

Tsunami source mechanisms in the Philippine archipelago

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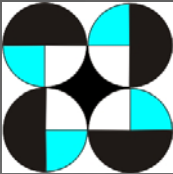
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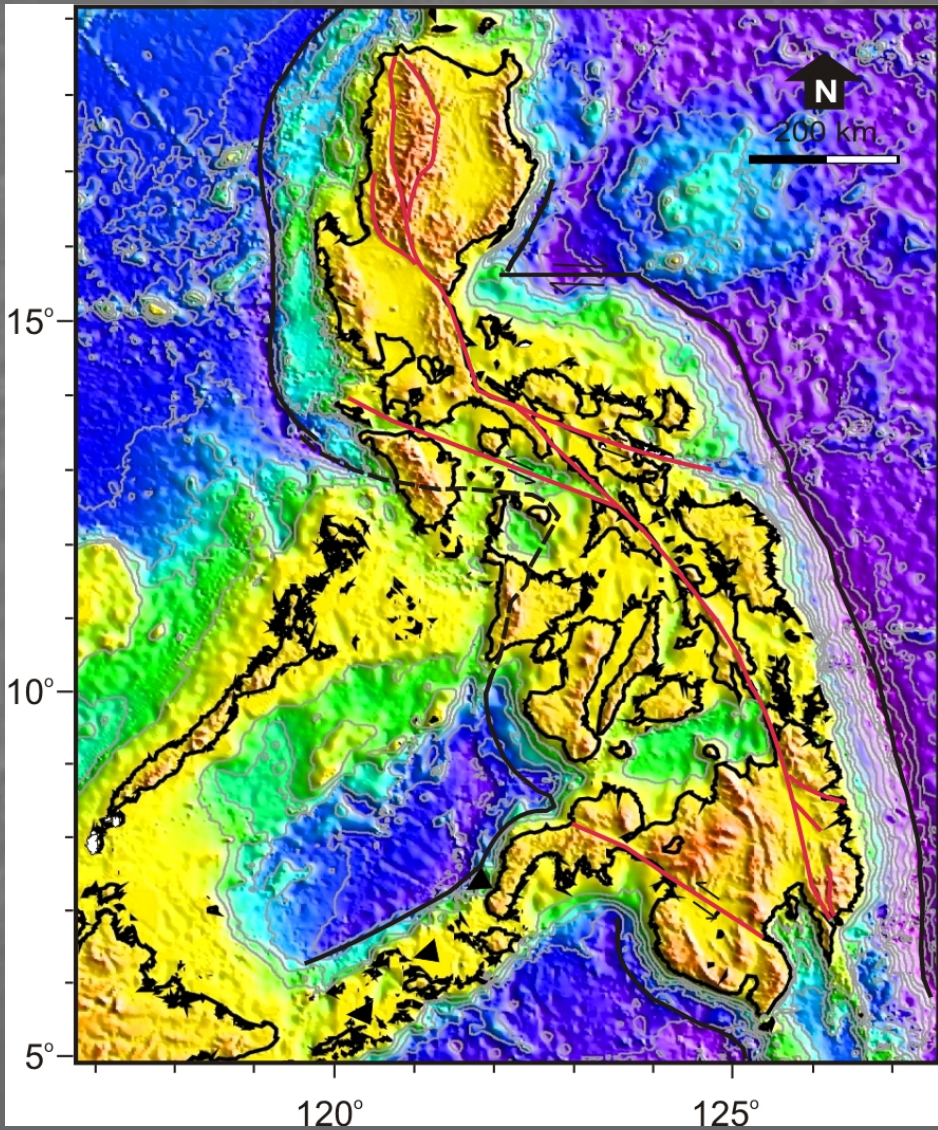
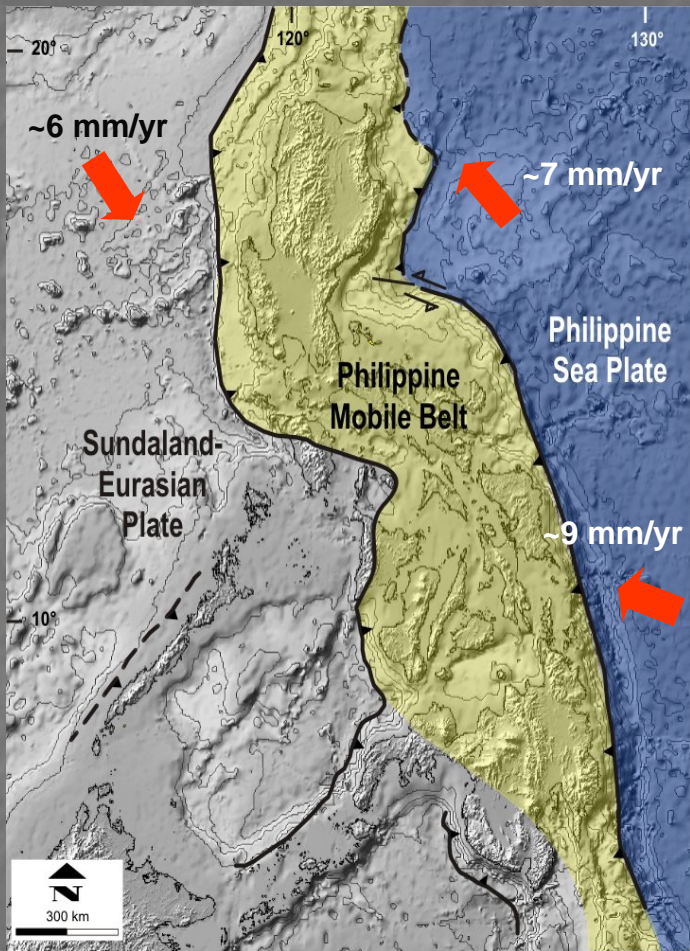
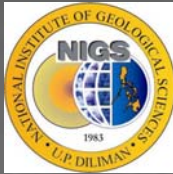
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City, Philippines

