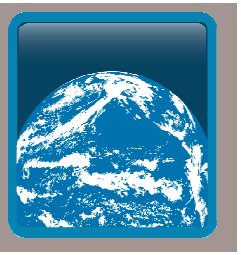
Cloud CCI



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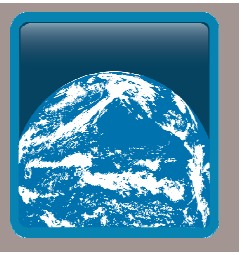
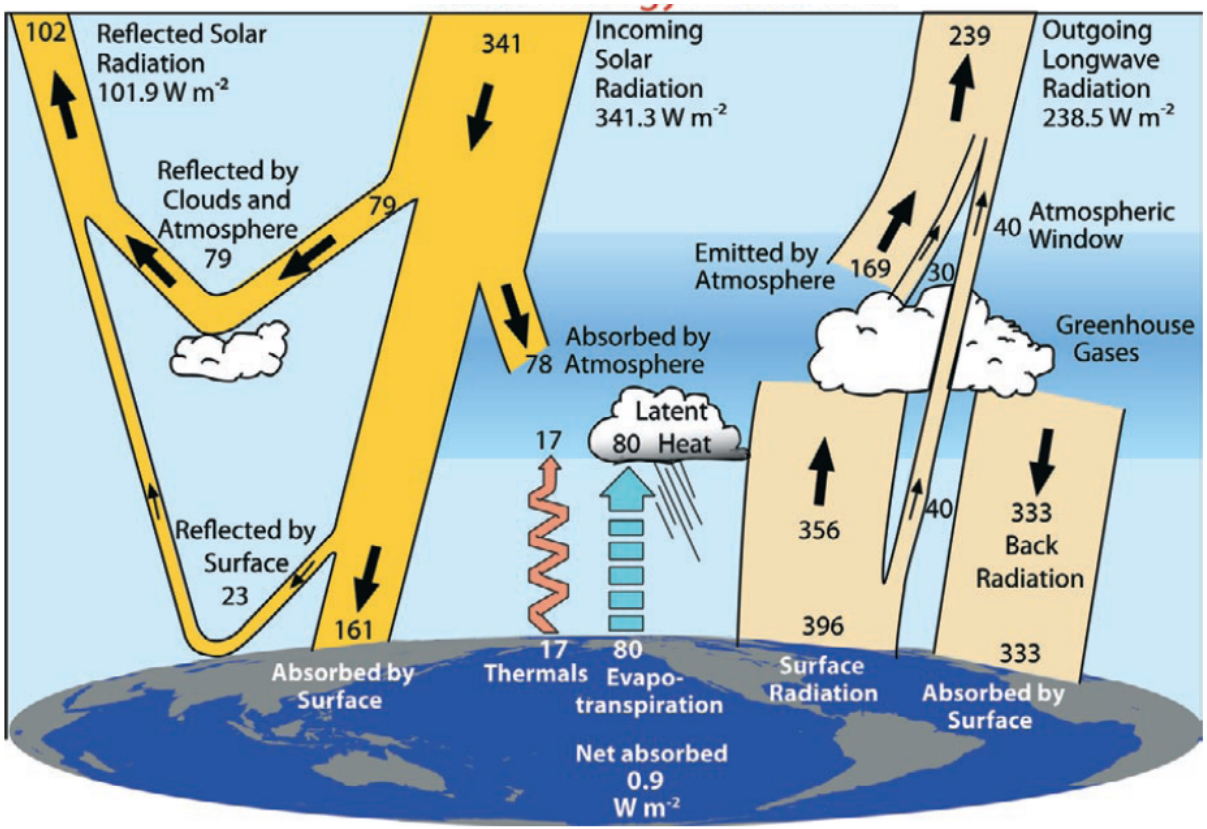


