RTH/RSMC Offenbach (DWD) report of activities for 2012

Executive Summary

Primary activities for 2012 consisted of the RTH Offenbach monthly communication tests with the IAEA and quarterly IAEA/RTH/RSMC tests including several CONVEX exercises conducted for different scenarios and accident countries. In the framework of the CTBTO/WMO commitment, a significant number of backtracking calculations were performed on request for level-5-events. RTH/RSMC Offenbach participated also in an international inverse modelling exercise with the Provisional Technical Secretariat (PTS) of the Comprehensive Test Ban Treaty Organization (CTBTO). Incremental updates and improvements were made to the DWD's dispersion model software, and to the response procedures. Regarding Ensemble Atmospheric Transport Modelling test run results were transferred to JRC Ispra.

1. Introduction

The RTH Offenbach is one of the 18 major Regional Telecommunication Hubs within the Main Telecommunication Network (MTN) of the Global Telecommunication System (GTS). RTH Offenbach is the operational counterpart of the Incident and Emergency Centre (IEC) of the IAEA with respect to the distribution of the notification of an accident and additional information. In the framework of the IAEA Convention on Early Notification and Assistance RTH Offenbach has to make sure that the NHMSs are informed as fast as possible of a nuclear accident. Additionally, in the context of the CTBTO/WMO backtracking arrangements Offenbach is one of the WMO-RSMCs for atmospheric dispersion modelling/backtracking.

2. Operational Contact Information

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3. Standing operational procedures

According to the regional and global arrangements for the provision of transport model products in the case of a nuclear environmental emergency, the RTH Offenbach is in charge of the global dissemination of emergency messages.

In the framework of the Convention on Early Notification of nuclear accidents, the IAEA informs the WMO Secretariat and the RTH Offenbach (Germany) of the status of the emergency. If needed, the IAEA will request support from the WMO RSMCs. Beginning with a site area emergency, RTH Offenbach will disseminate the EMERCON message on the GTS in the form of an alphanumeric bulletin in plain-text English language under the abbreviated heading WNXX01 IAEA for global distribution to the NMCs and RSMCs. (See also the WMO Manual on the Global Telecommunications System, WMO Publication-No. 386).

When the IAEA no longer requires WMO RSMC support, the IAEA will send an EMERCON termination message to the RSMCs, WMO Secretariat and RTH Offenbach. RTH Offenbach will also disseminate the ERMERCON termination message on the GTS under the heading WNXX01 IAEA for global distribution.

Therefore, in case of an accident occurrence and/or whether emergency meteorological support is required. RTH Offenbach will

(a) receive a message from IAEA (as an email and as a fax),

(b) verify its content by a phone call to the IEC of the IAEA,

(c) put the EMERCON message on the GTS in the form of an alphanumeric bulletin in plain-text English language under the abbreviated heading WNXX01 IAEA for global distribution to the NMCs and RSMCs,

(d) check that the Lead-RSMCs have received the same information (email/fax) and

(e) foreword the email (fax) with the notification or additional information to the Lead-RSMCs if they did not get it directly from the IAEA.

4. Programme of exercises - Regular tests

The communication between IAEA and RTH Offenbach is tested every month. According to the actual valid procedures the tests are performed each third Thursday a month except from one unannounced test per year. Once every quarter RSMCs and the delivery (but not the distribution) of products are included. The GTS link can be tested at every quarterly exercise. Additionally, GTS messages are distributed in the framework of full scale tests like ConvEx-3 exercises.

5. Evaluation of exercises

In 2012 communication test between IAEA and RTH Offenbach were conducted on a regular basis.

In this period 6 standard ("monthly") communication exercises (and also several ConvEx tests via USIE-web site) were performed, using the fax, email and phone contacts between IAEA and RTH Offenbach.

Additionally, every third month a quarterly exercise was conducted to test the communication procedures and contacts between IAEA, RSMCs and RTH Offenbach. In these exercises accident scenarios in different WMO regions were chosen and only the corresponding Lead RSMCs had to respond according to the distributed messages. The GTS link was utilized during these exercises.

The monthly and quarterly communication exercises were performed without any deviations or only minor ones (see list below) from the agreed procedures.

Some deviations are listed here:

- missing email resp. fax messages (both are required for back-up)
- incorrect subject information: (e.g. "communication test" instead of "quarterly exercise")
- missing exercise termination message
- unexpected replication of GTS messages

6. Lessons learned from experience

The regular monthly communication exercises are helpful to keep the procedure in mind and to test the handling of the information. But they are very simple and no significant problems are expected to show up except perhaps a disruption of the email system or similar technical problems.

It is therefore not surprising that the major problems or deviations from the agreed procedures only happened during the quarterly tests because they were the only tests with several steps in predefined accident scenarios which also include the distribution of GTS messages.

