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Interactive comment on "Adjoint backtracking for the verification of the Comprehensive Test Ban Treaty" *by* J.-P. Issartel and J. Baverel

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In the meteorological community, the term "trajectory" is used to denote real as well as calculated paths of infinitesimal air parcels. Calculated trajectories may well be unreal, such as isobaric trajectories or ground-level trajectories. A good overview of trajectories and their use in air pollution meteorology is provided by Stohl (1998). Nevertheless, Issartel and Bavarel are right in pointing out that trajectories calculated with surface winds are of very limited value (mixing-layer trajectories as suggested by Stohl and Wotawa (1995) would be a little better).

Normally, trajectories are calculated with Lagrangian models. The quality of a trajectory constructed from the movement of the peak concentration in a Eulerian tracer transport model, as performed by Issartel and Bavarel, will depend on the quality of the advection

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scheme. Eulerian advection schemes are known to suffer from numerical diffusion as well as phase speed and other errors. These depend on the local CFL number and and show a sprectral dependence. In any case, a typical Eulerian model will be inferior to a well-crafted trajectory model in calculating trajectories. If Issartel and Bavarel are in the unfortunate situation not to have access to a trajectory model in their institute, they could revert to the public web-interface of the HYSPLIT modelling suite at `http://www.arl.noaa.gov/ready/hysplit4.html`.

However, my opinion is that the trajectory as a comparison for the Eulerian model output is not an important component of this paper, and my suggestion would be to drop it entirely.

Concerning the temporal resolution of 6 hours for the meteorological input, there is of course a certain loss of accuracy as compared to higher data frequency (see Stohl et al. (1995) for a detailed investigation), but I would still see it in the acceptable range. The fact, however, that meteorological services often do not use or archive model data at a higher temporal resolution should not be interpreted as support for using 6-hourly data in transport calculations. These practices are mainly guided by the needs of synoptic meteorology. In the case of ECMWF, 3-hourly fields can be obtained by filling in short-range forecasts.

References

Stohl, A. (1998), Computation, accuracy and applications of trajectories - a review and bibliography. Atmos. Environ. 32(6), 947-966.

Stohl, A. and G. Wotawa (1995), A method for computing single trajectories representing boundary layer transport. Atmos. Environ. 29(22), 3235-3238.

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Stohl, A., G. Wotawa, P. Seibert, and H. Kromp-Kolb (1995), Interpolation errors in wind fields as a function of spatial and temporal resolution and their impact on different types of kinematic trajectories. J. Appl. Meteorol. 34, 2149-2165.

Interactive comment on Atmos. Chem. Phys. Discuss., 2, 2133, 2002.