- **Clouds in the climate system**
- **Problems existing data sets**
- **Results Round Robin / Community Retrieval**
- **Prototype Products**
- **Validation strategy**
- **Summary, outlook**

Motivation



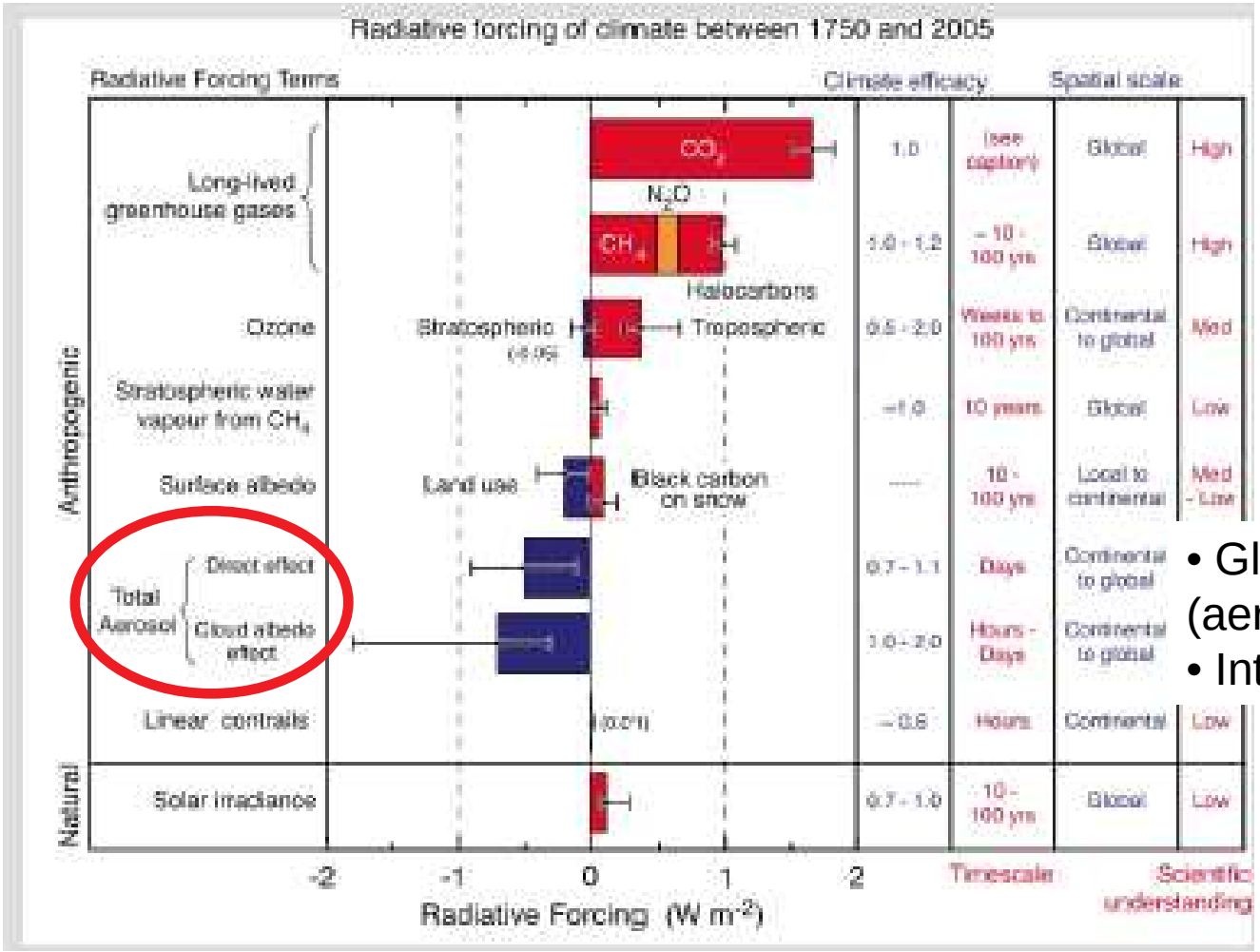
Trenberth, K. E., 2009: An imperative for adapting to climate change: Tracking Earth's global energy. Current Opinion in Environmental Sustainability, 1, 19-27. DOI 10.1016/j.cosust.2009.06.001.

