Final goal: evaluate GCM simulations using combined radar and lidar data

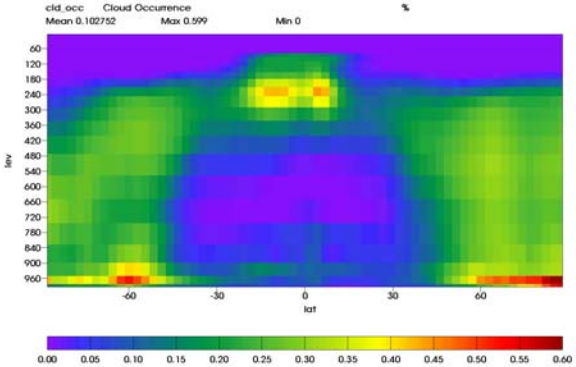
Outline:

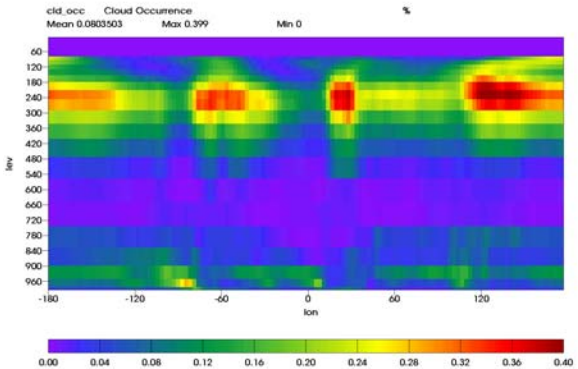
- ✓ **Create cloud occurrence statistics using GEOPROF and GEOPROF-LIDAR data**
- ✓ **Define principal clusters from observations for different seasons**
- ✓ **Apply the radar simulator to the CAM3 simulations**
- ✓ **Run the lidar simulator and merge these output together to produce information similar to observations**
- ✓ **Future work: assign model grid-box simulations to the observed clusters**

