



火山災害潛勢評估及觀測技術強化(3/4)

Potential Assessment and Observation Technology Enhancement of Volcanic Hazards (3/4)

林正洪¹ 陳建志² 馬士元³ 鄭鼎耀⁴ 洪國騰⁵ 許鈞傑⁵ 李柏村⁵ 陸挽中⁵

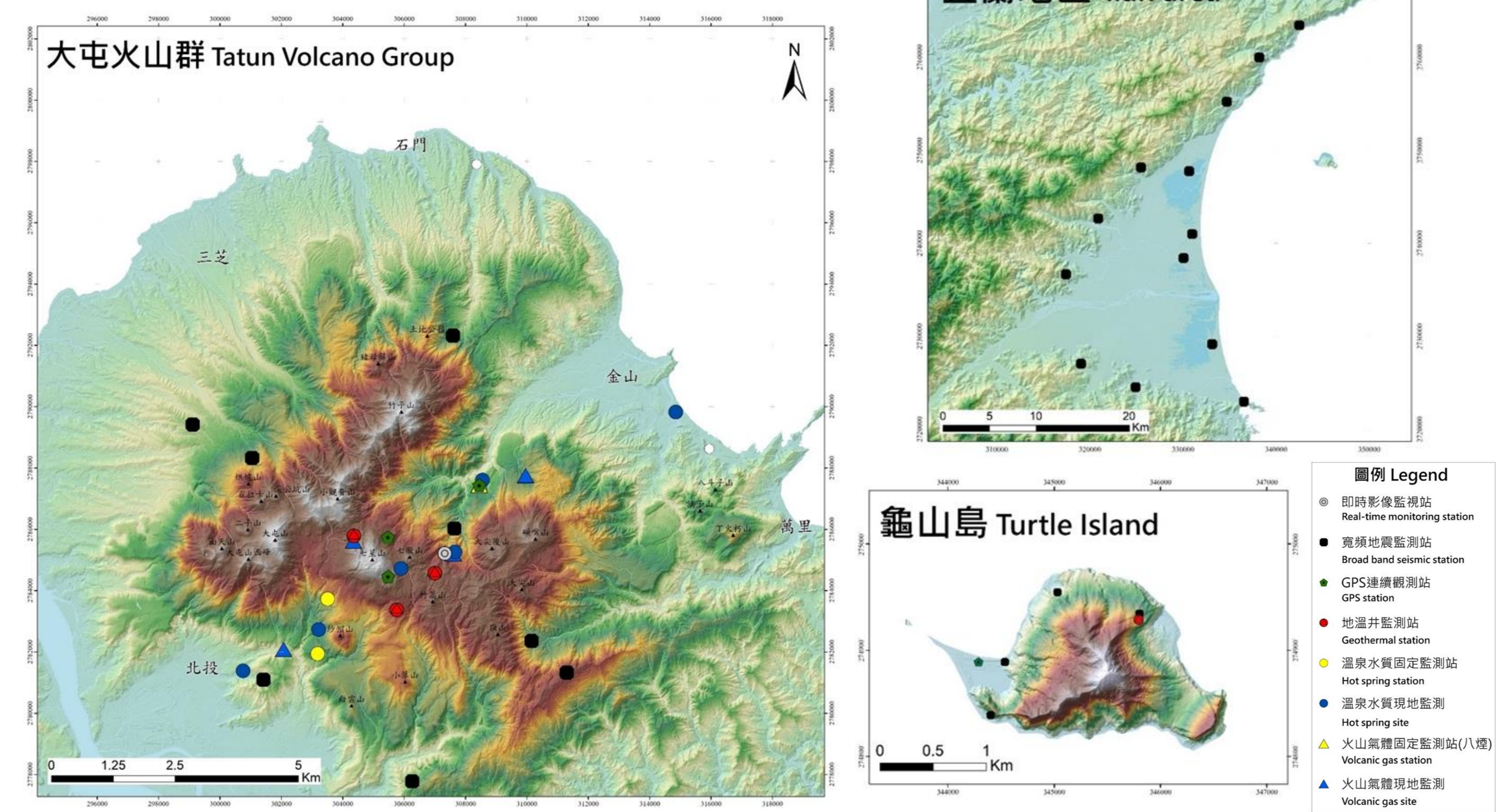
Lin, Cheng-Horng¹ Chen, Chien-Chih² Maa, Shyh-Yuan³ Cheng, Ding-Yao⁴ Hong, Guo-Teng⁵ Hsu, Chun-Jhieh⁵ Lee, Po-Tsun⁵ Lu, Wan-Chung⁵