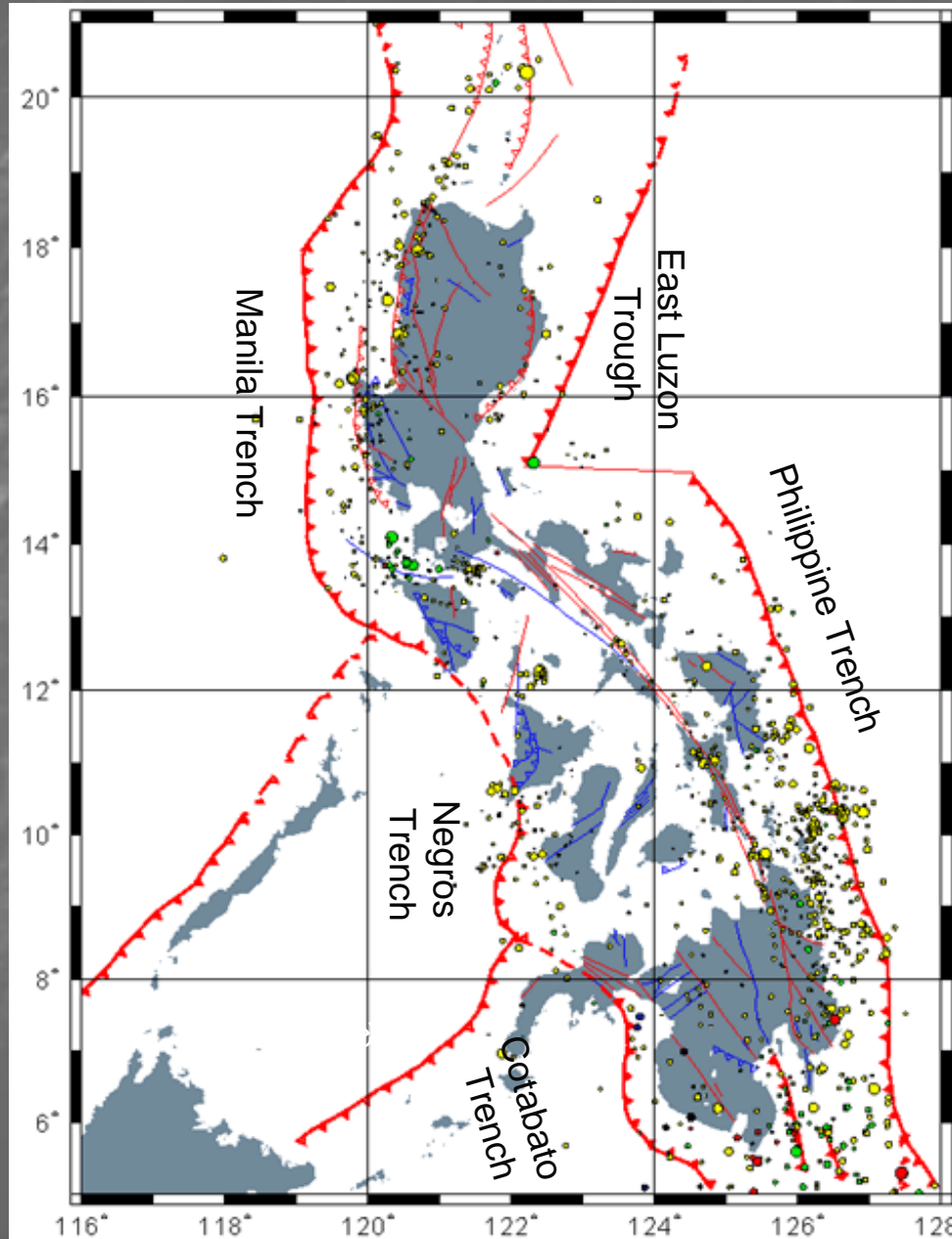
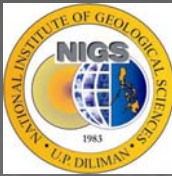