Clouds …

- affecting the energy budget
- are a coupling mechanism to hydrological cycle
- Are highly variable in space and time
- Are easy to observe?

… but not fully understood nor modelled.

IPCC -> Clouds



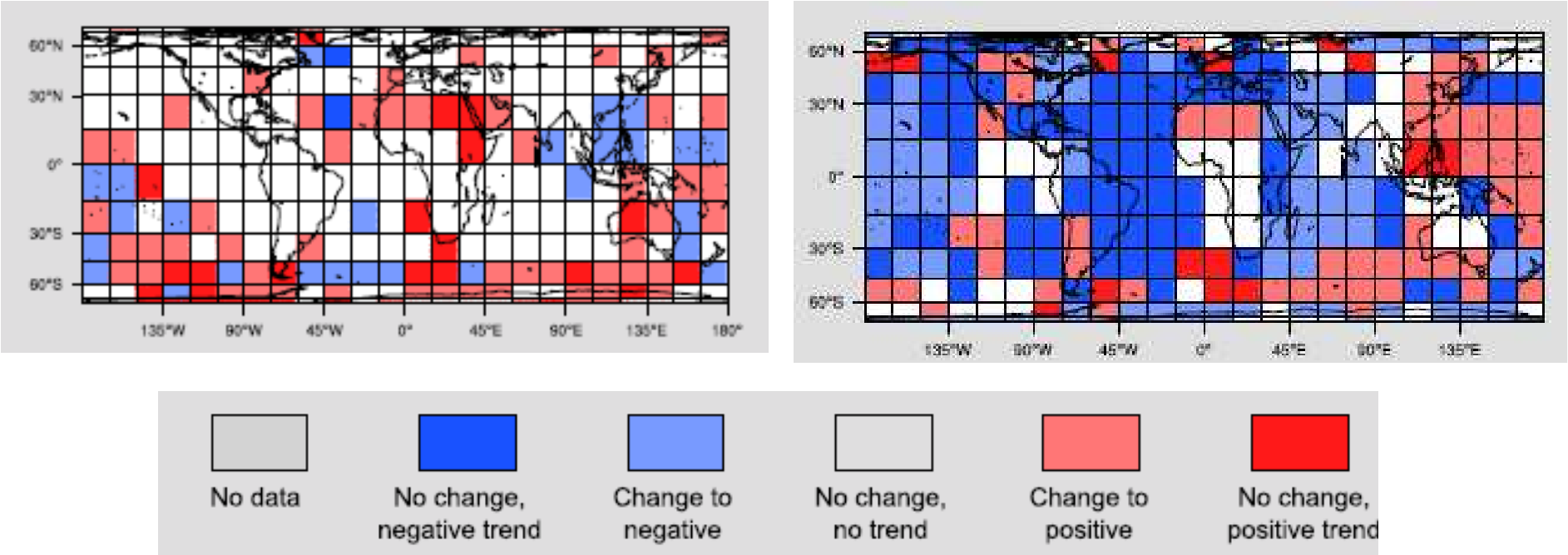
- Global dimming (aerosols-clouds-radiat.)
- Interaction clouds- fire

Trends - Consistency?