¹中央研究院地球科學研究所 ²國立中央大學地球科學系 ³社團法人臺灣防災產業協會 ⁴中興測量股份有限公司 ⁵經濟部中央地質調查所

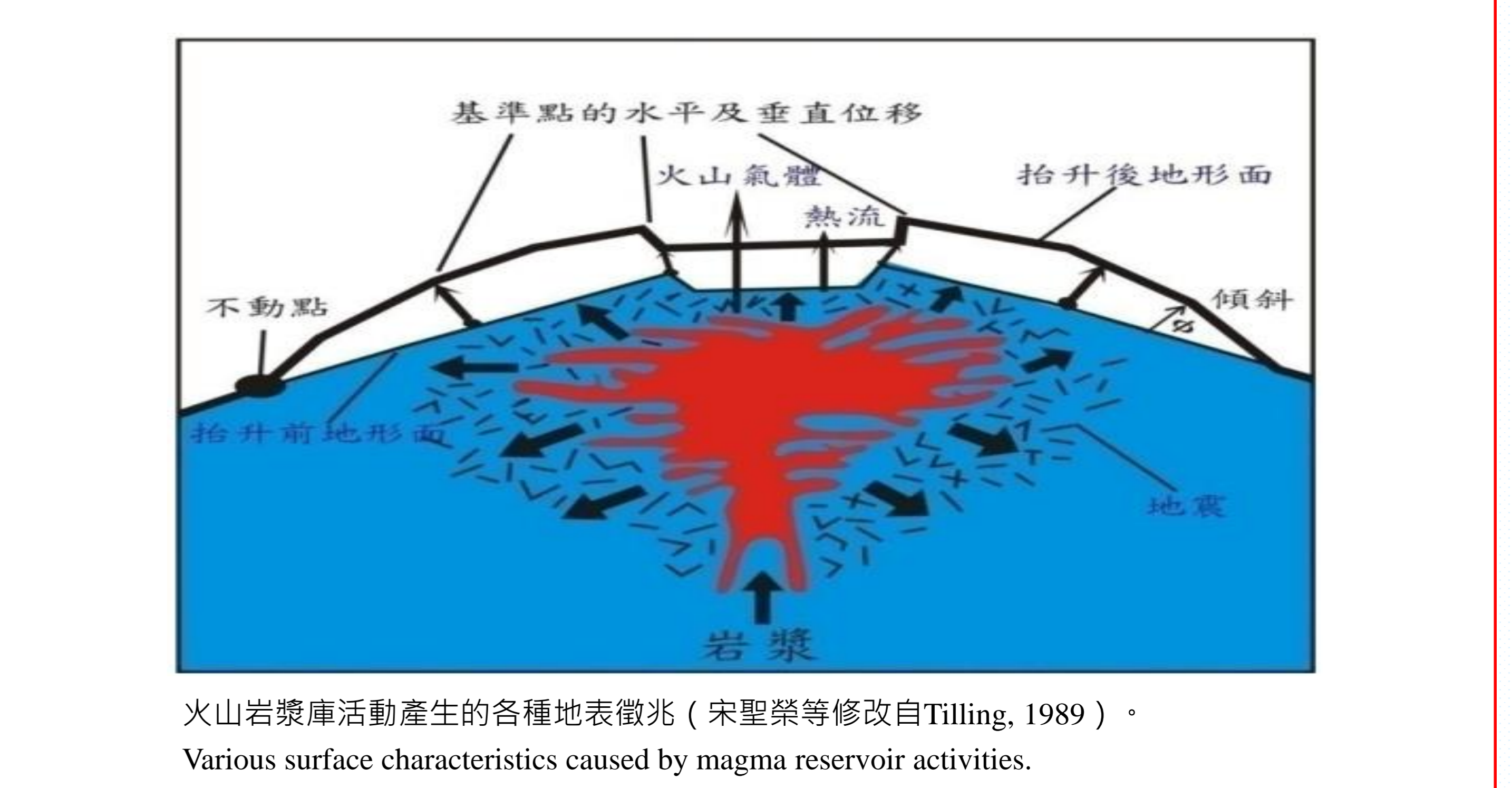
本計畫投入臺灣北部火山活動徵兆監測工作，以瞭解臺灣北部大屯火山群及龜山島火山岩漿庫或熱液活動，作為火山災害潛勢評估及火山防救災政策制定依據。內容包括火山微震、地球化學、地表變形監測及地球物理探測等。綜合111年各項監測資料，與往年相較，大屯火山區與龜山島之火山活動仍處於穩定狀態。此外，111年完成之磺嘴及竹子山火山亞群火山災害潛勢圖資，可供各機關火山災害防救計畫後續運用。大屯火山地區二連續測站之自然電位長期變化可作為火山地區熱液活動之觀察標的。以2022年群震事件紀錄對比其對應時段的自然電位功率譜比值變化為例，在群震發生前後經常出現低頻段功率譜比值變異。馬槽地熱區之近地表電性構造特性顯示，在馬槽地熱區噴氣孔下方的極低電阻率分布零散，代表馬槽地熱區地下缺乏類似於大油坑的集中型裂隙系統發育。

