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Disclosure of the National Data Centre Preparedness Exercise 2013 radionuclide release and atmospheric dispersion scenario

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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.
NDC Preparedness Exercises (NPE) are regularly performed dealing with fictitious treaty violations to practice the combined analysis of CTBT verification technologies and for the mutual exchange of information between NDC and also with the IDC.
The scenario of the NPE2013 was the most complex so far. As exercise trigger, a fictitious accusing State Signatory points to a series of (simulated) radionuclide findings at IMS stations in Europe/Asia and postulates a connection with detections of a supposed seismic event which occurred within the territory of the fictitious state of FRISIA on September 4th, 2013. FRISIA is located at the Coast of the North Sea in Central Europe. The synthetic radionuclide detections start in Vienna (8 Sept, I-131) and Schauinsland (11 Sept, Xe-133) with rather low activity concentrations and are most prominent in Stockholm and Spitsbergen mid of September 2013. Smaller concentrations in Asia follow later on. The potential connection between the waveform and radionuclide evidence remained unclear for the participants. The verification task was to identify the waveform event in the given tempo-spatial domain and to investigate potential sources of the simulated radionuclide findings. Finally the potential conjunction between the sources and the CTBT-relevance of the whole picture has to be evaluated. The overall question is whether requesting an On-Site-Inspection in FRISIA would be justified. Various pieces of Supplementary Information were offered in order to facilitate a broad participation of NDCs. Finally, the full NPE2013 scenario was disclosed at the NDC Workshop in Vienna in May 2014.
The radionuclide source scenario and location as well as the forward Atmospheric Transport Modelling (ATM) to generate the simulated concentrations are presented. The specific challenges of the localization of the fictitious radionuclide source by means of ATM backtracking and isotopic composition analysis are pointed out. The underlying scenario of NPE2013 was a false-positive: The induced seismic event in FRISIA was completely unrelated to the simulated reactor release at 600 km distance in a neighbouring country. The NPE2013 addressed thus a number of relevant issues which have to be considered when dealing with data of the International Monitoring System and of additional national technical means in the pre-run of a request for an On-Site Inspection.