

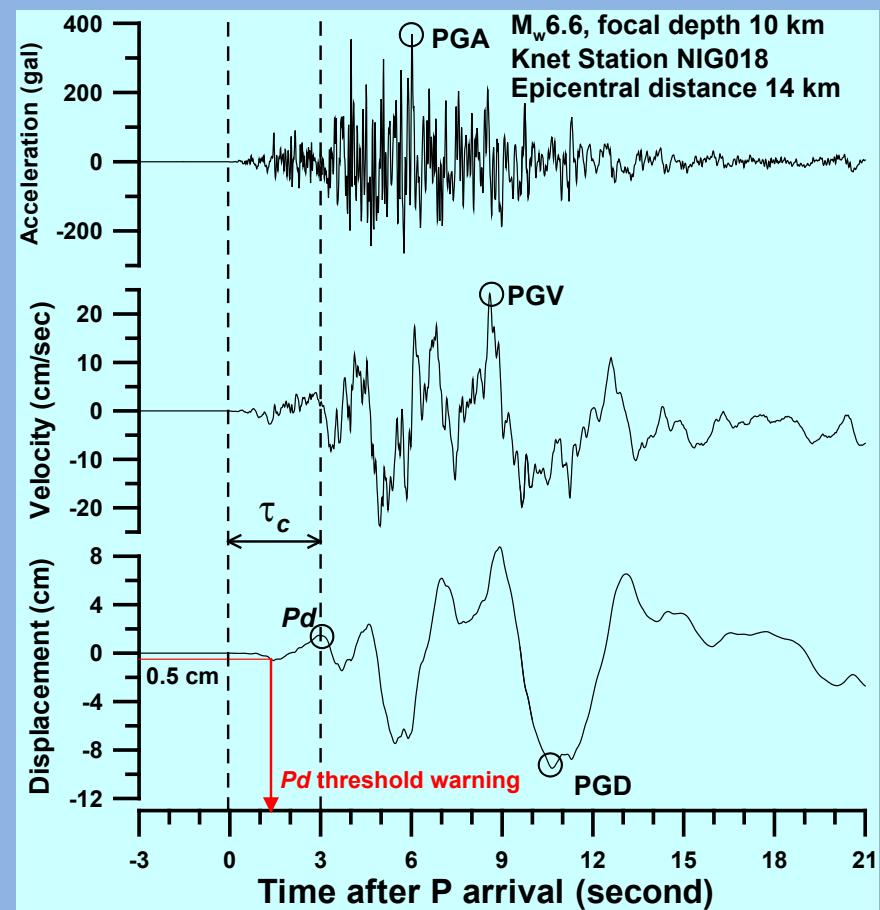
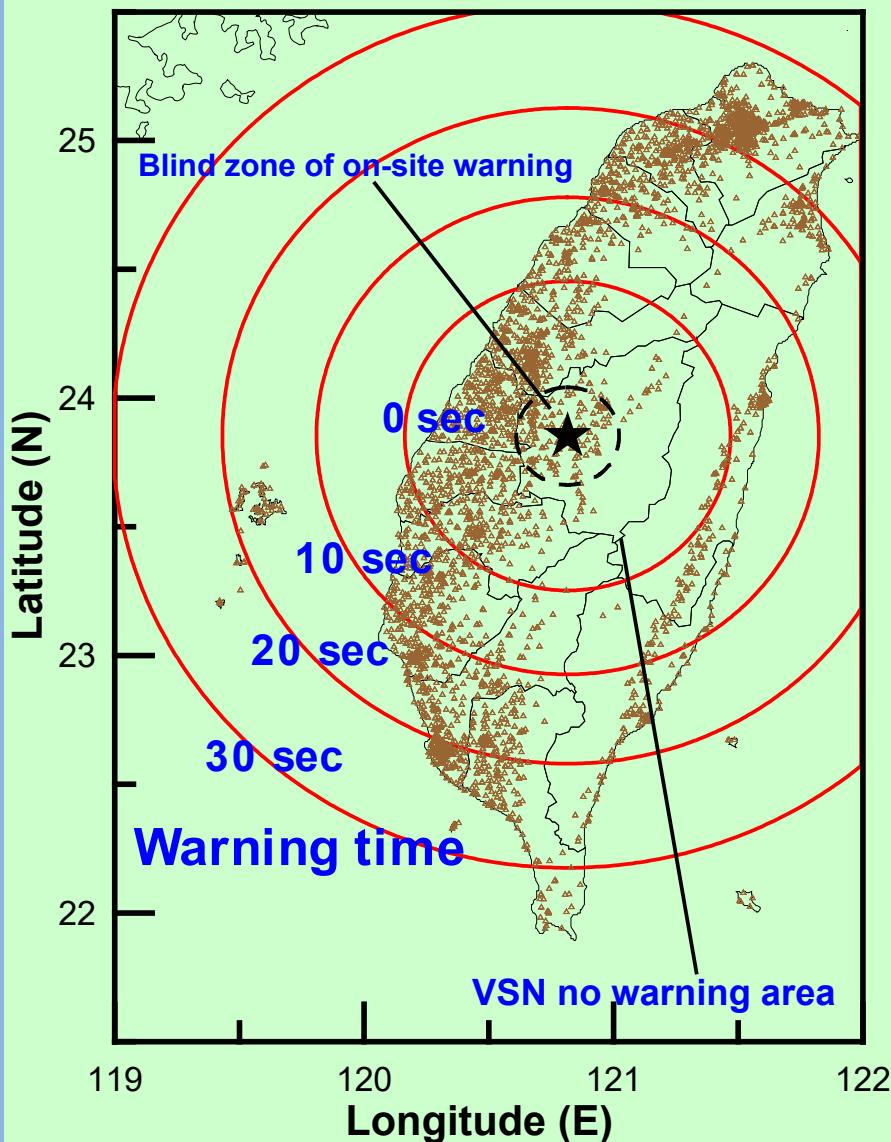
Development of an earthquake early warning system using low cost sensors

吳逸民

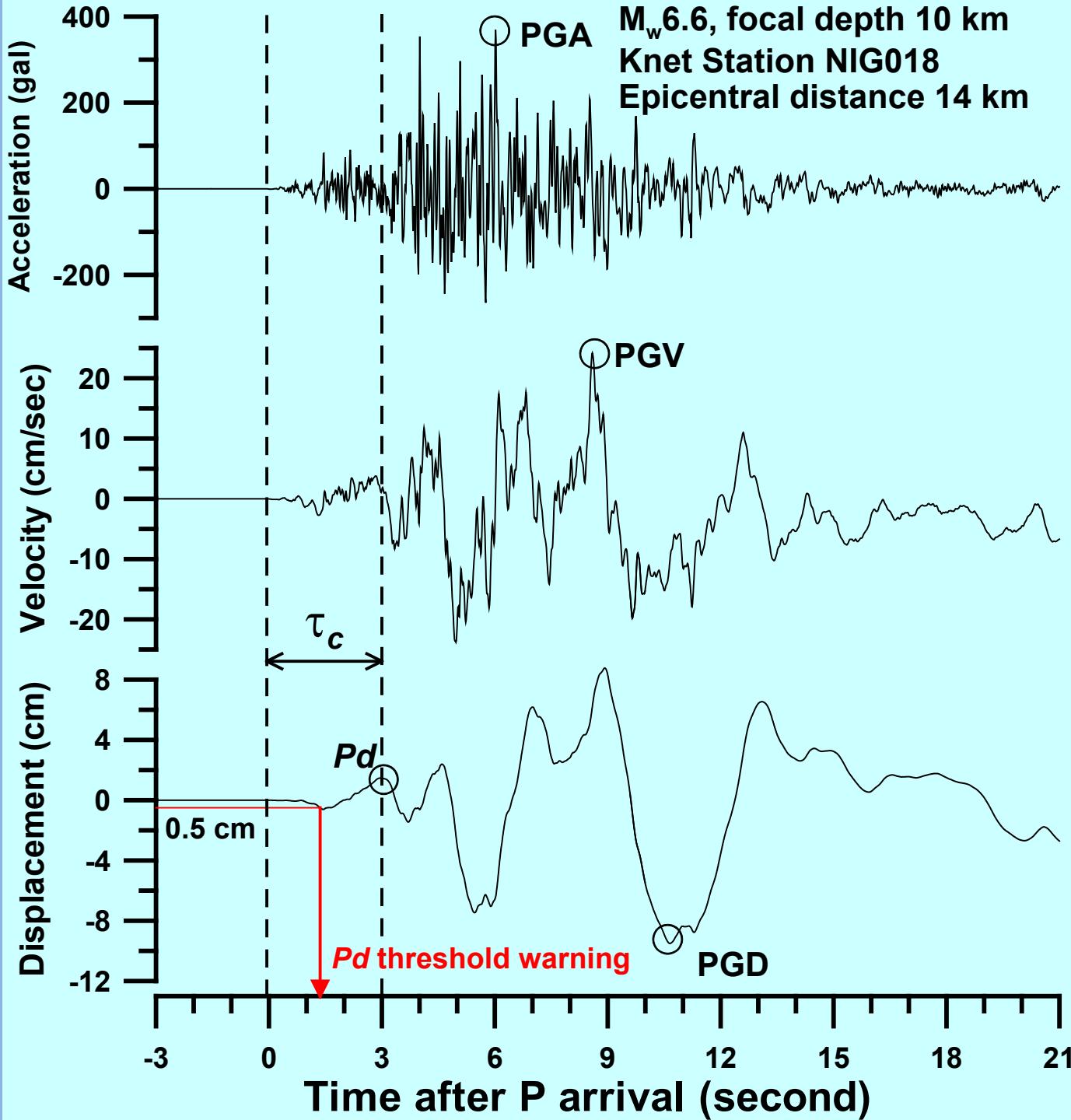
國立臺灣大學地質科學系特聘教授
中央研究院地球科學研究所合聘研究員

Regional Warning v.s. Onsite Warning

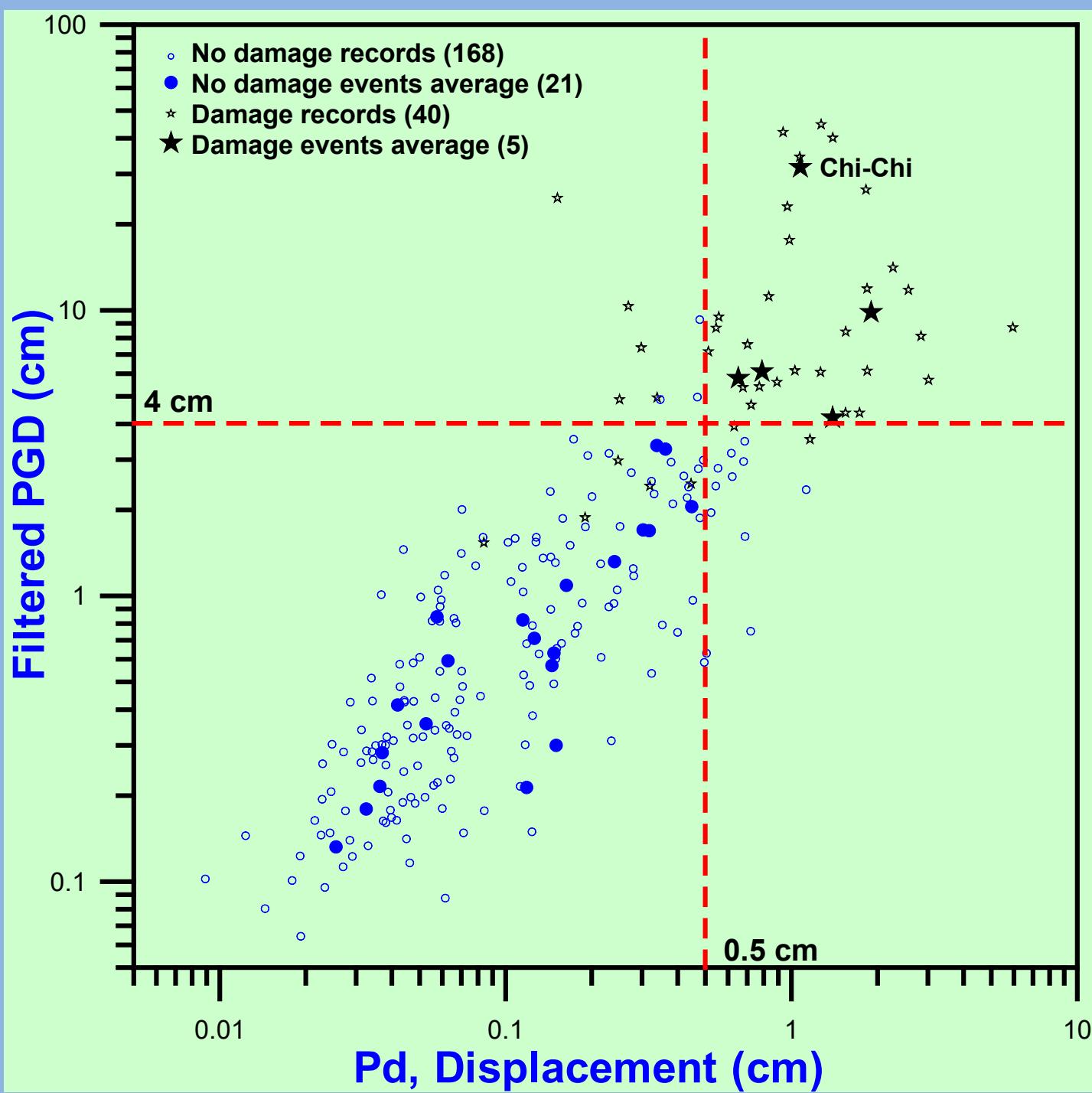
Early Warning Time of the Earthquake
of Sep. 20, 1999 (Mw7.6)



