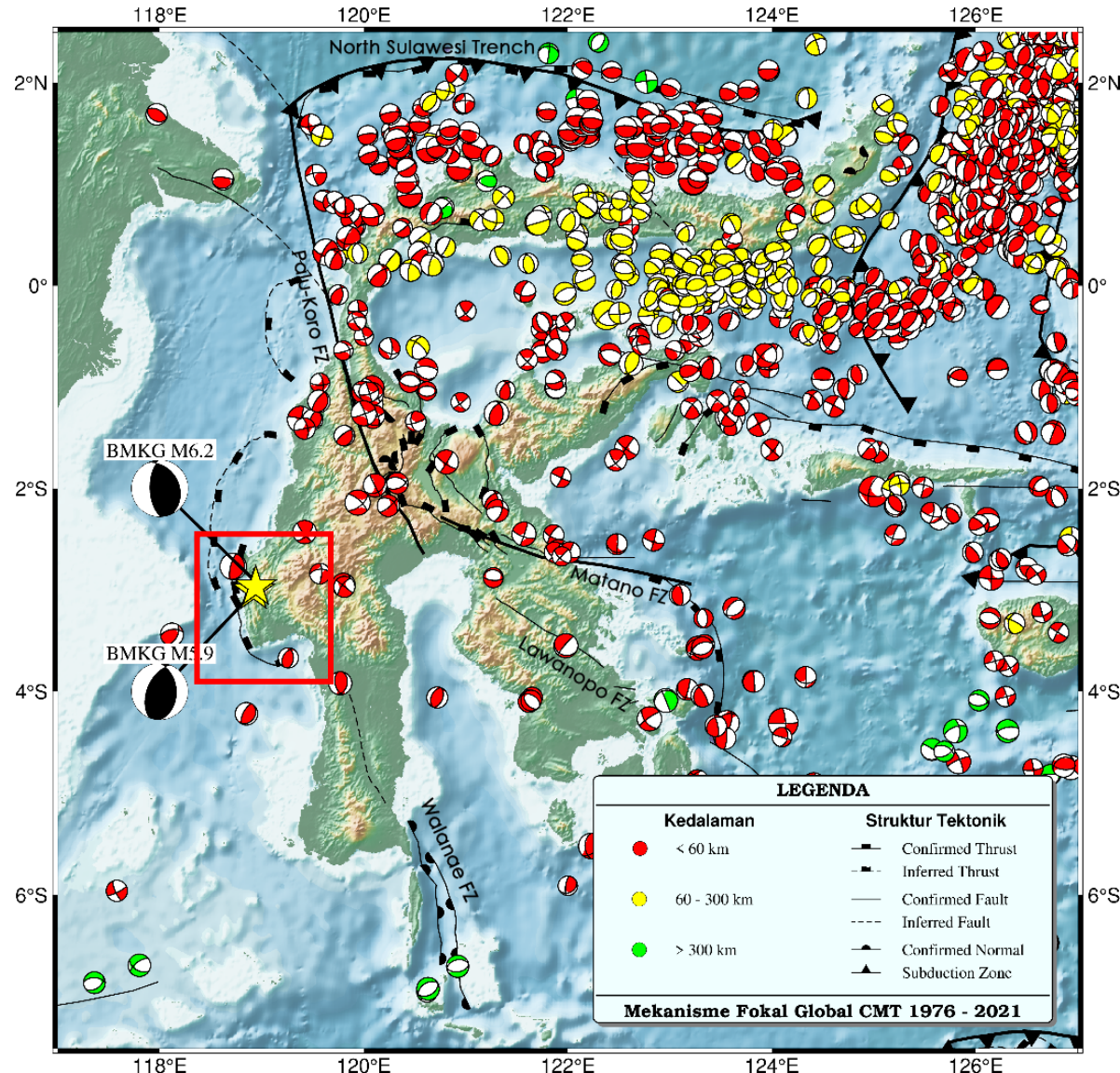


Characteristic of Source and Seismic Hazard Analysis of Majene-Mamuju Earthquake Mw 6.2, January 15, 2021

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Background



- There was a tectonic earthquake magnitude Mw 6.2 on Friday, January 15, 2021, at 02:28:21 Local time. The earthquake's hypocenter was at 21 km, and the epicenter location at 2.27S and 118.94E on land 6 km northeast of Majene, West Sulawesi Province.
- Based on the BMKG, this earthquake is a series of earthquakes consisting of several foreshocks, the mainshock, and aftershocks.
- Tectonically setting show the island of Sulawesi (K-shape) is controlled by complex tectonic activity and is located at the boundary of the Eurasian plate, Australia Plate, Pacific plate - the Philippines microplate.

