



# ***Study of the electrical field related to Kozani-Grevena (Greece) Ms 6.6 earthquake of May 13, 1995 Preliminary results***



**Vargemezis G.**

*Geophysical Laboratory of Aristotle's University of  
Thessaloniki, **GREECE***

CENTRE NATIONAL  
DE LA RECHERCHE  
SCIENTIFIQUE

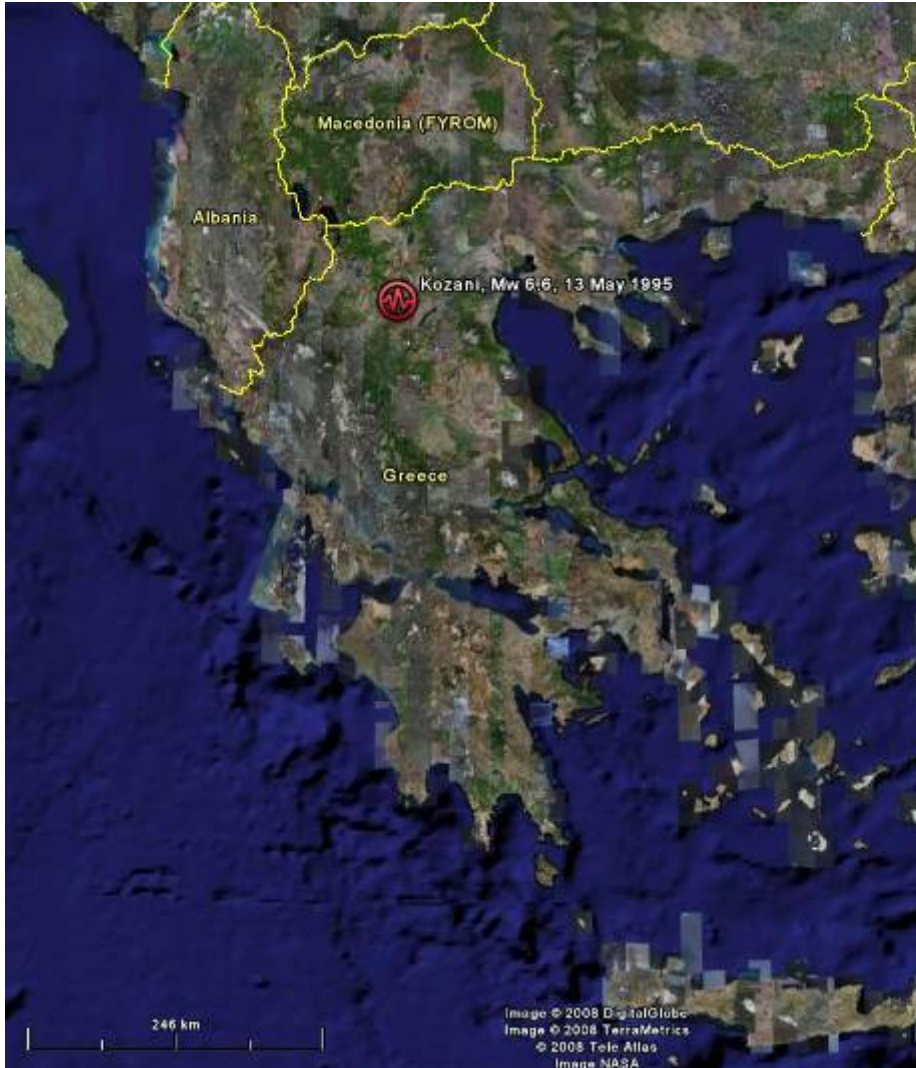


**Zlotnicki J.**

*CNRS-UPB-UMR6524, **FRANCE***

- Case description- Motivation
- Data collection
- Mass data processing
- Focusing in special cases
- Conclusions

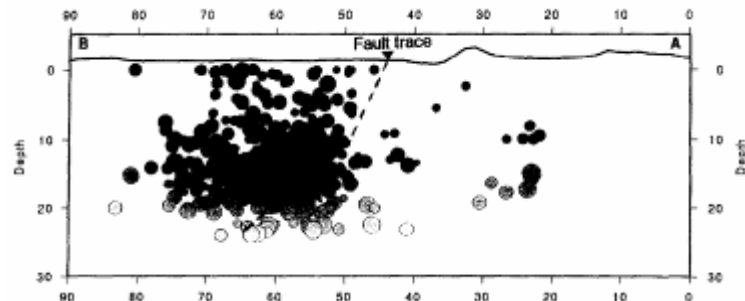
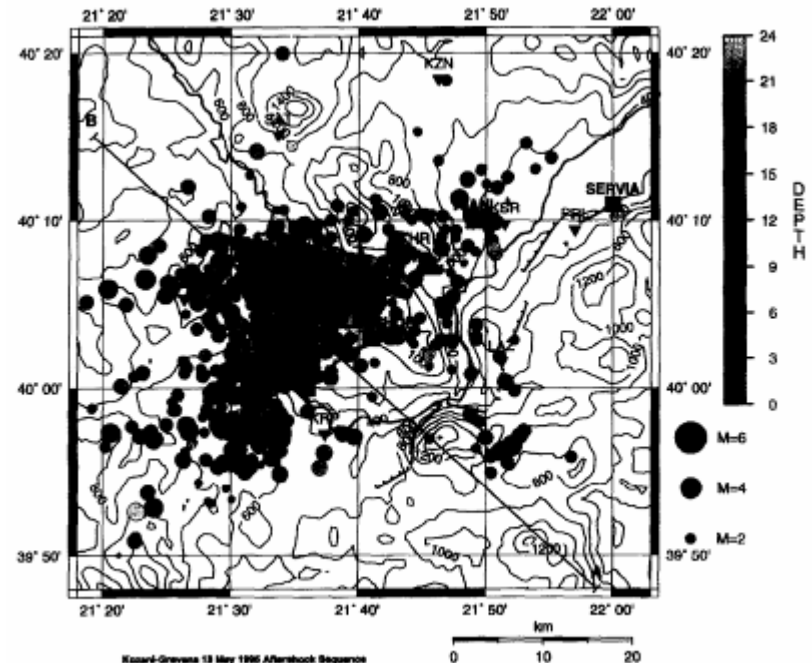
# May 13, 1995 earthquake in Kozani area, Greece



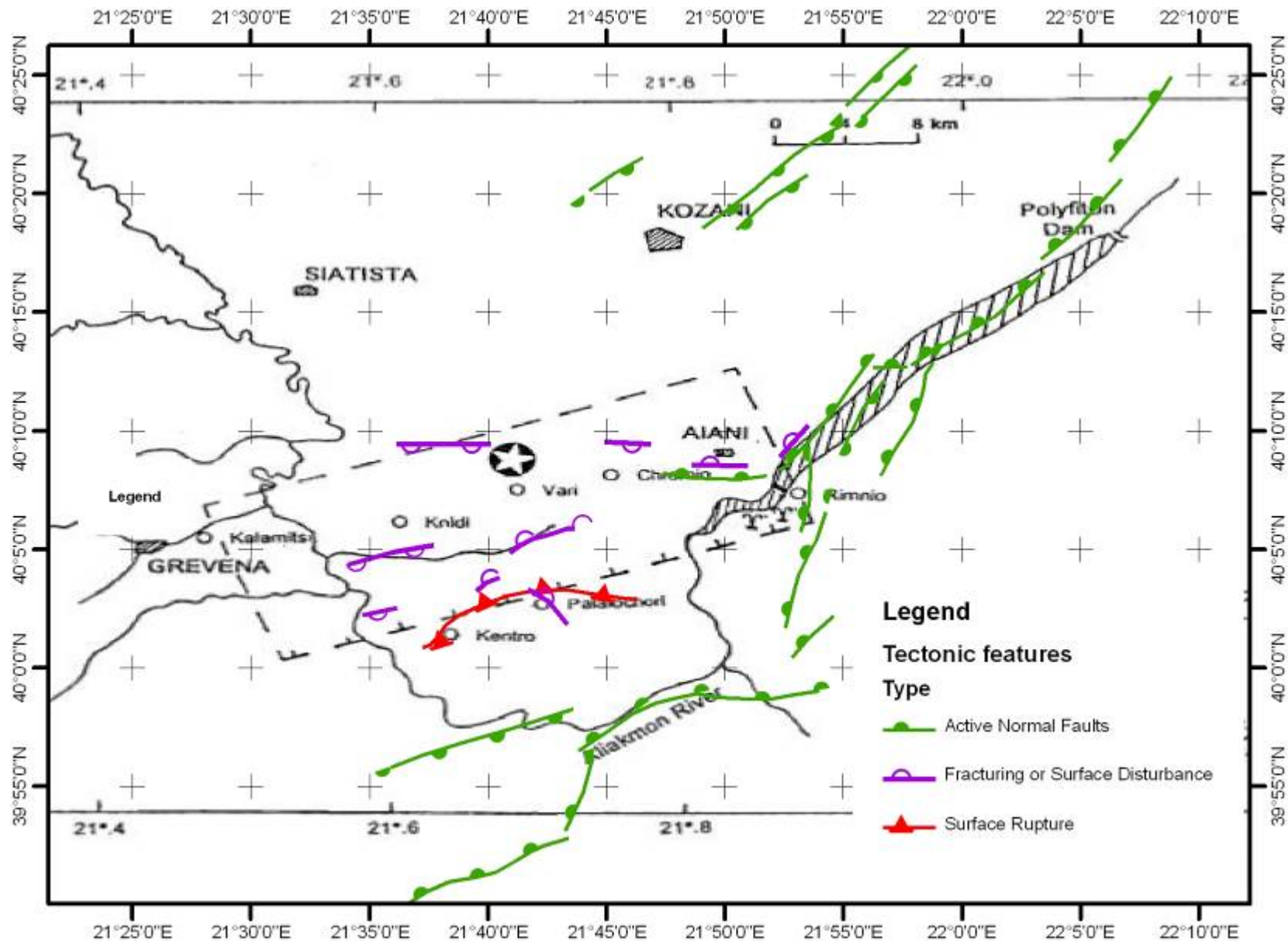
# Model of 1995 KOZANI-GREVENA sequence

- Mw 6.6
- Strike N65°E
- Length 30km
- Width 10km
- Dip NNW
- Mean displacement 50cm
- Depth 13.6km

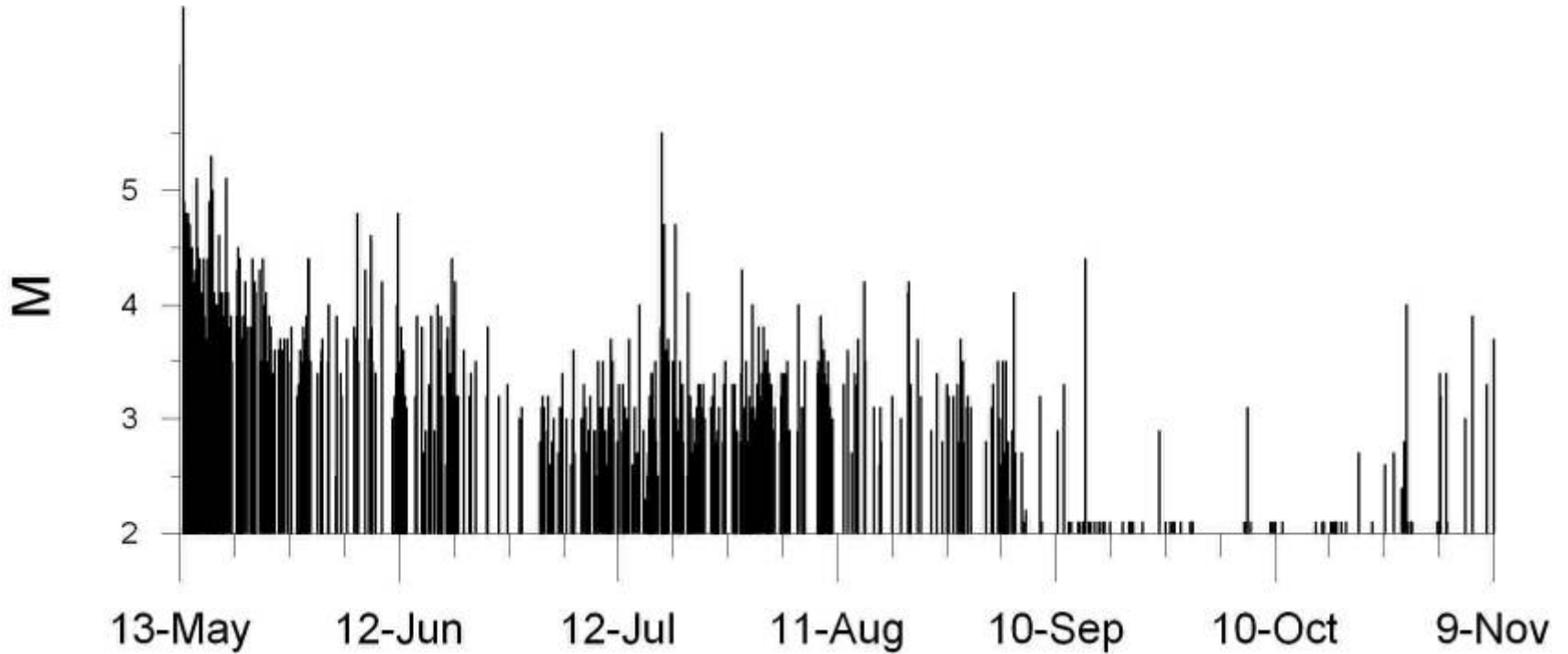
Papazachos et al. (1998)



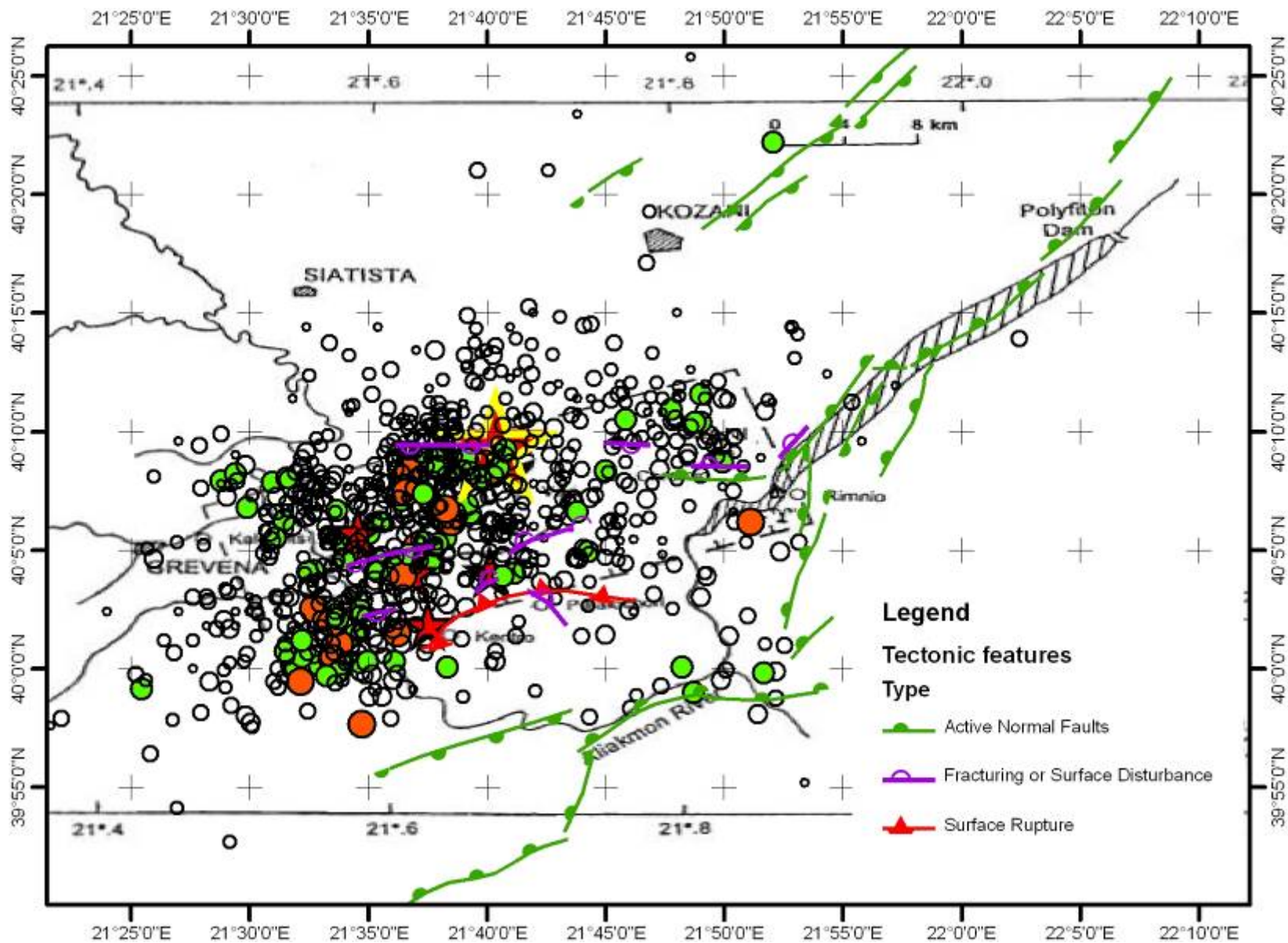
Papanastasiou et al. (1998)



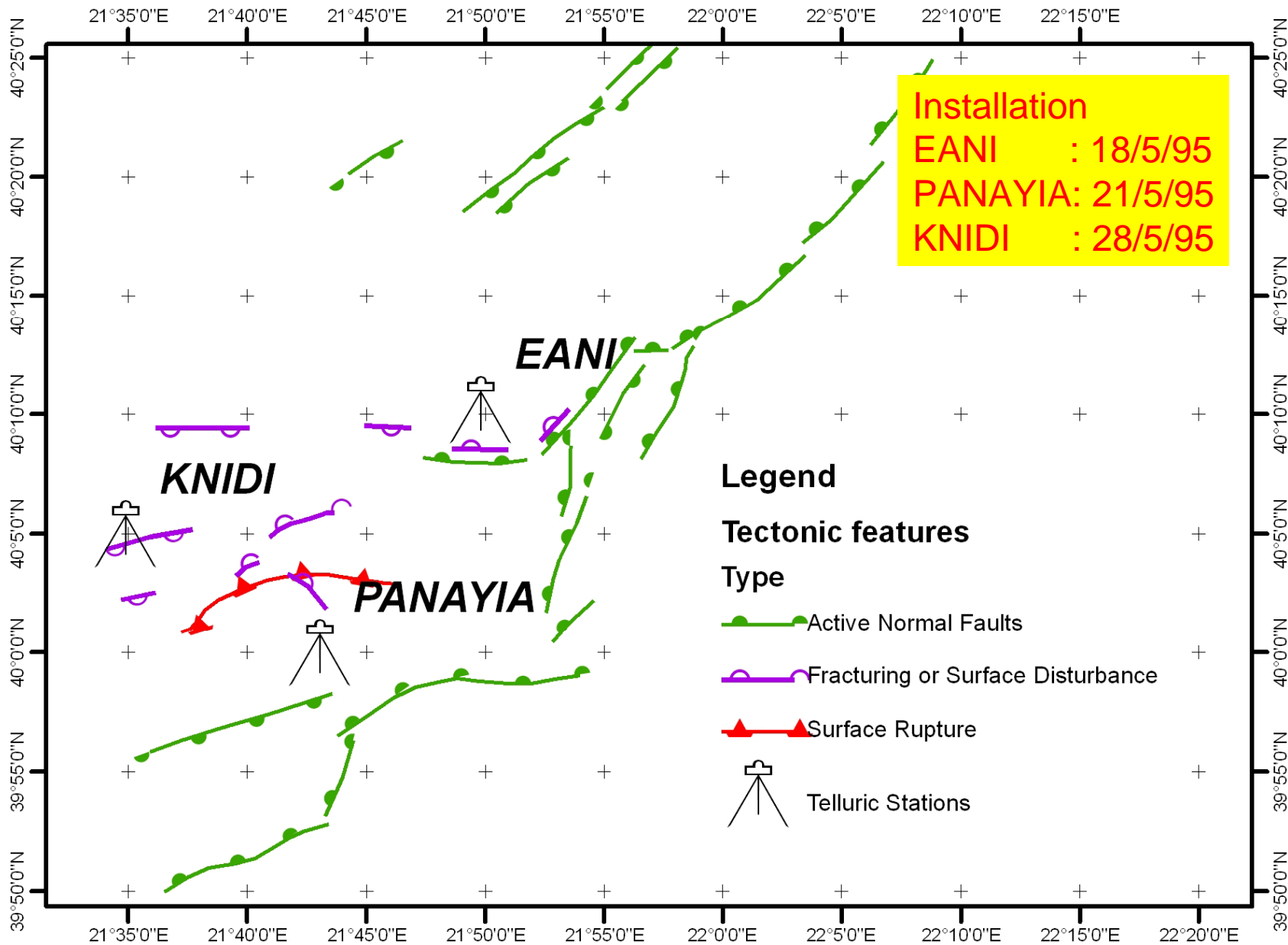
# Seismicity in time



Number of events	900
Minimum	2.1
Maximum	6.6



# Telluric stations





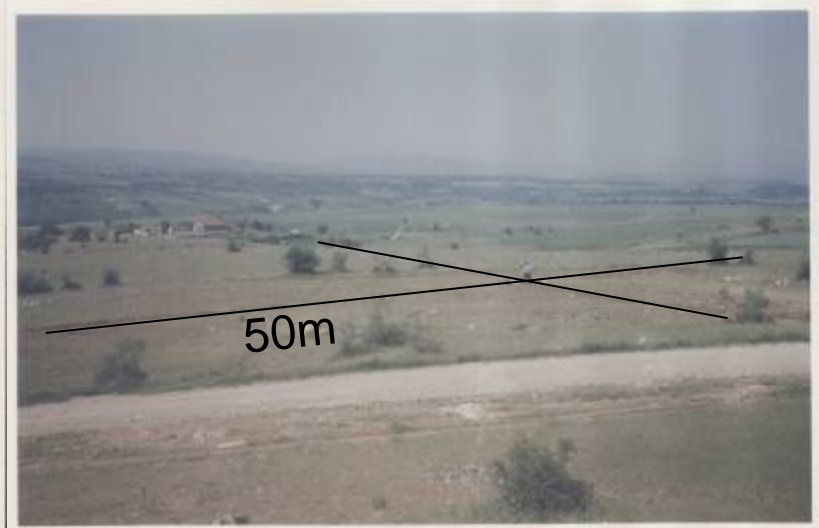
# Installation of KNIDI telluric station