Regarding the distribution of alarm messages the confirmation checks done by RTH Offenbach are very useful and necessary activities. They are important backup features in the emergency response communication context.

7. Participation in the WMO/CTBTO inverse dispersion modeling calculations

WMO and the Provisional Technical Secretariat (PTS) of the Comprehensive Test Ban Treaty Organization (CTBTO) cooperate according to adopted arrangements for the provision of inverse dispersion modeling by the WMO designated Centres to CBTO. At present 9 WMO Centres (RSMCs) are active participants in these backtracking calculations. The 9 WMO Centres are asked on request to provide inverse dispersion modeling as far back as 21 days and for up to 36 stations and to upload (to the CTBTO web-site) their results within 24 to 96 hours of receiving the request. RSMC Offenbach was successful in meeting the requirements. CTBTO then combines the results in various ways to generate ensemble products.

Beginning with September 2008, which was the official start of the operational phase of the CTBTO/WMO system, until end of 2012, more than 100 backtracking calculations were performed from RSMC Offenbach on request for level-5-events. In the context of the Fukushima releases about 55 backtracking request were received since March 2011 (2012: 20 requests). Additionally, one experimental exercise was conducted (May 29).

8. Status of the DWD's operational atmospheric transport and dispersion model (employed for WMO/CTBTO)

As a part of the German radioactive emergency systems IMIS/RODOS a Lagrangian Particle Dispersion Model (LPDM) is employed at the DWD. The LPDM calculates trajectories of a multitude of particles emitted from a point source using the grid-scale winds and turbulence parameters of the NWP-model and a time scale based Markov-chain formulation for the dispersion process. Concentrations are determined by counting the number and mass of particles in a freely eligible grid. Dry deposition parameterisation follows a deposition velocity concept and wet deposition is evaluated using isotope-specific scavenging coefficients. Also included is radioactive decay, a vertical mixing scheme for deep convection processes and optionally particle-size depending sedimentation coefficients. The LPDM was successfully validated using data of the ANATEX and ETEX tracer experiments.

The dispersion model is driven by the DWD's weather forecast models (GME, COSMO-EU/COSMO-DE). In case of emergency the model output will be transmitted to the national 'Integrated Measurement and Information System' (IMIS) and the real-time decision system RODOS in Germany. Additionally, the LPDM is utilized for the EU-activity "ENSEMBLE" (participants: weather services in Europe and North America), which combines the forecast of different emergency dispersion models to a multi-model ensemble.

The model is also a member of the multi-model backtracking ensemble of the CTBTO (Comprehensive Nuclear-Test-Ban Treaty Organization). The code is optimised for MPP computers (e.g. NEC-SX8/SX9, IBM P5 575) utilising MPI-based parallelisation features. The model is also implemented at MeteoSwiss based on the Swiss COSMO-version running on a CRAY-XT4.

The NWP modelling suite of DWD consists of three models, namely the global icosahedral-hexagonal grid point model **GME** (grid spacing 20 km, 60 layers), the non-hydrostatic regional **COSME-EU** (COSMO model Europe, grid spacing 7 km, 665x657 grid points/layer, 40 layers), and finally the convection permitting **COSMO-DE**, covering Germany and its surroundings with a grid spacing of 2.8 km, 421x461 grid points/layer and 50 layers.

Independent 4 dim. data assimilation suites are performed for all three NWP models, GME, COSMO-EU and COSMO-DE. For GME, analyses are derived for the eight analysis times 00, 03, 06, 09, 12, 15, 18 and 21 UTC based on a three-dimensional variational data assimilation scheme. For COSMO-EU and COSMO-DE, a continuous data assimilation system based on the nudging approach provides analyses at hourly intervals. Analyses and forecasts are currently run on a NEC-SX9.

During the release phase of the Fukushima accident (March/April 2011) the DWD provided dispersion forecasts for the public mainly based on GME data. Additionally, the COSMO model (7 km grid spacing) was set up and run in an operational mode for the relevant region covering Japan and its surroundings.

In 2012 incremental updates and improvements were made to the DWD's dispersion model software, and to the response procedures (e.g. for GRIB2). Regarding Ensemble Atmospheric Transport Modelling test run results were transferred to JRC Ispra in the context of a special WMO/RSMC experiment.

References:

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10. Plans for 2013:

- The schedule of tests (monthly, quarterly and others) has been set up and defined in cooperation with the IAEA.
- Continuation of the participation on WMO/CTBTO backward ensemble calculations.
- Adaptions to a new global NWP model ("ICON", operational in 2014)
- For regional applications the dispersion model will be based on a new version of the limited area NWP model (COSMO-DE-L65).