Detection of change points in existing data sets, Cloud Fraction

PATMOS-X

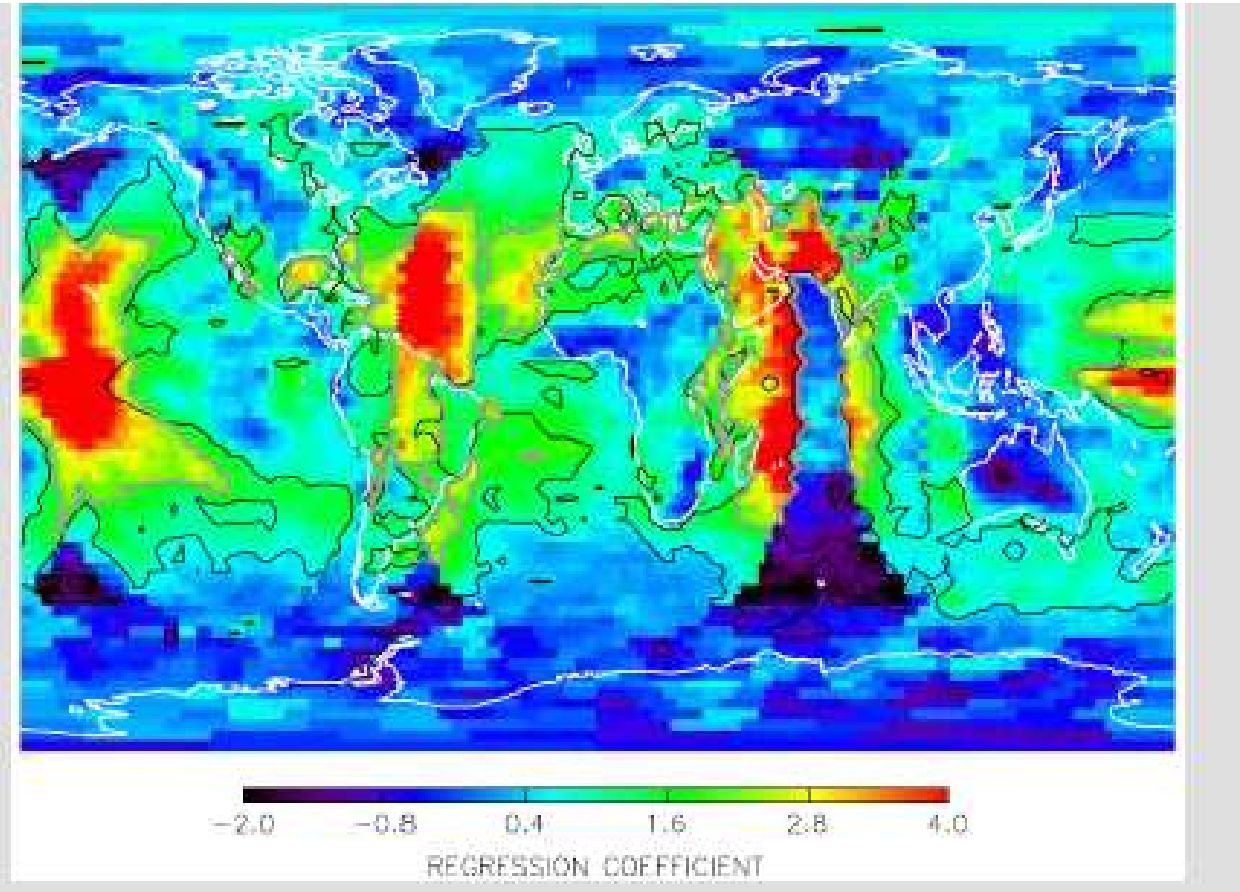
ISCCP



Cermak et al. 2010

Trends - Consistency?

