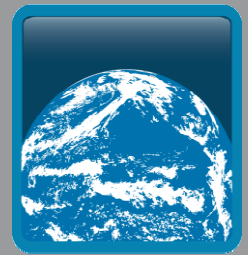


Cloud CCI



Rainer Hollmann
Deutscher Wetterdienst

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



VNIVERSITAT
DE VALÈNCIA



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Home Affairs FDHA
Federal Office of Meteorology and Climatology
MeteoSwiss

Contents

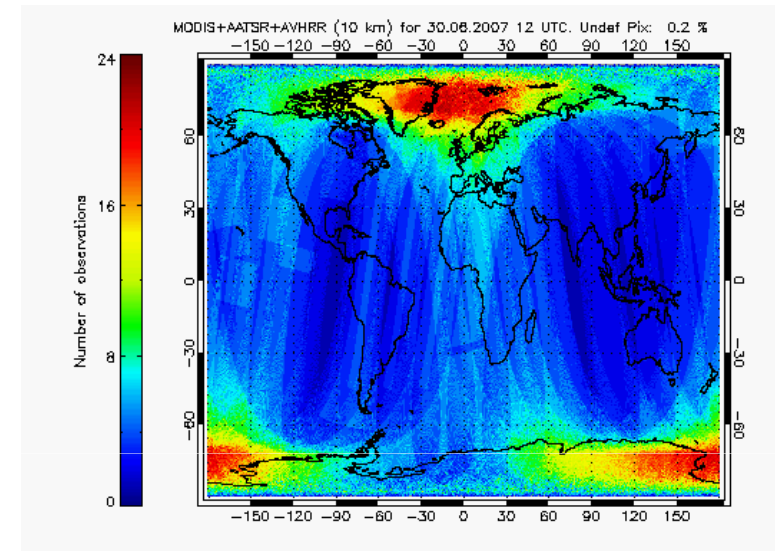


- **Cloud CCI objectives**
- **Results**
- **Validation**
- **Evaluation**
- **Summary**

Objectives of Cloud CCI



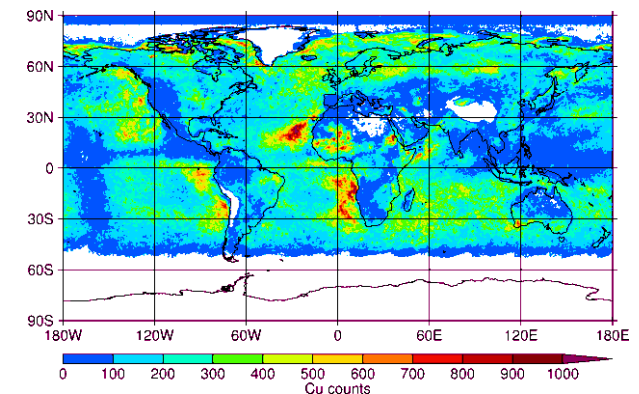
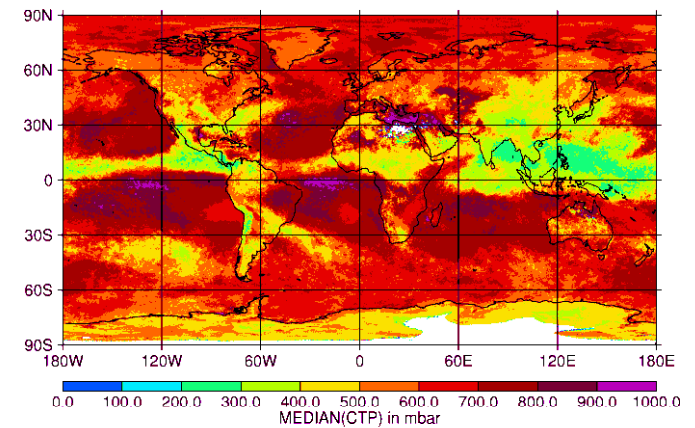
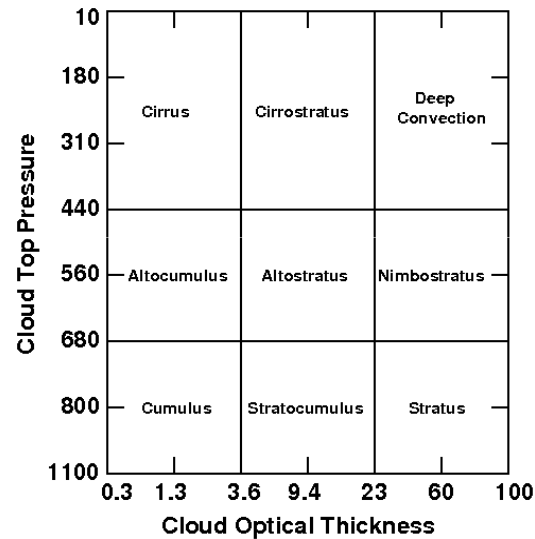
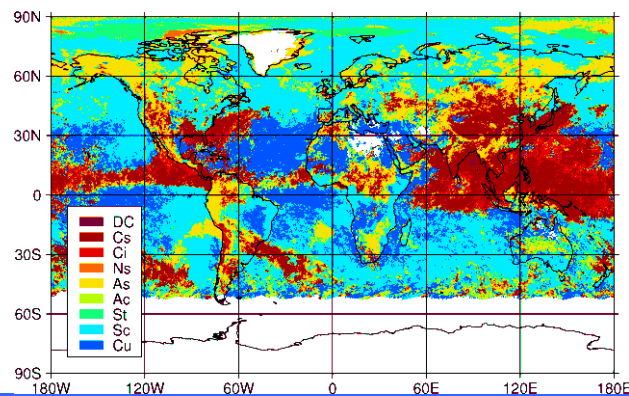
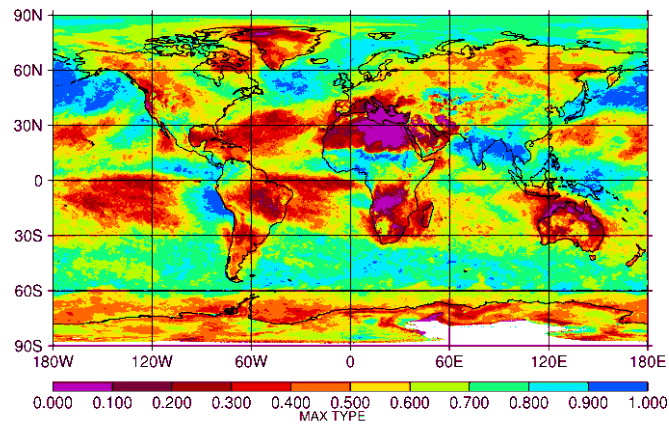
- The generation of two consistent global data sets for cloud property including uncertainty estimates based on inter-calibrated radiances from:
 - 1) AVHRR heritage measurements of MODIS, AATSR, AVHRR
 - 2) Combined AATSR + MERIS measurements with GCOS requirements in mind for 2007-2009.
- Development 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.