➤ Purpose

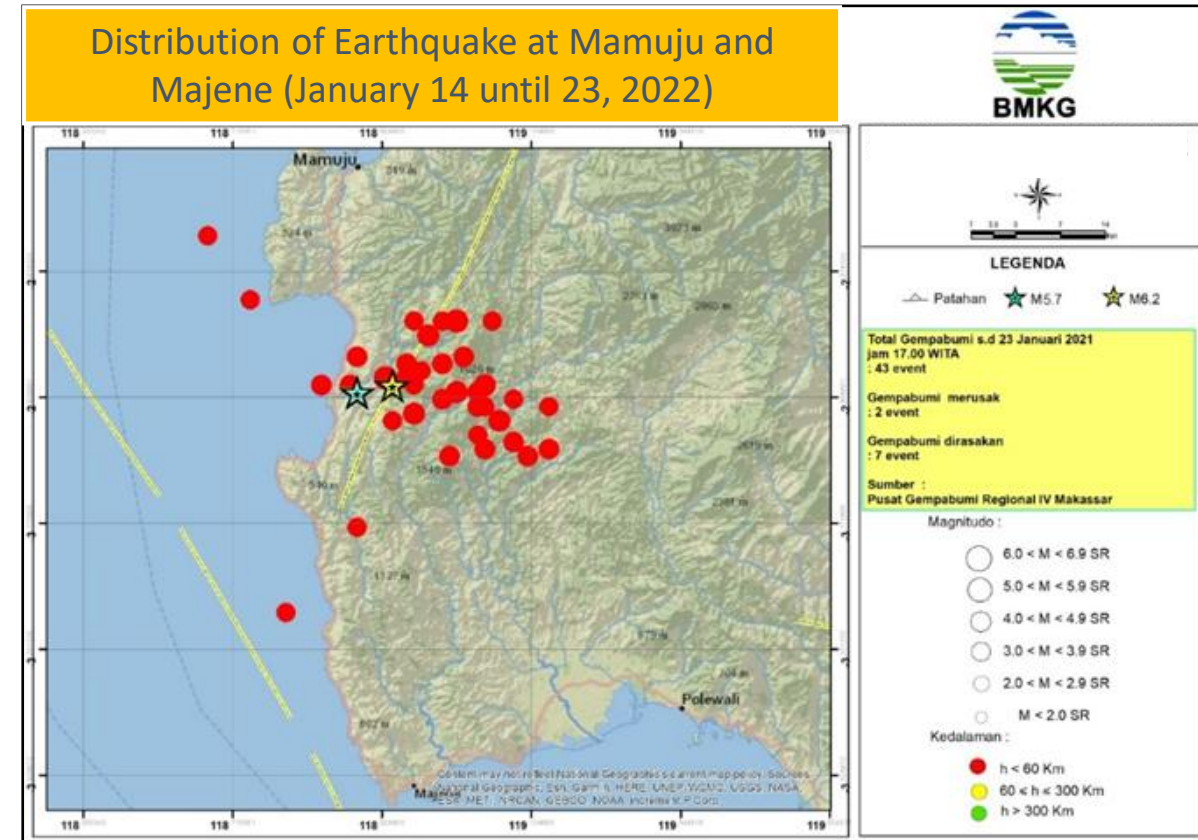
- The purpose of this study is to analyze the source characterization and also seismic hazard analysis of the 2021 (Mw 6.2) Mamuju–Majene earthquake

