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Characteristics of Low Frequency Earthquake Swarm in Taiwan

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The observation of low-frequency swarms (LFS) offers insights into fluid movements on faults. LFS as the events characterized by long-lasted low frequency energy (< 5 Hz), are believed to result from fluid flow through damage zone (Chouet, 1997; Neuberg, 2000; McNutt, 2005). Tracking the migration of such events may provide new insight into the deep fluid system. In Taiwan, the earthquake swarms that require transient aseismic slip and elevated fluid pressure to facilitate the triggering of nearby events, are found to be localized in eastern Taiwan and Central Range (Peng et al., 2021). We attempt to search for LFS using the swarm catalog and the waveforms detected by 5 closest seismic stations. The largest LFS sequence (called Shou-Fong swarm) is found near Hualien that lasted from 2021 April 18 to July 18. This sequence is composed of 1049 M>2 events and 70 M>3 events with mainshock magnitude of 6.2. Applying hypoDD relocation scheme, we found a clear migration pattern from deep to shallow, from SW to NE. The significant lower frequency content are commonly found at one of the five analyzed stations, EGC. The corresponding travel path coincides with the low Vp and high Vp/Vs from velocity imaging by Huang et al. (2014). This result suggests that the LFS may tie to fluids enrichment within a confined area. To further develop automatic search of LFS in Taiwan, two different identification exercises will be conducted using (1) low amplitude ratio and (2) CNN based classification approach. The resulting spatio-temporal distribution of LFS in Taiwan will help the general understanding of location and dynamic of deep fluid.

Keywords: earthquake swarm, low frequency