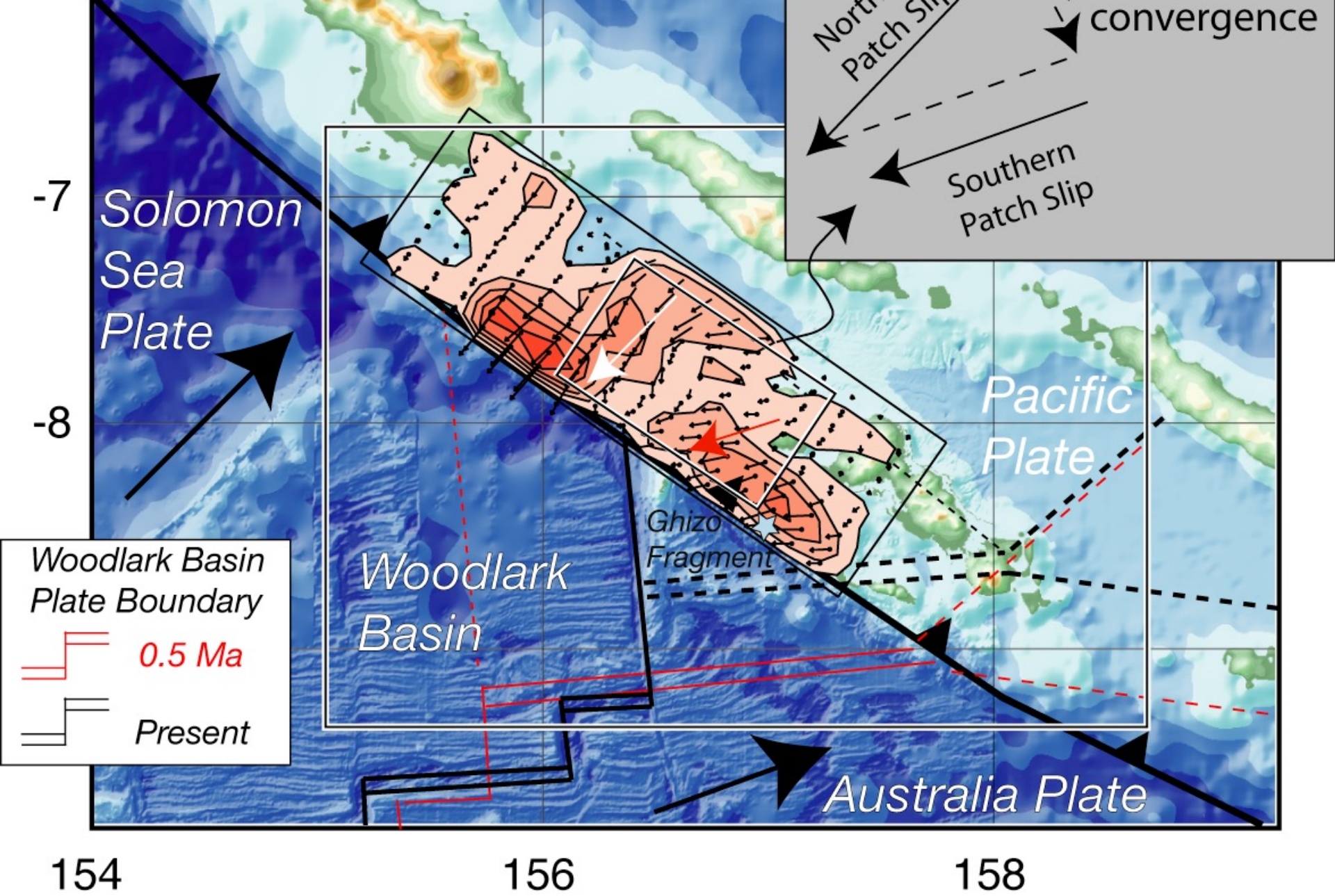


Solomon Islands/Vanuatu Regional Great Earthquakes

Thorne Lay

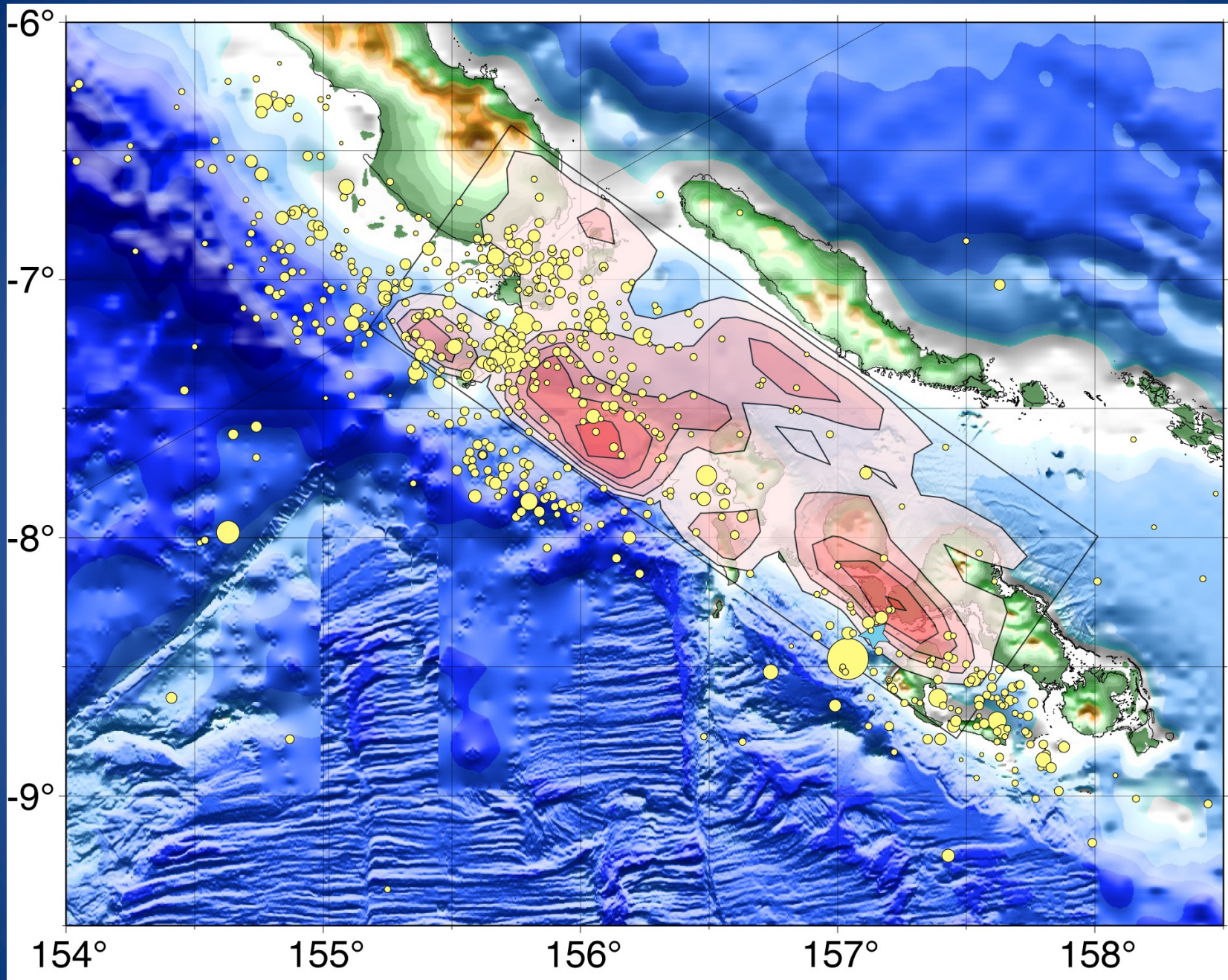




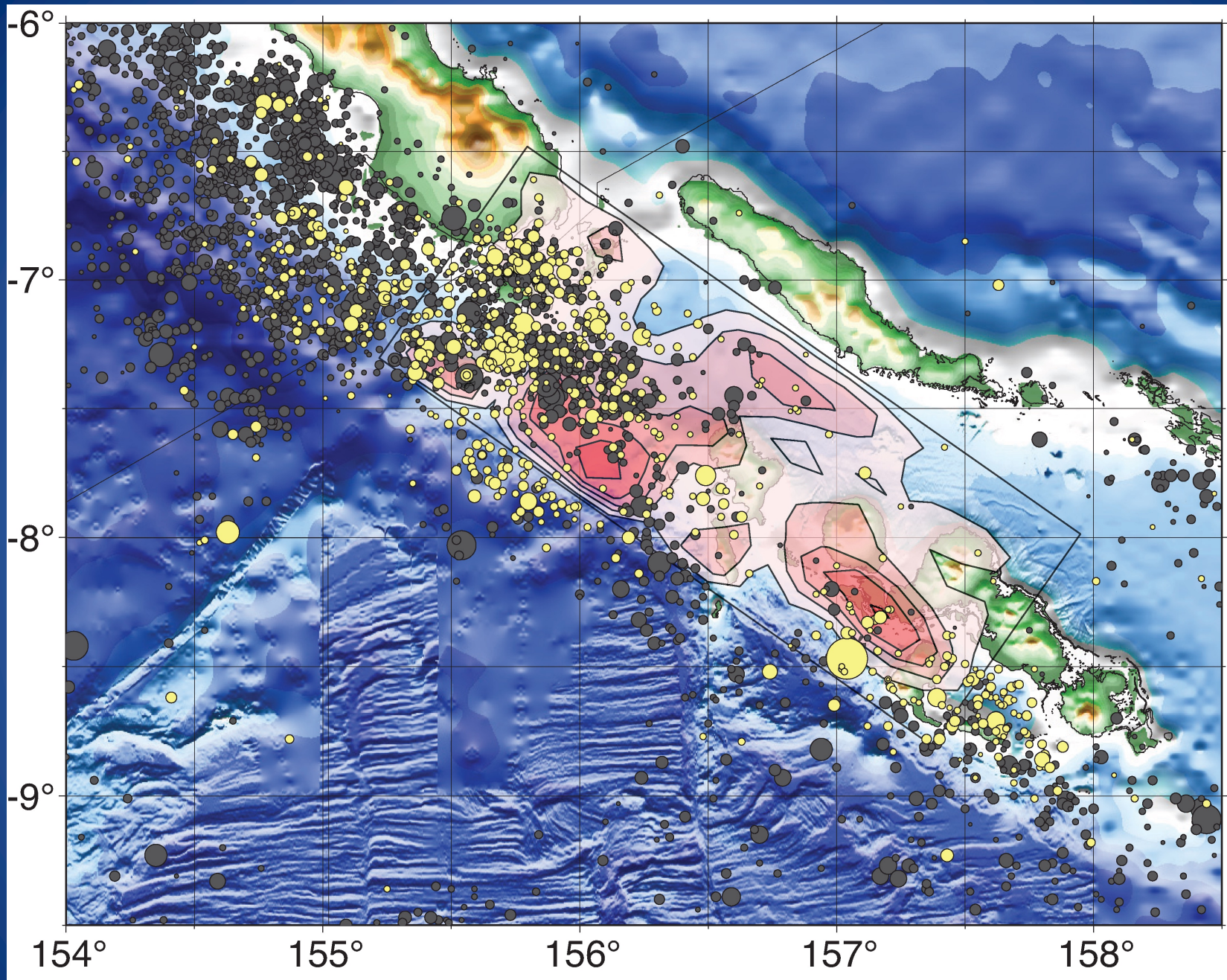


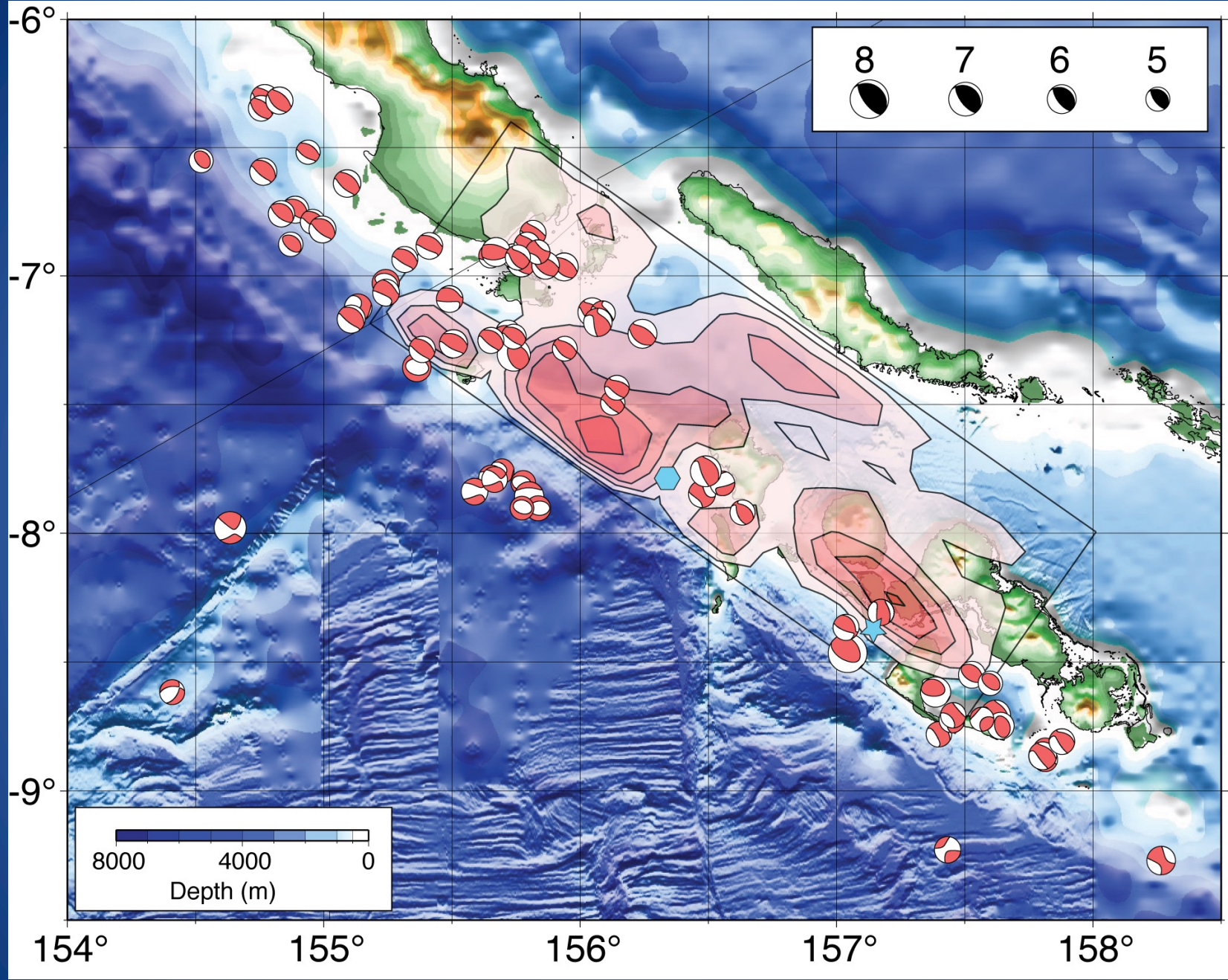
52 fatalities, thousands homeless

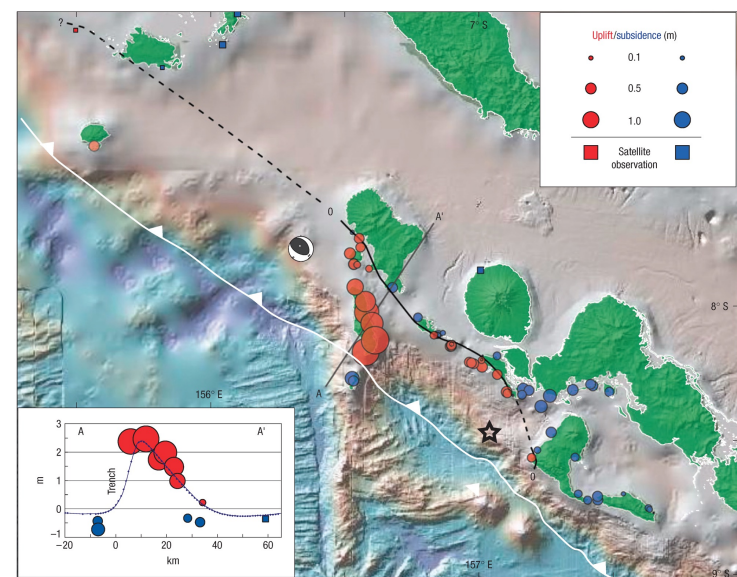
Furlong et al., Science 2009



Furlong et al., Science 2009

