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Interactive comment on "Transpacific transport of Benzo[a]pyrene emitted from Asia: importance of warm conveyor belt and interannual variations" *by* Y. Zhang et al.

U. Pöschl

u.poschl@mpic.de

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The discussion paper by Zhang et al. presents interesting model results on the intercontinental transport of benzo[a]pyrene (BaP) as a prominent example for persistent organic pollutants in air particulate matter. In view of the large body of literature available on the high reactivity of this and other polycyclic aromatic hydrocarbons (PAHs), however, it seems not appropriate to neglect its chemical degradation in the condensed/particulate phase without any discussion and sensitivity tests. BaP and other particle-bound PAHs are highly reactive against ozone, and BaP resides mostly in the condensed phase of atmospheric aerosols. The chemical lifetime of BaP and other

PAHs on the surface of aerosol particles is of the order of minutes, and their lifetime in the particle bulk depends on phase state, humidity and temperature. Accordingly, the model study should account for chemical degradation of BaP in the condensed phase, at least in the form of sensitivity tests. Moreover, the manuscript should explicitly address and discuss potential effects of heterogeneous chemical reactions in view of related earlier studies demonstrating and characterizing substantial degradation of BaP on aerosol particles exposed to ozone and other atmospheric photo-oxidants. The studies listed below are not the only ones that could/should be taken into account (they contain numerous further references), but in this short comment I just point to the papers with which I am most familiar. I would expect that chemical degradation in the condensed phase may substantially reduce the model estimates of intercontinental transport. For example, Schauer et al. (2003) showed that 1-2 days of exposure to ambient air containing up to 80 ppb ozone reduced the PAH content of air particulate matter by up to 50% (close correlation between ozone concentration and PAH loss).

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