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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Assessment of possible airborne impact from nuclear risk sites - Part I: methodology for probabilistic atmospheric studies" *by* A. A. Baklanov and A. G. Mahura

A. A. Baklanov and A. G. Mahura

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Dear Referees:

Thank you for the constructive comments you made corresponding to our paper entitled: "Assessment of possible airborne impact from nuclear risk sites ..." parts 1 and 2.

1. First, we agreed that both papers should be combined and re-written to exclude unnecessary material.

2. The abstract and introduction part will be up-dated. Corresponding references related to the specific case studies approach as well as earlier research in this direction will be included. This for sure will give the paper a more perspective.

3. The articles related to the methodology and results (parts as 1 & 2) were prepared originally as one paper, but due to large size were separated into two parts. These both parts will be combined again and significantly reduced.

SPECIFIC COMMENTS (REFEREE H. VAN DOP):

1. At the moment of trajectory calculations (performed during year of 2000-2001) the author had the user account at the National Center for Atmospheric Research (NCAR), Boulder, CO, hence, it was easier to access data sets at this facility.

2. Originally trajectories were calculated at multiple number of levels (255-330 K), but later only the trajectories starting within the first 500 m above surface were selected. In general, we used for analysis several altitudes: less than 500 m, 1.5 km asl. 3 km asl, but only first of three trajectories were used further in analysis.

3. Trajectories were calculated for a multi year period of 1991-1996 (mentioned in part 2, pp. 5323);

4. Yes, you are right, the number of passages by trajectories were modified to %, to clarify consideration of potential impact of risk object with respect to other surrounding territories. Moreover, in cases when trajectories were not calculated (due to missing archived data, processing problems, etc.) it will be not possible to compare correctly "number of trajectories passages" for risk site #1 vs. "number of trajectory passages" for risk site #2.

5. The reference at p 5299 is given to the DMI report which is not a peer-reviewed publication, we will omit it. Moreover, it was difficult to separate the material between section 2.4 - "INDICATORS ...", and section 2.3 - "STATISTICAL ANALYSIS ...". Finally we decided, that it will be more useful to give a more detailed description of probability fields construction in section 2.4.1 instead of 2.3.2.

6. "UNDERSTANDING THE THIRD APPROACH .." line 17-21, p 5301: It will be corrected in the revised version.

ACPD

3, S2399–S2403, 2003

Interactive Comment

7. In Fig. 2 - the text on isoline of ">90" is shown at intersection of 30E vs. 62N.

8. To resolve the task mathematically using available trajectory dataset - construct typical transport time fields as isolines for each term - it is possible only by introducing the polar grid domain with the risk site in the center; and hence, to re-calculate positions of all trajectories in the new domain with respect to the site.

9. "DETALIZATION ..." we assumed, for example, that 5 and 1 degrees (instead of 10 and 2 degrees) resolution can be used, or any other.

10. Section 2.4.4.: Agreed, this is why we do not use the first approach at all in our study. The second approach was tested on example of the Kola Peninsula risk site (shown on the web-site of the project: http://glwww.dmi.dk/f+u/luft/eng/arctic-risk/DIR_PRECIP/resknp.html). The third approach was applied within the frameworks of this Arctic Risk project, and it is included in the DMI report (reference is given as Baklanov et al., 2002) and it is also included in details in the manuscript in preparation Baklanov et al., - "Long-Term Dispersion Modelling. Assessment of Atmospheric Transport and Deposition Patterns from Nuclear Risk Sites in Euro-Arctic Region". We omitted detailed description of the third approach because it is not based purely on calculated trajectories, but includes calculation of wet deposition patterns. In particular, for long-term calculation of wet deposition patterns of Cs-137 for all risk sites, for several specific case studies, modelling of I-131 and Sr-90 patterns was performed too.

Technical suggestions (Referee H. van Dop):

1. All given suggestions will be incorporated into the text of article,

2. Missing and additional references will be added to the article,

3. The figure captions will be re-considered to explain more details shown in figures,

4. The figures which are difficult to read will be re-scaled, some of them less relevant (due to merging of both articles into one) will be removed.

ACPD

3, S2399–S2403, 2003

COMMENTS OF ANONYMOUS REFEREE #3:

1. "MY FIRST CRITICISM ... TO INITIAL SCOPE STATED IN THE ABSTRACT"

This paper is a part of a big multidisciplinary project "Arctic Risk" (web-site: http://glwww.dmi.dk/f+u/luft/eng/arctic-risk/main.html), therefore we mentioned in the abstract and introductory part that "Main purpose of the study is to develop a methodology for a multidisciplinary nuclear risk and vulnerability assessment, ..." and "The main focus of this paper is ... methodology for evaluation of atmospheric transport ...". So, in our understanding, in the methodological part it is important to give a short description of the general scheme of risk assessments and after that to focus on the main topic of the paper. We will try to rewrite this part to make it more understandable for readers.

2. "WHAT IS THE DIFFERENCE BETWEEN THE INDICATORS IN BAKLANOV ET AL. (2002, 2003) AND THUS PRESENTED HERE?"

There is no significant overlaps with other our publications. The first paper (Baklanov et al. 2002, submitted in 1999) was focused on specific case studies, cluster analysis and studies of bounds of risk for selected geographical regions of concern, and does not consider the suggested probabilistic indicators. This paper gives the methodology for probabilistic studies and methods for simulation of different risk indicators. The second (Kursk) paper (Baklanov et al. 2003) focused on a specific problem of consequence analyses for objects with higher than usual levels of risk of accidents during limited periods of special actions/operations or for moving risk sites (e.g., lifting and transportation of the Kursk submarine), where a combination of operational forecasting and probabilistic studies are useful. Therefore for that study we used some of the indicators, described in this paper, but there is no descriptions of the general methodology and methods for risk indicators calculation in that paper. Actually, we supposed that the Kursk paper will be published after this paper, but, as a part of the EGS-2002 proceedings, it was published earlier. In any case, we will correct the text to remove/minimise

ACPD

3, S2399–S2403, 2003

all similarities with other papers.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 5289, 2003.