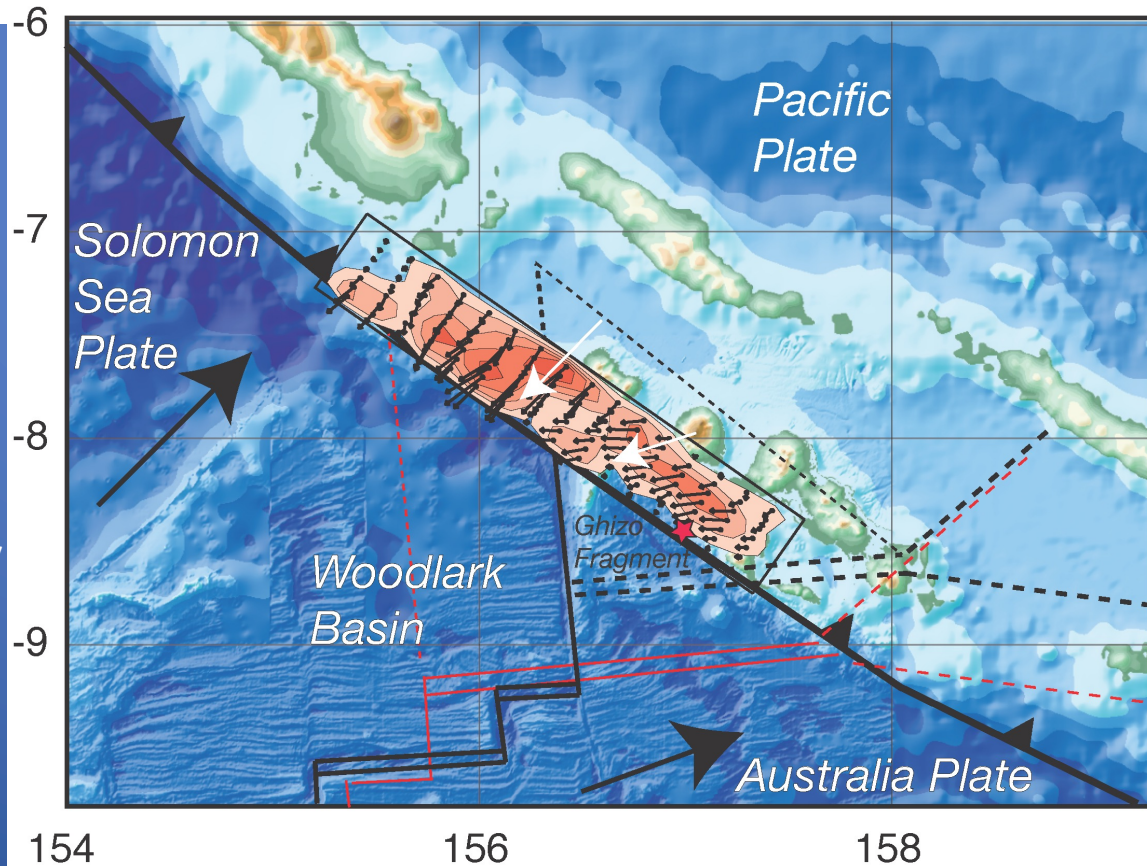


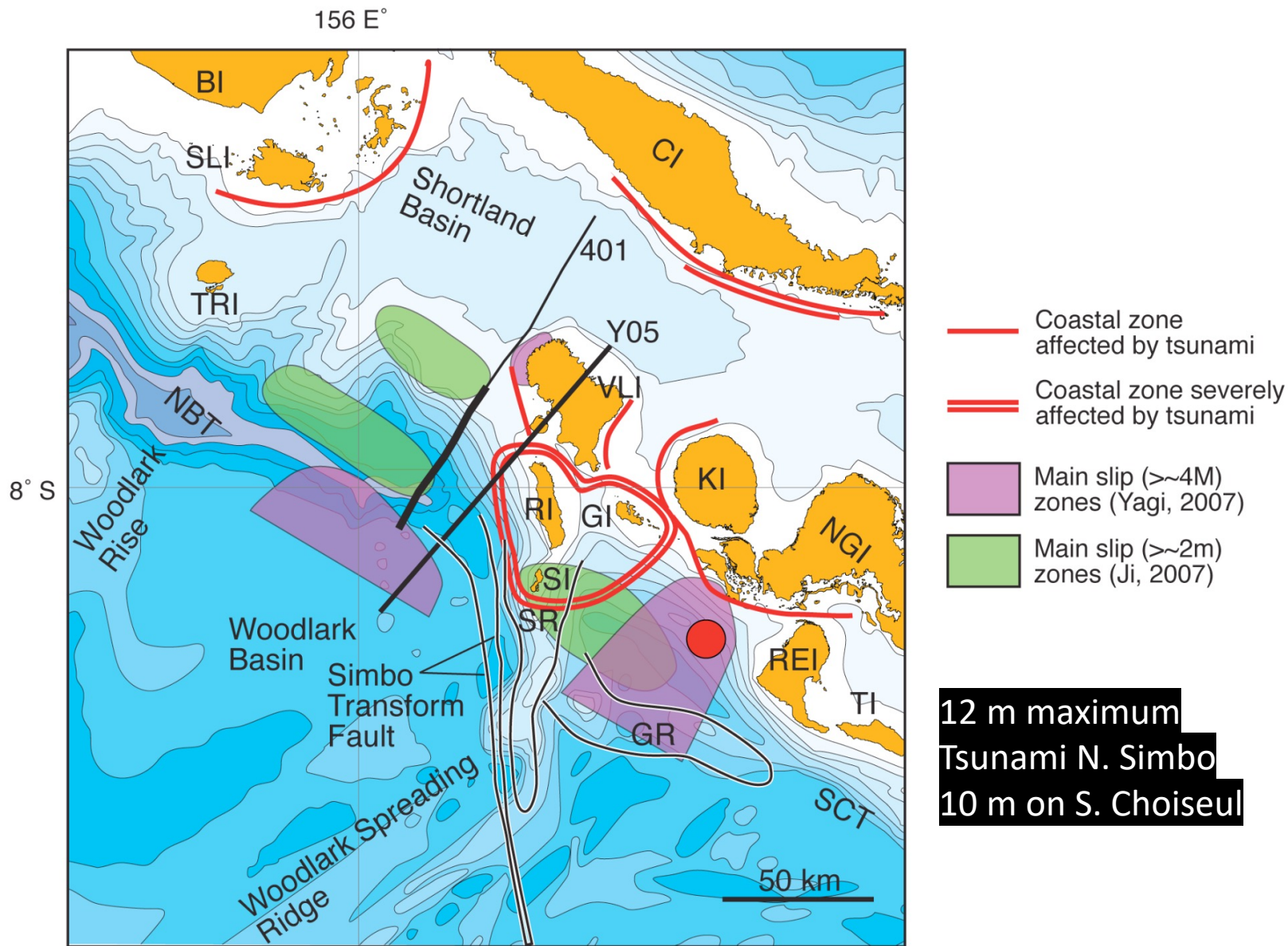


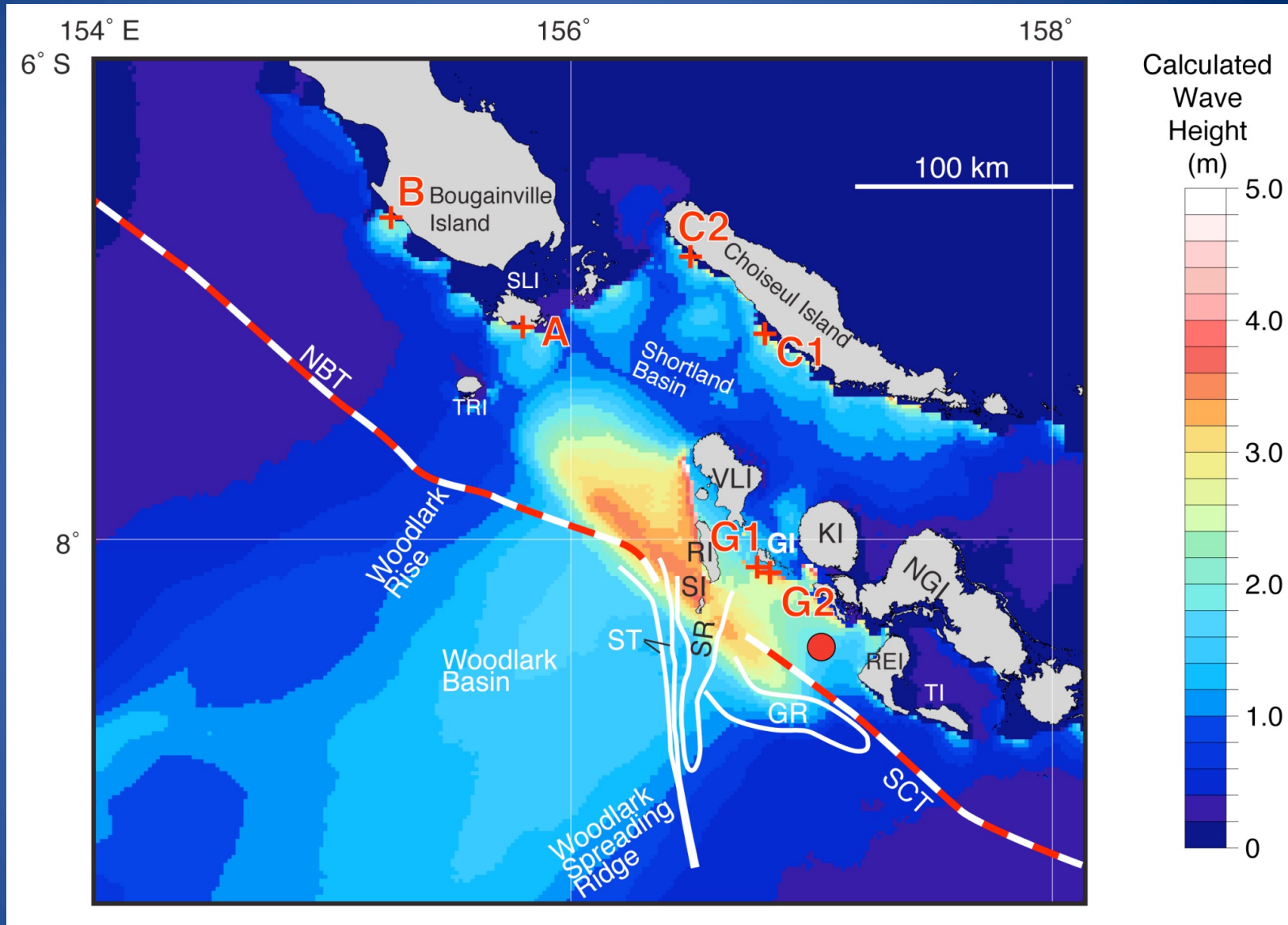


Uplift measured. Taylor et al. NatGeo 2008

Updated slip model concentrates slip toward trench. Rupture velocity of 2.0-2.5 km/s and moment-scaled radiated energy not like a shallow tsunami earthquake. Possibly due to lack of sediments on the megathrust.