Cloud occurrence statistics using GEOPROF and GEOPROF-LIDAR data

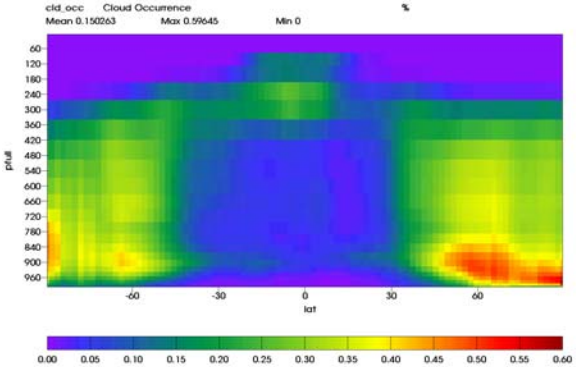
Dec 2006
Jan&Feb 2007

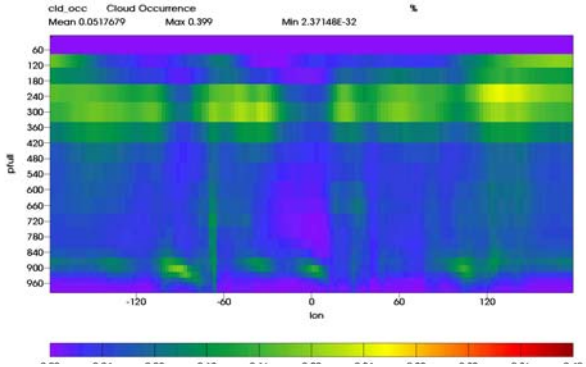
CAM2



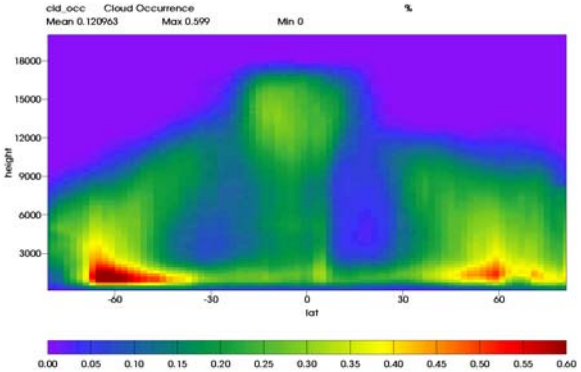


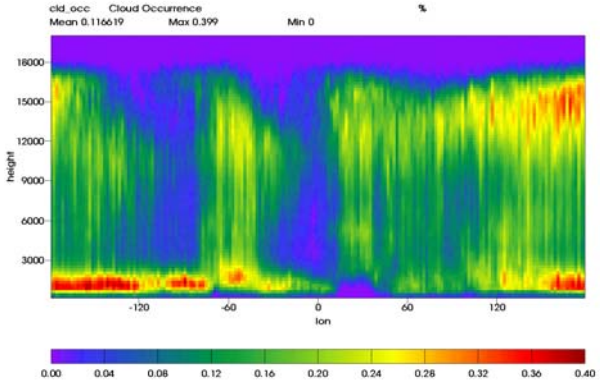
AM2





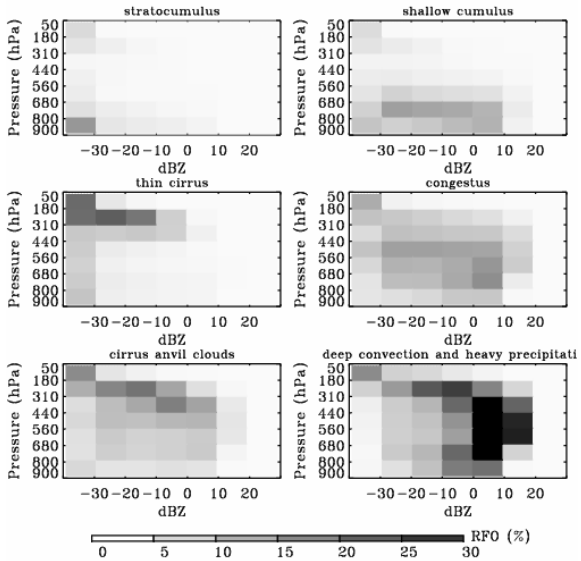
OBS

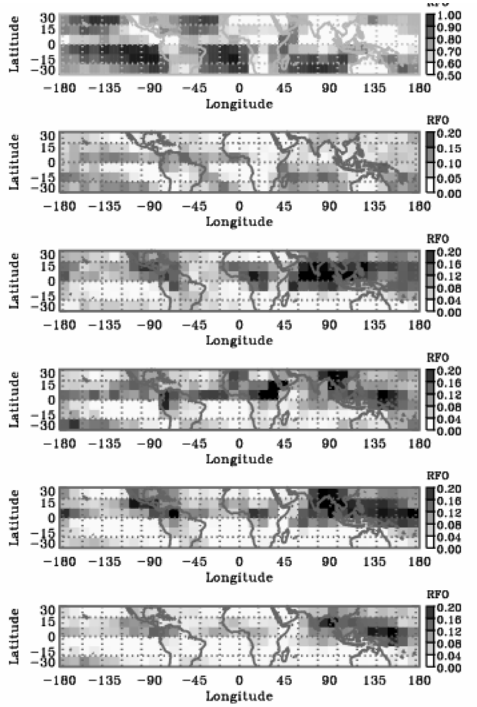




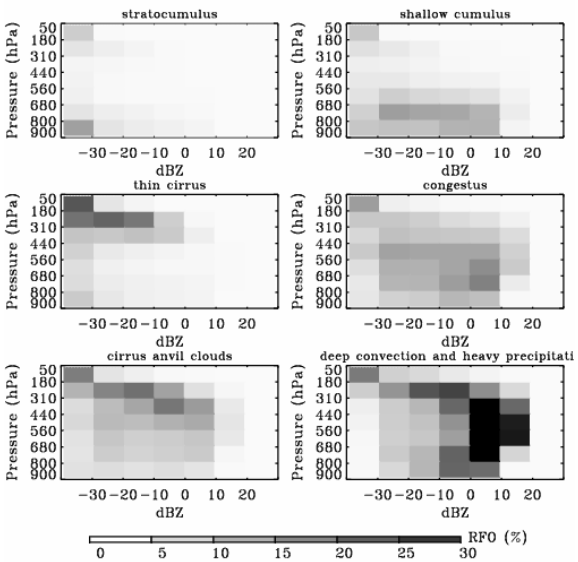
Define principal clusters from observations for different seasons

