

Interactive comment on “Impacts of 20th century aerosol emissions on the South Asian monsoon in the CMIP5 models” by L. Guo et al.

Anonymous Referee #2

Received and published: 2 February 2015

The manuscript makes use of CMIP5 all forcing and individual forcing historical experiments to identify the contribution of anthropogenic aerosols and their direct/indirect effects versus greenhouse gases to the pre-industrial to present-day long-term variation of the South Asian monsoon precipitation. Anthropogenic aerosols are found to dominate the recent precipitation decline. The indirect effect is key for models to simulate the negative precipitation trend, as the direct effect would lead to increase precipitation over India.

The topic is of great interest, as the Indian monsoon is very important for the livelihood of a substantial fraction of the world population. The manuscript is well written and presents some interesting points on the uncertainties in the simulated precipitation trends. Yet, the decrease of monsoon precipitation has been recently discussed in numerous papers (e.g., to mention the latest, Salzmänn et al., JGR, 2014; Polson et al., GRL, 2014; Saha et al., GRL, 2014; Ramesh and Goswami, Nature, 2014; Wang et al., Adv. Met., 2014). These studies have discussed potential driving mechanisms, uncertainties in the trend and among various forcing agents, comparison with observations, links with other monsoonal systems, etc.

Along the above point, my major concern is that, unfortunately, the manuscript does not show sufficient novel findings (compared to previous literature) that would lead to a substantial improvement of our understanding of this controversial issue. The improvement is needed before the manuscript can be acceptable for publication.

Other comments:

What about observations and observed precipitation trends? In this respect, what is the relationship (e.g., spatial patterns) with the changes in the recent decades?

The monsoon underwent multidecadal fluctuations during the 20th century. The models also show this, though the fluctuation is not as evident as in observations. Is a century-long linear trend appropriate?

The importance of model biases, which likely will affect their skill in simulating precipitation changes, would need to be discussed.

Are there differences between 1st and 2nd aerosol indirect effects?

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 30639, 2014.