Introduction to the special section on the 2007 Chuetsu-Oki, Niigata, Japan, Earthquake

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An M_{JMA} 6.8 earthquake occurred in the offshore region of mid-Niigata prefecture, central Japan, on July 16, 2007. This earthquake killed 15 people, injured 2,016 others, and destroyed 1,300 dwellings in coastal regions along the Sea of Japan, especially in the city of Kashiwazaki. The Kashiwazaki-Kariya nuclear power plant, which is the largest nuclear generating station in the world, is located in the epicentral area and automatically powered down safely in response to the earthquake. The extended shutdown needed for its post-earthquake inspection and subsequent upgrades, however, had a significant impact on the Japanese economy. This earthquake also focused attention on some of the problems involved in providing a high level of anti-earthquake resistance to nuclear power plants in the Japanese islands.

This earthquake occurred in a fold-and-thrust belt along the coast of the Sea of Japan in northern Honshu, which has been marked as a failed rift formed in the Miocene associated with the opening of the Sea of Japan (e.g., Sato, 1994). The more than 6-km-thick Neogene basin fill shows active folding and thrusting, forming a zone of late Quaternary contraction. The coast of the Sea of Japan in Niigata prefecture is also located in the zone showing a high strain rate, as observed by the continuous GPS network (Sagiya, 2004), and has been hit by many destructive earthquakes in the past, such as the 1964 Niigata earthquake (M_{JMA} 7.4) and the 2004 mid-Niigata Prefecture earthquake (M_{JMA} 6.8; Hirata, 2005). Studies of the 2007 Chuetsu-Oki Earthquake, as well as the 2004 mid-Niigata Prefecture earthquake, will provide important information towards a better understanding of the generation of earthquakes and crustal deformations in the inverted back-arc rift basin.

The special section in this issue of *Earth, Planets and Space* is a collection of papers on the 2007 Chuetsu-Oki Earthquake. Immediately after the earthquake, onshore and offshore seismic observations were made with densely distributed seismometers. The observations of aftershocks together with the data acquired by the permanent seismic networks enabled the source fault geometry and velocity structure to be delineated (Kato *et al*., 2008; Mori, 2008; Nakajima and Hasegawa, 2008; Shinohara *et al*., 2008; Yoshida, 2008; Yukutake *et al*., 2008). Interferometric synthetic aperture radar data and the GPS network (GEONET) provided essential information on the surface deformation. Based on the data provided by temporally installed instruments and field surveys, it has been possible to determine the co- and post-seismic deformation (Iinuma *et al*., 2008; Ohta *et al*., 2008) and to construct fault models (Nishimura *et al*., 2008; Ozawa, 2008; Aoki *et al*., 2008). The source process of the mainshock was inferred from strong motion-seismograms (Aoi *et al*., 2008). Other aspects of the earthquake have also been characterized: the earthquake sequence (Tajima and Tajima, 2008) and a paleosismic investigation of emerged wood blocks (Kaneda *et al*., 2008).

We hope that these studies will contribute to an improved understanding of the 2007 Chuetsu-Oki Earthquake and provide fundamental knowledge for the mitigation of future seismic disasters produced by destructive earthquakes beneath thick sediment cover in a fold-and-thrust belt.

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