Atmos. Chem. Phys. Discuss., 9, S2829–S2833, 2009
www.atmos-chem-phys-discuss.net/9/S2829/2009/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "An operational system for the assimilation of satellite information on wild-land fires for the needs of air quality modelling and forecasting" *by* M. Sofiev et al.

M. Sofiev et al.

Received and published: 29 July 2009

Let me first of all express, on behalf of all co-authors, our deep gratitude to both referees for their constructive comments, which helped us to improve the paper. The responses to specific comments are below.

Main modification of the paper: The paper has undergone several revisions, which regarded both style and content:

M1. The introduction has been substantially extended to include better representation of the state of the art, available satellite information and other data sources.

M2. The structure of the paper has been somewhat rearranged to make it easier to

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

follow

M3. In particular, an additional section describing the test cases used for the development has been added to the background section

M4. The issue of the total PM vs PM2.5 vs other species has been brought up and explained in the FAS description, operational setup and in the application parts

Ref1. (acpd-9-S2177.pdf)

General comments

- Introduction: see M1. Features of European fires have been added, as well the reference to JRC EFFIS system and an outook of the satellite data.

- well, in fact, the system can be used for air quality modelling if literature data are involved to cross-scale PM emission to gaseous species. However, there are difficulties on this way, which are now explained in the section 3.6 (operational setup); see also M4

- see M4

- the discussion of small fires has been extended

- See M3: episode description is extended

- comparison with full-chemistry runs is added

- the Northern Europe in the title would not reflect the features and coverage of the system. Already the initial development was done over a wider area than Northern Europe. However, Northern Europe is a particularly difficult region due to a large amount of small fires. Therefore, stressing the system evaluation over that region makes sense. The issue is now better reflected in the paper.

Specific comments

1

ACPD

9, S2829–S2833, 2009

Abstract corrected

Introduction corrected, see M1

2

Wild-land fires vs other fires can be differentiated only by land-use, i.e. this split comes after the satellite detects the general fire. Clarification is added.

4um is just the most-sensitive channel. Clarification is added

Explanation of Saarikoski et al coefficient is expanded

NTR is a misprint, NRT was certainly meant

The reason for TA branch development was that FRP was not available as easily. This is now brought up more clearly in section 3.6

3. See M2

3.1. See M3.

2006, of course. Figure corrected

See M4

We tried to do the calibration for the specific land use types, not for the regions. To the extent this was successful the results are applicable everywhere where the corresponding land use type is present. This is the key difference from Ichoku approach and this is why the cases have to be selected carefully. This explanation is added to the paper.

The ground-based observations were used after the calibration as an independent verification set. The comparison results are added

Comparison with anthropogenic emission is explained. See also M3

3.2.

ACPD

9, S2829–S2833, 2009

Figure 3 was just an illustration on the TA-FRP difference, not the emission factors performance. And region, of course, does not matter, the sensitivity towards small fires in case of TA and towards large fires in case of FRP does not depend on it. Anyway, the figure was redrawn with larger cover and the actual TA and FRP values are now presented. Regarding the fire area, the TA is a very good illustration of it.

The fit is universal: once again, this is not the land-use-type dependent feature of the fires, this is the difference between the fire signal processing. Minor differences may still exist but the goal was to find a universal parameterization. To streamline the reading, two figures are eliminated as redundant, two others are merged.

3.3. This set of comments refers to the items, which we had no space to discuss in details; and some of them are still under development.

Ensemble. We certainly do not just-average; that does not make any sense. Ensemble-related activities constitute a topic of its own, which is not of a primary interest for the current paper. So, we eliminated the sentence.

See M3 for tPM vs PM2.5 etc

Forecasting of fire development is again a topic of its own, unavoidable in the context of the paper but neither of primary importance, so we tried to keep it as short as possible. There is little justification for any kind of forecasting of the fire development. In Europe, this is particularly meaningless because of fire-fighting activities, which cannot be forecasted at all. Therefore, there are two choices: shut down the fires at the last moment we saw them (on the ground of no further information); or allow them to go with constant mean intensity over the forecast period. The later option is better already because it allows the fires to burn during the day when we last saw them. Also, after extinguishing, smoke keeps coming (with different intensity, of course), so the extinguished fire is still a source! Clarification is added to the paper.

Diurnal variation. Indeed, it has to depend on many factors and attempts to generate

ACPD

9, S2829–S2833, 2009

it were made but we are not aware about any sufficiently detailed analysis of the issue for Europe. Choosing between the extrapolation of some short-term regional analyses to the whole of Europe and our conservative variation, we selected the later one. As stated in the paper, the real variation is stronger. The research is going on but operational FAS works upon the principles described in the paper.

Injection height. Sorry for the misprint, not 90 but 200m. Indeed, this is based on the assumption that most of European fires are not strong; and this is essentially true. The discussion section is extended with a reference to MISR dataset where $>$500 fires analysed for the US all appeared to be of that kind. Extrapolation to Europe is certainly questionable but our on-going work with injection height models confirms this as well.

4.

The simulations are repeated with full emission and the corresponding figures are added/modified.

However, the fire contribution is dominant over the affected areas; hence the anthropogenic pollution had not changed the situation too much. Comparable AOT can come from desert dust only (as also seen from MODIS pictures) or some specific strong point sources, mainly located in the Eastern Europe; and this was one of the constraints while selecting the cases.

A figure is added for 2006 case to show how the plume goes along the whole continent and how the model represents the near-surface concentrations against observations.

5. Corrected

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 6483, 2009.