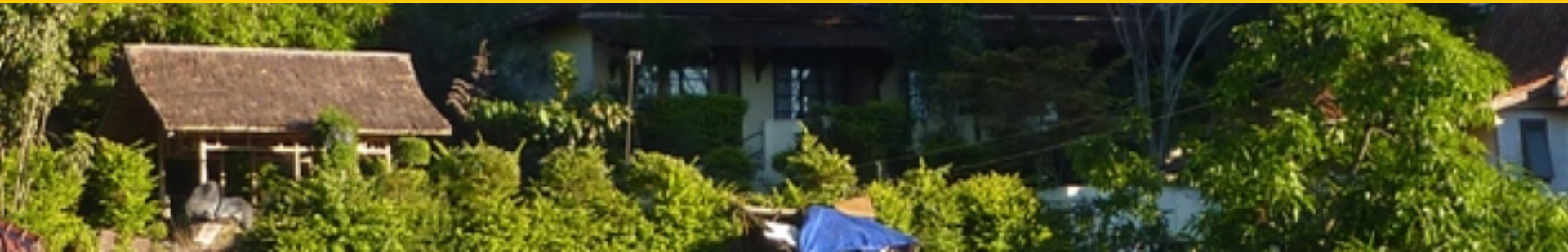


**Center for Volcanology and Geological Hazard Mitigation  
Geological Agency  
Ministry of Energy and Mineral Resources**



## **Recent Monitoring Data in Guntur Volcano Regional Center**

Ahmad Basuki, Hendra Gunawan, Hetty Triastuty, Iyan Mulyana, Umar Rosadi, Yoga E .Pramitro  
Workshop Satreps, Yogyakarta 9-10 November 2015



# Introduction - Guntur Volcano Regional Center

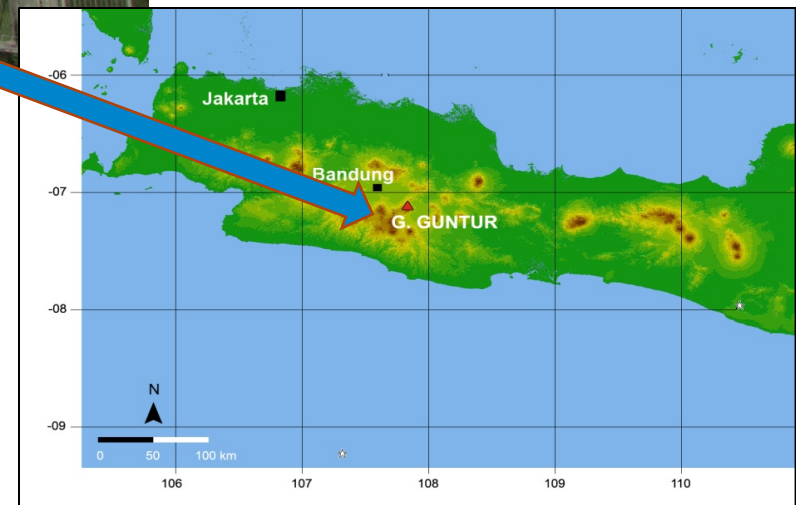


Location :  
Sirnajaya Village,  
Tarogong ,  
Garut, West Java

❑ Observatory built in 1989 , with only 1 telemetered seismic station (CTS) and 1 volcano to be observed

❑ In 1994, VSI (CVGHM present) added 3 seismic stations (LGP,PTR,PSC) collaborated with Sakurajima Volcano Observatory (SVO)

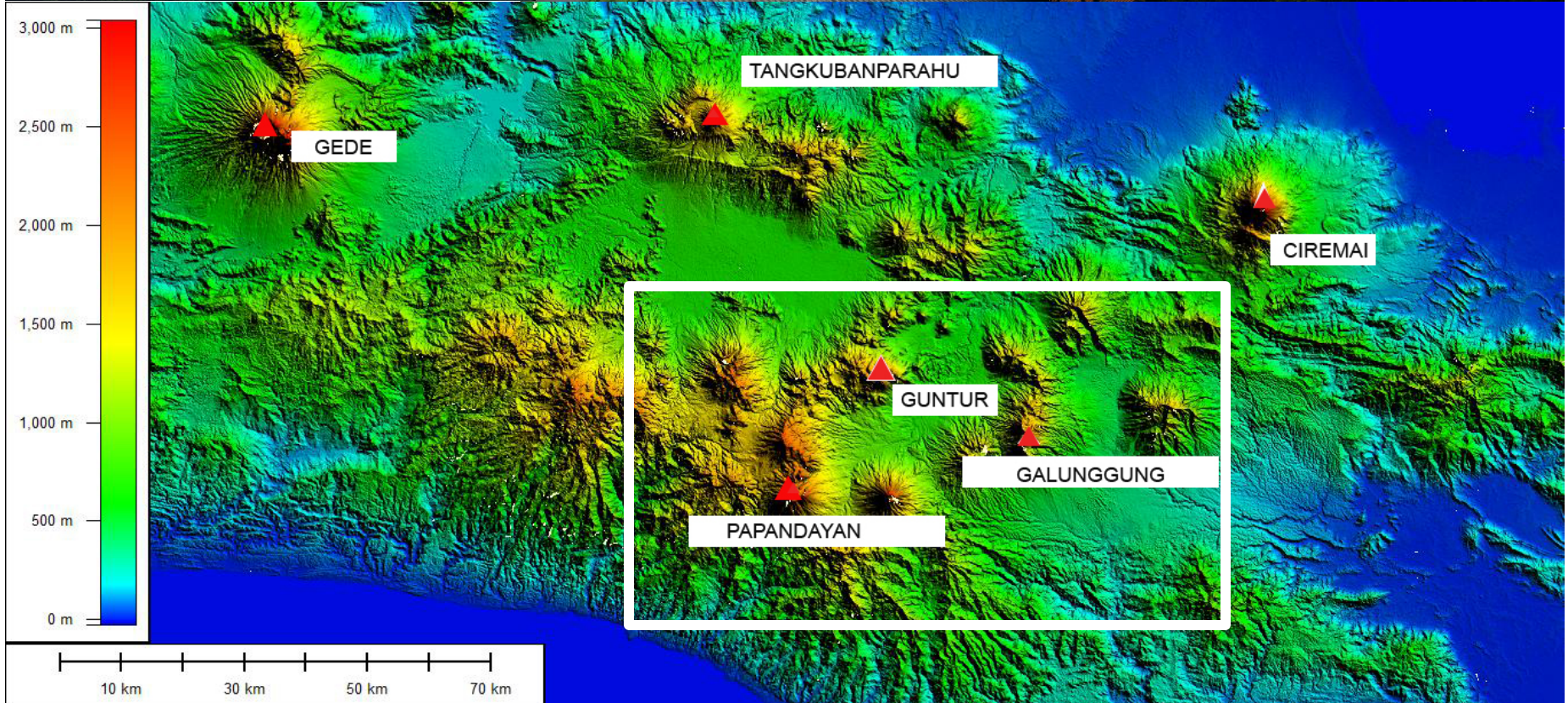
❑ In 2000, The observatory became Regional center and received data from Galunggung and Papandayan Volcano.





# Coverage of Guntur Volcano Regional Center

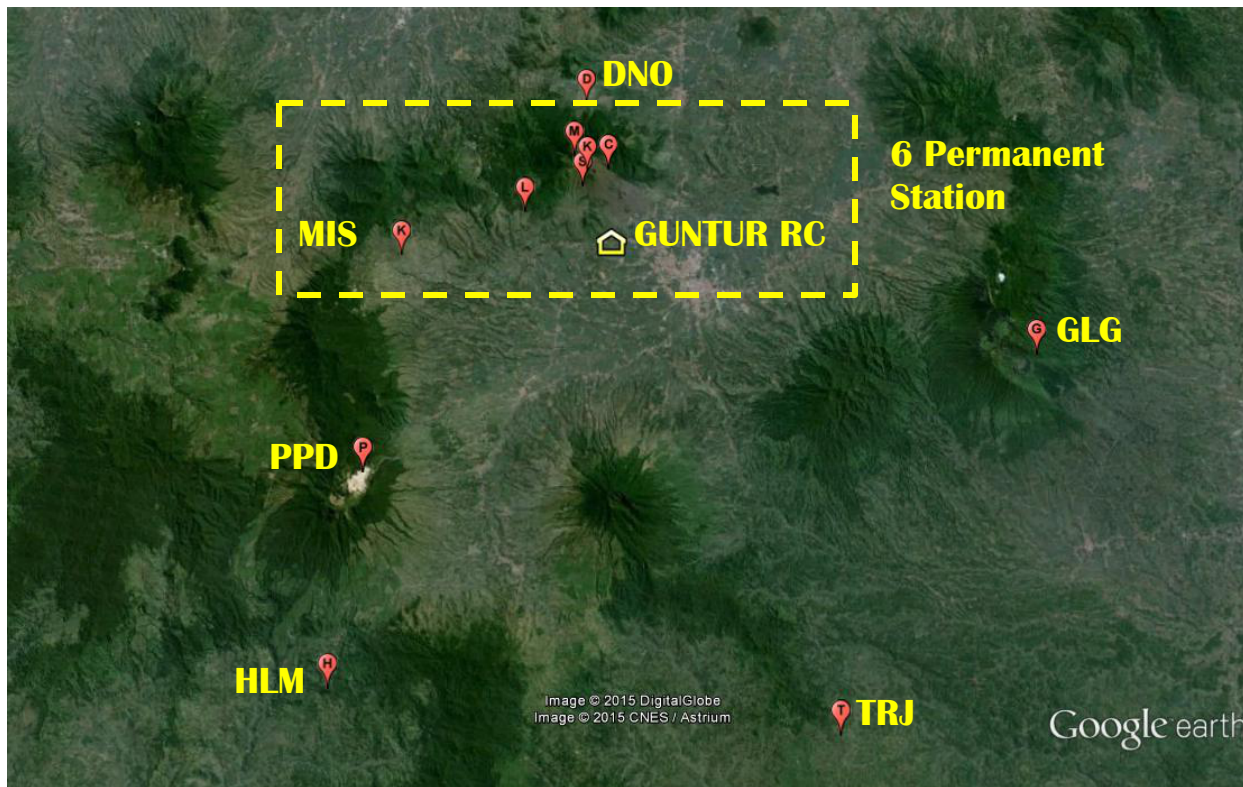
To Monitor Guntur Volcano, Galunggung Volcano, and Papandayan Volcano