Artefacts, e.g. in ISCCP

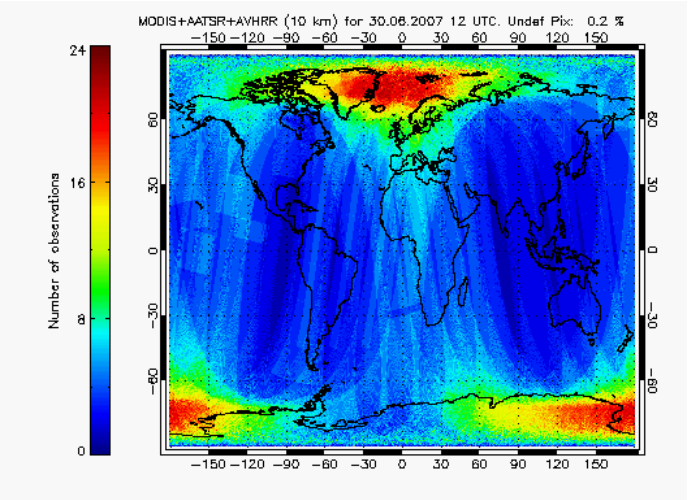


Evans et al. 2007

Objectives of Cloud CCI

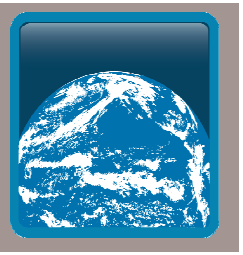
- The generation of two consistent global data sets for cloud property including uncertainty estimates based on inter-calibrated radiances from:

  1) AVHRR heritage measurements of MODIS, AATSR, AVHRR
  2) Combined AATSR + MERIS measurements with GCOS requirements in mind for 2007-2009.



- Development of a coherent physical retrieval framework for cloud properties as an open community retrieval framework, publicly available and usable by all scientists.
- Produce multi-year multi-instrument time series.

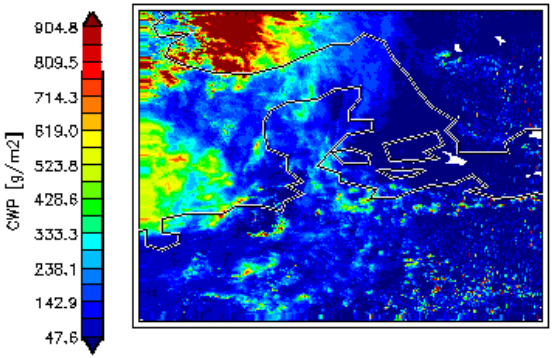
Round Robin Algorithm Comparison



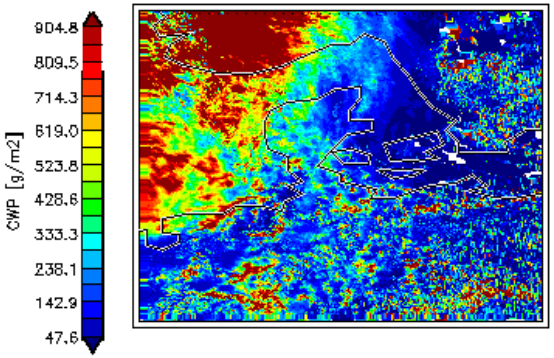
- Select most suitable algorithm and develop it into a community retrieval framework, identify areas for further development.
- Participating algorithms: CM-SAF (CPP+PPS),ORAC,CLAVR-X
- Apply to AVHRR NOAA18 and MODIS Aqua L1b in AVHRR channels of 5 days in 2008.
- Collocate and compare cloud retrieval results with respect to A-Train observations of CLOUDSAT (CTH, CMa), CALIPSO (CTH, CMa, CPH) and AMSR-E (LWP).

