Introduction to the special section for the 2004 Mid-Niigata Prefecture Earthquake

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The present special section is a collection of papers on the 2004 mid-Niigata Prefecture earthquake, which occurred on October 23, 2004 in central Japan. The local body wave magnitude determined by the Japan Metrological Agency (JMA) is 6.8 and the maximum seismic intensity of 7 in JMA scale was recorded at Kawaguchi Town. About twice as many aftershocks, including three aftershocks with magnitudes greater than 6, occurred in the source area as those of an ordinary inland earthquake of the same magnitude (Aoki *et al*., 2005). This succession of strong aftershocks caused further damage and hindered rescue and restoration activities. The events generated many fissures and landslides and destroyed up to 100,000 dwellings, with 46 fatalities and leaving 4800 injured.

The question why such an intensive aftershock activity occurred is of great concern to understand the generation mechanism of an inland earthquake far from plate boundaries. The area where the present event occurred has been known as an active fault-and-fold zone overlain by thick sediments and many landslides have been reported so far (Sato and Kato, 2005). The area is also located in the Niigata-Kobe Tectonic Zone, where a high strain rate of over 0.1 ppm/y is observed by the continuous GPS network (Sagiya, 2004). In the new national earthquake prediction research program, the preparation process of an intra-plate inland earthquake begins to be understood in terms of the heterogeneous structure of the crust (Hirata, 2004). The data from the present mid-Niigata event may provide an insight into the process.

The papers in this section cover a wide range of studies on the main shock, its aftershocks, geological and geophysical structure near the source area, and their tectonic implication by seismology, geodesy, geology, geomorphology, and geomagnetism and so on. The data presented include those acquired by permanent seismic networks (Okada *et al*., 2004), the GPS network (Sagiya *et al*., 2000), and temporally installed instrument and field surveys immediately after the event. We hope that all those studies provide fundamental knowledge on such a disastrous earthquake and useful for mitigation of future seismic disasters.

References

Aoki, S., Multi-planar structures in the aftershock distribution of the Mid Niigata prefecture Earthquake in 2004, *Earth Planets Space*, **57**, this issue, 411–416, 2005.

Hirata, N., Past, current and future of Japanese national program for earthquake prediction research, *Earth Planets Space*, **56**, xliii–l, 2004.

Okada, Y., K. Kasahara, S. Hori, K. Obara, S. Sekiguchi, H. Fujiwara, and A. Yamamoto, Recent progress of seismic observation networks in Japan—Hi-net, F-net, K-NET and KiK-net, *Earth Planets Space*, **56**, xv–xxviii, 2004.

Sagiya, T., S. Miyazaki, and T. Tada, Continuous GPS array and present-day crustal deformation of Japan, *Pure appl. Geophys*., **157**, 2303–2322, 2000.

Sagiya, T., A decade of GEONET: 1994–2003—The continuous GPS observation in Japan and its impact on earthquake studies, *Earth Planets Space*, **56**, xxix–xli, 2004.

Sato, H. and N. Kato, Relationship between geologic structure and the source fault of the 2004 Mid-Niigata Prefecture Earthquake, central Japan, central Japan, *Earth Planets Space*, **57**, this issue, 453–457, 2005.

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