Largest waves at Simbo, Ghizo, Ranungga, almost no warning time possible

Fisher et al., 2008

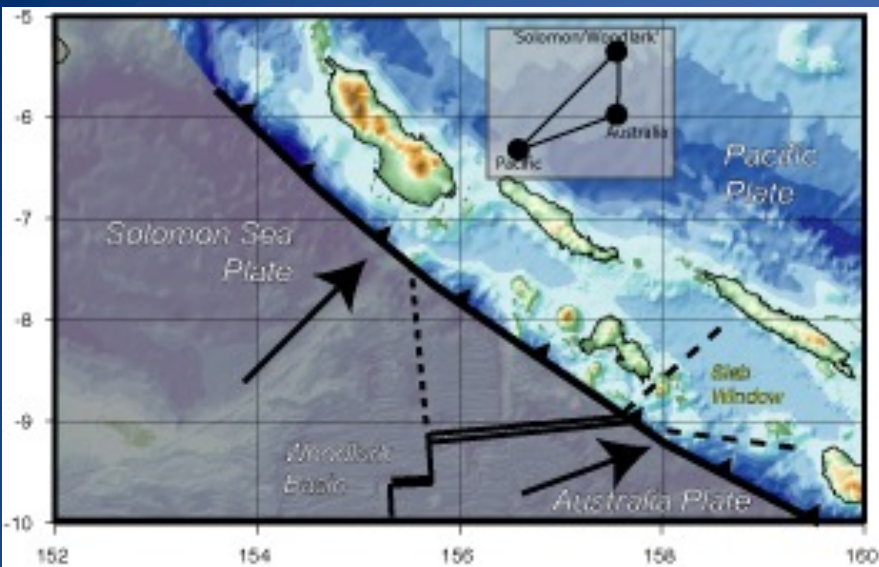
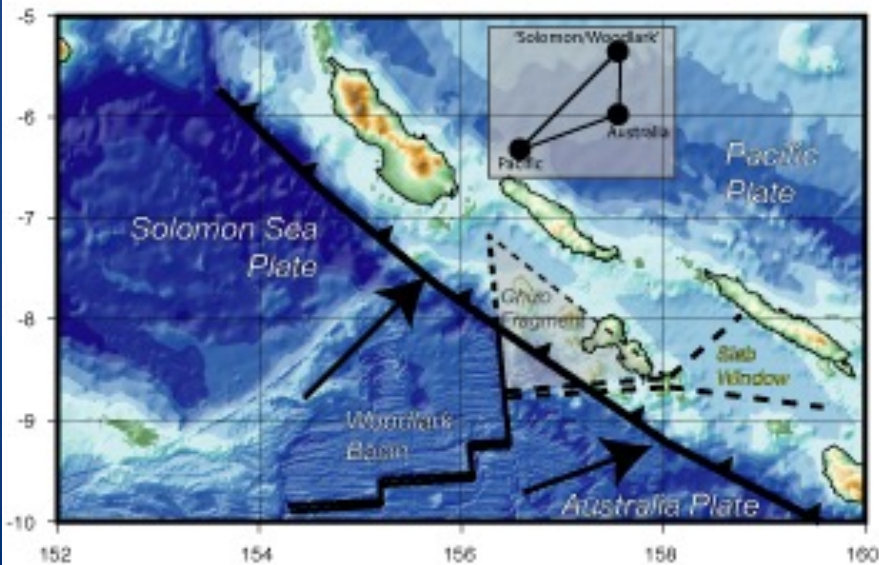
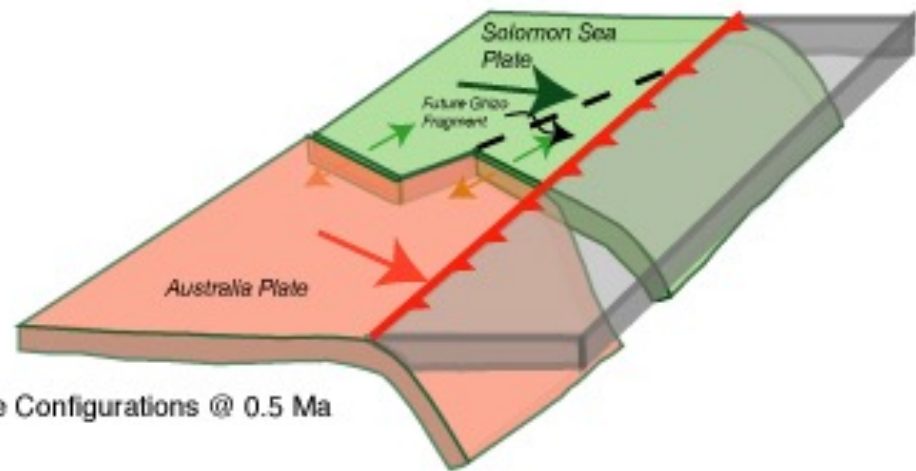
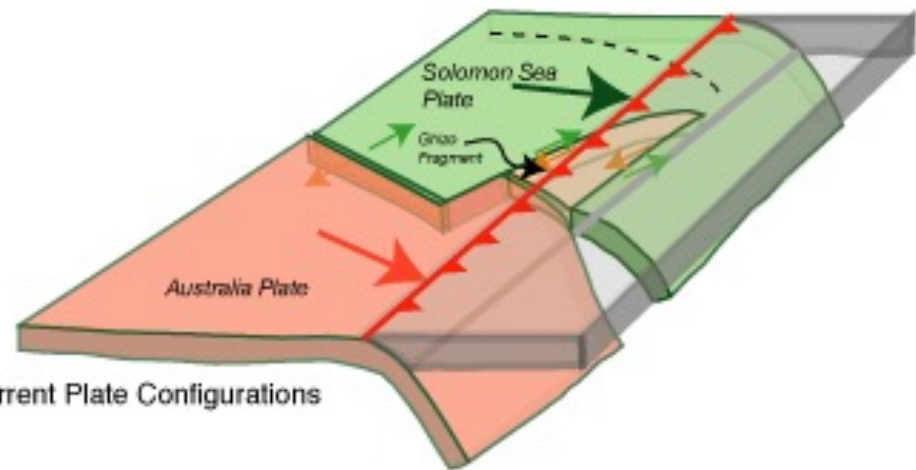
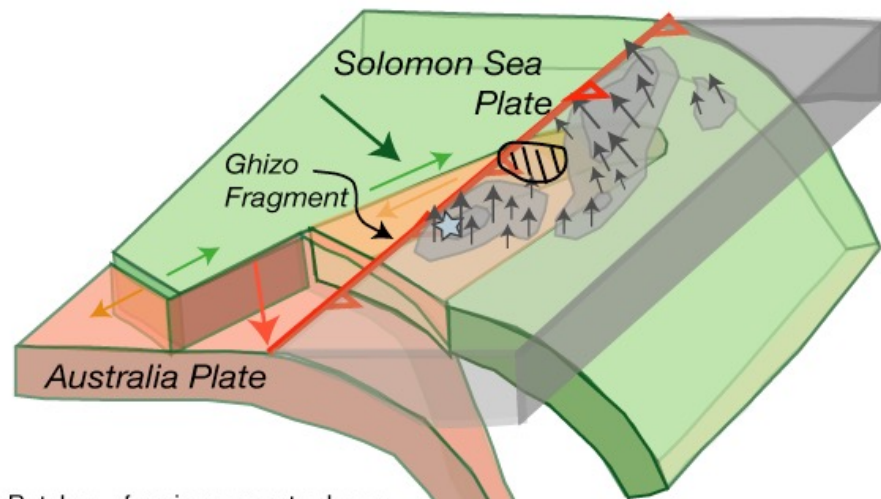
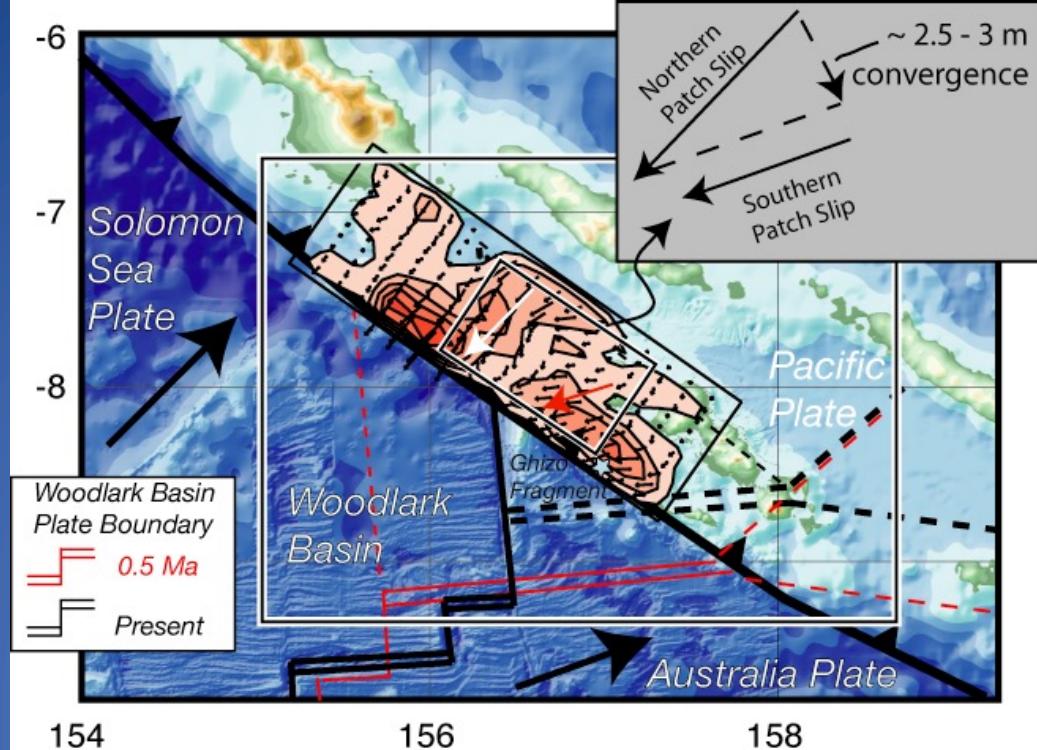