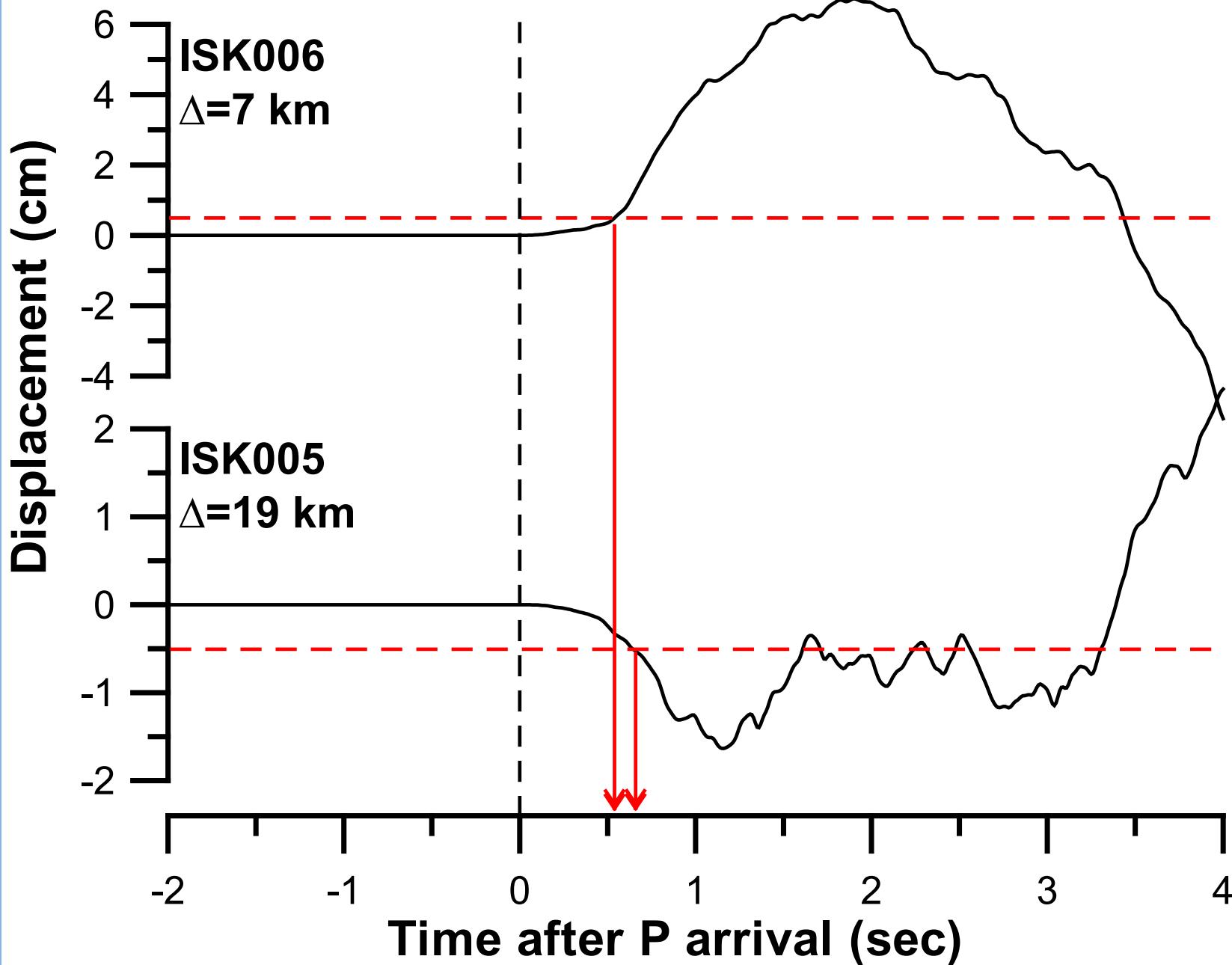
P wave method



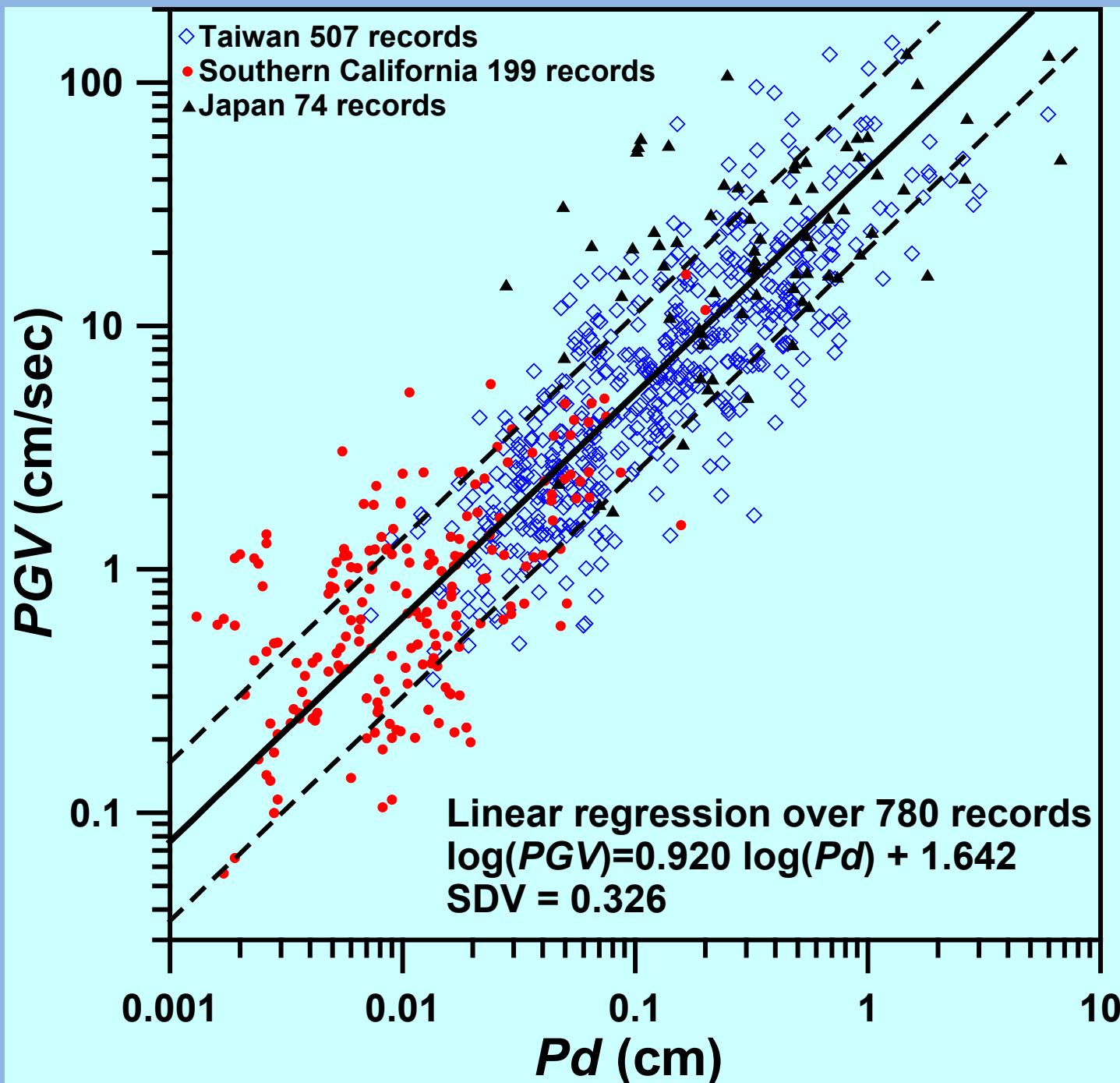
Pd large than 0.5 cm following shakings may cause damage



2007/03/25 Noto M_w6.7 earthquake

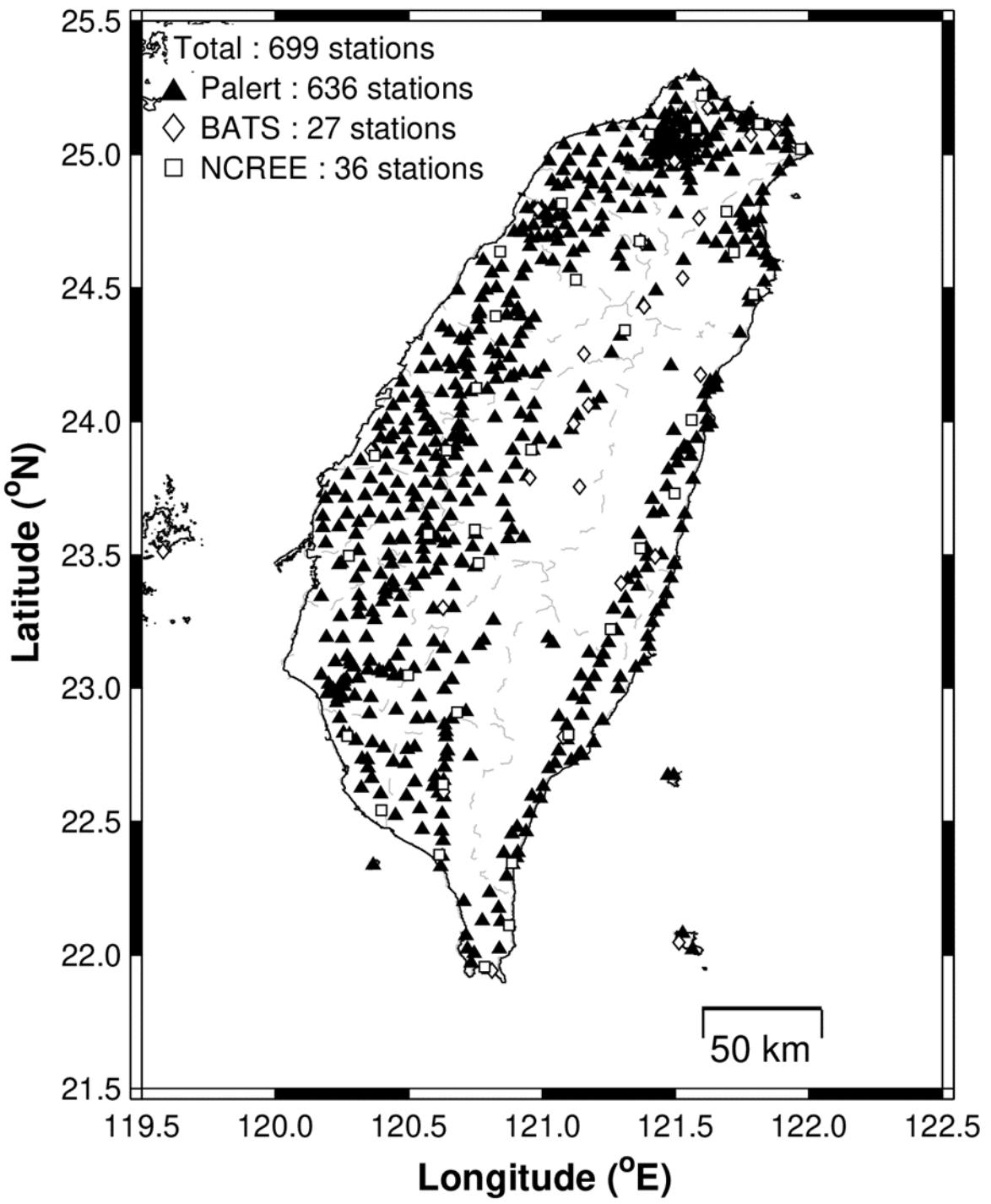


PGV could be predicted by Pd
and then Shaking Intensity could
be predicted!

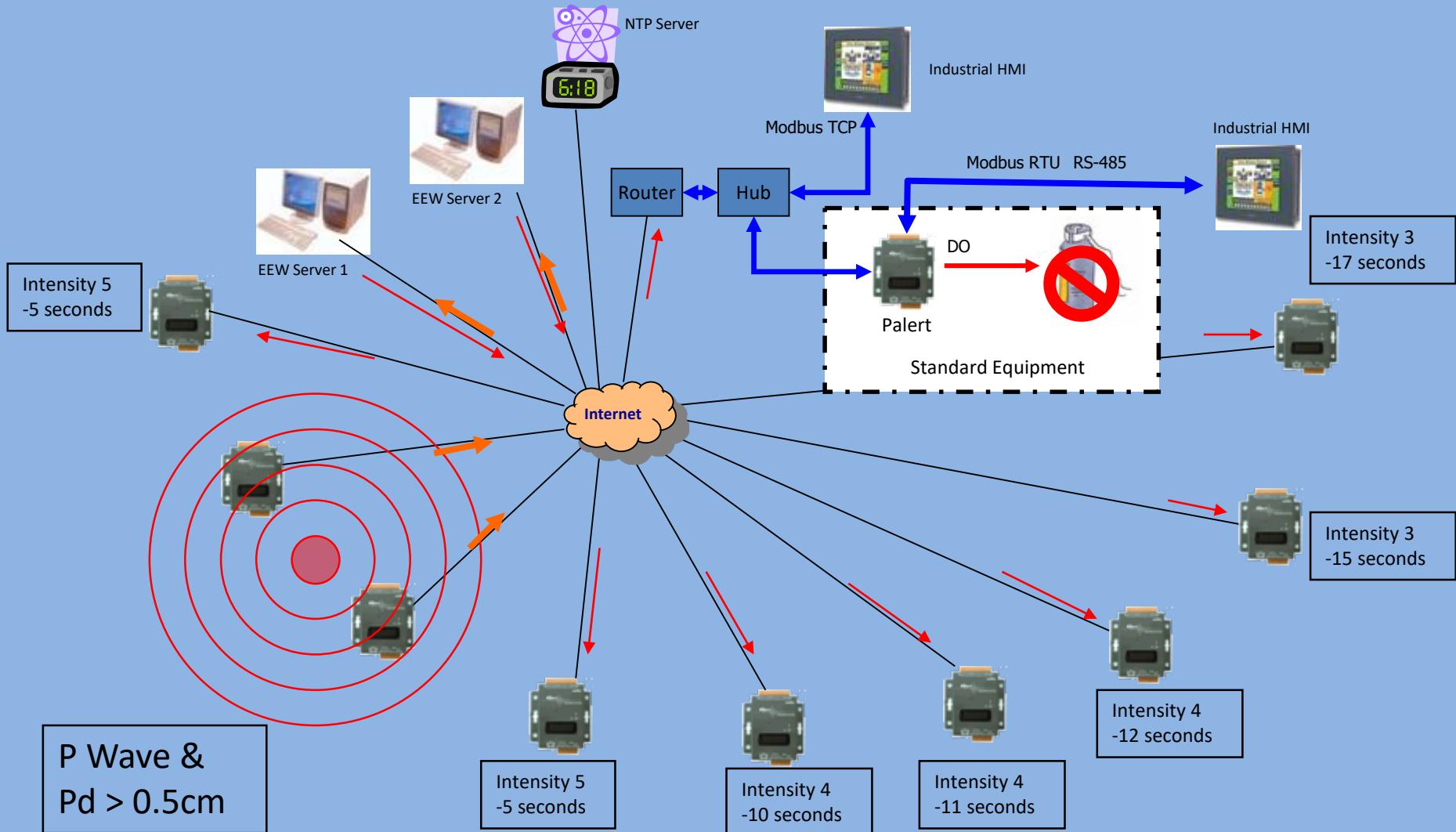


Combination with modern MEMS sensor. Cheaper device may install to every building to give warning within three seconds after P arrival after a large earthquake occurs.

