Day 2

beyond cloud cover

summary and issues

cloud data and "offerings"

- optical depth (solar)
  - Polder, Calipso (thin), MODIS-CE, ATSR, ISCCP, MODIS-ST, PATMOS
- optical depth (IR) or emissivity
  - Calipso, HIRS, AIRS/TOVS
- particle size (water)
  - MODIS-CE, ATSR, ISCCP, MODIS-ST, PATMOS
- particle size (ice)
  - MODIS-CE, Calipso, ISCCP, AIRS/TOVS, MODIS-ST, PATMOS
- cloud phase
  - Polder, Calipso
- liquid water content
  - MODIS-CE, ATSR, PATMOS
- ice water content
  - Calipso, ATSR, ISCCP, AIRS/TOVS
- profile
  - Calipso, ATSR, ISCCP

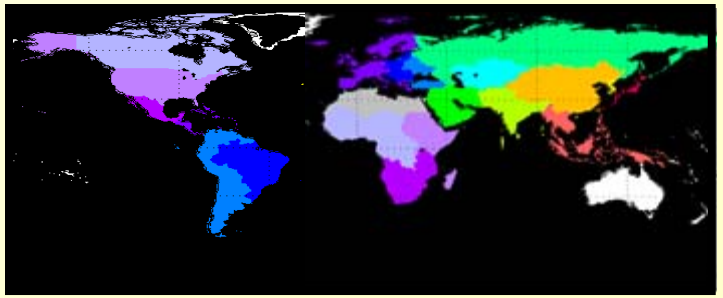
many products to choose from

and now ?

- **The good**
  - many choices, complementary in nature
- **The bad**
  - sparse and biased sample, limited detection range, uncertainties often poor defined
- **The ugly**
  - data-statistics is applied (often un-educated) to “validate” or evaluate modeling

needs

- **assessment report**
  - **summarize, what each product can do (best)**
  - **stratify temporally (seasonally, daily)**
  - **stratify spatially (zonally, regionally)**
- **recommendations (?), yes !**
  - **how and when to use**
  - **synergies**



compare cloud data products (1)

many cloud retrievals are ill-defined

- what is a cloud **(depends on the part of the spectrum as well as the application)? What is the function of a cloud mask (for what user community/science purpose)?**
- what is the cloud-top height **(radar vs. lidar vs. IR vs. polarization vs. molecular absorption vs. Raman scattering line filling)?**
- cloud phase? **for which layer(s)? Mixed phase?**
- cloud effective particle size ? **at what level ?, local quantity, not vertically integrated as with *t***

'stolen' from Steve Plantick's presentation

compare cloud data products (2)

what model assumptions (e.g., ice cloud models) are used?

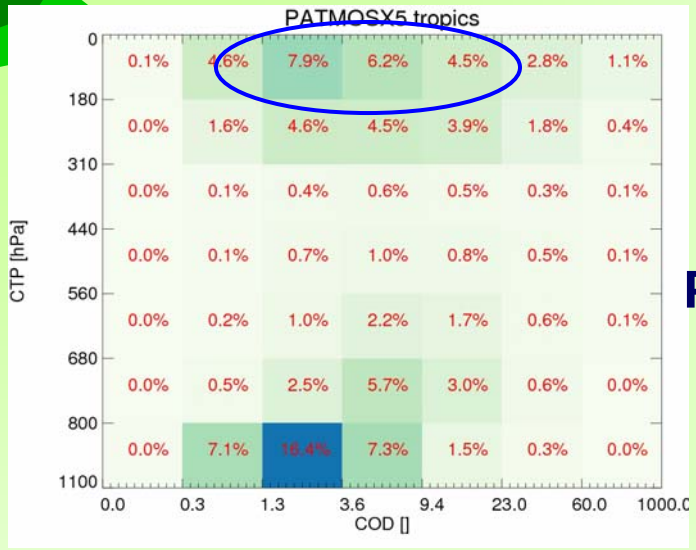
what ancillary data sets are used?

what QA (Quality Assessment), uncertainties, or other choices are made to screen or weight retrievals ?