Plate Configurations @ 0.5 Ma



Current Plate Configurations

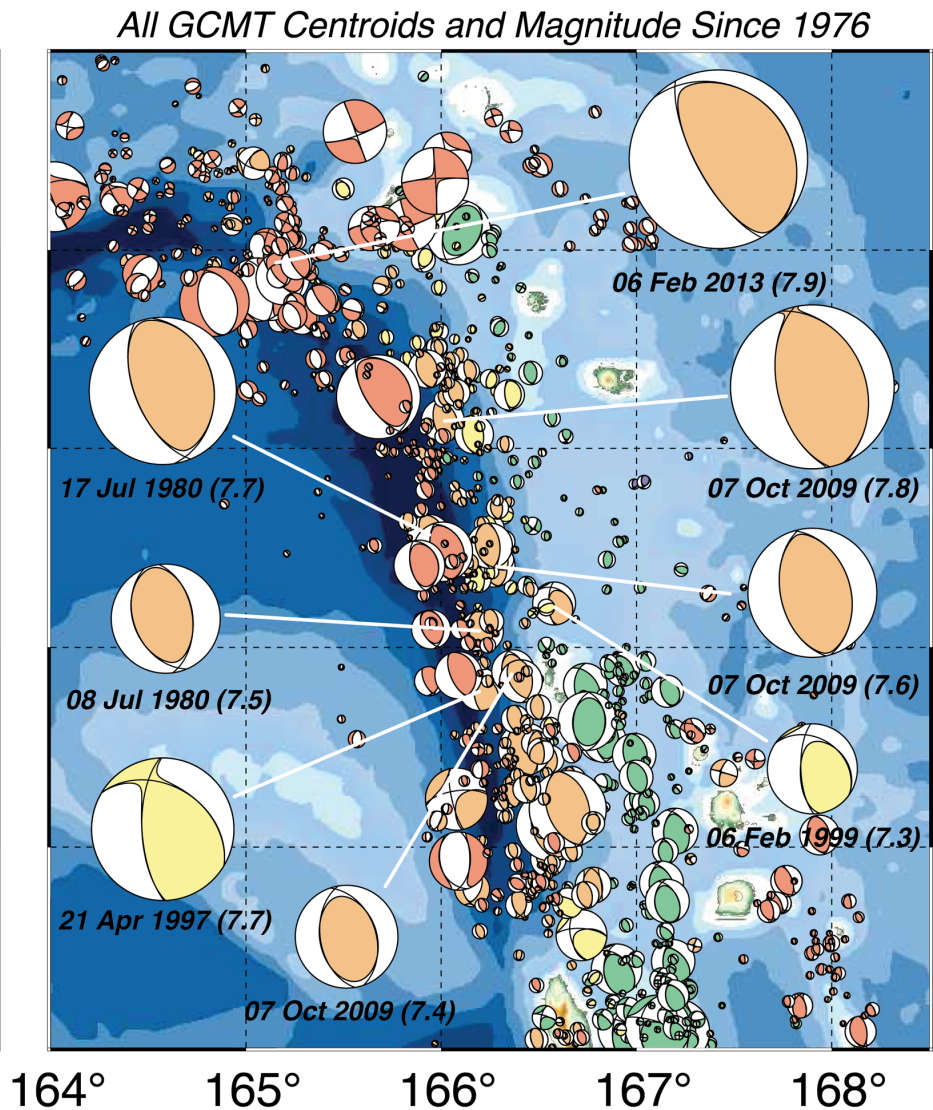
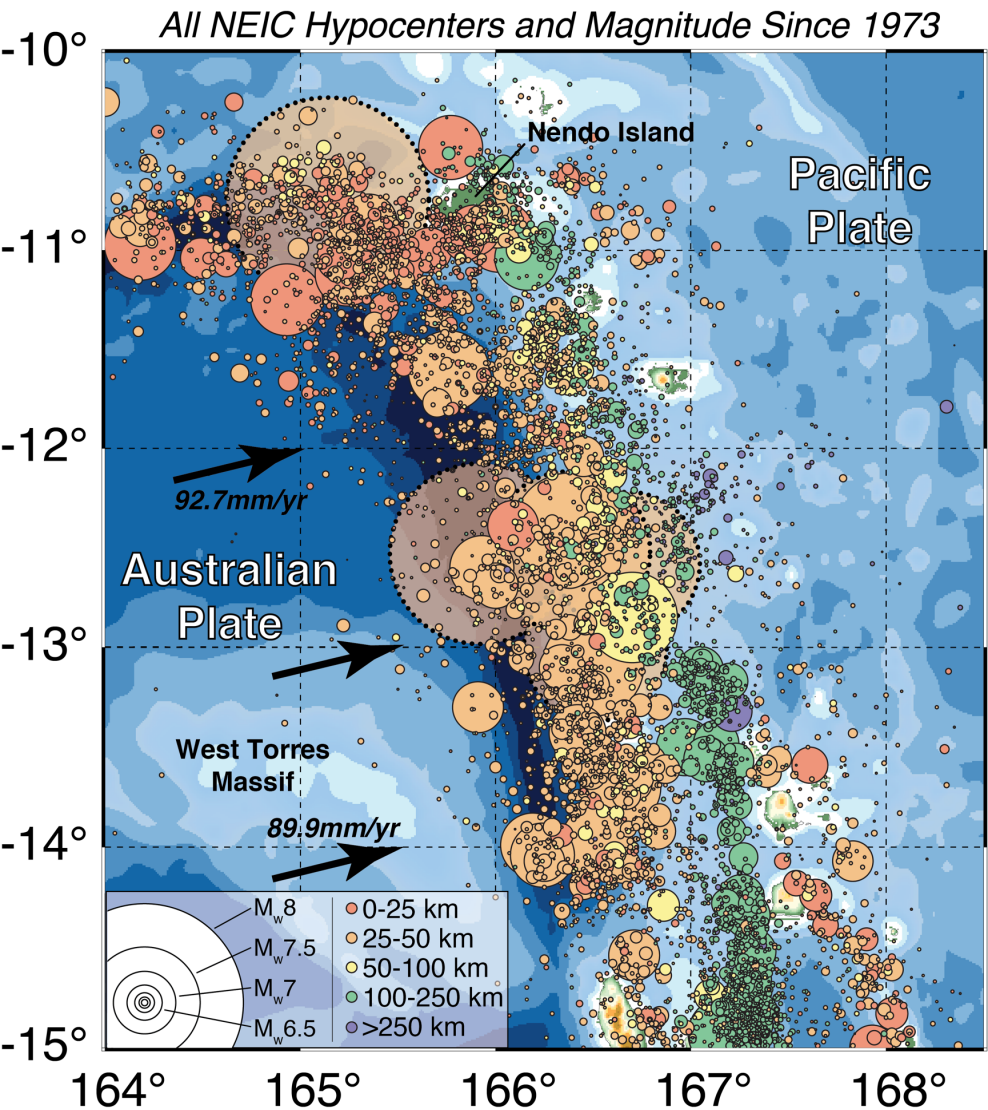