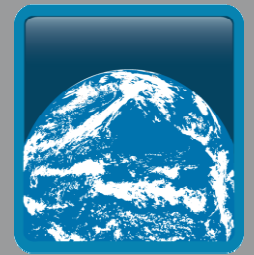
Cloud CCI Products



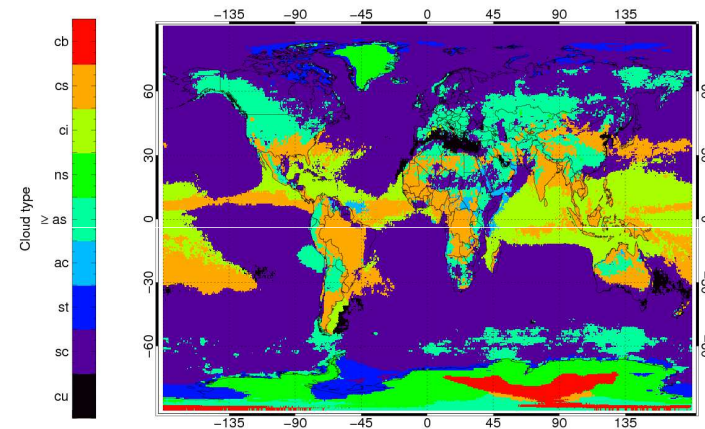
- **Product suite COT, CTP, REF, CPH, CWP, CMA**
 - L2: pixel based results including uncertainty estimates.
 - L2b: 0.1 deg. daily L2 composite.
 - L3: monthly 0.5 deg. Av., St. Dev. median incl. uncert. est.,
 - 2D COT-CTP Histograms, time-series at locations