Pb-PbCl<sub>2</sub> Non polarized electrode



Sampling interval: 4 sec



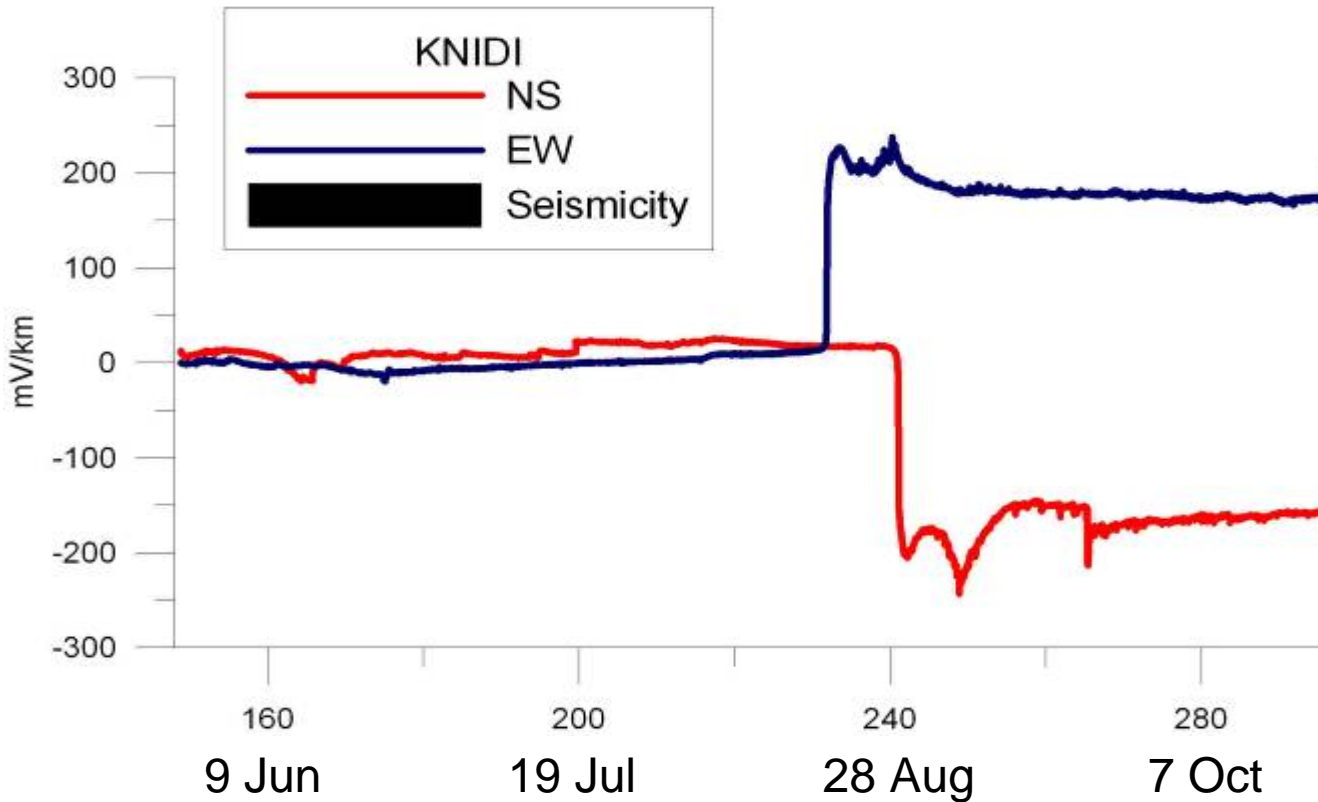
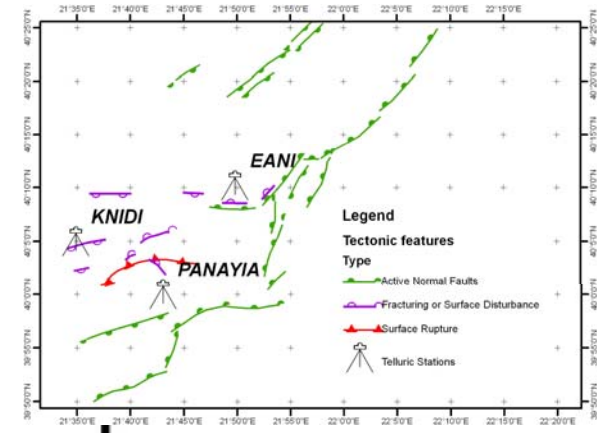
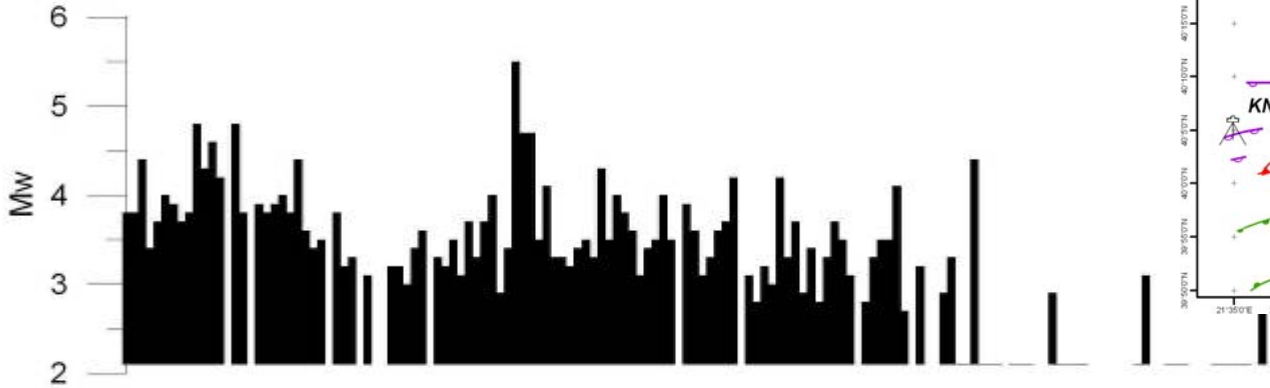
# VOLOS remote EM station



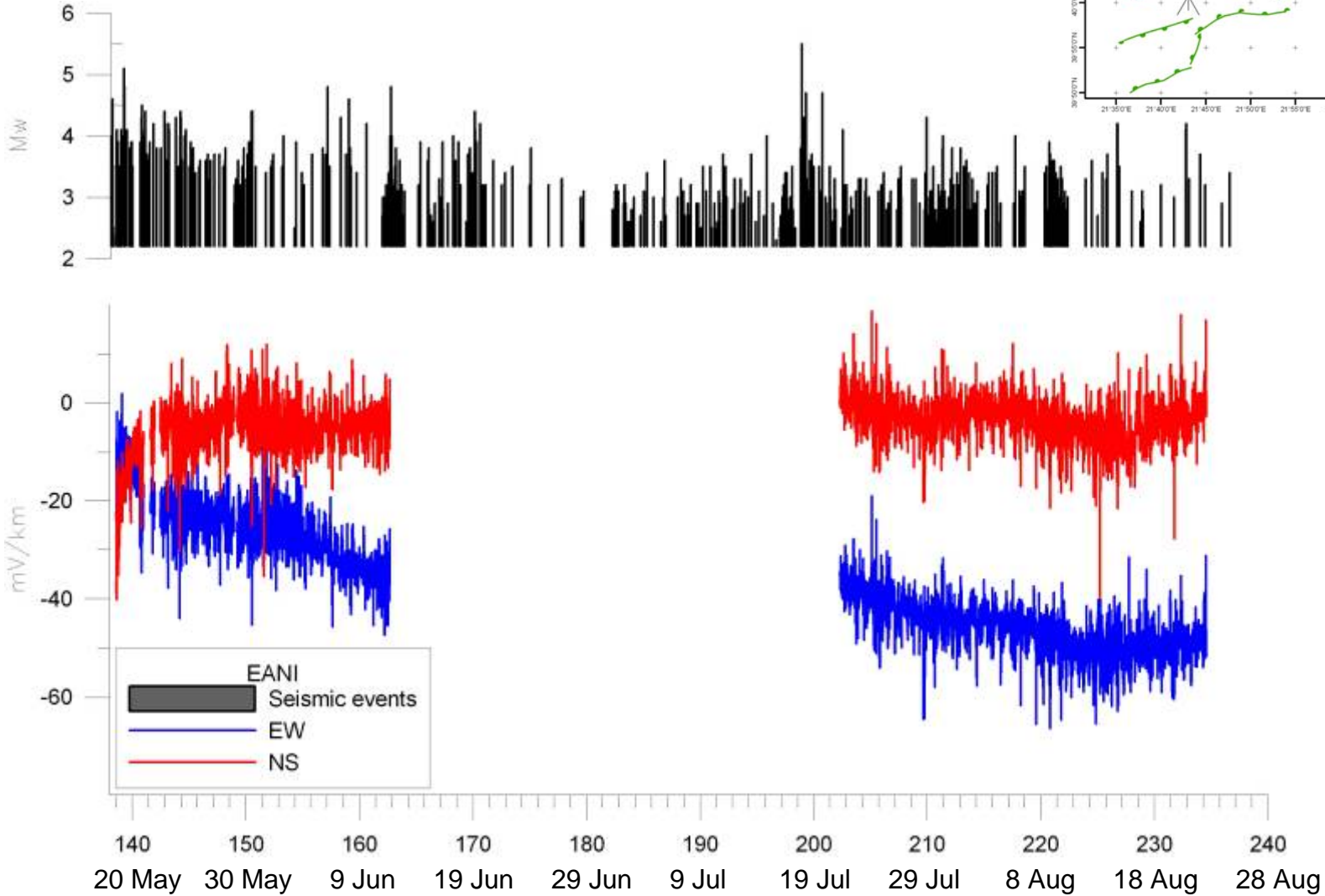
- Plots of time series of raw data in different time periods
- Filtering in different frequencies
- Time-space plots of telluric and seismic activity
- Plots of polarization variation in time

..... Comparison with seismic activity

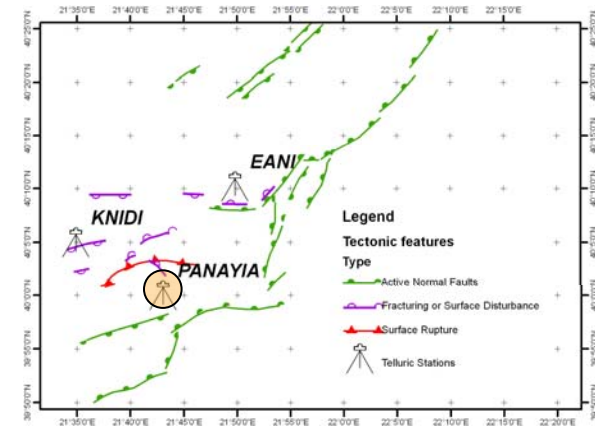
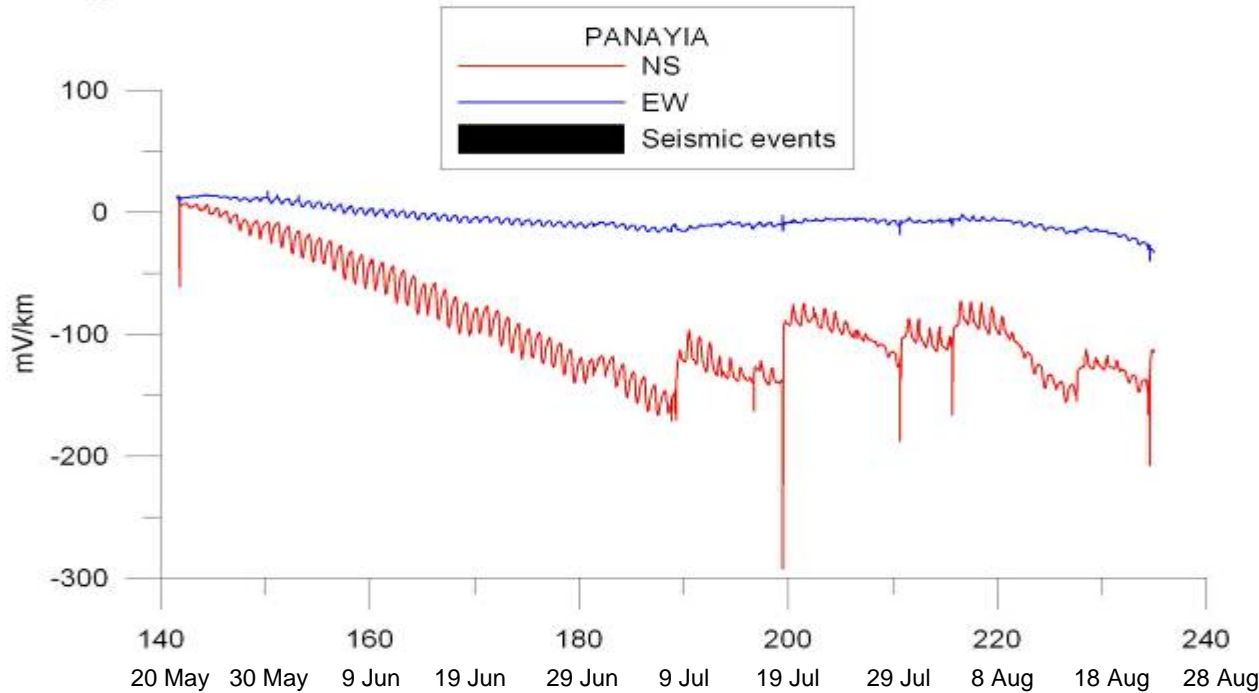
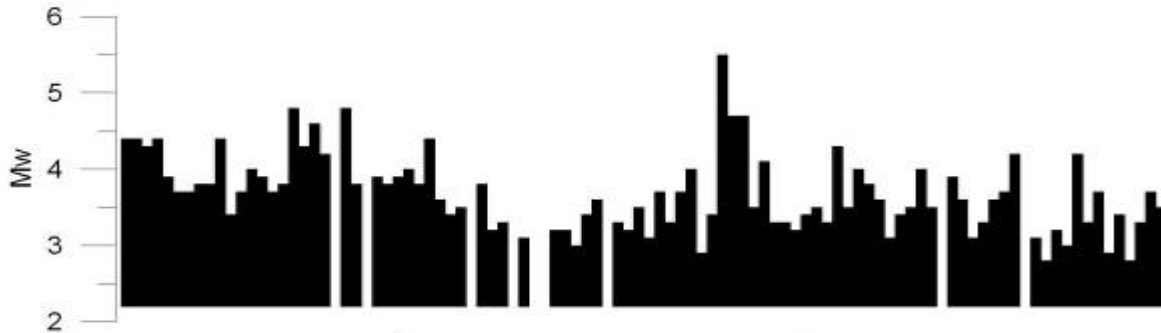
# Telluric activity in KNIDI station