This project invests in monitoring the signs of volcanic activity in northern Taiwan to understand the Tatum Volcano Group and Guishan Island volcanic magma reservoir or hydrothermal activity in northern Taiwan, as a basis for volcanic disaster potential assessment and volcanic disaster prevention and relief policy formulation. The contents include volcanic microseismic activities, geochemistry, surface deformation monitoring, terrestrial spontaneous potential observation and geophysical detection, etc. Based on the monitoring data in 2022 and compared with previous years, the volcanic activity in the Tatum Volcanic Area and Guishan Island is still in a stable state. In addition, the volcanic hazard map of Mt. Huangzui and Mt. Zhuzi volcanic subgroups completed in 2022 can be used for subsequent use of volcanic disaster prevention and rescue plans of various agencies.

火山監測站 Volcano Monitoring Stations

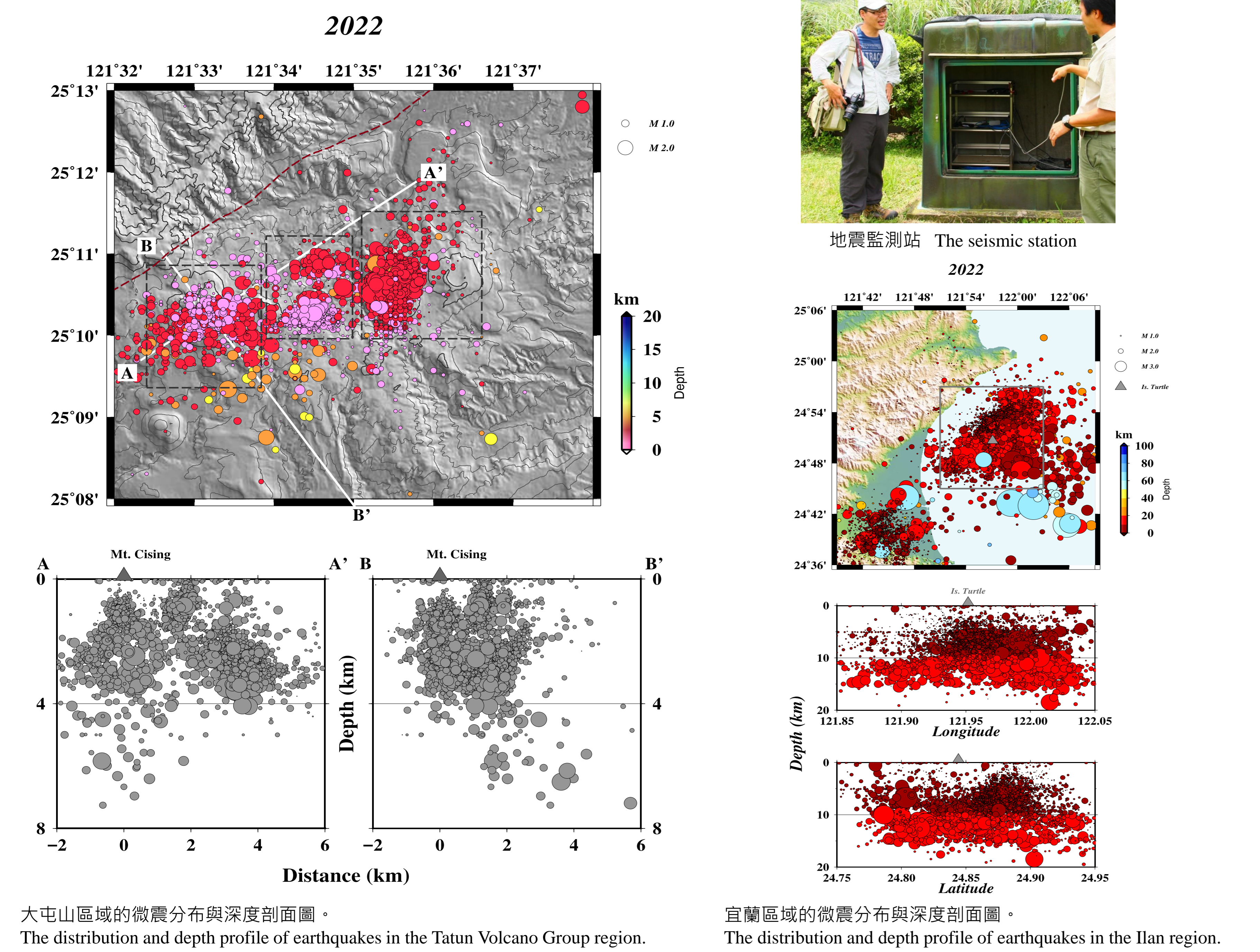


火山監測方法 Volcanic Monitoring Methods



火山岩漿庫活動產生的各種地表徵兆 (宋聖榮等修改自Tilling, 1989)。 Various surface characteristics caused by magma reservoir activities.