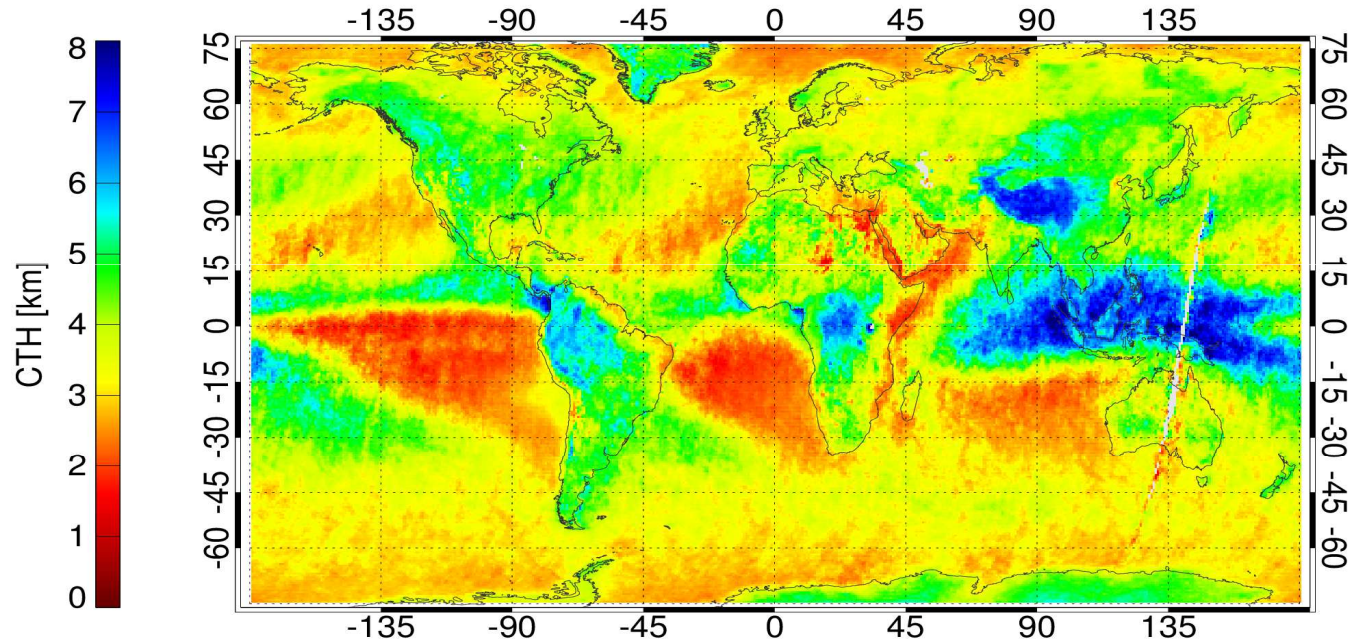
Example of Cloud CCI data sets



- Maximum of Cloud type occurrence based on NOAA AVHRR data



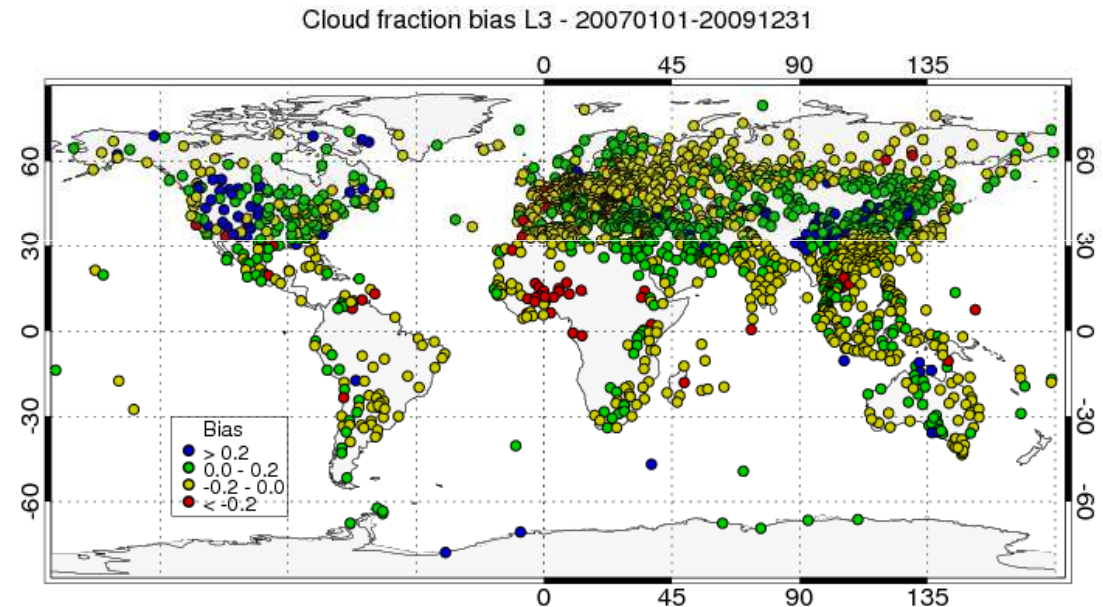
- CTH from the joint AATSR & MERIS retrieval