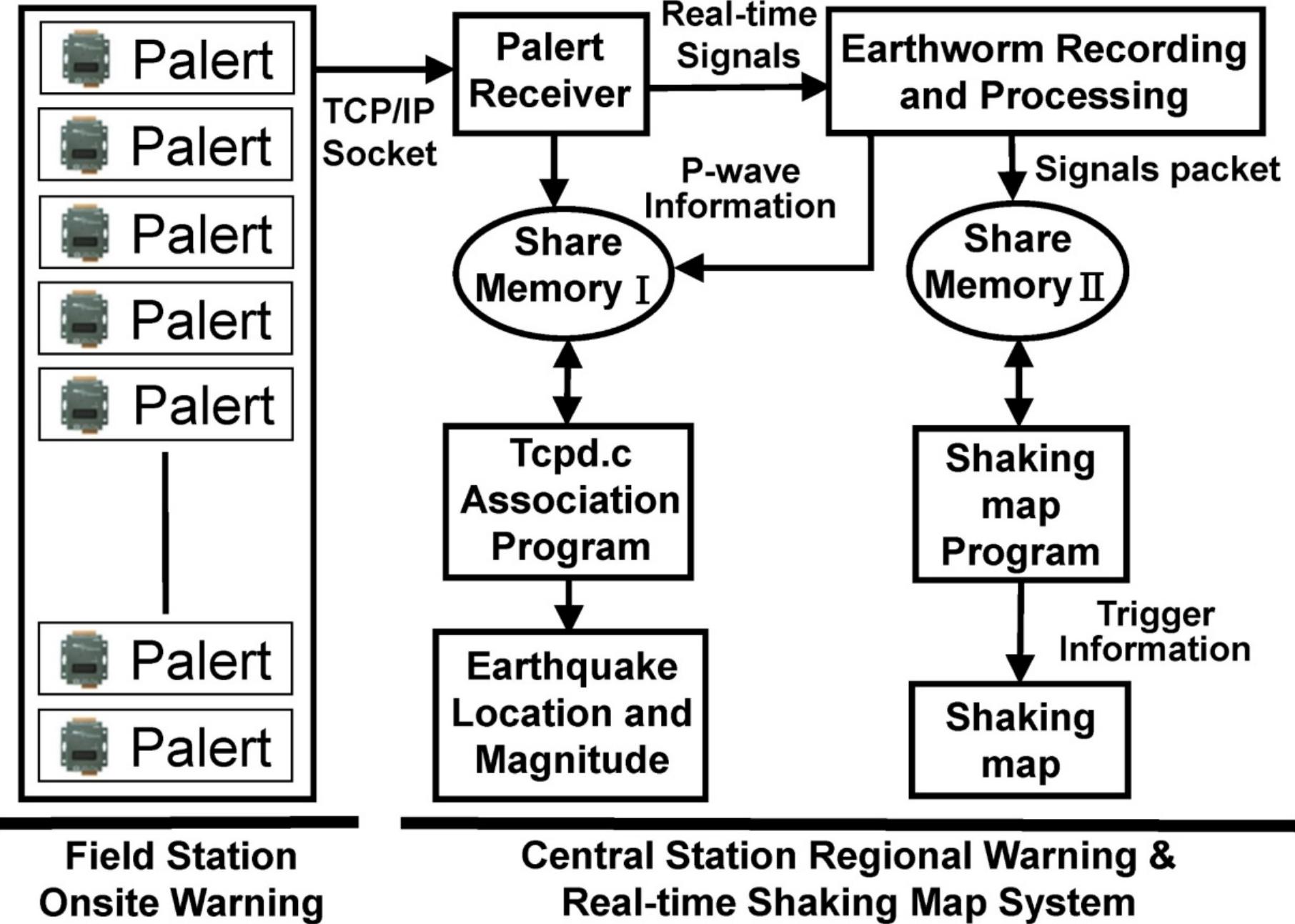




Palert EEW Networking System



Palert Network System Configuration



中央氣象局地震報告

編號：第105006號

日期：105 年 2 月 6 日

時間：3 時 57 分 27.2 秒

位置：北緯 22.93 度，東經 120.54 度

即在 屏東縣政府北偏東方 27.4 公里

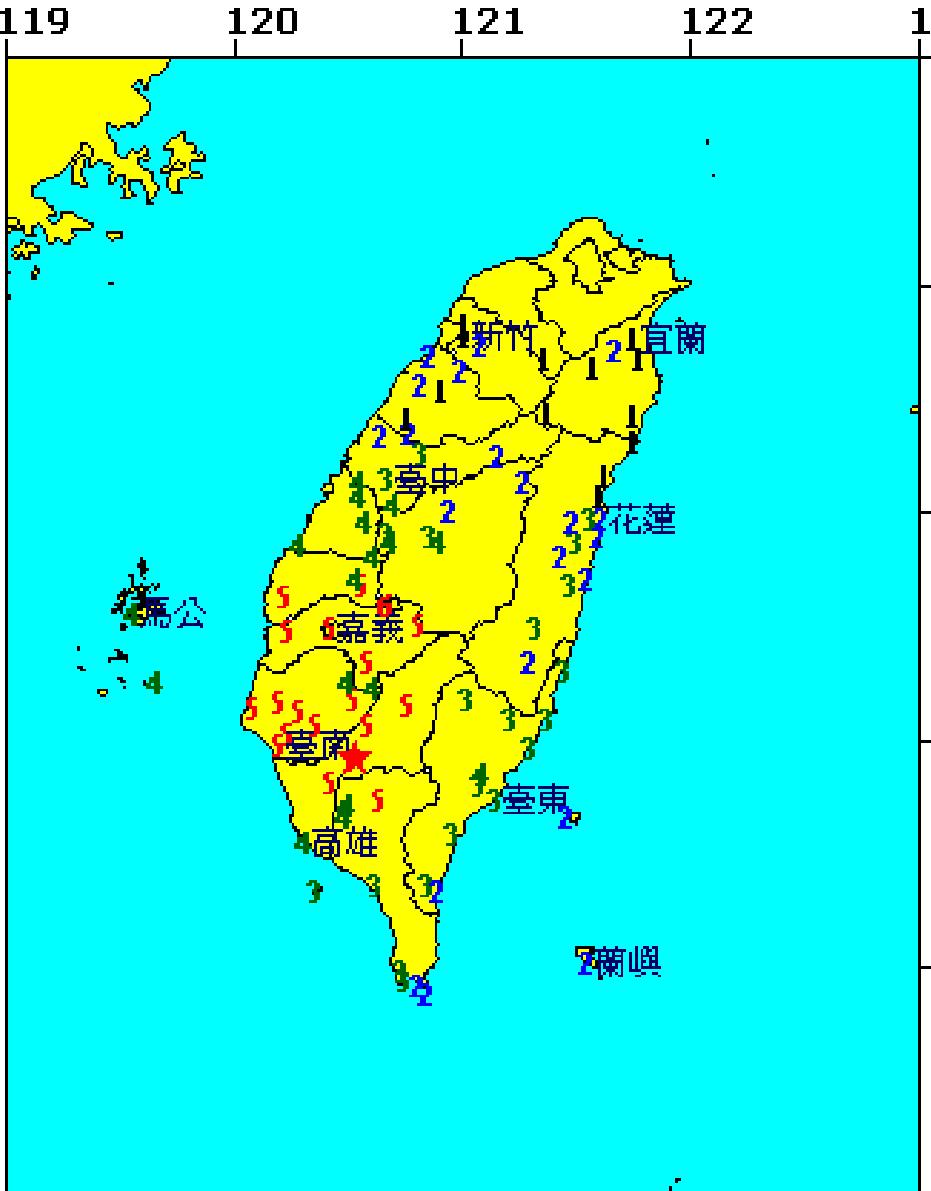
位於 高雄市美濃區

地震深度：16.7 公里

芮氏規模：6.4

各地最大震度

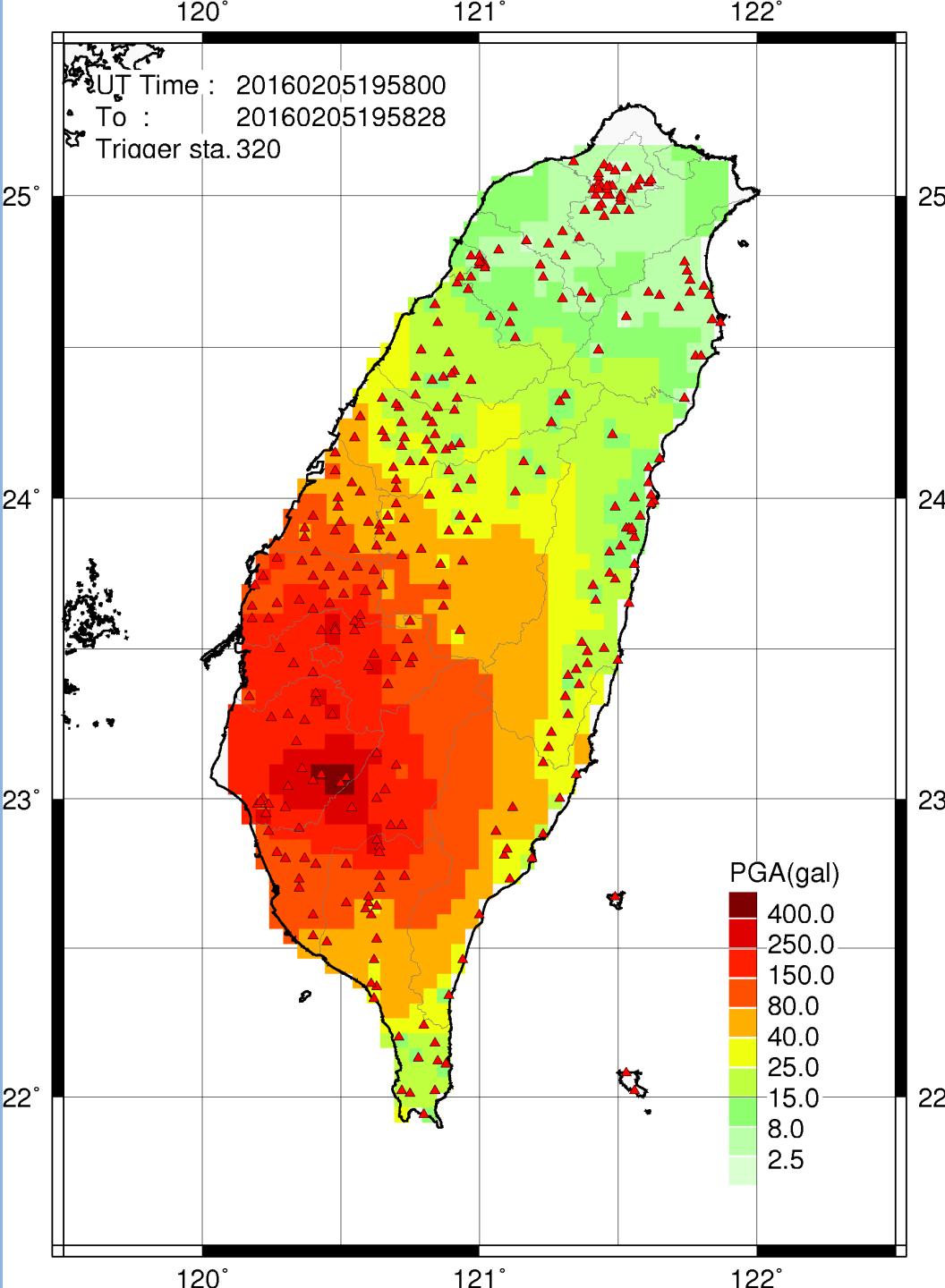
雲林縣草嶺	6級	彰化縣彰化市	4級
高雄市旗山	5級	臺東縣臺東市	3級
屏東縣三地門	5級	花蓮縣紅葉	3級
臺南市楠西	5級	屏東縣南灣	3級
臺南市	5級	南投縣南投市	3級
嘉義縣草山	5級	臺中市	3級
嘉義市	5級	花蓮縣花蓮市	2級
屏東縣屏東市	4級	苗栗縣鯉魚潭	2級
高雄市	4級	苗栗縣苗栗市	2級
臺東縣初鹿	4級	新竹縣竹東	2級
雲林縣斗六市	4級	宜蘭縣內城	2級
澎湖縣東吉島	4級	桃園市三光	1級
彰化縣二水	4級	新竹市	1級
南投縣名間	4級	新竹縣竹北市	1級
澎湖縣馬公市	4級	宜蘭縣宜蘭市	1級
臺中市霧峰	4級		

