

Case Study on Using High Resolution Atmospheric Transport Modelling on Historical Democratic People's Republic of Korea Announced Tests

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Detection of radionuclides released from a nuclear explosion is an essential task performed by the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) as mandated under the Comprehensive Nuclear-Test-Ban Treaty. Identifying possible source regions for relevant radionuclide observations and identifying potential stations for measuring releases from known source locations is done by atmospheric transport modelling (ATM). The CTBTO currently investigates the potential benefits of using high resolution ATM (HRATM). Past announced underground nuclear tests at the Punggye-ri Nuclear Test Site from the Democratic People's Republic of Korea are used as case studies to scale CTBTO's capability to identify sites of the International Monitoring System (IMS) that might detect a hypothetical release. These events are also used to identify the capability to locate Punggye-ri as the possible source location. The current study evaluates the performance of CTBTO's HRATM approach compared to previous results. Variations in spatial resolution of meteorological input data (0.5° to 0.01°), meteorological models European Centre for Medium-Range Weather Forecasts (ECMWF) and Weather Research and Forecasting Model (WRF), ATM models (Flexpart and Flexpart-WRF) and physical parameterization demonstrate the sensitivity to configurations. Evaluating the potential increase in accuracy by using metrics from previous ATM challenges shows what enhancements can be acquired with HRATM and what configuration works best.

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Promotional text

Using historical experiences with nuclear tests announced by DPRK to evaluate potential increases in accuracy of identifying possible source regions and hypothetical plume arrival at IMS sites acquired by CTBTO's high-resolution ATM.

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