

Localization of an Atmospheric Source by Inverse Modeling

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Inverse modelling in the domain of atmospheric transport is tested to localize a punctual source in space and time, composed of radioactive gases or particles and detected by radioactivity measurements of the CTBT network of the International Monitoring System. 3D trajectories in a backward mode are calculated by the numerical model HYSPLIT, considering the measurements stations as potential sources and taking into account deposition processes and dispersion due to wind shear. Concentrations of particles or gases are calculated in a computational grid whose resolution is independent of the wind grid (NCEP or ECMWF). The synthetic concentrations constitute the elements of a source-receptor matrix. The inversion of the system is based on the Backus-Gilbert method, it is carried out from measured concentrations, assuming a given release time. This method, that privileges the solution stability, is evaluated by comparing results in forward and backward modes for a fictitious release in the Mediterranean Sea. Sensitivity tests are carried out by varying the meteorological data fields, their resolution and the altitude of receptors. Finally, the influence of dispersion and deposition coefficients is analysed.