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Webinar

Update Sesar Aktif Daerah Istimewa Yogyakarta Monitoring GNSS Sesar Opak

Nurrohmat Widjajanti & Cecep Pratama

Struktur Presentasi

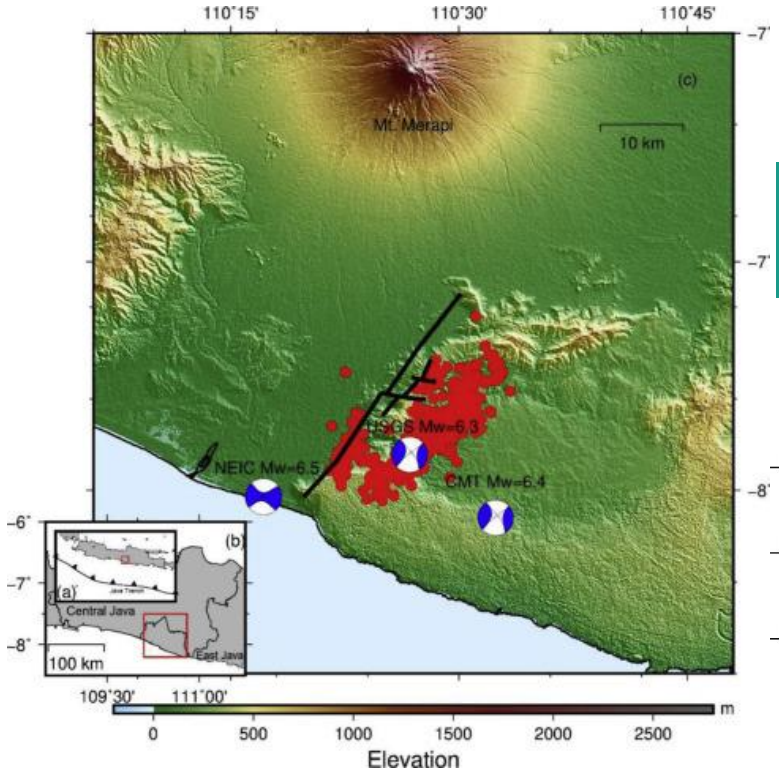
1. Studi Sesar Aktif Berdasarkan Data Pengamatan Geodetik

2. Data Geodetik
Utilisasi Data Geodetik

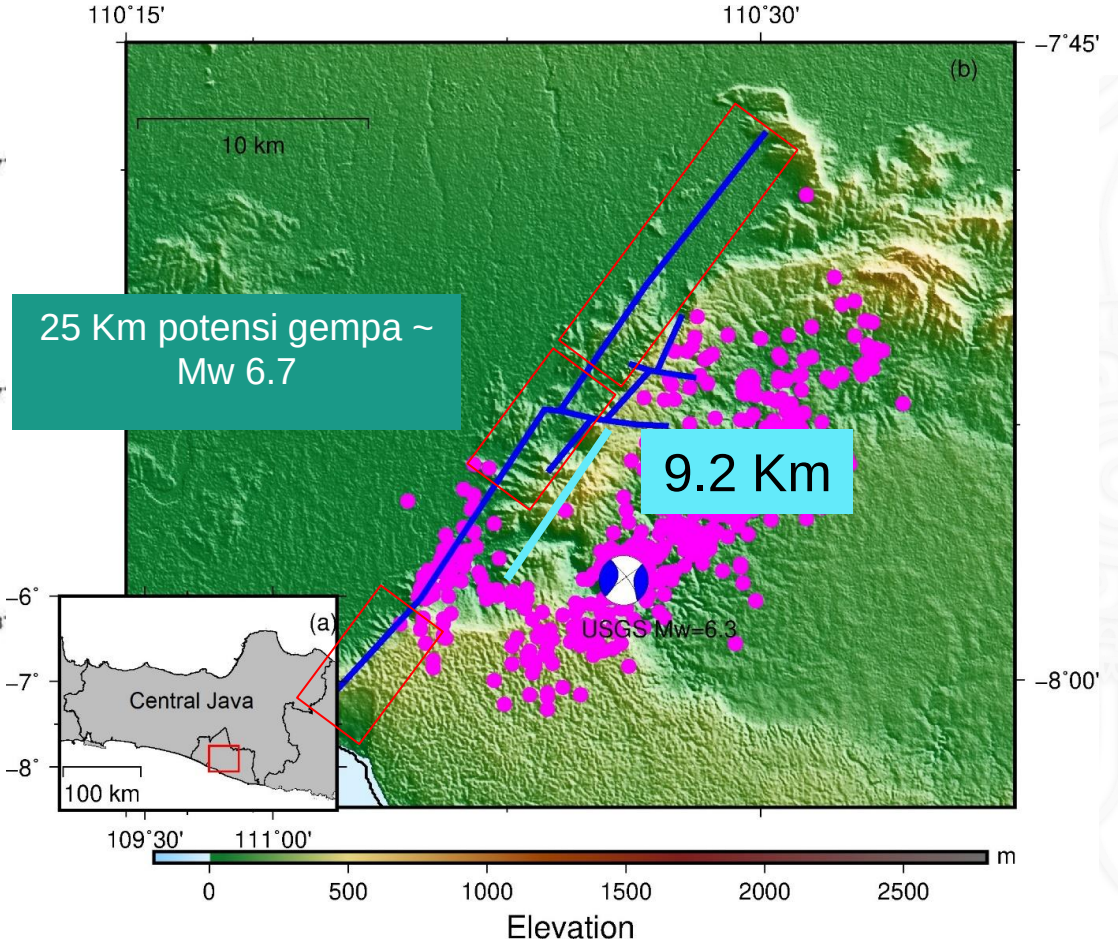
3. Model dan Metode
Model dan Metode dalam Pembangunan Model Deformasi