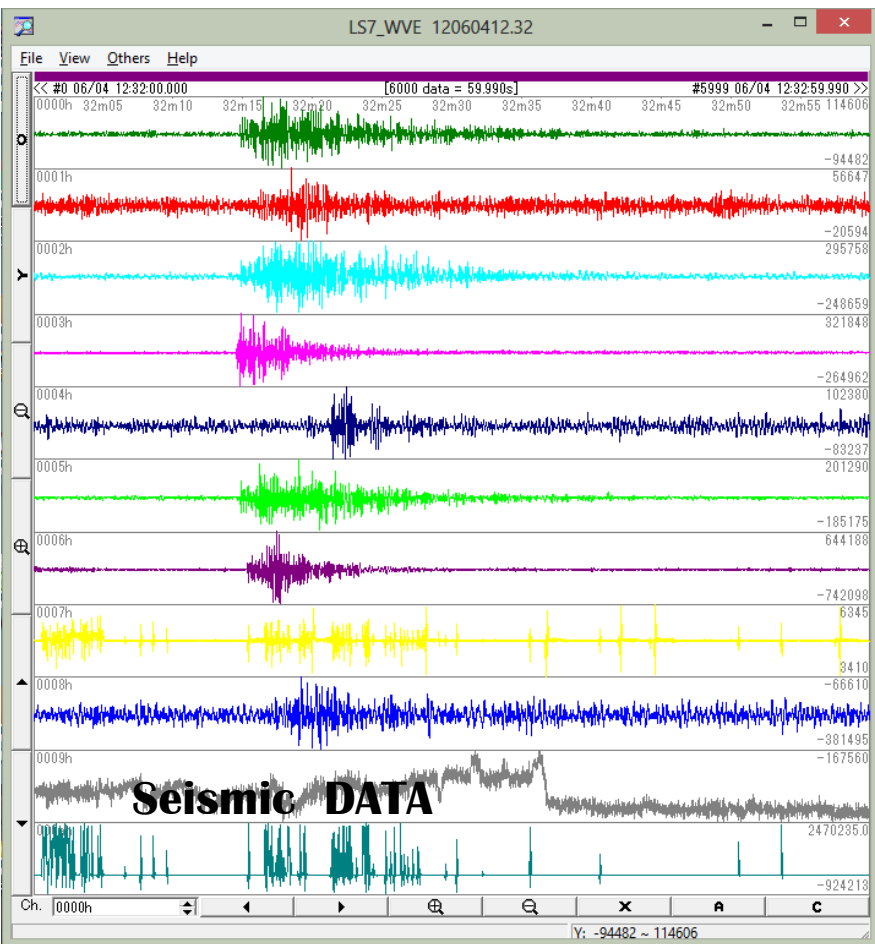


# Monitoring Data in Guntur RC before Satreps Project

- Receive seismic data from 6 permanent Station (SDN, KBY, MSG, CTS, LGP, MIS) and 3 temporary seismic Station (DNO, TRJ, HLM) from Guntur volcano, 1 seismic station from Papandayan volcano, and 1 seismic station from Galunggung volcano. Seismic data is transmitted by radio wave
- GPS Data from 4 GPS station (SDN, MSG, CTS, POST, installed in 2009)

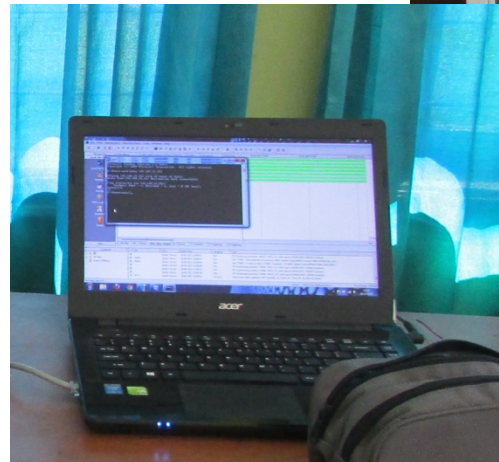






- Ch.0005 – SDG
- Ch.0006 – LGP
- Ch.0007 – KBY
- Ch.0008 – MIS E
- Ch.0009 – LGP N
- Ch.000A – LGP E
- Ch.0000 – CTS
- Ch.0001 – MIS
- Ch.0002 – KBY
- Ch.0003 – MSG
- Ch.0004 – PPD

Site Name	Site Code	Comm Activity	Data Rate	GLONASS	First Epoch	Data Rate	Last Gap	Total
MSGT	MSGT	receive data	99.8	No	28.01.2015 11:56:36	1.000 sec	28.01.2015 11:56:36 (13 ...)	1
SODN	SODN	receive data	99.8	No	28.01.2015 11:56:36	1.000 sec	28.01.2015 11:56:36 (13 ...)	1
CTSG	CTSG	receive data	99.8	No	28.01.2015 11:56:36	1.000 sec	28.01.2015 11:56:36 (13 ...)	1
POST	POST	receive data	100.0	No	28.01.2015 11:56:37	1.000 sec	-	0

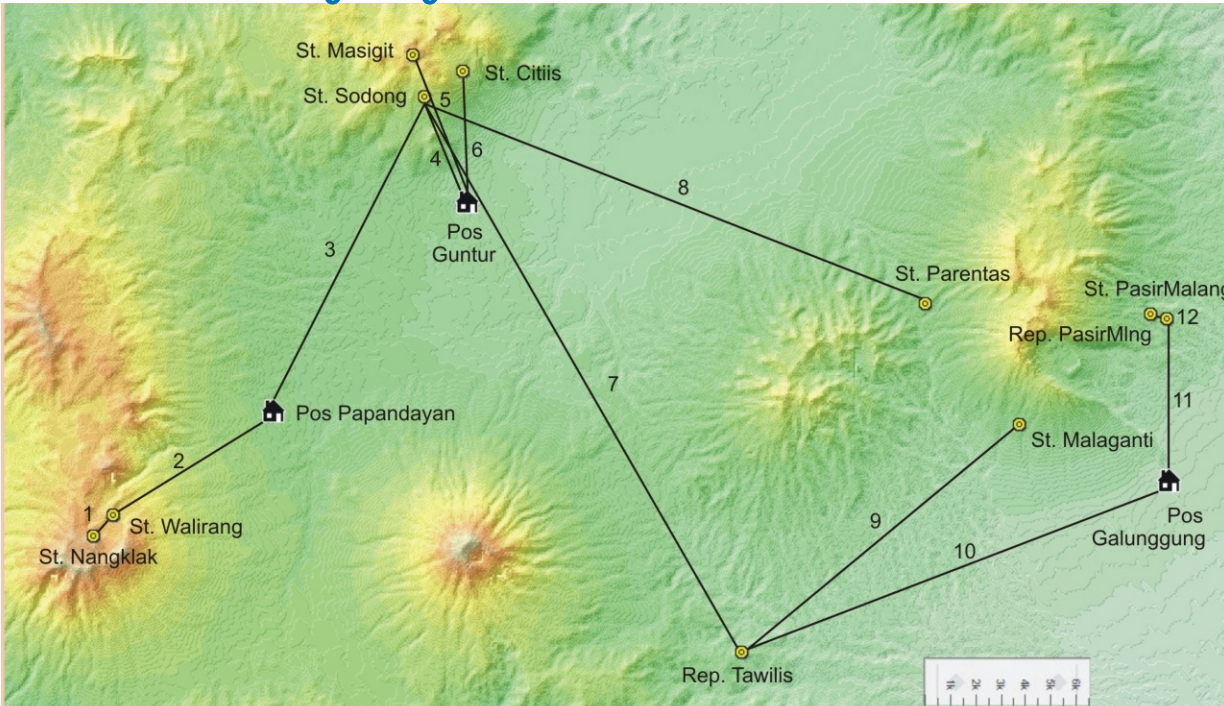


# **Adding Monitoring Data in Guntur RC by Satreps Project**

1. Tiltmeter Data , Installed at Sodong Station in December 2014 and Citiis Station in January 2015
2. Seismic Data from 3-component seismometer, Installed at Sodong and Citiis Station in January 2015
3. GPS data from Galunggung volcano, (PSML, MLGT, PRTS) Transmitted to Guntur RC in April 2015
4. Seismic data from Papandayan volcano ( Walirang St), Transmitted to Guntur RC in April 2015



# Telemetry Sytem



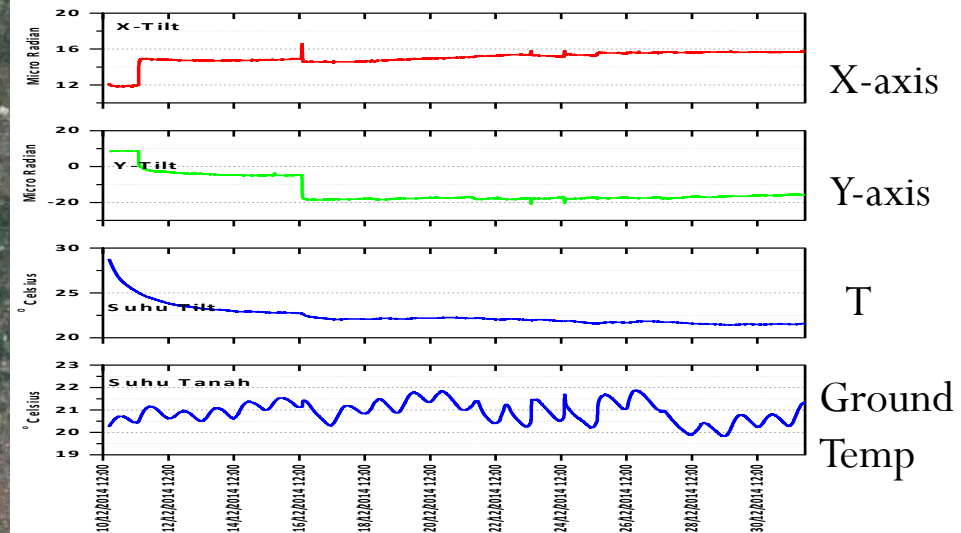
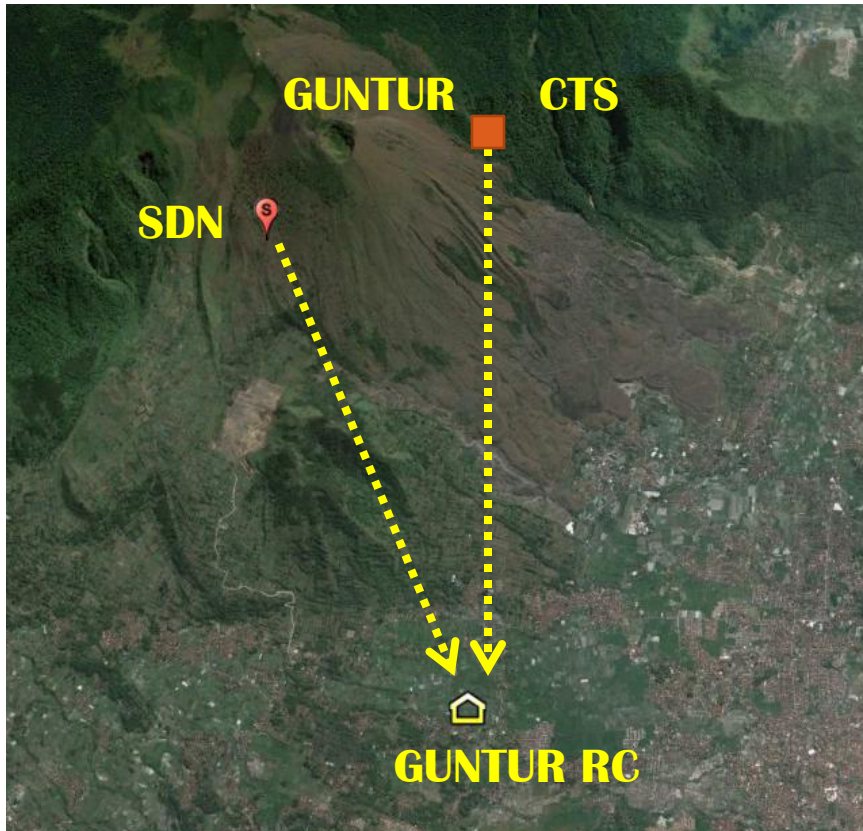
Adding Solar cell at Sodong Station

