

JMA's regional ATM calculations for the WMO Task Team on the meteorological analyses for Fukushima Daiichi NPP accident

Kazuo Saito^{1*}, Toshiki Shimbori¹, Roland Draxler²

¹Meteorological Research Institute, ²NOAA Air Resources Laboratory

The World Meteorological Organization (WMO) convened a small technical task team of experts to produce a set of meteorological analyses that would be used to drive atmospheric transport, dispersion and deposition models (ATMs) for the UN Scientific Committee on the Effects of Atomic Radiation's (UNSCEAR) assessment of the Fukushima Daiichi Nuclear Power Plant accident. The primary aim of the group is to examine how the use of meteorological analyses could improve the ATM calculations.

The Japan Meteorological Agency's regional ATM (JMA RATM) for radionuclides has been developed at the Meteorological Research Institute (MRI), based on the JMA mesoscale tracer transport model for the predictions of oxidant concentration and volcanic ash. The RATM shares its horizontal and vertical grid configurations with the JMA operational nonhydrostatic mesoscale model (NHM) and the JMA operational mesoscale 4D-VAR analysis. With reference to the JMA's global environmental emergency response model, dry deposition, wet scavenging, and gravitational sedimentation for light particles have been revised.

Preliminary and revised calculations of the JMA RATM were conducted according to the task team's agreed standard with a horizontal resolution of 5 km using a unit source emission rate. The simulations were conducted for the period 11 through 31 March 2011. The mesoscale analysis data of JMA were used to drive the ATM, while the JMA's radar/rain gauge-analyzed precipitation data were employed to evaluate the wet scavenging.

Several modifications were made to the JMA RATM. Results of the RATM calculation were verified against the observed Cs-137 deposition pattern and the air concentration time series. The performance of the ATM was significantly improved by the revisions, especially for the Cs-137 deposition.

Keywords: Fukushima Daiichi NPP, Meteorological analyses, WMO Task Team, regional ATM