4. Hasil Studi dan Pembahasan
Perbandingan Antara Pengamatan dan Model deformasi

Pendahuluan



Widjajanti et al. (2020)

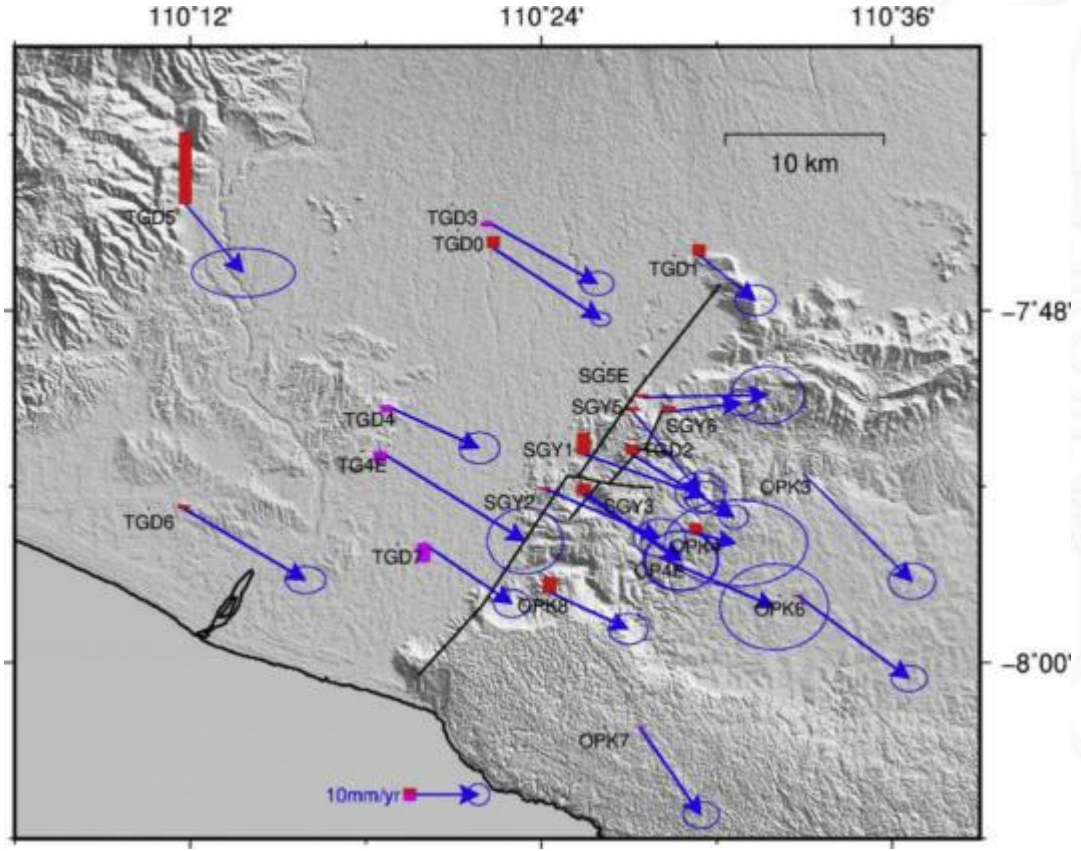


Pratama et al. (2019)

Data: Opak Fault Zone GNSS Network

Our Lab. (Geometrical and Physical Geodesy, Department of Geodetic Engineering, UGM) conduct campaign observation between 2013 to 2018

Velocity field relative to ITRF2008



Widjajanti et al. (2020)

Method: Deformation

Geodetic Deformation Model

1. **Interseismic**

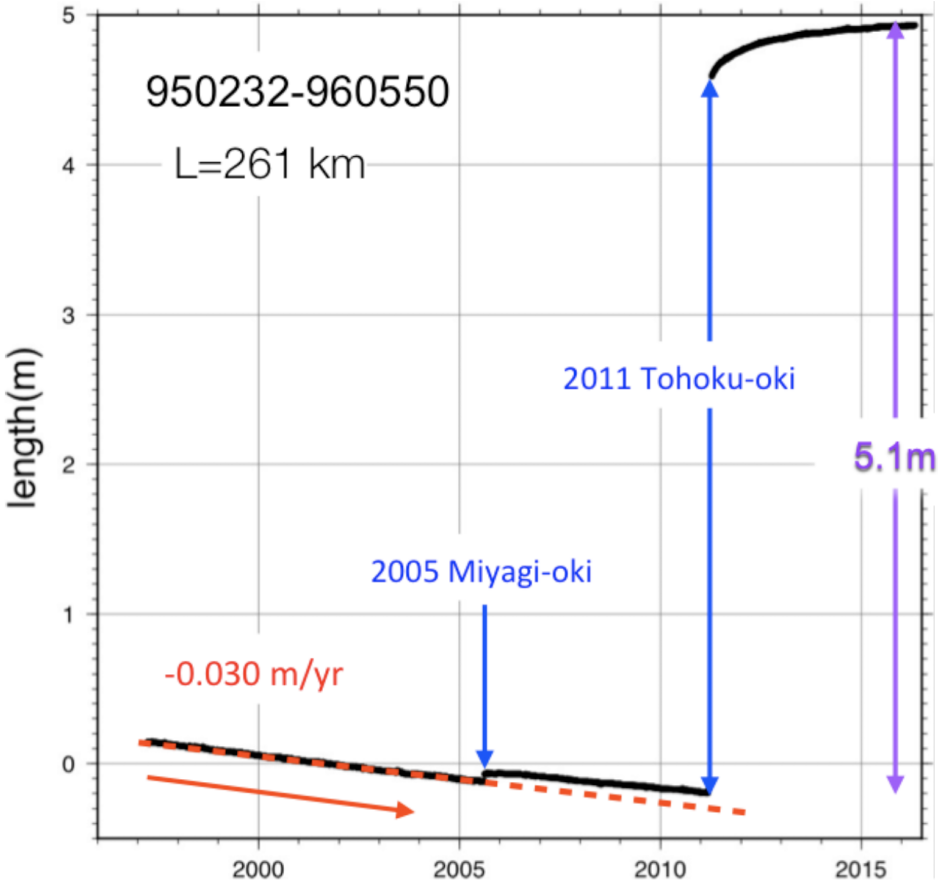
Strain Rate, Slip Rate, Locking Depth, Plate Coupling etc.