- All data from Galunggung and Papandayan volcano transmitted to Guntur RC through Sodong Repeater (Wifi 5.8 GHz)
- All data from Guntur volcano Transmitted directly to Observatory



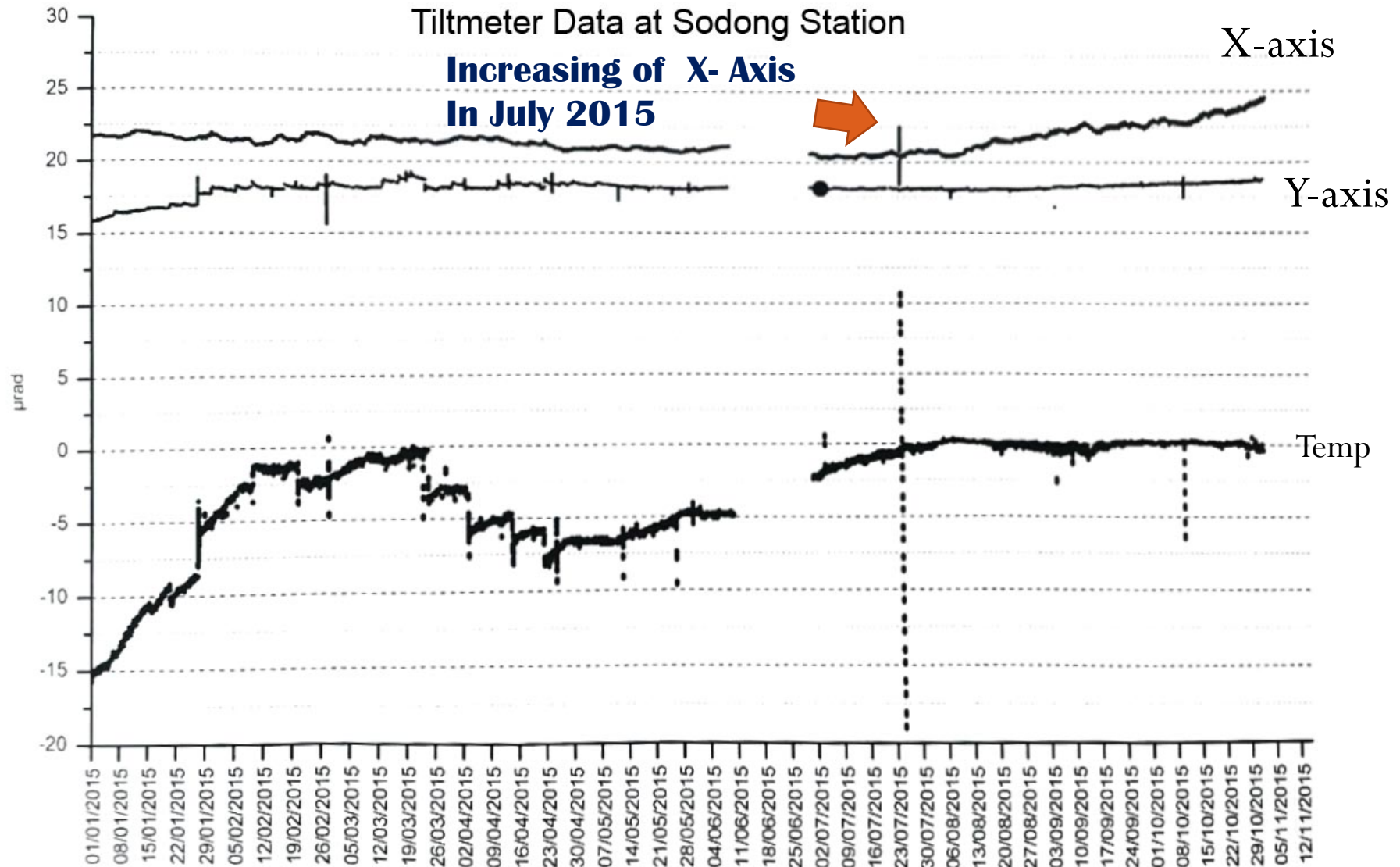
# Tiltmeter

- ❑ Installed in December 2014 at Sodong Station, and January 2015 at Citiis station
- ❑ Using biaxial tiltmeter A711-2, Resolution 0.1 mrad
- ❑ Using ADC of MiniPC TS-4200 (SDG) , LS7000XT (CTS)
- ❑ Transmitted using wifi radio  
5.8 GHz



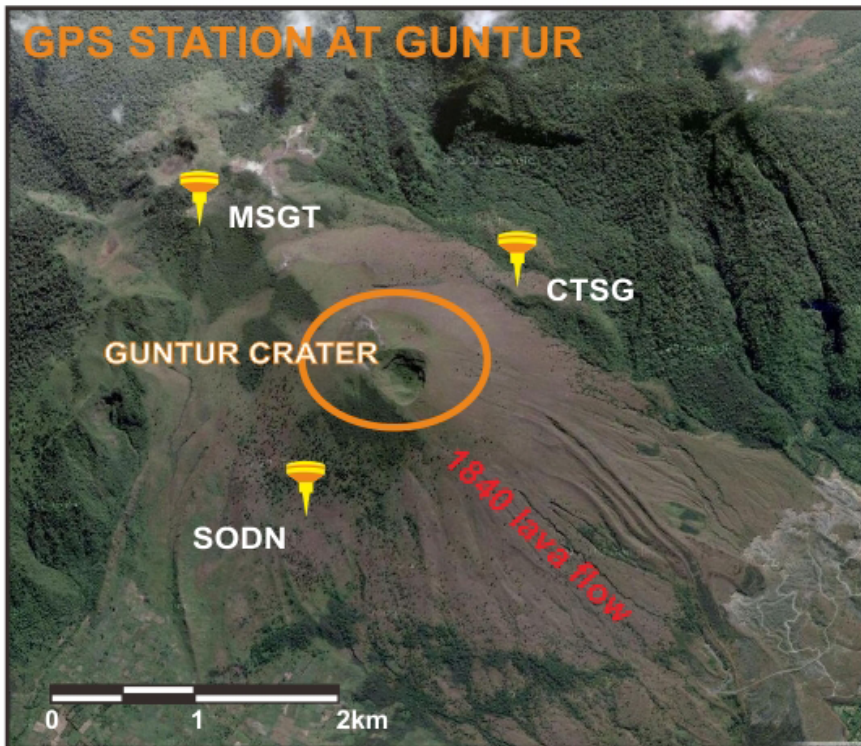


# Tiltmeter Data from January – October 2015



# GPS Data

- 3 GPS Stations Installed in October 2009 (MSGT, SODN, CTSG)
- Each Station was equipped with a dual-frequency GPS Receiver (Leica GRX 1200+GNSS)
- GPS Receiver at POST was installed as reference using Leica Sr520 and then changed to AR10 GNSS