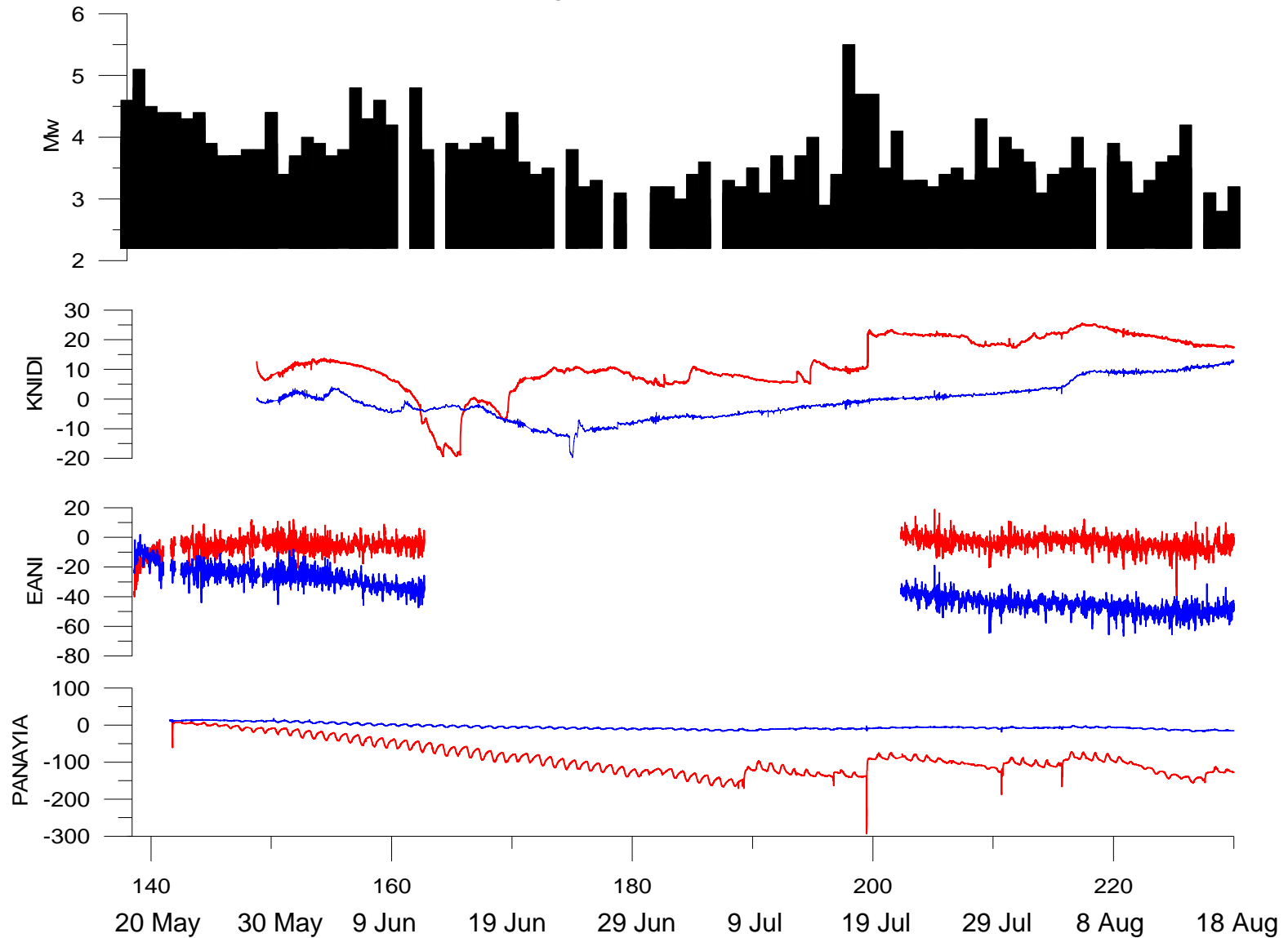
# Telluric field at EANI station



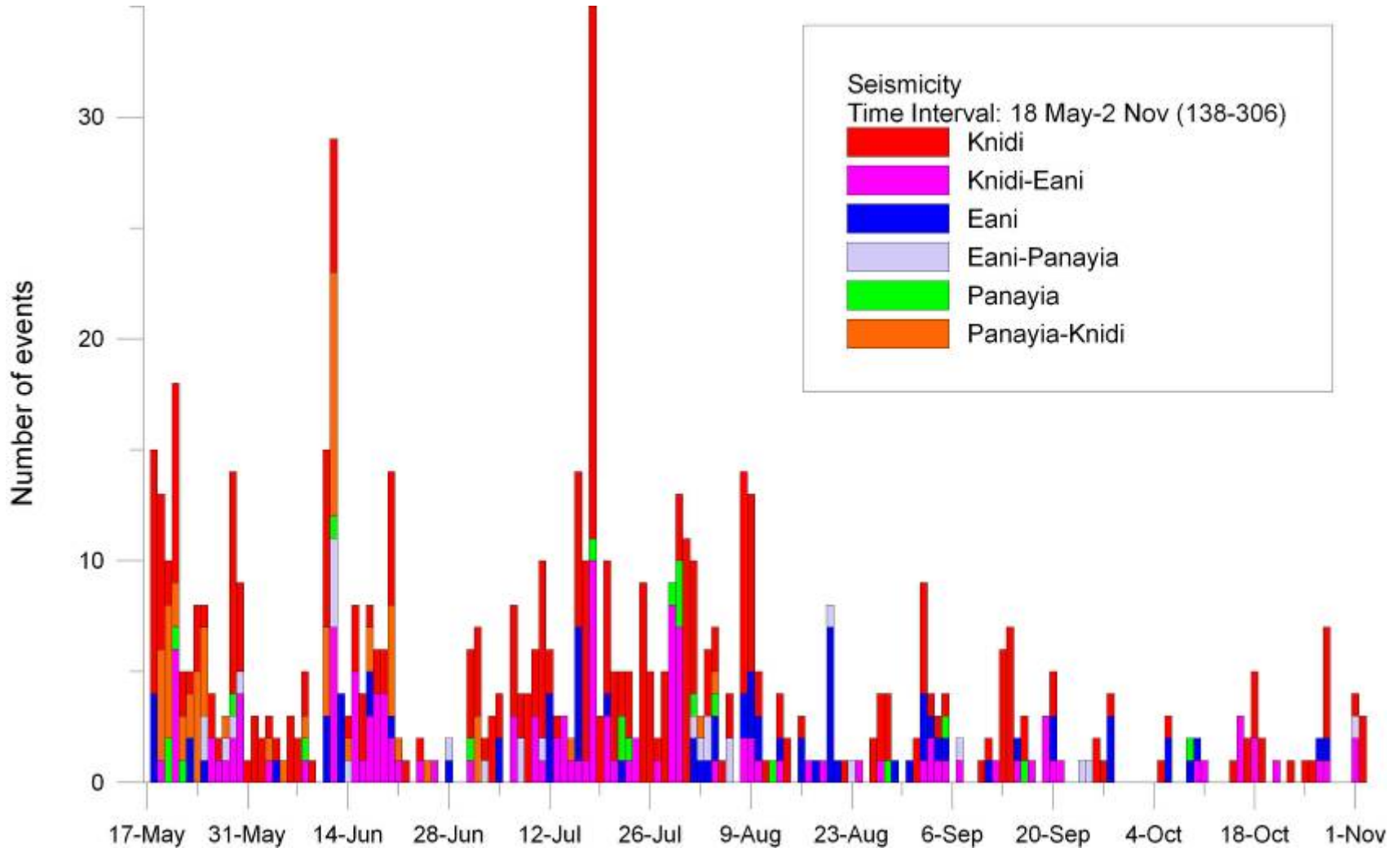
# Telluric field at PANAYIA station



# Telluric activity in KOZANI network

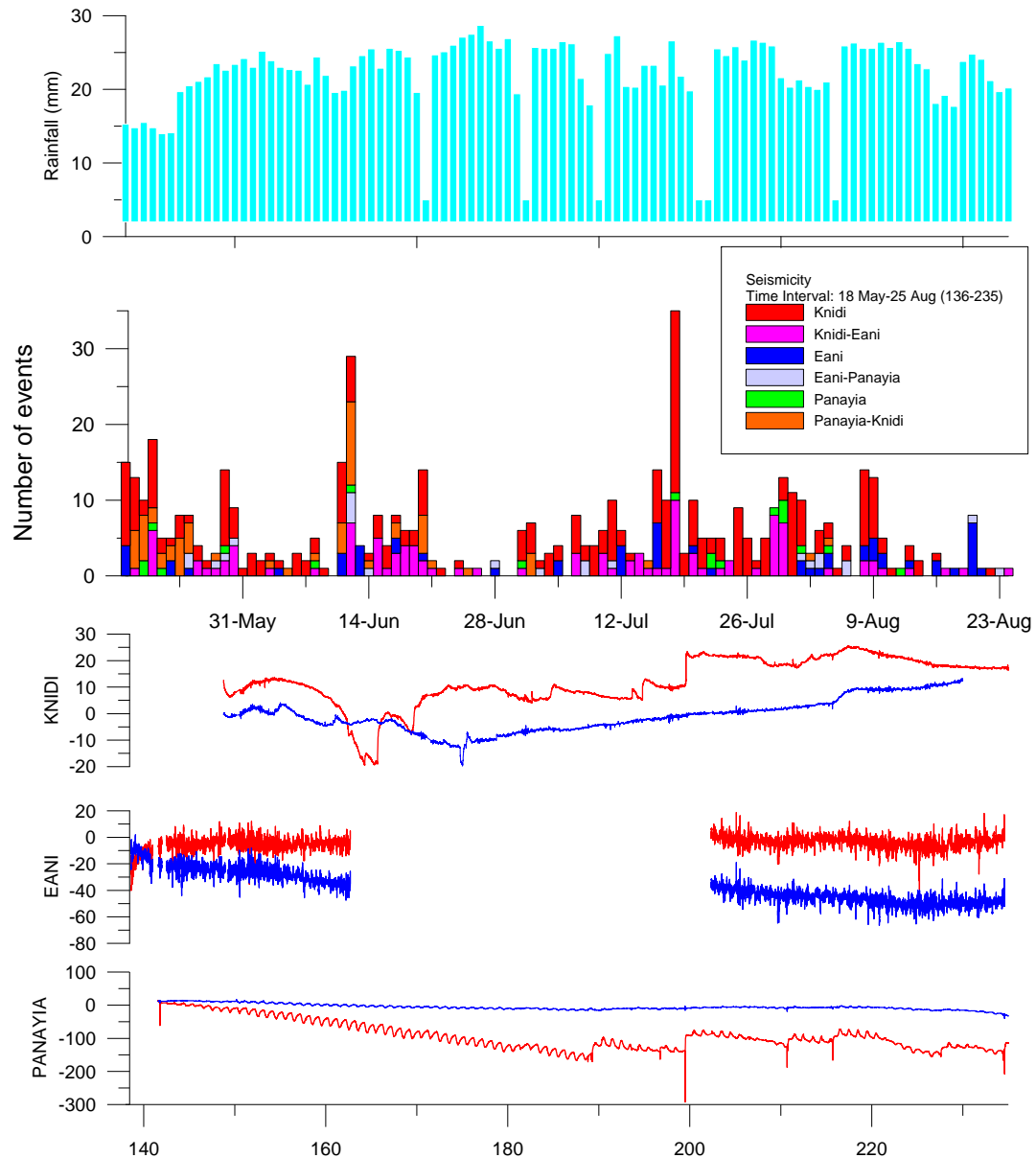


# Time-Space distribution of seismic events

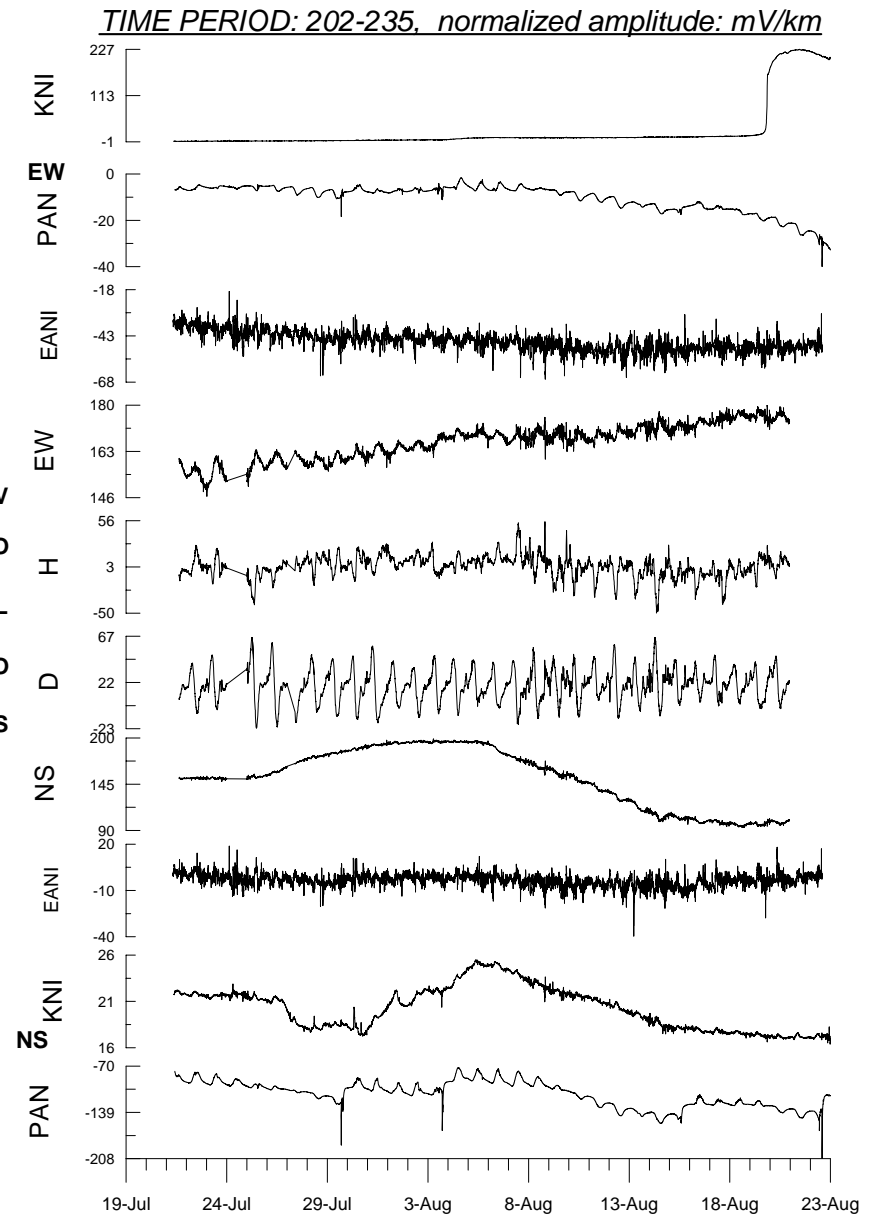
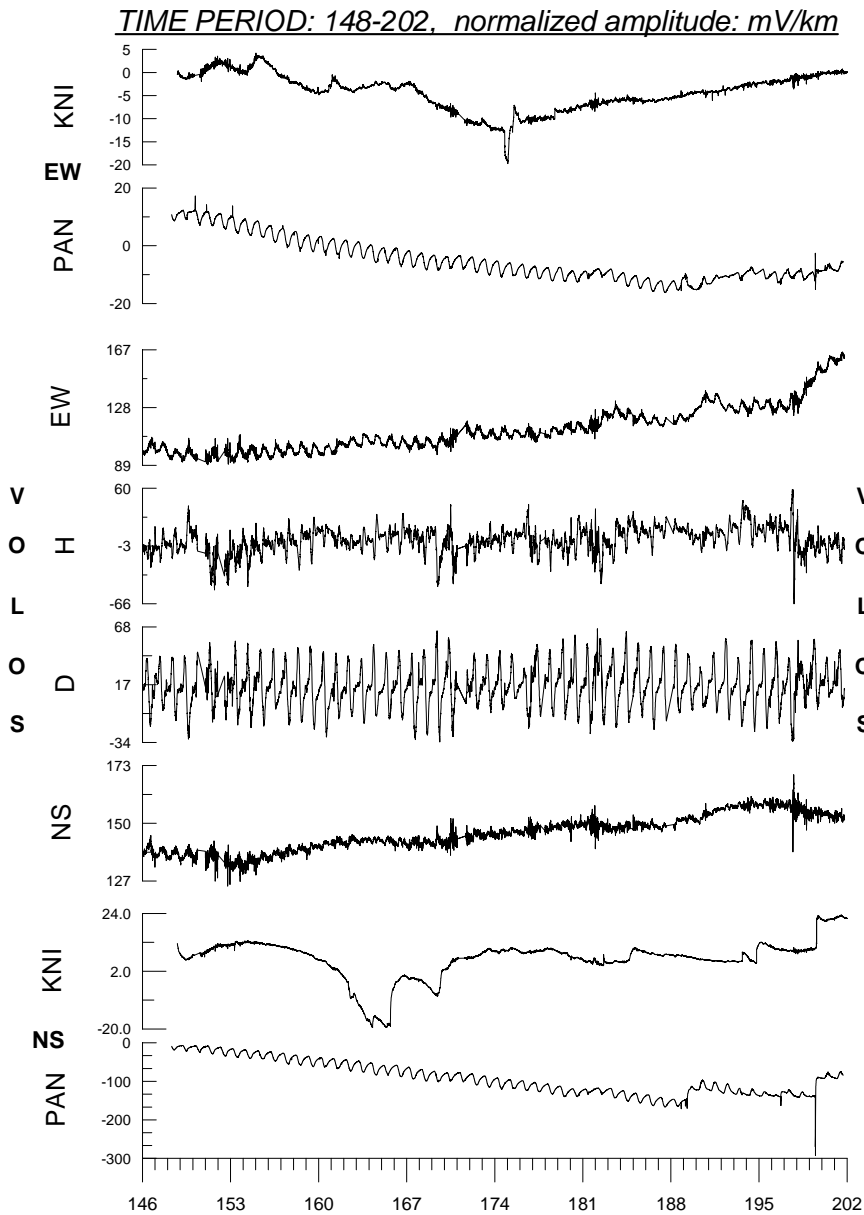




# Telluric activity compared to rainfalls and seismicity



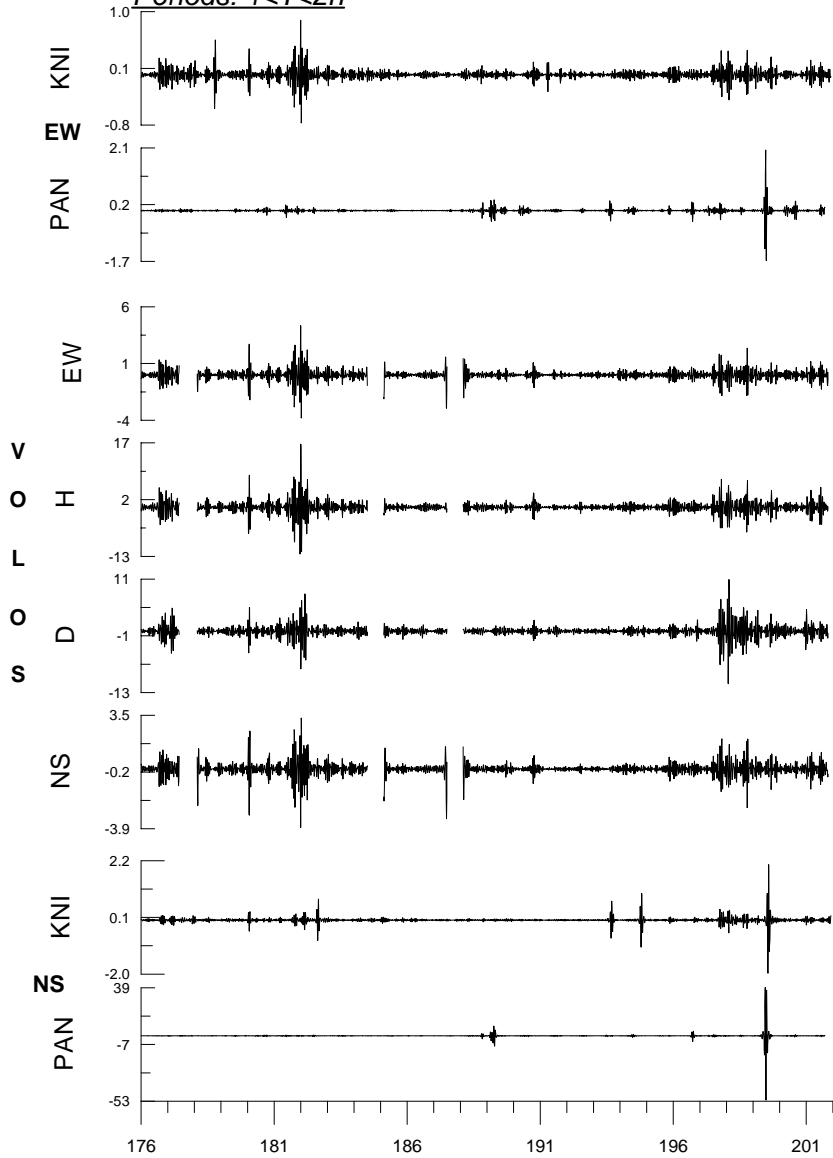
# Step 1: Raw data observation



# Filtered data

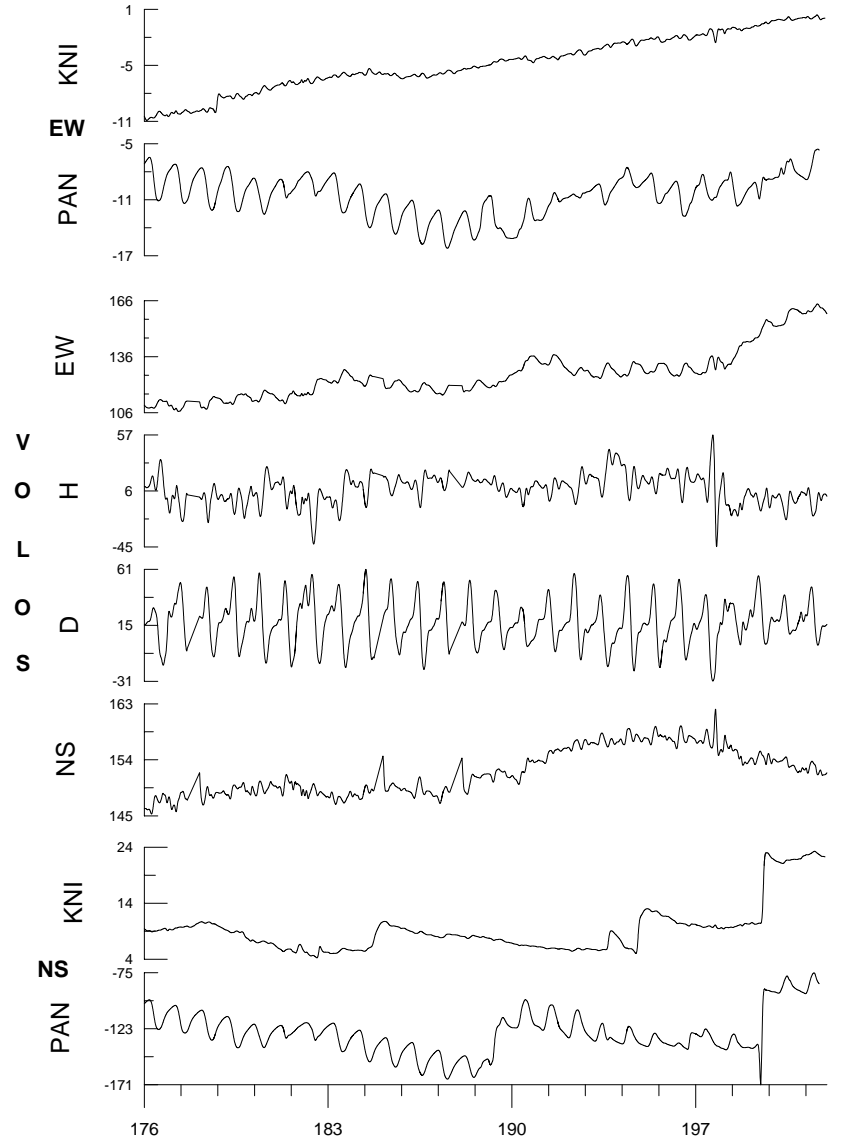
TIME PERIOD: 176-202. normalized amplitude: mV/km