2. **Coseismic**

Slip Distribution, Dynamic Rupture, Source Mechanism, etc.

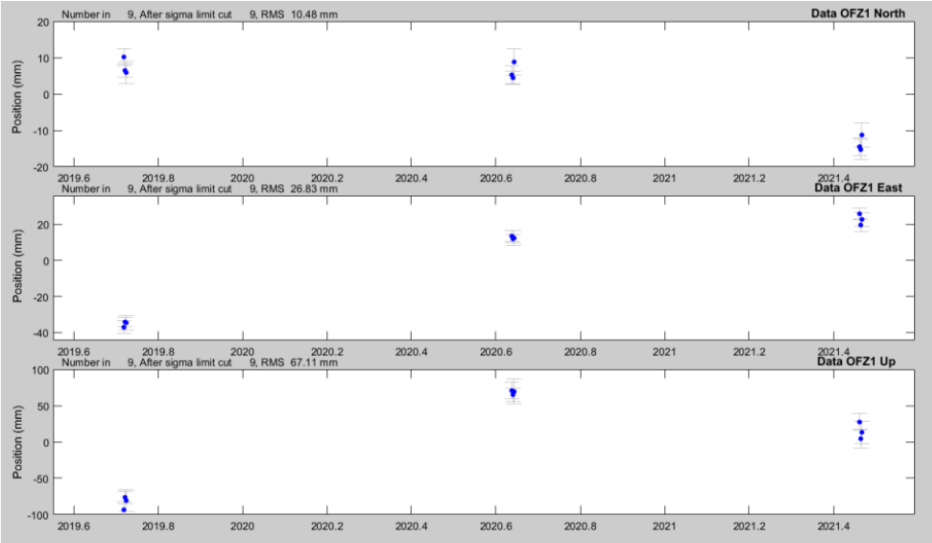
3. **Postseismic**

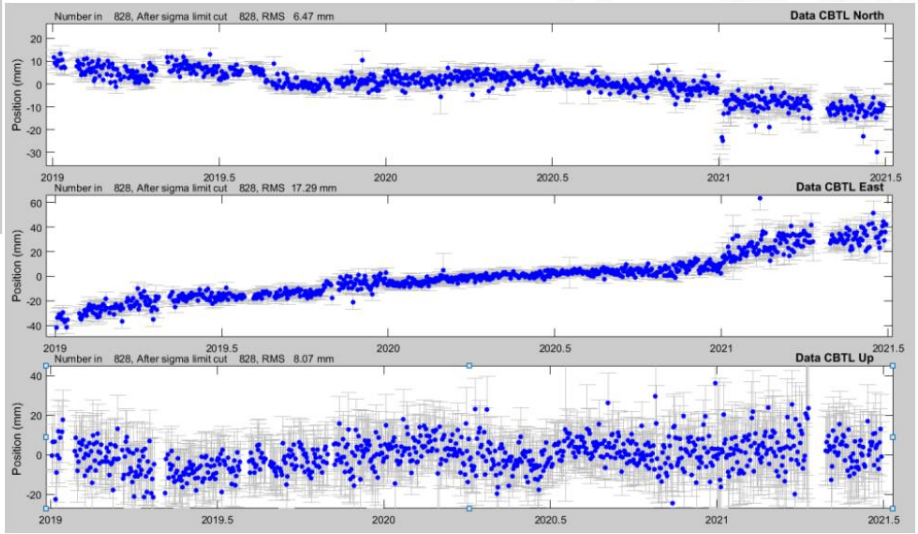
Aseismic Slip, Afterslip, Viscoelastic Relaxation, etc.



Meneses and Sagiya (2016)

Method: GNSS Time Series





Method: Secular Motion Extraction

To estimate the secular motion of each GPS sites, we decompose the GPS time series based on multiple signals which assumed by a combination of several mathematical expression

$$u(t_i) = I(t_i) + S(t_i) + C(t_i) + P(t_i)$$

Each of I, S, C and P is mathematically defined as follows:

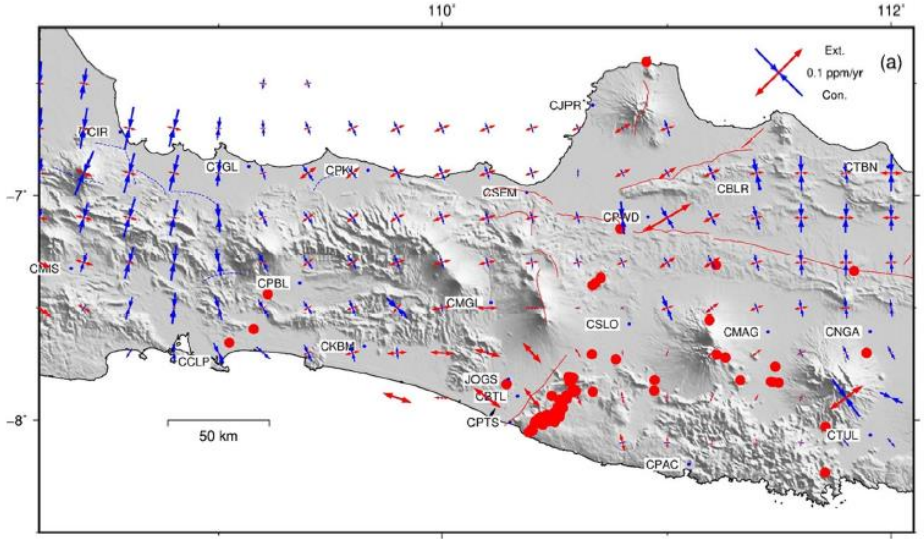
$$I(t_i) = (vt_i + b)$$

$$S(t_i) = \mathrm{c}\,\sin(2\pi t_i) + d\,\cos(2\pi t_i) + e\,\sin(4\pi t_i) + f\,\cos(4\pi t_i)$$

$$P(t_i) = \sum_{j=1}^{J} h_i \ln\left(1 + \frac{t_i - t_{eq_j}}{\tau_j}\right) H\left(t_i - t_{eq_j}\right)$$

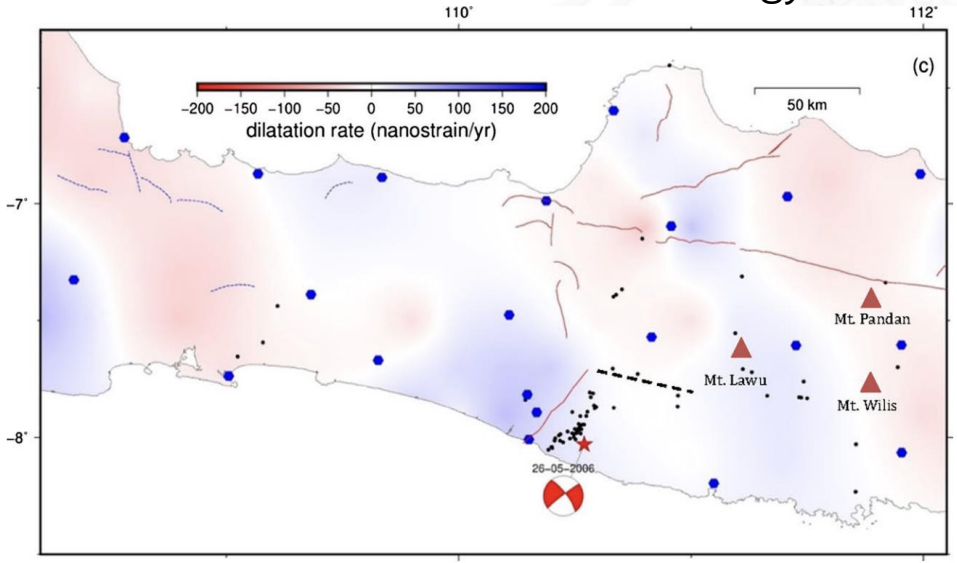
$$C(t_i) = \sum_{j=1}^{J} g\, H\left(t_i - t_{eq_j}\right)$$

Result: Geodetic Strain Rate



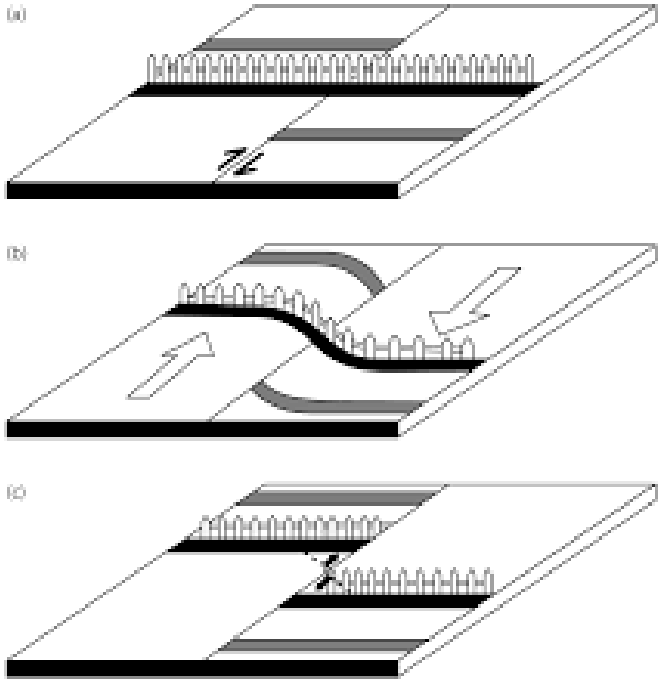
Principal strain rate with shallow earthquake seismicity

Short wavelength of GNSS-derived dilatation rate suggesting extensional zone in Yogyakarta

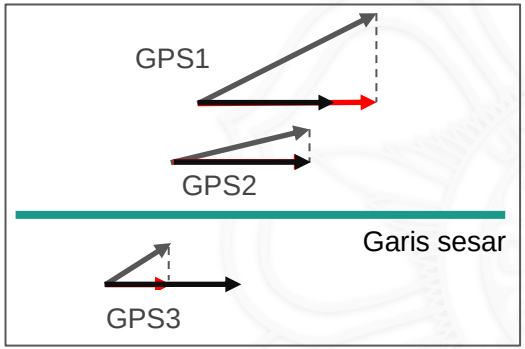


Pratama et al. (2022)