Validation of Cloud CCI products

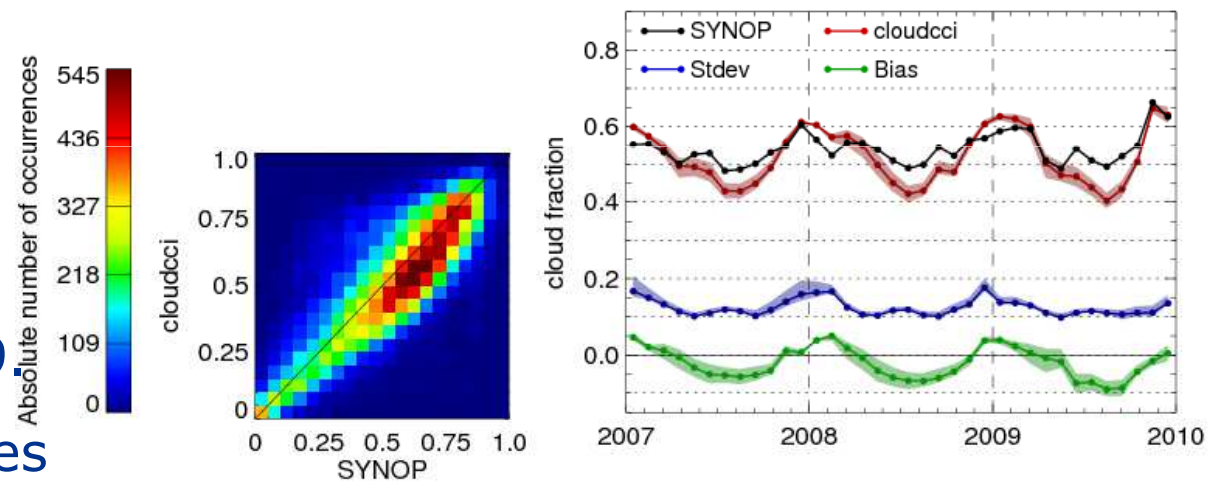


- Validation for L2 and L3 data using tools used for RR.
- References: Ground based (ARM, Cloudnet, **Synop**) and Spaceborne (CALIOP, CPR, AMSRE, SEVIRI) as well as established climatologies (ISCCP, PATMOS-X, CM SAF)



Comparison cloud fraction(all AVHRR's) vs. **SYNOP** 2007-2009

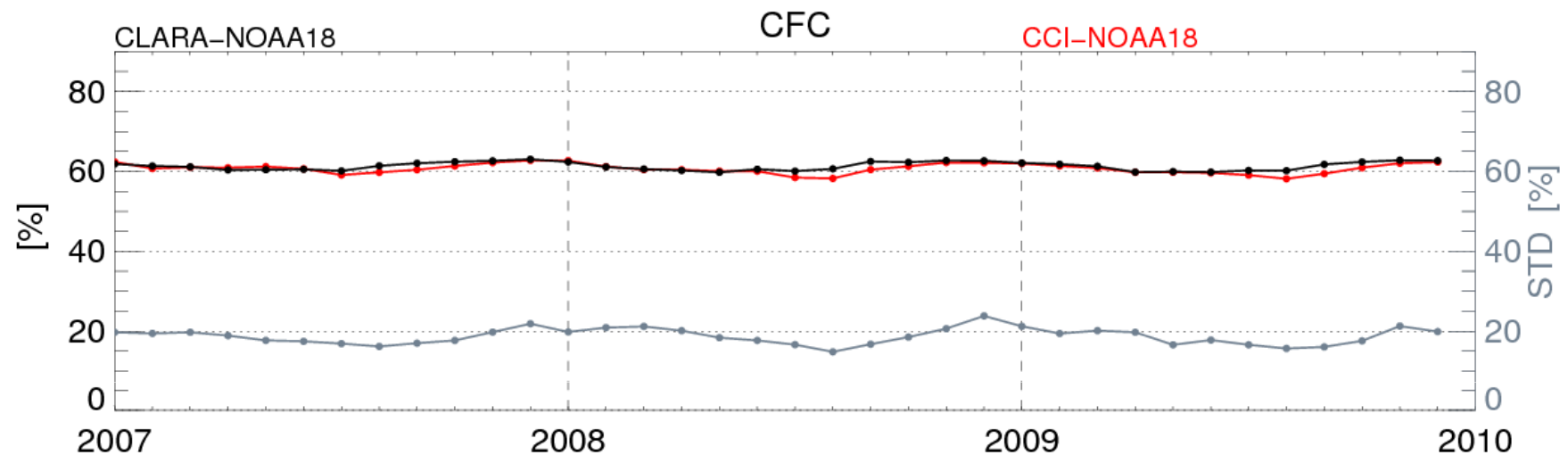
Map, 2-D histogram , Time-series of means, bias and std



Validation of Cloud CCI products



- References: Ground based (ARM, Cloudnet, Synop) and Spaceborne (CALIOP, CPR, AMSRE, SEVIRI) as well as established climatologies (ISCCP, PATMOSX, CM SAF)