**POST Station**

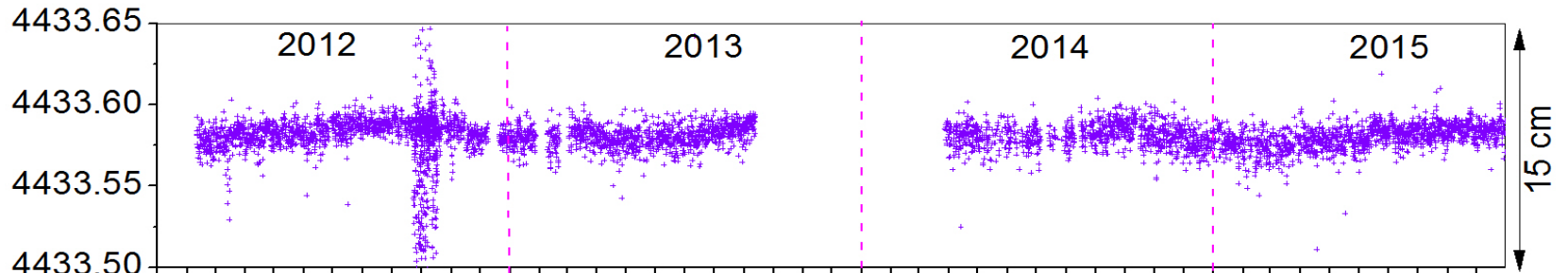


**SODN Station**

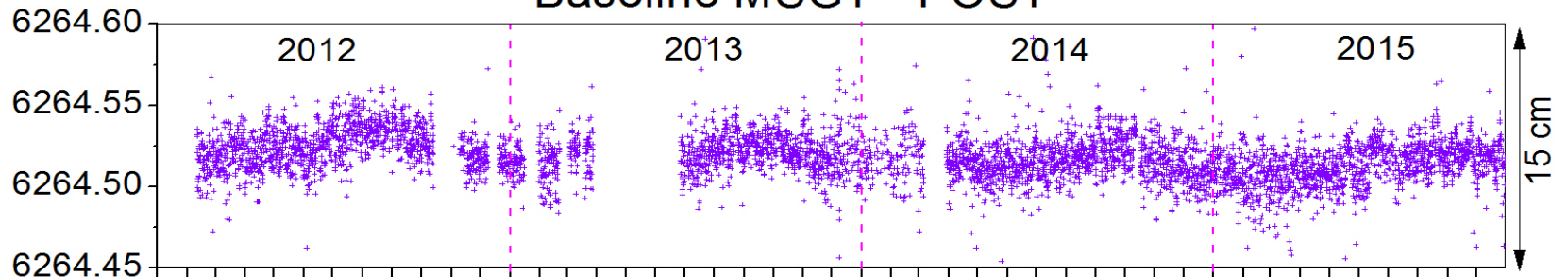


# Baseline Data

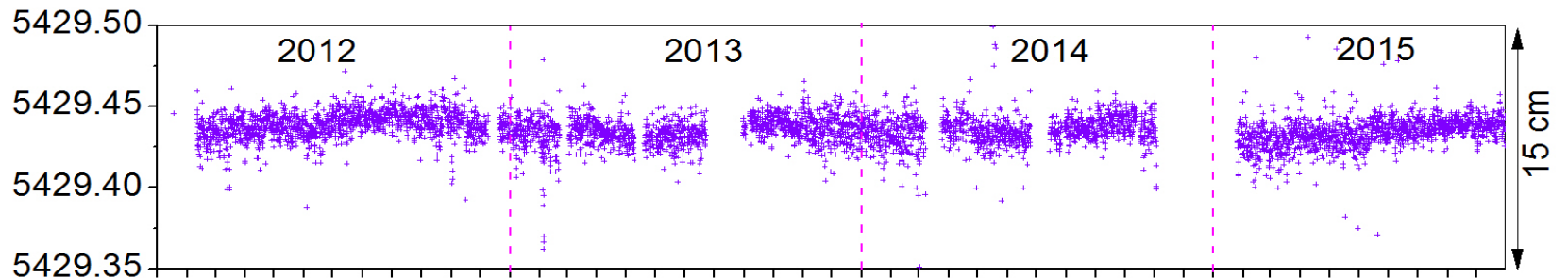
## Baseline SODN - POST



## Baseline MSGT - POST



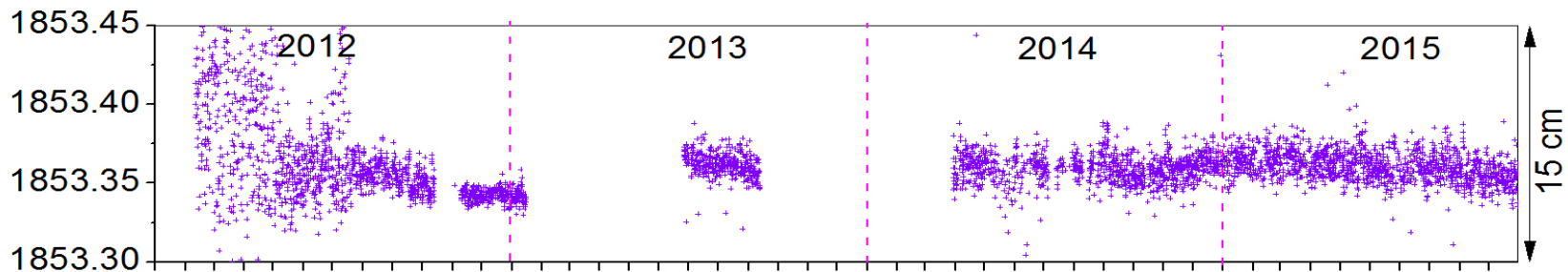
## Baseline CTSG - POST



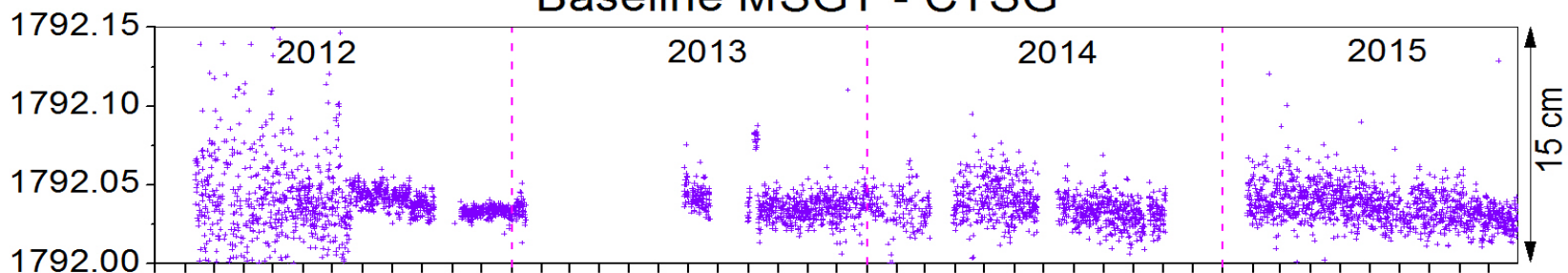
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct

# Baseline Data

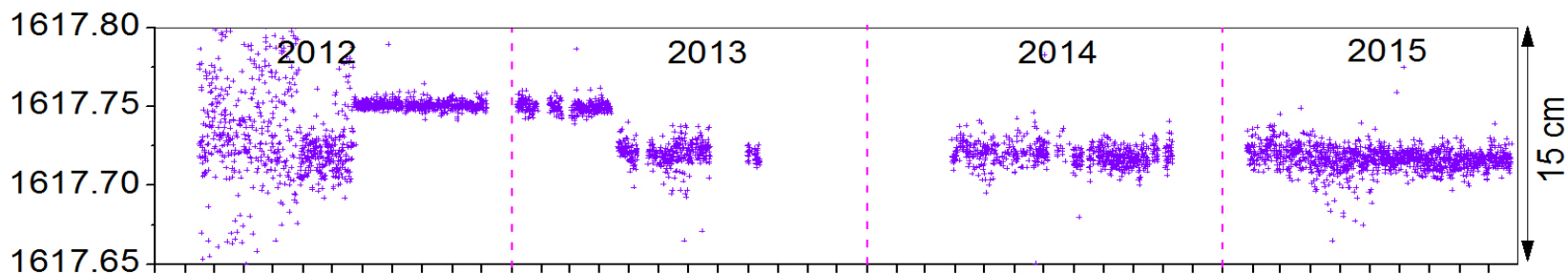
## Baseline MSGT - SODN



## Baseline MSGT - CTSG



## Baseline CTSG - SODN



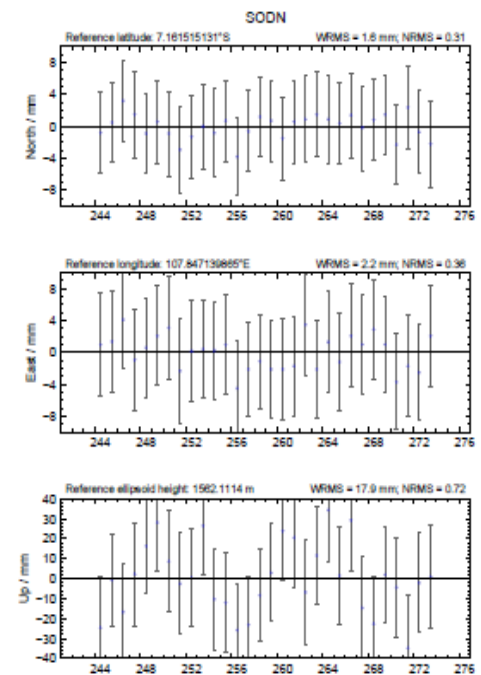
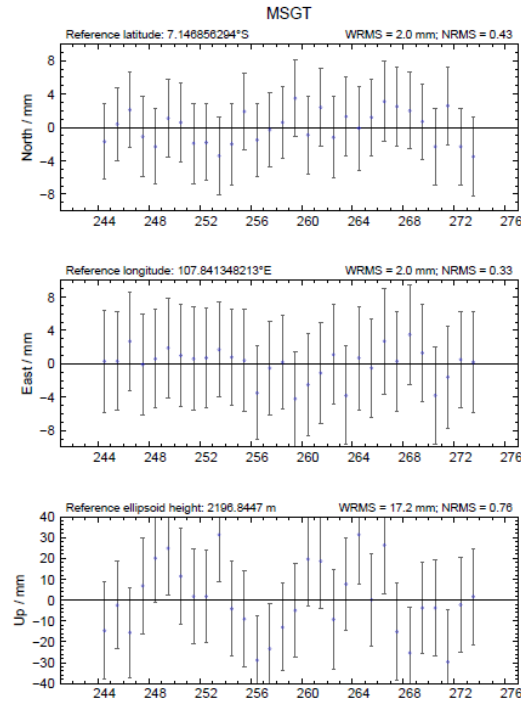
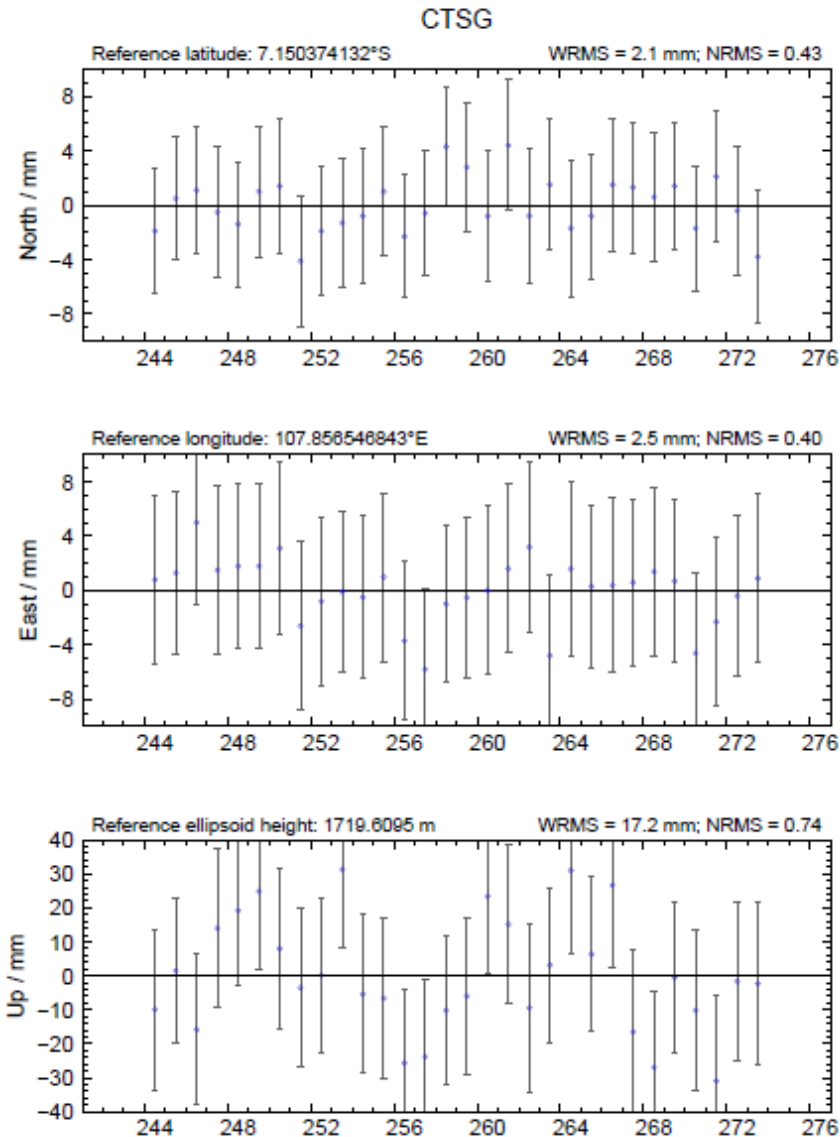
Slope Distance (m)