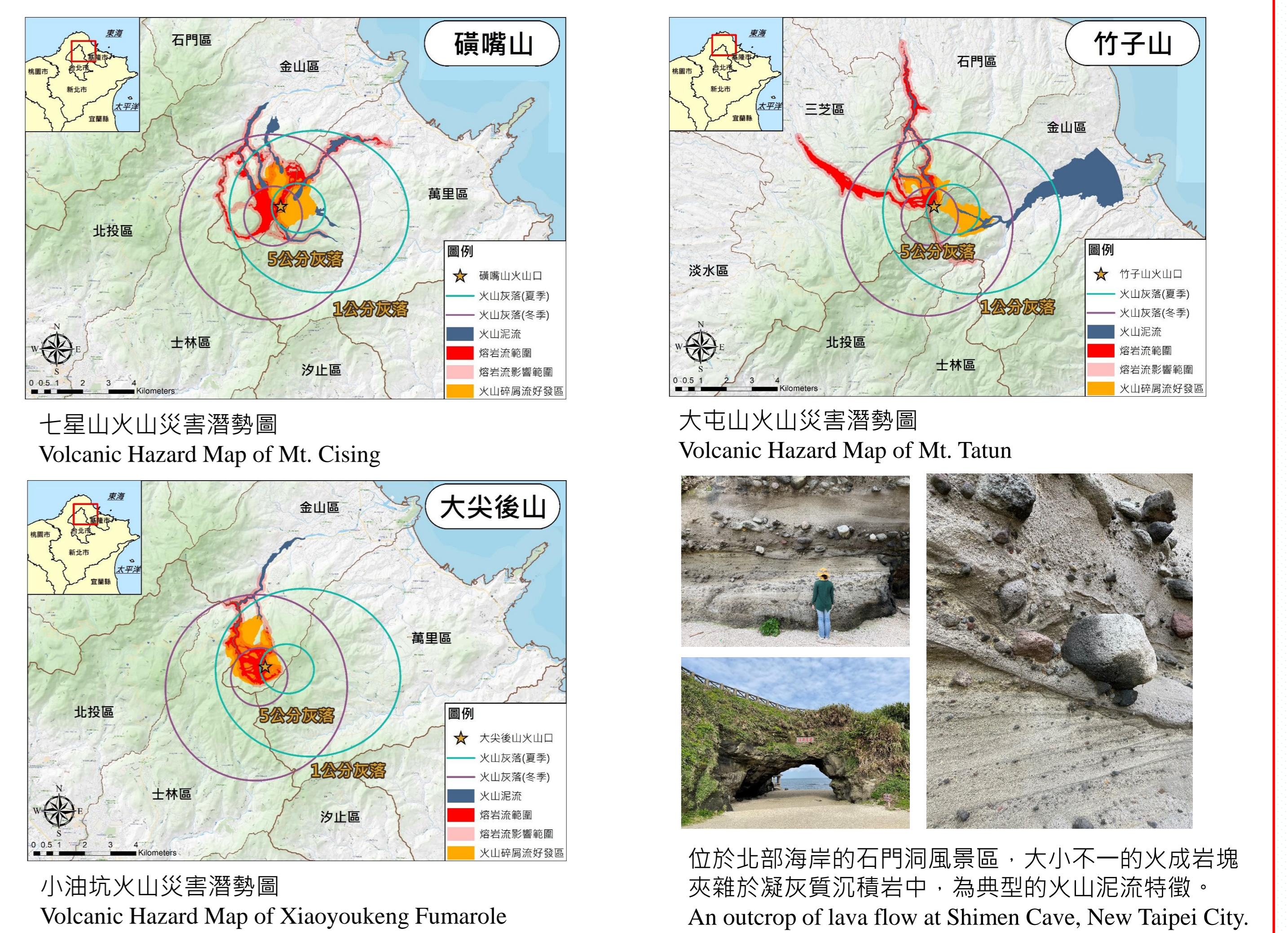
微震監測 Monitoring of Seismic Activities



大屯山區域的微震分布與深度剖面圖。 The distribution and depth profile of earthquakes in the Tatum Volcano Group region.

宜蘭區域的微震分布與深度剖面圖。 The distribution and depth profile of earthquakes in the Ilan region.

