

# **RSMC Beijing report of Activities for 2015**

## **Executive Summary**

Primary activities at RSMC Beijing for 2015 consisted of a quarterly exercise of Asian RII, ConvEx-2b exercise and the TOA exercises conducted by WMO and IAEA. In addition, RSMC Beijing provided atmospheric backtracking products for the Provisional Technical Secretariat (PTS) of the Comprehensive Test Ban Treaty Organization (CTBTO). Also, some improvement of Environmental Emergency Response System (EERS) in RSMC Beijing and new products are developed in 2015.

### **1. Introduction**

The National Meteorological Centre (NMC of China Meteorological Administration) is designated by the WMO as the Beijing Regional Specialized Meteorological Centre (RSMC) for the provision of atmospheric transport modelling in case of an environmental Emergency Response. The primary region of responsibility is WMO Regional Associations (RA) II. RSMC Beijing performs its functions jointly with RSMC Tokyo and RSMC Obninsk when requested by the IAEA or member states of WMO Regional Association II (RA-II). In addition to emergency response, RSMC Beijing contributes global reverse modelling support to the CTBTO's verification system and updated the new products upload method.

### **2. Operational Contact Information**

National Meteorological Centre (NMC)  
China Meteorological Administration  
No.46, Zhongguancun Nandajie  
Haidian District, Beijing  
China, 100081

Business contact: Dr. Song Zhenxin  
Tel : 86 10 68400477  
Fax : 86 10 68407469  
Email: [songzx@cma.gov.cn](mailto:songzx@cma.gov.cn)

Operational contact (24 hours): Shift supervisor  
Tel : 86 10 68406344  
Fax : 86 10 62172909  
Email : [rsmc@cma.gov.cn](mailto:rsmc@cma.gov.cn); [shenglilily@gmail.com](mailto:shenglilily@gmail.com);

### **3. Responses and information on dissemination of products**

### **i. Exercises (2015)**

February 19 – RSMC Beijing participated in the quarterly exercise of Asian RII. The release site was Fukushima, Japan and real-time meteorological field was considered. RSMC Beijing received IAEA faxed request for transport and dispersion modelling of radionuclide in support of the exercise. There has been good cooperation between us and other RSMCs.

August 26 – RSMC Beijing participated in the ConvEx-2b exercise. The release site was Barakah NPP, United Arab Emirates. RSMC Beijing received IAEA faxed request for transport and dispersion modelling of radionuclide in support of the exercise.

June 2 and October 27 – RSMC Beijing participated in the TOA exercises. The release sites were Enrico Fermi NPP, Italy and Mochovce, Slovak Republic. RSMC Beijing received the e-mail request and provided the TOA products.

### **ii. Dissemination of products**

Transport model graphical products and joint statements are posted to secure joint web pages, and faxed to relevant RSMCs and NMHSs.

In addition to the other RSMCs, the following NMHSs are in our fax lists:

Bahrain  
Bangladesh  
Democratic People's Republic of Korea  
Hong Kong, China  
India  
Iran, Islamic Republic of  
Iraq  
Republic of Yemen  
Kazakhstan  
Kyrgyzstan  
Macao  
Mongolia  
Myanmar  
Oman  
Pakistan  
Qatar  
Republic of Korea  
Saudi Arabia  
Sri Lanka  
Tajikistan  
Thailand  
Turkmenistan  
United Arab Emirates

Uzbekistan  
Viet Nam  
Kuwait

The failure rate of fax transmission in 2015 was decreased. During the 2015 exercises, 17 out of 26 fax transmissions to NMHSs were successful, which was better than 14 out of 24 in 2014. The successful fax transmissions were as following:

Democratic People's Republic of Korea

HONGKONG

MACAO

The People's Republic of Korea

UZBEKISTAN

MONGMLIA

MYANMAR

KYRGYSTAN

TURKNENISTAN

IRAN

SRI LANKA

PAKISTAN

QATAR

SAUDI ARABIA

BAHRAIN

KUWAIT

VIET NAM

### iii. Response to requests by CTBTO-PTS

In 2015, RSMC Beijing has completed 18 CTBTO back-tracking exercises. From January to September, each request included generally 7 sites; meanwhile in October and November, RSMC Beijing carried out 12 requests and each request included more than 10 monitoring sites. In addition to the back-tracking of monitored particles, RSMC Beijing has supplemented the ability for back-tracking noble gas.

