



Nuclear Treaty Verification using Atmospheric Transport Modelling

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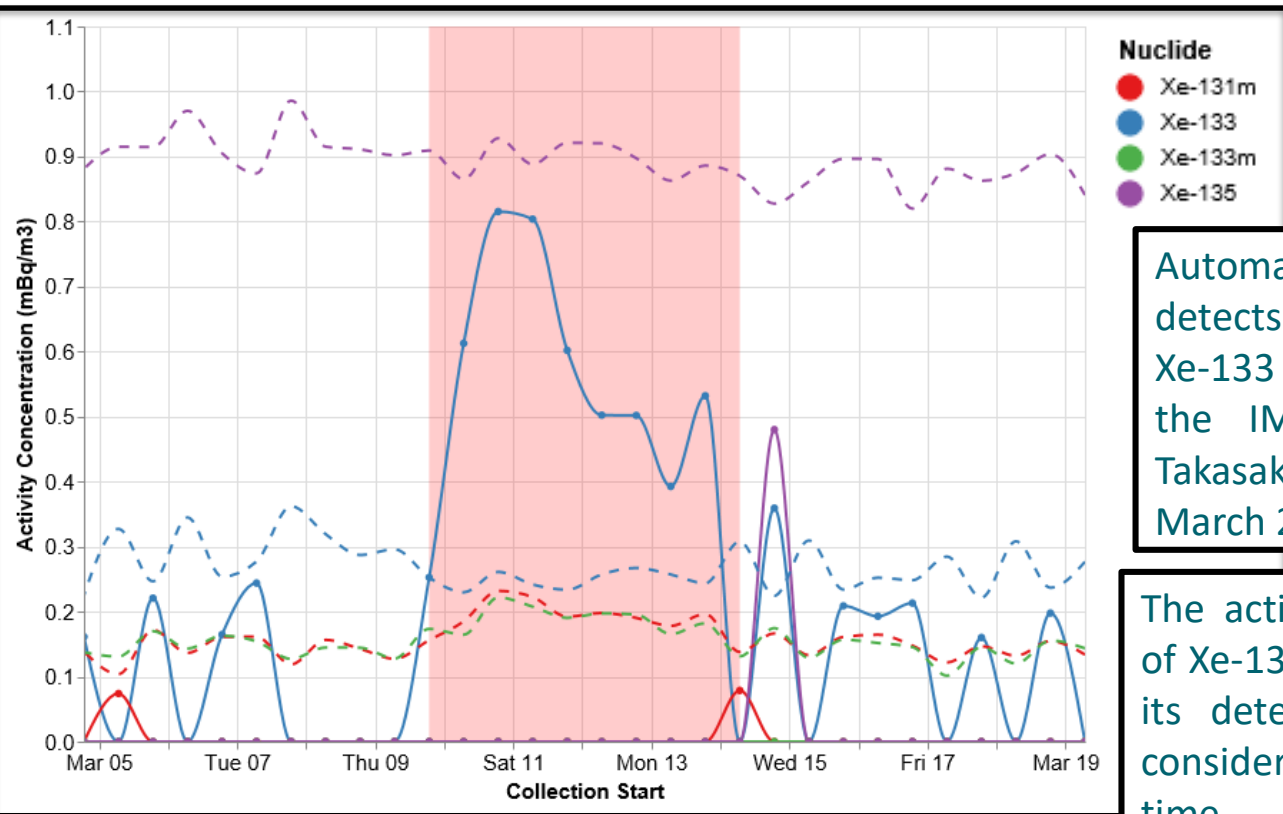
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Radioxenon analysis using noble gas technology on the International Monitoring System is key to verifying compliance with the nuclear weapons test ban treaty.

A global radioxenon background exists due to emissions from nuclear power plants and medical isotope production facilities.

Atmospheric Transport Modelling can be used to assess simulated contributions to detection systems, aiding specialists to determine whether a treaty violation has occurred.

An automated data visualisation process has been produced to link real detection events to simulated emissions.



Automated software detects a plume of Xe-133 travelling over the IMS station in Takasaki, Japan during March 2017.

The activity concentration of Xe-133 (blue) sits above its detection limit for a considerable period of time.