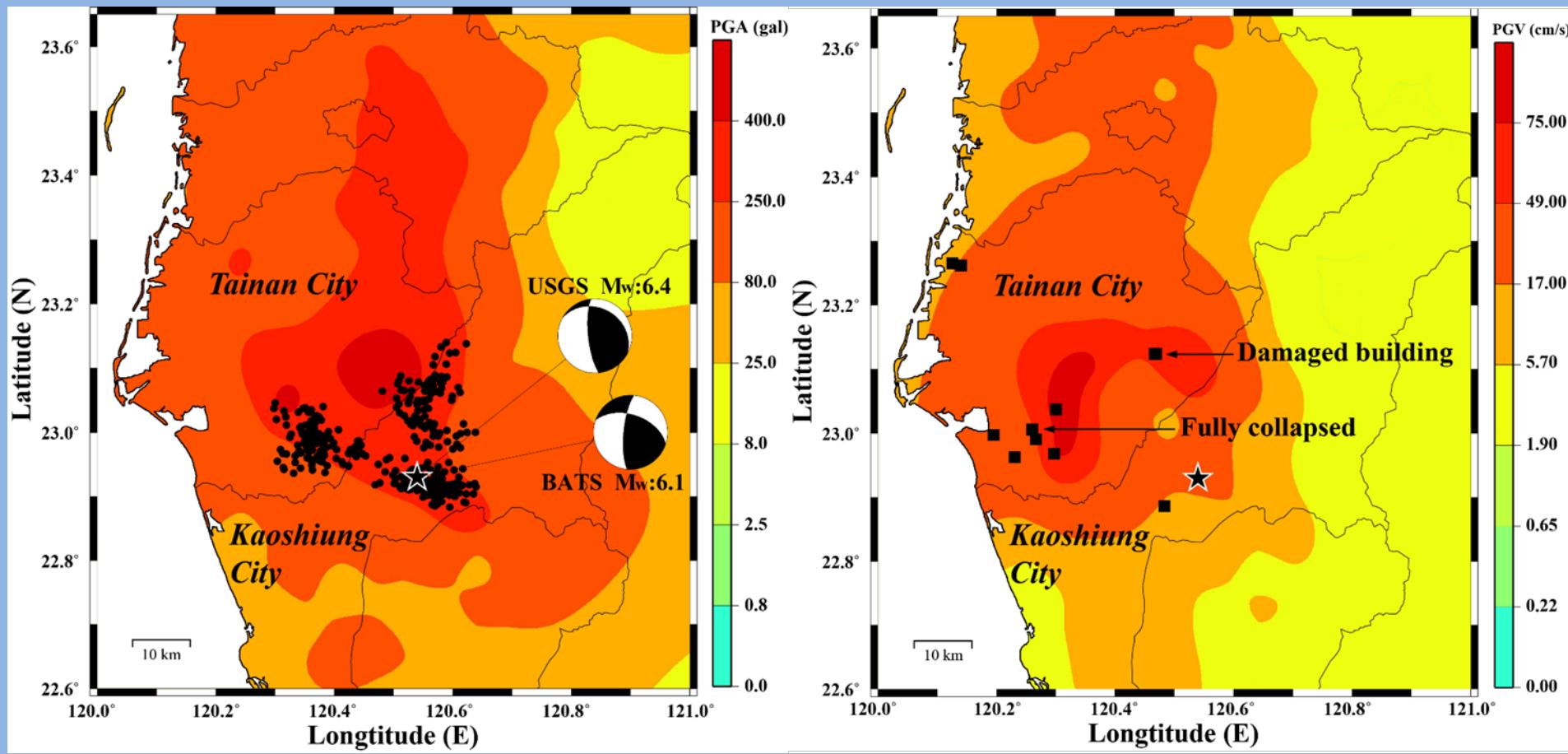


圖說：★表震央位置，阿拉伯數字表示該測站震度

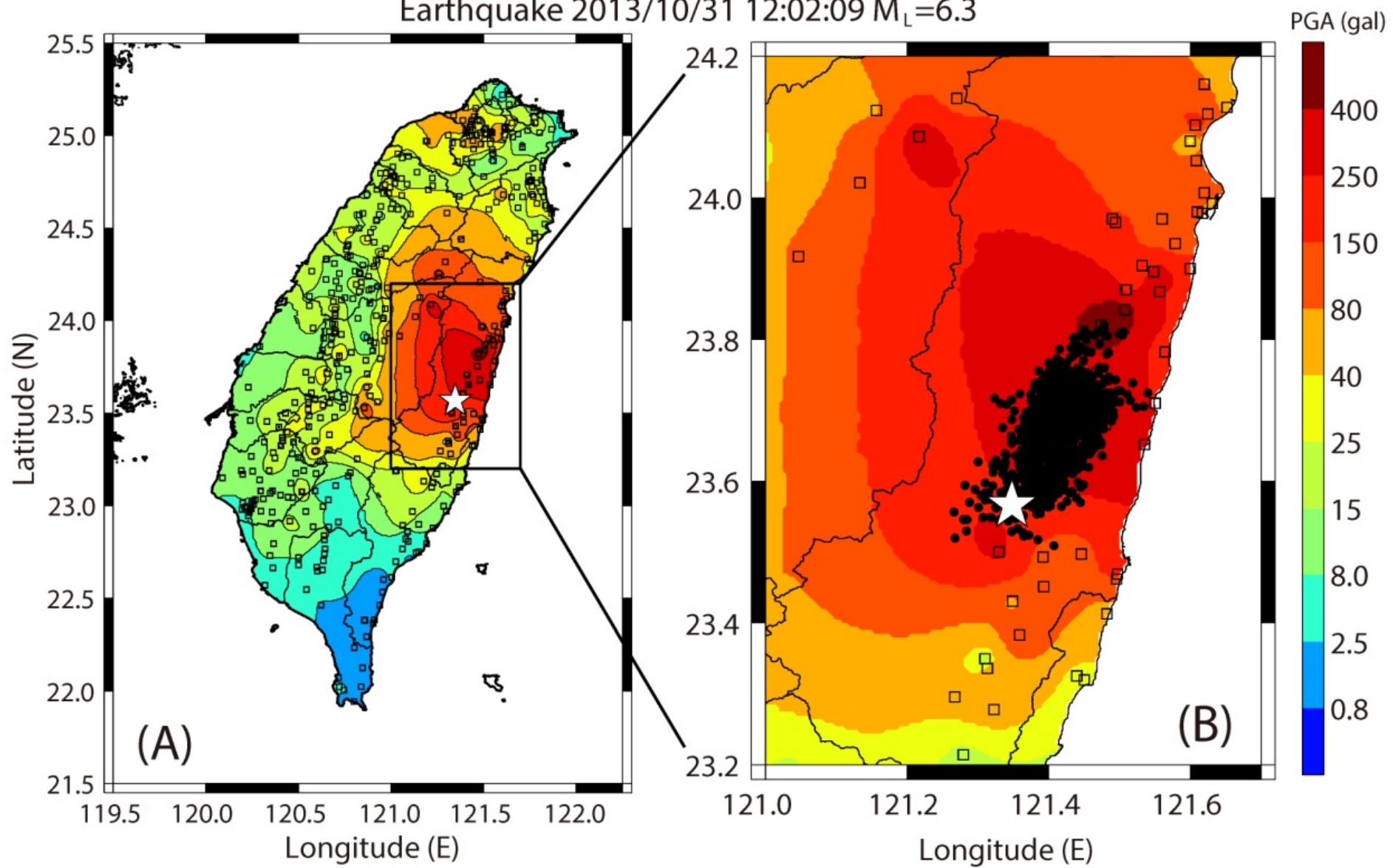
本報告係中央氣象局地震觀測網即時地震資料
地震速報之結果。

**Shake map
Delivers via
Email
Automatically**



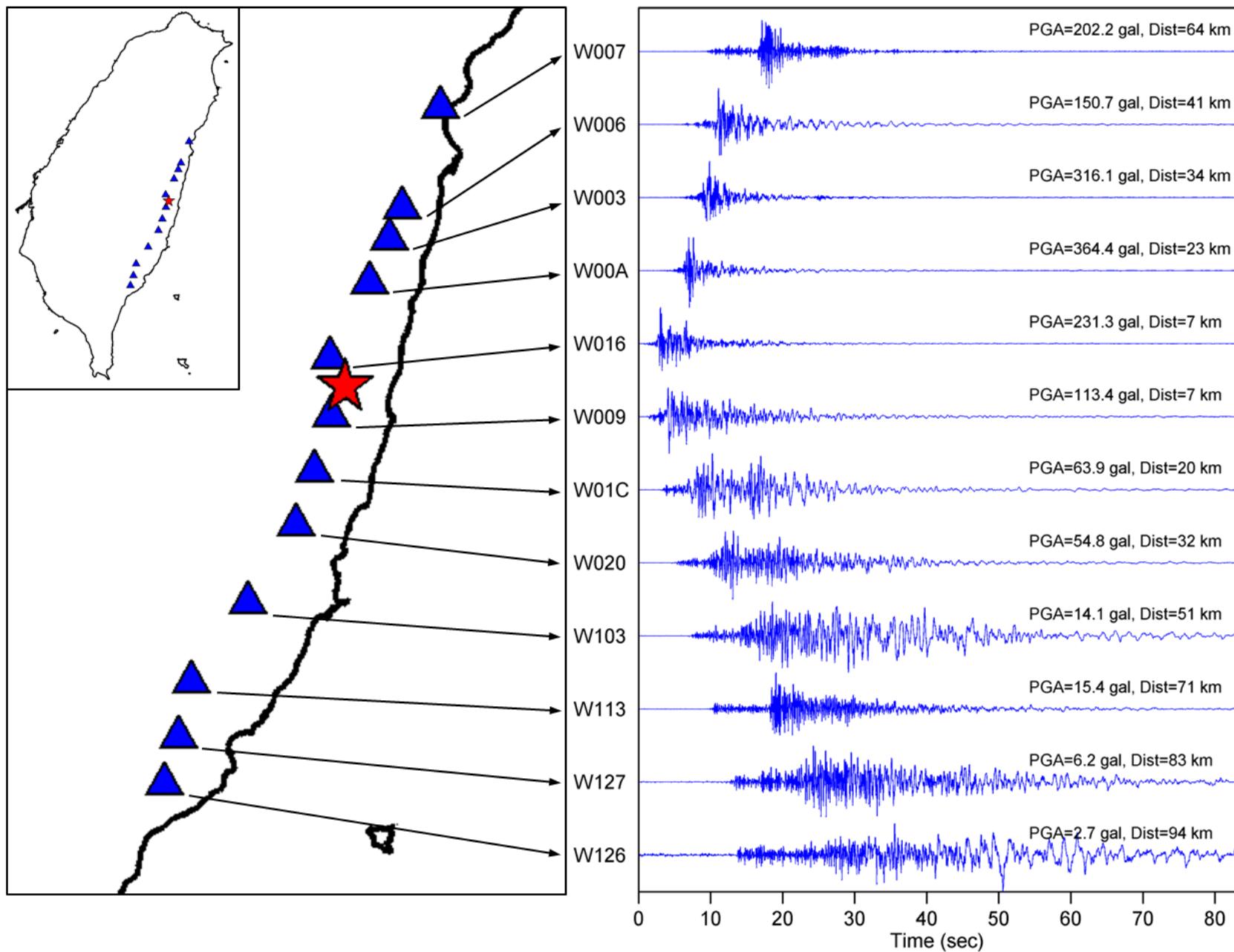


Earthquake 2013/10/31 12:02:09 $M_L=6.3$

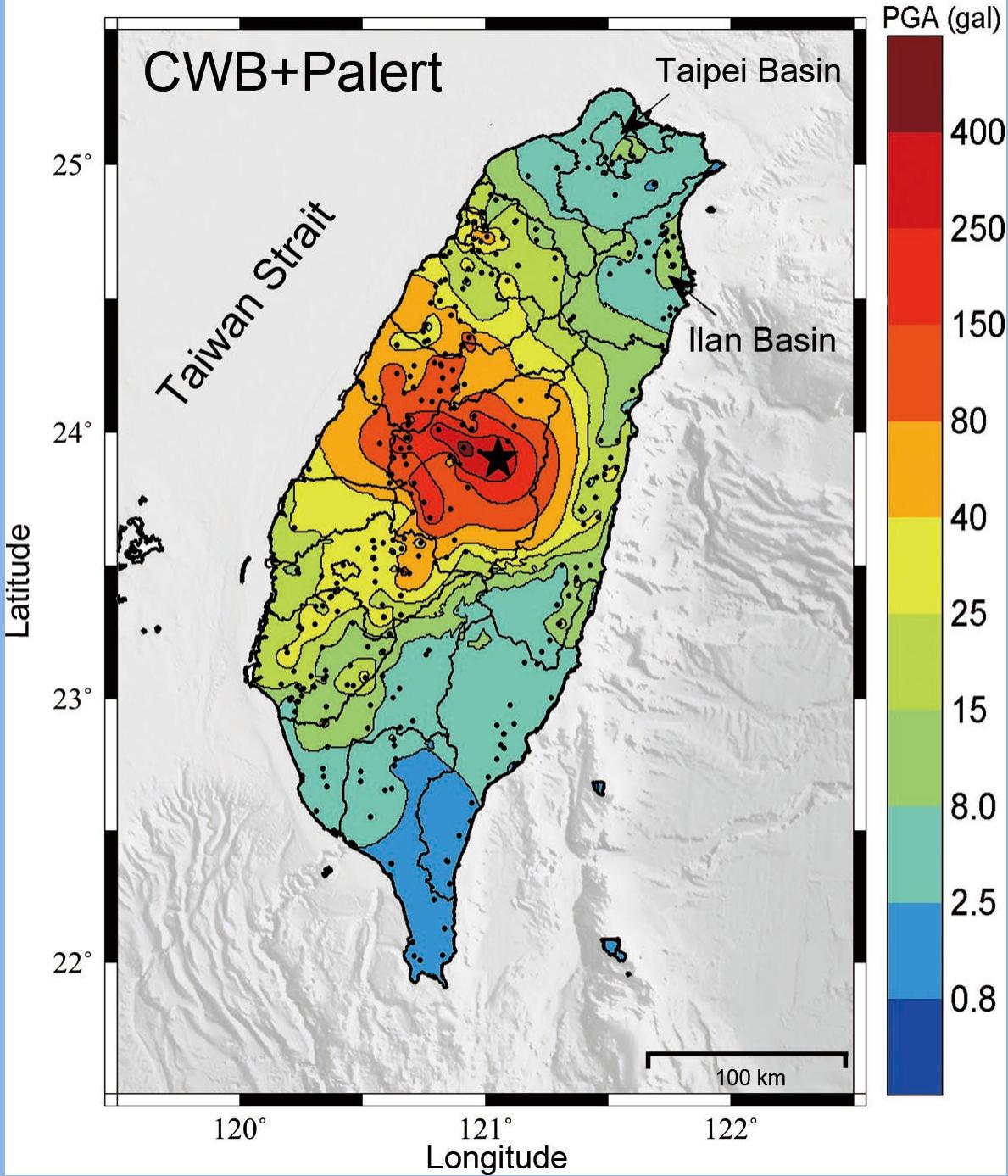


EW-component, Earthquake 2013/10/31 12:02:09

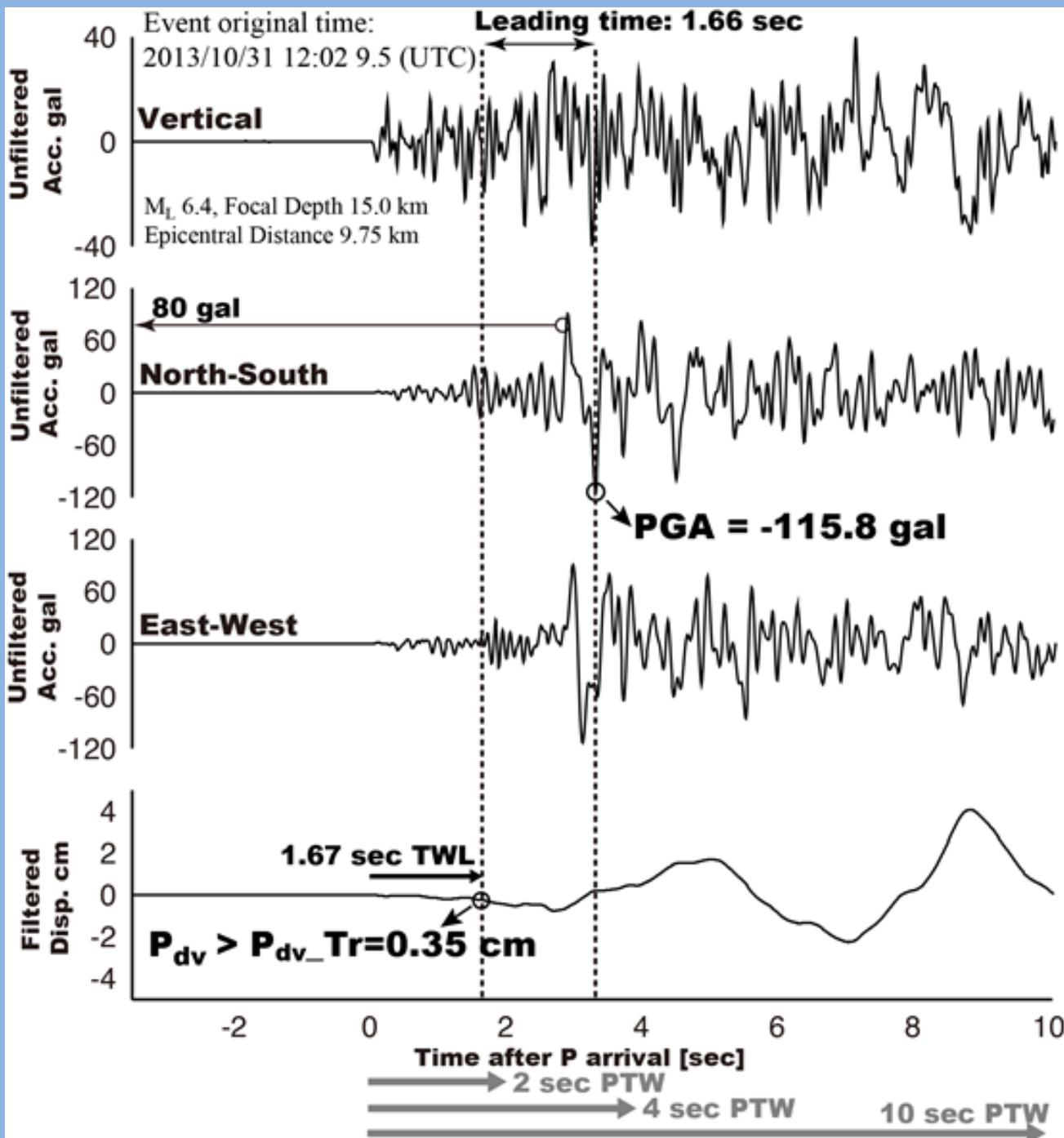
Lon:121.42, Lat:23.55, Depth:19.5, M_L :6.3



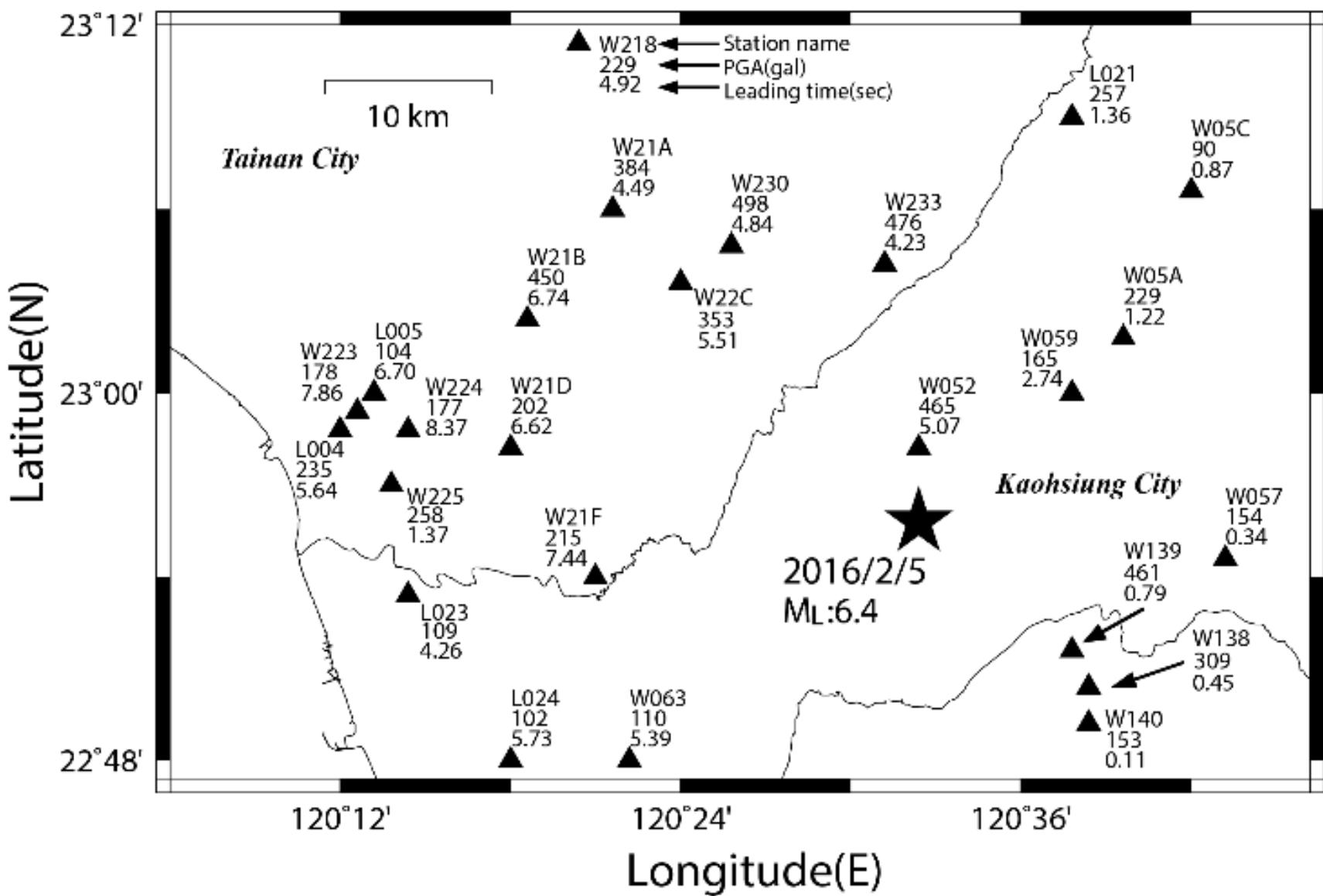
