aerosol indirect effect

aerosol and clouds

aerosol and precipitation

approaches

- **learning from observations**
  - **associations / correlations**

- **modeling with observational constrains !**
  - **model set-up to optimal fit data (simulator)**
  - **data correlations are constrains (not causal)**
  - **prepare data ?**

- **understanding model behavior (as modeling is needed)**
  - **simplify modeling to essential processes**
  - **conduct sensitivity tests**
  - **successively enhance complexity**

learning from observations

if not now … when then ?

- **many matured satellite products**
  - **a decade of passive aerosol / cloud /radiation dedicated sensors**
  - **years of active remote sensing from space**
- **improved (-ing) ground-networks**
  - **sun-photometer, lidar, radar, radiation**

- **Q: are there essential product (-combinations) for cloud-aerosol relationships ? Qualitative?**

understanding modeling

- **processes / parameterizations … and scales**
  - **local underst. may not apply to large scales**
    - **smaller scale modeling (LES) or obs?**

- **proposals**
  - **stepwise increase in complexity for low clouds**
    - **Ming: perturbation of cloud water / drop #**
  - **aerosol eff. on liquid and mixed-phase clouds**
    - **Storelvmo: 2-moment cloud microphy models**
  - **aqua-planet with constant NH sulfate emission**
    - **Stevens: do models exhibit robust response?**

modeling with obs. constrains

- **… a focus of AeroCom activities**

- **Q: How can available data be prepared (or combined) to be most beneficially to modeling?**

- **Q: What data-constrains are needed by modeling?**

- **can we think about 'handshakes'**

selected questions

- **how can 'simultaneous' in observations different properties be relaxed ?**

- **aerosol and clouds are connected via CCN and IN … are there observations?**

- **how to address scale issues?**