➤ Data

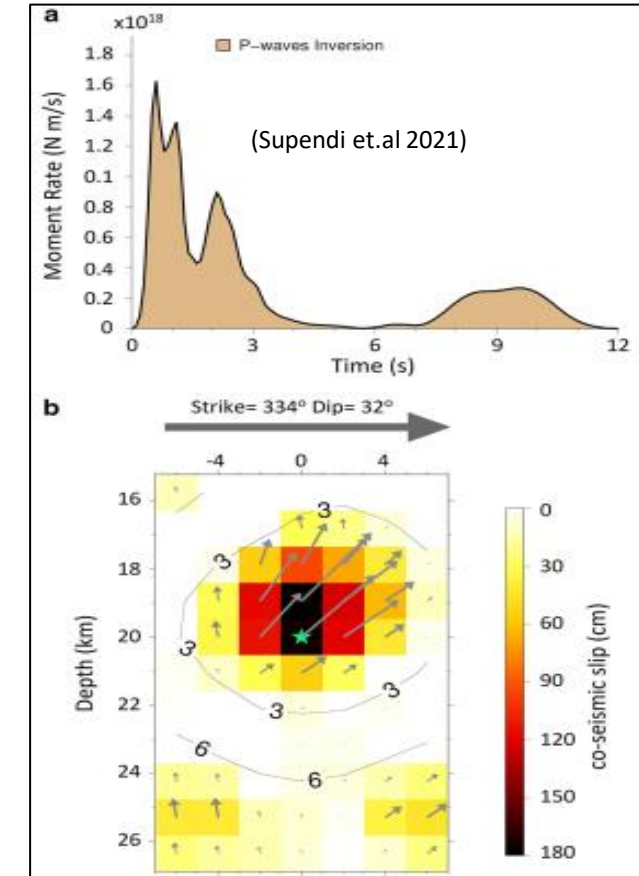
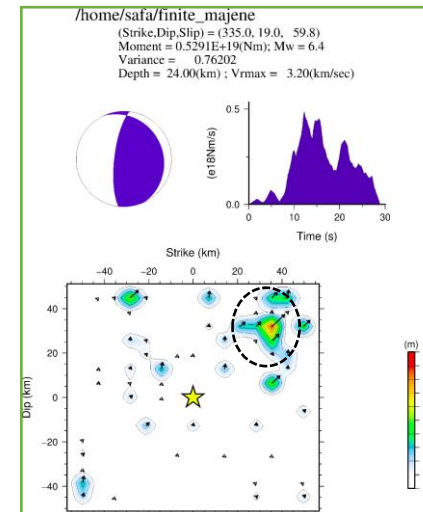
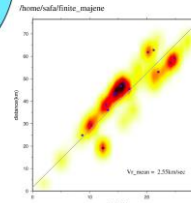
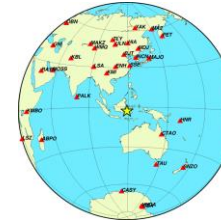