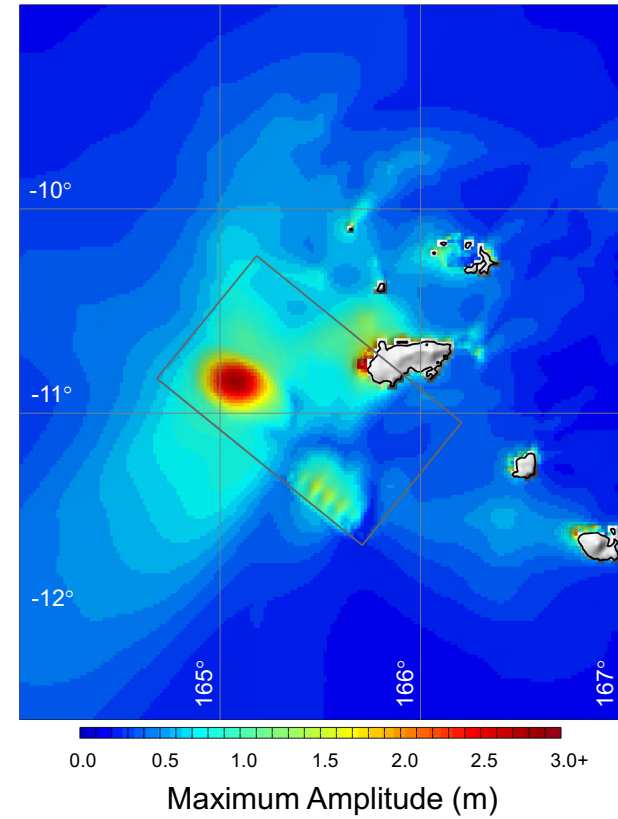
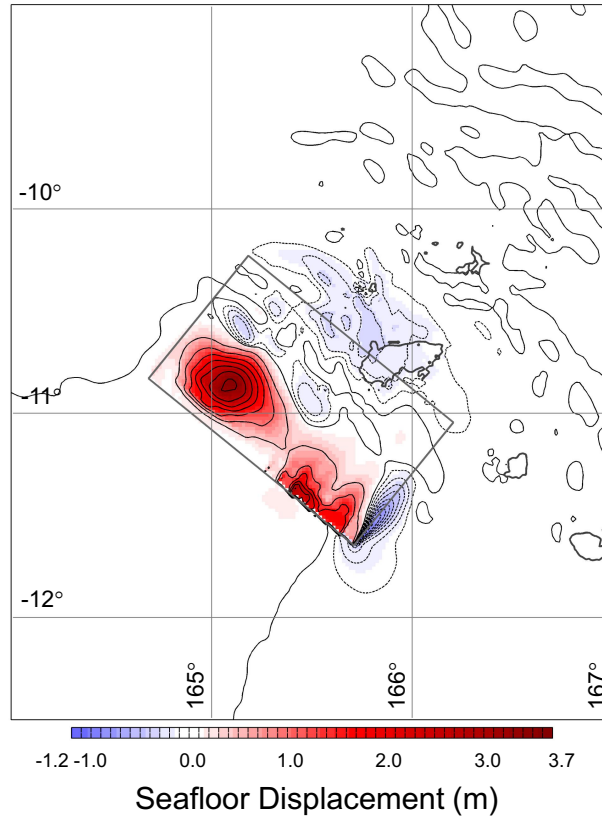
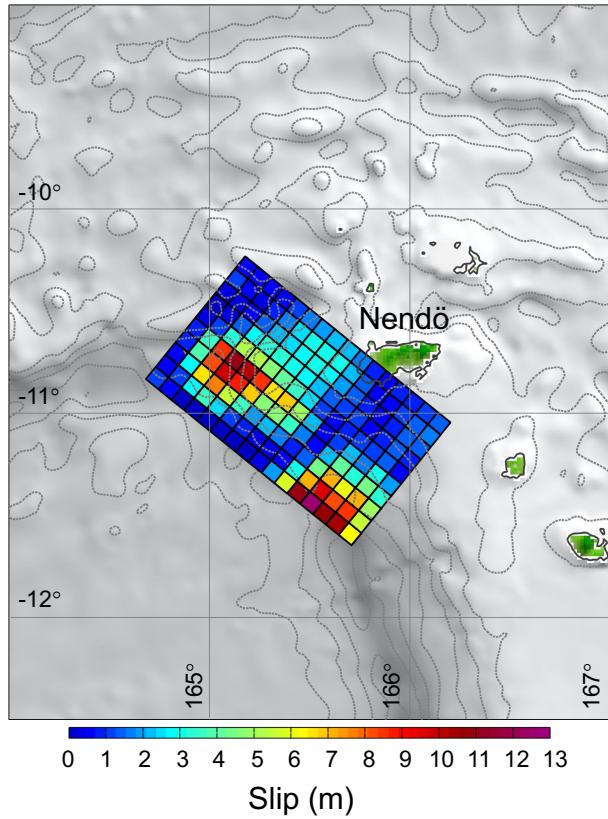
-  Patches of main moment release
-  Hypocenter Main Shock
-  Localized uplift

