Geophysical Research Abstracts, Vol. 9, 04517, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04517

Enhanced global backtracking and uncertainty analysis for CTBT verification purposes based on various adjoint ensemble dispersion modelling techniques

A. Becker and G. Wotawa

Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization, Vienna, Austria (andreas.becker@ctbto.org / Fax: +43 1 26030 5973 / Phone: +43 1 26030 6415)

The Provisional Technical Secretariat (PTS) of the CTBTO Preparatory Commission maintains and permanently updates a source-receptor matrix (SRM) describing the global monitoring capability of a highly sensitive 80 stations radionuclide (RN) network in order to verify states signatories' compliance of the comprehensive nuclear-test-ban treaty (CTBT). In support of this, receptor-oriented Lagrangian particle dispersion modelling (LPDM) is performed in 24h/7d operations to help determine the region from which suspicious radionuclides may originate. In so doing the two LPDM algorithms (FLEXPART_5.1 and HYSPLIT_4.7) are integrated backward in time based on two different global analysis wind fields yielding global source-receptor sensitivity (SRS) fields stored in three-hour frequency and at 1° horizontal resolution.

A database of these SRS fields substantially helps to improve the interpretation of the RN samples measurements because it enables the testing of source-hypothesis's later on in a pure post-processing (SRM inversion) step. This analysis is feasible on hardware with specifications comparable to currently available PC at any location, provided the SRS fields are accessible.

Within the CTBT environment it is important to build confidence in the SRM based backtracking products issued by the PTS in the case of the occurrence of treaty relevant radionuclides. Therefore the PTS has set up a highly automated response system together with the Regional Specialized Meteorological Centres of the World Meteorological Organization in the field of dispersion modelling. These Centres have committed themselves to provide the PTS with the same standard SRS fields as calculated

by their systems for CTBT relevant cases.

The SRS field data standard allows for ensemble dispersion modelling. The parametric inter-comparison among ensemble members has been integrated into the software application tool WEB-GRAPE (*CTBTO Newsletter Spectrum*, **7**, page 19). In sensitivity studies we varied the choice of LPDM, and the kind and source of wind field utilized to demonstrate the potential of the following ensemble dispersion modelling (EDM) methods:

a) Multi-model EDM in order to improve the accuracy of a global scale source attribution (Becker et al., 2007, *Atmos.Env accepted*).

b) Single-model EDM with different lead times of the wind fields utilized in order to estimate the relative error of forecasted source attribution results (here: vulnerability maps for Vienna) in comparison to the analysed ones.

c) Single-model EDM with different choices of wind field resolutions for the source-receptor sensitivity fields of a radionuclide monitoring station situated in highly structured terrain (Schauinsland, Freiburg) in order to assess the quality of the PTS standard backtracking results based on 1° horizontal resolution.