This event can be linked to simulations from known nuclear facilities to build up a view of which emitters the station was sensitive to at the time.

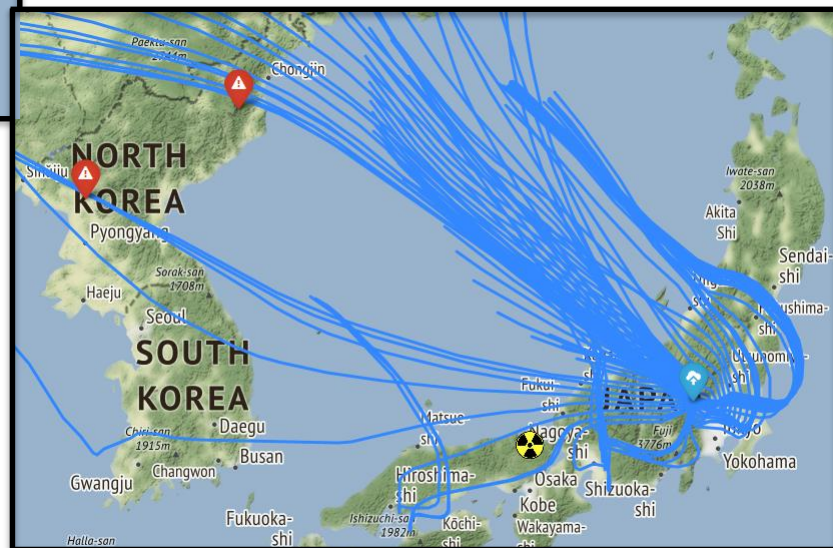
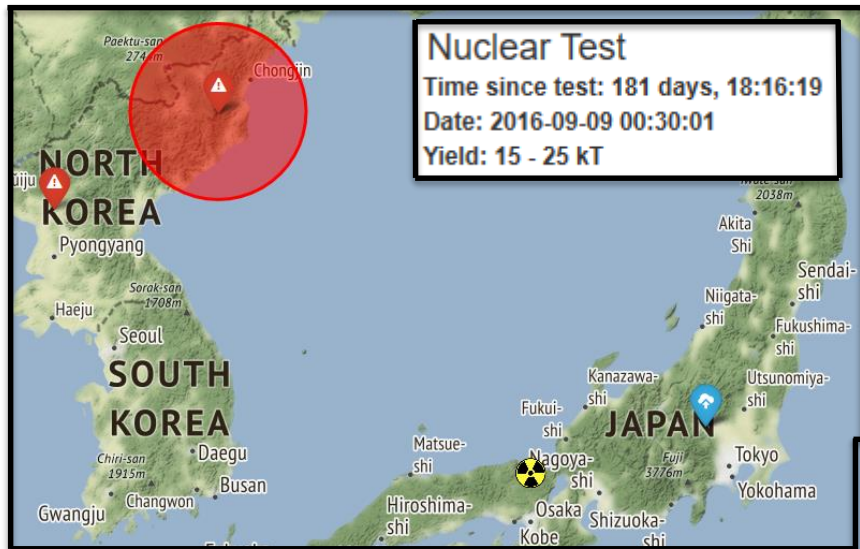
Nuclear Test

Time since test: 181 days, 18:16:19

Date: 2016-09-09 00:30:01

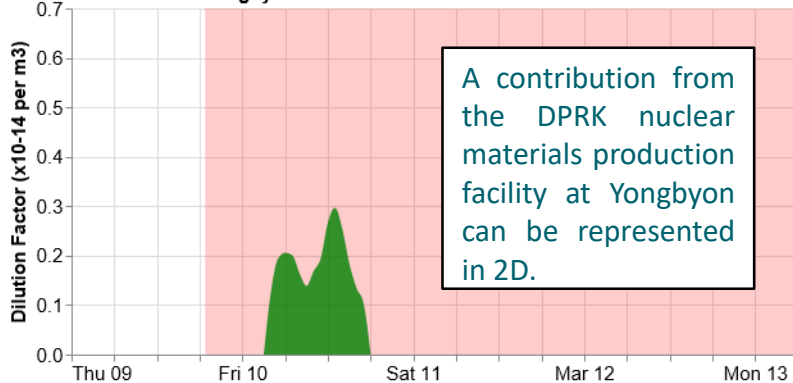
Yield: 15 - 25 kT

Interactive virtual mapping shows emission simulations from three local emitters contribute to Takasaki (blue icon) during the event time. Also shown is a recent nuclear test at the DPRK test site, as well as possible source regions from the wind direction during the event period (blue lines).

