Use of data of Sacks-Evertson volumetric strainmeters and signal decomposition

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Now, Sacks-Evertson volumetric strain sensors installed in collaboration with the Carnegie Institute of Washington are working at the three stations in Hokkaido, the Urakawa Seismological Observatory in Urakawa and Kusharo and Nita stations in Teshikaga. These equipments based with PC at these stations generate four files of 50Hz sampling, one second sampling, one minute sampling, and one hour sampling for strain data and are recorded on the Compact flash memory (data volume of 4GB or 8GB). In addition to these strain record, the data of atmospheric pressure, air temperature, system information, and three components seismographs are recorded simultaneously. The data are written in a SAC format, and are compressed at the time of preservation. On schedule, they are automatically transmitted to PC, a remote station of Hokkaido University where data management is carried out, as well as to the remote PC of the Carnegie Institute of Washington, through the internetwork by ISDN. By having developed such an internet acquisition system, the system situation of each station is able to be monitored on real time from these remote PC, and we can respond promptly to the system failure. Moreover, every day the remote PC of Hokkaido University creates the graphic one day waveform files (jpeg) from one second sampling data at three stations and it distributes them to the candidates by e-mail. Therefore, it can be freely monitored from all the places in the world, and the user who wishes acquisition of raw data, enables it to acquire direct data. It becomes possible that daily continuation data also comes to hand, of course. Since all the data are recorded in SAC format, they can be used easily for the researchers in the world. But although the data are high flexibility from a viewpoint of use in the world, the researcher which can analyze this kind of raw data is very restricted, namely, - generally these data has been influenced by atmospheric pressure, temperature, tide, precipitation, and a source - that an unknown noise, are mixed. As a result, it is usually hard to become familiar with the raw data. Therefore, an advanced technology is surely needed in order to extract a pure strain change of the crust related only to plate movement. In succession of the pre-report (Takanami, et al., 2007), we again applied the method of the waveform separation (Kitagawa, 1996) in consideration of a non-gauss type state space model to the raw strain data of the Urakawa Seismological Observatory, and investigated the efficiency of the method. In conclusion, the saw-like waveform peculiar to Urakawa station is completely decomposed as well as the trend component from the complex raw data. Moreover, it has become clear that the strain seismograms of big earthquakes, such as the 2007 Notohanto-oki and the 2007 Chuetsu-oki earthquakes are also separated completely. However, for the case of the big earthquakes occurred near stations and a deep earthquake occurred in the plate subducted beneath the Sea of Japan, the separation is not yet successful.