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Influence of the selected atmospheric processes on the long and short-range transport of the noble gas emissions as seen through CTBT monitoring.

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The International Monitoring System (IMS) developed by the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) is a global system of monitoring stations, using four complementary technologies: seismic, hydroacoustic, infrasound and radionuclide. Data from all IMS stations are collected and transmitted to the International Data Centre (IDC) in Vienna, Austria. The radionuclide network comprises 79 stations, of which more than 60 are certified and send data. The aim of radionuclide stations is a global monitoring of radioactive aerosols, radioactive noble gases, in particular xenon isotopes, supported by atmospheric transport modeling (ATM).

The aim of this study is to investigate the transport of xenon emissions using the atmospheric transport modeling system based on the Lagrangian Particle Dispersion Model FLEXPART. The model is fed with analysed wind data provided by the European Centre for Medium-Range Weather Forecasts (ECMWF). In this study, emphasis is put on ^{133}Xe, which is the most prevalent xenon isotope. Recent studies identified a few medical radioisotope production facilities as the major emitters of xenon isotopes worldwide. The question arises how far the plume emitted from such a radiopharmaceutical facility may be detected. It is also interesting to test whether atmospheric processes like for example convection change the results significantly. To answer these questions a series of forward simulation was conducted, assuming the maximum transport duration of 21 days, and the release point at the medical facility in Fleurus (Belgium). The results were compared with the measurements .