



Impact on aerosol emissions in China and India on local and global climate

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Existing surface temperature records show warming in the beginning of last century, followed by cooling starting from 1940 and again strong heating from 1975 until recent years. This behaviour has been attributed to increase in the greenhouse gas and aerosol emission as well as to natural variability of climate. Making a difference between these is crucial as climate predictions and international policy related to emission reductions are based on the models that are mainly evaluated against the historical temperature records.

While in Europe and North America the aerosol emissions have decreased since the late 1970s, the emissions in China and India have started to increase dramatically at about the same time and have only recently started to stagnate due to new regulations in China. Here we use emission scenarios from the years 1996 through 2010 to assess the effect that these emissions have on local aerosol properties and climate as well as on the global climate.

We use the aerosol-climate model ECHAM5-HAM [Roeckner2003, Roeckner2004] to simulate the local aerosol properties in China and India in the years 1996 through 2010, and their impact on local as well as global climate. For anthropogenic aerosol greenhouse gas emissions we use the ACCMIP-MACC City Aerocom emissions (Aerocom 2) [Lamarque2010] in combination with the emissions for China and India after Lu et. al [Lu2011] for the mentioned period of time.

To assess the effect of anthropogenic aerosol emissions on earth's climate is assessed using the ECHAM-HAM model coupled to a mixed layer ocean on a T42L19 grid. The model is run with fixed yearly emissions for several emission scenarios (e.g. for the years 1996 and 2010), with data derived from 100-year averages. Additionally we run a number of transient simulations (i.e. with varying yearly emissions) from 1996 to 2010 in the attempt to extract a climate trend for the given period.

References

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