

Fundamental improvement of precise and longterm monitoring system of seismic wave with giant magnetostrictive seismic source

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An actuator using a giant magnetostrictive element is characterized by large generative stress and simplicity of use, but disadvantaged by small displacement relative to actuators such as electrodynamic shaker and hydraulic vibrator. Therefore, it is expected to be applied to the high frequency seismic source. In Tono Research Institute of Earthquake Science, the giant magnetostrictive seismic sources (GMSS) have been developed [Ishii et al. (2011), Sano et al. (2011), Okubo & Sano (2011)]. Boxcar signal of 500Hz with GPS time synchronization has been tested, in order to detect not only within the Mizunami observation tunnel but also in the borehole array observation system of TRIES far from the GMSS. However, detailed investigation in 2015 revealed that electrical noises, derived from the data logger or electrical signal such as trigger signal, have been mistakenly perceived as elastic wave signals from GMSS so far. The GMSS system, especially control instruments and signal design, was thoroughly renewed. As the result, P-wave arrival from the GMSS was clearly observed at the 350m borehole seismometer by ten days data stacking. We prepare to remake the GMSS into a single-force seismic source for power upgrade for the realization of practical subsurface monitoring.

Keywords: giant magnetostrictive actuator, GPS time synchronization, single force