火山災害潛勢調查 Volcanic Hazard Potential Investigation



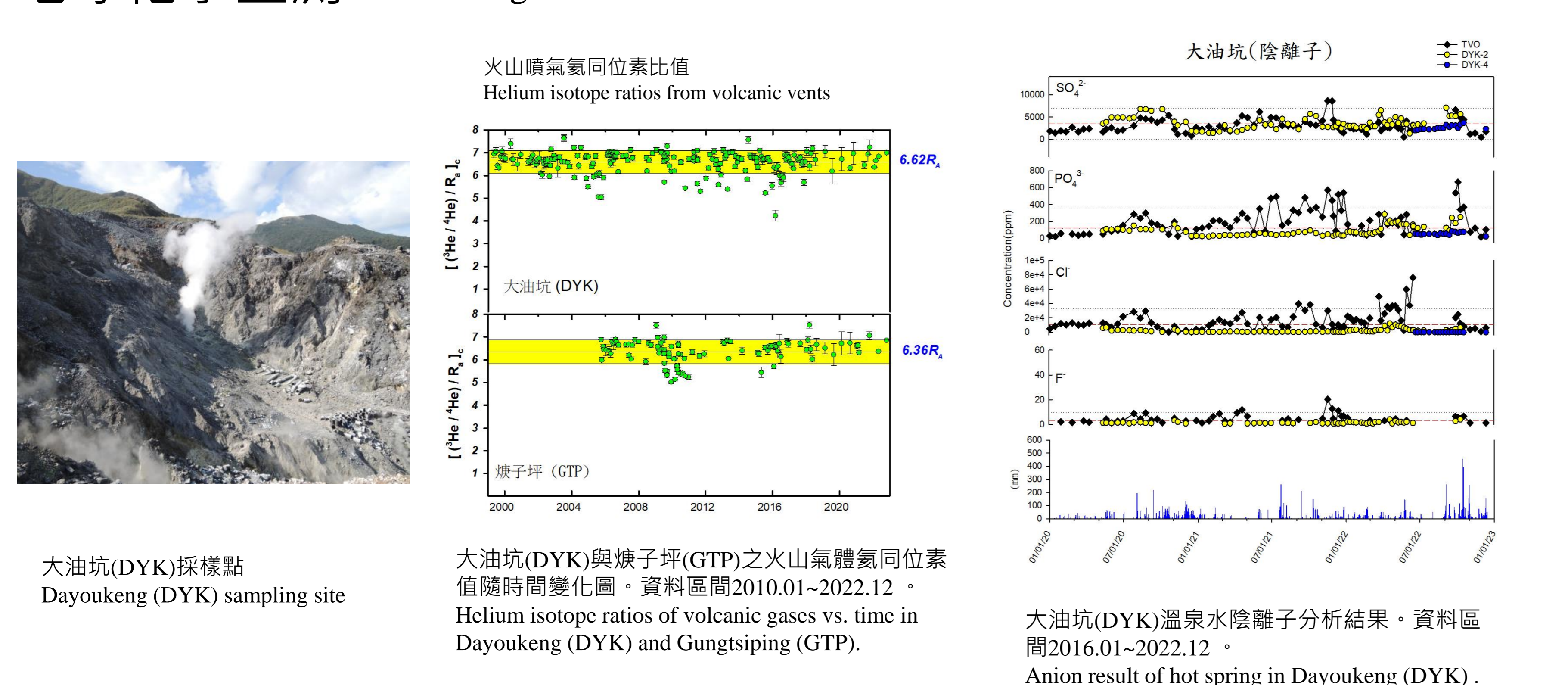
七星山火山災害潛勢圖 Volcanic Hazard Map of Mt. Cising

大屯山火山災害潛勢圖 Volcanic Hazard Map of Mt. Tatum

小油坑火山災害潛勢圖 Volcanic Hazard Map of Xiaoyoukeng Fumarole

位於北部海岸的石門洞風景區，大小不一的成岩塊夾雜於凝灰質沉積岩中，為典型的火山泥流特徵。 An outcrop of lava flow at Shimen Cave, New Taipei City.

地球化學監測 Monitoring of Geochemical characteristics



大油坑(DYK)採樣點 Dayoukeng (DYK) sampling site

大油坑(DYK)與婁子坪(GTP)之火山氣體氦同位素值隨時間變化圖。資料區間2010.01~2022.12。 Helium isotope ratios of volcanic gases vs. time in Dayoukeng (DYK) and Gungtsiping (GTP).

大油坑(DYK)溫泉陰離子分析結果。資料區間2016.01~2022.12。 Anion result of hot spring in Dayoukeng (DYK).

大地自然電位觀測 Self-potential continuous observation

藉由連續觀測大屯火山地區的自然電位變化，可延伸應用於觀測地下熱液的長期流動變化，以瞭解火山熱液系統之活動性。 We extensively monitor the long-term variation of the local self-potential in TVG region to better understand the activity of the underground hydrothermal system.