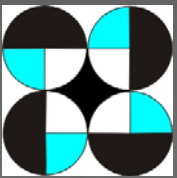


Tectonic setting

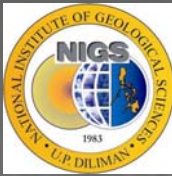


Earthquake generators

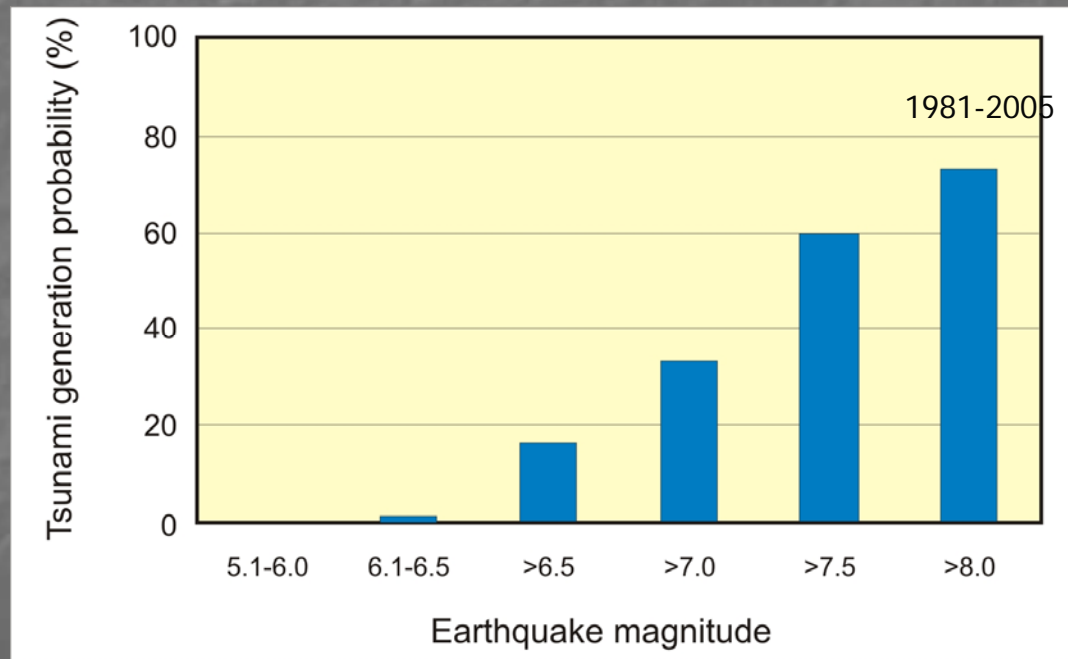


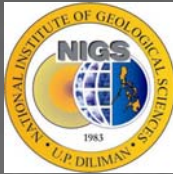
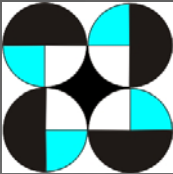


