



ID: P2.3-824

Type: E-poster

## the Benefits and Limitations of Transitioning to FLEXPART v11 for Operational Use

The Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) relies on atmospheric transport modelling (ATM) to establish a link between potential source locations and measurement locations of radionuclides. Currently, FLEXPART v9 is used, which simulates radionuclide transport pathways using an idealized noble gas assumption. However, particulate matter undergoes significant dry and wet scavenging during its transport, underscoring the need for representing these processes in the model.

As the CTBTO considers adopting FLEXPART v11, with upgrades including optimized code for high-performance computing (HPCs) and calculating vertical transport using the native vertical coordinate of the meteorological data, this study investigates the implications of this transition. A key focus is on evaluating the new scavenging scheme's performance in simulating particle transport through comparative analysis across three scenarios: FLEXPART v9 versus v11 with operational setup, both versions with a particulate case study, and using v11 in the CTBTO environment.

This investigation aims to quantify the differences in model performance between FLEXPART v9 and v11, assessing whether upgrading can improve the representation and reliability of ATM. Ultimately, our findings will support the decision to adopt FLEXPART v11 for operational use.

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**Session Classification:** P2.3 Atmospheric and Subsurface Radionuclide Background and Dispersion

**Track Classification:** Theme 2. Monitoring events and Nuclear Test Sites: T2.3 Atmospheric and Subsurface Radionuclide Background and Dispersion