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct



# Processing Data GPS in September 2015

## Guntur Volcano

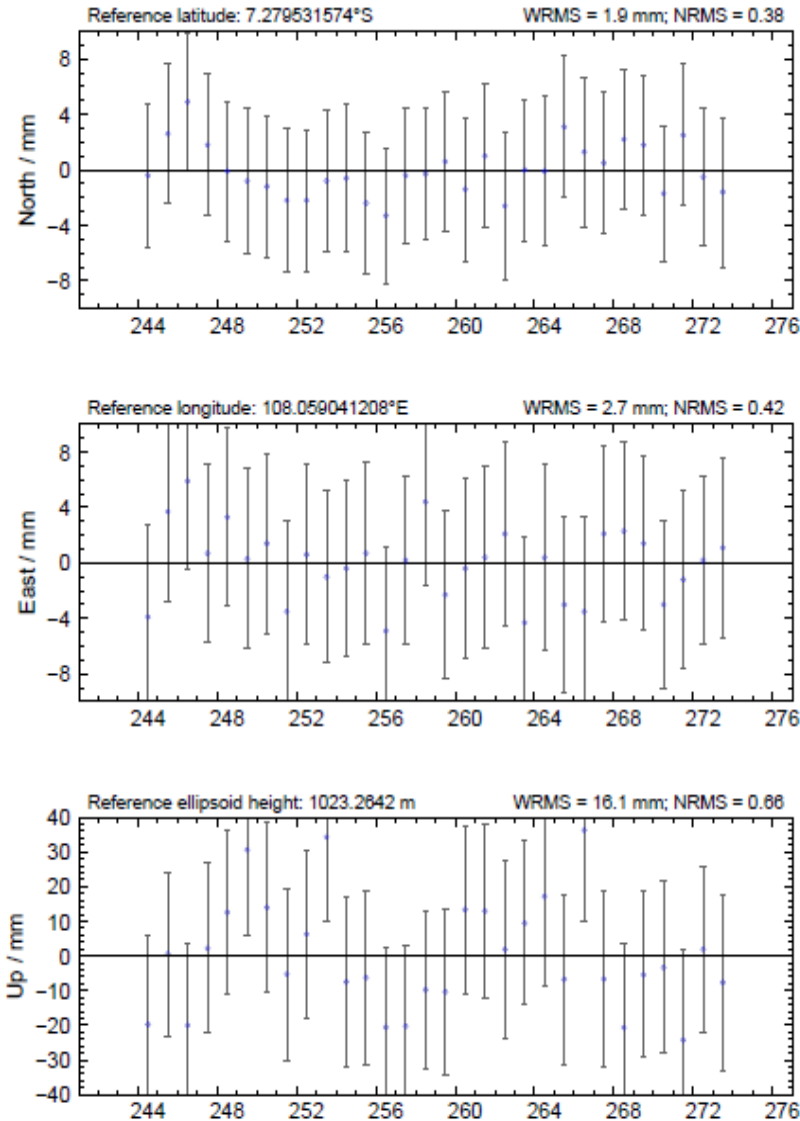


Processing with GAMIT, Using 10 IGS station used as reference of POST Station, Displacement still under 4 mm, suggesting no significant Deformation occurred

# Galunggung Volcano

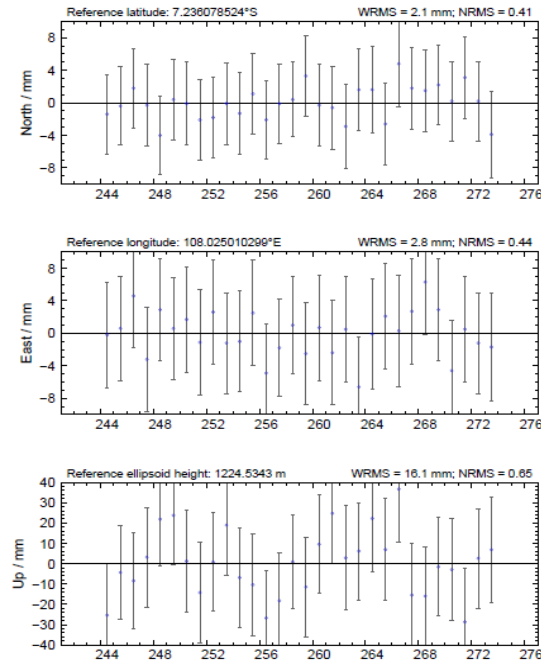
## MALAGANTI

MLGT



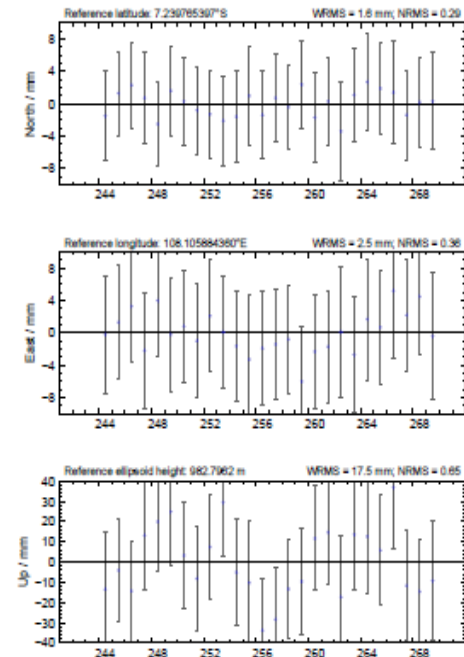
## PARENTAS

PRTS



## PASIRMALANG

PSML

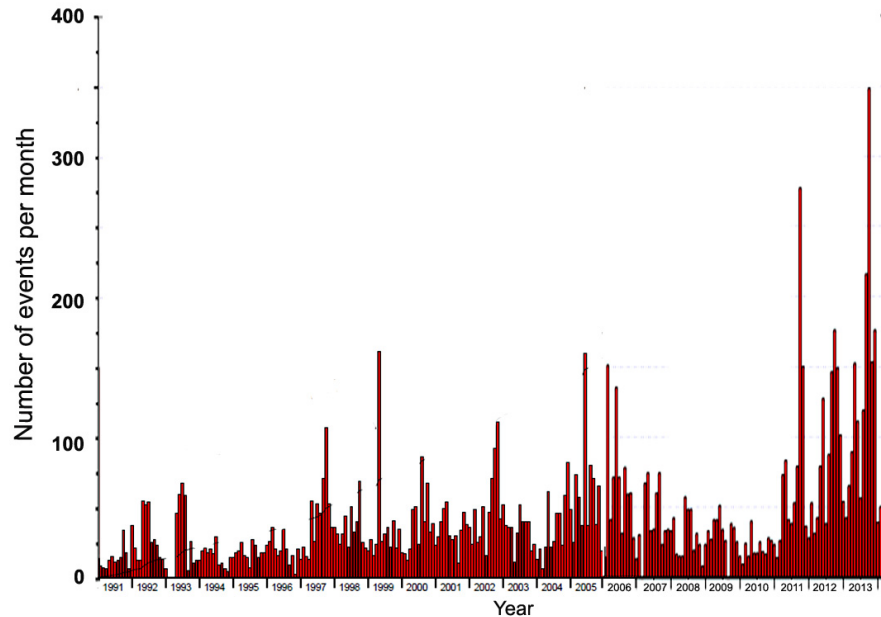


Processing with GAMIT, Using 10 IGS station used as reference of POST Station, Displacement still under 4 mm, suggesting no significant Deformation occurred

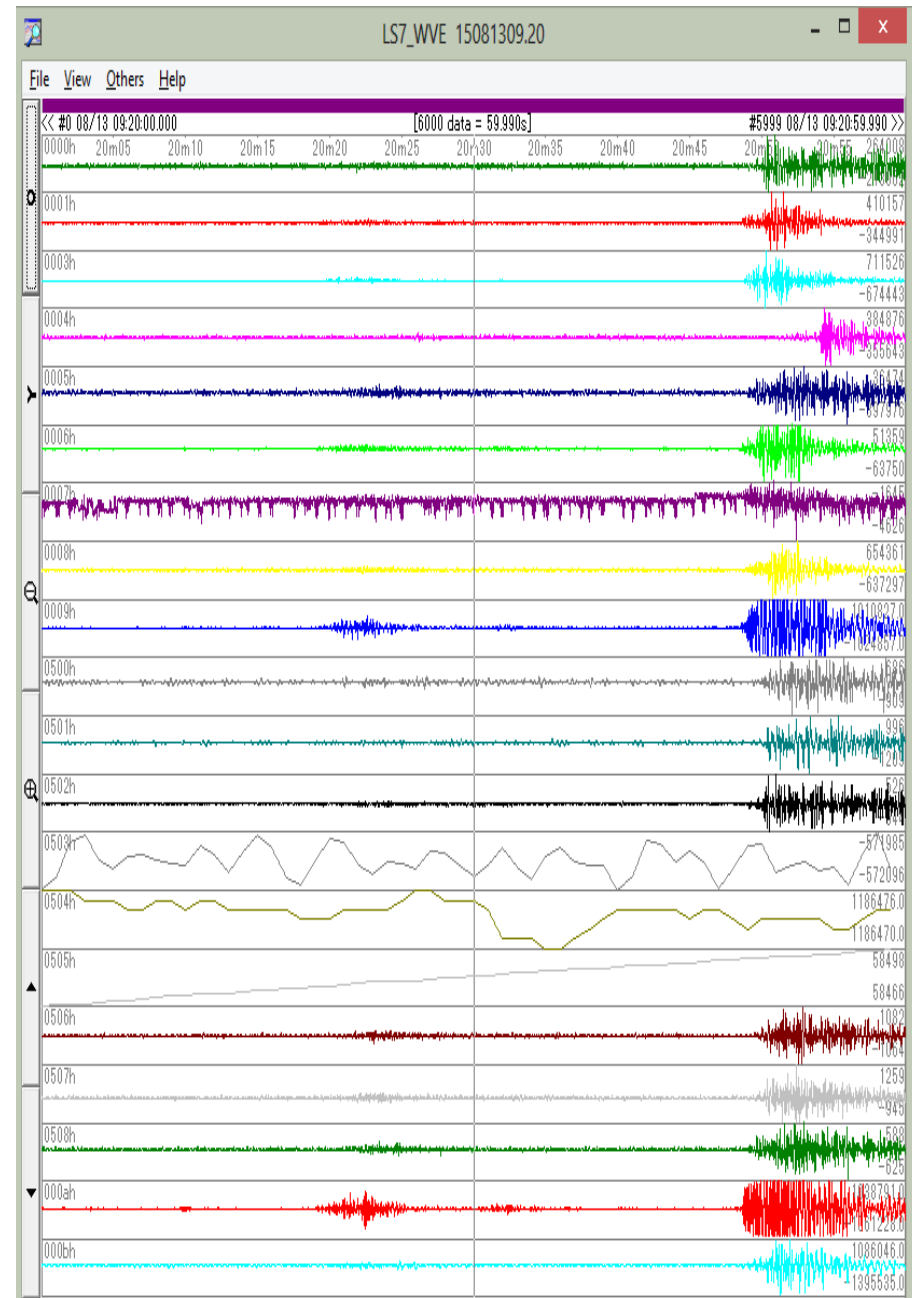


# Seismic Data

- ❑ Adding 6 Channel to receive data from Citiis and Sodong Station
- ❑ Seismometer short period 1 Hz 3 Komponen type SSV-002 was installed in Januari 2015 at Citiis and Sodong Station