Nantou Taiwan Earthquake 2013/03/27 02:03:20 ML 6.1

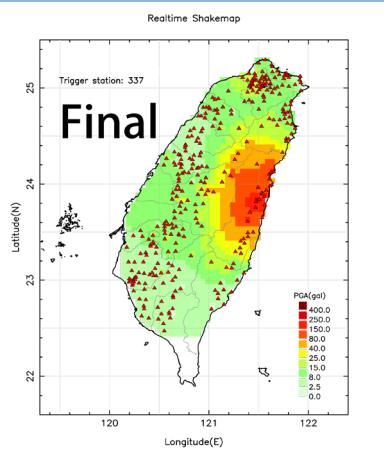
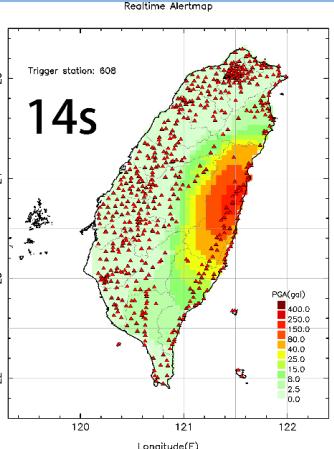
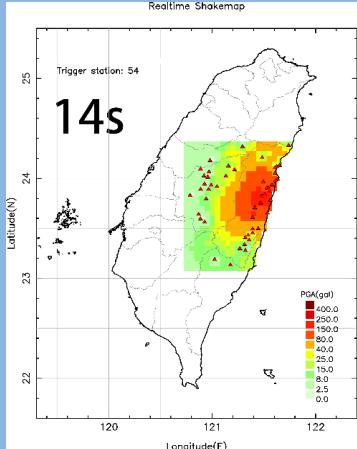
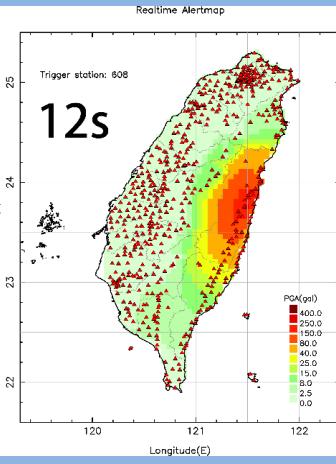
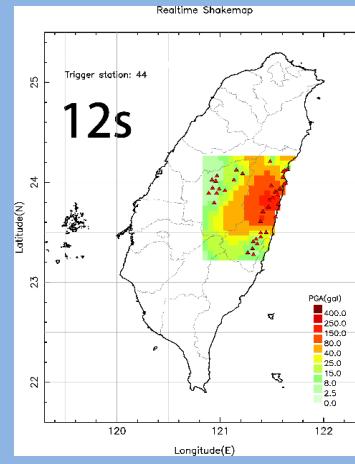
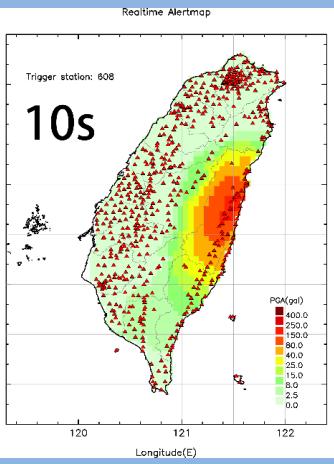
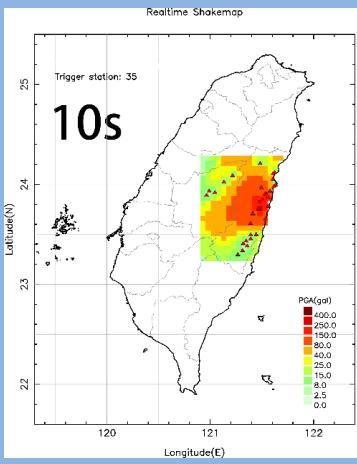
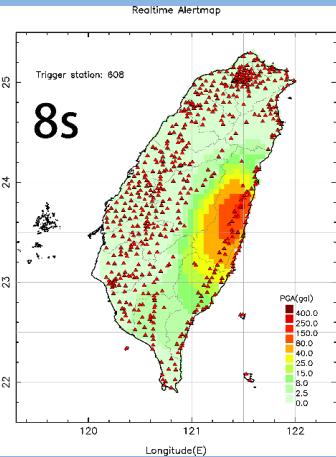
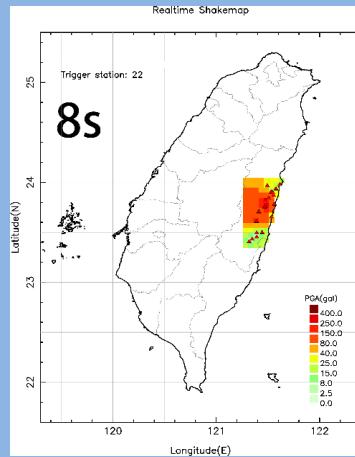
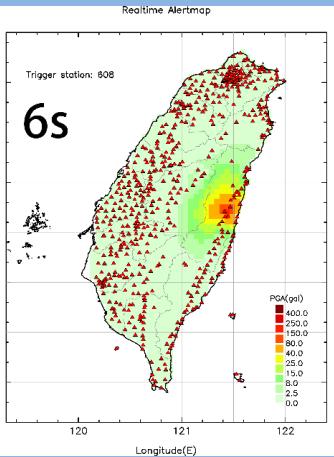
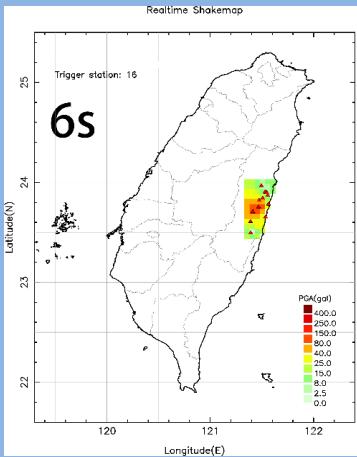


