RSMC Vienna report of activities for 2016

Executive Summary

Primary activities for 2016 consisted in processing several operational backtracking calculations on requests of the Provisional Technical Secretariat (PTS) of the Comprehensive Test Ban Treaty Organization (CTBTO) for level-5 events. The PTS made 4 requests for inverse modelling support in 2016.

1. Introduction

The Zentralanstalt für Meteorologie und Geodynamik (ZAMG) is designated by the World Meteorological Organisation (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.

2. Operational Contact Information

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3. Responses and information on dissemination of products

A total of 4 requests for support were received from the Provisional Technical Secretariat of the Comprehensive Test Ban Treaty Organization between March 15th and November 21st, 2016. In all cases, the products were supplied to CTBTO within the allowed time limit.

4. Routine operations

RSMC Vienna (backtracking only) does not participate in exercises and tests designed for emergency response activities in forward mode.

5. Lesson learned from recent experiences and significant operational and technical changes

No changes to the operational system have been applied.

6. Operational issues and challenges

None

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

i. CTBTO-WMO Backtracking Response System

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 $1x10^{15}$ Bq and a total number of 200.000 particles.

8. Plans for 2017:

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

9. List of References

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.