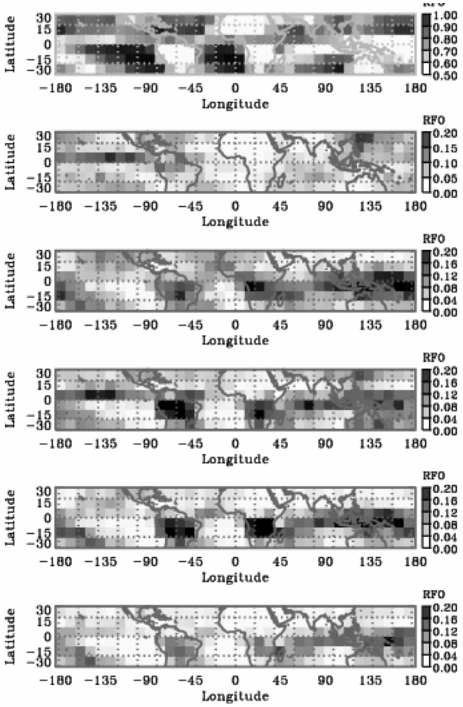
Summer JJA



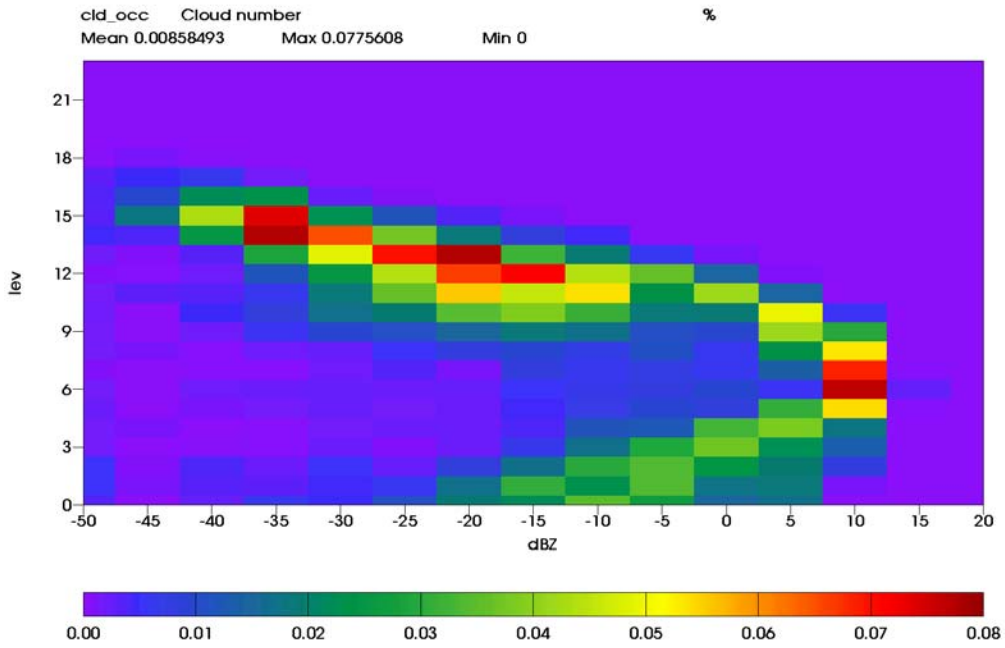


Winter DJF

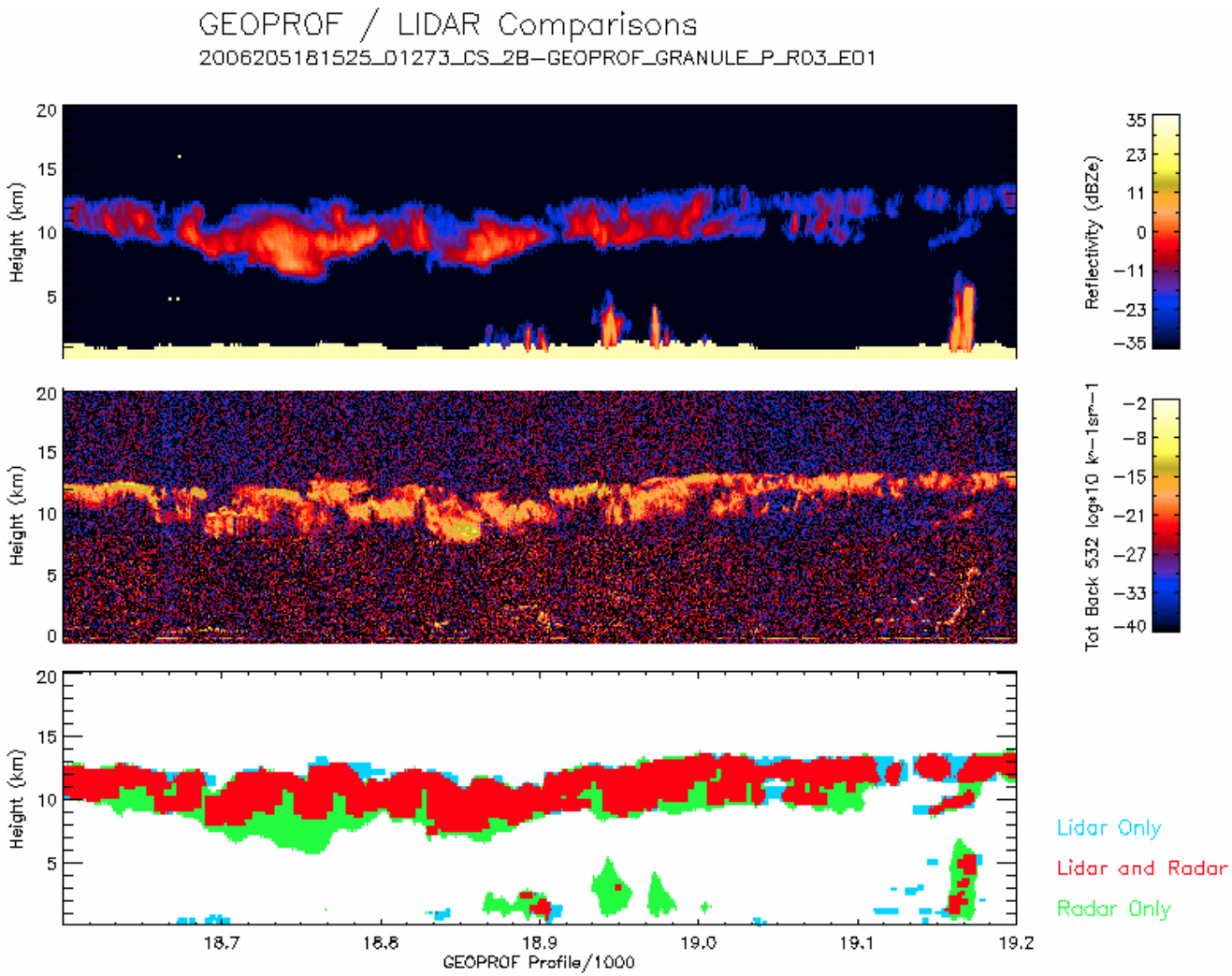




Apply the radar simulator to the CAM3 simulations



Run the lidar simulator and merge these output together to produce information similar to observations



Run the lidar simulator and merge these output together to produce information similar to observations

Input:

P T CF q r_e

Lidar simulator

Output:

Sr τ depol

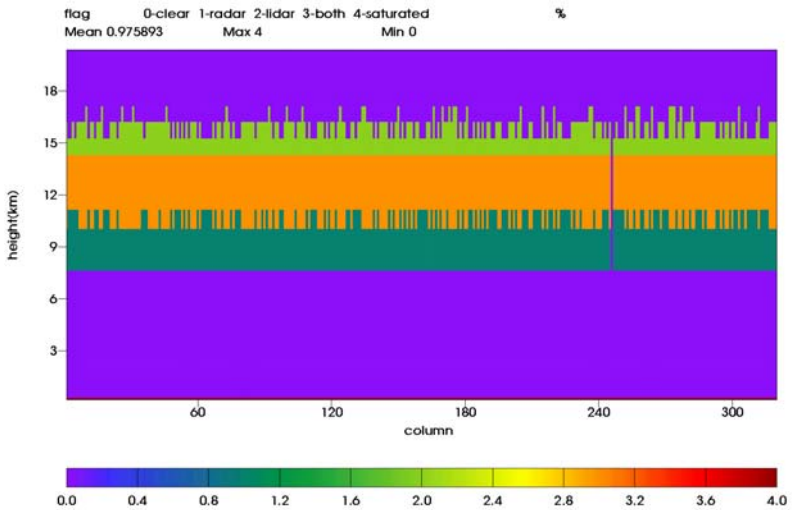
Input

Lidar stat summary

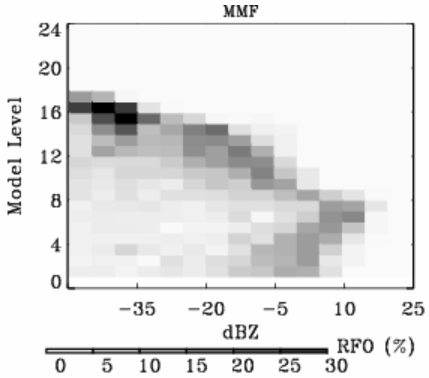
Output :

meanSr Fcld Fclr Fsat …

Sub-column flag:
cld clr sat



Future work: assign model grid-box simulations to the observed clusters

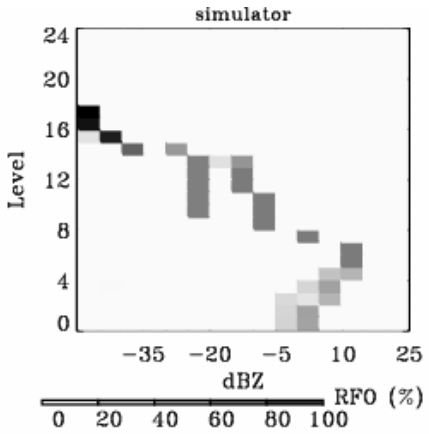


Gordon et al. (2005) :

Gridbox mean CF
cloud top pressure
cloud reflectivity

Williams and Webb (2008) :

Gridbox mean CTP
total cloud cover
cloud albedo

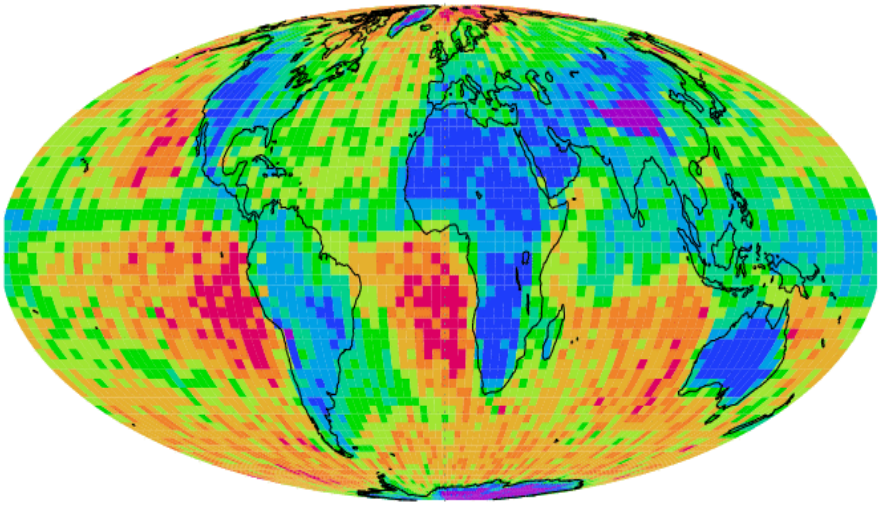


Assignment method :
Mean joint histograms of the six clusters from obs
Distance=RFO*scale_factor