Method: Elastic Dislocation Model



Original motion



Relative motion

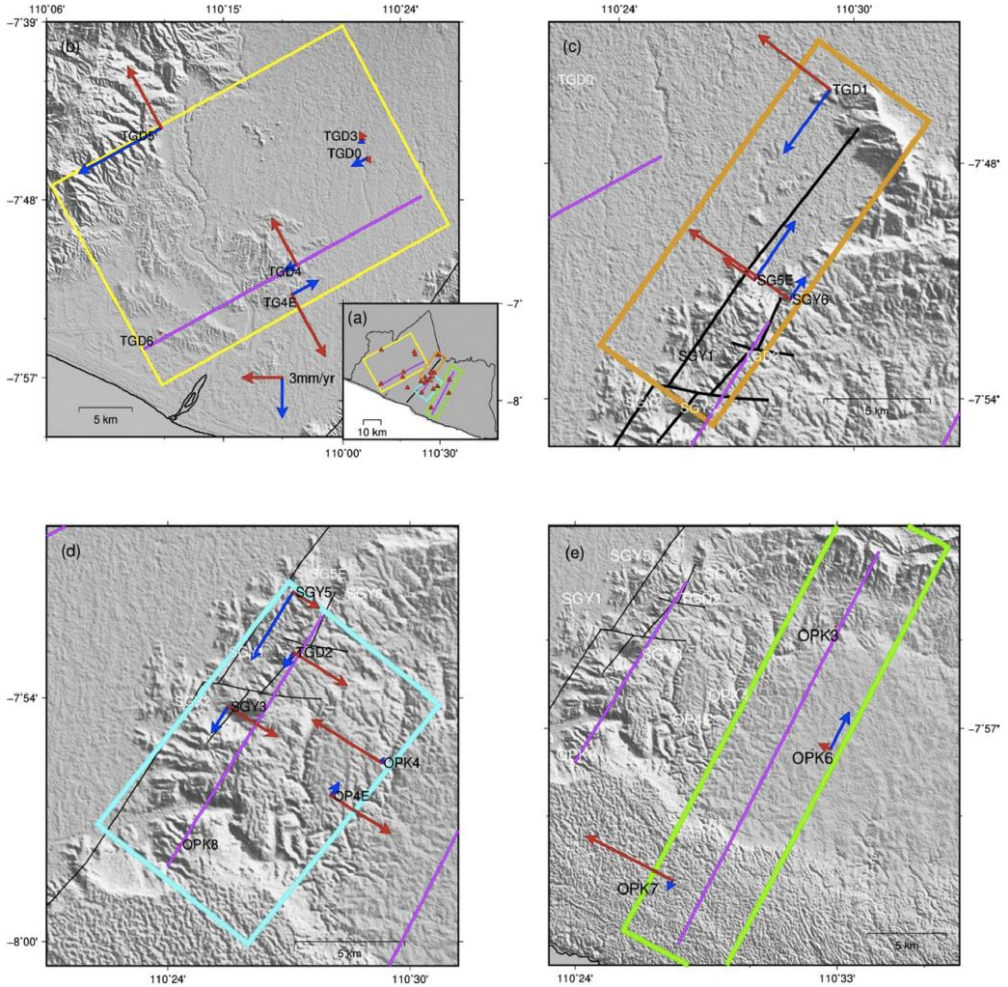
e.g. Reid (1910), Chinnery (1961), Segall (2010)

Result: Yogyakarta Velocity Field

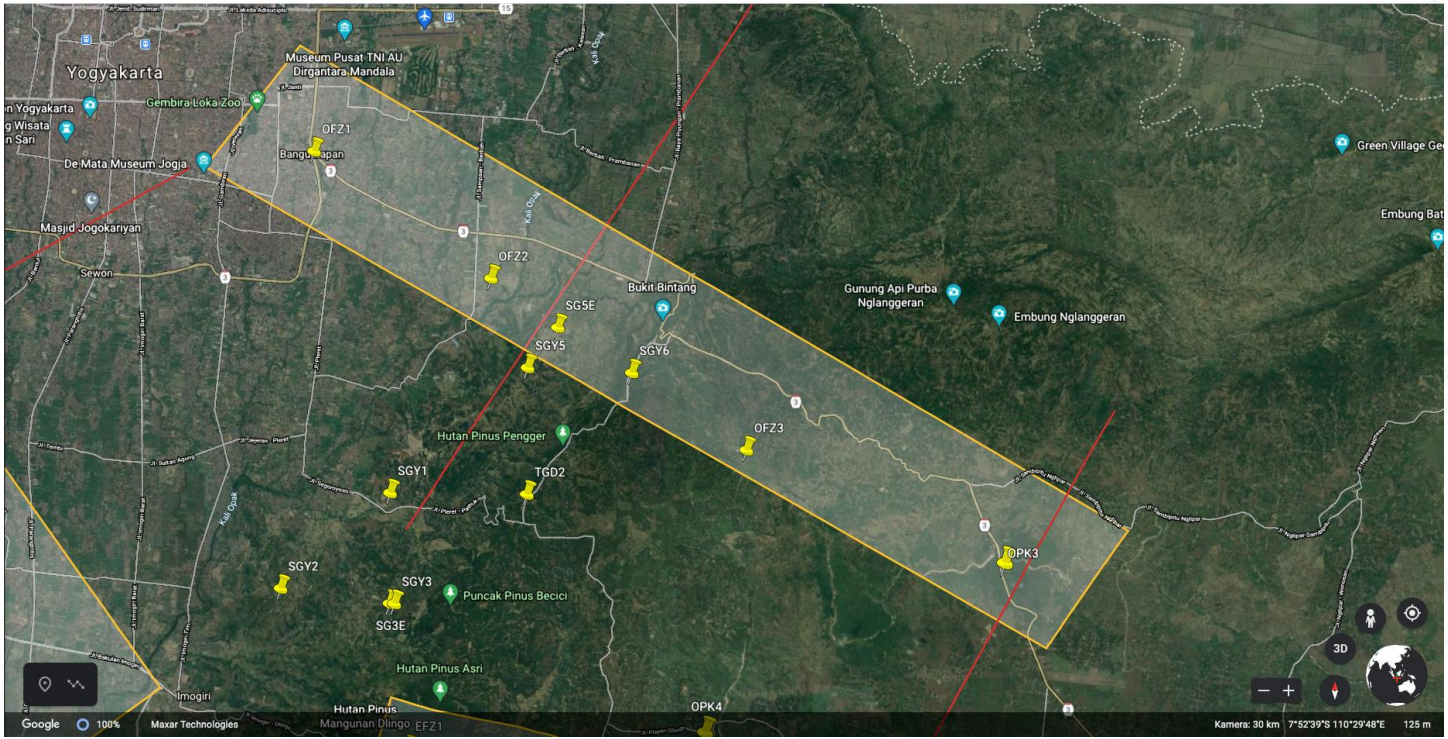
Observation between 2013 to 2018 revealed four potential active fault