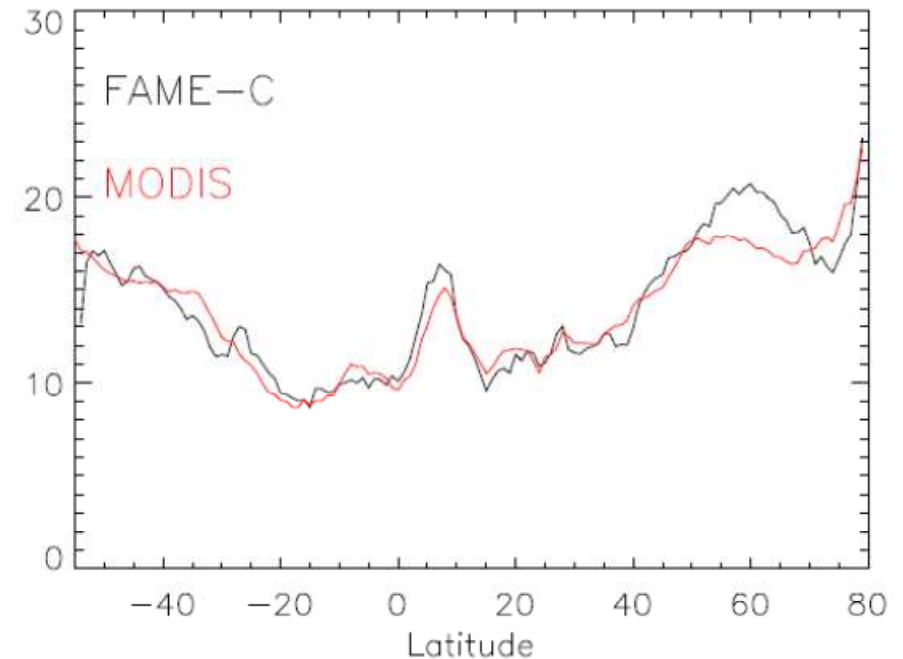
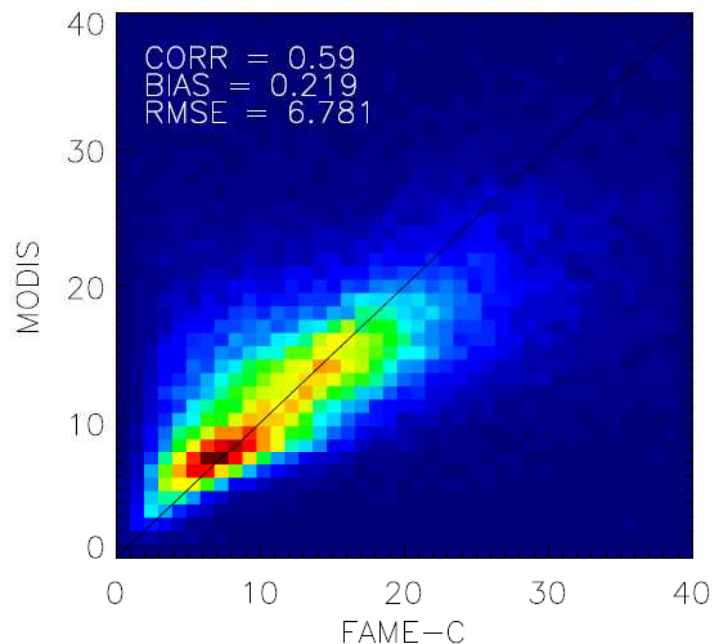


Comparison of CFC vs. CLARA A1, global mean values (2007-2009, NOAA-18)

Validation of Cloud CCI products



- References: Ground based (ARM, Cloudnet, Synop) and Spaceborne (CALIOP, CPR, AMSRE, SEVIRI) as well as **established climatologies** (ISCCP, PATMOSX, **MODIS**)

