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Development of a low power consumption strong motion observation system

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Recent studies on seismic wave analysis have found that the seismic basement structure hidden beneath a thick sedimentary layer can be investigated by the seismic interferometory of strong motion records. In order to obtain strong motion records at as many points as possible, we developed a low power consumption strong motion observation system.

The strong motion observation system consists of electronic parts for consumer market applications, such as a digital triaxial MEMS acceleration sensor, ultralow-power 16-bit microcontroller, and SD card device. The MEMS acceleration sensor allows high accurate measurement of accelerations with +- 1.5G full scale and 14-bit resolution. The noise level is 4 gal in p-p amplitude, approximately. The 16-bit microcontroller monitors the acceleration signals with 40 Hz sampling rate, and makes a trigger for event recording when the monitor signals exceed a certain level. The recording signal is 64 s in length, including 15 s pre-trigger part. The recording capacity of SD card device is 2G byte. The new strong motion observation system consumes 2mA or less, and operates over several months by using 4 alkaline D-size batteries.

A test observation to evaluate the availability of the new strong motion observation system shows that this system is useful for recording strong motion with an intensity of 3 and over on the JMA seismic intensity scale.

Keywords: strong motion observation system, MEMS acceleration sensor, low power consumption