Pd Onsite

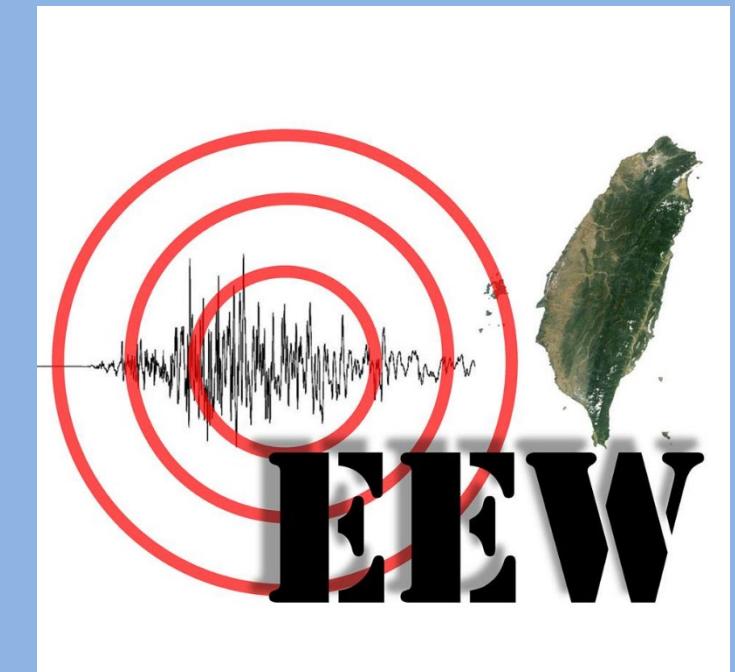
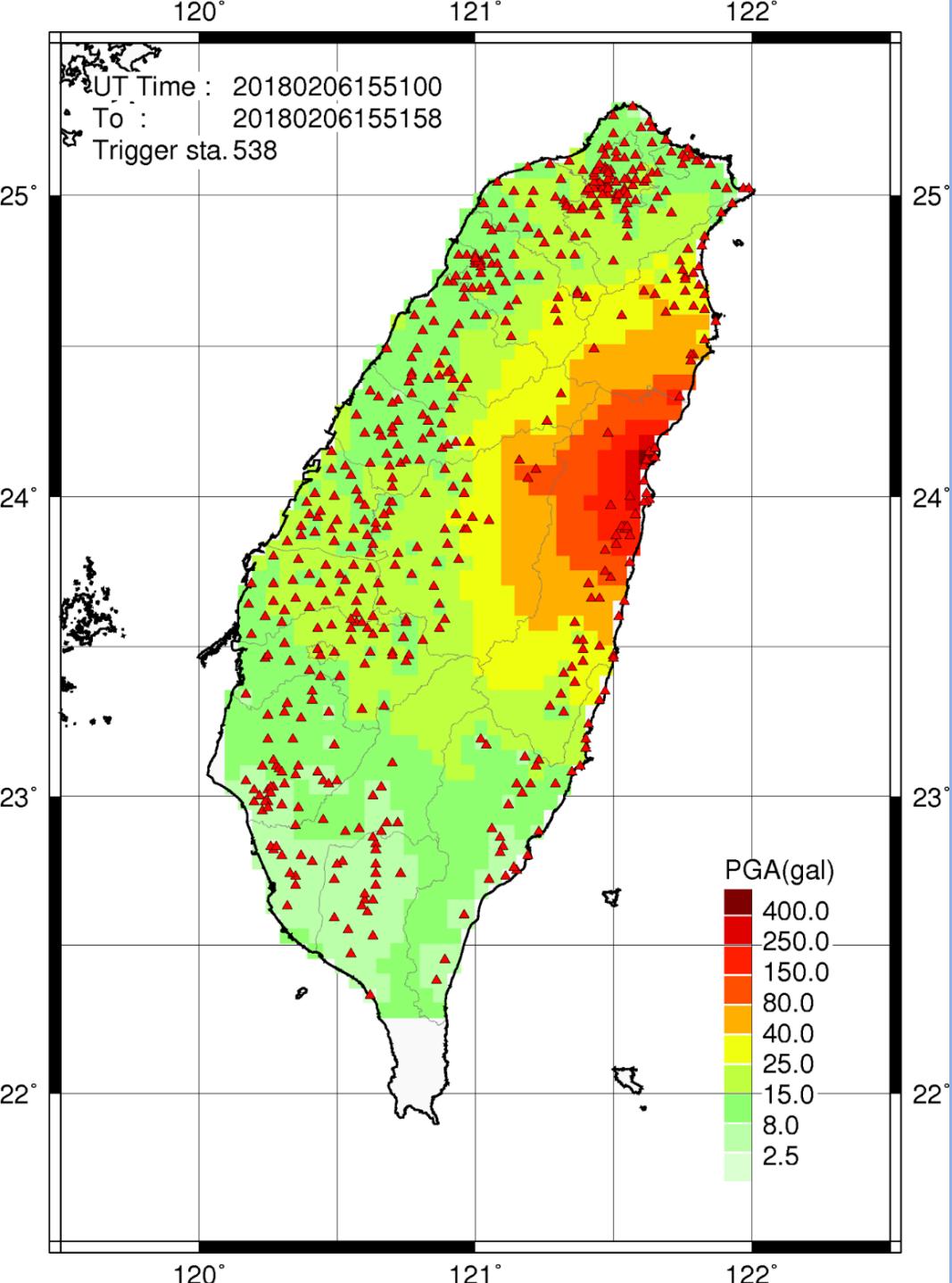


Leading time PGA

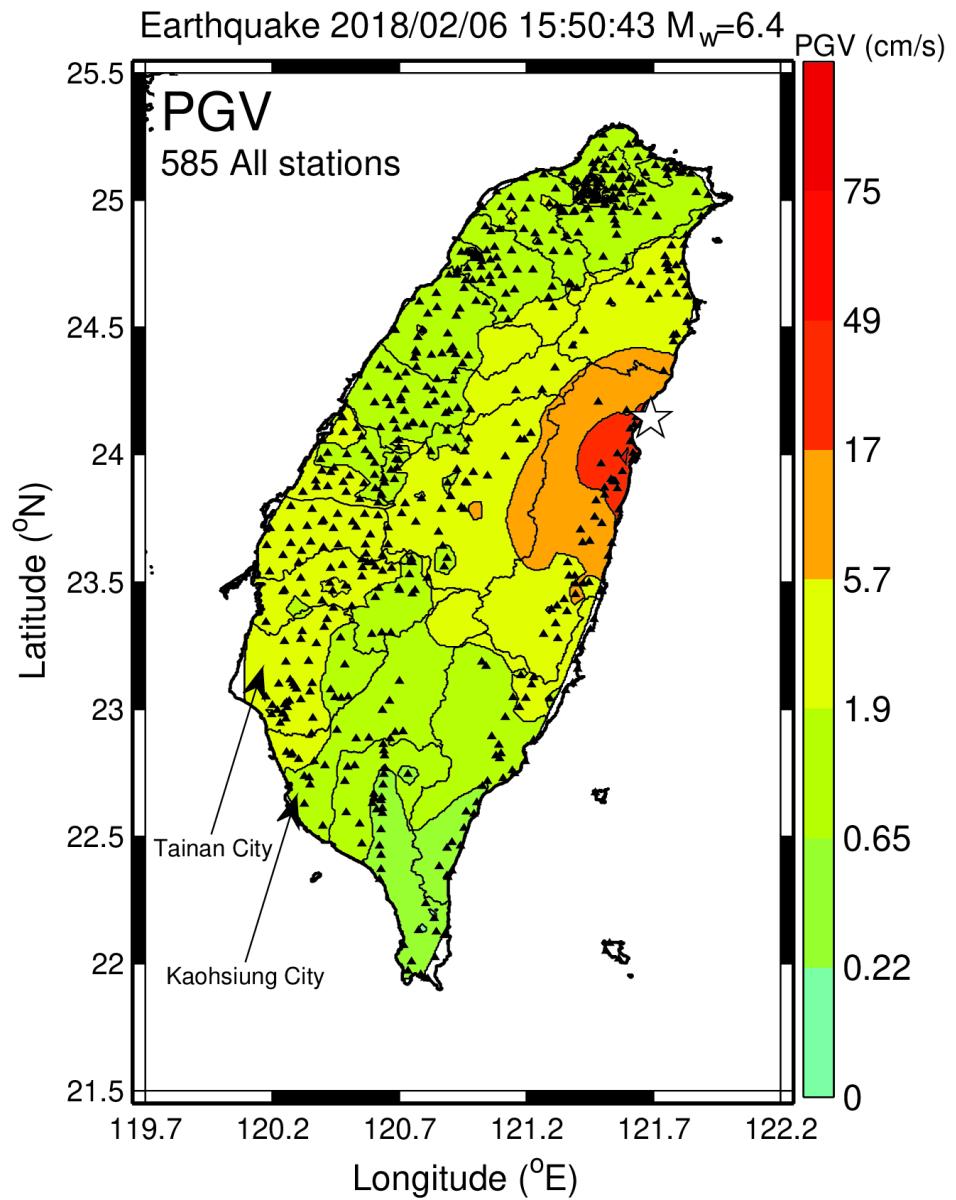
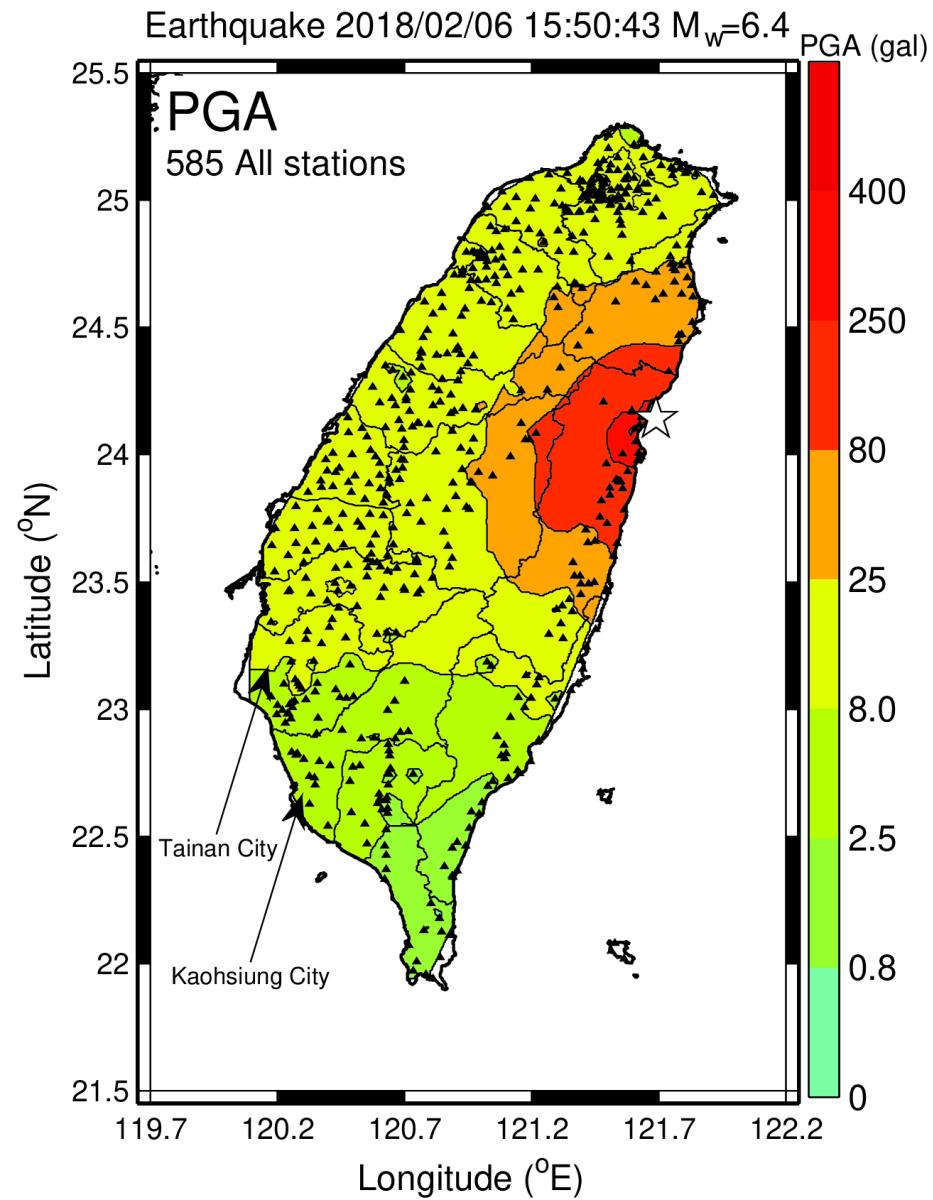