Tsunamigenic earthquakes

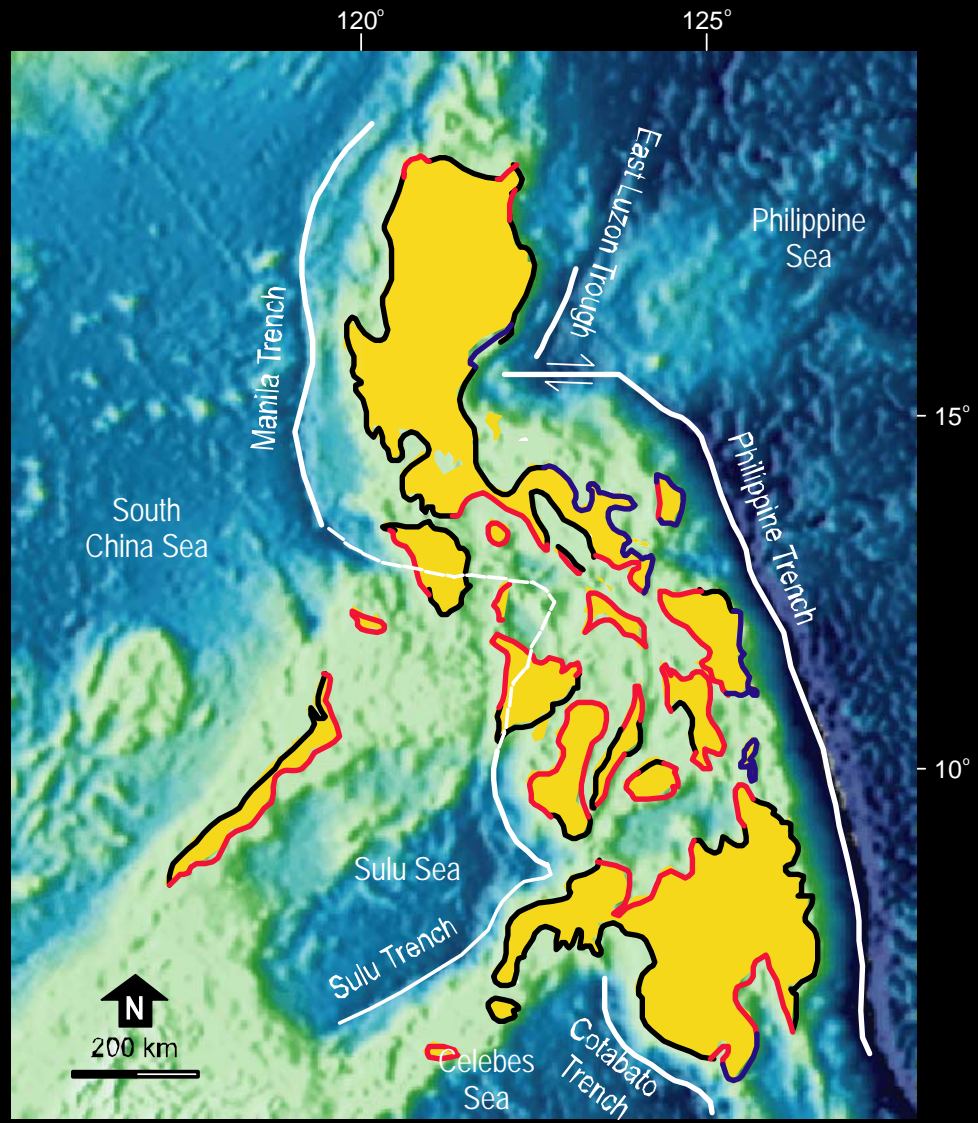




- generated by shallow earthquakes
- large tsunamis likely to be generated by earthquakes with magnitude ≥ 7.0