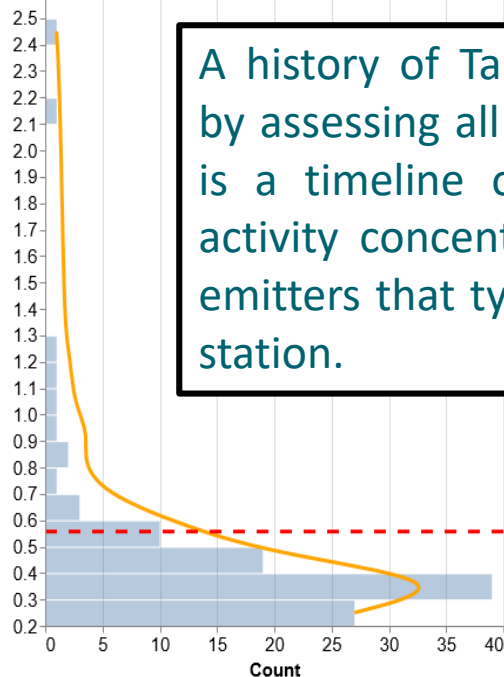
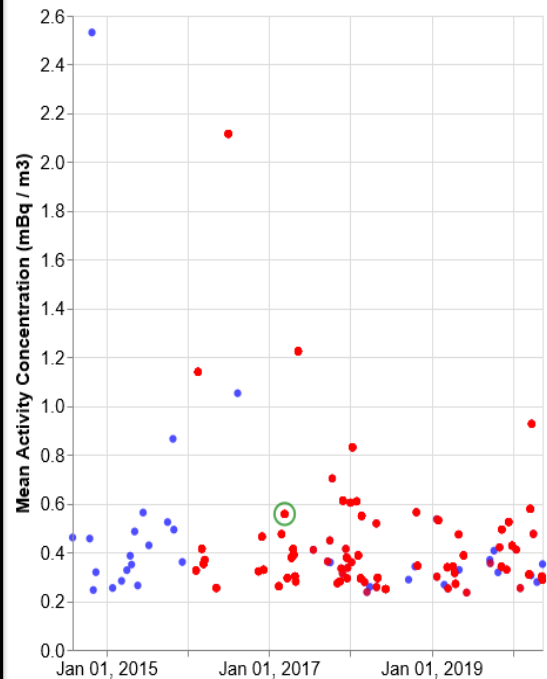


DPRK reactor Yongbyon

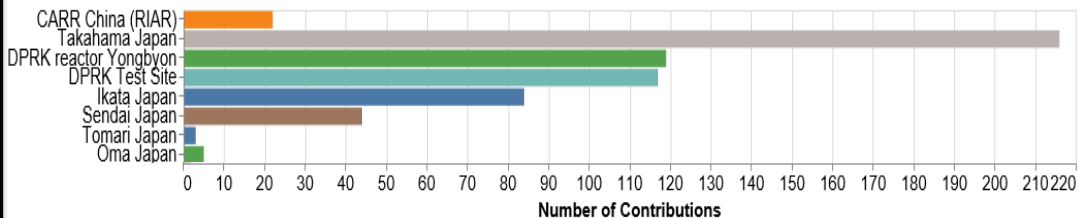
2017-03-08 21:00:00 - 2.95e+11 Bq



A contribution from the DPRK nuclear materials production facility at Yongbyon can be represented in 2D.



A history of Takasaki can be produced by assessing all assigned events. Shown is a timeline of previous events, the activity concentration distribution, and emitters that typically contribute to the station.



Emitters in the DPRK frequently contribute, along with local nuclear power plants and medical isotope production facilities in Japan, South Korea and China.