

Characteristics of Seismic Ground Motion in Japan deduced from JMA Intensity Database

Yumi Kohayakawa¹, KATO, Mamoru^{2*}

¹IHS, Kyoto Univ., ²GSHES, Kyoto Univ.

JMA Seismic Intensity is an index of seismic ground motion which is frequently used and reported in the media. While it is always difficult to represent complex ground motion with one index, the fact that it is widely accepted in the society makes the use of JMA Seismic Intensity preferable when seismologists communicate with the public and discuss hazard assessment and risk management. With the introduction on JMA Instrumental Intensity in 1996, the number of seismic intensity observation sites has substantially increased, and the observed data should represent some aspects of the seismic ground motion in Japan. We report our attempt to investigate characteristics of seismic ground motion in the last 50 years utilizing JMA Seismic Intensity Database.

It is empirically known that observations of large intensity is rare compared to those of small intensity. Previous studies, e.g., Ikegami (1961), conclude that frequency distribution of observed intensity obeys the Ishimoto-Iida law (Ishimoto & Iida, 1939). We are able to confirm Ishimoto-Iida law with recent Instrumental Intensity data, but observed number of large intensity is smaller than extrapolated and predicted from those of small intensity. In any calendar year, the average observed number of felt ground motion at any station is approximately 10. At stations with long recording period, there is no apparent difference between pre-instrumental and instrumental intensities when we use Ishimoto-Iida law as a measure.

Numbers of average felt ground motions per year and slopes of intensity-frequency curve are site-dependent and time-dependent. These numbers are strongly affected by the large earthquakes and seismic swarms in the vicinity of the observation site, but the annual change of these parameters appears to be small at all stations. Seismicity at its vicinity controls number of observation at each station.

PGA at observation sites are also listed in Intensity Database. Frequency distribution of PGA also obeys Ishimoto-Iida law. There is no clear linear relationship between Intensity and PGA. In the current formulation of Instrumental Intensity duration of the ground motion is taken into consideration, and this should be the cause of lack of linearity between PGA and intensity.

Keywords: Seismic strong motion, Seismic intensity