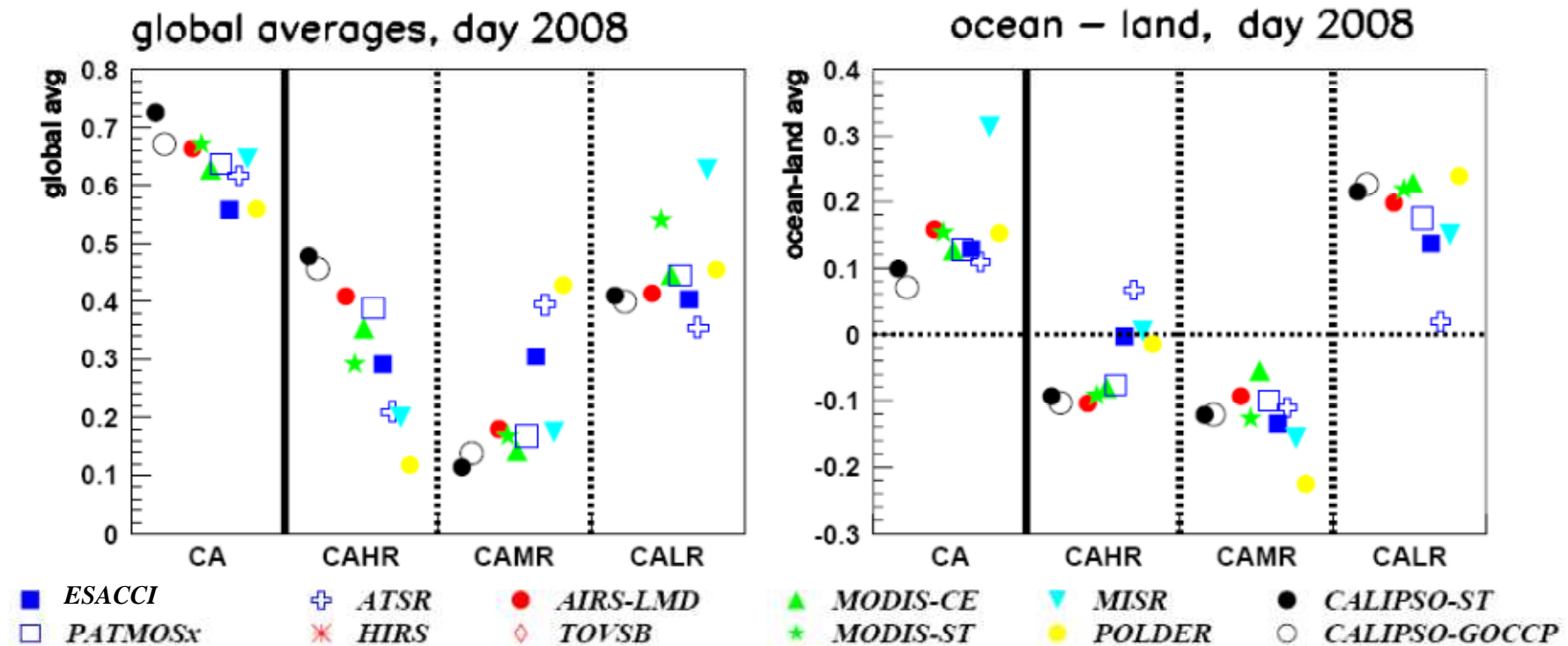


Comparisons of monthly averages (August 2008) of COT (leaving out the polar regions) of FAME-C and MODIS: 2d-histogram (left) and zonal mean (right)

Evaluation of Cloud CCI products



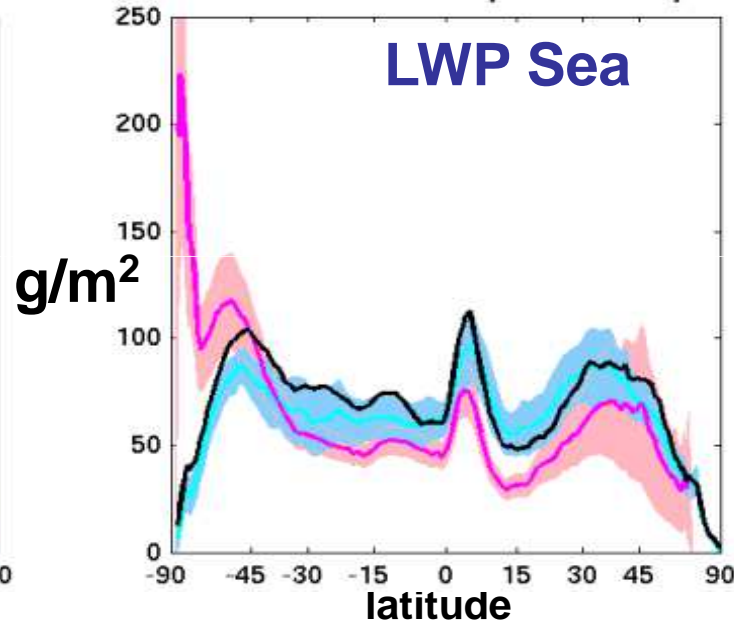
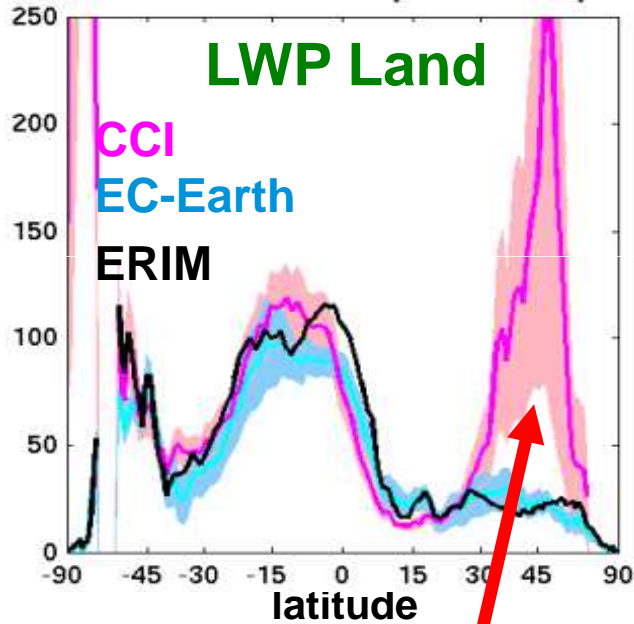
- Apply L3 processing as developed for GEWEX Cloud Assessment to ESA CCI cloud products and evaluate against all other data sets available



Prelim. results (only 2008): global CA underestimated by 0.1; CA larger over ocean by about 0.14, in agreement with other international datasets. Misidentification of high-level clouds as midlevel clouds; mostly over land