One segmen is consistent with the 2006 earthquake, western side segment may related with Progo fault, and others is unidentified

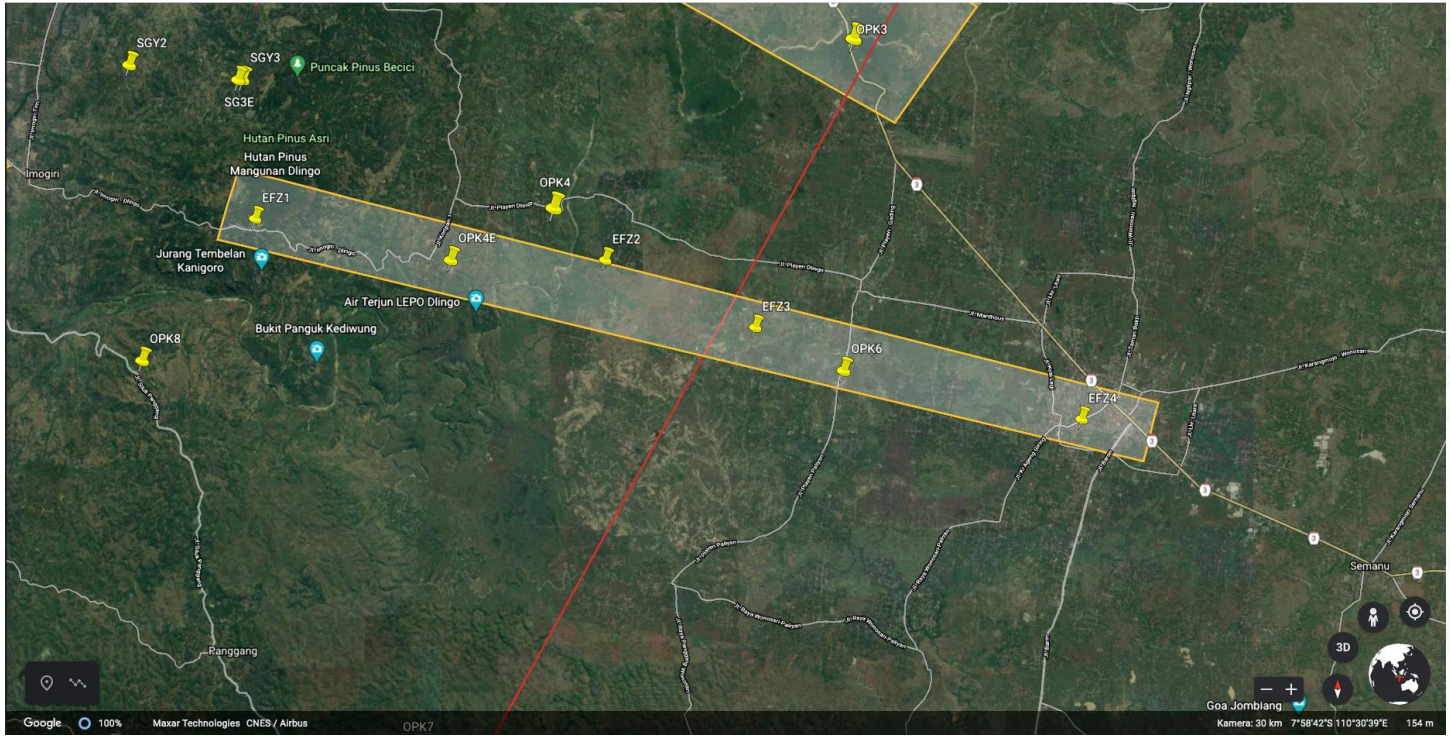
Widjajanti et al. (2020)



