Seismological Investigations of the National Data Centre Preparedness Exercise 2015 (NPE2015)



Bundesanstalt für Geowissenschaften und Rohstoffe

1 Introduction

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) prohibits all kinds of nuclear explosions. For the detection of treaty violations the International Monitoring System (IMS) operates stations observing seismic, hydroacoustic, and infrasound signals as well as radioisotopes in the atmosphere. While the IMS data is collected, processed and technically analyzed in the International Data Center (IDC) of the CTBT-Organization, National Data Centers (NDC) provide interpretation and advice to their government concerning suspicious detections occurring in IMS data. If the nature of a suspicious event cannot be clarified with data of the IMS or national technical means, an on-site inspection (OSI) can be requested by the member states.

Results of the National Data Centre Preparedness Exercise 2015 (NPE2015) are provided on this poster. NPEs are exercises which are dealing with fictitious treaty violations.

2 The Concept of the NPE

Purpose

The National Data Centre Preparedness Exercise (NPE) is an exercise conducted by NDCs for NDCs

Scenario

Fictitious / partly hypothetical "suspicious event" which is handled as a possible treaty violation

- Apply verification procedures to identify the source and decide whether it can be a treaty
- violation. Test the usefulness of the data, products, and services provided by the CTBTO

Participants

All National Data Centres (NDCs) and associated institutions. Support by CTBTO

The National Data Centre Preparedness Exercises (NPE) are regularly performed dealing with fictitious treaty violations to practice the combined analysis of CTBT verification technologies and national technical means. These exercises should help to evaluate the effectiveness of analysis procedures applied at National Data Centres (NDCs) and the quality, completeness and usefulness of IDC products.

3 The NPE2015 Scenario

The National Data Centre Preparedness Exercises 2015 (NPE2015) has a combined radionuclidewaveform scenario. Fictitious particulate radionuclide and radioxenon measurements at stations of the IMS (International Monitoring System) of the CTBTO were reported to the international community. The type of isotopes and concentrations could arise from an underground nuclear explosion (UNE). The task of the exercise is to identify the scenario behind the provided data. The source region and time domain of a possible treaty violation activity was determined from Atmospheric Transport Modeling (ATM) in backtracking mode with input data from the fictitious data. A time slot in October and a region around the mining area of Lubin could be identified as the possible source area of the fictitious measurements.





Fictitious radionuclide detections at stations of the IMS in October 2015 may be connected to suspicious activities in ENPEDOR. These radionuclide spectra are the start of the exercise 2015. The closes stations are displayed on the map.

NPE 2015 – Scenario and verification task

Your national authority has noticed some indications of suspicious activities in the fictitious State of ENPEDOR (map on the left) which is located in Central Europe (roughly around 51° N, 16° E) as shown in the map below.

Participants are requested to monitor waveform events occurring in the region. The period of higher alertness is initially planned to last two months from October 1st until November 30th, 2015.

If any potentially connected radionuclide detections will be reported during or after this period you will get informed timely.

Selection of Search Area and Time Interval of trigger Event

- Time interval from isotope ratios of radionuclide particulates Żr97 Zirconium
- Nb97 Niobium
- Source time: 15/16 October 2015
- Number and concentration of radionuclide particulates indicate a **surface explosion**
- ATM backtracking Large source region Trigger event on area of ENPEDOR is consistent with release scenario
- ATM forward calculation Arrival time of radionuclide isotopes is consistent with an event on **15 October 2015** at area of ENPEDOR
- Investigation of surface and subsurface events at the territory of ENPEDOR on 14 - 16 October 2015

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idate The very a and ed as uced burce be	 An explosion as source of the release scenario could not be verified, but a small explosion (surface or subsurface) below the detection threshold (seismic and infrasound) of the networks cannot be excluded. A special investigation with local stations available at the German NDC could reduce the completeness magnitude Mc below 2.0 ML In this exercise, it was decided that an on-site inspection (OSI) is not necessary to exclude the possibility of a fictitious clandestine underground nuclear explosion. 	
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