Site amplification characteristics of central Wajima, Ishikawa, inferred from aftershock recordings of the 2024 Noto Peninsula earthquake

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The Noto Peninsula earthquake (Mw7.5, Mj7.6) that occurred on January 1, 2024, struck a wide area in the northern part of the Noto Peninsula with a Japan Meteorological Agency (JMA) seismic intensity scale of 6-upper to 7 (maximum scale), damaging many buildings, mainly low-rise wooden houses. In the central area of Wajima City, Ishikawa Prefecture, fires at the Morning Market and the collapse of a five-story building were highlighted as characteristic damage as well as damage to many wooden houses.

In downtown Wajima, the K-NET Wajima station (ISK003) of the National Research Institute for Earth Science and Disaster Resilience (NIED) is located on a sloping hillside to the east of the city, and the JMA seismic intensity station (E10: Fugeshimachi) is located on a lowland area to the west. Although the JMA seismic intensity at both stations during the mainshock was 6-upper (calculated intensity: 6.2), the spectral characteristics of the ground motions were different, suggesting differences in the subsurface soil structure. Investigating the difference in ground motions and the spatial distribution of amplification characteristics in the area is crucial to understanding the damage during the mainshock.

We conducted aftershock observations on the ground surface and in buildings at eight locations in the central area of Wajima from April 10 to May 8, 2024, as well as microtremor array surveys. We used accelerometers (CV-374: Tokyo Sokushin Co., Ltd.; SUP-X-X2: Sonas Inc.) and geophones (McSEIS-AT: OYO Cooporation) for aftershock observations. We conducted microtremor array surveys using geophones (McSEIS-AT) at each observation station. Since our microtremor survey used a miniature array with a radius of 1 m, and the Rayleigh wave dispersion curve is resolved only in the high-frequency band above a few Hz, the Rayleigh waves on the low-frequency side were referenced to results from a previous survey conducted in the same area (Horikawa et al., 2010). The aftershock data in the central area showed a common peak at around 1 Hz in the horizontal component. Although the presence of soft sedimentary layers (Vs <200 m/s) at the surface with a thickness of a few tens of meters is suggested at all stations, the 1 Hz peak may be contributed not only by the surface soil but also by slightly deeper sediments. In this presentation, the characteristics of the measured aftershocks and the subsurface soil structure at each site will be reported.

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