

Geoelectric potential change related to Miyagi-oki EQ on May 26, 2003- Preliminary result of borehole measurement in Matsukawa -

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We have been developing a deep-sea borehole instrument for long-term temperature and self-potential observations. The objective of this study is to investigate changes of temperature and SP with time, distribution, movement and state of water, and crustal deformation processes in subduction zones. The test measurement by the first version of the instrument was carried out in the Matsukawa geothermal field near Mt. Iwate in the northern part of Japan. Here we will present the preliminary results of the test including an unusual change of SP related to Miyagi-oki EQ on May 26, 2003.

The instrument consists of a main unit in a pressure case, sensors, and two main cables. The main unit contains thermometer, potentiometer, power supply, and so on. The sensors are 18 thermistors, 6 silver - silver-chloride (Ag-AgCl) non-polarizing electrodes, and 4 copper (Cu) electrodes. The test measurement started on December 7, 2001, and was completed on October 23, 2003. Ten thermistors and 4 Ag-AgCl and 4 Cu electrodes was used in the test. The deepest sensor was installed at a depth of 270 m. The main features of the retrieved data was as follows. Temperature in the borehole was very stable within less than 0.5 deg. The highest temperature was 80 deg at a depth of 270m. Concerning SP, the data on Cu electrodes was more stable than those on Ag-AgCl ones. Unusual changes of SP were observed at least in February and March, 2002, and May 26, 2003. There were no changes of temperature corresponding to them. The reason of the former two SP changes is not clear. The last SP change was observed about the same time as the occurrence of Miyagi-oki EQ (M=7.0). The SP rapidly increased and gradually decreased for 20 to 30 minutes. This is suspected to be related to EQ induced subsurface hydrological change.