Furlong et al.,
Science 2009

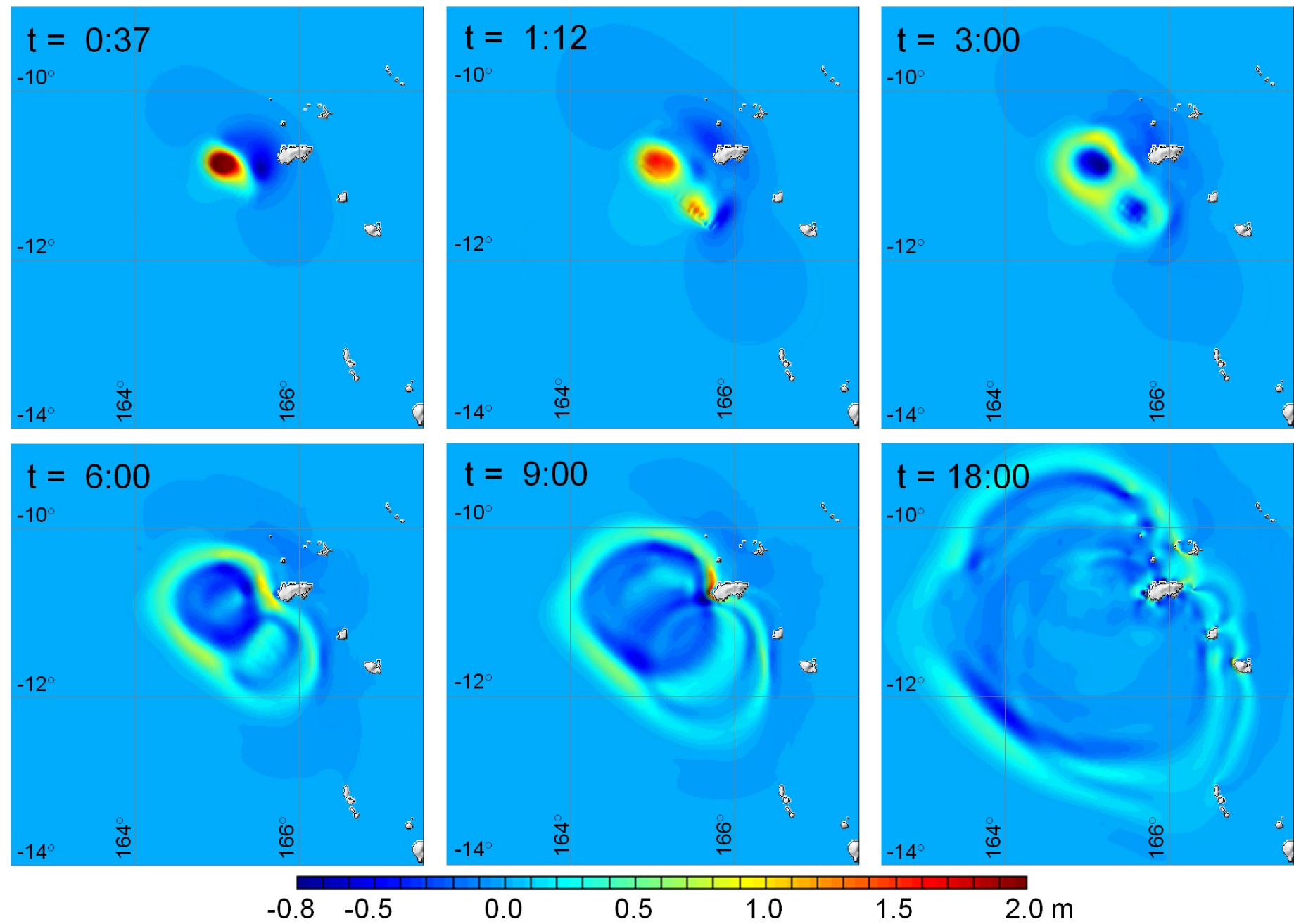
Northern Vanuatu Subduction Zone

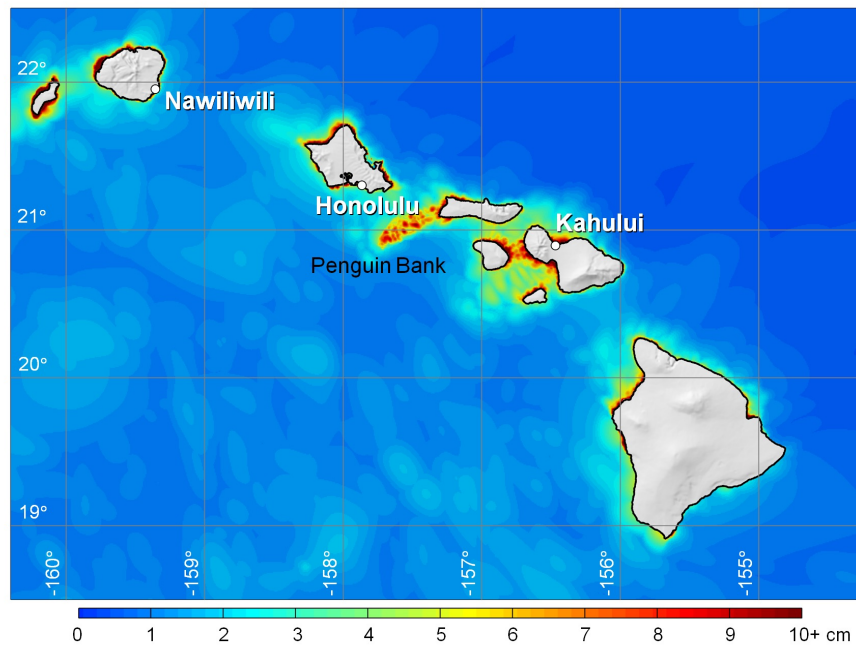
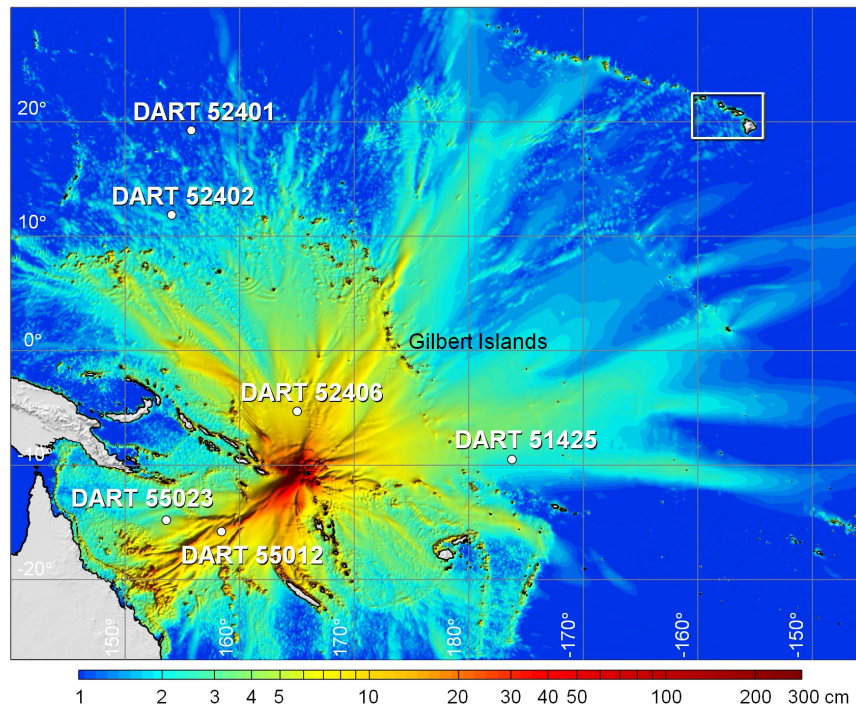


Feb. 6, 2013 Mw 8.0

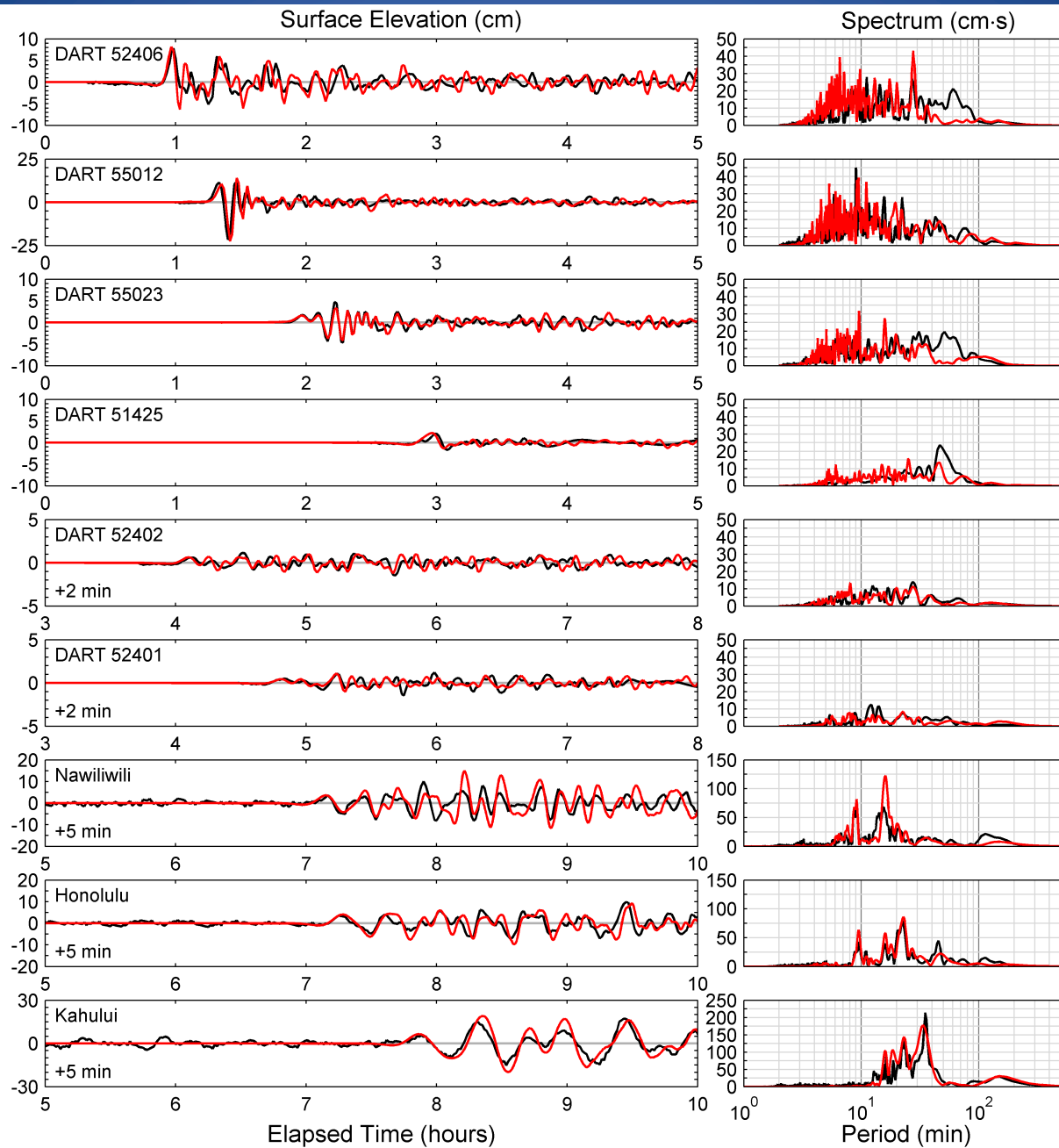


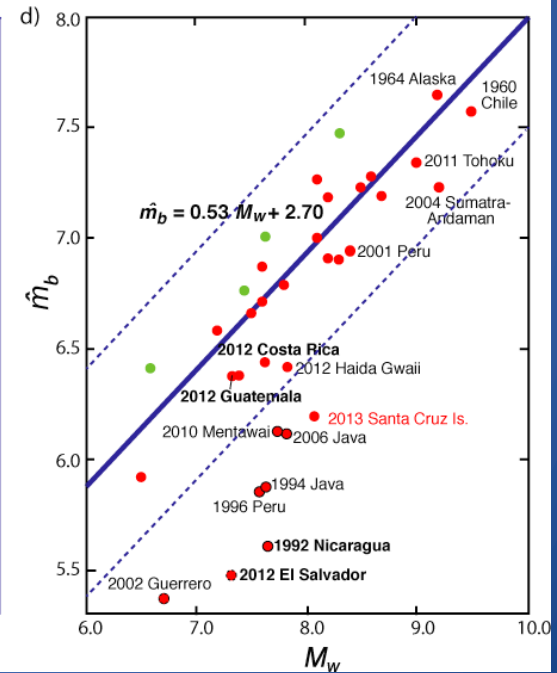
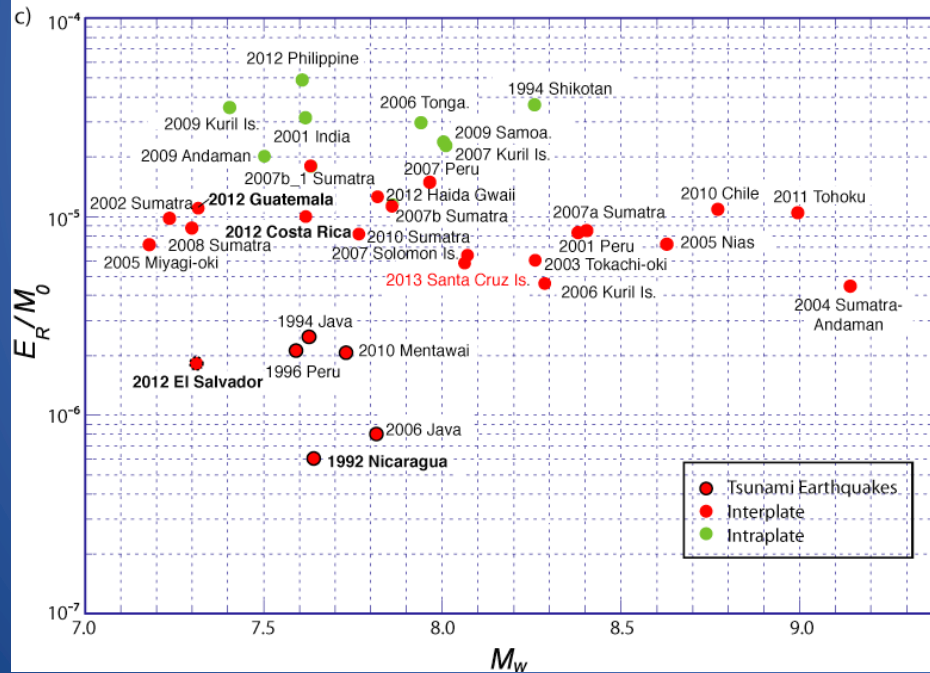
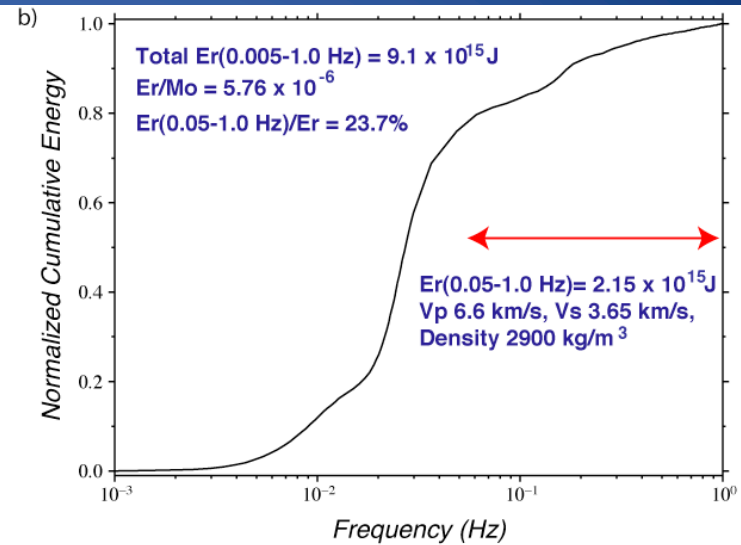
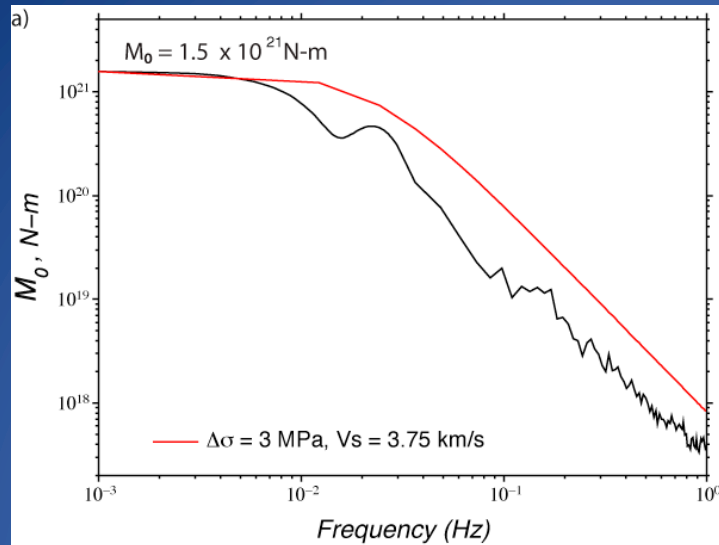
0.89 m at Lata Gauge, 11 m runup on West Nendo