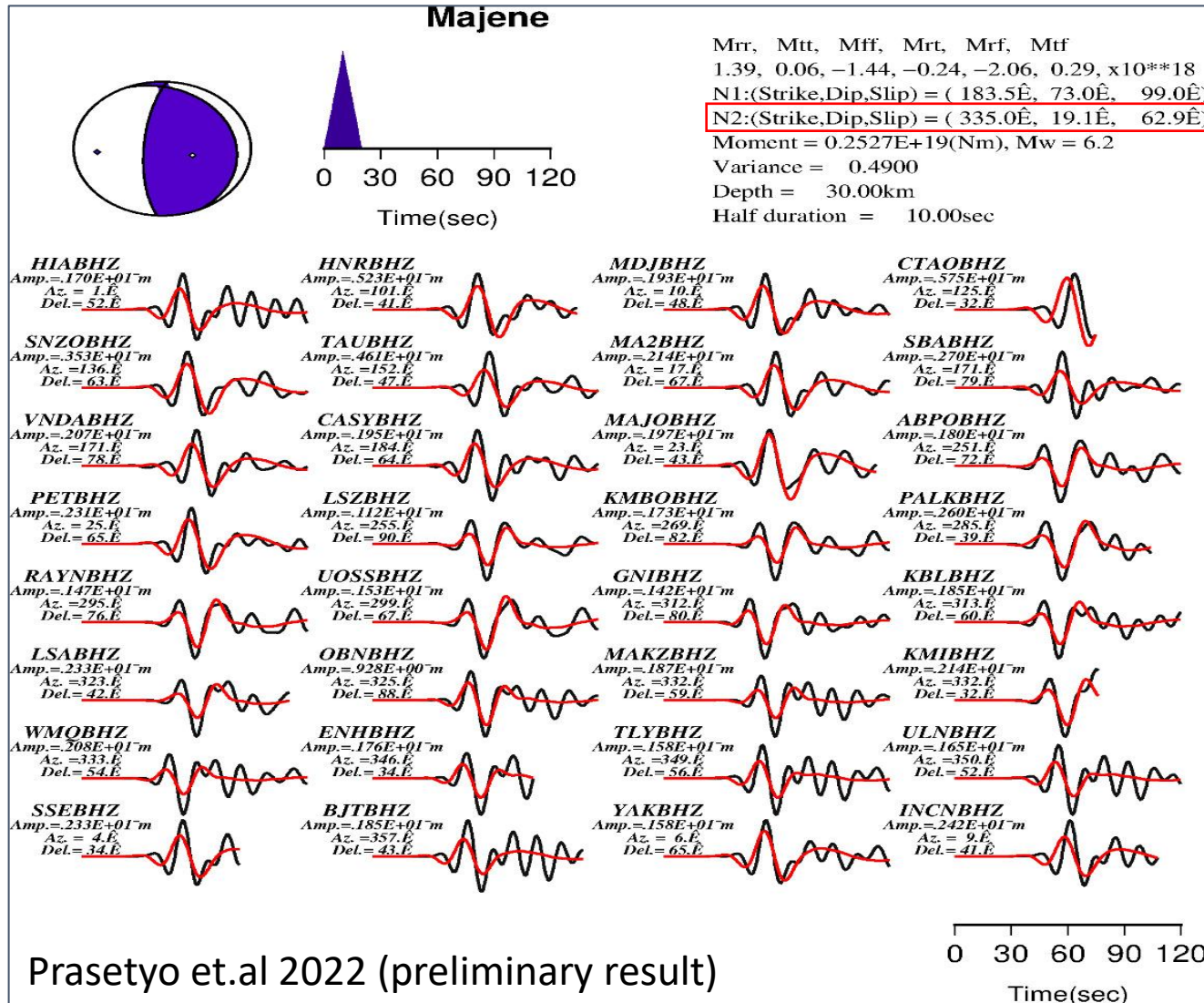
- Earthquake catalog (BMKG), Waveform (IRIS), historic moment tensor (GlobalCMT), Field Survey (BMKG)

