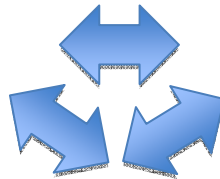
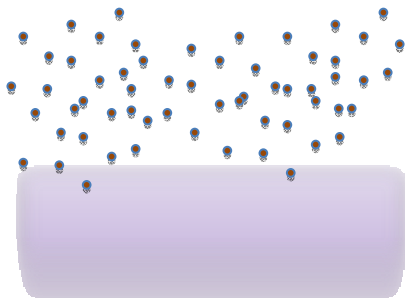

Are aerosols important in high-resolution NWP models?

Annica Ekman

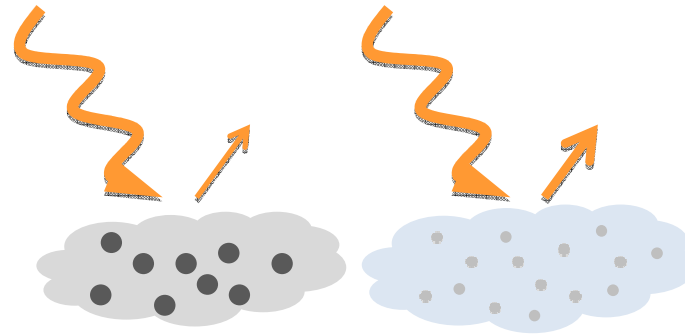
Department of Meteorology
Stockholm University

Aerosol effects on weather and climate

Aerosol direct effects



Aerosol indirect effects



Aerosol semi-direct and 2nd indirect effects



When may aerosol effects be of importance in NWP?

- Direct effect: Strong gradients in aerosol (mass) concentrations?
 - Indirect effect: Long-term statistics? Stratiform clouds and rain processes?
 - When are other parts of model "good enough" ...?
-

What is needed for simulating aerosol effects on clouds and precipitation?

- Two moment microphysics scheme
 - Aerosols that are emitted, advected, scavenged, dry deposited etc.
-

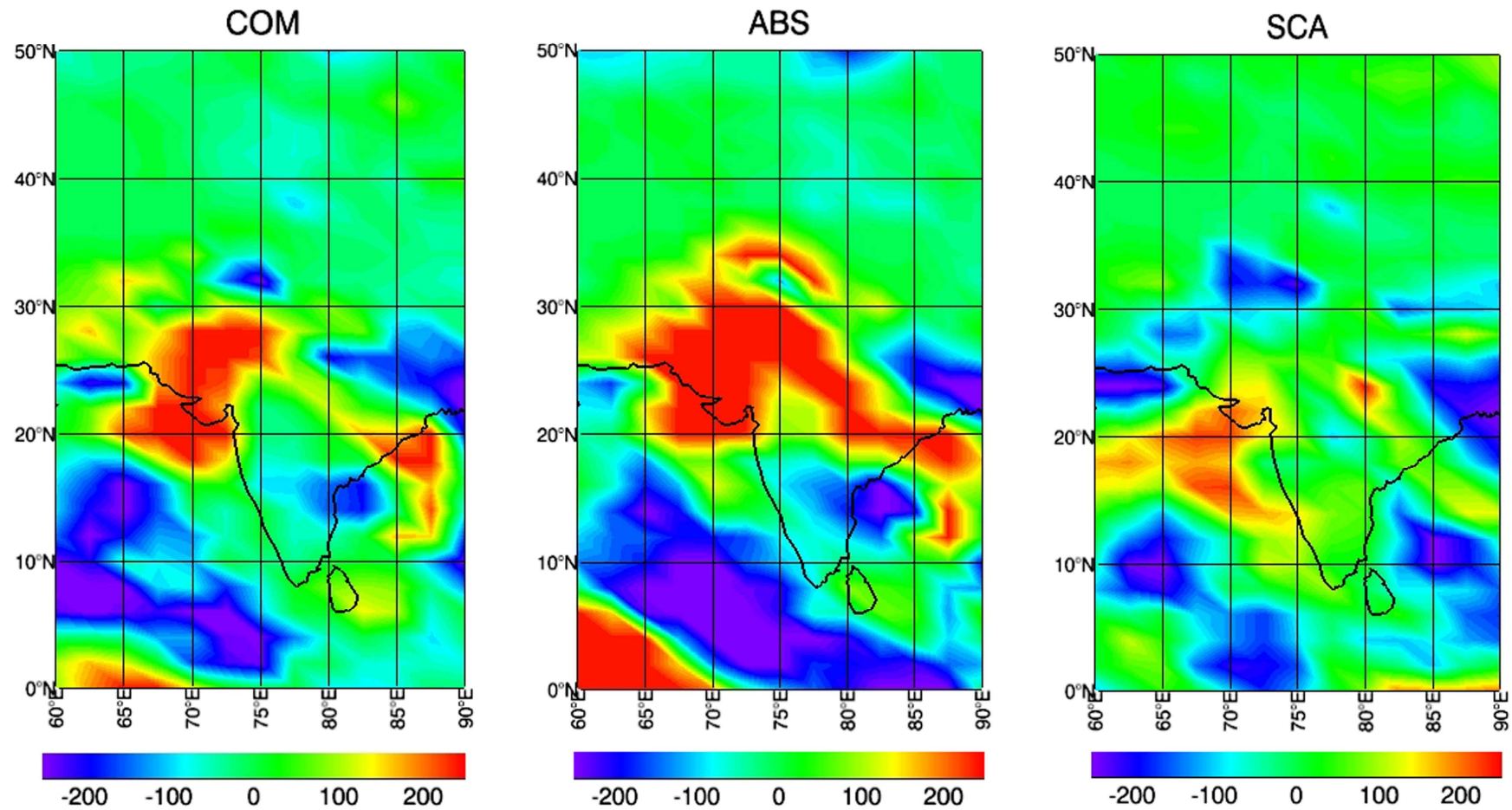
Opinion....

