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Spatial Distribution of Radiated Seismic Energy from Local and Regional Earthquakes in Taiwan

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The radiated energy during earthquakes is one of the important characteristics that have a great impact on human lives. The study of the released energy during earthquakes and their distribution may provide a detailed knowledge about the driving forces. The earthquakes occurring between 1994 and 2018 are used to study the spatial distribution of energy in and around Taiwan. The maximum depth of earthquakes used in the present work is 320 km. Hwang's (2012) approach based on local records from Taiwan is used to estimate energy for all earthquakes having $M_L \leq 6.4$. As M_L saturates for higher magnitude earthquakes, a correction factor is applied to all earthquakes above 6.4 based on energy calculation for Chi-Chi and JiaSian earthquake. It is found that the distribution of earthquake numbers and energy is not uniform. In particular, 99% of the events occurred within 100 km while the remaining 1% occurred from 100 to 320 km. Most of the events, about 78% of the total earthquakes are confined to the upper 20 km depth. Around 90% of energy release in and around Taiwan is contributed by the earthquakes occurring to a depth of 100 km. Only a few earthquakes occur beyond 100 km depth; contributing around 10% of total released energy. The highest energy release is attributed to the eastern subduction along the Ryukyu trench. Our results show that the lower crust may play an important role in energy distribution, though most of the earthquakes have occurred in the upper crust. So, in addition to upper crust controlling plate-driving forces, the lower crust may also control these forces causing deformation. Therefore, the temporal and spatial distributions of seismic energy release can be further studied to reveal the characteristics of the seismogenic zone in the future.

Keywords: Energy, Magnitude, Subduction, Ryukyu trench, Subduction