## 4. Routine operations

### Quarterly Tests:

RSMC Beijing participated in quarterly tests conducted by IAEA. Table 1 contains summary information on these tests. The products of the tests were uploaded to RSMC common web pages and distributed to other NMHSs when requested.

Month	Source location	Initiated by	WMO Regional Associations
February	Fukushima, Japan	IAEA	I/VI <sup>1</sup>

June	Enrico Fermi NPP, Italy	IAEA	all
August	Barakah NPP, United Arab Emirates	IAEA	I/VI <sup>1</sup>
October	Mochovce, Slovak Republic	IAEA	all

*Table 1: RSMC quarterly tests for 2015*

Notes:

1. The RSMCs of Beijing, Obninsk and Tokyo products were uploaded to RSMC common web pages and faxed to NMHSs in WMO RA II as requested.
2. The products of TOA were uploaded to IAEA and RSMC Obninsk.

#### **Developed the new products:**

Time of arrival (TOA) product has been modified. The new product can display the dispersion arrange at different time in an individual figure.

Based the ensemble T639 and GRAPES\_MESO numerical forecasting systems, the products of ensemble atmospheric dispersion modeling are developed and were applied to the emergency support service of Tainjin 8.12 accident.

#### **Capacity Building for Services system:**

The new source term evaluation system and dose calculation system of NPP accident source suite for China NPPs are integrated into the operational system of the emergency response system. In addition, the operational system of EER system has improved.

#### **5. Operational issues and challenges:**

- In past two year, the successful rate of fax transmissions during the dissemination of atmospheric transport or dispersion products are low. During IAEA exercises, a lot of fax communications maybe lead to two problems: (1) frequent communications is easy to cause busy and lead to the failure of products distribution; (2) the delivery of products using fax takes a long time, which limits the timeliness of the emergency response.
- In past several months, the e-mails of RMSC Beijing are often rejected by the recipient server. In future, there are in need to develop a new communication or transmission method for backup.

#### **6. Summary and status of the operational atmospheric transport and dispersion models**

The operational Environmental Emergency Response (EER) system, in RSMC Beijing, is currently based on the Hybrid Single-Particle Lagrangian Integrated

Trajectories (HYSPLIT4) Atmospheric Transport Model, developed at the NOAA Air Resources Laboratory. HYSPLIT4 is driven by meteorological input resulting from the operational numerical weather prediction system T639L60 global model and the GRAPES\_MESO medium model. In 2015, the T639L60 and GRAPES\_MESO are in the old resolutions: 0.285° and 0.1° respectively. The system is available for running on demand and produce forecast trajectories, concentrations (or exposures) and depositions for nuclear accident, volcanic ash, smoke and other episodes. In 2013, the HYSPLIT version was updated to HYSPLIT 4.9 new version.

The HYSPLIT4 is used for modelling atmospheric transport and dispersion of pollutants over medium/long-distance. The equations used in the calculation of pollutant transport and dispersion are a hybrid Lagrangian approaches. Advection and diffusion calculations are made in a Lagrangian framework using the meteorological gridded analysis and forecast fields. Air concentrations are calculated on a fixed three dimensional grid by integrating all particle masses over a pre-set averaging period. Routine calculations may consist of simple trajectories from a single source to consideration of complex emissions from several sources. Dry deposition is treated with the deposition velocity concept. Wet deposition is divided into two processes: a scavenging ratio for pollutants located within a cloud layer and a scavenging coefficient for pollutant removal in rain below a cloud layer. Radiological decay is also included when necessary.

## **7. Plans for 2015:**

- Continue to develop the atmospheric dispersion ensemble techniques. Based on the different uncertainties from source, meteorology and dispersion physical process, develop the atmospheric dispersion perturbation or ensemble methods and apply these methods to nuclear or non-nuclear emergency response exercises.
- Develop the on\_line HYSPLIT and GRAPES\_MESO system, improving the temporal and spatial accuracy of meteorological fields forecast.
- Strengthen the development of new products, such as the new atmospheric dispersion products based on Chinese high resolution GIS information and the atmospheric dispersion ensemble forecast products, etc..