Periods:  $1 < T < 2h$



TIME PERIOD: 176-202. normalized amplitude: mV/km

Periods:  $> 4h$



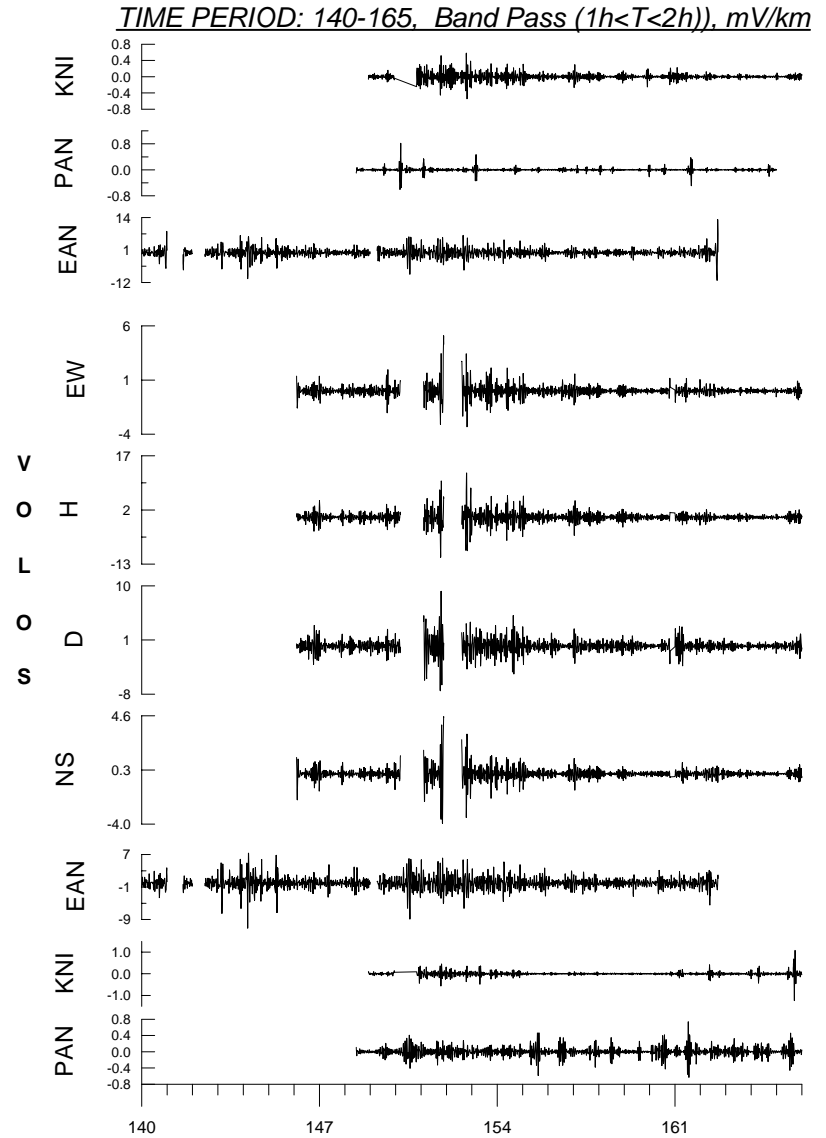
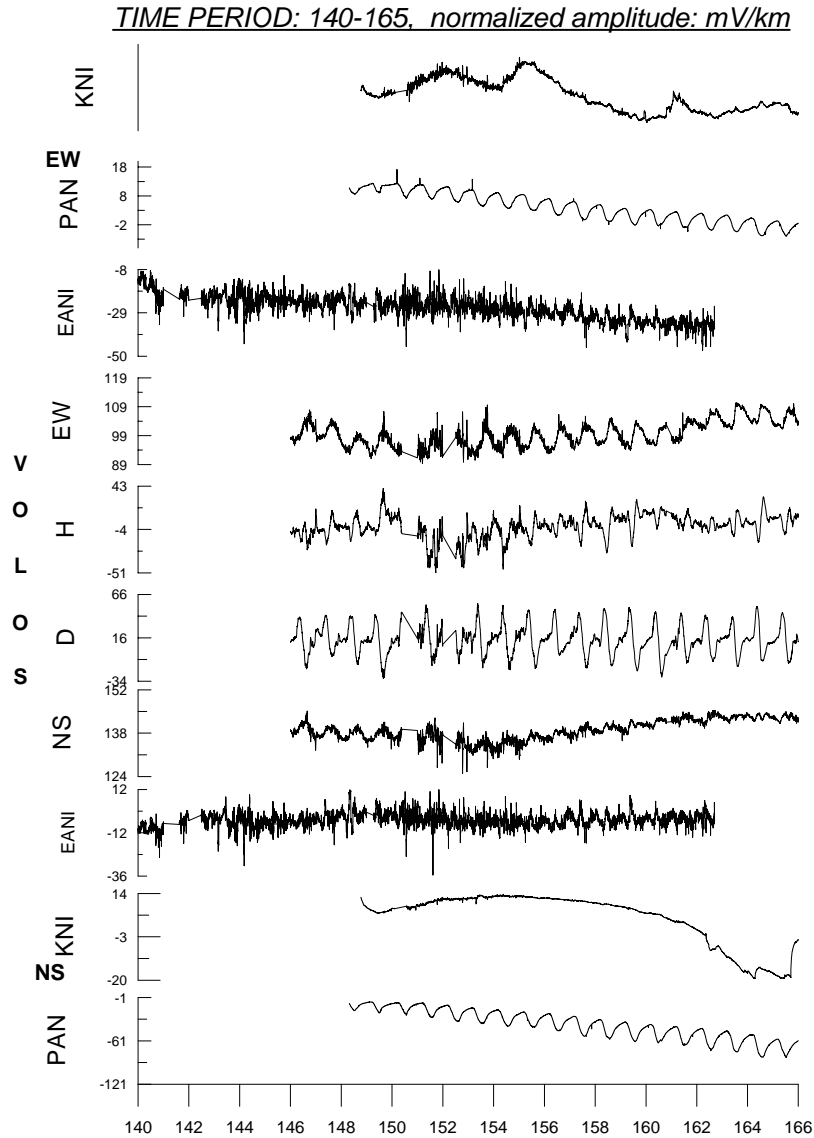
Step 2: Focusing on shorter  
periods of data records

Period A: 20 May-14 June

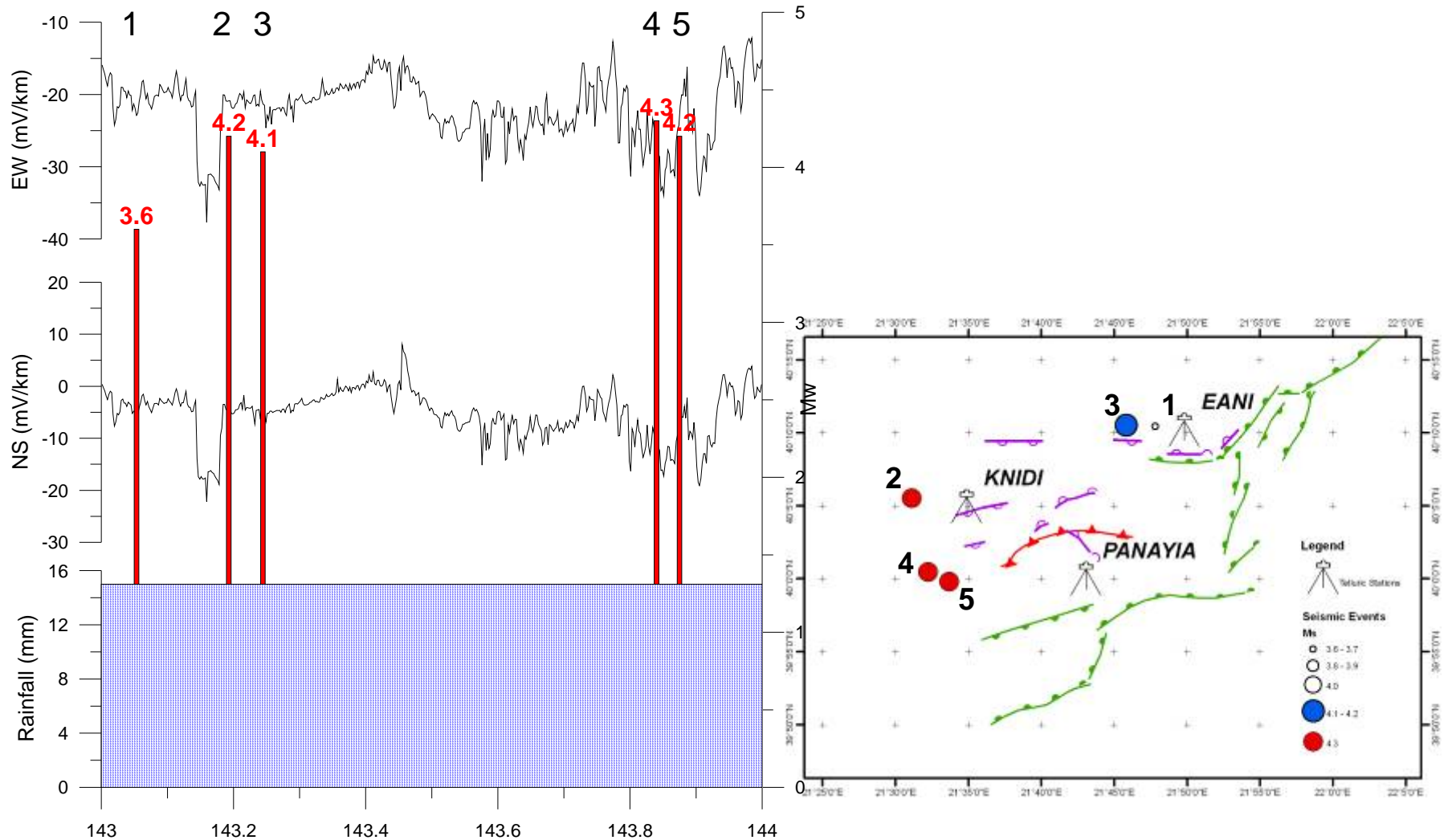
Period B: 12 -24 July

Period C: 12-27 September

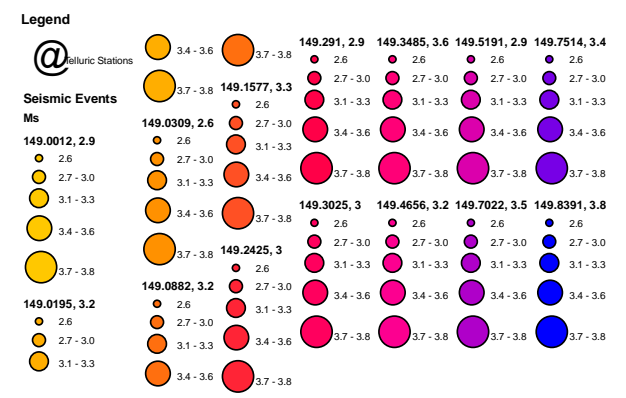
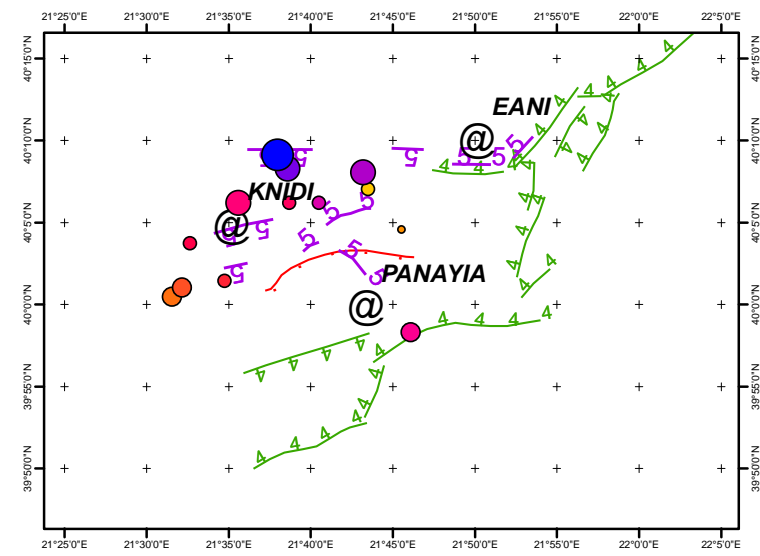
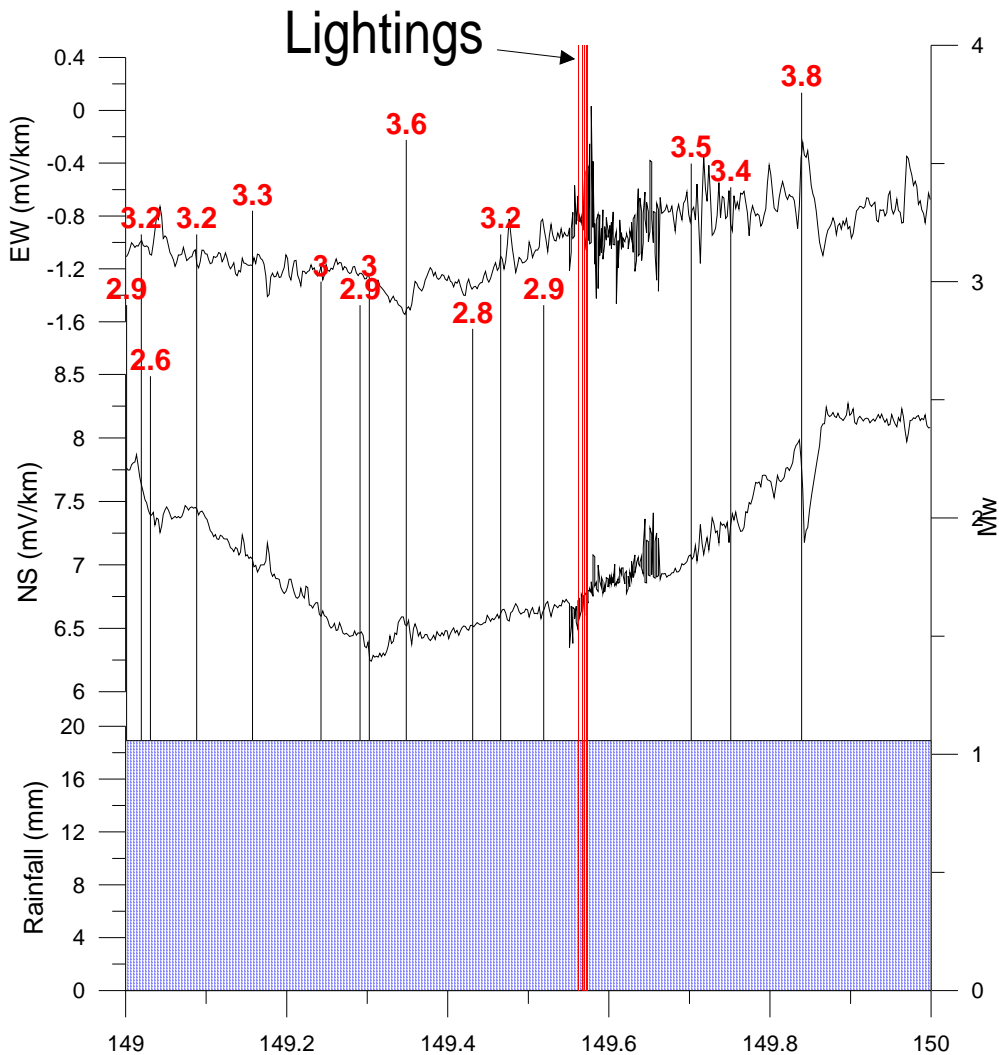
# Period A: 140-165



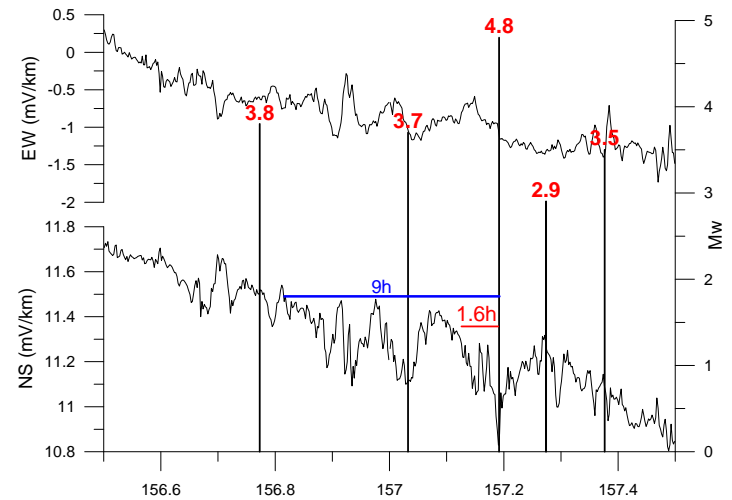
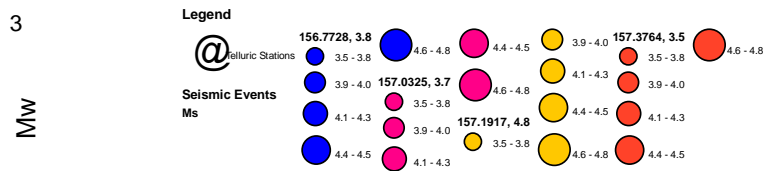
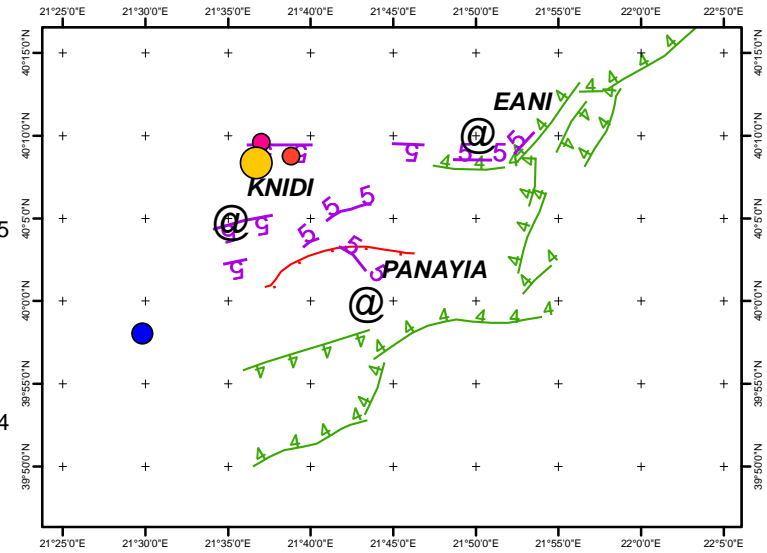
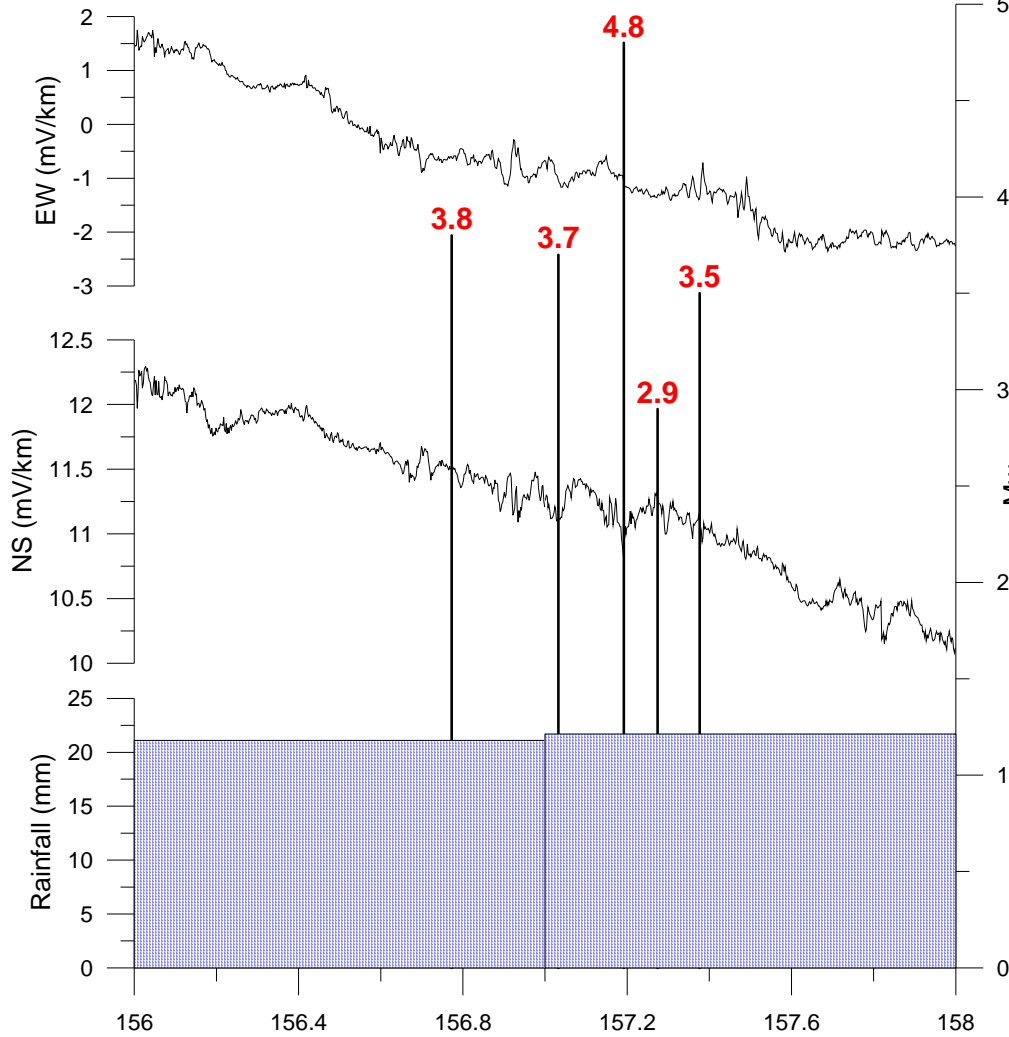
# Day 143: EANI station