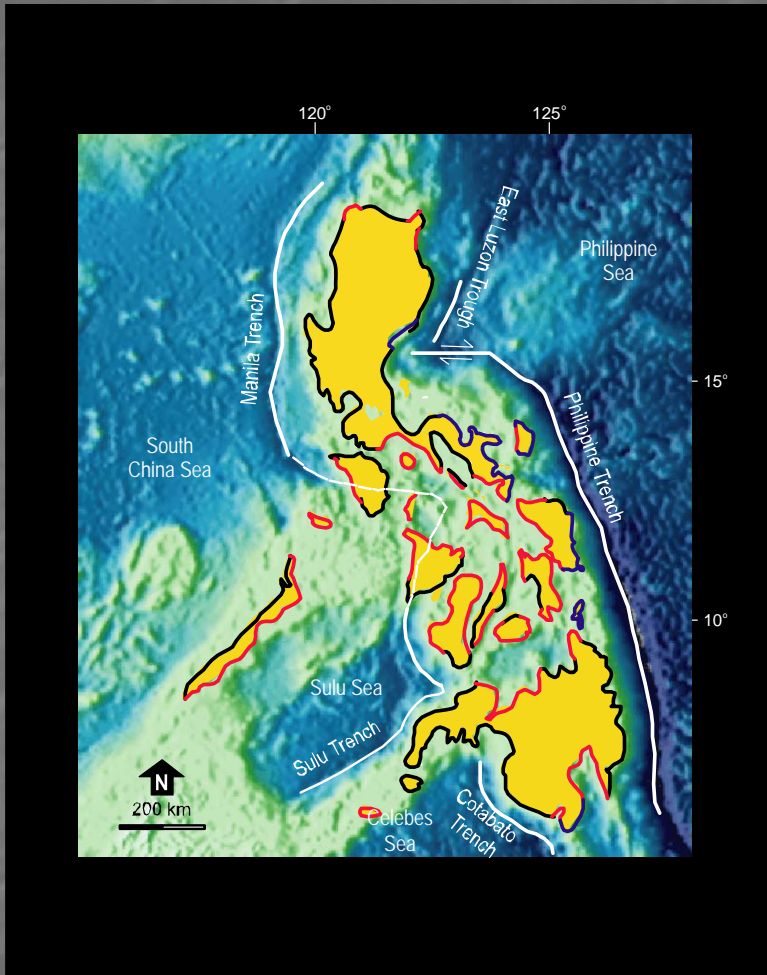
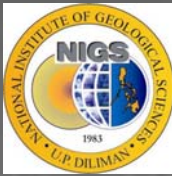


