Resistivity structure around the 2011 earthquakes bellow Mt. Fuji volcano, Japan

Koki Aizawa[1]; Makoto Uyeshima[2]; Yusuke Yamaya[3]; Hideaki Hase[4]; Yasuo Ogawa[5]
[1] SEVO, Kyushu Univ.; [2] ERI, Univ. Tokyo; [3] GSJ, AIST; [4] KSVO, Tokyo Tech; [5] VFRC, Titech

On March 15 2011, 4 days after the Mw 9.0 megathrust Tohoku-Oki earthquake, the Mw 5.9 earthquake occurred beneath the southern flank of Mt. Fuji volcano. The aftershocks and the coseismic ground movement showed that the rupture is the left-lateral strike-slip with a strike of N24E at an approximate depth of 7˜13 km. Beneath the northern flank, the rate of micro-earthquakes increased gradually after the Tohoku earthquake. These earthquakes were on the approximately North-South trending line across the volcano, implying the earthquakes occurrence is guided by the structure. In this study, we show the electric resistivity structure around the focal zone of the earthquakes.

The MT data were obtained in the three campaigns. Between August and September 2009, audio-frequency band (10,000˜1 Hz) data was obtained to map the structure at shallow (˜3 km) level of the volcano. From June to December 2011, the broad-band (200˜0.001 Hz) MT data was obtained to elucidate the deep structure around the seismicity, then followed up by the observation in April-May 2012. Typical recording duration for one site is 1 night in the 2009 survey, and 3 weeks in the 2011-2012 surveys. In addition to these data, we also used the broad-band MT data recorded on 2002-2003 along the ENE-WSW line (Aizawa et al., 2004). By using these data, we estimated the resistivity structures by using the 2-D (Ogawa and Uchida, 1996) and 3-D inversion codes (Siripunvaraporn et al., 2009) on the assumption that the structure did not significantly change during 2002-2012. This assumption was confirmed by the comparison of the sounding curves of the sites where the MT data was recorded both in 2009 and 2011. The results show that the moderate (10˜100 ohm-m) conductive zone corresponds to the location of the seismicity, and suggest that the earthquakes occurred on the relatively fractured zone.

Acknowledgments

The geomagnetic data used for the remote-reference processing were provided by the Kakioka Geomagnetic Observatory, Japan Meteorological Agency. We thank landowners and regional forest offices (Shizuoka and Yamanashi prefectures) for permitting the observations to be conducted. A. Watanabe, K. Miyakawa, H. Abe, and TaWaT Rung-Arunwan, were thanked for field campaign. We thank W. Siripunvaraporn for supplying his 3-D inversion code. The 3-D inversion was conducted on the EIC of the Earthquake Research Institute, University of Tokyo. We thank to use of JMA seismic catalogue. This work was supported by a Grant-in-Aid from MEXT.