WORLD METEOROLOGICAL ORGANIZATION

THIRD MEETING OF WMO TASK TEAM ON METEOROLOGICAL ANALYSES FOR FUKUSHIMA-DAIICHI NUCLEAR POWER PLANT ACCIDENT

VIENNA, AUSTRIA, 3 – 5 DECEMBER 2012

FINAL REPORT

DISCLAIMER

Regulation 43

Recommendations of working groups shall have no status within the Organization until they have been approved by the responsible constituent body. In the case of joint working groups the recommendations must be concurred with by the presidents of the constituent bodies concerned before being submitted to the designated constituent body.

Regulation 44

In the case of a recommendation made by a working group between sessions of the responsible constituent body, either in a session of a working group or by correspondence, the president of the body may, as an exceptional measure, approve the recommendation on behalf of the constituent body when the matter is, in his opinion, urgent, and does not appear to imply new obligations for Members. He may then submit this recommendation for adoption by the Executive Council or to the President of the Organization for action in accordance with Regulation 9(5).

Chairperson, Publications Board
World Meteorological Organization (WMO)
7 bis, avenue de la Paix Tel.: +41 (0)22 730 84 03
P.O. Box No. 2300 Fax: +41 (0)22 730 80 40
CH-1211 Geneva 2, Switzerland E-mail: Publications@wmo.int

NOTE:

The designations employed in WMO publications and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of WMO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Opinions expressed in WMO publications are those of the authors and do not necessarily reflect those of WMO. The mention of specific companies or products does not imply that they are endorsed or recommended by WMO in preference to others of a similar nature which are not mentioned or advertised.

This document (or report) is not an official publication of WMO and has not been subjected to its standard editorial procedures. The views expressed herein do not necessarily have the endorsement of the Organization.

Dèlia Arnold, Gerhard Wotawa, Matthew Hort, Roland Draxler, Peter Chen, Stefano Galmarini, Kazuo Saito, René Servranckx

EXECUTIVE SUMMARY

The WMO Task Team on Meteorological Analyses for Fukushima Daiichi NPP Accident was formed in late 2011 to develop a series of meteorological analyses in numerical form, using as much observational data and related information as available, that will be suitable for estimating the atmospheric transport, dispersion and deposition of radioactivity released from the Fukushima-Daiichi Nuclear Power Plant in 2011. This is the report of the Task Team's third and final meeting, whose members developed a final record of its work and outputs.

Since the time of the Task Team's second meeting, Mr Draxler engaged the collaboration of the European Commission Joint Research Centre ENSEMBLE project to assist in the evaluation of a set of 18 different "runs" of meteorological and atmospheric dispersion and deposition calculations.

Mr Roland Draxler, the Chairperson of this Task Team, will use the final report of the team to develop suitable condensed text as input to the study on the levels and effects of the radioactivity released from the nuclear accident, being conducted by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR).

The report also suggests possible improvements to the present nuclear emergency response arrangements.

1 Opening

1.1 The third meeting of the WMO Technical Task Team (TT) on Meteorological Analyses for Fukushima Daiichi NPP Accident was held at the offices of the Zentralanstalt für Meteorologie und Geodynamik (ZAMG), Vienna, Austria, and opened by the TT's chairperson, Mr Roland Draxler. Mr Michael Straudinger, Director of ZAMG and PR of Austria with WMO, welcomed the participants. He noted the importance of the work of this Task Team and expected that there would be some important suggestions for improving WMO's nuclear emergency response procedures, supporting National Meteorological Services.

Mr Draxler welcomed the participants and expressed appreciation to all the participants for their efforts in this work and for participating at this crucial and final meeting. Mr Peter Chen, on behalf of the WMO Secretariat, added appreciation for the hard work of members over the last year, the outcome of which will meet the requirements expressed by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). Mr Stefano Galmarini of the EC/JRC was invited to participate at this meeting in relation to the EC/ENSEMBLE assessment tools that were used to evaluate the atmospheric transport and dispersion runs carried out by the TT members. The participants expressed their appreciation to ZAMG and Mr Gerhard Wotawa for hosting the meeting and for having provided the local arrangements for the meeting.

Mr Draxler recalled the history of this Task Team's work, including the development of its Terms of Reference at the first meeting (see first meeting report) and agreement by Executive Council at its 64th session (2012), and leading up to this third and final meeting. Mr Draxler also informed the meeting of his participation at, and interactions with the UNSCEAR Expert Groups. In particular, he indicated that UNSCEAR had decided in July 2012 that the dose estimation group would use an ensemble output from the WMO TT as input to their dose calculations. This decision was a change from an earlier understanding that the WMO was only to provide the best meteorological analyses during the period 11 – 31 March 2011, to be applied in the atmospheric transport and dispersion modeling of radionuclides released during the nuclear power plant accident. The meeting noted that UNSCEAR finally established the source term time series in mid-October 2012. It was also noted that UNSCEAR requires a descriptive document on the atmospheric transport and dispersion/deposition results, and meteorological aspects by 14 December 2012.