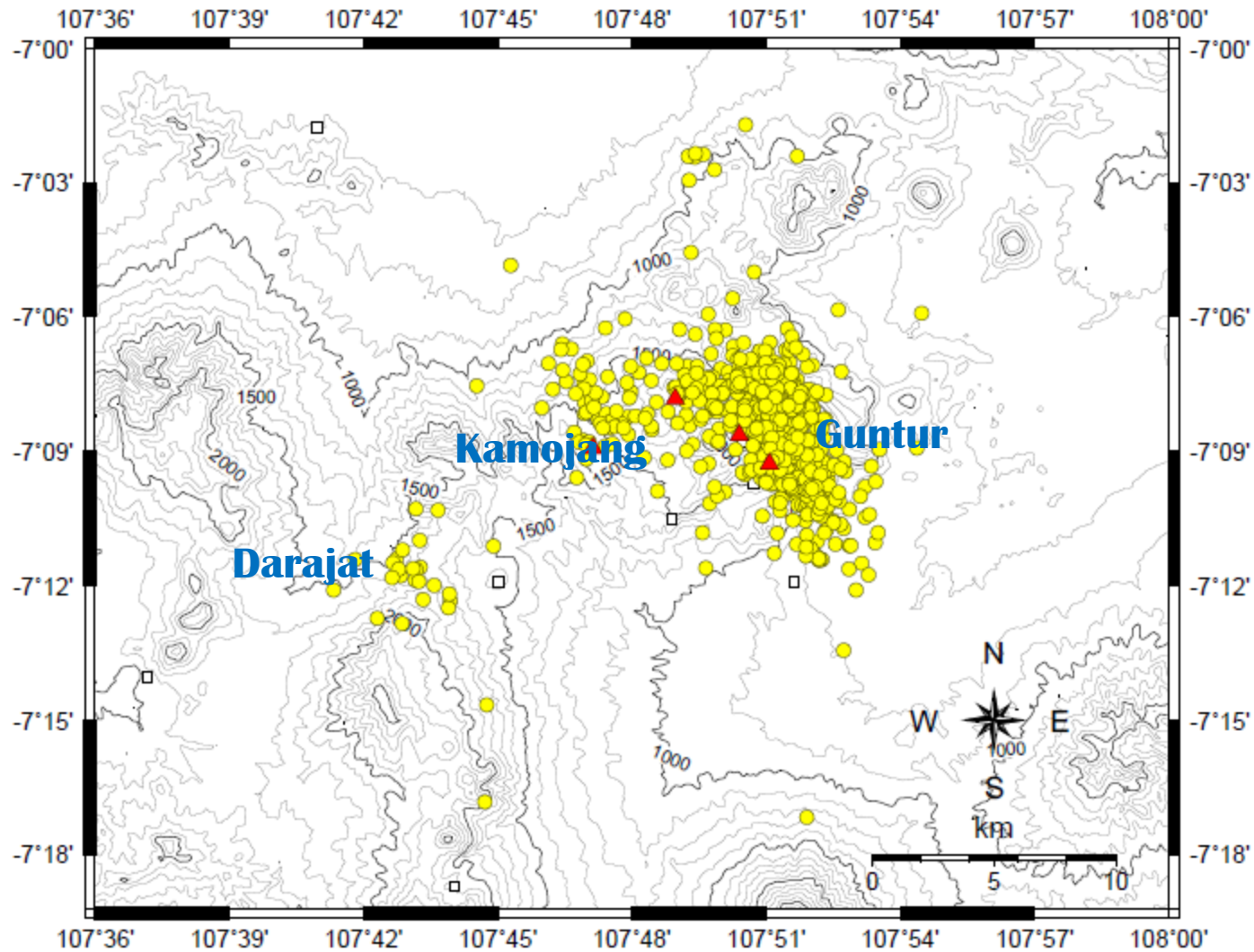


Increasing number of event 1991 - 2013



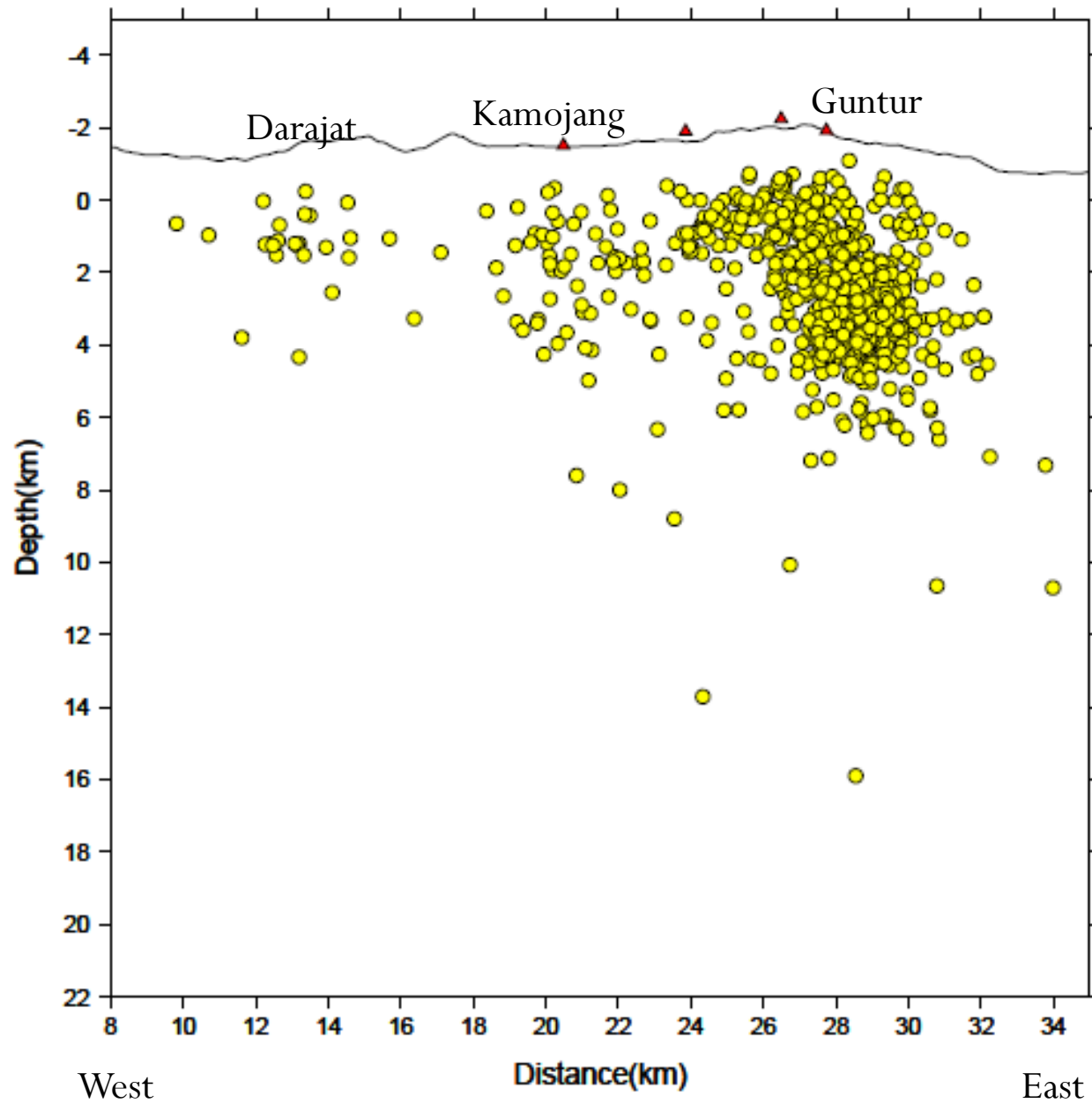
# Processing Seismic Data

Hypocenter from selected Data in 2010 – 2015 using hypomh (hirata and matsuura, 1987)

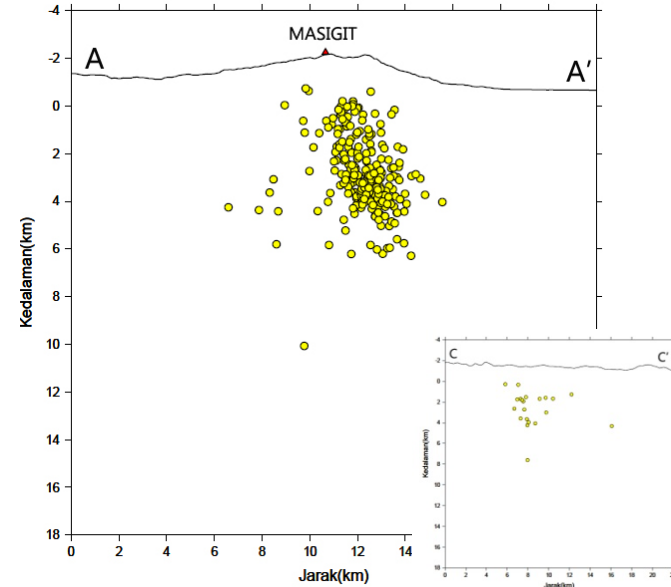
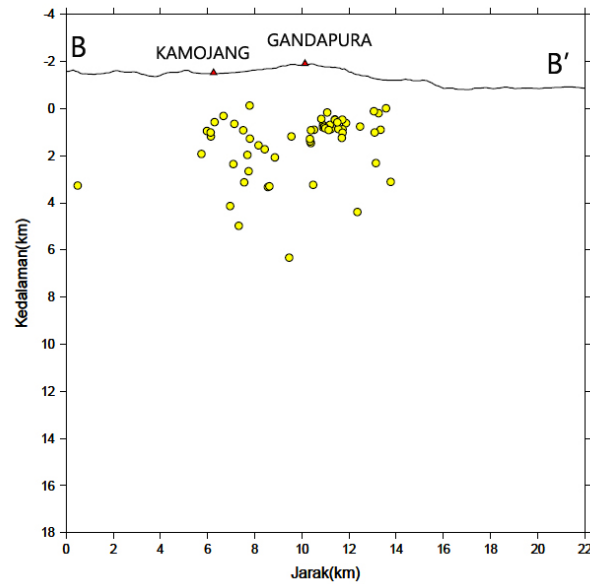
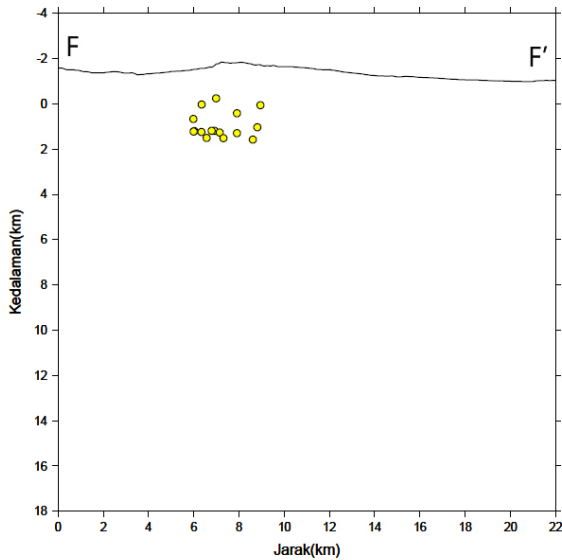
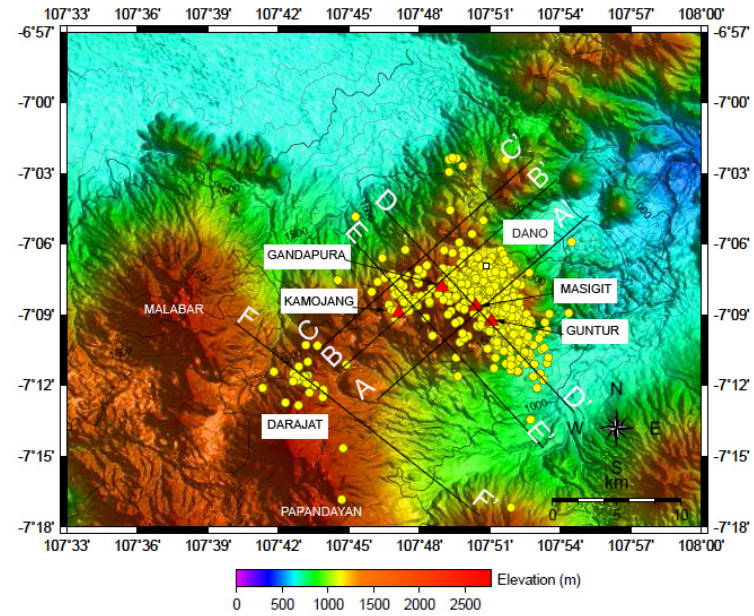
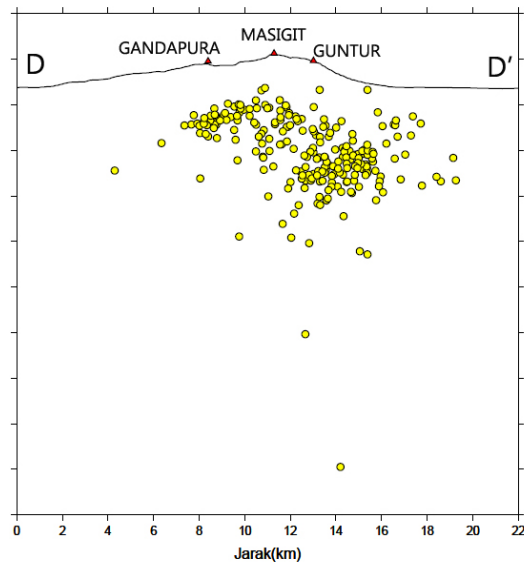
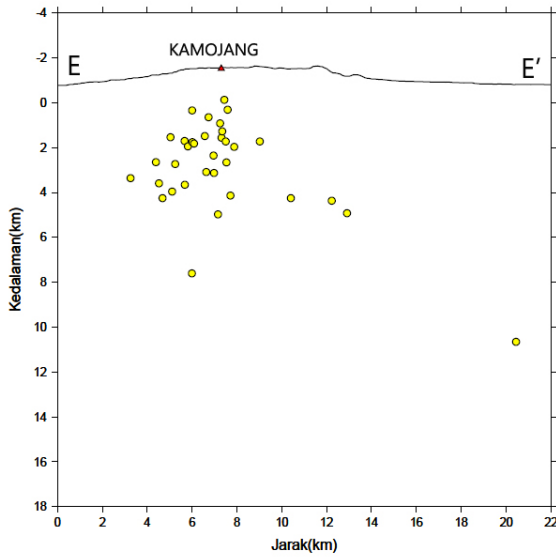