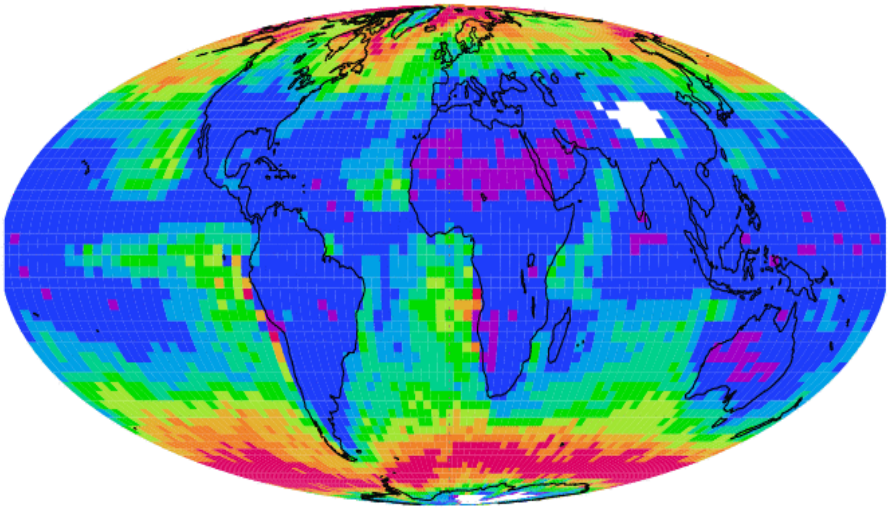
The end

Low Level clouds fraction (Ptop > 680hPa) Sept-Oct-Nov

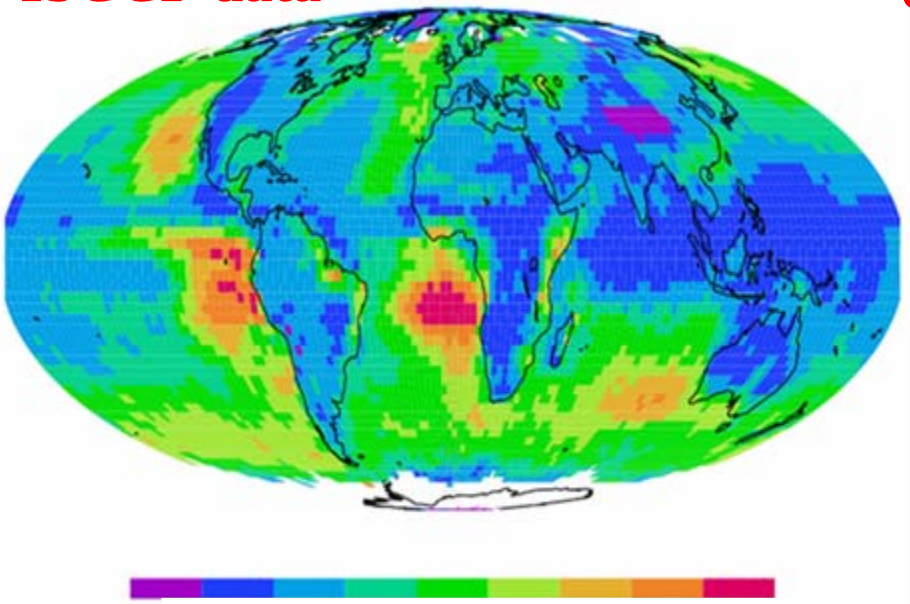
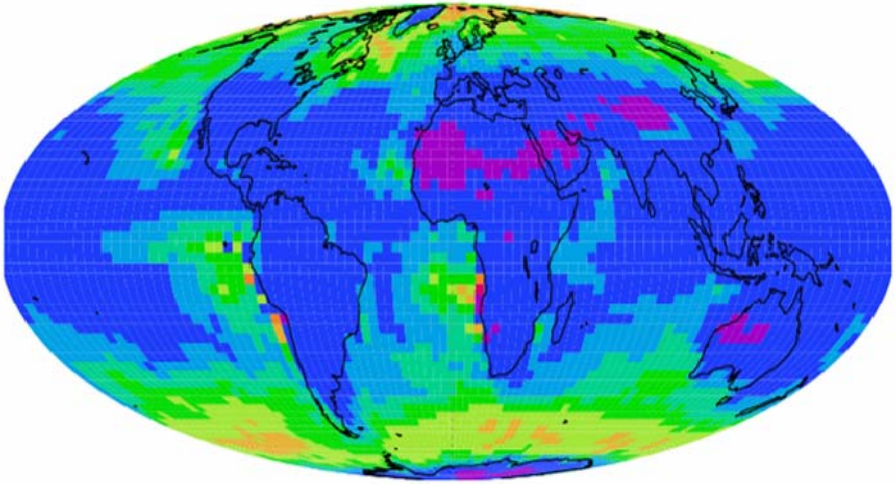
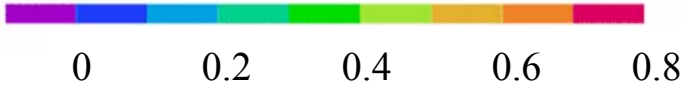
CALIPSO data



GCM + CALIPSO simulator



ISCCP data



GCM + ISCCP simulator