# Day 149: KNIDI station

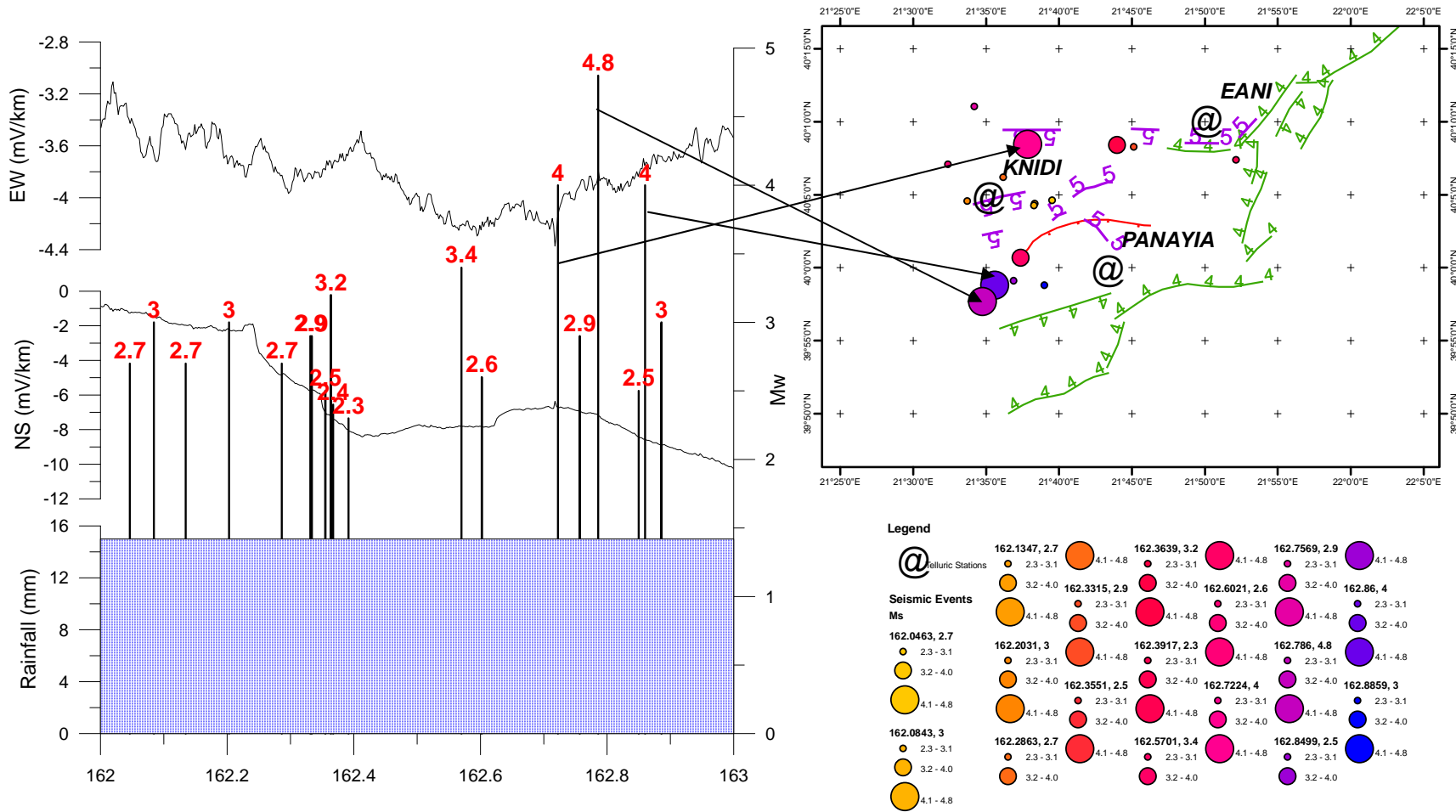


# Day 157: KNIDI station





# Day 162: KNIDI station

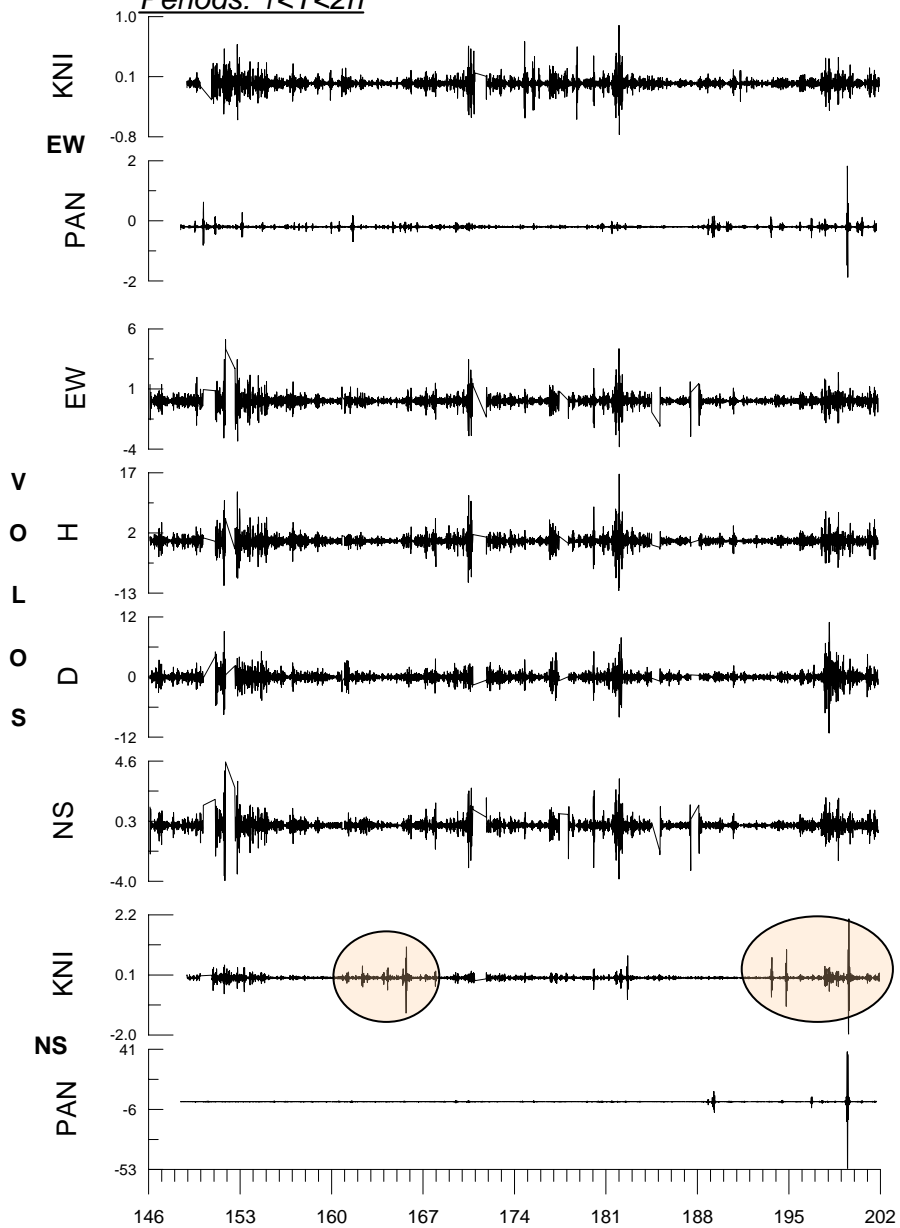


# Period B: 193-205

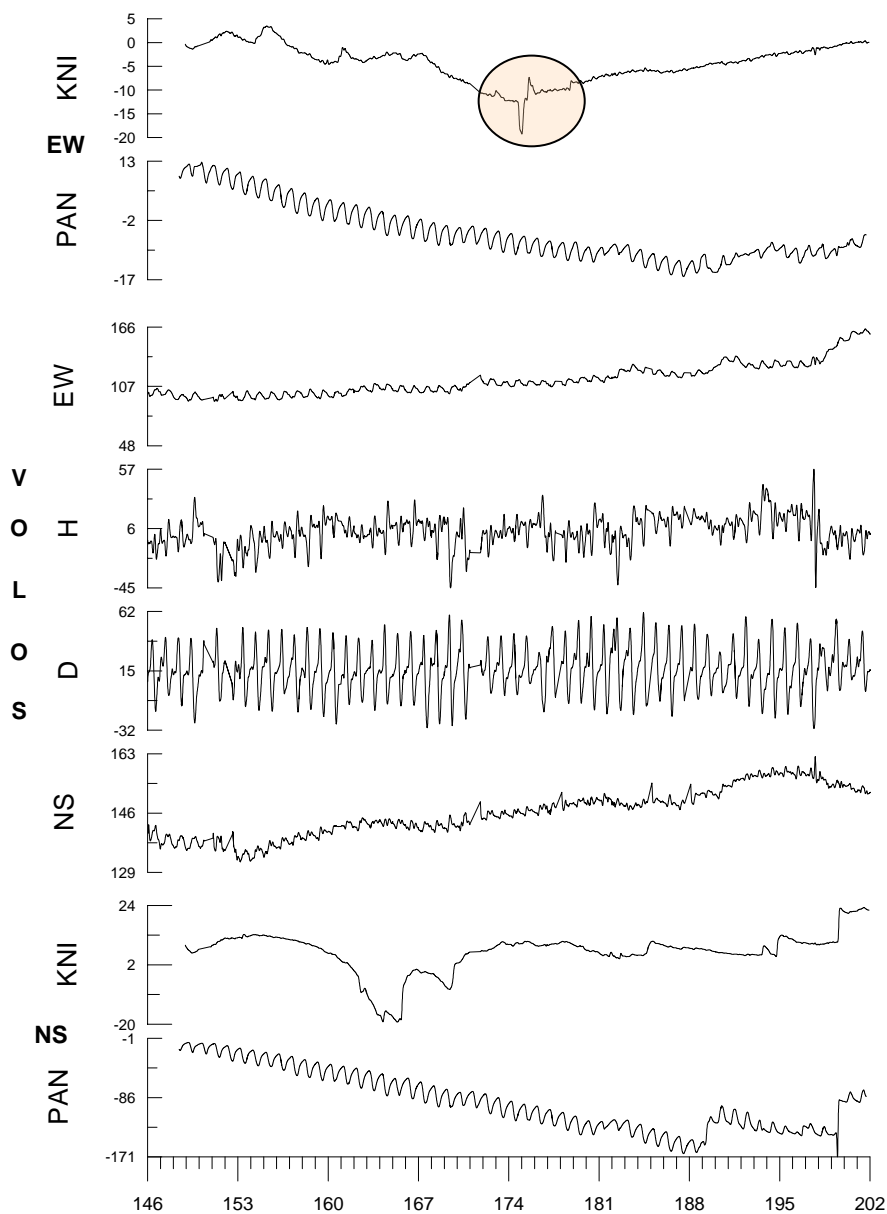
12 July – 24 July

# Filtered data

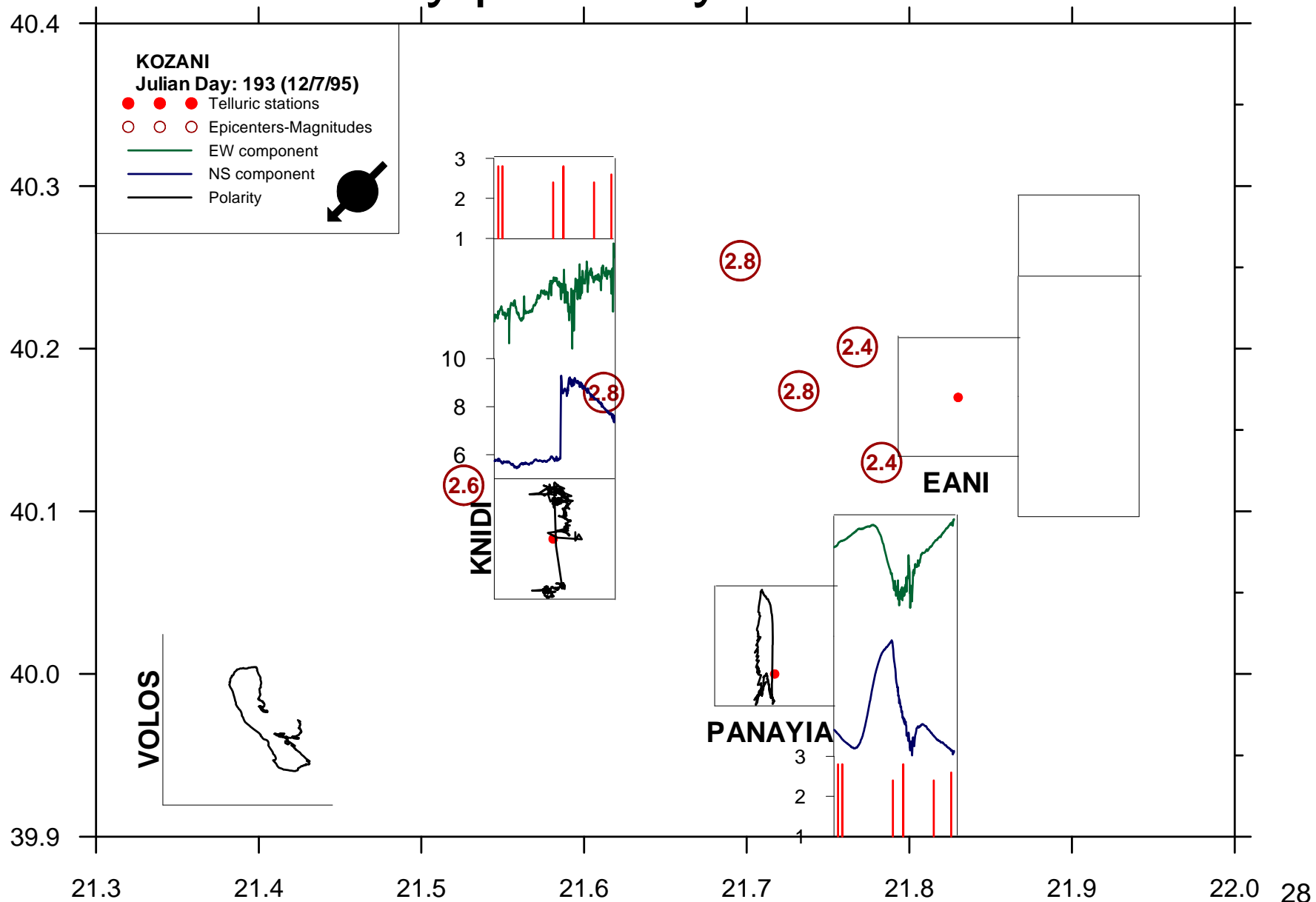
TIME PERIOD: 148-202, normalized amplitude: mV/km  
Periods:  $1 < T < 2h$



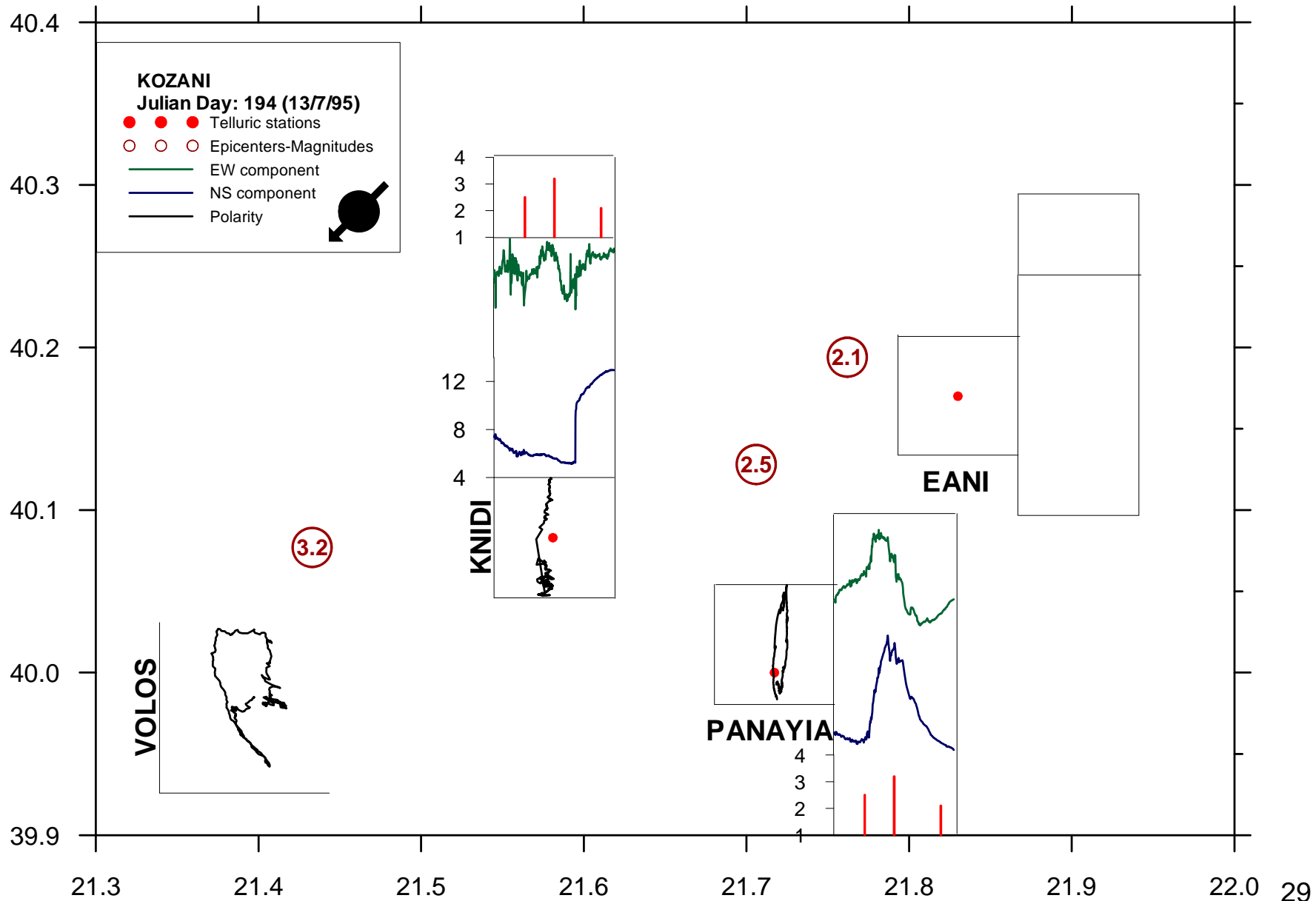
TIME PERIOD: 148-202, normalized amplitude: mV/km  
Periods:  $> 4h$



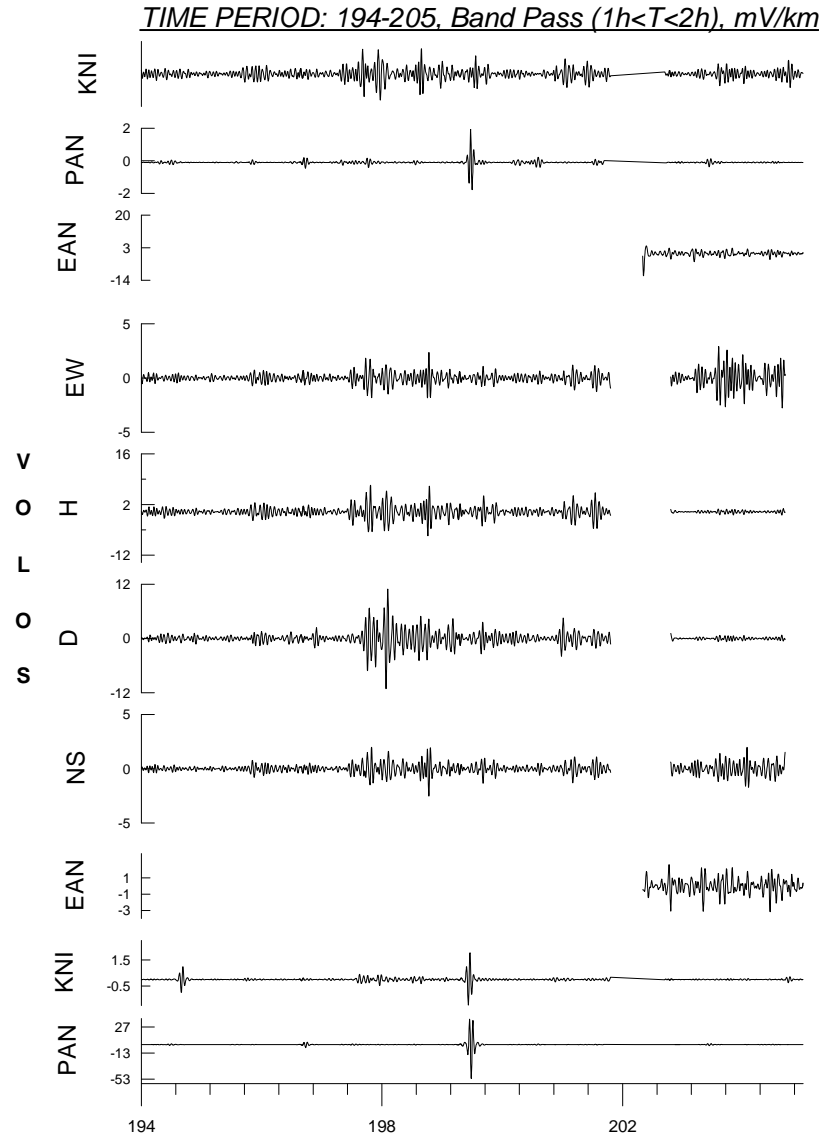
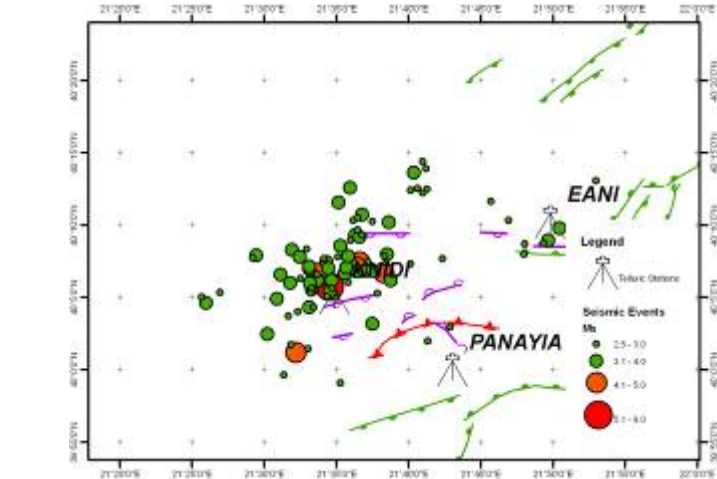
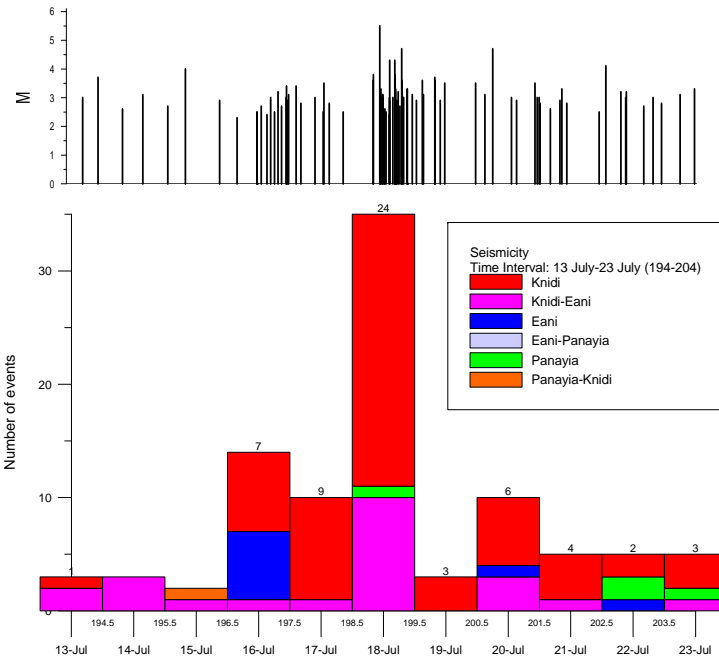
# Daily plot: Day 193