# Vertical Profile



# Vertical Profile

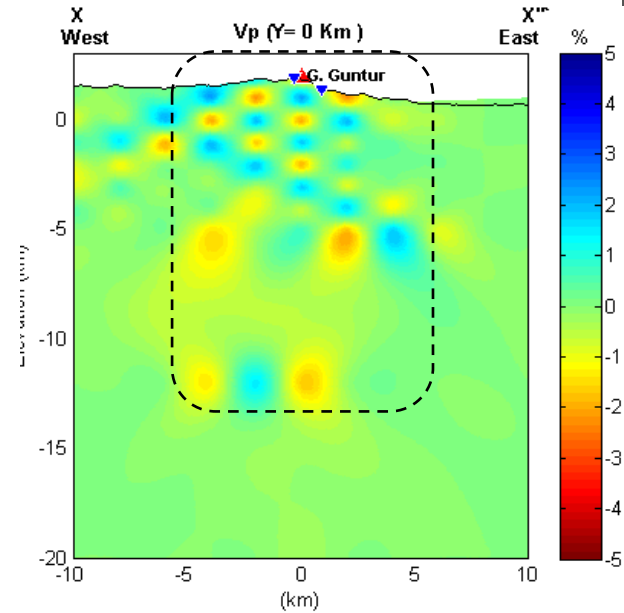
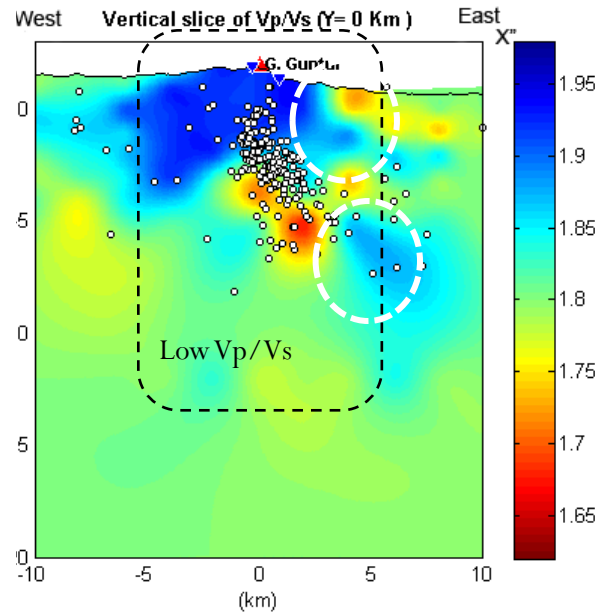
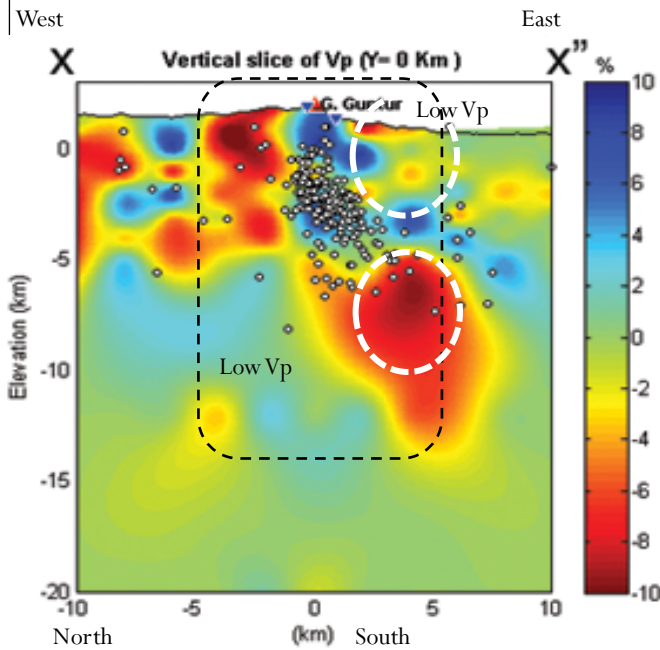
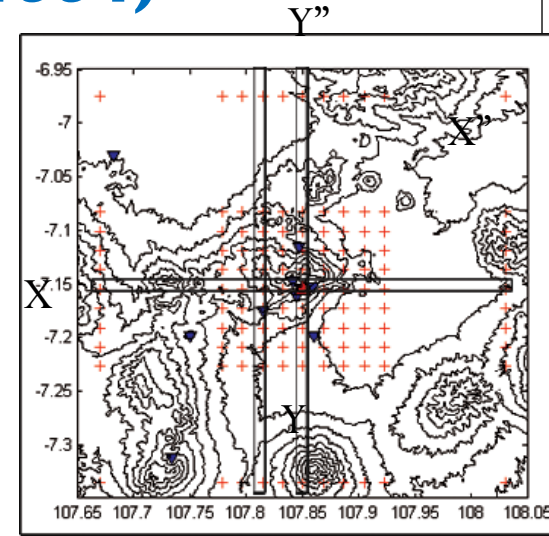




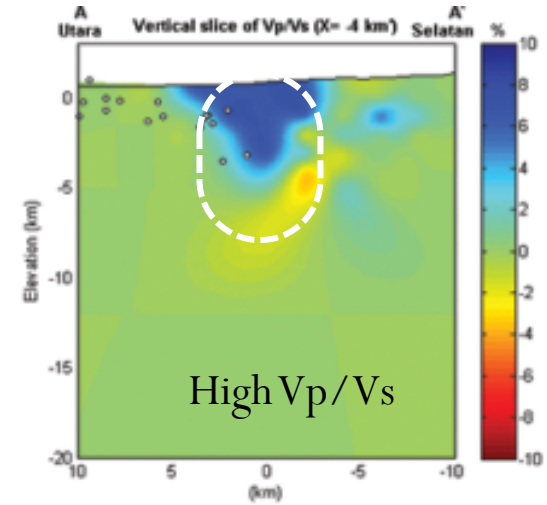
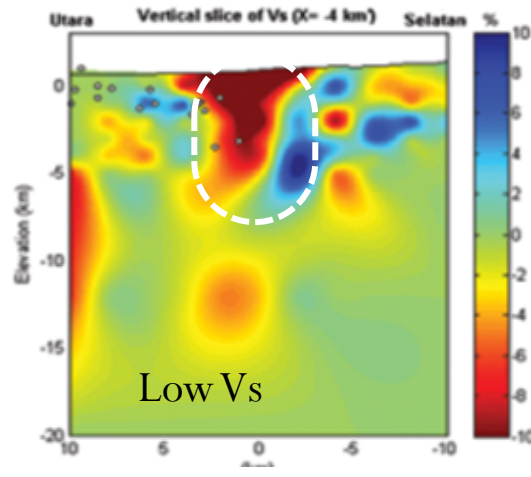
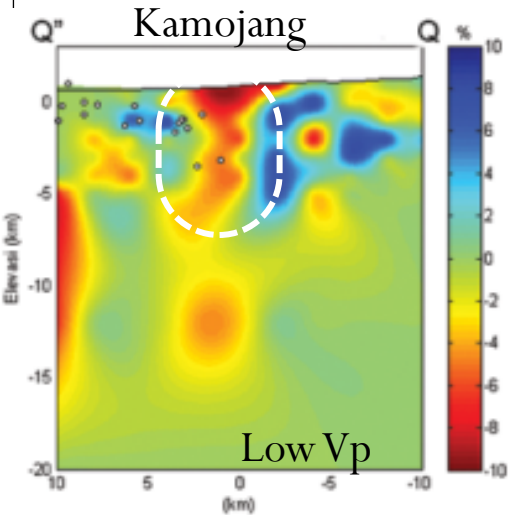
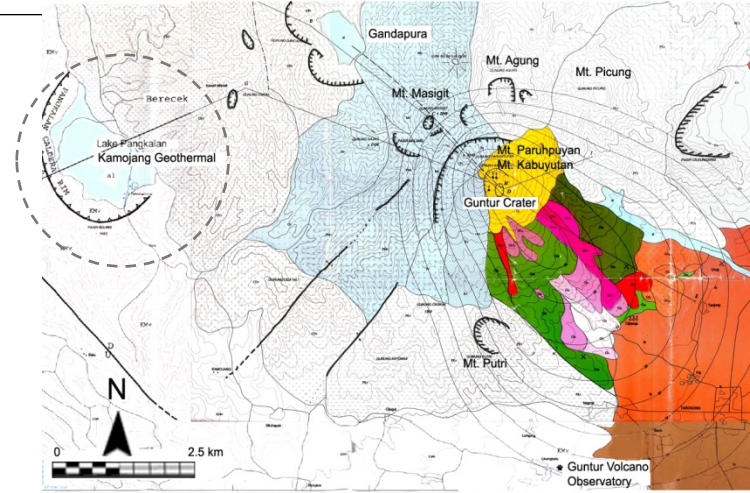
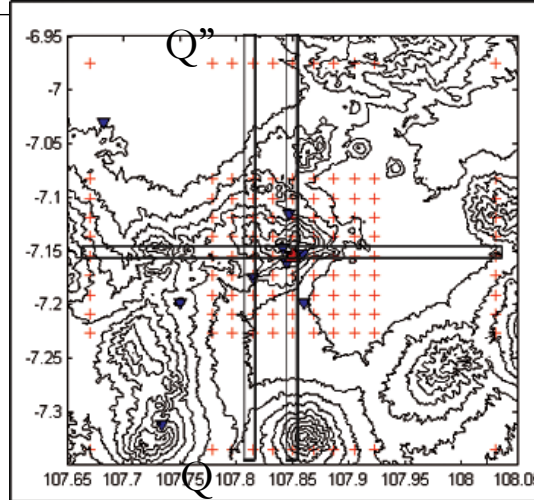
# Velocity Structure using Simulps (evans et al, 1994)

