

On the Attenuation Characteristics of Strong Ground Motions during the 2024 Noto Peninsula Earthquake

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On January 1, 2024, a large inland crustal earthquake of Mj7.6 (the 2024 Noto Peninsula earthquake) occurred with its epicenter at Suzu City in the Noto Peninsula. Thanks to the nation-wide strong motion networks in Japan, the strong ground motions were recorded in and around the source area. The attenuation characteristics of these strong ground motion records are important as one of the primary pieces of information to understand the source and site properties. In this study, we summarized the attenuation characteristics of strong ground motions records during the 2024 Noto Peninsula earthquake based on the various ground motion prediction equations (GMPEs) and source models.

We calculated the peak ground acceleration (PGA) and peak ground velocity (PGV) from the strong motion data recorded at K-NET and KiK-net of the National Research Institute for Earth Science and Disaster Prevention (NIED) and the strong motion observation network of the Japan Meteorological Agency (JMA). Five source models were used to estimate the fault distance from the source to site. For comparison, we used the following four GMPEs: Si and Midorikawa (1999) (SM1999), Morikawa and Fujiwara (2013) (MF2013), Boore et al. (2013, 2014) (BSSA14), and Cambell and Bozorgnia (2013, 2014) (CB2014).

As a result, the attenuation characteristics of the observed PGAs and PGVs were comparable to those of the GMPEs of SM1999 and MF2013. On the other hand, The GMPEs of BSSA14 and CB2014 underestimated to the observed PGAs and PGVs for the stations located 20 km or more from the source fault. For the near fault distance within 0–20 km, the fault distance varied depending on the source model used, especially in the vicinity of the source fault (e.g., ISK006: K-NET Togi). However, as for the overall trend of the shortest fault distances, there was no obvious difference between the observations and GMPEs even if we use either source model. Therefore, the 2024 Noto Peninsula earthquake was comparable to past inland crustal earthquakes of similar magnitude in terms of source characteristics. We also note the data used in this study include preliminary information and should be reexamined in light of future updates to the information.

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Keywords: 2024 Noto Peninsula Earthquake, GMPE, Attenuation characteristics, Source model