Tsunami Vulnerability Map



-  Historical Tsunami
-  Local Generators
-  Local and Foreign Generators

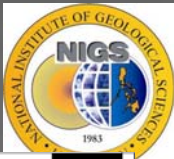




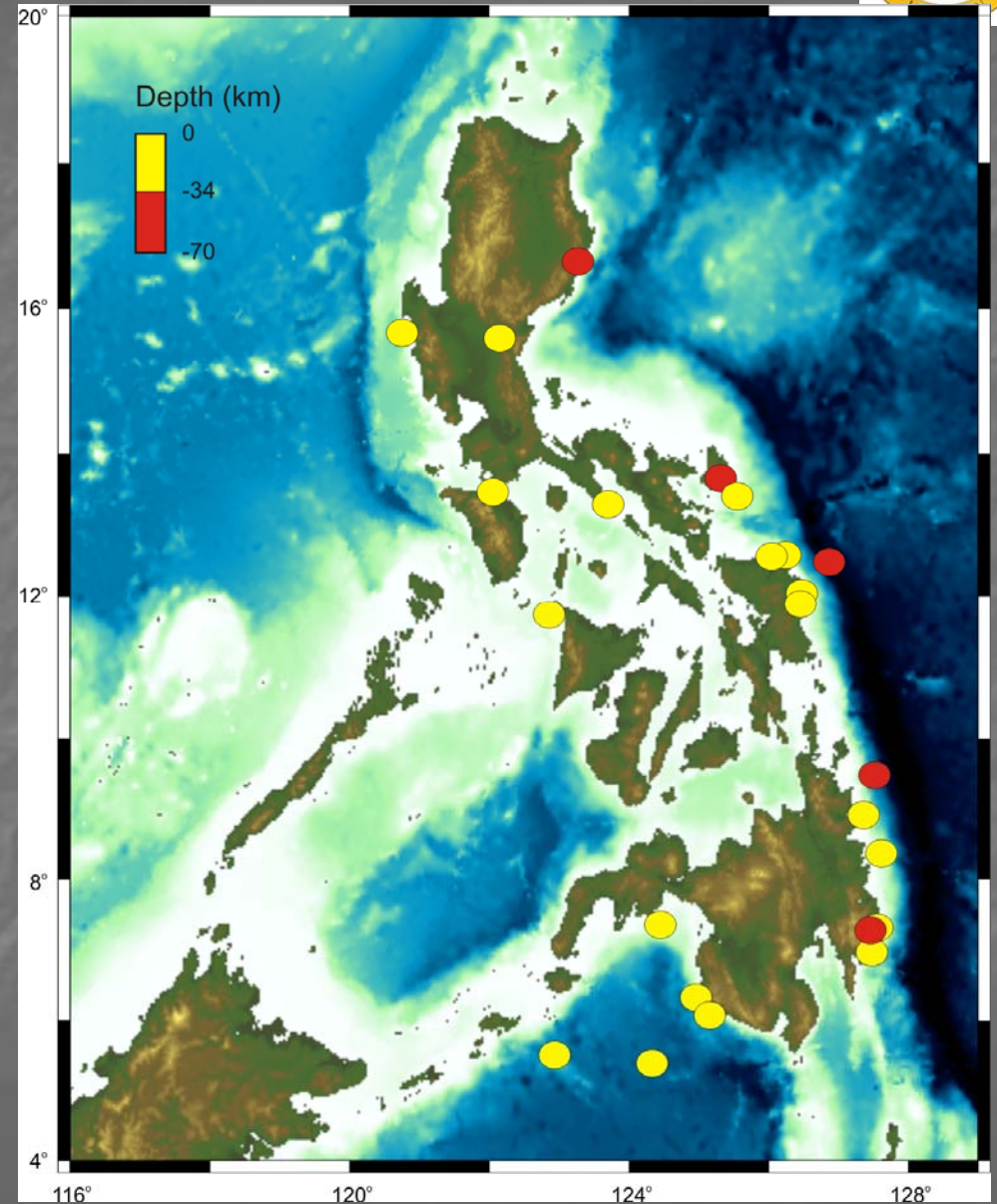
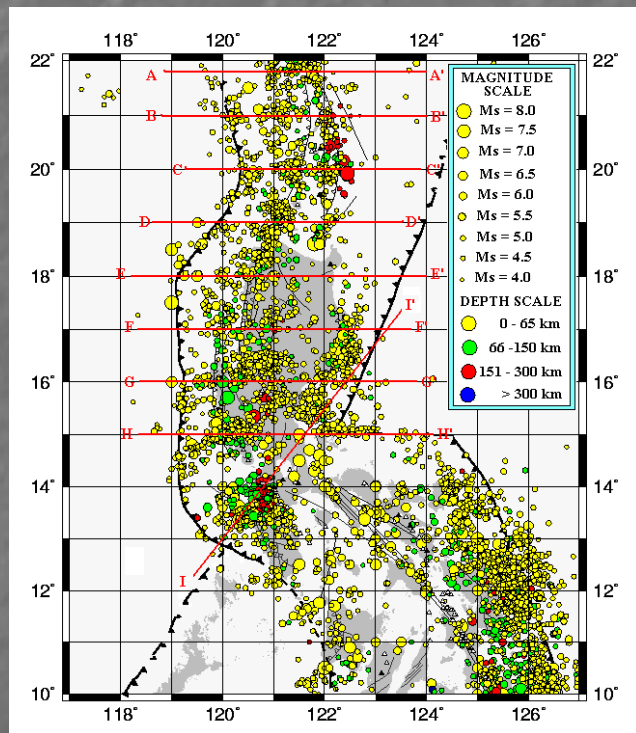
HIGHER VULNERABILITY

- ✓ lack of knowledge
- ✓ high population density
- ✓ improper land use
- ✓ fatalistic attitude





Earthquakes ($M \geq 7.0$)