Round Robin Algorithm Comparison

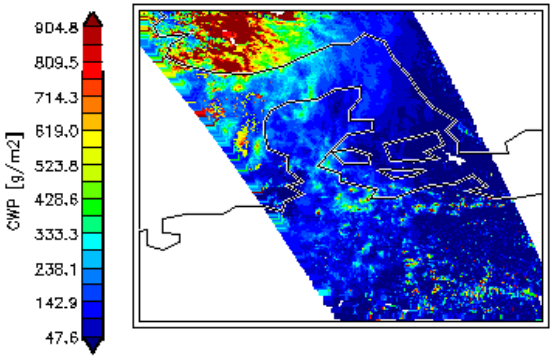
CLAVR-X



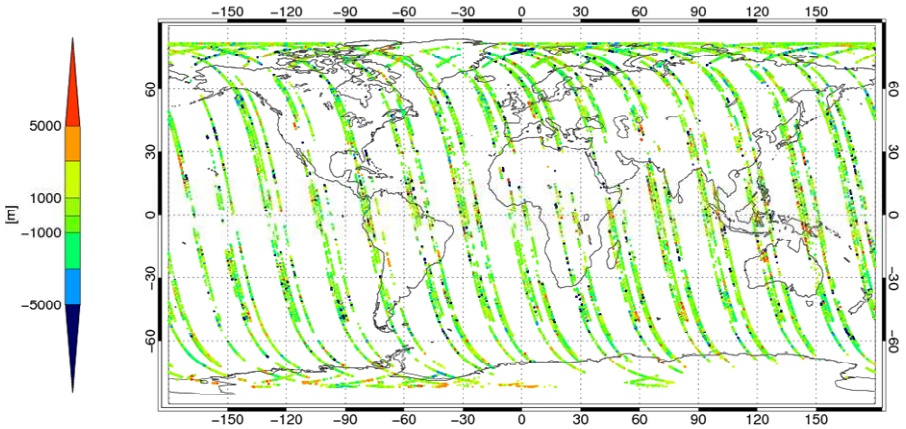
CM-SAF



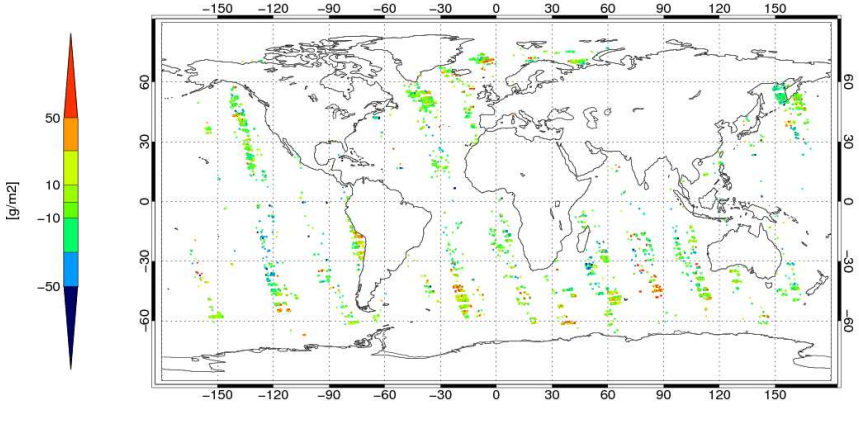
ORAC



CTH: CLAVR-X MODIS -CLOUDSAT

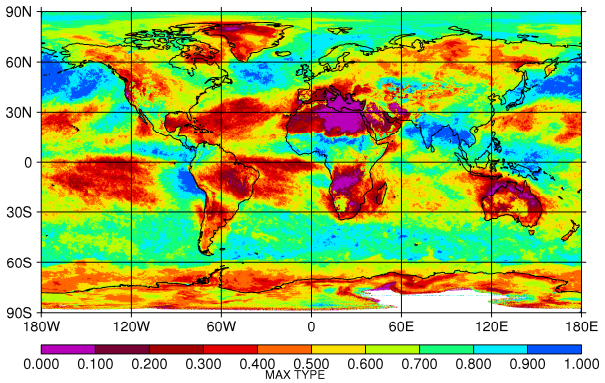


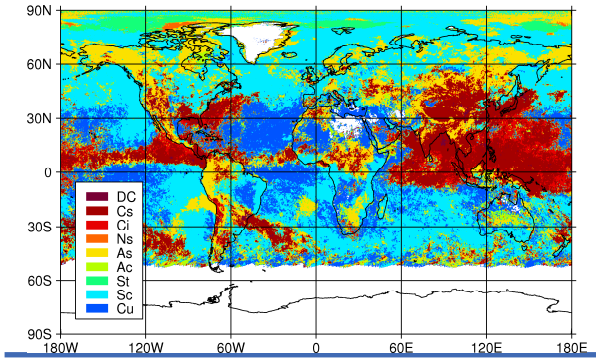
LWP: CM-SAF MODIS-AMSR-E

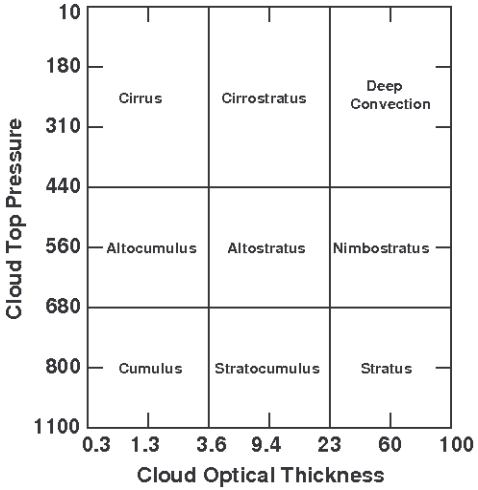


Prototype Products

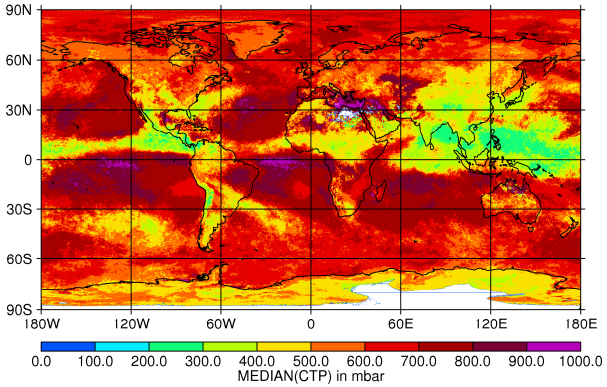
