GEOS & ECMWF for CERES : An Analysis with SARB CRS Product

Presentation for CERES teleconference 10/08/03

Fred Rose (AS&M)

Tom Charlock (NASA Langley)

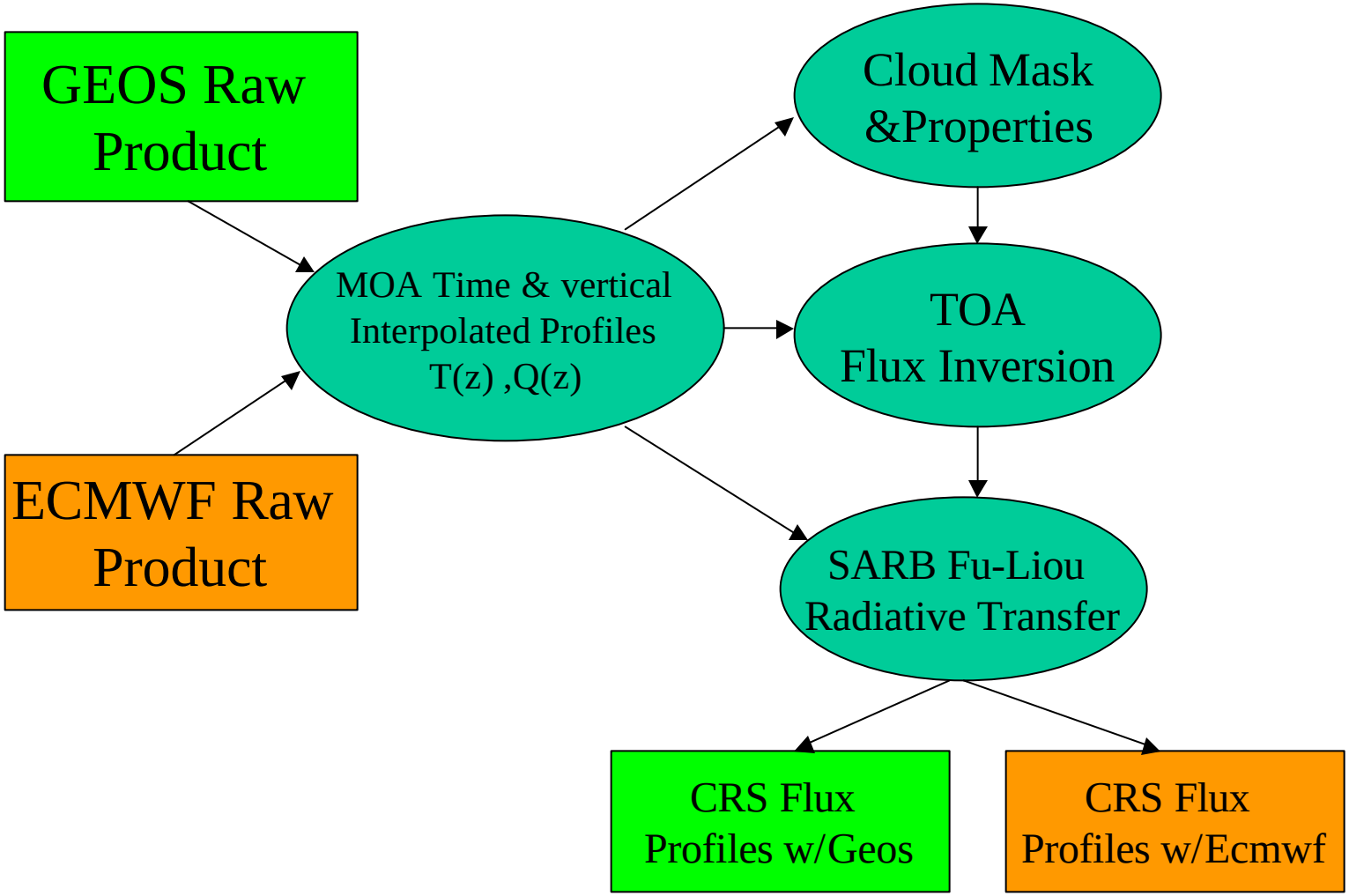
Lisa Coleman (SAIC)

Tom Caldwell (SAIC)

