Geophysical Research Abstracts
Vol. 18, EGU2016-15989, 2016
EGU General Assembly 2016

Atmospheric Transport Modelling assessing radionuclide detection chances after the nuclear test announced by the DPRK in January 2016

J. Ole Ross and Lars Ceranna

BGR Hannover, B4.3, Hannover, Germany (ole.ross@bgr.de)

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) prohibits all kinds of nuclear explosions. The International Monitoring System (IMS) is in place and at about 90% complete to verify compliance with the CTBT. The stations of the waveform technologies are capable to detect seismic, hydro-acoustic and infrasonic signals for detection, localization, and characterization of explosions. The seismic signals of the DPRK event on 6 January 2016 were detected by many seismic stations around the globe and allow for localization of the event and identification as explosion (see poster by G. Hartmann et al.). However, the direct evidence for a nuclear explosion is only possible through the detection of nuclear fission products which may be released. For that 80 Radionuclide (RN) Stations are part of the designed IMS, about 60 are already operational. All RN stations are highly sensitive for tiny traces of particulate radionuclides in large volume air samplers. There are 40 of the RN stations designated to be equipped with noble gas systems detecting traces of radioactive xenon isotopes which are more likely to escape from an underground test cavity than particulates. Already 30 of the noble gas systems are operational. Atmospheric Transport Modelling supports the interpretation of radionuclide detections (and as appropriate non-detections) by connecting the activity concentration measurements with potential source locations and release times.
In our study forecasts with the Lagrangian Particle Dispersion Model HYSPLIT (NOAA) and GFS (NCEP) meteorological data are considered to assess the plume propagation patterns for hypothetical releases at the known DPRK nuclear test site. The results show a considerable sensitivity of the IMS station RN 38 Takasaki (Japan) to a potential radionuclide release at the test site in the days and weeks following the explosion in January 2016. In addition, backtracking simulations with ECMWF analysis data in 0.2° horizontal resolution are performed for selected samples to get a complementary estimation of the sensitivities and the connected thresholds for detectable releases.The meteorological situation is compared to the aftermath of the nuclear explosion on 12 February 2013 after which a specific occurrence of an unusual ^{131m}Xe signature at RN 38 eight weeks after the test could be very likely attributed to a late release from the DPRK event.