1.2 Adoption of agenda and working arrangements

Mr Draxler introduced the provisional agenda, which the meeting adopted, and is found in Annex I. Daily working arrangements were decided.

1.3 The list of participants is found in Annex II.

2 Final Report of the Task Team

2.1 The TT members each provided a verbal summary of their respective contributions to this work, and discussed numerous technical issues related to its tasks. Mr Galmarini of EC/JRC provided a briefing on the ENSEMBLE assessment of the 18 ATM modelling results, including the various metrics used in the evaluation. He agreed

to provide suitable text to describe this assessment to be included in the final report of the TT.

2.2 The meeting developed a report of the work of the TT, and agreed to undertake final revisions by the end of January 2013. The version of TT report reached by 21 December 2012 is found in Annex III.

3 AMS Conference session on Fukushima accident

3.1 Mr Draxler recalled that American Meteorological Society (AMS) Committee on Meteorological Aspects of Air Pollution, and the Meteorological Society of Japan (MSJ) will jointly convene a one-day specialty symposium at the AMS 2013 Annual Meeting to review the present status and identify the role of meteorology for the analysis of the transport and dispersion of contaminants from the Fukushima nuclear power plant. A special journal publication is planned.

3.2 Mr Draxler has submitted an abstract of his presentation on the work of this TT. Mr Saito has submitted an abstract of his presentation of the JMA regional ATM for the accident.

3.3 Mr Draxler considered the opinion of TT members regarding the submission of an extended abstract to the planned AMS journal publication. Recalling the deadline for this submission is 10 February 2013, the members were of the general opinion that little time is available to deal with unresolved scientific questions prior to this deadline. Mr Saito indicated that he intends to submit an extended abstract for the journal publication.

3.4 The TT then considered alternative publication opportunities, including the possibility to initiate collaboration with a suitable scientific journal (e.g. Atmospheric Environment) to produce a special issue on meteorological aspects of the Fukushima-Daiichi accident. Such a special issue could include topic areas such as: source term estimation, dispersion and deposition estimation, use of high resolution precipitation analyses, ensemble techniques, etc. Mr Draxler will contact a suitable journal office to explore this possibility, including time-lines, and whether another similar development is already underway. Mr Chen will explore with WMO Secretariat whether such a special publication could be coordinated and developed through WMO. Upon favourable responses, WMO could invite its Members to participate, including all the RSMCs for ERA.

3.5 Mr Wotawa indicated that he plans to make a presentation on the TT's work to the annual meeting of the European Geophysical Union (Vienna, week of 8 April 2013).

4 Cooperation with the Science Council of Japan (SCJ) model evaluation

4.1 Mr Draxler and Mr Hort were contacted by Mr Teruyuki Nakajima, Chairperson of the Working Group for model inter-comparison of the Science Council of Japan (SCJ), who would like to review the modelling capability of the dispersion and deposition of radioactive materials to the land and the ocean as a result of the Fukushima Daiichi Nuclear Power Plant accident. The purpose of this initiative is to compare existing model results in order to access the uncertainty in the results. Mr Draxler provided to

Mr Nakajima the NOAA Web page URL where the TT model results are posted. The SCJ has subsequently contacted WMO informally regarding its interest, or the interest of individual TT members to participate.

4.2 The TT decided not to participate as a group, while Mr Saito indicated that JMA will participate in this model inter-comparison.

5 WMO EER System

5.1 RSMC-ENSEMBLE experiment

5.1.1 Mr Wotawa presented the results of the RSMC ENSEMBLE experiment that was conducted earlier this year, which was based on a fictitious scenario of a NPP accident in USA, on 18 April 2012, 0430 UTC. The results showed a wide range of model results from 9 RSMCs. RSMC Washington is expected to provide its results shortly.

5.1.2 Mr Wotawa agreed to provide the presentation and a summary of the evaluation to Mr Servranckx (Chairperson of the CBS Expert Team on ERA). Mr Servranckx will then communicate this information to the representatives of the RSMCs.

5.1.3 The TT considered the possibility of creating an ENSEMBLE session for the Fukushima-Daiichi ATM results, to open the participation to other RSMCs and possibly other ATM centres. Such a project could support the scientific work of contributors to the possible special journal issue on the meteorological aspects of the Fukushima-Daiichi accident (see agenda item 3).

5.2 Enhancement to the WMO EER system based on TT's experience

5.2.1 The TT discussed the present arrangements, in particular the RSMC-ERA system that serves both WMO Members, the IAEA, and other relevant International Organizations. The Secretariat recalled that under IAEA's Action Plan for Nuclear Safety, established since the Fukushima accident, provides the IAEA/IEC with a broader mandate to assess accident situations, and to predict possible impacts. This would be a more favourable environment to undertake a joint review of IAEA requirements for meteorological products and services for nuclear ERA.