➤ Method

- Moment tensor inversion, Seismic hazard analysis, and stress drop



Result and Discussion

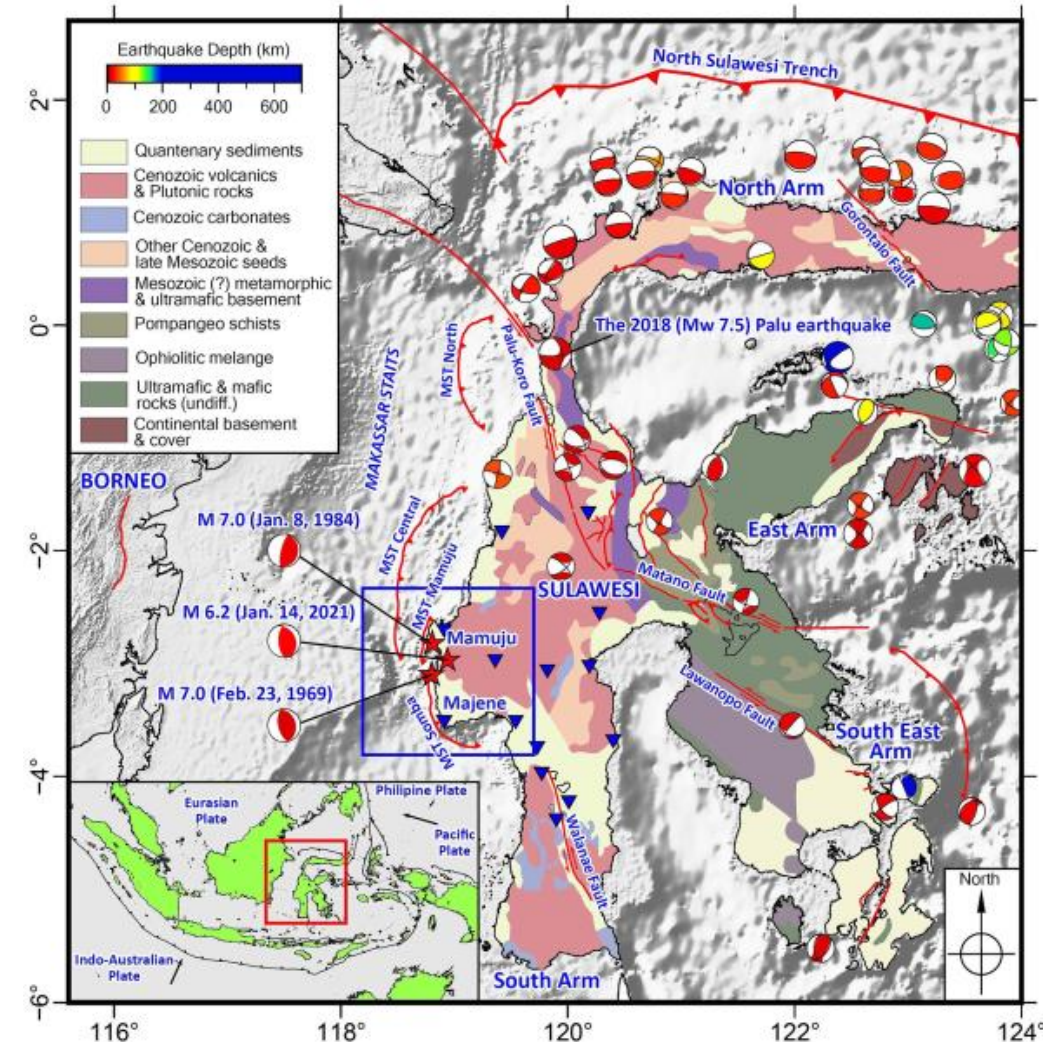


The limited aftershocks caused by this earthquake are likely related to the kinematics of its source, which involves a relatively high moment release over a small source area and with a short duration (Supendi et.al 2021)

Result and Discussion

- Based on historical seismic data, most of the earthquakes which felt significant to have a damaging impact in the West Sulawesi region were caused by the **Mamuju Thrust Fault**.
- On **April 11, 1976**, an earthquake with a magnitude of **6.3** in Polewali Mandar triggered building damage and a tsunami wave, in which 13 people were dead.
- On **February 23, 1969**, an earthquake with a magnitude of 6.9 at a depth of 13 km again caused a tsunami as high as 4 meters that hit the Maliaya Village area, Taan, Tepalang, Malunda. A total of 64 people died and were missing, and 1,287 houses were damaged.
- Then, on **January 8, 1984**, an earthquake with a magnitude of **6.7** on the Richter Scale shake Majene and Mamuju Regencies, causing hundreds of casualties.

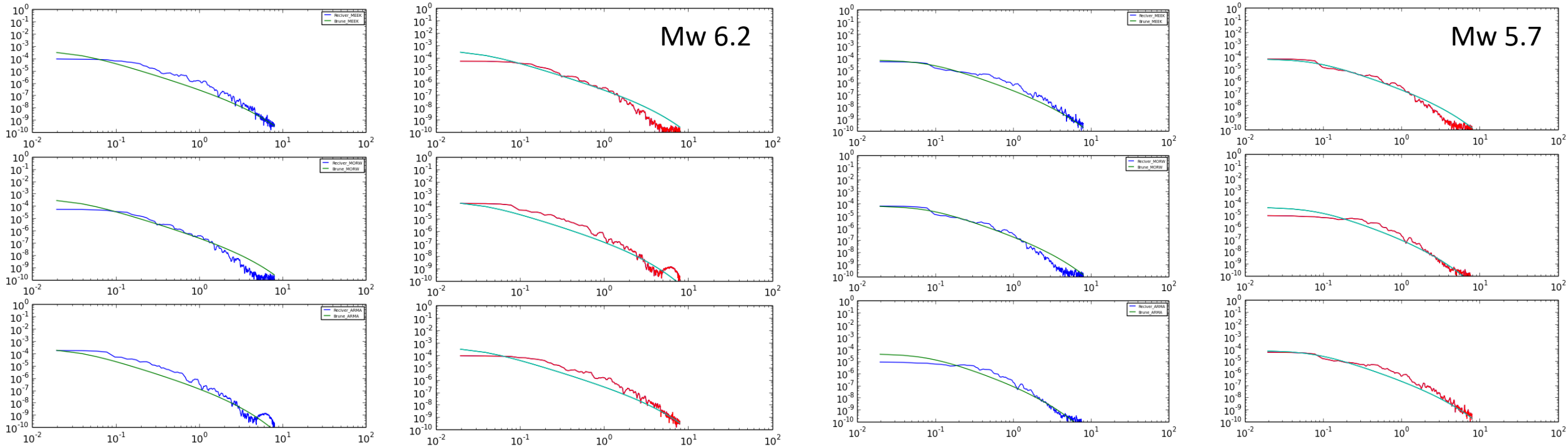
(BMKG Catalog)



