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Comment

Interactive comment on “An important fingerprint of wildfires on the European aerosol load” by F. Barnaba et al.

Anonymous Referee #1

Received and published: 1 March 2011

This manuscript presents a comprehensive study combining satellite information on wildfires and aerosol optical depth with trajectory modelling to illuminate the contribution of wildfire emissions on the European aerosol load. The manuscript is well written and organised and introduces significant new information. I have some comments and suggestions how to further improve this nice study. Altogether, I recommend publication after taking these minor modifications into account.

- page 2318, line 1: no aitken model aerosol?
- page 2318, line 3: ‘the largest part’ is an unclear phrase, because it may be related to the area burned or the amount of emissions produced
- page 2318, line 18: add ‘the’ Western Mediterranean

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- page 2319, line 6: add 'the' Russian Federation
- page 2319, line 9: ignited instead of started
- page 2319, line 25-38 and page 2334, line 17-19: The weather conditions during April/May 2010 over Europe with the dispersion of volcanic ash from the eruption of the Icelandic volcano Eyjafjallajökull are an example for increased transport towards the south and east of Europe. Therefore I suggest to delete the example of the dispersion of the Chernobyl plume and maybe to better include a brief discussion of transport pathways dependent on NAO conditions.
- page 2321, line 8: add fine particulate 'matter'
- page 2321, line 25: did you check possible improvements of modifications published in Giglio et al., Biogeosciences 7, 1171–1186 (2010)?
- page 2322, line 18-21: The sentence is a bit unclear to me: does it mean the MISR AOT evaluation against AERONET data is pretty good or not? And what does it mean for the study for sites with dust and smoke?
- page 2324, line 5: the chosen of resolution of 2.5° is rather coarse, uncertainties due to this coarse resolution should be discussed in section 4
- page 2324, line 11: what is agl??
- page 2324, line 26: is an hourly resolution time step providing numerically stable results?
- page 2325, line 18: in 2.5° resolution, the European domain shown in Fig. 3 is subdivide into about 36×20 grid cells, however the figure suggests a much higher resolution. Please add more description if the FWTD has higher horizontal resolution or chose a more adequate and less smoothing algorithm for the illustrations. I would suggest not to focus only so much on the April fires, but at least to mention that the FWTD is maximum in August and that the whole continent is affected from the fires

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from July to September in particular in the east and the south.

- page 2326, line 3: How many grid cells contribute to each of the seven selected European target areas?
- page 2326, line 16: instead of generally: expect in Western Europe and the Western Mediterranean
- page 2326, line 17: instead of only July I would recommend to mention August as well, which is in several of the seven target regions the month with the second maximum
- page 2326, line 17-19: I do not see the bimodality to be more evident in the fine fraction AOT in Figure 4. Please correct.
- page 2326, line 24: inter-annual instead of interannual
- page 2326, line 25/26: Here the inter-annual variability is only mentioned to be also interesting. Please include some examples out of the period 2002-2007 which may be responsible for the extraordinary high or low AOD values in some of the seven target regions, e.g. variability in fire occurrences
- page 2327, line 1-9: relatively unclear paragraph, please try to clarify, e.g. why should the summer minimum suggest the two maxima having non-negligible inter-annual variability?
- page 2327, line 22-24: it is mentioned that $R \geq 0.8$ in each region, please provide R for each region
- page 2329, line 9: please mention other 'disturbances' with pronounced seasonal cycles, e.g. soil dust and pollen mobilisation during harvesting and planting, biogenic aerosol formation during summer etc.
- page 2331, line 19: please correct: Stohl
- page 2332, line 1: please take also into account intercontinental transport in higher

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altitudes from e.g. Asia, e.g. Lelieveld et al., Science 298, 794-799 (2002)

- page 2332, line 11-14: it is unclear why it is sufficient to fit only the January-March and August to December values

- page 2332, line 17 and 22, 23 and page 2333, line 1, 2: Fig. 9 is unnecessary, as the monthly mean wind field in 925 hPa does not tell much about transport pathways of pollutant plumes. The actual wind speed and direction and height of the plume determines the transport pathways. Therefore figures 8 and 9 do not present a prove for the aerosol production and transport from North-Central America.

- page 2333, line 3: see for BC measurements at Mace Head at the Atlantic Coast of Ireland for the variability on intercontinental transport of polluted air masses across the Atlantic

- page 2333, line 8-11: I suspect this is no misinterpretation as aerosol, but it is marine organic aerosol produced from phytoplankton, see e.g. O'Dowd et al., Nature 431, 676-680, 2004.

- page 2336, line 5, 6: isn't there a new directive only allowing the threshold of 50 microgram/m³ not to be exceeded more than 7 days per year

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 2317, 2011.

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