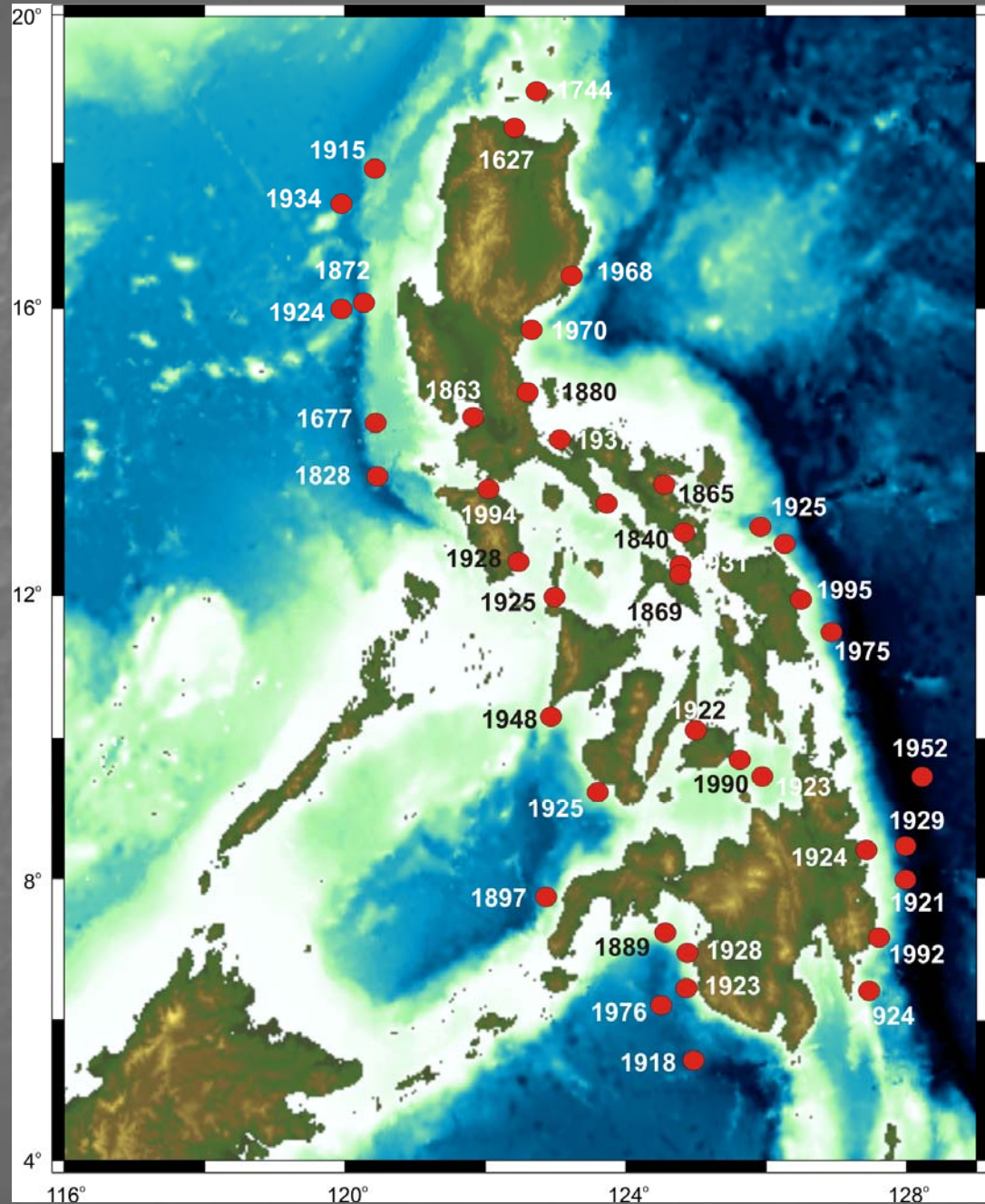
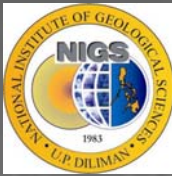


<http://neic.usgs.gov/neis/epic/epic.html>





Tsunamigenic earthquake events

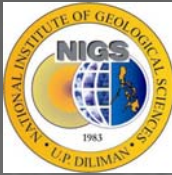


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1976 Moro Gulf Earthquake



- ✓ Magnitude: 7.9
- ✓ Cotabato Trench
- ✓ ~6 m tsunami, peak velocity: 720 km/hr
- ✓ Tsunami affected 700 km of the coastline bordering the gulf (Pagadian City, Cotabato City and Zamboanga City)

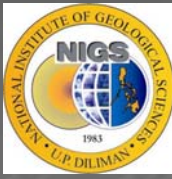
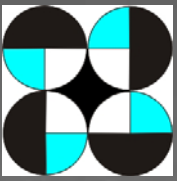
QuickTime?and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

Area north of Zamboanga

QuickTime?and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

Bongo Island





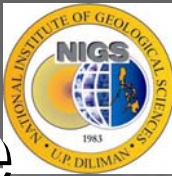
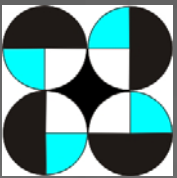
1990 Bohol Earthquake

- ✓ Magnitude: 6.8
- ✓ Offshore thrust fault, east of Bohol Island
- ✓ 0.2-2 m tsunami
- ✓ affected the municipalities of Jagna, Duero, Guindulman, Garcia Hernandez, Valencia as well as Camiguin Island