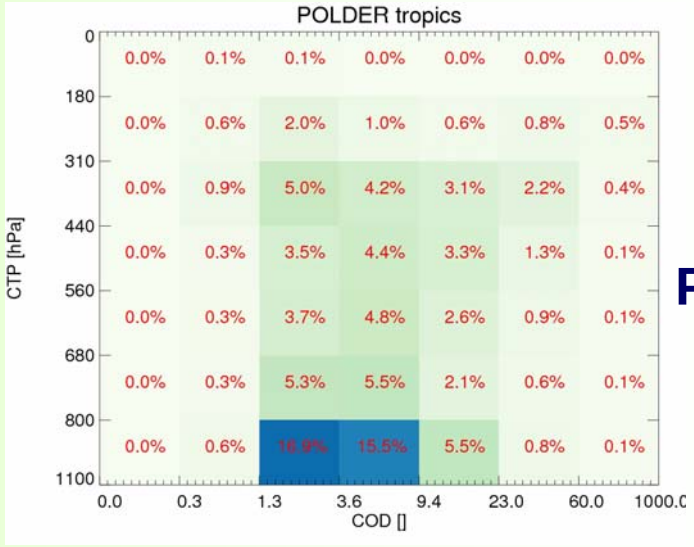
no instrument covers the entire PDF
each technique/algorithm has a particular part of the solution space for which it is “useful”

‘stolen’ from Steve Plantick’s presentation

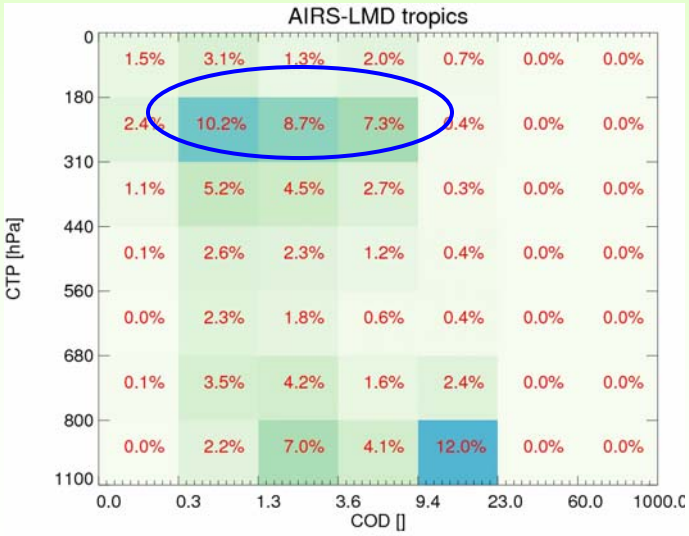
COD-CP histograms: Tropics (30S – 30N)



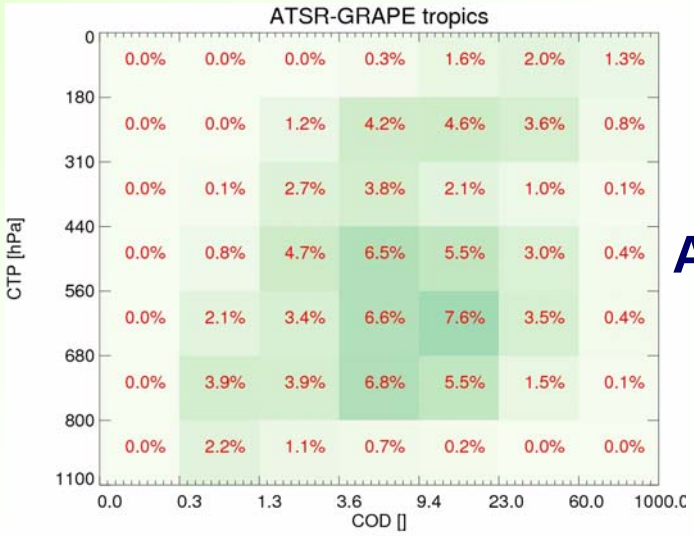
PATMOS



POLDER



AIRS



ATSR

some issues (1)

- sampling
  - temporal and spatial … often sparse, and QA data are often biased
- identify sweet-spots
  - retrievals are best in ranges (vary by sensor) … so uncertainty histograms are desirable
- limitations
  - retrievals of upper and lower bound … how do missed data impact
- dependencies
  - some properties are at the end of the food-chain → larger uncertainties (e.g. ice habit impact)

some issues (2)

- focus on uncertainties (that matter to user)
- no microwave data-set in the data-base
- linking solar and IR opt.depth
- understanding the low opt.depth detection
  - … to be able to link cloud cover data

a global modeler's perspective (1)

- evaluation of vertically distributed water
- evaluation of (L)WC → heating rate profiles
- Qs
  - are the simulated properties (spatially highly averaged ~ 100*100km) in the right ball-park ?
    - upper and lower bound statistics needed
    - spatially and regionally stratified … if possible
  - water content (high values missed ?)
  - total optical depth (how to average ?)
  - radiative fluxes (simulator?)
  - particle size
  - vertical distribution and phase partitioning

a global modeler's perspective (2)

- given the variety of products offered…

… explaining differences (strength and deficiencies) are not good enough

- uncertainty ranges are essential …

… otherwise best estimates are taken as "data-truth"

- model-simulators are not always the answer