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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Inverse modelling of the Chernobyl source term using atmospheric concentration and deposition measurements" *by* Nikolaos Evangeliou et al.

Anonymous Referee #2

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This paper appears to be the next in a series by this research group to recreate the events associated with the Chernobyl disaster in an attempt to better understand the emissions produced and how they were dispersed and deposited across the landscape. A previous paper (or two) in the series attempted to reassemble the original deposition dataset used to generate the maps published by De Cort et al in 1998, and these data are now being used via an inversion process to model (predict) the source term (actual amounts) of radioactive materials that were released during the disaster. I was shocked to read that only a very small percentage of the original data was discoverable by this research team which reaffirms the growing philosophy of requiring empirical data to at least be archived and accessible under some defined conditions.

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Discussion paper

This latest effort represents a highly innovative and creative approach to refine estimates of the source terms for the Chernobyl accident. Perhaps I am easily impressed, but I found this exercise to be nothing short of brilliant. Of particular note is the revised injection height profile suggested by the current modeling effort which may have broader relevance to other contamination systems that may be influenced by fire (e.g. Fukushima).

Of course, what is equally interesting from this exercise is the fact that there is no substitute for good direct measurements – even the best models are approximations and usually miss many important features of the phenomenon under study. The physicist might suggest that the addition of other variables/factors might solve this problem but this may not be possible under most real-world situations. This this exploration is as valuable as a revealer of what is not predictable as it is as a predictor.

Overall, this is a very interesting and well-written paper that makes a substantial and original contribution to this literature. Studies of this sort are increasingly valuable as we face greater threats of nuclear incidents and other environmental hazards in the coming years.

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