5.2.2 The following suggestions could be pursued by the CBS Expert Team on ERA (chaired by Mr Servranckx), and Secretariat:

- Explore if the formation of an interdisciplinary science forum would be useful to advance the science to support operational ATM programmes (nuclear, non-nuclear):
- Convene with IAEA, a users requirements conference (previous one was in 1993). This is already in the list of actions of the Expert Team on ERA;
- Discuss informally with IAEA about the concept for a new computational framework (operational atmospheric dilution factors, and ensembles) for ATM in ERA, which would provide additional capabilities to IAEA/IEC to apply source information, and to interpret radiological measurements;
- WMO may wish to contact IAEA at the senior management level regarding improved meteorological products and services.

6 Future status of the NOAA hosted web page with TT ATDM results

6.1 Mr Draxler offered to continue hosting the web page, and the TT members gratefully accepted. This web page would be “re-branded” from the current “TT Meteorological Analysis” site, to become a generic site with tools for incorporating ATM results for the Fukushima accident, with the possibility for participating ATM centres to update with improved simulations. In addition Mr Draxler agreed to send the Web php file(s) to participating centres, in sequence, to update each centre’s information and attributions (e.g. logo).

7 Closing

7,1 The meeting closed at 17:15, Wednesday, 5 December 2012

ANNEX I - AGENDA

WMO Task Team on Meteorological Analyis of Fukushima-Daiichi NPP Accident
3 – 5 December 2012, Vienna, Austria

1 Opening and adoption of the agenda

2 Final Report of the Task Team

3 AMS Conference session on Fukushima accident

4 Cooperation with the Science Council of Japan (SCJ) model evaluation

5 WMO EER System
- 5.1 Review and discuss the RSMC-ENSEMBLE experiment
- 5.2 Recommend enhancements to the WMO EER system

6 Future status of the NOAA hosted web page with TT ATDM results

7 Closing

ANNEX II – List of Participants

Mr Gerhard **WOTAWA** Zentralanstalt für Meteorologie und Geodynamik (ZAMG) Hohe Warte 38 A-1191 VIENNA **Austria**	Tel: Fax: Email:	+(43 1) 36026 2007 +(43 1) 369 12 33 gerhard.wotawa@zamg.ac.at
Ms Dèlia **ARNOLD** Zentralanstalt für Meteorologie und Geodynamik (ZAMG) Hohe Warte 38 A-1191 VIENNA **Austria**	Tel: Fax: Email:	+(43 1) 36026 2007 +(43 1) 369 12 33 Deliona.arnold@gmail.com
Mr Christian **MAURER** Zentralanstalt für Meteorologie und Geodynamik (ZAMG) Hohe Warte 38 A-1191 VIENNA **Austria**	Tel: Fax: Email:	+(43 1) 36026 2007 +(43 1) 369 12 33 Christian.maurer@zamg.ac.at
Mr René **SERVRANCKX** Canadian Meteorological Centre Meteorological Service of Canada Environment Canada 2121 Trans-Canada Highway Dorval, Québec H9P 1J3 **Canada**	Tel: Fax: Email:	+(1 514) 421 4704 +(1 514) 421 4679 rene.servranckx@ec.gc.ca
Mr Kazuo **SAITO** Meteorological Research Institute Japan Meteorological Agency (JMA) 1-1, Nagamine, Tsukuba Ibaraki 305-0052 **Japan**	Tel: Fax: Email:	+(81 29) 853 8638 +(81 29) 853 8649 ksaito@mri-jma.go.jp
Mr Matthew **HORT** Met Office UK Fitzroy Road Exeter EX13PB Devon **United Kingdom**	Tel: Fax: Email:	(+44 1392) 886 242 (+44 1392) 885 681 matthew.hort@metoffice.gov.uk
Mr Roland **DRAXLER** Air Resources Laboratory NOAA – Office of Oceanic and Atmospheric Research R/ARL – NCWCP – Rm 4205	Tel: Fax: Email:	+(1 301) 683 1372 +(1 301) 683 1370 roland.draxler@noaa.gov

5830 University Research Court College Park, Maryland 20740 **United States of America**		
Mr Peter **CHEN** **WMO Secretariat** 7 bis avenue de la Paix Case postale 2300 1211 GENEVE 2 **Switzerland**	Tel: Fax: Email:	+(41 22) 730 8231 +(41 22) 730 8128 pchen@wmo.int
Invited Expert: Mr Stefano **GALMARINI** EC Joint Research Centre Via E. Fermi 1, TP 441 21020 Ispra **Italy**	Tel: Fax: Email:	+39 0332 785 382 +39 0332 785 466 stefano.galmarini@jrc.ec.europa.eu

ANNEX III

The World Meteorological Organization's Evaluation of Meteorological Analyses for the Radionuclide Dispersion and Deposition from the Fukushima-Daiichi Nuclear Power Plant Accident

Roland Draxler, Delia Arnold, Matthew Hort, Alain Malo, Stefano Galmarini, Kazuo Saito, Efisio Solazzo, Andrew Jones, Susan Leadbetter, Christian Maurer, Glenn Rolph, Toshiki Shimbori, Gerhard Wotawa, René Servranckx

http://www.wmo.int/pages/prog/www/CBS-Reports/DPFSERA-index.html