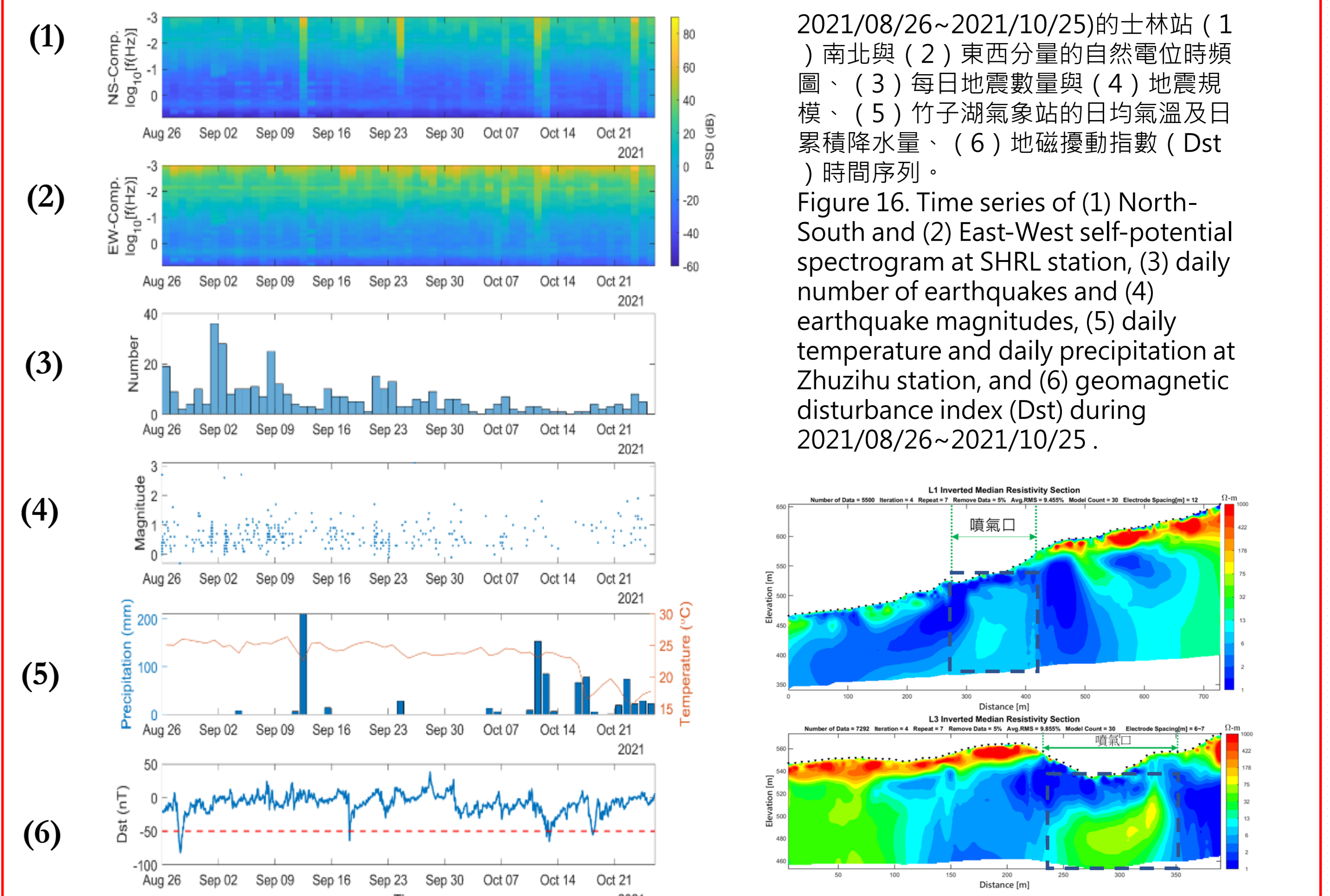


Figure 16. Time series of (1) North-South and (2) East-West self-potential spectrogram at SHRL station, (3) daily number of earthquakes and (4) earthquake magnitudes, (5) daily temperature and daily precipitation at Zhuzihu station, and (6) geomagnetic disturbance index (Dst) during 2021/08/26~2021/10/25.

本研究於大油坑附近布設的地電剖面測線中馬槽地區L1測線(上圖)以及L3測線(下圖)的中位數地電阻剖面圖。黑色虛線方框指出一個上覆低電阻率及下伏高電阻率的電性構造特徵，顯示火山噴氣口下方的地質構造特徵。