- **Product suite COT, CTP, REF, CPH, CWP, CMa**
  - L2: pixel based results including uncertainty estimates.
  - L2b: 0.1 deg. daily L2 composite.
  - L3: monthly 0.5 deg. Av., St. Dev. median incl. uncert. est.,
  - 2D COT-CTP Histograms, time-series at locations

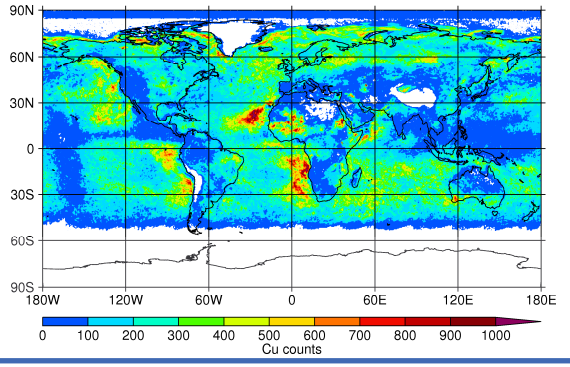






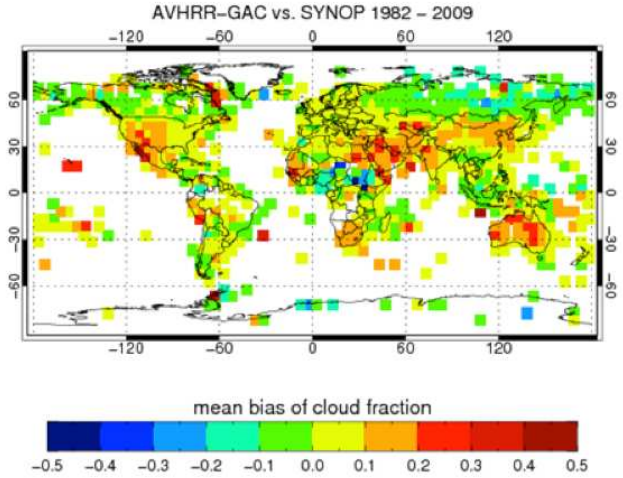
Prel. results based on CM-SAF's AVHRR GAC data for 200907