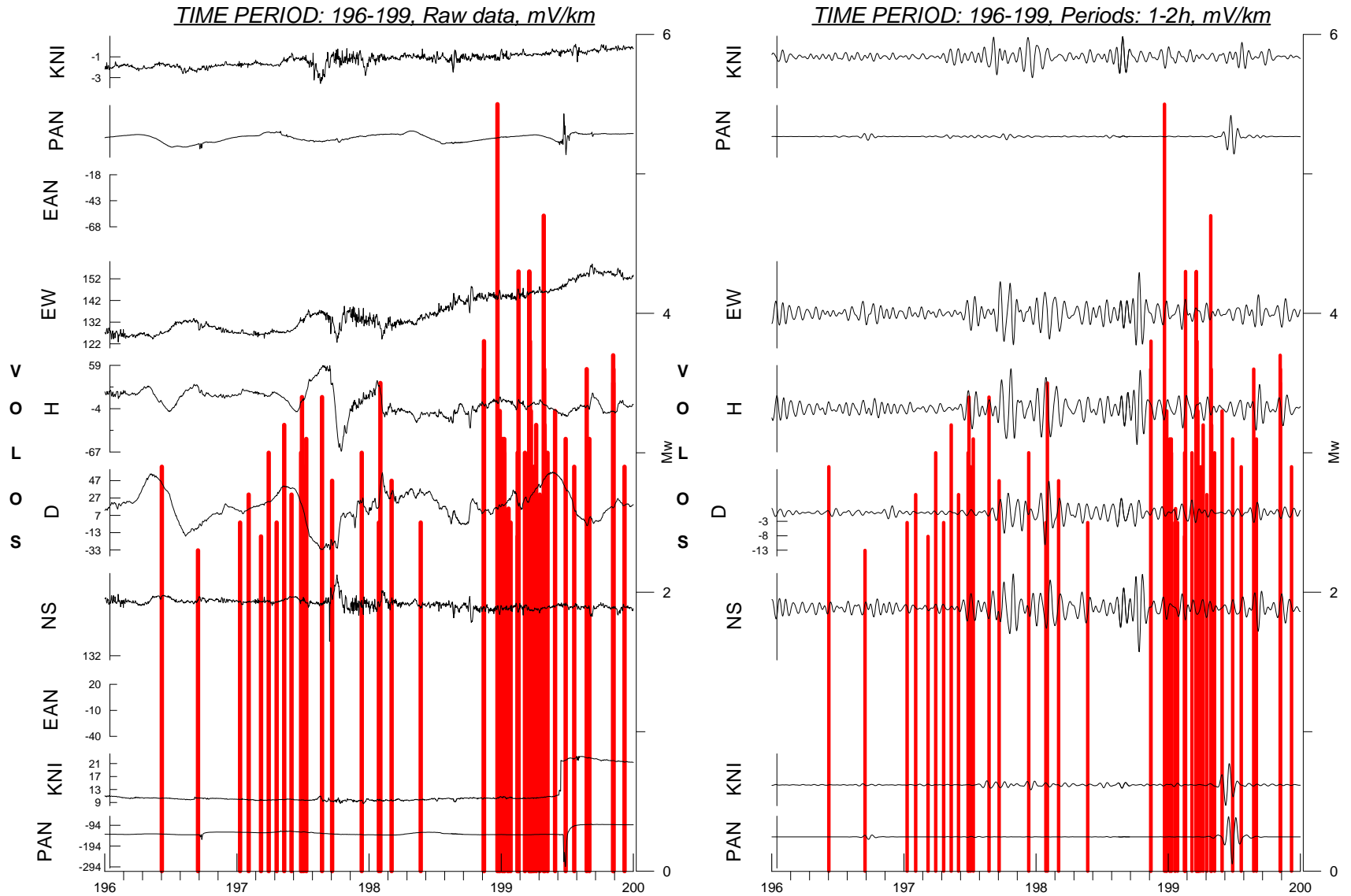
# Daily plot: Day 194

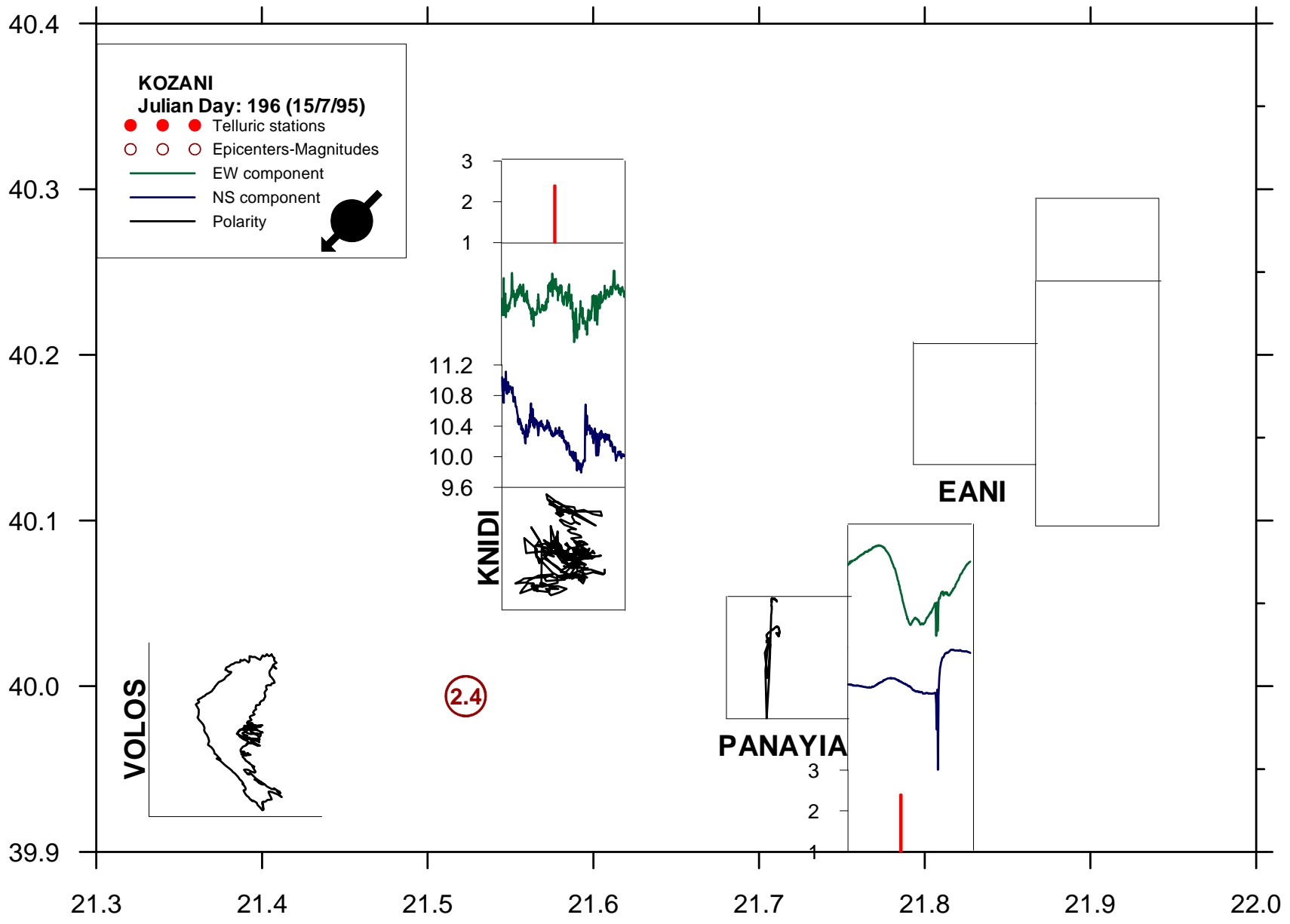


# Filtered data: 194-205

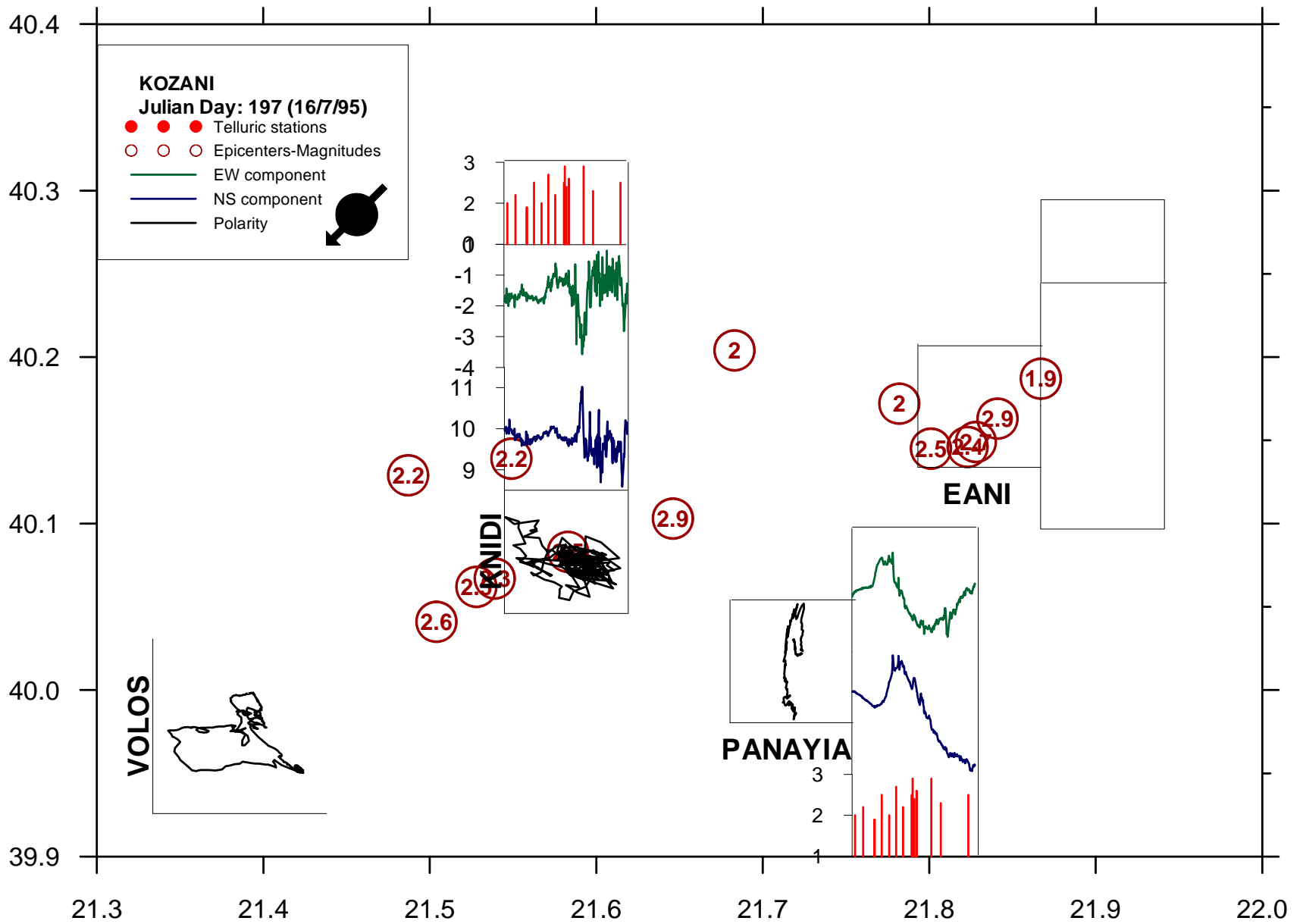


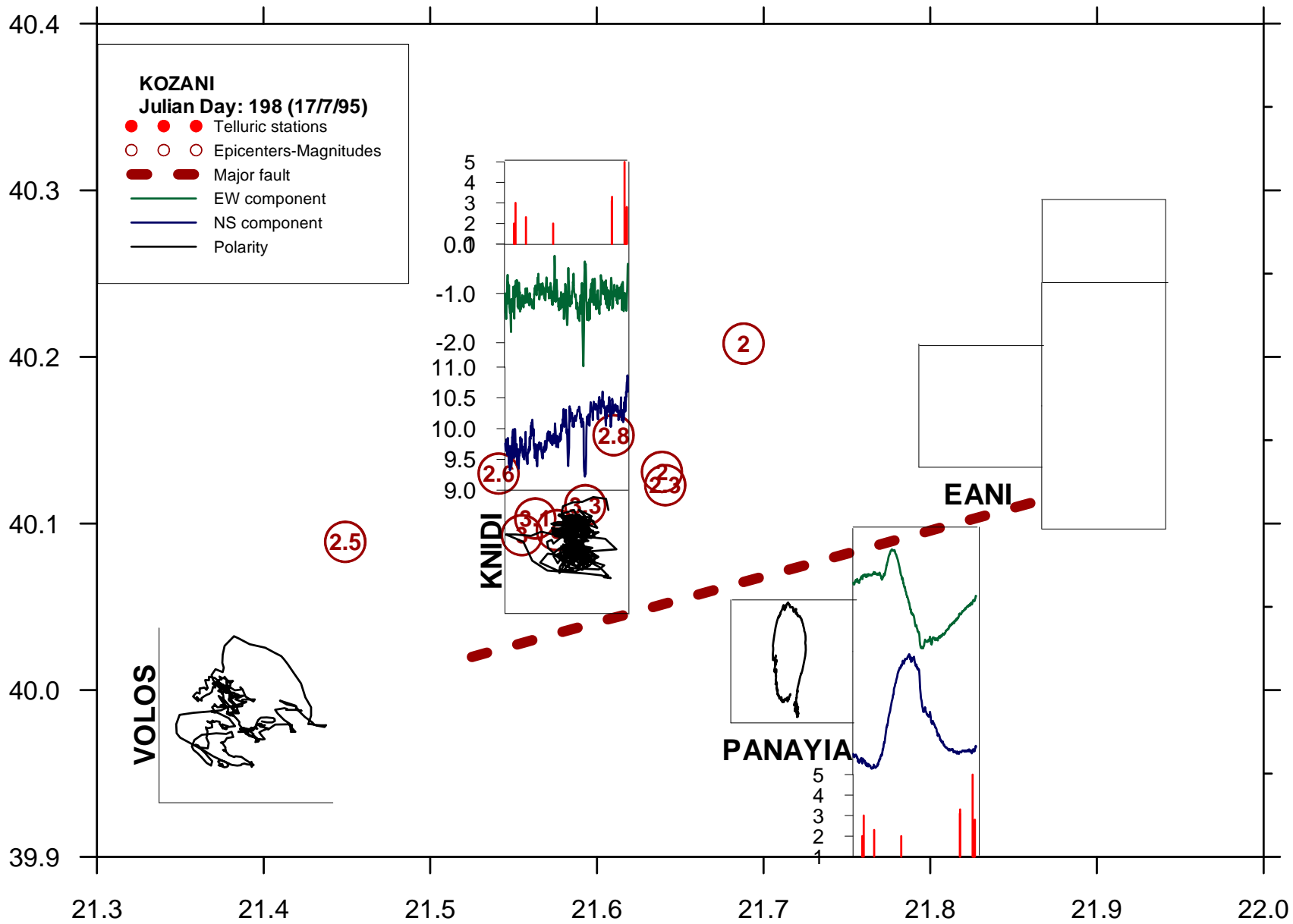
# Period: 196-1999 JD

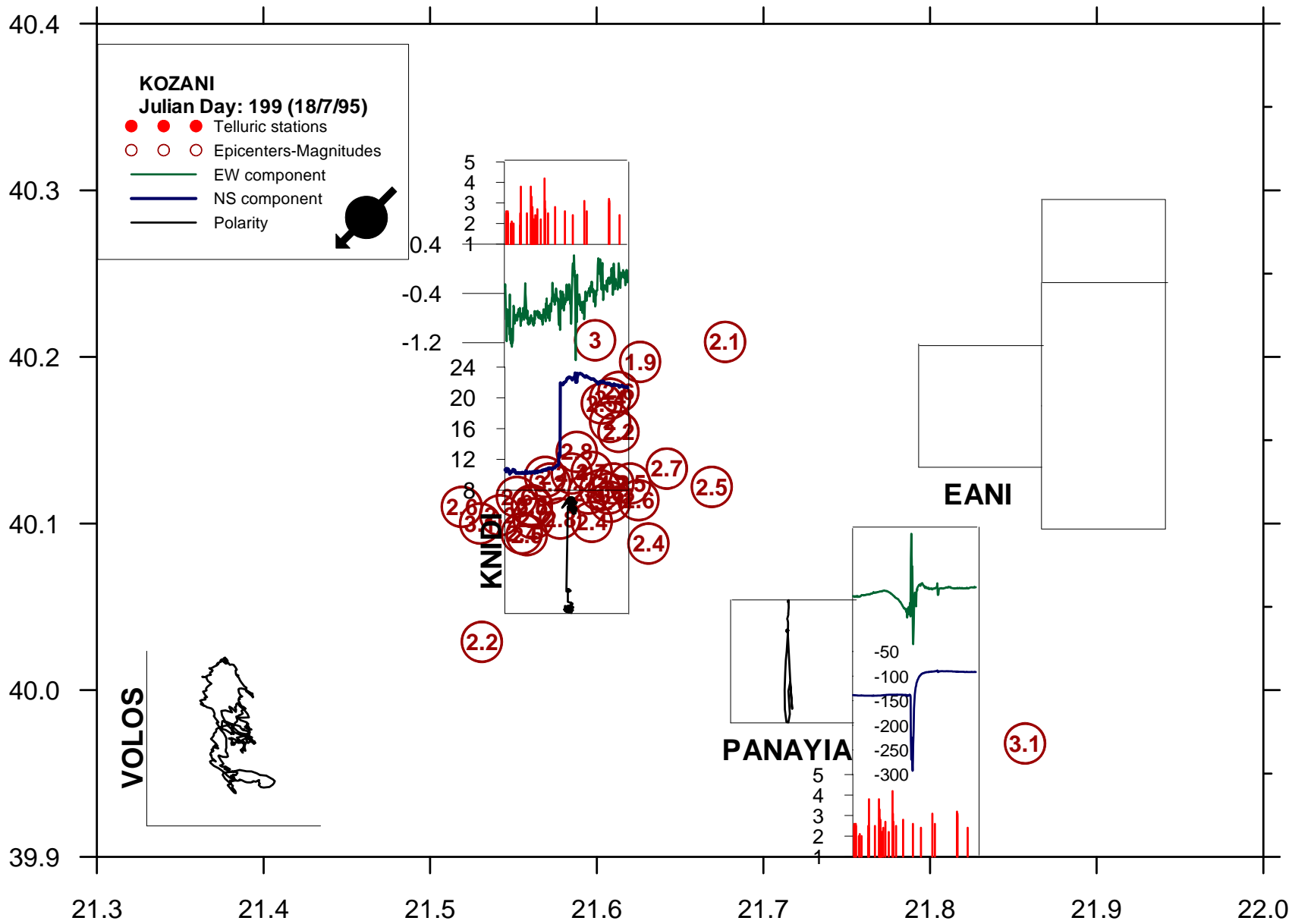




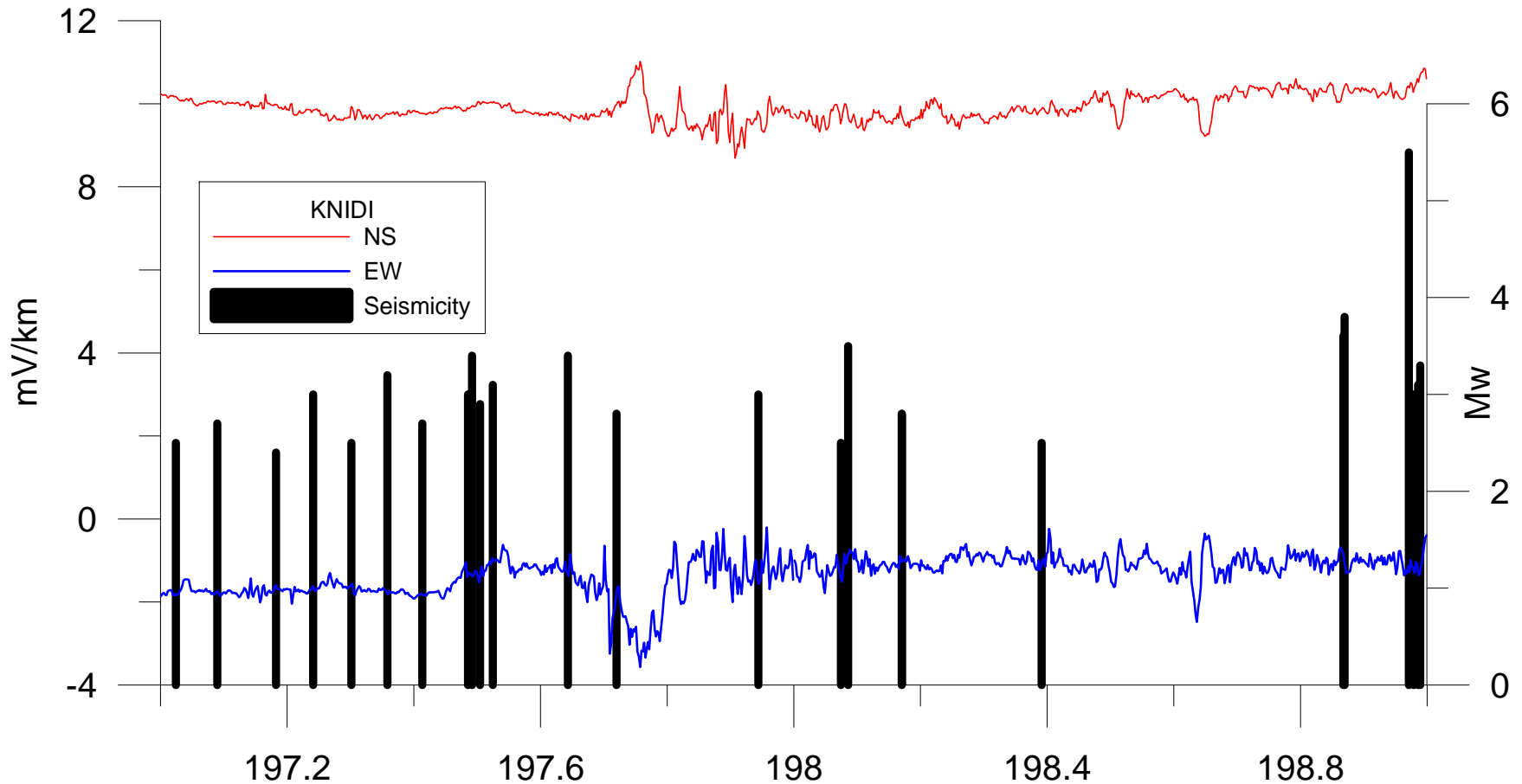






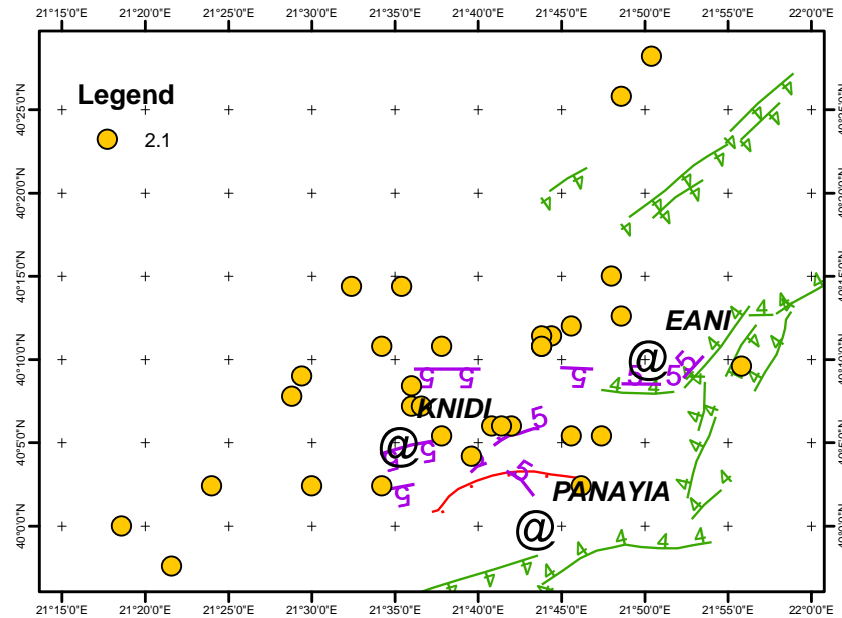