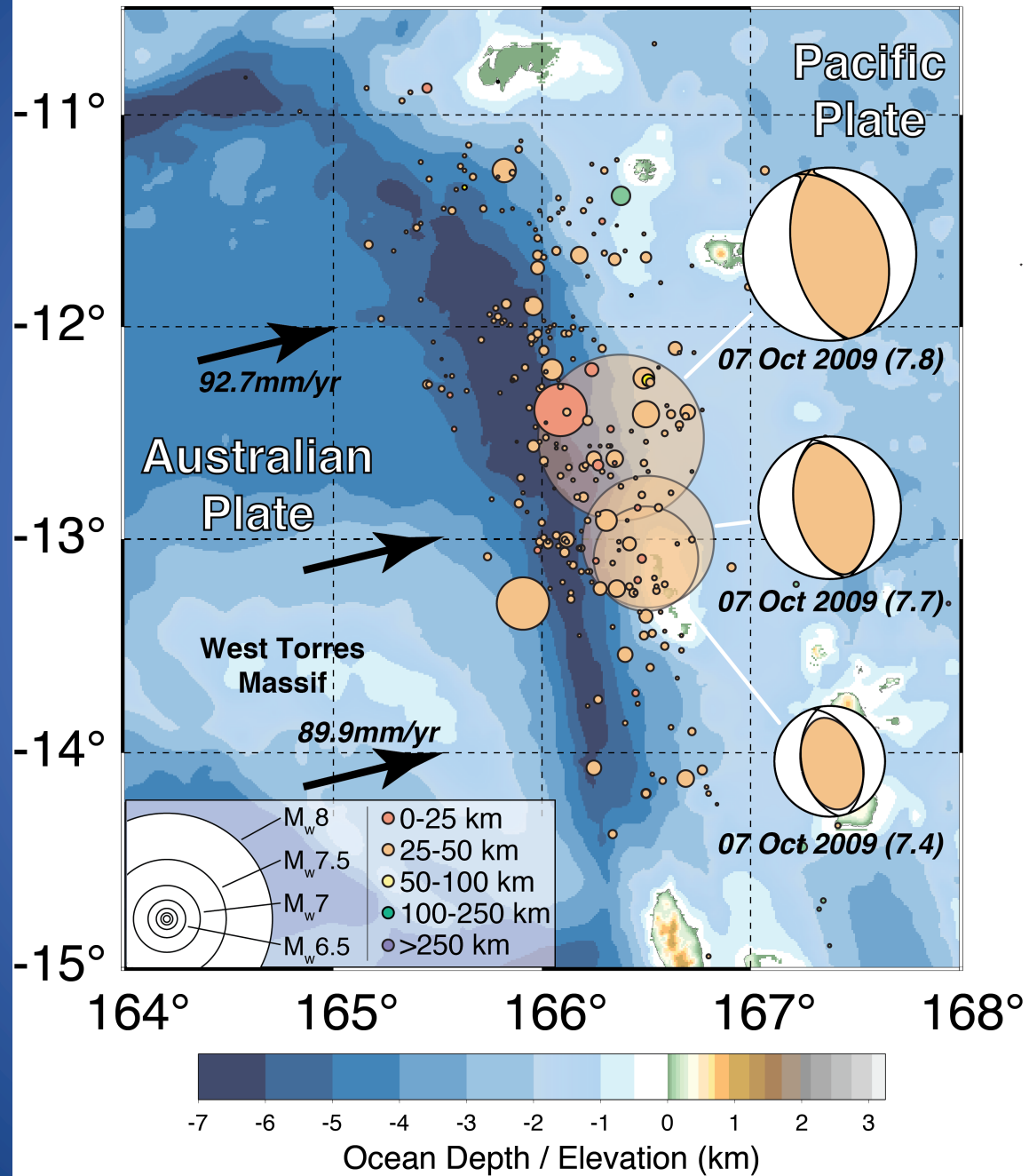


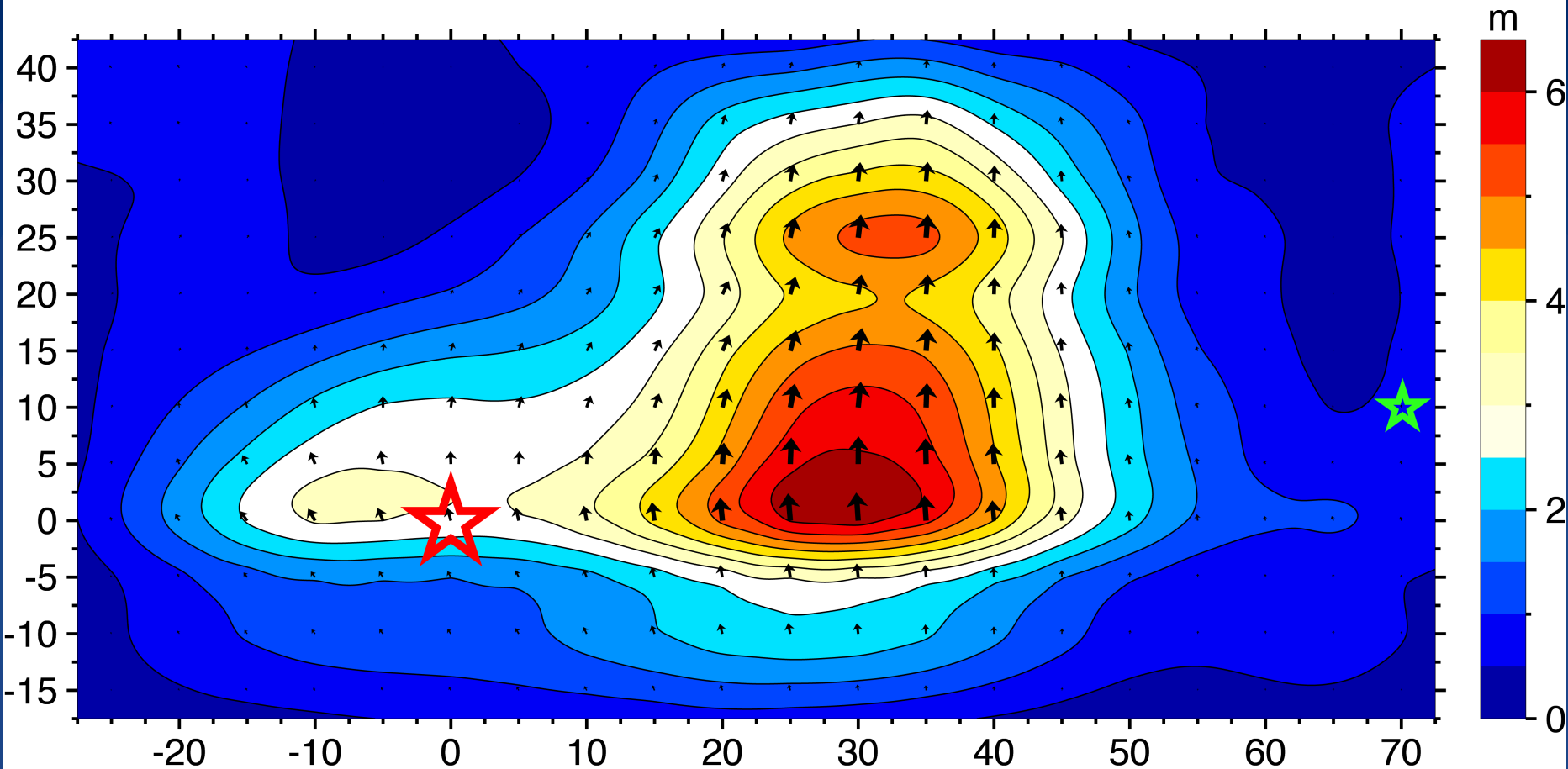


Lay et al.,
Tectonophysics 2013

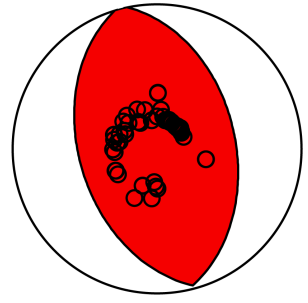
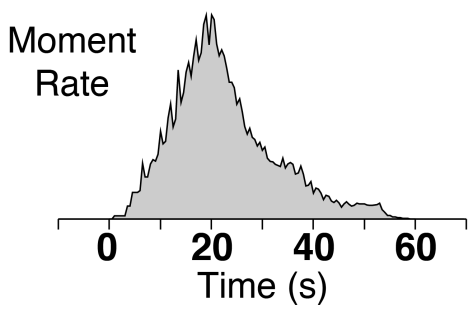