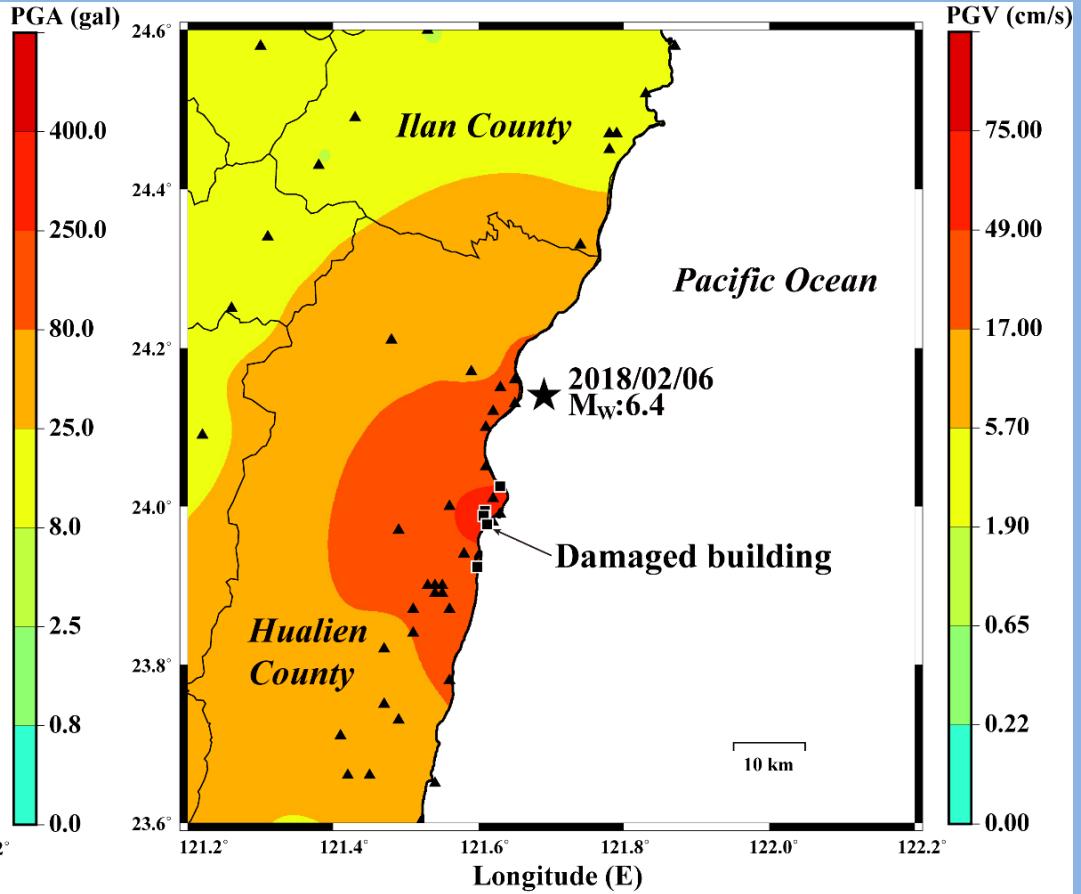
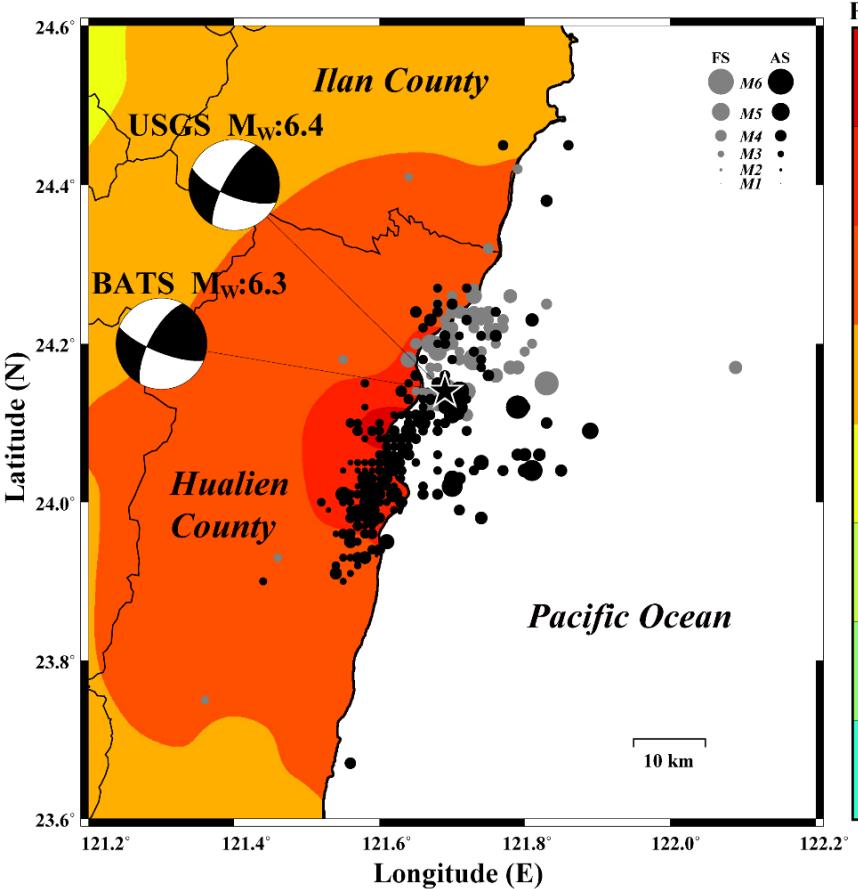


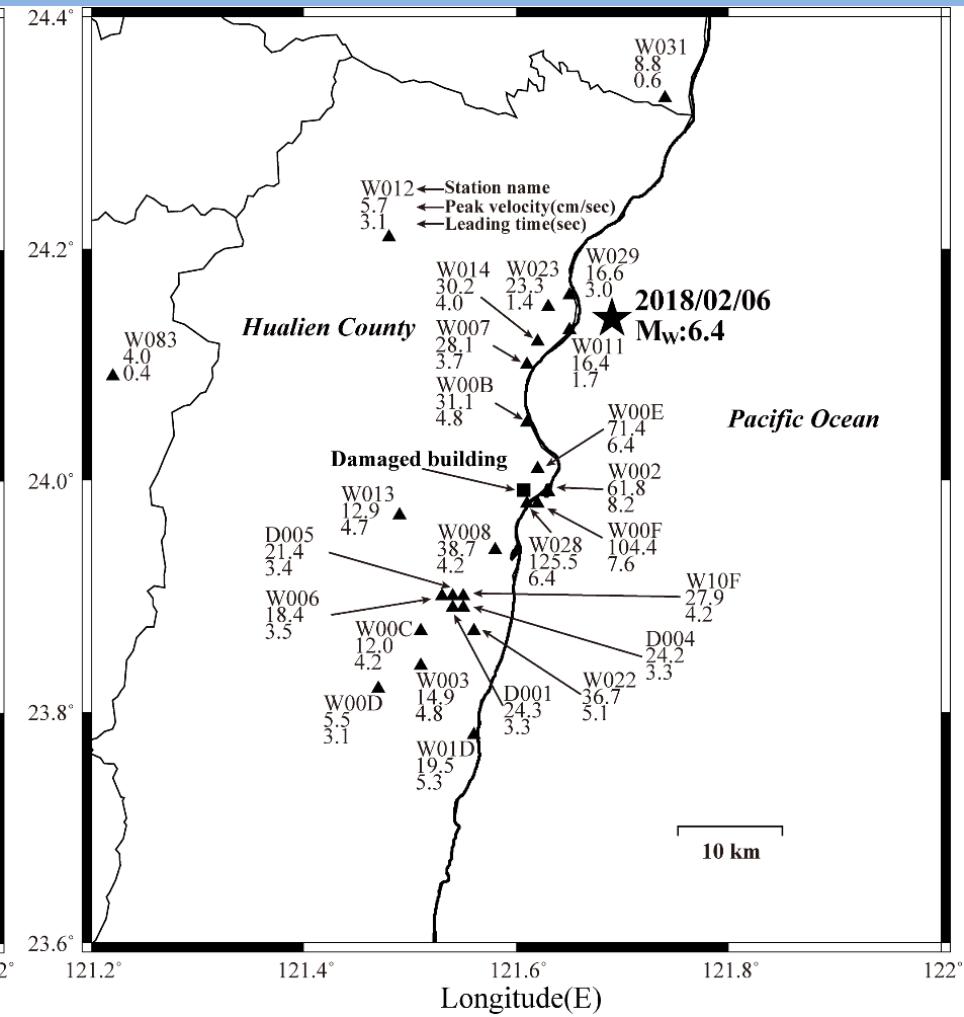
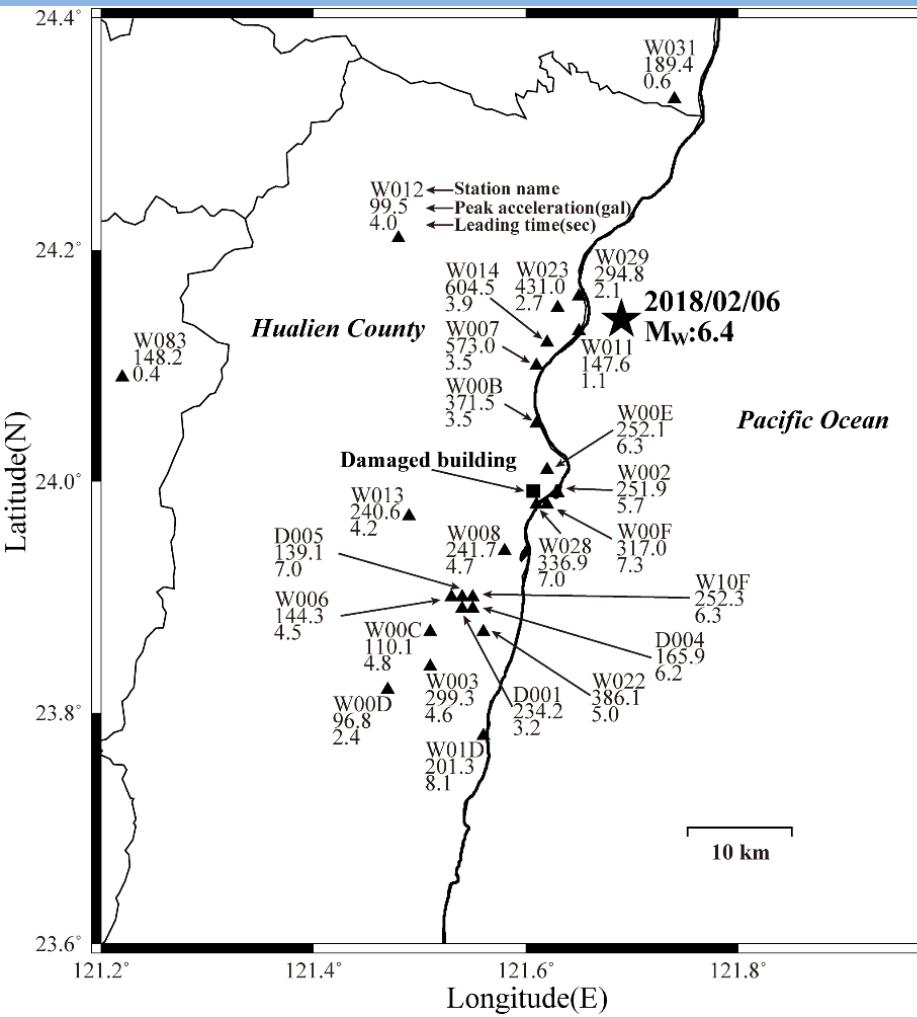
2018/02/06 Mw 6.4 Hualien
Earthquake



