RSMC Vienna – Annual Report 2015

EXECUTIVE SUMMARY

Primary activities for 2015 consisted in processing several operational and planned backtracking calculations on requests of the Provisional Technical Secretariat (PTS) of the Comprehensive Test Ban Treaty Organization (CTBTO) for level-5 events and in supporting the CTBTO National Data Centre Preparedness Exercise 2015. The PTS made 19 requests for inverse modelling support until November 15th, 2015. The response procedures were adapted to the changed request form and to the changes in the upload mechanism.

INTRODUCTION

The Austrian Central Institute for Meteorology and Geodynamics (ZAMG) is designated by the World Meteorological Organization (WMO) as Regional Specialized Meteorological Centre (RSMC) Vienna (backtracking only) since July 1st, 2011 and supports the CTBTO verification system with inverse atmospheric modelling activities on a global scale.

OPERATIONAL CONTACT INFORMATION

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ROUTINE OPERATIONS AND RESPONSES

A total of 19 requests for support were received from the Provisional Technical Secretariat of the Comprehensive Test Ban Treaty Organization between January 6th and November 7th, 2015. In all cases, the products were supplied to CTBTO within the allowed time limit.

SIGNIFICANT OPERATIONAL AND TECHNICAL CHANGES

During the March CTBTO 2015 Exercise, both, the new upload mechanism, which was implemented in 2014 and this year's changes in the request form were successfully tested and finalized.

STATUS OF THE OPERATIONAL ATDM MODELS

Atmospheric Backtracking

RSMC Vienna (backtracking only) participates in the CTBTO-WMO Backtracking Response System since its entry into operations in 2008. For backtracking the Lagrangian Particle Dispersion Model FLEXPART Version 6.2 is used. The system is driven by meteorological input data from ECMWF with 1 ° horizontal resolution and a temporal resolution of 3 hours. In 2014, the dispersion modelling software has been completely re-written in Python and was ported to the ZAMG computer system running operationally on two fully redundant machines, which are connected to uninterruptible power supplies (UPS) and an emergency power generator. The system has been designed to work fully automated. Each step – from receiving and decoding the request to the uploading of the results to the CTBTO server via a secured internet connection – is controlled by daemon service, written in Python.

Once an email from PTS is received, a python routine is triggered to retrieve and store the essential information in a sqlite3 database. In a second step it is checked whether computer related resources and input fields are available and depending on the outcome, a reply-email is automatically sent to inform PTS of the feasibility to perform the calculations. Once it is assured, that the calculation can be done, the Lagrangian dispersion model FLEXPART is initialized and executed. The results of the dispersion calculations are post-processed., Source-receptor relationships are calculated (Seibert P. et al., 2004) and uploaded to a CTBTO server using a sftp connection. Both input and output grids of the dispersion calculation are defined as 1°x1° global regular lon/lat fields. The FLEXPART calculation is performed in backward mode. In the model calculation, each release point (as defined in the email, received by the PTS) emits a total mass of 1x1015 Bq and a total number of 200.000 particles.

Austrian Emergency Response Modelling System TAMOS

For the Austrian radiological emergency response preparedness, NMC Vienna supports the Department for Radiation Protection in the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management with the emergency response modelling system TAMOS (Pechinger et al., 2001). The modelling system, based on the Lagrangian particle dispersion model FLEXPART (Stohl et al., 2005) and the trajectory model FLEXTRA (Stohl et al., 1998), is adapted for real-time forward-mode applications using as input the meteorological forecast fields from the European Centre for Medium Range Weather Forecast (ECMWF). Numerical fields are retrieved and processed twice a day from the ECMWF MARS archive with a horizontal resolution of 0.20° and a temporal resolution of 3 hours. Products of TAMOS delivered to the Austrian Department for Radiation Protection are trajectory and dispersion plots (wet-, dry deposition, time integrated concentration and total deposition).

NON-OPERATIONAL ACTIVITIES

- NMC Vienna participated in two Time of Arrival (TOA) exercises in June and October 2015. Software to generate TOA products was developed
- NMC Vienna developed software to present radionuclide products at flight levels. In

cooperation with RSMC Montreal, some case studies for Chernobyl and Fukushima were conducted to assess the vertical extent of radionuclide plumes after an accident/incident.

PLANS FOR 2016

- Upgrade of the Lagrangian dispersion model FLEXPART to version 9
- Investigation of the feasibility to perform and store backtracking computations with 0.5 degree meteorological input fields, as proposed by CTBTO

LIST OF REFERENCES

- Stohl, A., and P. Seibert, 1998: Accuracy of trajectories as determined from the conservation of meteorological tracers. Q. J. Roy. Met. Soc. 124, 1465-1484
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- Stohl, A., C. Forster, A. Frank, P. Seibert, and G. Wotawa, 2005: Technical Note : The Lagrangian particle dispersion model FLEXPART version 6.2., Atmos. Chem. Phys. 5, 2461-2474.