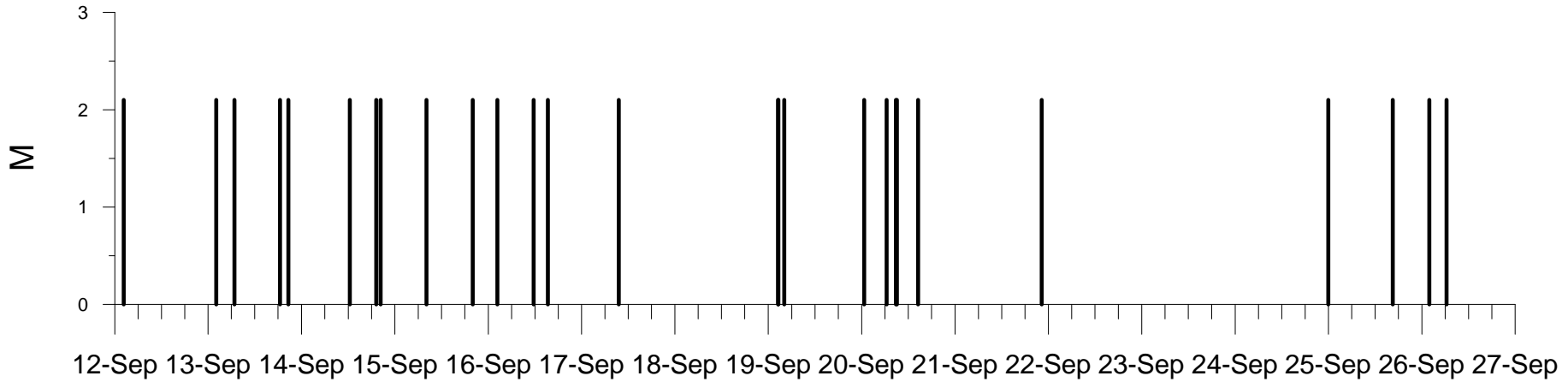


# Pre-seismic electric signal?



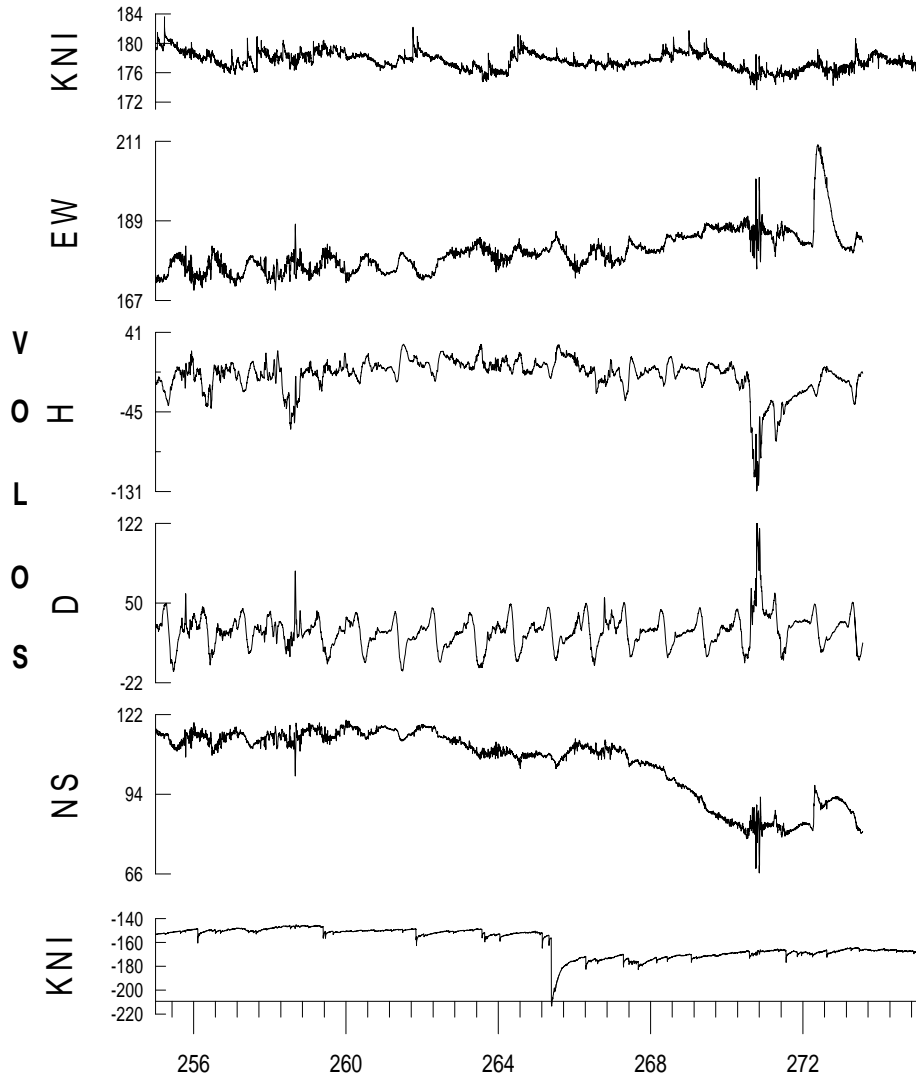
Period C: 255-275  
(12-27 Sep)

# Period C: 255-275 (12-27 Sep)

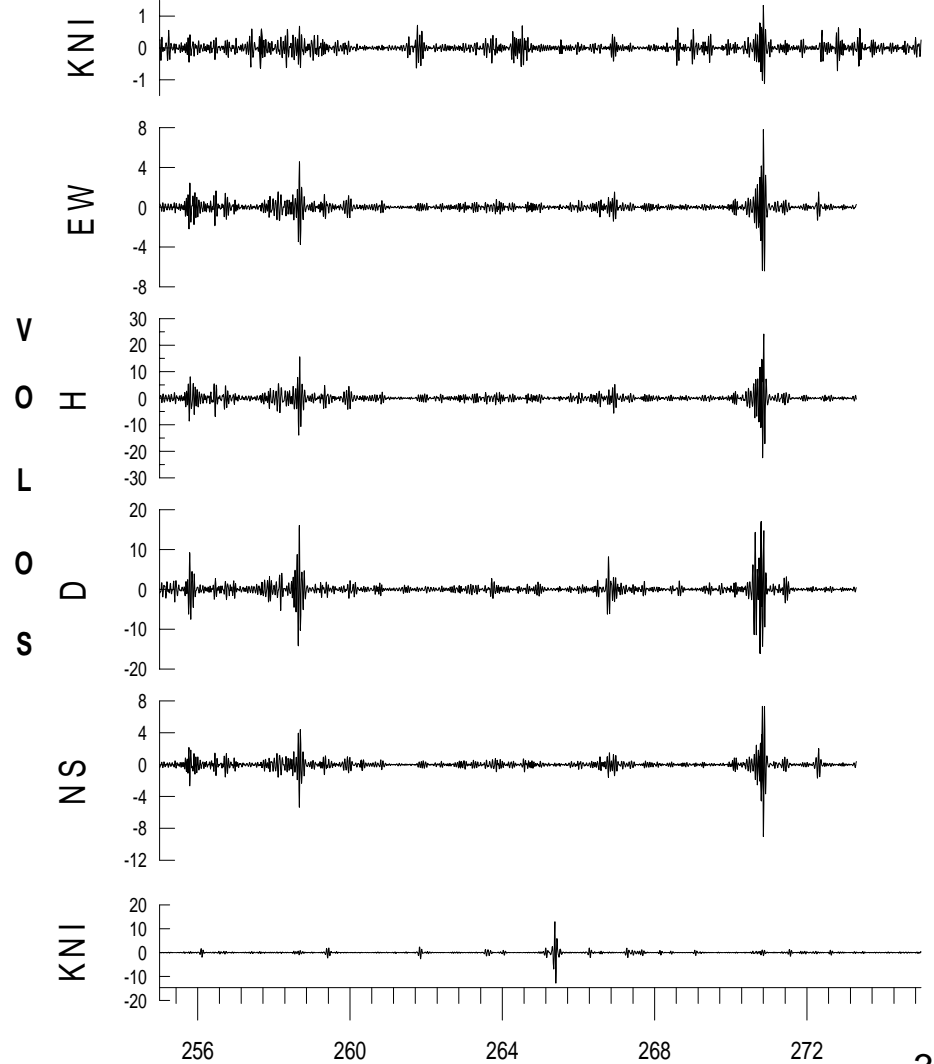


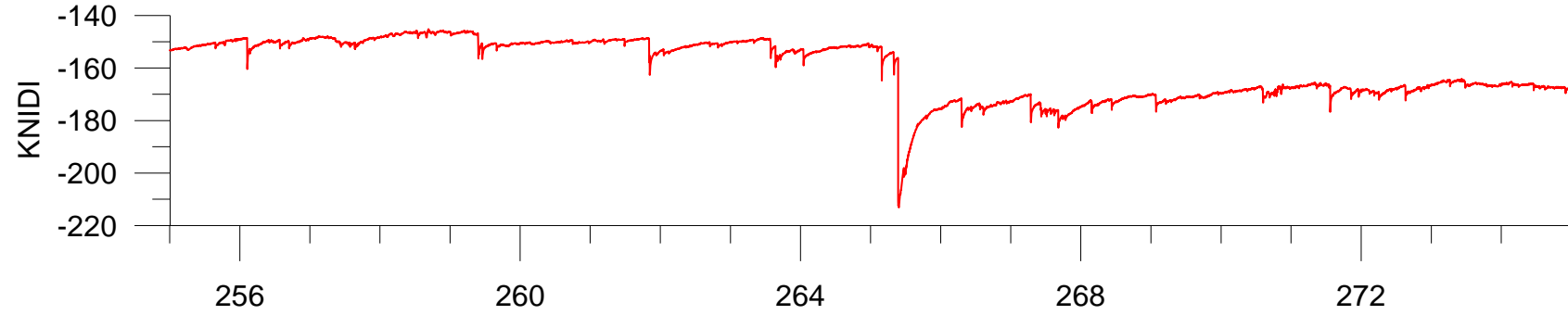
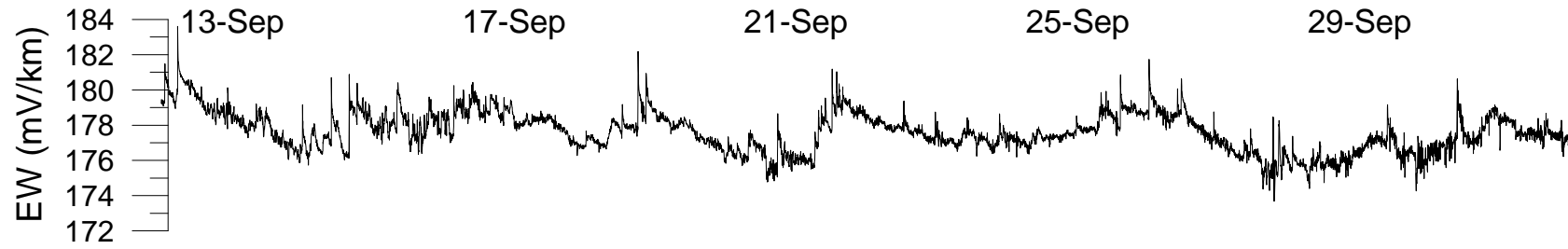
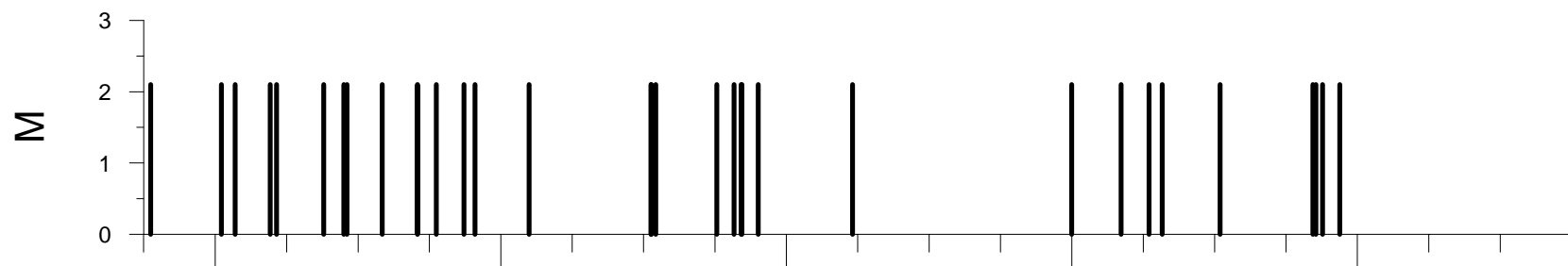
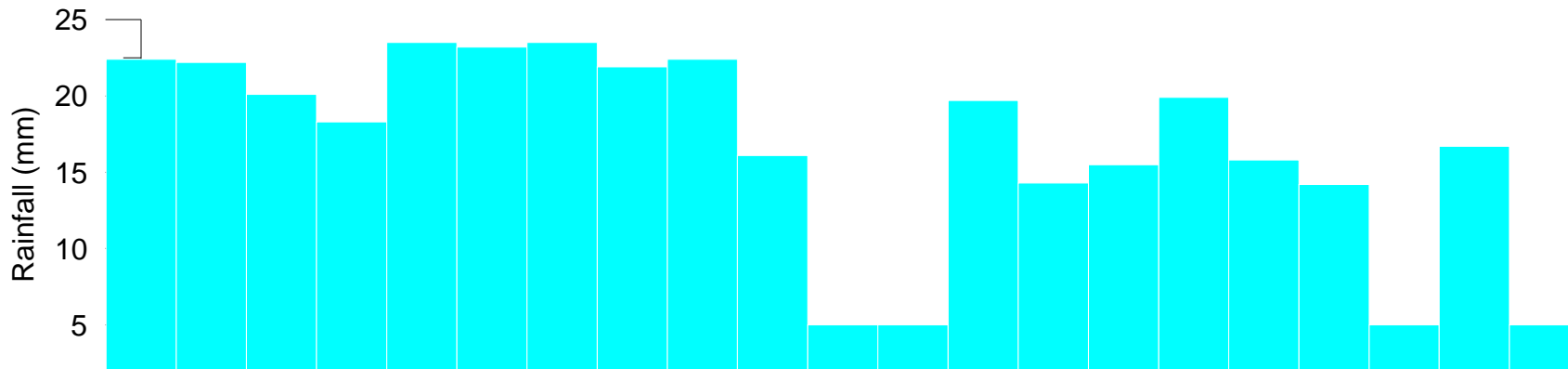
# Raw data