(Supendi et.al 2021)

Result and Discussion

Best fitting of receiver signal and Brune Source Signal

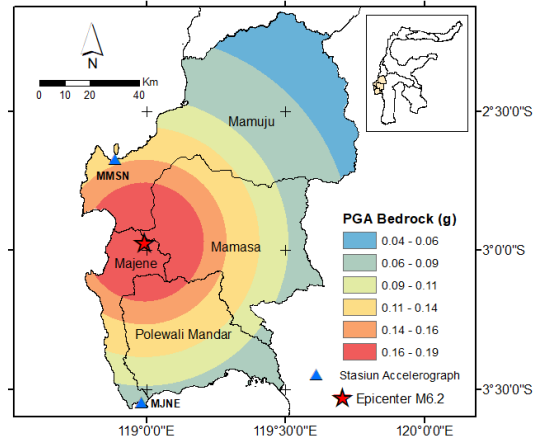


Date	UTC	LAT	LON	H	MAG (Mw)	fc (Hz)	$\Delta\delta$ (Mpa)
14 Jan 2021	18:28:20	2.97 LS	118.94 BT	21	6.2	3.233	26.36
14 Jan 2021	06:35:50	3.01 LS	118.92 BT	12	5.7	7.729	14.29

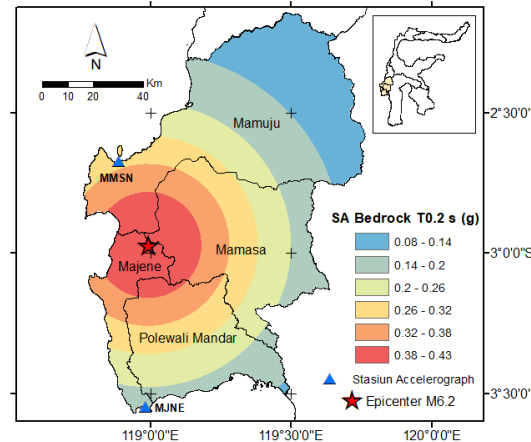
Result and Discussion

PGA Estimation (10% PE 50 yr)

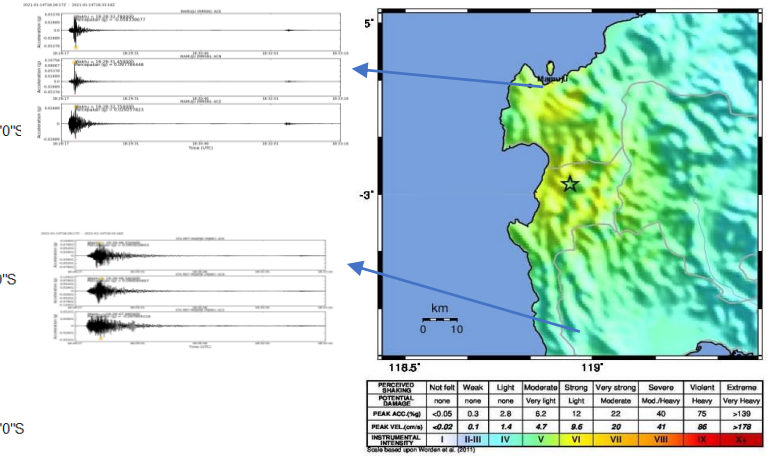
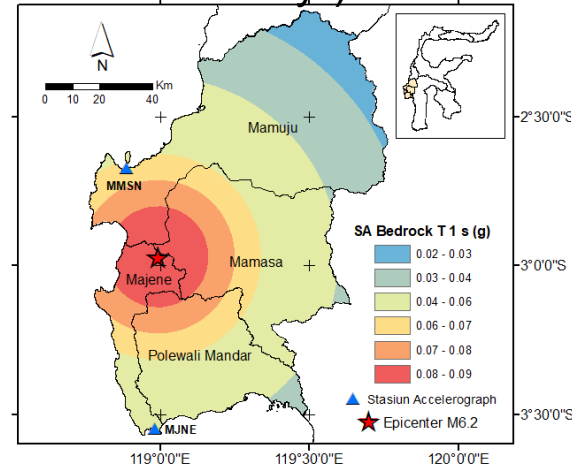
Bedrock



