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Interactive comment on “Atmospheric pollutant outflow from southern Asia: a review” by M. G. Lawrence and J. Lelieveld

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This is a thorough and well-presented review of the outflow of southern Asian pollutants based on the many observational and modeling studies carried out over the last decades. In this review authors have performed a nice job of balancing between comprehensive coverage with sufficient details, yet providing an impression of what we know and future focus of research on this topic. Authors also provide extensive literature survey on the topic, which covers the chemistry, transport and climate implications. The paper is well written. My comments are listed below.

1. Discussions: Recent investigations over Indian region have shown that the dust is contaminated with other aerosols such as black carbon. Dust particles mixed with soot, sulfates, nitrates or aqueous solutions can have drastically different properties as evi-

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denced by recent investigations. Most of the models used for estimating the aerosol-climate effects have assumed that the various aerosol species are mixed externally. The treatment of mixed-aerosol in models is particularly important over Asian region, which is unique in aerosol perspective, because natural and anthropogenic aerosols co-exist. I suggest a brief discussion on this aspect. 2. Open Issues: Recent studies over India have shown that substantial fraction (as much as 50 to 70%) of aerosol optical depth was found contributed by aerosols above (reflecting) clouds, consequently enhancing absorption and hence strong warming above clouds by several degrees (K) compared to that near the surface. The impact of large elevated warming over India and its meridional dependence, coupled with strong aerosol-induced cooling of Earth's surface on Asian summer monsoon is not understood well. A brief discussion on this aspect would improve the discussion.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 9463, 2010.

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