

Affordable Smart Sensor Deployments in the Tokyo Area: New Means of Communicating Earthquake Risk and Chances for Seismology

*Naoshi Hirata¹, Danijel Schorlemmer², Hiroshi Tsuruoka¹, Takashi Furuya³, Hiromichi Nagao¹

1. Earthquake Research Institute, The University of Tokyo, 2. GFZ Potsdam, 3. Institute of Scientific Approaches for Fire & Disaster

Affordable devices based on MEMS acceleration sensors have seen a rise in recent years. We have explored the utility of the smartphone-type sensors built into small devices directly plugged to power outlets in the wall for the use by volunteers and companies. We deployed 10 devices to private people in the Zama region, southwest of Tokyo, in 2021 and 50 devices in the larger Tokyo region in 2022 for about a half year each. Additionally, we have equipped the 48-story Tokyo Metropolitan government building in Shinjuku, Tokyo, with many devices on floors ranging from 1st to 44th, and one 6-story building of the Tokyo Narita International Airport with many devices on four floors. All devices have provided us with both three-component acceleration records and seismic intensities in the Japan Meteorological Agency (JMA) scale, which is familiar to non-professional Japanese people. The measured seismic intensities on different floors and within the same floor show a variety of values different to the reported JMA intensity for the wider area. Also, we have obtained human assessments of experienced seismic intensity. Basically, the felt and measured intensities are consistent with some significant outliers. Our original hypothesis is that people with sensors at home are more sensitive and better prepared and behave more reasonably when experiencing large intensity shaking. We were not able to clearly prove it yet due to a lack of a strong-shaking event during the experiment.

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