RSMC Melbourne report of activities for 2016

Executive Summary

Primary activities for 2016 were the monthly tests conducted for scenarios over Canada, the United States and Australia and the IAEA quarterly tests for scenarios over South Africa (February), Japan (May), Mexico (August) and Australia (November, as lead centre). The Provisional Technical Secretariat (PTS) of the Comprehensive Test Ban Treaty Organization (CTBTO) made 4 requests for inverse modelling support throughout the year.

1. Introduction

The Bureau National Operations Centre (BNOC) of the Australian Bureau of Meteorology is designated by the WMO as the Melbourne Regional Specialized Meteorological Centre (RSMC) with the specialization to provide atmospheric transport model products for environmental emergency response. The region of responsibility is WMO Regional Association (RA) V, which includes the countries: Australia, Brunei Darussalam, Fiji, Indonesia, Malaysia, New Zealand, Papua New Guinea, Philippines and Singapore. RSMCs Washington and Montréal also respond jointly in support of RSMC Melbourne in case of an event in WMO RA-V until a second RSMC can be designated for this region. In addition to emergency response, RSMC Melbourne contributes global inverse modelling support to the CTBTO's verification system.

2. Operational Contact Information

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3. Responses and information on dissemination of products

i. Dissemination of products

Transport model graphical products and joint statements are posted to secure joint web pages, and faxed to relevant RSMCs and NMHSs. For examples of the graphical products, see Annex 4 of WMO, 2015. In addition to the other RSMCs, the following RA-V member countries' NMHSs are in our email and fax lists: Brunei Darussalam, Fiji, Indonesia, Malaysia, New Zealand, Papua New Guinea, Philippines, and Singapore.

ii. Response to requests by CTBTO-PTS

A total of 4 requests for support were received from the Provisional Technical Secretariat of the Comprehensive Test Ban Treaty Organization during 2016. In all cases, the products were supplied to CTBTO within the allowed time limit.

4. Routine operations

Monthly Test:

RSMCs Melbourne, Montréal and Washington generally held a joint exercise on the second Thursday of every month. In addition, RSMC Melbourne participated in four IAEA-initiated exercises during the year, one in which RSMC Melbourne was lead with support from RSMC Montréal and RSMC Washington. The table below shows the list of tests held in 2016.
Once the model products are posted to the common web pages, an email is sent in English to the relevant RSMCs, the NMHS contact points in WMO RA-V, the IAEA and WMO. The email contains login information to retrieve the RSMC products from the common web pages.

Month	**Source Location**	**Initiated By**	**RSMC providing joint statement**
January	Gentilly NPP, Quebec, Canada	Montreal	Washington
February	Koeberg, South Africa	IAEA	Exeter, Toulouse
March	Lucas Heights, Australia	Melbourne	Melbourne
April	Calvert Cliffs NPP, Maryland, USA	Washington	Montreal
May	Shika, Japan	IAEA	Obninsk, Beijing, Tokyo
June	Bruce NPP, Ontario, Canada	Montreal	Washington
July	Lucas Heights, Australia	Melbourne	Melbourne
August	Laguna Verde, Mexico	IAEA	Washington, Montreal
September	Clinton NPP, Illinois, USA	Washington	Montreal
October	Darlington NPP, Ontario, Canada	Montreal	Washington
November	Lucas Heights, Australia	IAEA	Melbourne
December	Lucas Heights, Australia	Melbourne	Melbourne

5. Lessons learned and significant operational or technical changes:

- The routine monthly RSMC tests continue to be invaluable for identifying and rectifying any problems in our scripts or in the uploading of data to the various ftp sites, as well as helping our operational staff maintain familiarity with the procedures for responding to requests for support. This has been particularly true this year following the porting of our EER suite to the new Cray supercomputer. The participation of other RSMCs in these exercises is welcomed and encouraged.
  The global NWP model, ACCESS-G, was upgraded in March 2016 to a N512 (~25km) horizontal resolution. Several new data sources are now assimilated and forecast skill has improved significantly over the previous version. Vertical resolution remains unchanged at 70 levels.
  The regional ACCESS-R NWP model was made also upgraded to a new APS2 version in April 2016. Horizontal (~12km) and vertical (70 levels) resolutions remain unchanged, the upgrade involved newer software versions and additional observation sources.
  All NWP and dispersion modelling systems were ported to the new Cray XC-40 supercomputer during the second half of 2016.The operational version of HYSPLIT 4.9 was upgraded to revision 804 in August 2016 when the EER suite began running on the Cray XC-40.

- An "All Products" archive directory was added to the RSMC Melbourne joint web page in August 2016.

6. Operational issues and challenges:

During 2016 the EER suite was transferred to run on the BoM's new operational supercomputer, a Cray XC-40. At the same time a new IT paradigm was introduced necessitating changes to previously used methods of software maintenance. A development-stage-production approach has been implemented which should minimise future errors when introducing new changes to the system. Unfortunately during the transition period a small number of "bugs" appear to have been introduced, which have only become apparent during subsequent monthly tests.

7. Summary and status of the operational atmospheric transport and dispersion models

RSMC Melbourne's operational Environmental Emergency Response (EER) system is currently based on version 4.9 (revision 804) of the Hybrid Single-Particle Lagrangian Integrated Trajectories (HYSPLIT) model, developed by Roland Draxler at the NOAA Air Resources Laboratory. HYSPLIT is driven by meteorological input from the various "ACCESS" operational numerical weather prediction systems run in the Bureau of Meteorology. The system is available for running on demand and produces forecast trajectories, concentrations (or exposures) and depositions for nuclear accident, volcanic ash, smoke and other episodes. For most initial responses to requests for nuclear EER products the input to HYSPLIT is provided by global ACCESS-G system, the current horizontal resolution of which is N512 (approximately 25km horizontal resolution) with 70 vertical levels.

8. Plans for 2017:

- The planned 2016 upgrade to RSMC Melbourne's city-based ACCESS-C systems from 0.036° (approximately 4km horizontal resolution) to 0.0135° (approximately 1.5km horizontal resolution) was delayed is now planned for the 2nd quarter of 2017.

- Further refinement of TOA Charts displays.

References:

WMO, 2015: Documentation on RSMC Support for Environmental Emergency Response. WMO-TD/No.778. Available online at http://www.wmo.int/pages/prog/www/DPFSERA/td778.html