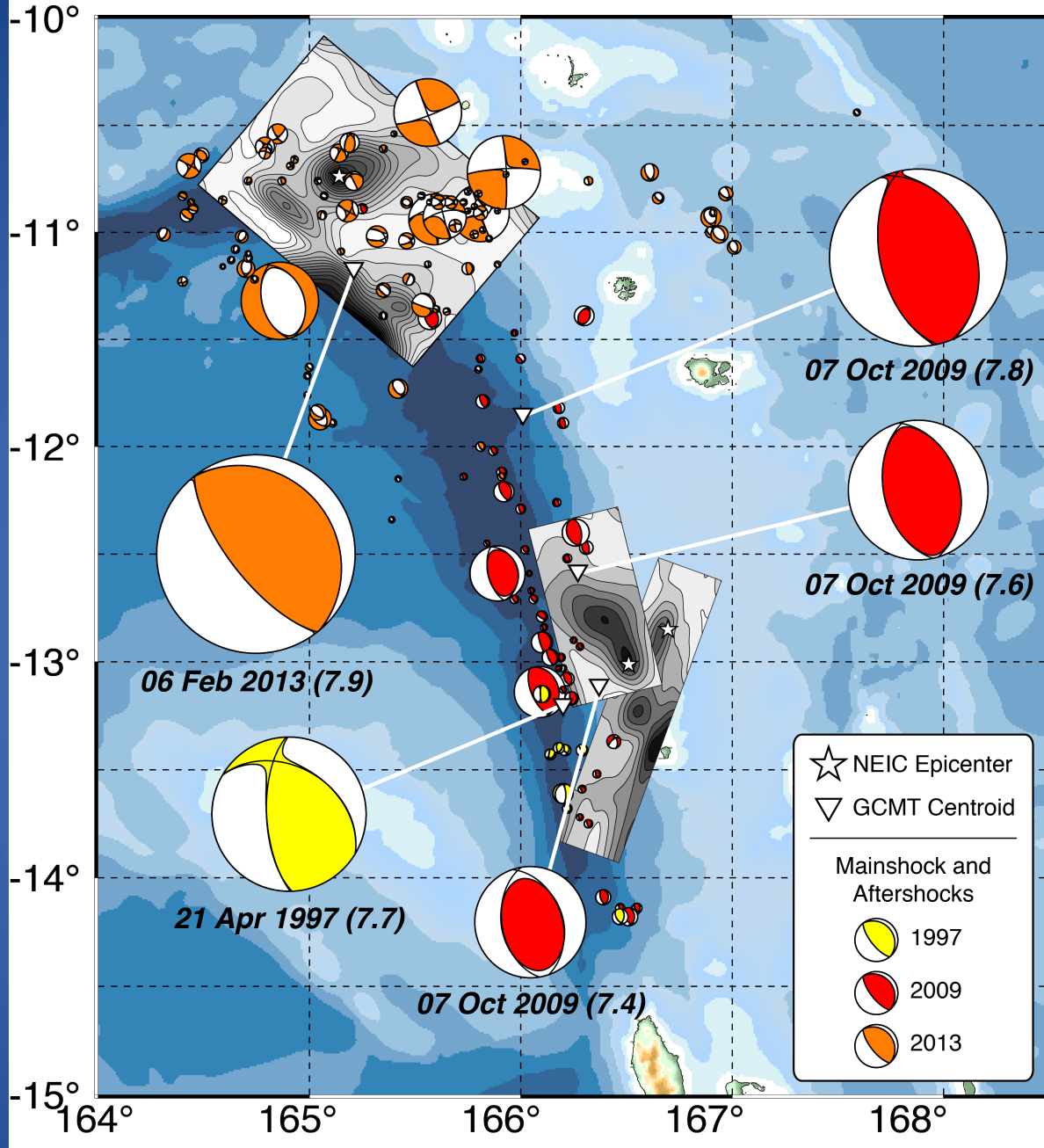




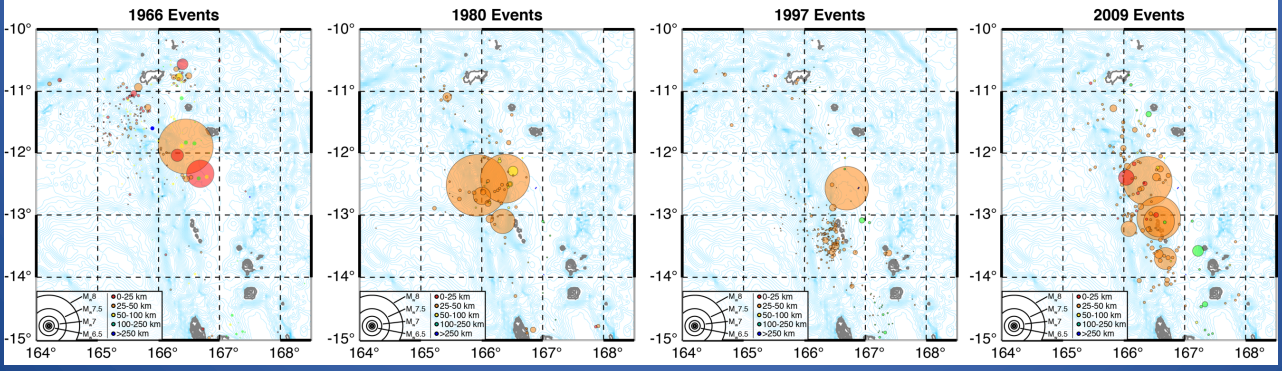
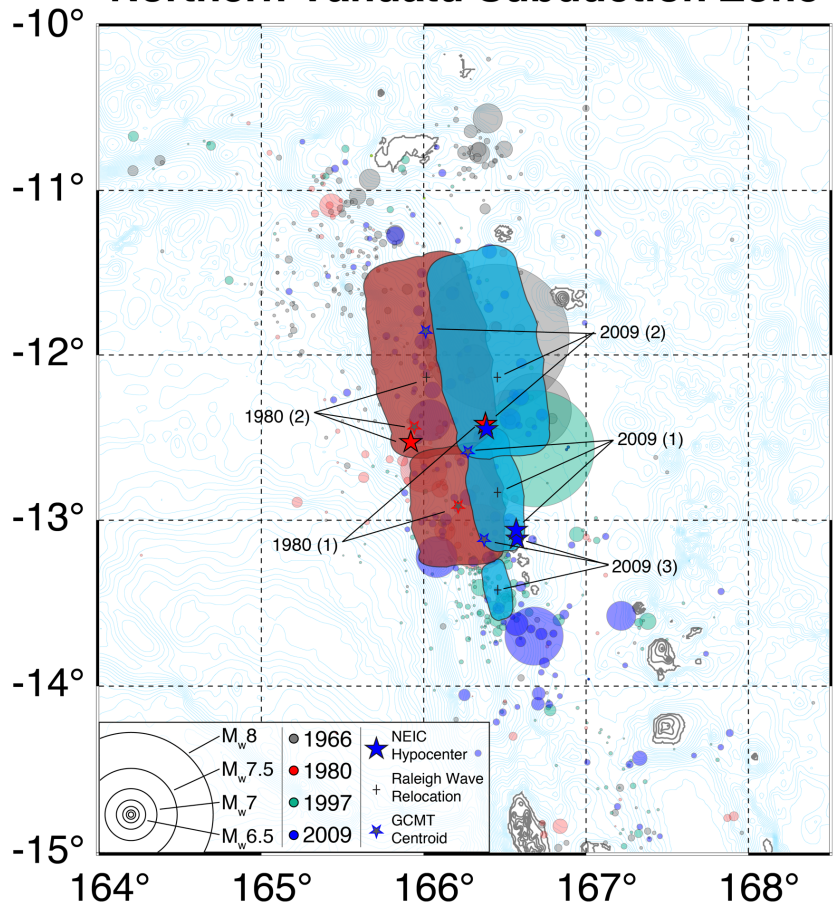


$M_0 = 0.451E+21 \text{ Nm}$
 $M_w = 7.70$
 Depth = 31 km
 Strike = 348°
 Dip = 45°
 Rake = 94°

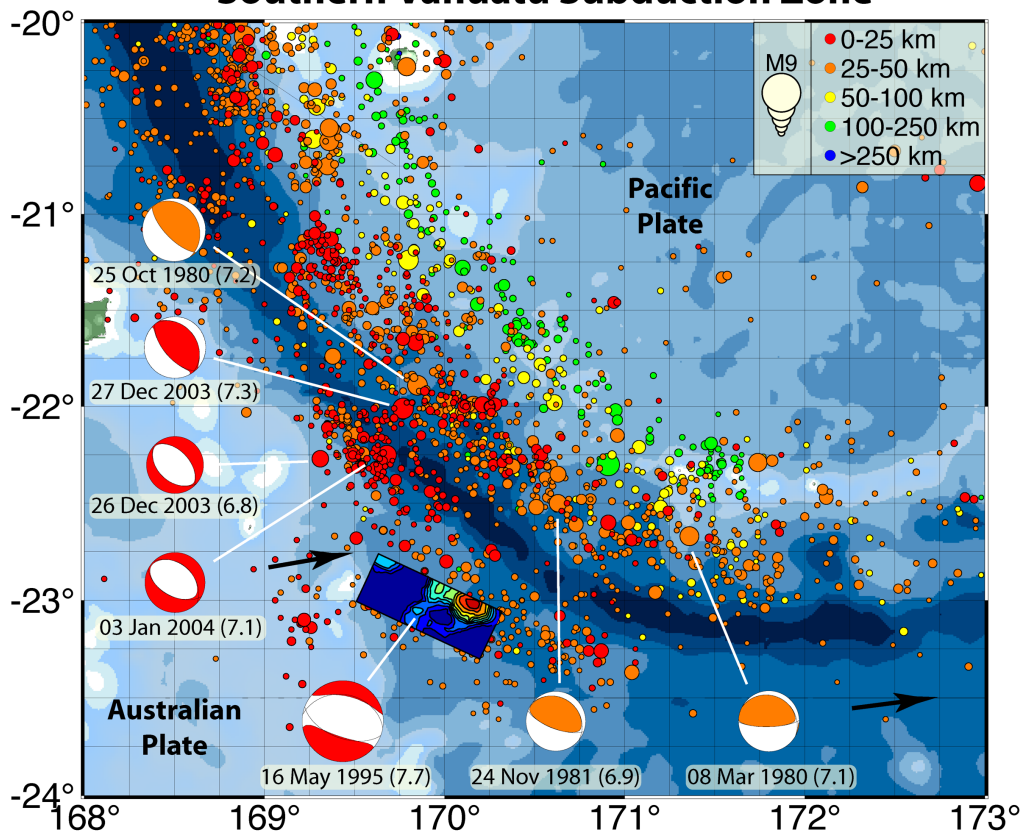




Northern Vanuatu Subduction Zone

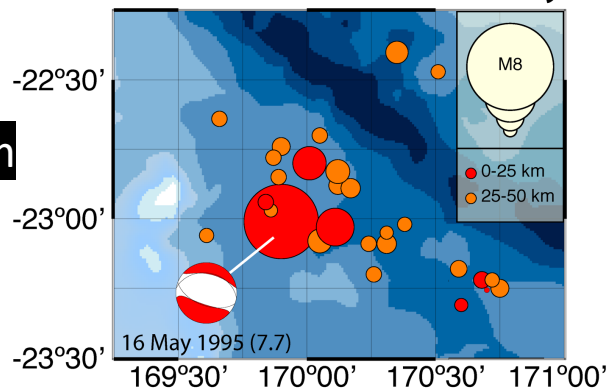


Southern Vanuatu Subduction Zone



1995
7 m
Runup
Aneityum

16 May 1995 (7.7) Two-Week Aftershock Activity



Summary

1. Vanuatu region has hosted M 7.7.-8.0 earthquakes; several large doublets/triplets (1965, 1980, 2009)
2. The seismic activity level is high, and includes modest numbers of intermediate and deep earthquakes
3. The slab appears to be segmented, and large fracture zone disrupts seismicity, but the arc is very straight with fishhooks at north and south
4. Unclear whether any region has characteristic rupture, does seem that multiple asperities are involved
5. Large outer rise faulting has occurred.