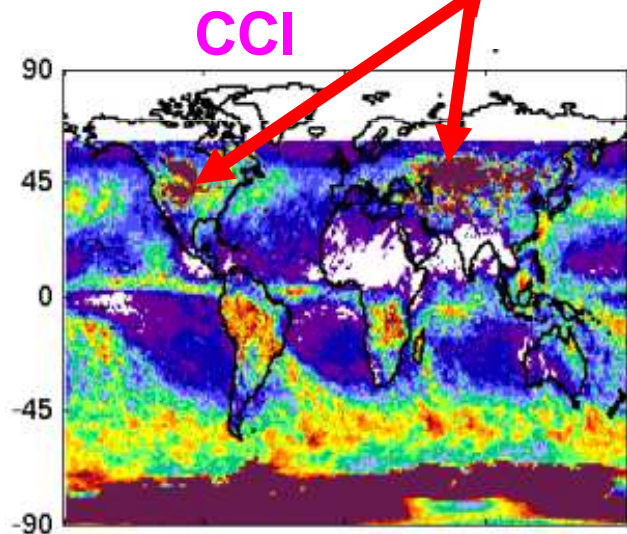
EC-Earth compared to Cloud-CCI

Liquid Water Path (LWP) January 2007-2009
Mean and Uncertainty

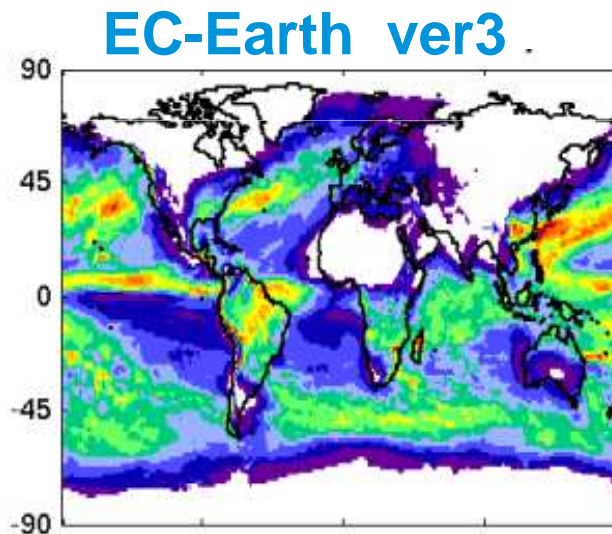


Good agreement except over snow and stratocumulus regions

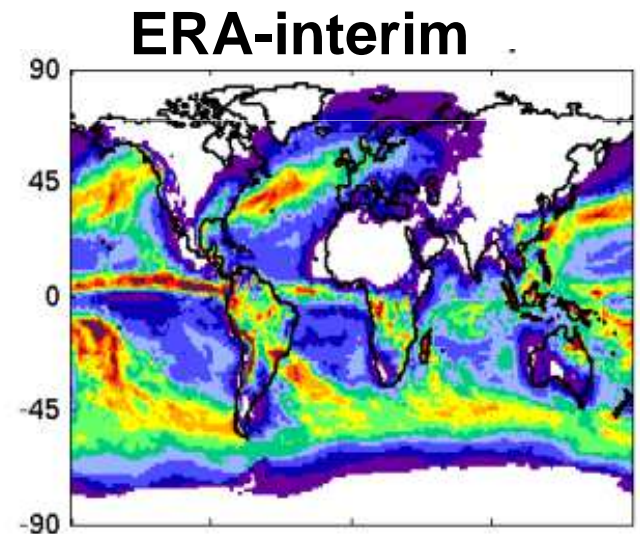
Good with interactions – finding problem regions, how to use data and uncertainties



NOAA18



EC-Earth ver3



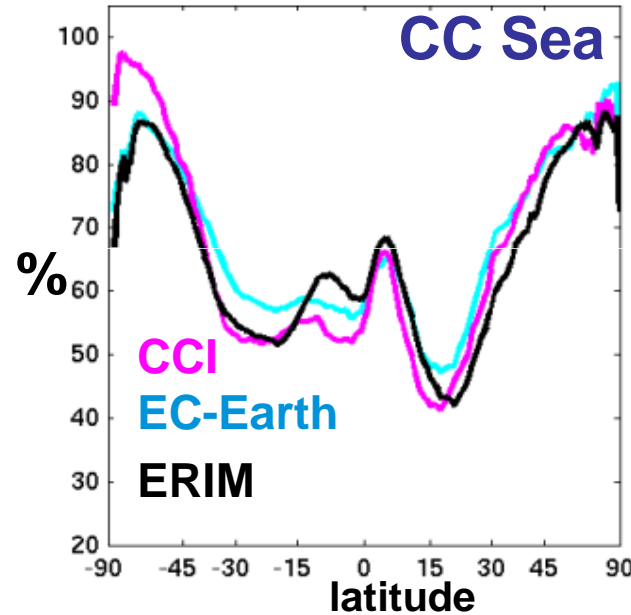
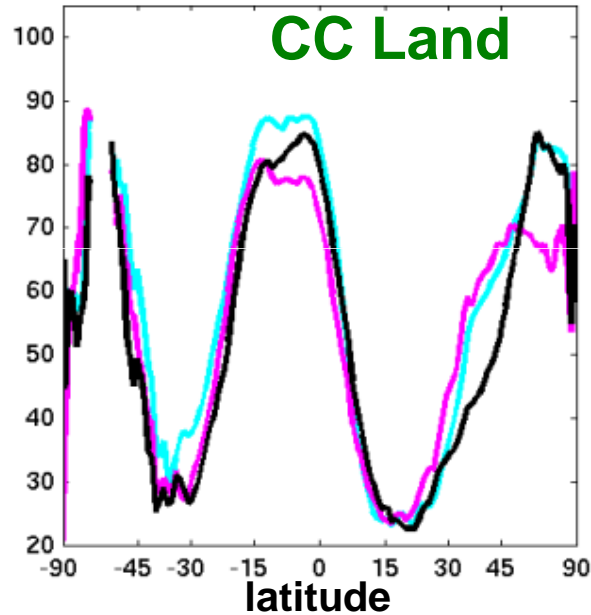
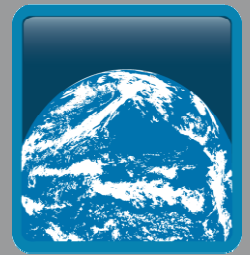
ERA-interim



