

## Post-seismic deformation of 2016 Kumamoto Earthquake by continuous GNSS network

\*Shigeru Nakao<sup>1</sup>, Takeshi Matsushima<sup>2</sup>, Takao Tabei<sup>3</sup>, Makoto OKUBO<sup>4</sup>, Tadashi Yamashina<sup>4</sup>, Takahiro Ohkura<sup>5</sup>, Takuya NISHIMURA<sup>6</sup>, Takuo Shibutani<sup>6</sup>, Masahiro Teraishi<sup>6</sup>, Takeo Ito<sup>7</sup>, Takeshi Sagiya<sup>8</sup>, Kenjiro Matsuhira<sup>7</sup>, Teruyuki Kato<sup>9</sup>, Jun'ichi Fukuda<sup>9</sup>, Atsushi Watanabe<sup>9</sup>, Satoshi Miura<sup>10</sup>, Yusaku Ohta<sup>10</sup>, Tomotsugu Demachi<sup>10</sup>, Hiroaki Takahashi<sup>11</sup>, Mako Ohzono<sup>11</sup>, Teruhiro Yamaguchi<sup>11</sup>, Kazumi Okada<sup>11</sup>

1. Department of Earth and Environmental Sciences, Graduate School of Science and Engineering, Kagoshima University, 2. Institute of Seismology and Volcanology, Faculty of Sciences, Kyushu University, 3. Department of Applied Science Department, Faculty of Science, Kochi University, 4. Kochi Earthquake Observatory, Faculty of Science, Kochi University, 5. Aso Volcanological Laboratory, Institute for Geothermal Sciences, Graduate School of Science, Kyoto University, 6. Disaster Prevention Research Institute, Kyoto University, 7. Earthquake and Volcano Research Center, Graduate School of Environmental Studies, Nagoya University, 8. Disaster Mitigation Research Center, Nagoya University, 9. Earthquake Research Institute, University of Tokyo, 10. Research Center for Prediction of Earthquakes and Volcanic Eruptions, Graduate School of Science, Tohoku University, 11. Institute of Seismology and Volcanology, Graduate School of Science, Hokkaido University

The 2016 Kumamoto Earthquake (M 7.3) attacked to Kumamoto prefecture in Japan on April 16, 2016. Seismic intensity 7 was observed twice in the 2016 Kumamoto Earthquake. Post-seismic deformation was observed after the large earthquake occurred in land and trench. Twenty-one continuous GNSS observation sites were occupied after the 2016 Kumamoto Earthquake to observe post-seismic deformation. Thirteen of our twenty-one sites were near Futagawa and Hinagu fault zones, four of our sites were around Aso Volcano, which is east from Futagawa fault zones and the others were in Ohita Prefecture, which is east of Kumamoto Prefecture

Bernese GNSS Software Ver. 5.2 is used for GNSS data analysis of our newly sites together with GEONET and JMA GNSS sites for volcanoes in Kyushu for the period from April 15 to December 31, 2016. We used CODE precise ephemerides and CODE Earth rotation parameters. The coordinates of the GNSS sites are estimated respect to ITRF2008.

Large post-seismic deformation in horizontal component was observed at CGNSS sites near Hinagu and Futagawa fault zone. However, there is almost no observation in vertical component. Largest post-seismic deformation of 11 cm from April to December, 2016 is observed in NS-component at MIFN, which is located east side of Hinagu fault zone. It seems that post-seismic deformation does not come to stop. After slip model is assumed for initial post-seismic deformation from April to July, 2016. We assumed two faults, one is located in Futagawa fault zone and the other is Hinagu fault zone. Fault parameters of length, width, strike, dip, amount of slip, position are estimated by simulated annealing method. Top and bottom of fault plane are 0.1 to 40 km in Hinagu fault and 0.8 to 32 km in Futagawa fault. Two fault planes extended to mantle. It suggests that there are several phenomena in initial post-seismic deformation, effect of viscoelastic etc.

Keywords: Continuous GNSS observation, post-seismic deformation