

## ***Interactive comment on “Source-receptor matrix calculation with a Lagrangian particle dispersion model in backward mode” by P. Seibert and A. Frank***

### **Anonymous Referee #1**

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### **SUMMARY**

This generally well-written article mixes an introductory overview of the backwards Lagrangian approach to relating sources to observed concentrations, with an intricate accounting detail that tends to obscure the simplicity of the physics. The new method appears to be very powerful, and poised to assume a useful role in assessment of the origin of contaminants seen in the atmosphere. The originality of the paper lies not so much in the model algorithm itself (forwards or backwards), but in the formalism in which the source-receptor relationship is described.

### **DETAILS**

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Can the authors succinctly explain why the backward mode is computationally advantageous (only) if the number of receptors is less than the number of sources?

It seems to me that the label  $r^*$  should appear in the definition  $r(t'), t' \leq t$  appearing immediately after eqn (2).

It might be useful to briefly mention why "the approach is based on mass mixing ratios" (p2) and that "particles carry mixing ratios rather than masses" (p4)

The reference Flesch et al. (1995), given in the context of using backwards Lagrangian models to determine the footprint, and appearing in the left-hand column of page 2, is incorrect: this should be Flesch (1996; Boundary-layer Meteorology, Vol. 78, 399-404).

The convection scheme is interesting and novel. Can the authors explain in more basic terms (than use of the transpose of the redistribution matrix) what is involved in reversing this for the backward scheme?

What are the authors meaning when they say, "to convince skeptics" ? To whom is this addressed? Is it necessary to say?

Tests 1 and 2 are rather trivial- I think one can assume the reader will trust that the authors' programme is correct. Suppressing those tests will allow space for more explanation of the more interesting tests, especially 4, and the case study (re-emission from contaminated soil due originally to Chernobyl).

Figure (2) requires more explanation

At the base of p9, the authors need to state the obvious, which is not immediately obvious to the reader... why does Fig. 5 indicate the reactor itself is not likely to be the source?

What is the "NPP site"? (legend of Fig. 5)

TYPOGRAPHICAL/GRAMMATICAL ERRORS:

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1. easily (p1)

2. The statistics of the turbulence DO not depend (p4)

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Interactive comment on Atmos. Chem. Phys. Discuss., 3, 4515, 2003.

**ACPD**

3, S1662–S1664, 2003

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