## Vertical Slice Under Guntur

- Low  $V_p/V_s$  found depth 0 km below Cipanas Hotspring, suggesting reservoir area
- High  $V_p/V_s$  found under depth of 5 km, suggesting partial melting/hot material/fluid



# Vertical Slice Under Kamojang/ Pangkalan caldera

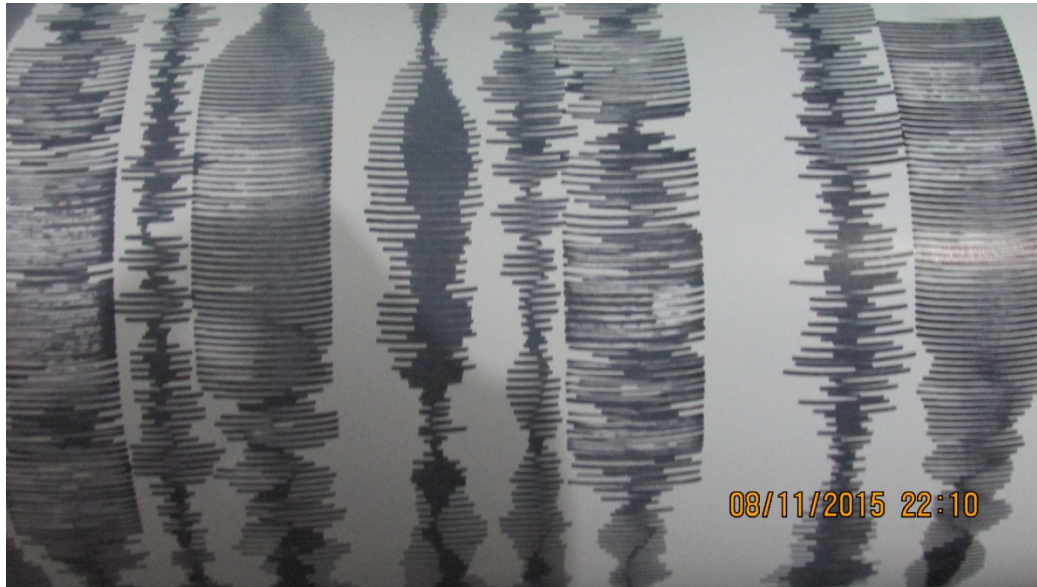


**High  $V_p/V_s$  regions potentially indicate regions of high fluid content and fracturing (Muksin et al, 2013)**

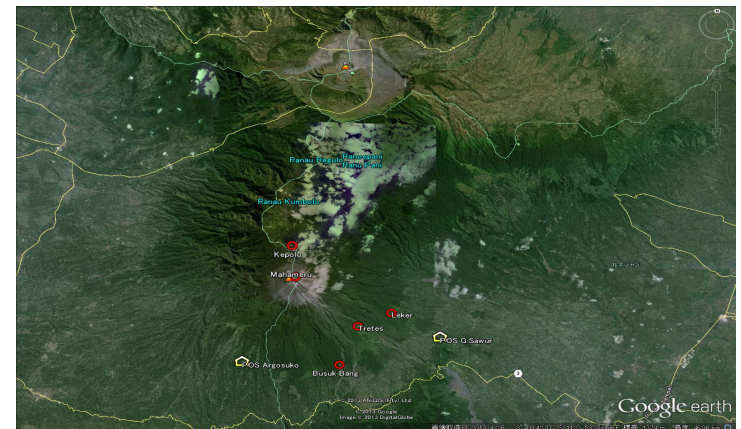
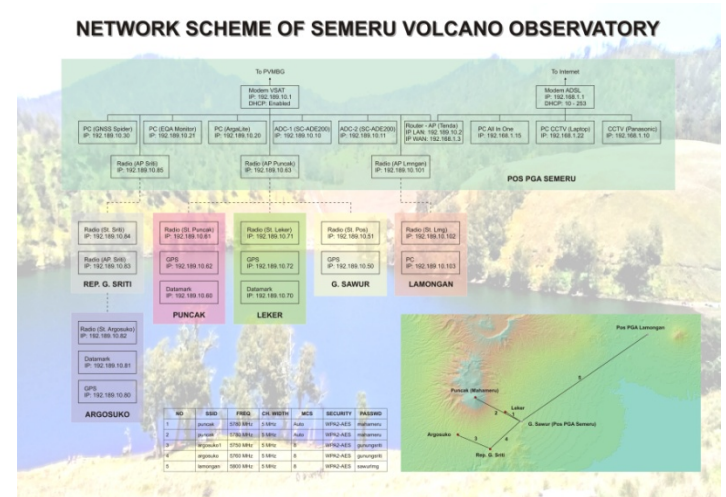


# Future Work

## Processing Data from GPS and Seismic station in Kelud and Semeru Volcanoes

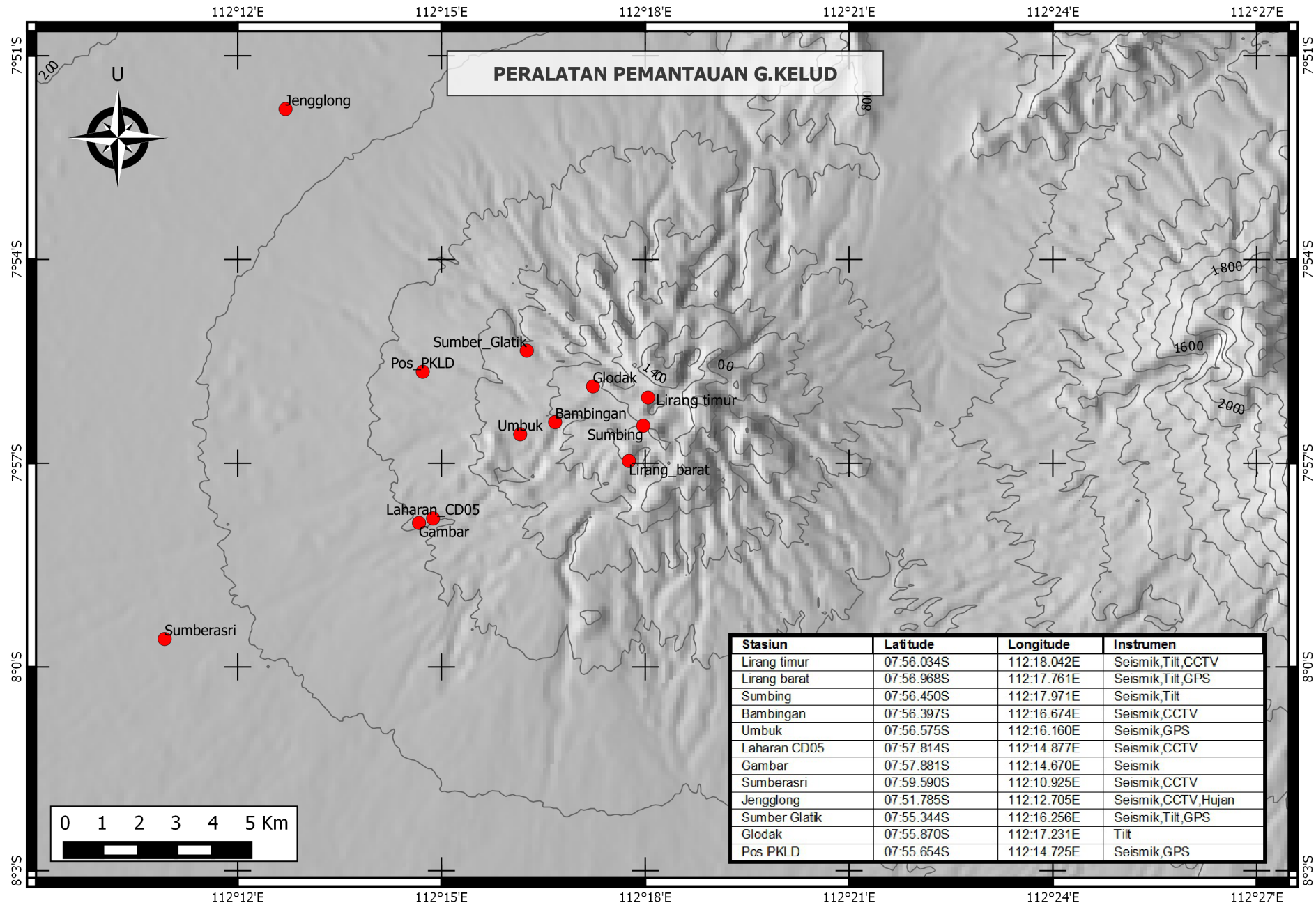


Volcanic Tremor at Semeru Volcano 08/11/2015





## PERALATAN PEMANTAUAN G.KELUD



Stasiun	Latitude	Longitude	Instrumen
Lirang timur	07:56.034S	112:18.042E	Seismik,Tilt,CCTV
Lirang barat	07:56.968S	112:17.761E	Seismik,Tilt,GPS
Sumbing	07:56.450S	112:17.971E	Seismik,Tilt
Bambang	07:56.397S	112:16.674E	Seismik,CCTV
Umbuk	07:56.575S	112:16.160E	Seismik,GPS
Laharan CD05	07:57.814S	112:14.877E	Seismik,CCTV
Gambar	07:57.881S	112:14.670E	Seismik
Sumberasri	07:59.590S	112:10.925E	Seismik,CCTV
Jengglong	07:51.785S	112:12.705E	Seismik,CCTV,Hujan
Sumber Glatik	07:55.344S	112:16.256E	Seismik,Tilt,GPS
Glodak	07:55.870S	112:17.231E	Tilt
Pos PKLD	07:55.654S	112:14.725E	Seismik,GPS



**Thank you**



# The Concept of Regional Center

- First time introduced in Guntur Volcano and Batur Volcano in 2000, As center of volcano monitoring in its region.
- The Characteristic of Regional Center :
  - Receive transmitted-data from more than 1 volcano
  - It has wide coverage, high facilities of electricity and communication
  - It can send real time seismic data to CVGHM in Bandung
- Now we have 6 Regional Center, Such as Guntur, Batur, Gamalama, Lokon, Marapi, Semeru

**Batur RC, Bali**



**Guntur RC,  
West Java**



**Lokon RC, North  
Sulewasi**



**Marapi RC, West  
Sumatera**



**Gamalama RC,  
Molluca**



**Semeru RC,  
East Java**