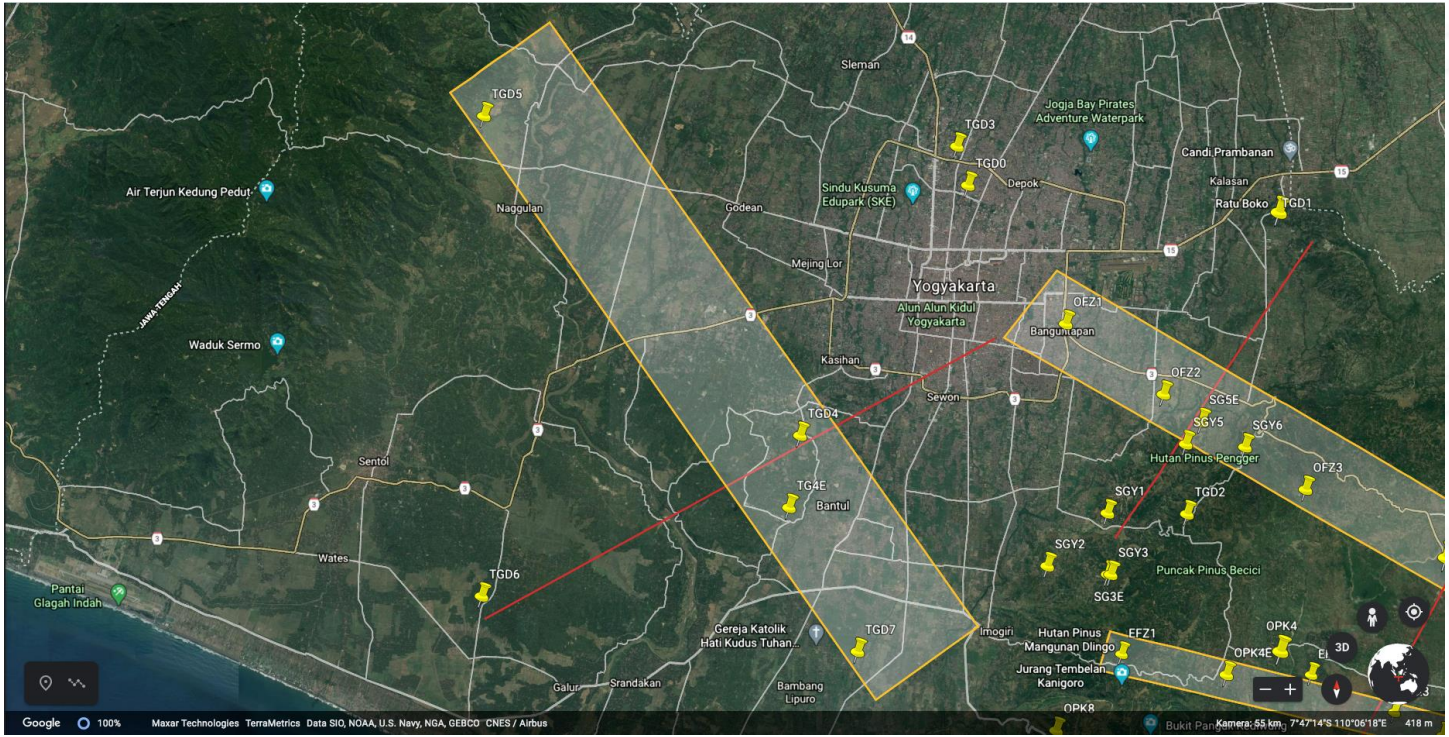
Result: campaign observation 2019-now



Result: campaign observation 2020-now



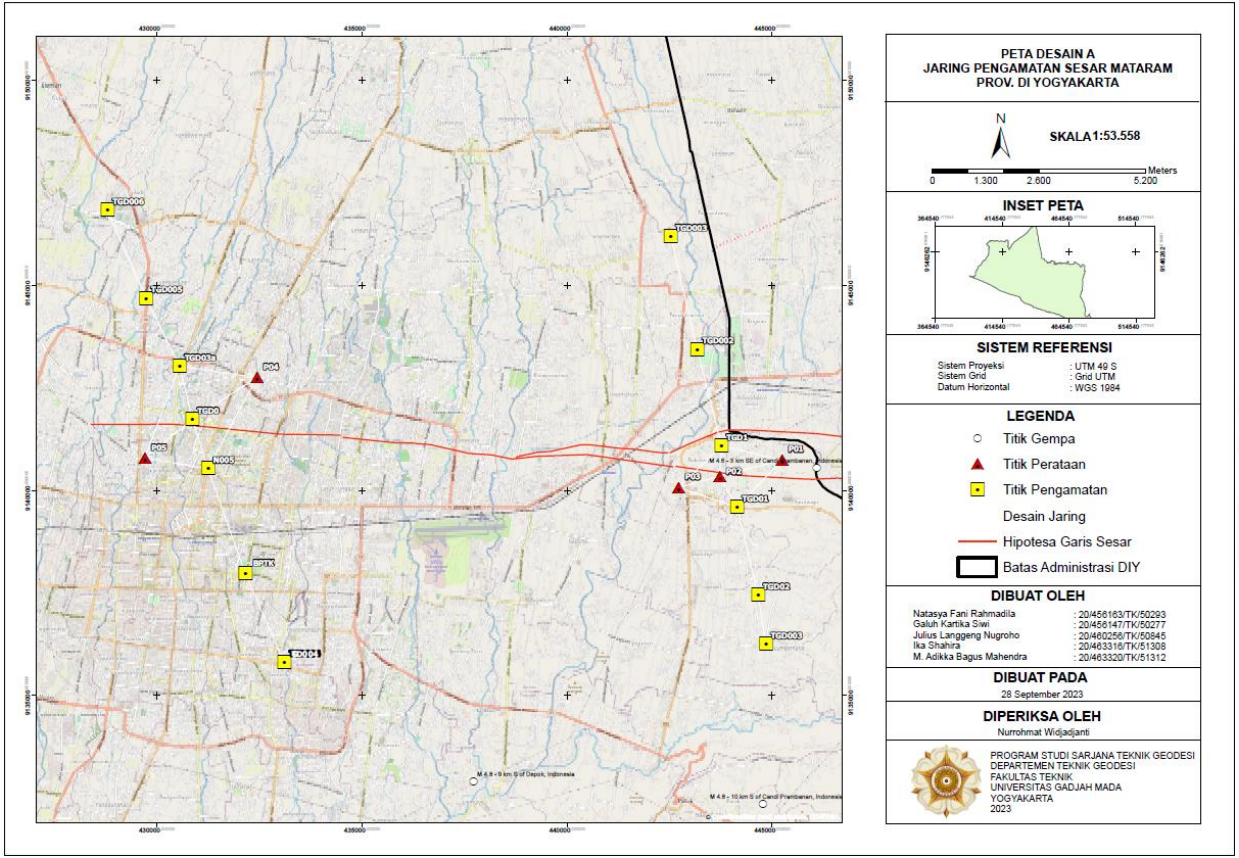
Result: campaign observation plan



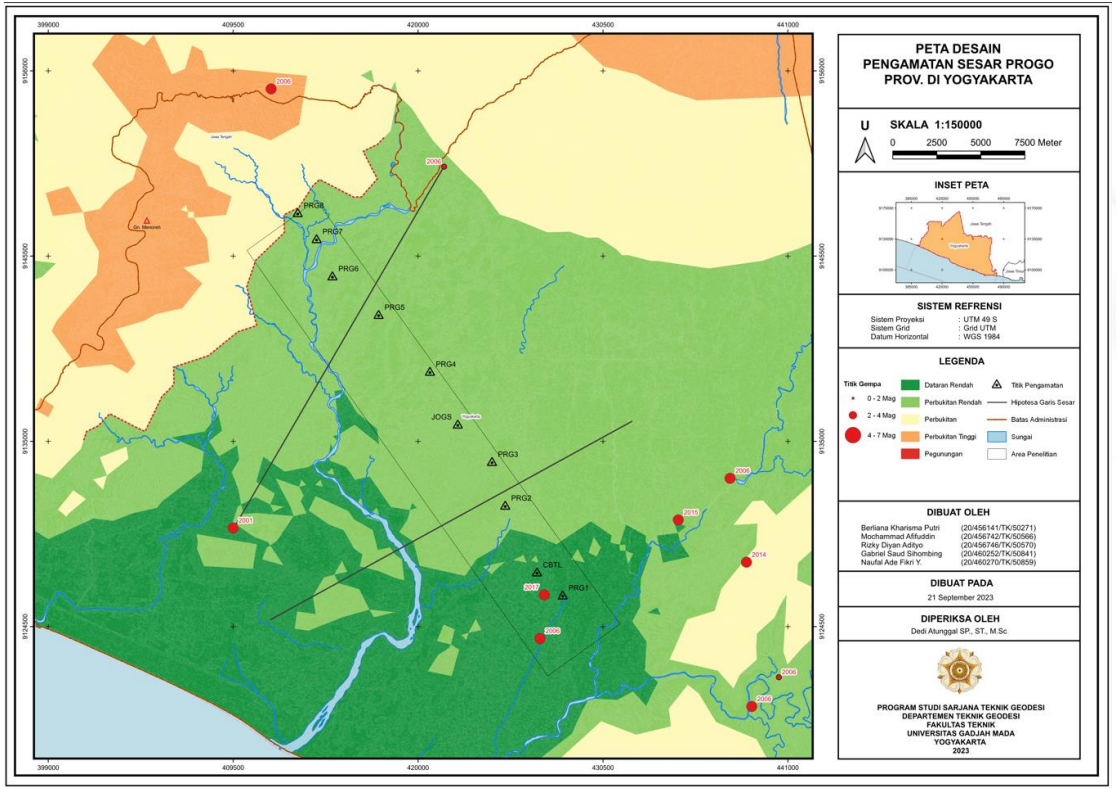
Mataram and Progo Fault

Nurrohmat Widjajanti, Dedi Atunggal, Cecep Pratama, Iqbal Hanun Azizi, Berliana Kharisma Putri, Gabriel Saud Sihombing, Mochammad Afifuddin, Naufal Ade Fikri