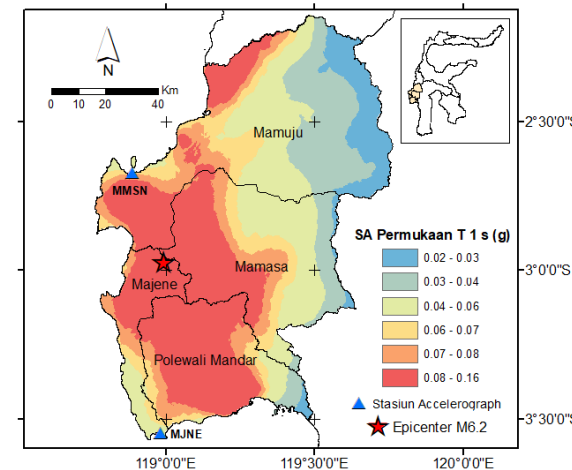
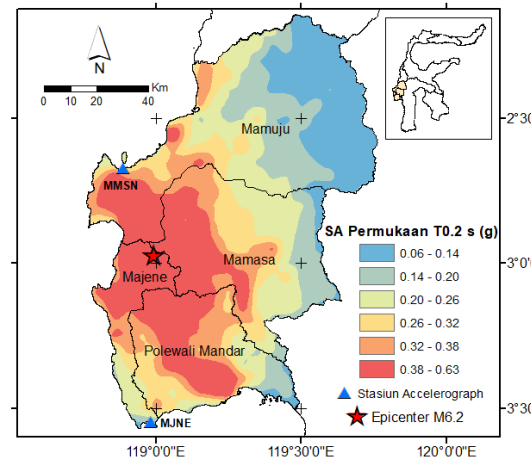
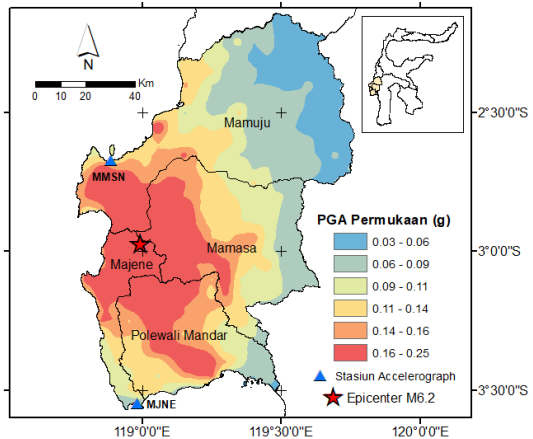
Spectrum Acceleration Estimation T0.2s (10% PE 50 yr)



Spectrum Acceleration Estimation T 1s (10% PE 50 yr)



Surface



The largest PGA value was recorded at the accelerometer Mamuju Meteorological Station (MMSN), with a PGA value of 150.7799 gals.



Conclusion

- Mamuju-Majene Earthquake mainshock January 2021 Mw 6.2 with Strike/Dip/Rake = $335^{\circ}/19^{\circ}/63$ is Thrust Fault and located near Mamuju Thrust Fault
- Seismic Hazard Analysis with Spectrum Acceleration Estimation T 1s (10% PE 50 yr) and Spectrum Acceleration Estimation T 0.2 (10% PE 50 yr) at the surface show a value lower than 1 g.
- From field surveys such as macroseismic in Mamuju, the level of damage to buildings is heavy to light
- The stress drop value from the mainshock EQ Mw 6.2 is 26,36 Mpa and from Foreshock, EQ Mw 5.7 is 14.29 Mpa
- Mamuju-Majene is an area that is prone to destructive earthquakes