TIME PERIOD: 255-275, Raw Data, mV/km



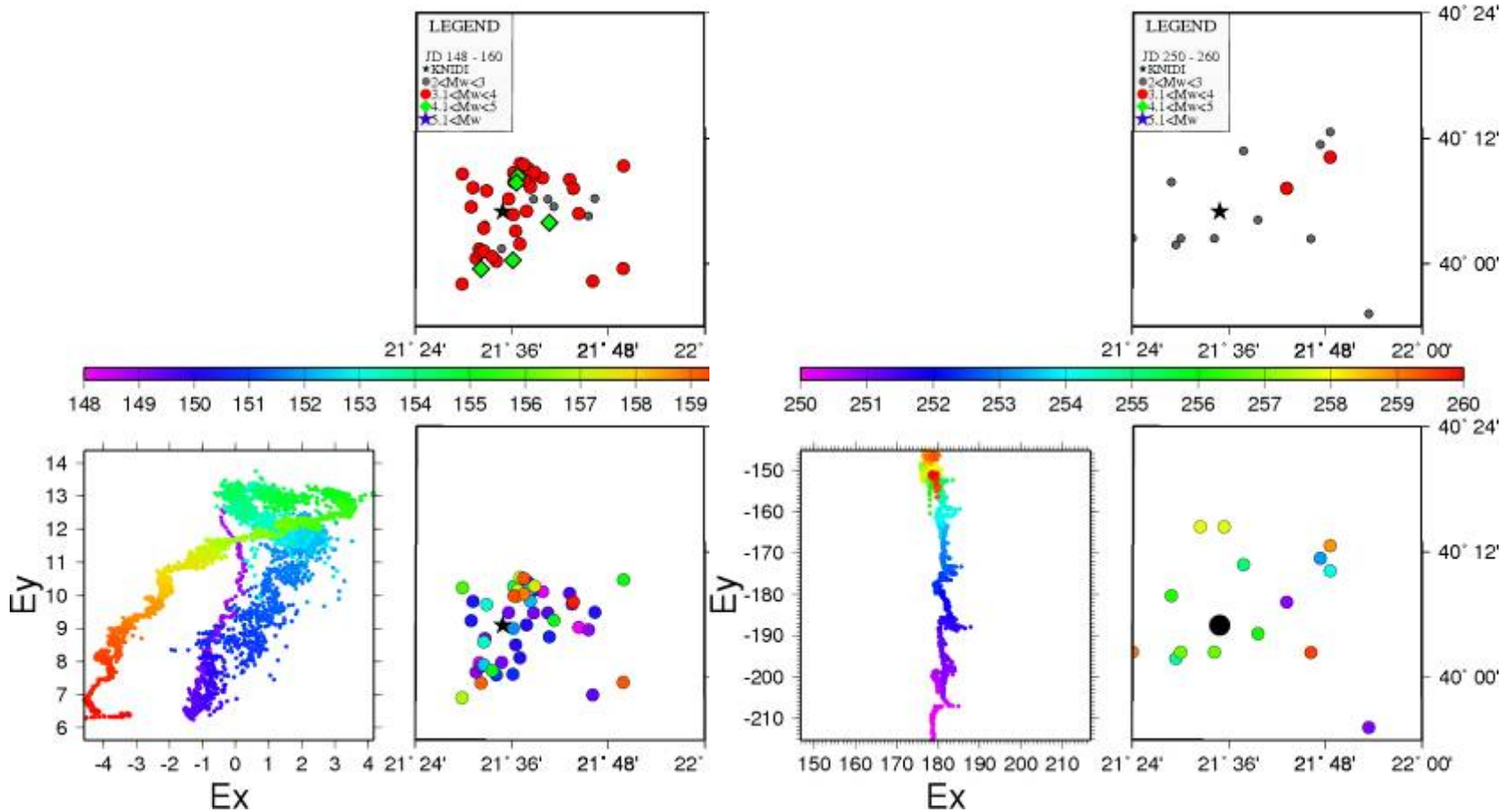
TIME PERIOD: 255-275, Periods 1-2h, mV/km

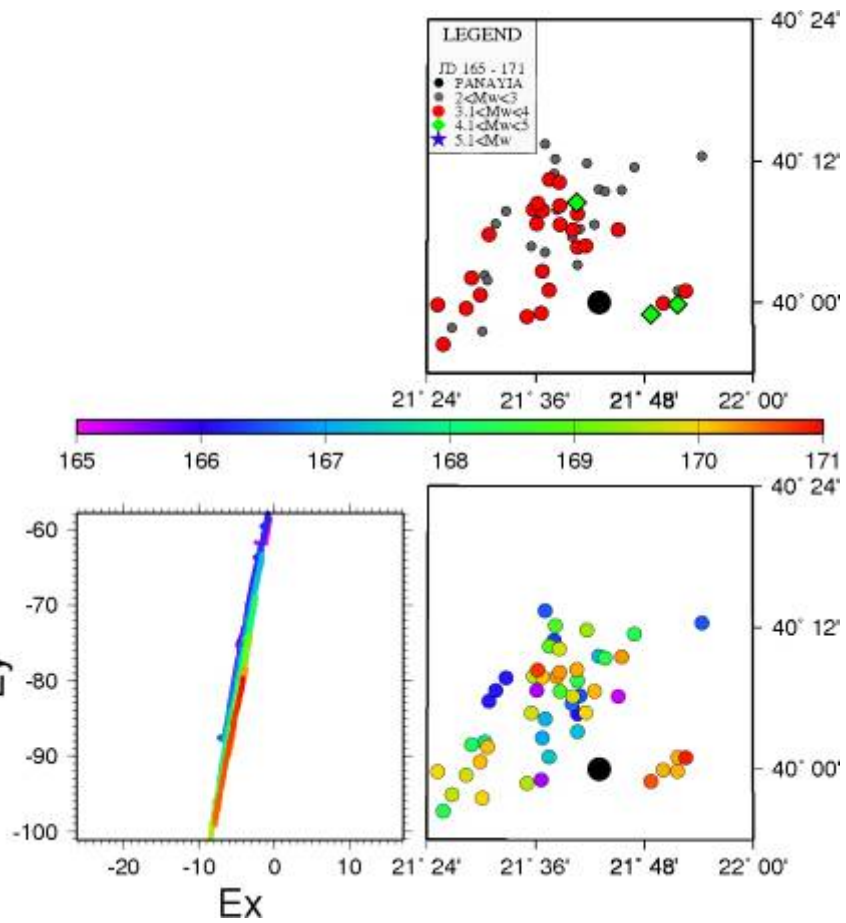
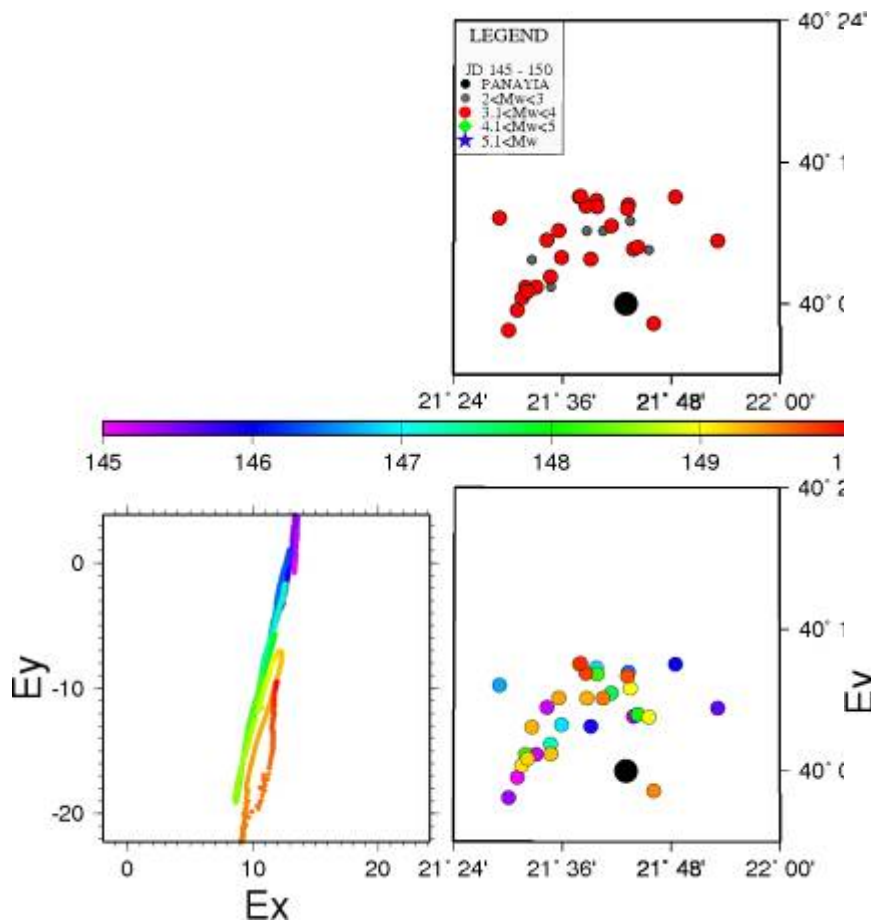


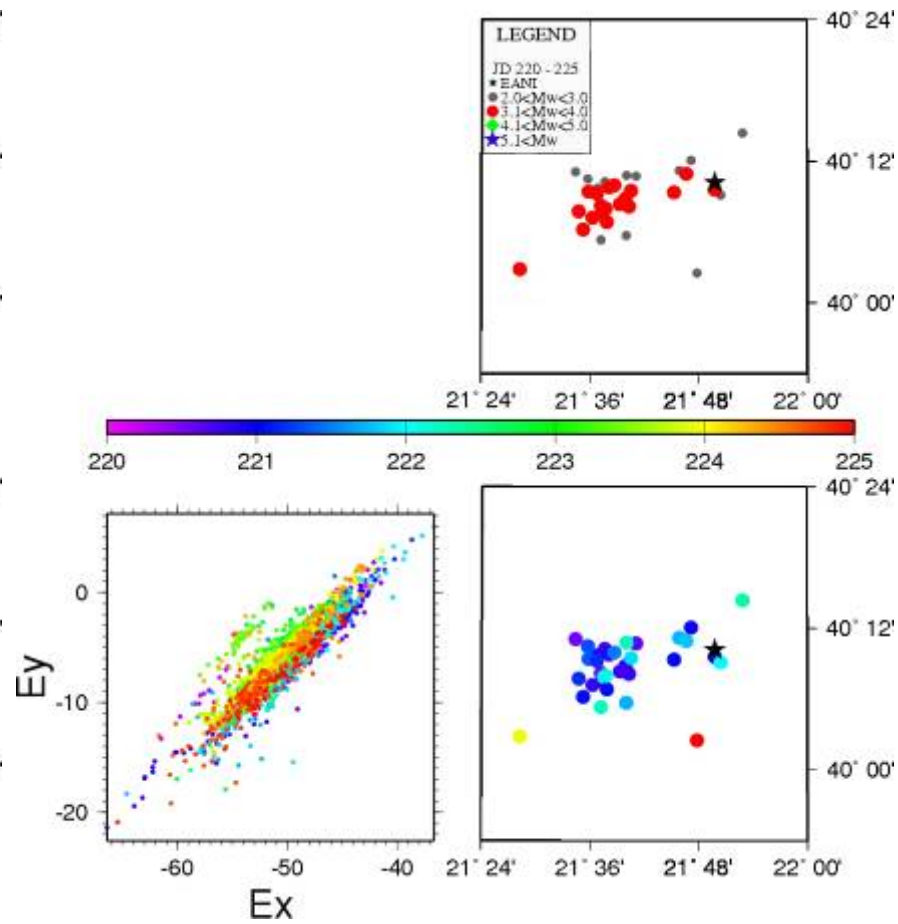
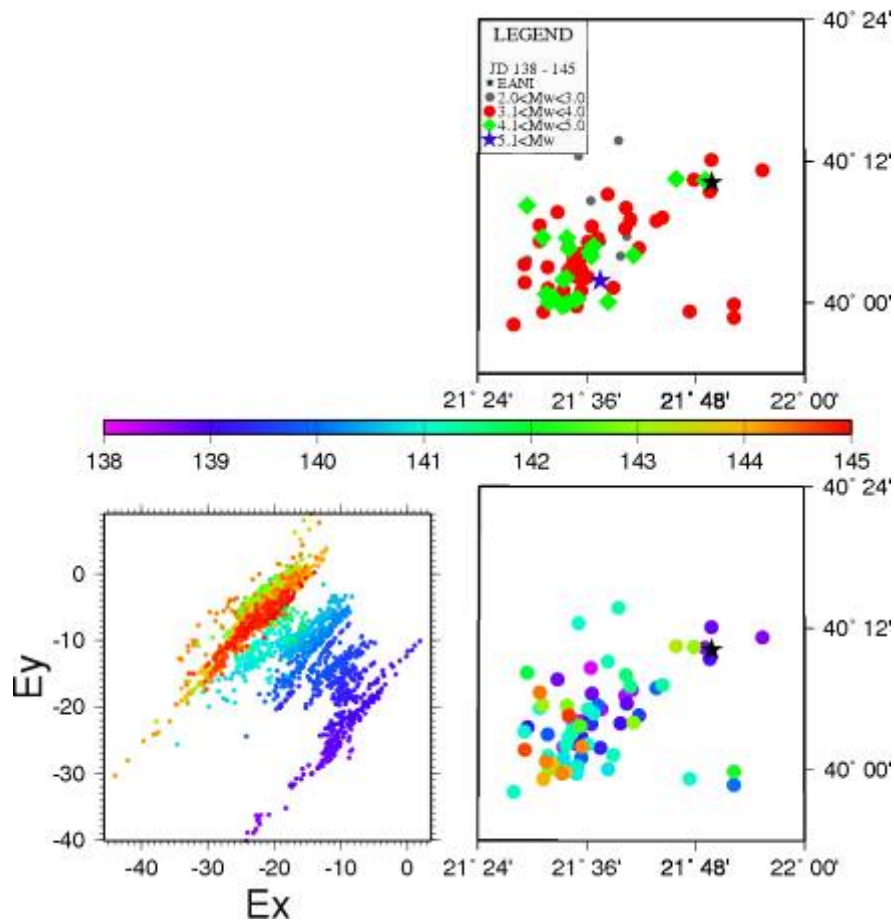


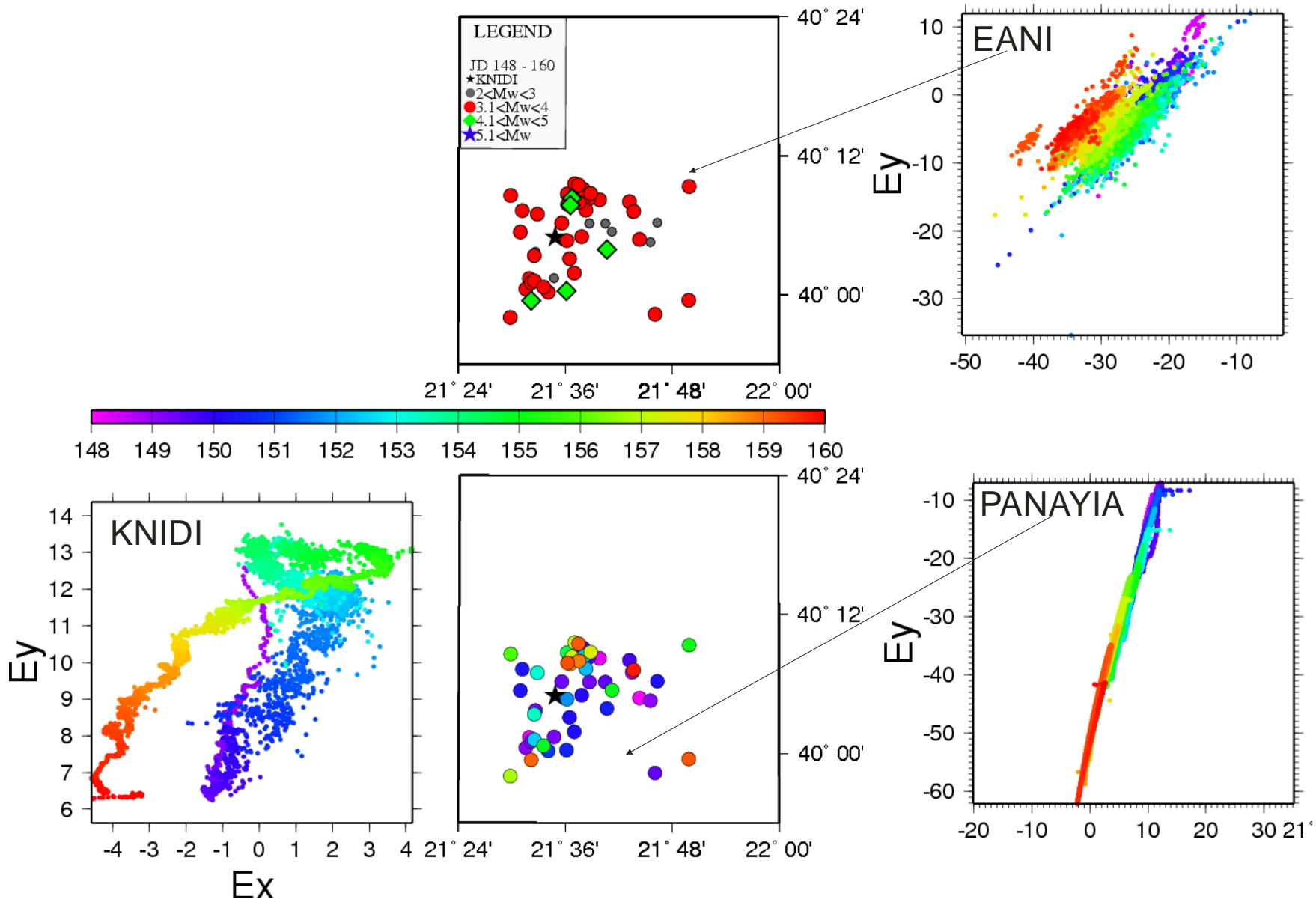


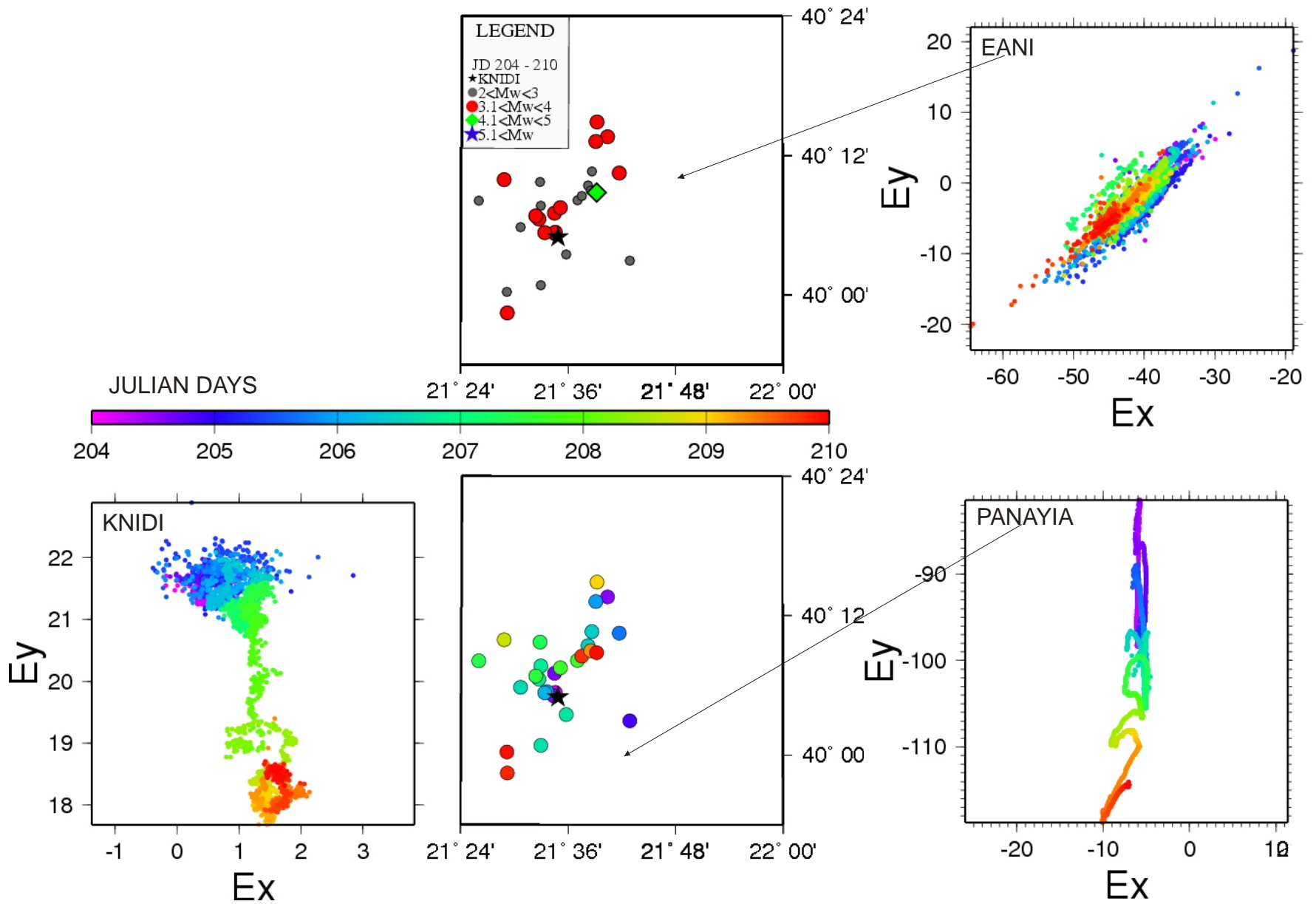
# Time varying polarization











# CONCLUSION

- Polarization of the electric field over the electric network is strongly inhomogeneous, depending on the location of the station relatively to the location and the mechanism of the active fault
- Electric field varies strongly very close to the epicentral area
- Electrical anomalies are transient effects with amplitude of a few mV/km
- Abnormal changes of the telluric field sometimes are mostly related with rainfalls (need of local data for every station)

# To be done.....

- Filtering in higher frequencies (up to 0.25Hz)
- Cross correlation of different data sets
- Discrimination of preseismic/coseismic or postseismic signals
- Study of the origin of anomalous signals
- Pattern recognition of probable seismoelectric signals