Chapter 6
Attributing Causes of regional climate change

Subchapter 6.2 Aerosols

H-C Hansson,

hc@itm.su.se

6.2.0. Summary

- The aerosols affect the present climate, heats and cools, processes not well known.
- This uncertainty is clearly dominated by the lacking knowledge of the influence of the aerosol on climate (Schwartz et al., 2010).
- Airborne particles affect human health to about 300 000 per year in the EU (WMO, 2002). Other air pollutants as ozone has besides considerable health effects also damage crops and forests.
- Particles, including black carbon and ozone, are called Short Lived Climate Forcing components (SLCF) affect climate. This implies that an integrated air quality and climate change abatement policy is needed for a cost effective mitigation (Amann et al. 2008).
- SLCFs impact the regional climate and air quality. Still regional climate models are not able to well describe the effect of regional SLCF’s.

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Main paragraphs:

- 6.2.1. Aerosols, The basics about aerosols and climate
- 6.2.2. Aerosols and Air quality
- 6.2.3. Air Quality and Climate globally
- 6.2.4. Regional climate influence of natural and anthropogenic aerosols and other air pollutants

6.2.1. Aerosols, The basics about aerosols and climate

- ***6.2.1.1. Influence on climate***
  - Condensed review
- ***6.2.1.2. Sources***
  - Summary global and European aerosol sources
- ***6.2.1.3. Atmospheric particle size distribution***
  - Intro giving the importance of size distribution
- ***6.2.1.4. Formation in the atmosphere***
  - Nucleation and balance natural and anthropogenic sources
- ***6.2.1.5. Aerosol – Cloud Interaction***
  - Review giving reasons to main uncertainties
- ***6.2.1.6. Direct effect***
- ***6.2.1.7. Indirect effects***
- ***6.2.1.8. The total aerosol climate effect and climate sensitivity***

6.2.2. Aerosols and Air quality

- ***6.2.2.1. Present understanding of health effects from air pollution***
  - ***Condensed review***
- ***6.2.2.2. Estimating the risk for public health due to air pollution***
  - ***Review on estimates***
- ***6.2.2.3. Future need for assessment of health effects***
  - ***Short on important missing knowledge***
- ***6.2.2.4. Convention of Long Range and Transboundary Air Pollutants (CLTRAP)***
  - ***Presenting the most important political tool for abatement especially for the Baltic (might be not necessary)***
- ***6.2.2.5. Influence on the Baltic region***
  - ***Condensed presentation on air quality influence and changes during the last 30 years of climate influencing component.***

6.2.3. Air Quality and Climate globally

- ***6.2.3.1. Major anthropogenic climate forcing air quality components***
  - Short lived air pollutants can be abated giving a better air quality and simultaneously reducing the climate warming.
- ***6.2.3.2. Co beneficial mitigation of Air Quality and Climate change***
  - The main conclusion is that abatement measures are available to make significant co-beneficial air quality abatement and climate change mitigation.

6.2.4. Regional climate influence of natural and anthropogenic aerosols and other air pollutants

- **6.2.4.1. Regional climate influence of natural and anthropogenic aerosols and other air pollutants**
  - The direct radiative effects of aerosols are thus quite concentrated to the emission areas and their vicinity as it depends mainly on the aerosol mass, while the indirect effects are not only depending on the amount of air pollution but more on the chemical and physical properties as well as the type of clouds, e.g. their sensitivity to increasing number of CCN.
- ***6.2.4.1. Regional emissions of climate forcing air pollutants during the last 50 years***
  - Connect to chapter 3.
- ***6.2.4.2. Observed and possible climate effects***
  - Very few studies, coordination with modeling needed