

Local Scale Deep Autoencoder-Based Models to Characterize Early Times of Global Atmospheric Transport

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The International Monitoring System (IMS) monitors compliance with the Comprehensive Nuclear Test-Ban Treaty (CTBT) using information collected by sensors (radionuclide, seismic, infrasound, and hydroacoustic) placed around the world. Sensors, however, give limited information; hence scientists at the International Data Centre (IDC) rely on data fusion and atmospheric transport modeling (ATM) for producing reviews and bulletins. ATM codes often do not resolve local, sub-grid scale information. However, local terrain features can cause the plumes from two releases that are tens of meters away from each other to travel in completely different directions under the same weather conditions. Accurate characterization of the transport of gases and particles at early times after their release may play a crucial role in making an informative prediction at later times on the global scale. Large eddy simulation (LES) transport codes, such as Aeolus, resolve turbulence using physics-based equations but they are computationally expensive, and running them in an operational situation becomes intractable if many simulations are required. Therefore, we developed a three-dimensional temporal deep autoencoder-based model in complex terrain that can characterize the transport and dispersion of gas release at early times. This information can then be passed to global-scale ATMs, potentially improving their predictability.

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Promotional text

Atmospheric transport models (ATMs) often do not resolve local scale information. To aid ATMs, we developed a three-dimensional temporal deep autoencoder-based model in complex terrain that can characterize the transport and dispersion of a gas release at early times.

Oral preference format

in-person

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