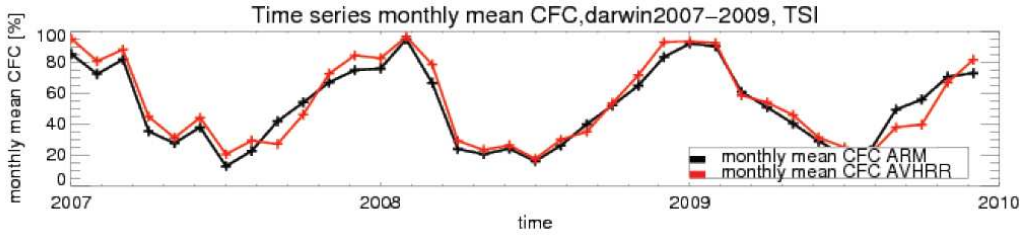


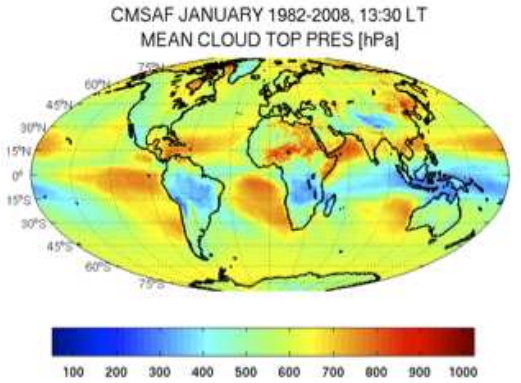


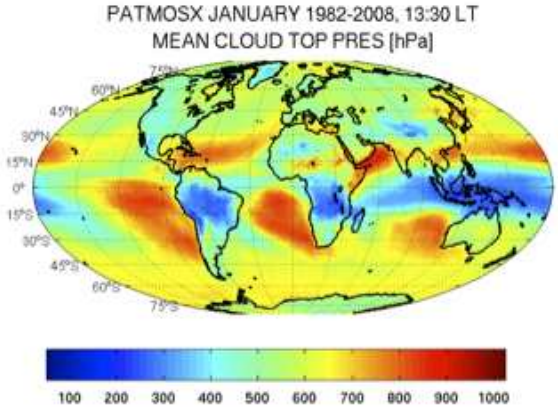
Validation

- Validation for L2 and L3 data using tools used for RR.
- References: Ground based (ARM, Cloudnet, Synop) and Spaceborne (CALIOP, CPR, AMSRE, SEVIRI) as well as established climatologies (ICCP,PATMOSX,CM-SAF)

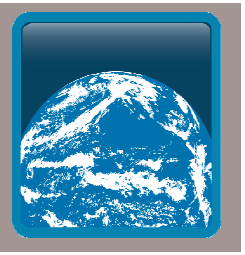








Summary and Outlook

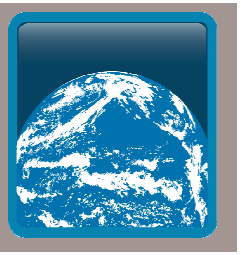


- ESA Cloud CCI will produce two datasets spanning 2007-2009 exploiting synergistic capabilities of different sensors.
- Optimal Estimation technique employed improving homogeneity and stability of time series developed
- Processing will start soon

Additional project components start soon:

- Validation over mountainous and polar areas (Meteo Swiss)
- Advanced Cloud Screening for AATSR-MERIS (Univ. Valencia)
- Cloud detection under presence of aerosol (OU, RAL, DWD)
- 1D Var for SSMI to produce LWP dataset for CCI validation (DWD)

Thanks



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