Y., Rizky Diyan Adityo, Natasya Fani Rahmadila, Galuh Kartika Siwi, Ika Shahira, Julius Langgeng Nugroho, M. Adikka Bagus Mahendra

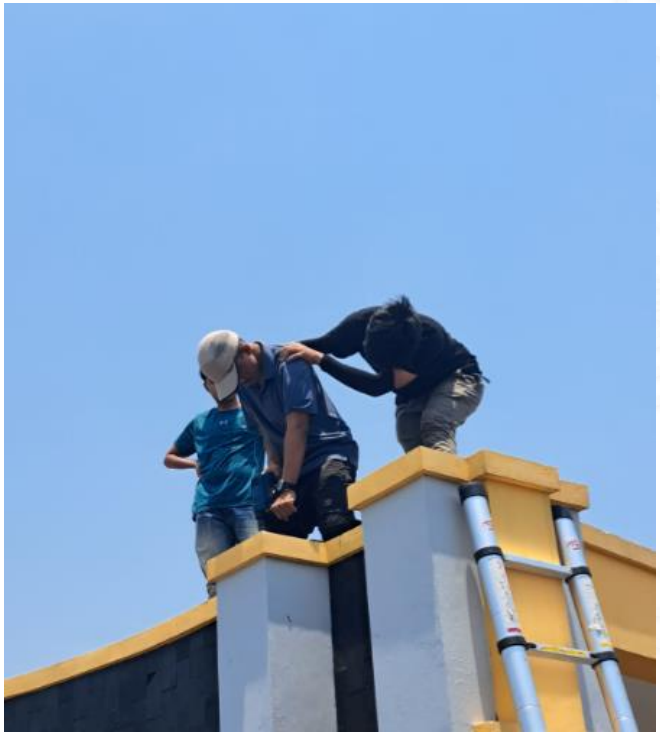
Mataram Fault Observation Network



Progo Fault Observation Network



GNSS Point Construction



GNSS Point Construction

GNSS Point Construction

GNSS First Observation

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Thank You

For your attention