



Atmospheric Transport Modelling confining potential source location of East-Asian radionuclide detections in May 2010

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The radionuclide component of the International Monitoring System (IMS) to verify compliance with the Comprehensive Nuclear-Test-Ban Treaty (CTBT) is in place to detect tiny traces of fission products from nuclear explosions in the atmosphere. The challenge for the interpretation of IMS radionuclide data is to discriminate radionuclide sources of CTBT relevance against emissions from nuclear facilities.

Remarkable activity concentrations of Ba/La-140 occurred at the IMS radionuclide stations RN 37 (Okinawa) and RN 58 (Ussurysk) mid of May 2010. In those days also an elevated Xe-133 level was measured at RN 38 (Takasaki). Additional regional measurements of radioxenon were reported in the press and further analyzed in various publications. The radionuclide analysis gives evidence for the presence of a nuclear fission source between 10 and 12 May 2010. Backward Atmospheric Transport Modelling (ATM) with HYSPLIT driven by 0.2° ECMWF meteorological data for the IMS samples indicates that, assuming a single source, a wide range of source regions is possible including the Korean Peninsula, the Sea of Japan (East Sea), and parts of China and Russia.

Further confinement of the possible source location can be provided by atmospheric backtracking for the assumed sampling periods of the reported regional xenon measurements.

New studies indicate a very weak seismic event at the DPRK test site on early 12 May 2010. Forward ATM for a pulse release caused by this event shows fairly good agreement with the observed radionuclide signature. Nevertheless, the underlying nuclear fission scenario remains quite unclear and speculative even if assuming a connection between the waveform and the radionuclide event.