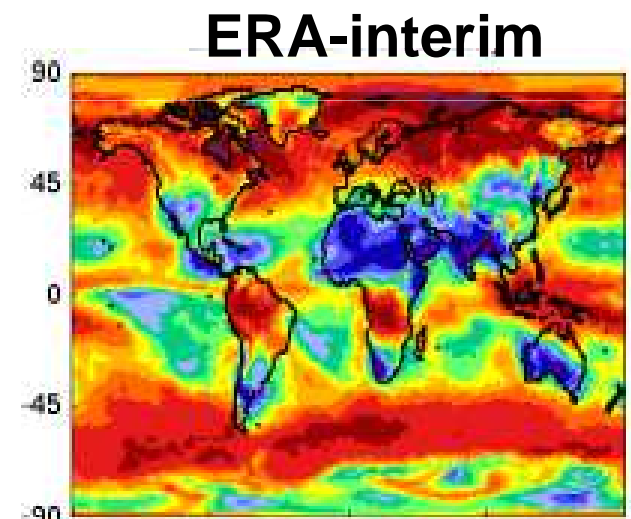
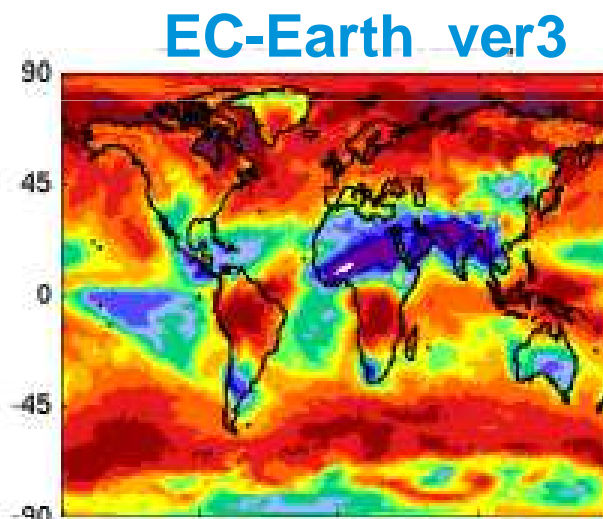
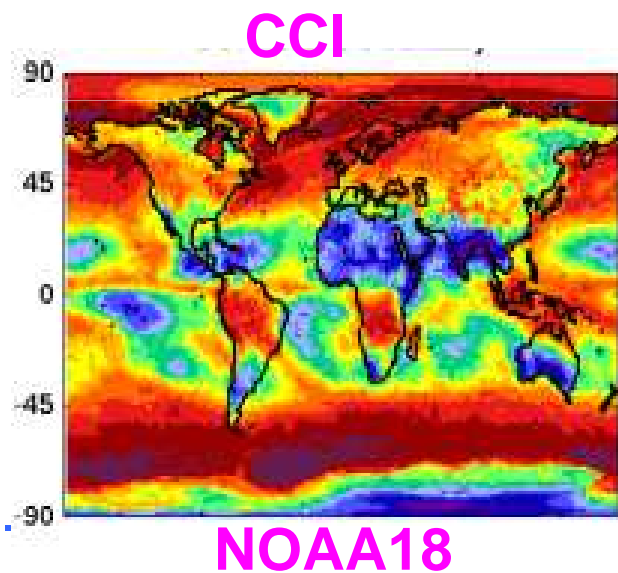
g/m^2

EC-Earth compared to Cloud-CCI

Cloud Cover (CC) January 2007-2009 Mean and Uncertainty



Good agreement but more/less CCI clouds than models over land south/north of 45N – problems over snow/semi-arid regions?



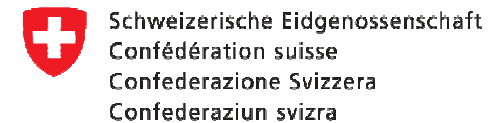
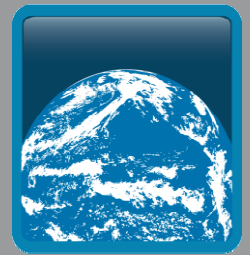
%



Summary and Outlook

- ESA Cloud CCI has produced two datasets spanning 2007-2009 exploiting synergistic capabilities of different sensors.
- Optimal Estimation technique has been employed improving homogeneity and stability of time series developed
- Data will be available via website in June 2013
- Validation is ongoing
- Evaluation in GEWEX cloud assessment and
- Comparison vs. EC-Earth, ERA-Interim started
- Feedback loop will help to detect and set priorities for algorithm improvements

Thanks



Swiss Confederation

Federal Department of Home Affairs FDHA
Federal Office of Meteorology and Climatology
MeteoSwiss

