

Rock-outcrop Strong-motion (Kyoshin) observation network system (RK-net): Its development and application

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Since 1970's CRIEPI has been observing strong motions on the rock sites and thus far lots of strong motion data from the major earthquakes have been observed, which are necessary to verify the design ground motions for important structures or plants, usually built on the hard bedrocks. Recently we have replaced the accelerometers, recording system, and other peripherals due to equipment decaying and introduced the latest observation system, which leads to the improvement of data quality and acquisition rate. It is noted that the distribution of stations is changed partially according to our long-term research plan for engineering seismology, though it is based on the present observation network. The new data observation network system is called RK-net, which takes initial letters of rock-outcrop strong-motion network in Japanese. The RK-net has been newly operated since April 2008.

Strong motion data obtained on the rock site are useful for the study on seismic source process as the influence of the shallow subsurface structure is small. We can also use such rock observation station as the reference site when we evaluate the strong motions on the surface of sedimentary basin by using temporal high-density observation network for aftershocks of the severely damaging earthquake.

At present 33 stations for strong motion observation are under operation and 28 stations of them are located on the bedrocks. Furthermore 3 stations of Nemuro, Kushimoto, and Miyazaki are vertical arrays excavated in bedrock sites toward about 50 m depth. Though the shear velocities at the deepest points for all array stations are less than that of seismic basement, valuable strong-motion data to reveal the wave propagation path effect in rock medium can be obtained. For all rock-outcrop sites P and S wave velocities near installed points are measured by the laboratory experiment.

In order to reduce the costs for station maintenance and building database the web-based data operation system is developed. As a maintenance function for strong-motion stations calibration signal and time history of ground noise are acquired from the center server to find machine trouble. Moreover the backup server site is set up at Akagi area for the business continuity plan that makes it possible to keep on research and send information when Abiko area suffers severe damage from a large earthquake or other disasters.

Digital strong motion data are now available on the closed web site only for the limited members in our institute, however even now the digital data may be supplied by request under restricted condition such as for the purpose of research.