ZAMG
Zentralanstalt für Meteorologie und Geodynamik

Accident in the Japanese NPP Fukushima: Spread of Radioactivity/first source estimates from CTBTO data show large source terms at the beginning of the accident/weather currently not favourable/low level radioactivity meanwhile observed over U.S. East Coast and Hawaii (Update: 22 March 2011 15:00)

Weather in the crisis region

The weather front that crossed the crisis region meanwhile went out. Rain in Fukushima and Tokyo stopped. The winds are weak, mostly from northerly to easterly directions. Air from the reactors can thus be blown inland.

Tomorrow and the day after tomorrow, winds from westerly directions predominate. Air is thus mostly transported towards the Pacific.

On Friday, a new disturbance is expected to cross the region. There is again potential transport of radioactivity inland.

First emission estimates

In the phase of March 12 to 13, the Fukushima emissions were mostly transported to the Pacific, eventually hitting the CTBTO station in Sacramento/California. In the phase March 14 to 15, on the other hand, most of the emissions were transported inland, hitting the CTBTO station in Takasaki, Japan. Based on simulated dilution factors and measurements, we were able to have a first rough source estimate.

Regarding Iodine-131, the picture is relatively homogeneous. A source term of 10^{17} Bq per day would explain the measurements in Takasaki as well as Sacramento. The total 4-day emission of 4 10^{17} Bq is on the order of **20% of the total emissions of Iodine-131 that occurred during the Chernobyl accident**. Regarding Cesium-137, the situation is a bit different. In the cloud eventually propagating to the United States, the ratio of Iodine-131 to Cesium-137 was about 30. This is similar to the Chernobyl accident. In Takasaki, however, this ratio was four. This would indicate a much larger Cesium-137 release in the second two-day period after the accident. Taking this together, the source terms would be about 3 10^{15} Bq during the first two days, and 3 1016 during the second two-day period. **In sum, this could amount to about 50% of the Chernobyl source term of Cesium-137**.

Dispersion Modeling

The results of the dispersion model show that radioactivity is transported inland today. Tomorrow, the cloud goues to the Pacific. The day after tomorrow, the cloud is mostly transported to the Pacific Ocean, but inland regions north and south of the reactor may be affected again.

The colour scale shows a total of 5 colours. The area marked „E“shows an area with estimated current equivalent dose rate of 10 mSv/h (in a 25x25 km^2 square). The violet colour on the outer edge of contaminated areas (Area A) represents 0,3 µSv/h, which corresponds to the amount of the natural background radiation dose.

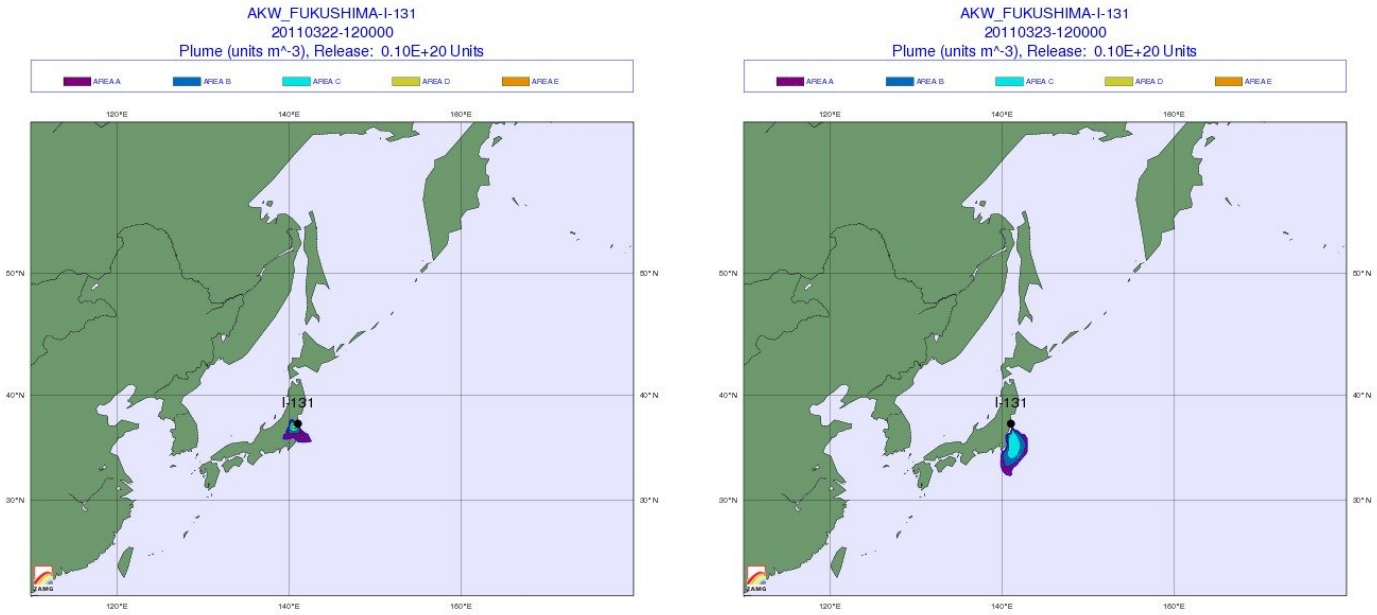

Figure: Spread of Radioactivity over Eastern Asia today and tomorrow 12:00 UTC

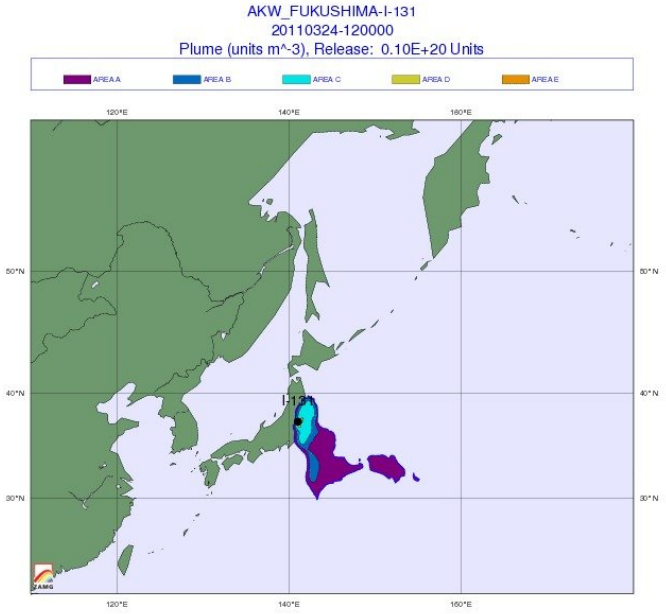

Figure: Spread of Radioactivity over Eastern Asia the day after tomorrow 12:00 UTC

Radiation data/CTBTO

Currently, radiation data from CTBTO (last update today, data are from 19 March) show that low levels of radiations are meanwhile observed in Hawaii, Wake Islands (Pacific) and the U.S. East Coast. The I-131 levels in Hawaii were on the order of $mBqm^{-3}$, the levels in Charlottesville, Virginia were close to the detection limit (µBqm-3). There is no health risk whatsoever.

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ZAMG will not answer any questions related to travel in Japan or in other parts of the world, since this is the responsibility of national radiation protection authorities. Travel advisories and warnings are available from your foreign ministry. In Austria, such advisories are available on www.bmeia.gv.at.

This information is updated daily, and whenever the development of the situation requires it.

Videos:

Plume spread from Fukushima/Permanent Release/Iodine-131