The Great Tohoku Earthquake in Japan

Japan was struck by a massive earthquake on March 11, 2011. The quake caused one of the worst disasters in human history due to the core-melt in several nuclear reactors. The earthquake and numerous stronger aftershocks caused havoc under civilians and the world community started a discussion whether or not the usage of nuclear power can be still considered as a safe technique for generating electric power.

A strong earthquake of magnitude Mw 9.0 occurred on March 11, 2011 on the western coast of Japan. The fault extended over 500 km (Fig. 1) and the subsequent tsunami reached a maximum height of 39 m.

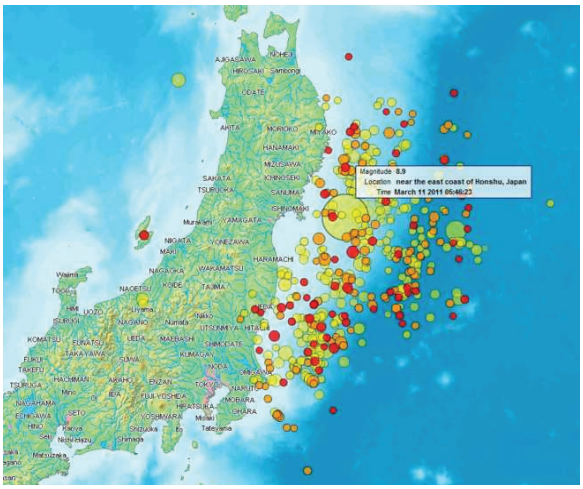

Figure 1: Aftershock distribution (from Wikipedia).

The nuclear power plant at Fukushima became flooded and back-up power generators for the second cooling circuit failed to secure a safe shut-down. More than 200 aftershocks (Fig. 2) could be recorded alone at the Conrad Observatory (ZAMG) in Austria, at a distance of more than 9000 km.

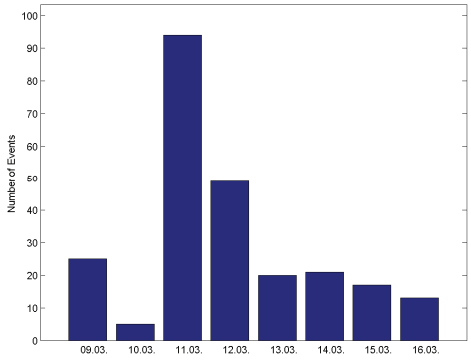

Figure 2: Aftershocks recorded at COBS.

Seismic records at the observatory could be used to determine several distinct onsets (Fig. 3), such as reflections of body waves at the Earth's surface (PP), the shear wave (S), the body wave diffracted at the Earth's core (PkPdiff) and the surface wave (L).

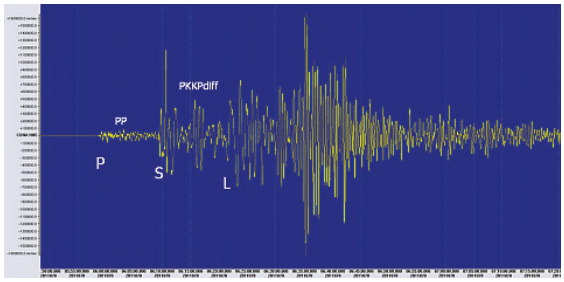

Figure 3: Seismic record at COBS.

Table 1: Measurements at COBS

Component	PGV (mm/s)
E-W	1,55
N-S	1,46
Z	1,58

The P-wave arrived 12 minutes and 17 seconds after the earthquake originated. 10 minutes and 37 seconds later the shear wave arrived. Much later, 26 minutes after the P-wave, the surface wave with the Airy-phase could be observed, which carried most of the energy, as expected. From these data, the magnitude could also be determined.

Observations of this kind help to judge the destruction potential at the epicentre, and to inform rescue-teams and other non-governmental organizations in Austria, which are able to assist the local population to cope with such a disastrous situation.

References:

Wikipedia: http://de.wikipedia.org/

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