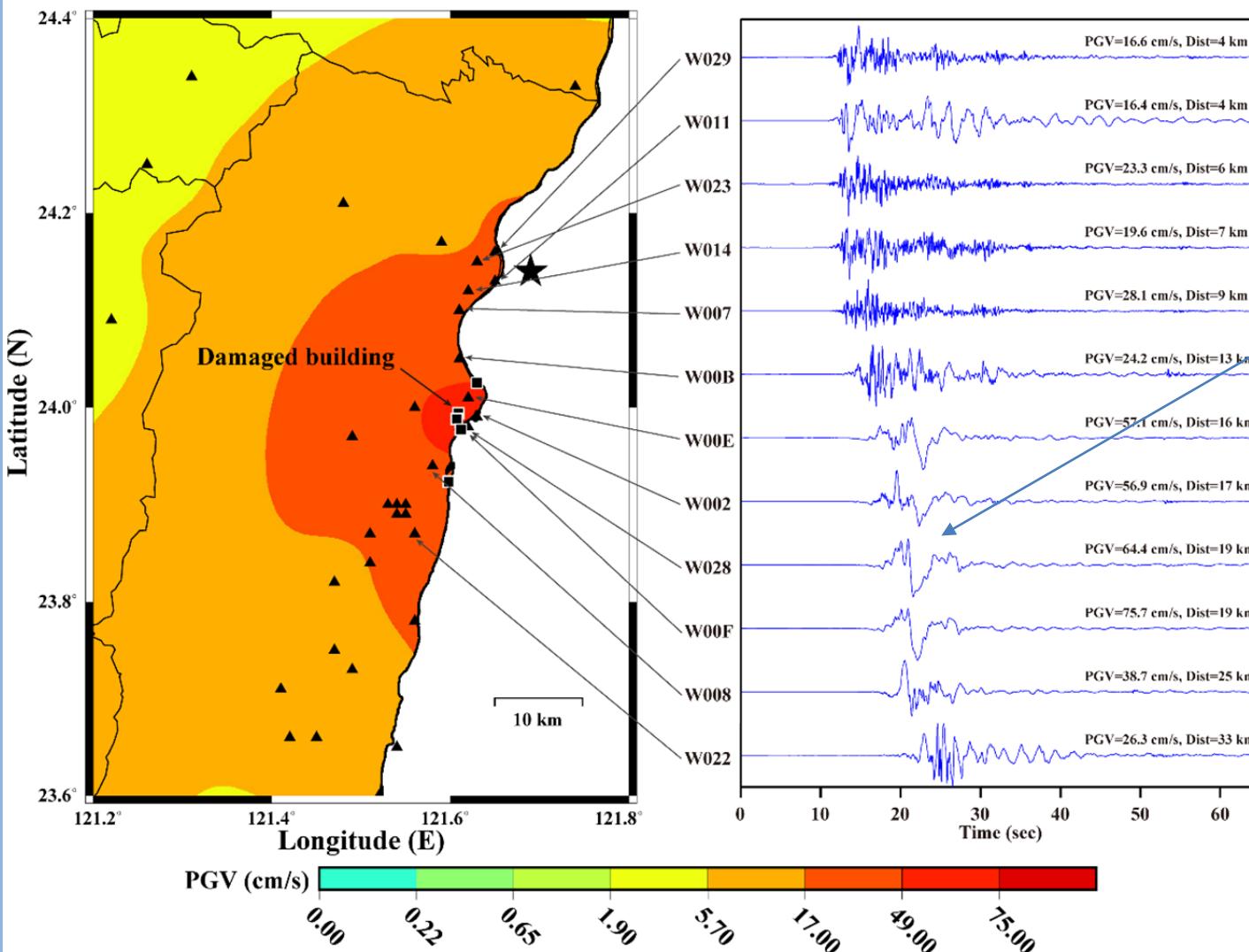
FB
NTU-GEO-EEW







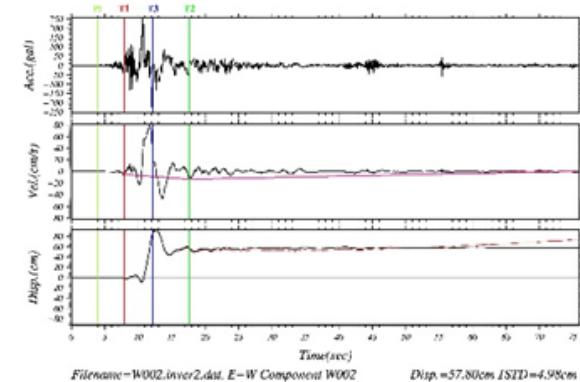
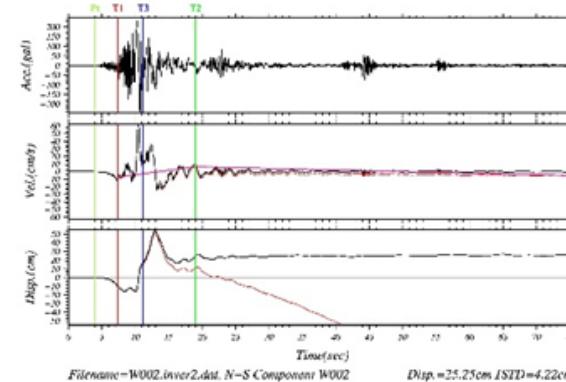
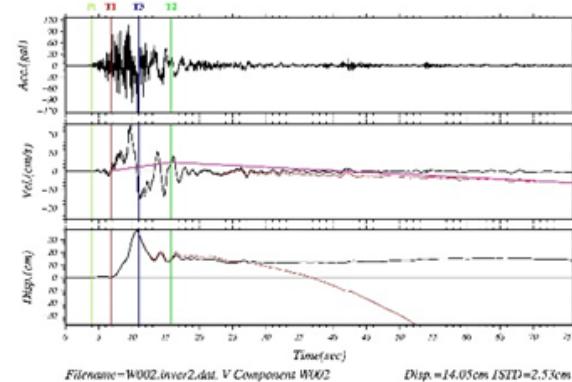
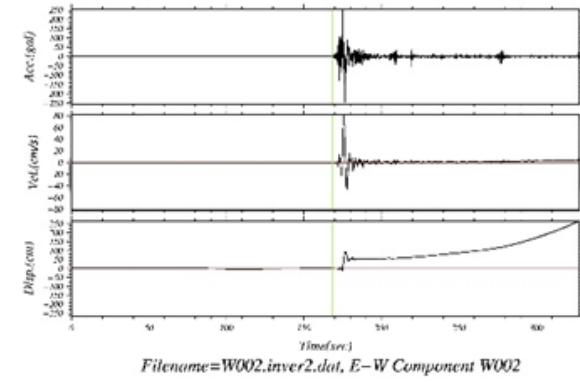
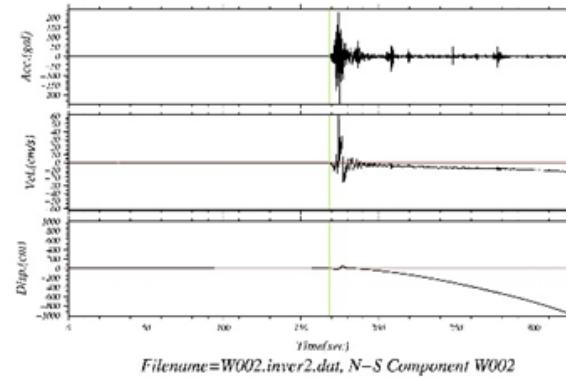
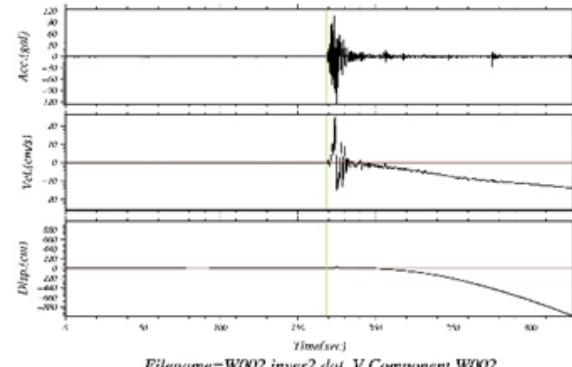
NS-component, Earthquake 2018/02/06 15:50:43
Lon:121.69, Lat:24.14, Depth:10.0, Mw:6.4



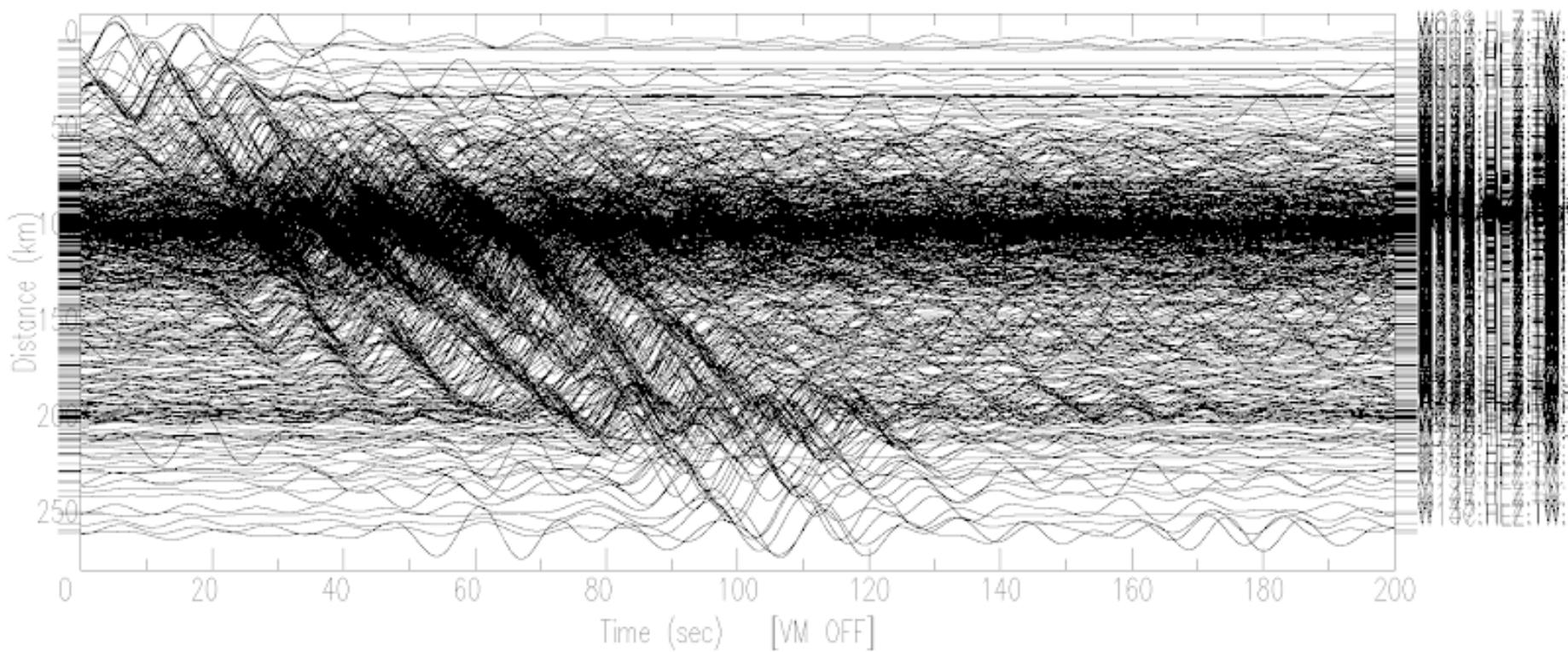
震動速度脈衝



由於震源往南南西方向破裂震波堆疊，及在花蓮下方的主要錯動，由科技部所支持的P波警報器系統(P-Alert)在花蓮地區觀測到超過50cm/s的速度脈衝，這是致災的震動，主要的災害分布在震動最大速度50cm/s以上的區域，在花蓮市區P-Alert現地預警系統在致災震動脈衝前可有五秒的預警時間。

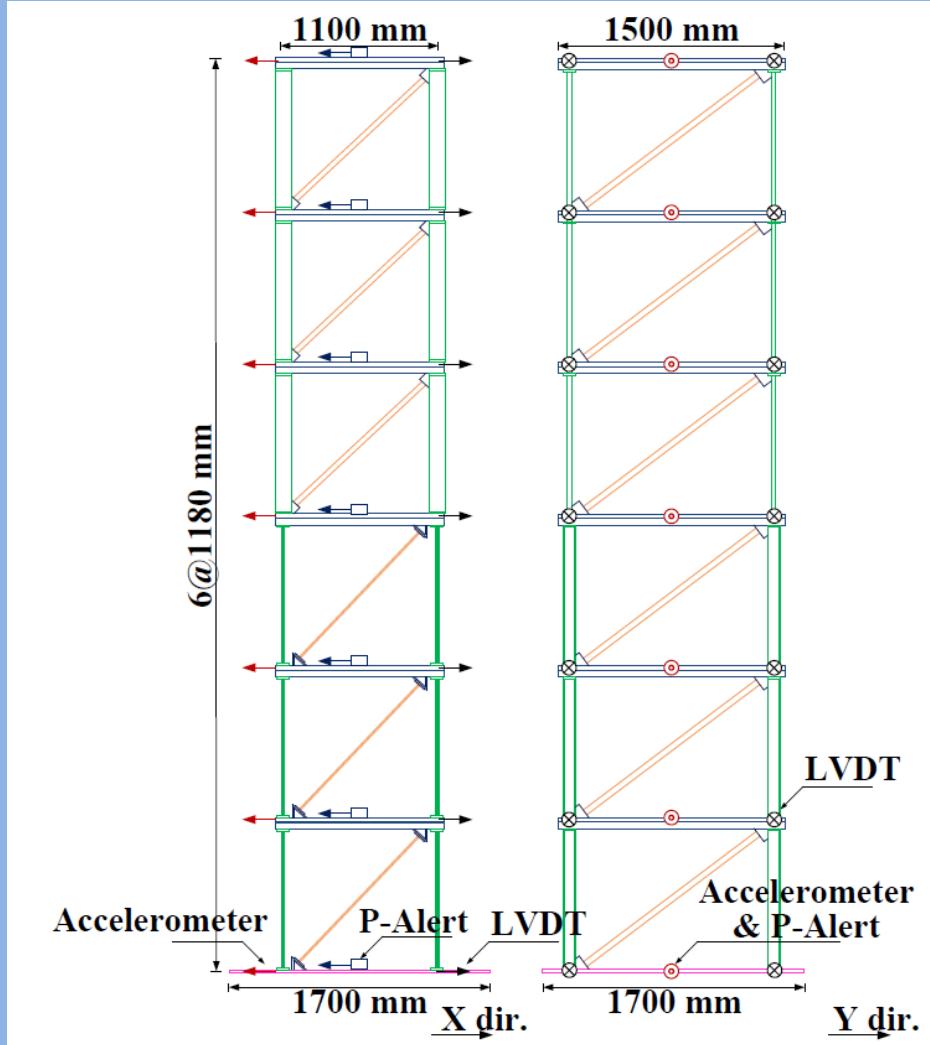


W002 Coseismic deformation



P-Alert waveform can be
downloaded in near real-time @
<http://palert.earth.sinica.edu.tw/db/>

From early warning to structural health monitoring



Thanks for your attention!