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study of the Flexpart-WRF model with episodes of Xe-133 releases and detections in Europe

The International Data Centre (IDC) of the CTBTO is developing the capability to conduct High-Resolution Atmospheric Transport Modelling (HRATM) using the Numerical Weather Prediction model WRF and the Atmospheric Transport Model (ATM) Flexpart-WRF. The performance of Flexpart-WRF at the IDC is assessed by using source terms from a medical isotope production facility in Belgium to simulate the resulting concentration time series at IMS noble gas station DEX33 in Germany. Seven episodes of elevated Xe-133 concentrations at DEX33 were selected; each episode consists of 6 to11 subsequent samples with each sample being taken over a 24-hour period. For each sample a high-resolution backward simulation was performed with nests of increased resolution around the source and the receptor. The simulated concentrations were produced by HRATM for different output resolutions (10, 30 and 50 km) and are compared to simulated results by the conventional Flexpart model as well as verified by the available measurements for DEX33. The comparison includes similar statistical metrics as established during the first ATM challenge in 2016 are applied for the comparison of the model outputs against the measurements.

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