



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

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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.

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 NDCs and the quality, completeness and usefulness of IDC products.

The NPE2015 is a combined radionuclide-waveform 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 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.

The seismicity of the determined source region was investigated in detail to identify events which cannot be classified as natural or induced within the relevant time interval. The comparison of spectral characteristics and a cluster analysis was applied to search for a non-characteristic event within a number of known induced events in the area. The results reveal that none of the candidate events had an explosion like characteristic. All candidate events are part of event cluster with a minimum of seven events with comparable signature. The possibility of a treaty violation would be very low in a real scenario.

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. Taking into account the results of the seismological investigations it could be decided that an OSI is not necessary for the possible source region to exclude the possibility of a fictitious clandestine underground nuclear explosion.