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Editorial: Source and effects of light to moderate magnitude earthquakes – Volume II

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Editorial on the Research Topic

Source and effects of light to moderate magnitude earthquakes—Volume II

The study of light-to-moderate magnitude earthquakes has been receiving increasing attention during the last decades. The development of detection networks has led to an increased availability of good quality data of these events, which facilitates the study of seismic sequences, source characteristics, and path propagation properties. The results of these investigations present strong implications for the distribution of stresses in the lithosphere and ultimately for seismic hazard.

The first volume of the Research Topic “*Source and Effects of Light to Moderate Magnitude Earthquakes*” contains seven contributions that used instrumental records to analyze the source characteristics of different seismic sequences, two articles on strong ground motion analysis, and three articles describing applications of seismic data analysis to hazard assessment and to the development of risk scenarios (Pino et al., 2021). In less than 2 years, these papers accumulate almost 40 citations and more than 30,000 views, revealing the interest of the scientific community in such a Research Topic.

This second volume contains four articles that cover a wide range of subjects, including the characterization of seismic sources, the identification of active fault structures, the analysis of source propagation effects on ground motion records, and the investigation of crustal permeability changes and their impact on earthquake triggering.

Peruzza et al. performed a detailed analysis of a highly productive seismic sequence in the Southeastern Alps (Northern Italy). In spite of the very low energy (maximum magnitude $M_W=2.4$), these authors accurately relocated about 400 earthquakes and estimated the seismic moment for most events, also obtaining a focal mechanism solution for some of them. Their investigation allowed the identification of seismic activity on a structure—potentially capable of generating light-to-moderate magnitude events—never before revealed by previous earthquake locations, further demonstrating the importance of studies focused on the careful analysis of minor seismicity.

Xie et al. presented a new analysis of the Menyuan Earthquake (Qinghai, China), $M_S=6.9$, from 8 January 2022. The authors explored the effects of the rupture directivity by analyzing strong ground motion and microelectromechanical systems (MEMS) data within 100 km from the causative fault. The authors also provided a clear example of

application of MEMS technology in defining the source propagation effects, suitable also for investigating earthquakes with magnitudes between 4 and 6.

Wang et al. used high-quality seismic data from the National Earthquake Data Center of China to estimate source parameters of 184 moderate magnitude events (M_w 3.9–6.2) in the Longmen-Shan Fault zone. The apparent stress of the analyzed earthquakes is higher than the global average. This evidence may be associated with the high-stress accumulation and the strong deformation characteristics in the intraplate environment. The radiated energy enhancement factor (REEF) is between 1.2 and 7.1, consistent with the Brune ω -square model. According to the authors, this result suggests that the REEF is more suitable to compare earthquakes at different scales than radiation efficiency.

Malagnini et al. used seismograms from the 2016–2017 Central Apennines sequence to obtain high-resolution time histories of seismic attenuation. The authors ascribed the observed changes to the time variations in rock permeability. The authors also proposed a conceptual model of preseismic rupture growth, coseismic stress drop, and dilatation and pore pressure distribution, which explains the development of the mentioned sequence.

Overall, the papers included in this Research Topic demonstrate the interest in analyzing the data corresponding to light-to-

moderate magnitude earthquakes to unravel detailed features of seismic sources and propagation effects.

Author contributions

JMG-E, NP, VC, and RW edited the Research Topic “Source and Effects of Light to Moderate Magnitude Earthquakes, Volume II.” JMG-E wrote the Editorial with contributions from all authors.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Reference

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