(Besana et al., 2004)





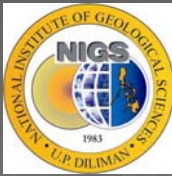
1992 Eastern Mindanao Earthquake



- ✓ Magnitude: 6.8
- ✓ Philippine Trench
- ✓ Several cm up to ~6 m
- ✓ Affected the eastern coastlines

(Besana et al., 2004)

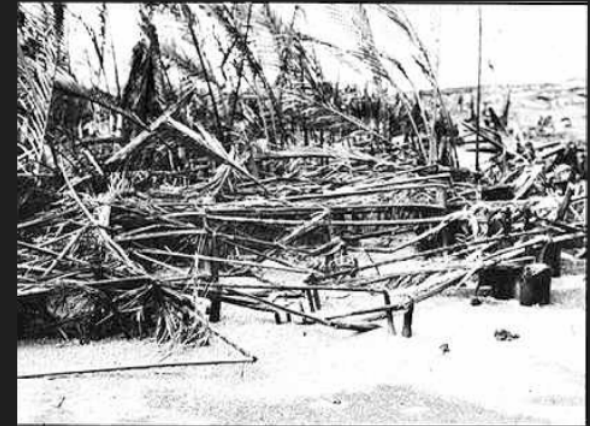




1994 Mindoro Earthquake

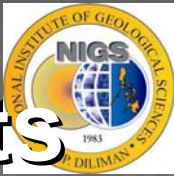


- ✓ Magnitude: 7.1
- ✓ Aglubang River Fault (dextral)
- ✓ Vertical run-up: 0.5-8.5 m; Horizontal run-up: 4-250 m
- ✓ Tsunami affected 40 km of the northern and eastern shoreline of Mindoro (Puerto Galera to Pinamalayan) plus the Verde and Baco Islands



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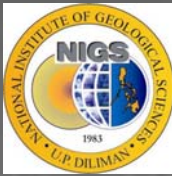




Tsunamigenic earthquake events

Date	Affected Areas	Magnitude
November 9, 1828	Manila Bay	6.6
June 3, 1863	Manila Bay	6.5
August 15, 1918	Southern Mindanao	8.0
November 11, 1921	Manay, Davao Oriental	7.5
April 14, 1924	Mati, Davao Oriental	8.3
August 1, 1968	Casiguran Bay	7.3
April 7, 1970	Baler, Aurora	7.0
October 31, 1975	Borongan, Eastern Samar	7.2
July 16, 1990	Luzon	7.8

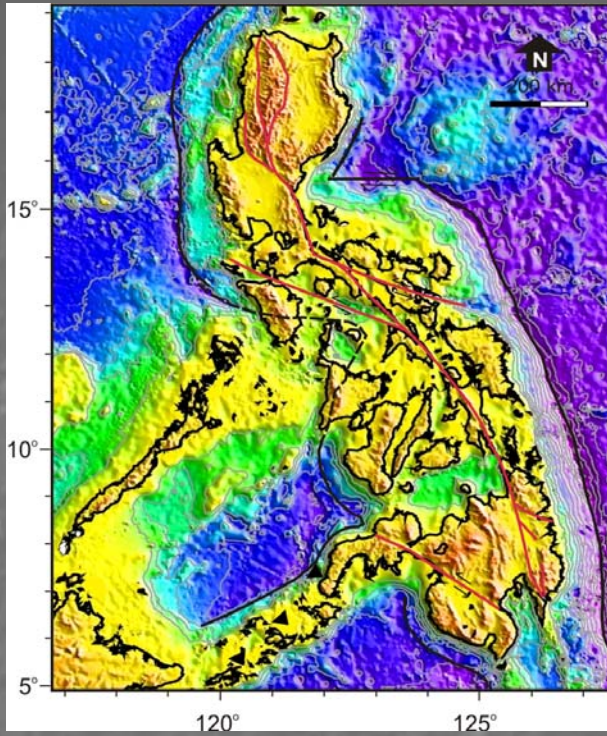
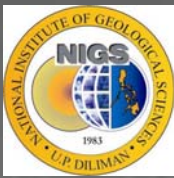
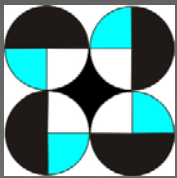




Summary

- ✓ Tsunamis in the Philippines were generated by
 - Trench systems surrounding the archipelago
 - Faults





Thank you!

