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Atmospheric Chemistry and Physics Discussions

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Interactive Comment

# *Interactive comment on* "Release and dispersion of vegetation and peat fire emissions in the atmosphere over Indonesia 1997/1998" *by* B. Langmann and A. Heil

**B. Langmann and A. Heil**

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1) Both referees recommend to include the main purpose and outcome of the study (which is, as Frank Dentener noted, the valuation of emission estimates and area burned published in the literature from the fires in Indonesia during 1997/1998 ) more clearly in the abstract, to guide the reader through the manuscript. We agree with the referees that the manuscript will be improved by doing so.

2) Our assumption of 100 % solubility of the particles is an issue for both referees. But the measurements of particles collected in Indonesia during 1997/1998 and the published literature about that topic are very much convincing to our opinion. We should also mention in the final manuscript that not only sulfur but also water soluble organic compounds contribute to the hygroscopicity of the Indonesian haze particels. Okada

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et al., J. Aerosol. Sci., 32, 1269-1279 (2001) for exampled analysed single particles collected during a flight in October 1997 over Southern Kalimantan according to their hygroscopicity and sulfur content. They found that a water insoluble core is coated by water soluble organic material and ammonium sulfate and suggest that these haze particles could act as efficient cloud condensation nuclei.

Concerning the black carbon (BC) content of biomass burning aerosols: generally BC is about 10 % of the particle mass or lower (e.g. Trentmann et al., J. Geophys. Res. 107, 2002, Maenhaut et al., Nuc. Instr. Meth.Phys. Res. B189, 2002, Balasubramanian et al., J. Geophys. Res. 108, 2003). However, there is a large uncertainty and variability possible, dependent on the combustion conditions and material burned. Recent laboratory measurements within the EFEU project (www.tropos.de:8088/afo2000g3/) of particles released from controlled combustion show results in that range for Indonesian peat. We will include more information in the final manuscript.

3) Another comment given by both referees deals with the forecast and climate mode simulation set ups, which seem to be confusing and we will try explain in more detail here and make it more clear in the final manuscript.

The definition has been used in several publications (e.g. Langmann, 2000; Langmann and Bauer, 2002; Chevillard et al., 2002, Langmann et al., 2003). In contrast to global climate models which present mathematically an initial problem, regional scale climate models present an initial and boundary problem. This problem is solved by providing e.g. ECMWF data for the regional model for the initialisation all over the model domain and, throughout the simulation continuously at it's lateral boundaries independent on the climate or forecast mode. The only difference between the climate and forecast mode is that the model is initialised only once in the climate mode and then run for e.g. a one year simulation period, whereas in the forecast mode a sequence of 30 h simulations, all of them fully initialised with ECMWF data at 0 UTC, are put together for e.g. a one year period. With particulate matter processes that are calculated continuously, the emission, transport and deposition processes are meant.



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In the forecast mode we introduce this way a discontinuity at 6 UTC each day (but we receive better model results for precipitation - consequently also for the wet deposition - whereas the other model variables e.g. wind speed and direction are more or less unaffected). The differences in the physical state of the model atmosphere after a 30 h simulation compared to a 6 h simulation by which it is replaced, are relatively small. If we would replace every third day only or at even longer time intervals then we would really introduce a physically doubtful discontinuity. Maybe a comparison with weather forecast simulation, where the confidence level for a one day weather prediction is high, but decreases dramatically after about 3 days helps to illuminate the differences.

A last comment to the forecast mode application: we introduce once per day a discontinuity but have every model time step (5 min) physically sound meteorological data available what we regard as a major advantage compared to CTM's, which are driven by meteorological data provided every 6h up to 1h with a linear time interpolation in between (more discussion in Langmann, 2000).

4) Conversion factors TPM -> PM10, TPM(C) -> TPM: There is not much information available in the literature, neither close to the sources nor after transport. However, generally, PM10 largely contributes to TPM. If we would leave out the relationship PM10/TPM = 80 % when comparing model results with measurements, our principal conclusions would not change. But we thank the referees for their comment to discuss the sensitivity of conversion factors in the final paper, including the more critical conversion from TPM(C) to TPM.

5) Parameter beta and 5 % maximum area burned per week: Thank you for the hint. We missed to mention that solely for peat the maximum area burned did not exceed 5 %. Will be corrected in the final manuscript.

6) GPCC and GPCP: we didn't refer correctly to the precipitation data over sea, in fact we used GPCP data and will correct that in the manuscript.

7) Andreas Stohl asked why we didn't do simulations also for CO2 and CO? The rea-



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son that we focussed on the particles rather than on the trace gases is the fact that continuous station measurements for a half year period of aerosol concentrations were available for comparison with the model results. To our knowledge comparable data sets for CO2 or CO are not available for Indonesia and the adjacent countries.

8) Rain forests in Northern Australia: near by Darwin and around Kap York (already outside of our model area) there are some areas with rain forests. Nevertheless, the dominating vegetation type in Northern Australia is dry forest and savannah and in the land use data set of Loveland et al. (2000) that we apply the fraction of rain forest per model grid cell is less than 0.1, which is about 250 km2.

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Interactive comment on Atmos. Chem. Phys. Discuss., 4, 2117, 2004.