- Cloud physics people should get involved in the aerosol-cloud discussion.



Direct effect example....

Aerosol caused change in convective precipitation

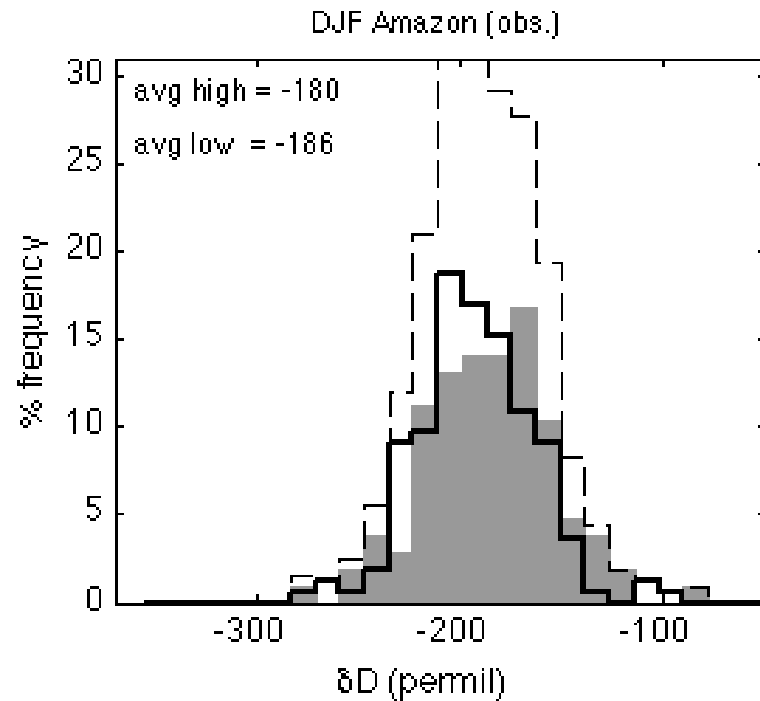
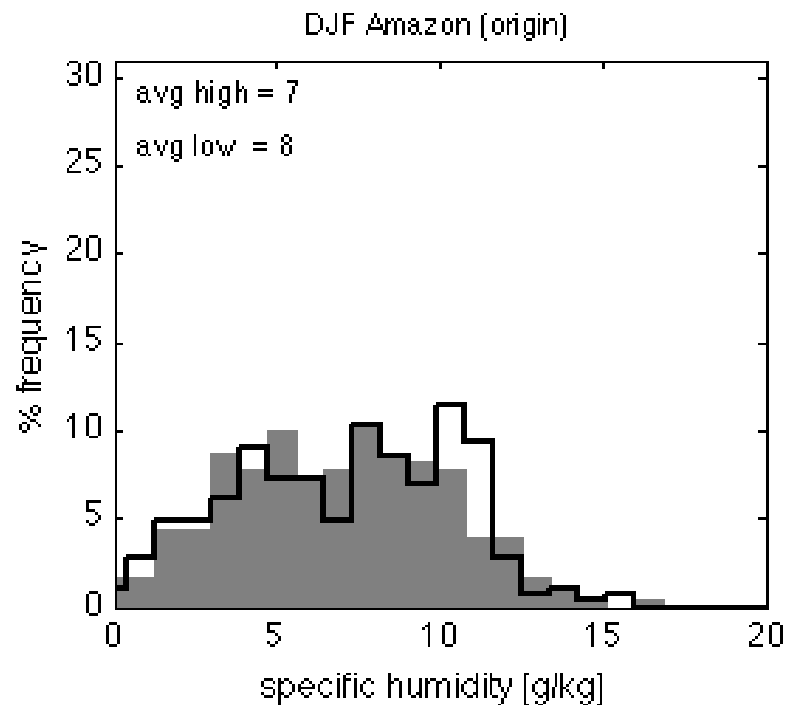


[mm yr^{-1}]

Wang et al., submitted

Indirect effect example...

- - High aerosol loading
- - Low aerosol loading



Engström et al., manuscript