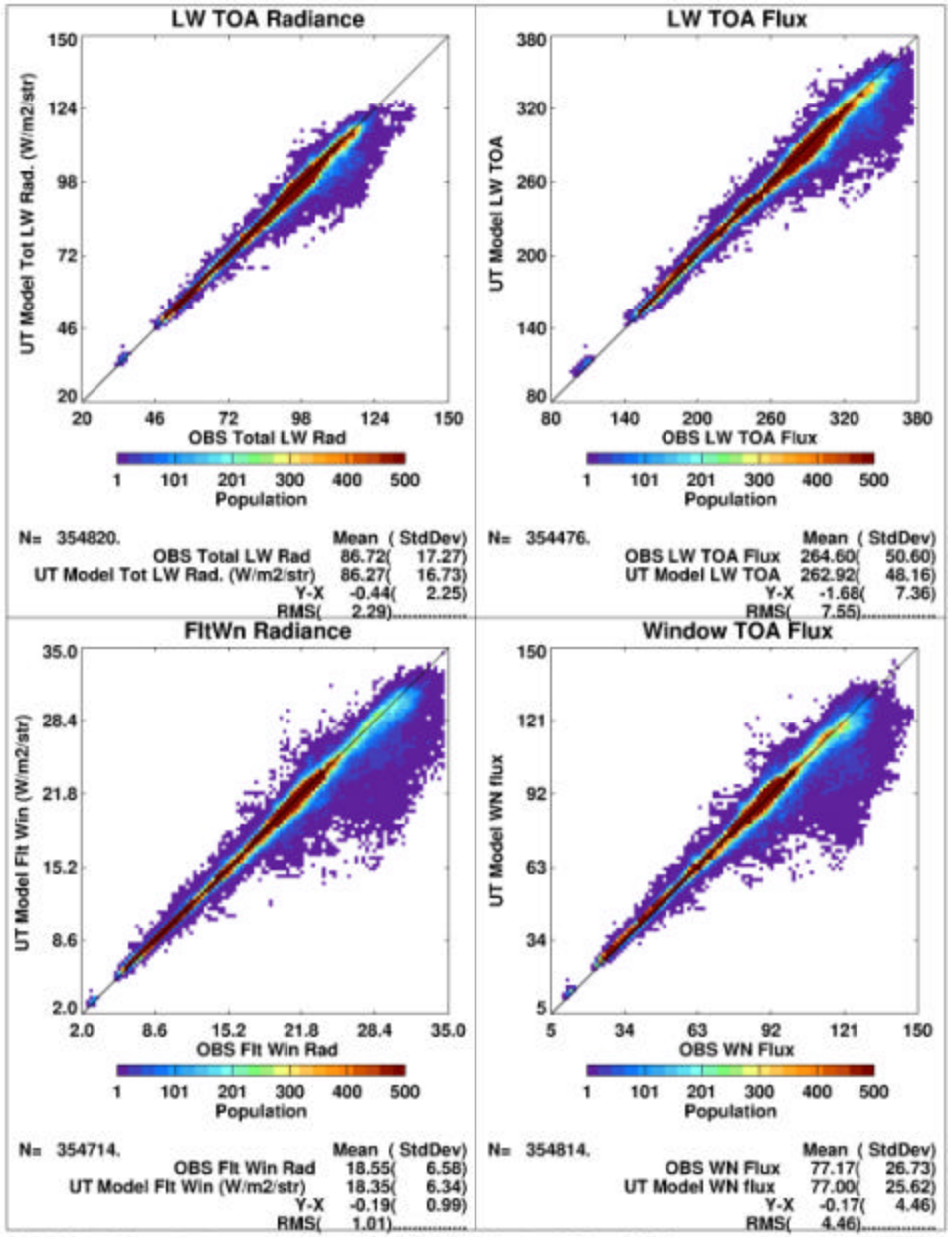
Analysis Domain

- GEOS_4.0.3 and ECMWF input via MOA
- CERES SARB CRS Product
  - OLR, Window OLR (Wm-2)
  - LW Radiance(Wm-2sr-1)
  - Flt. Window Radiance(Wm-2sr-1) NOT per micron!
  - Window Flux (Wm-2)
  - 2 days (48hrs combined, ~4.5 Mfov)
    - January 3rd & July 12th 2001
- Clear Sky , All Sky , Overcast
- Computed radiation compared to CERES before tuning (constrainment)

Processing Description



GEOS4 Clear Sky Scatterplot



	Geos – Ceres Obs	Ecmwf- Ceres Obs
LW Radiance	-0.44	-0.36
OLR	-1.68	-1.55
Flt Window Radiance	-0.19	-0.22
Window Flux	-0.17	-0.30

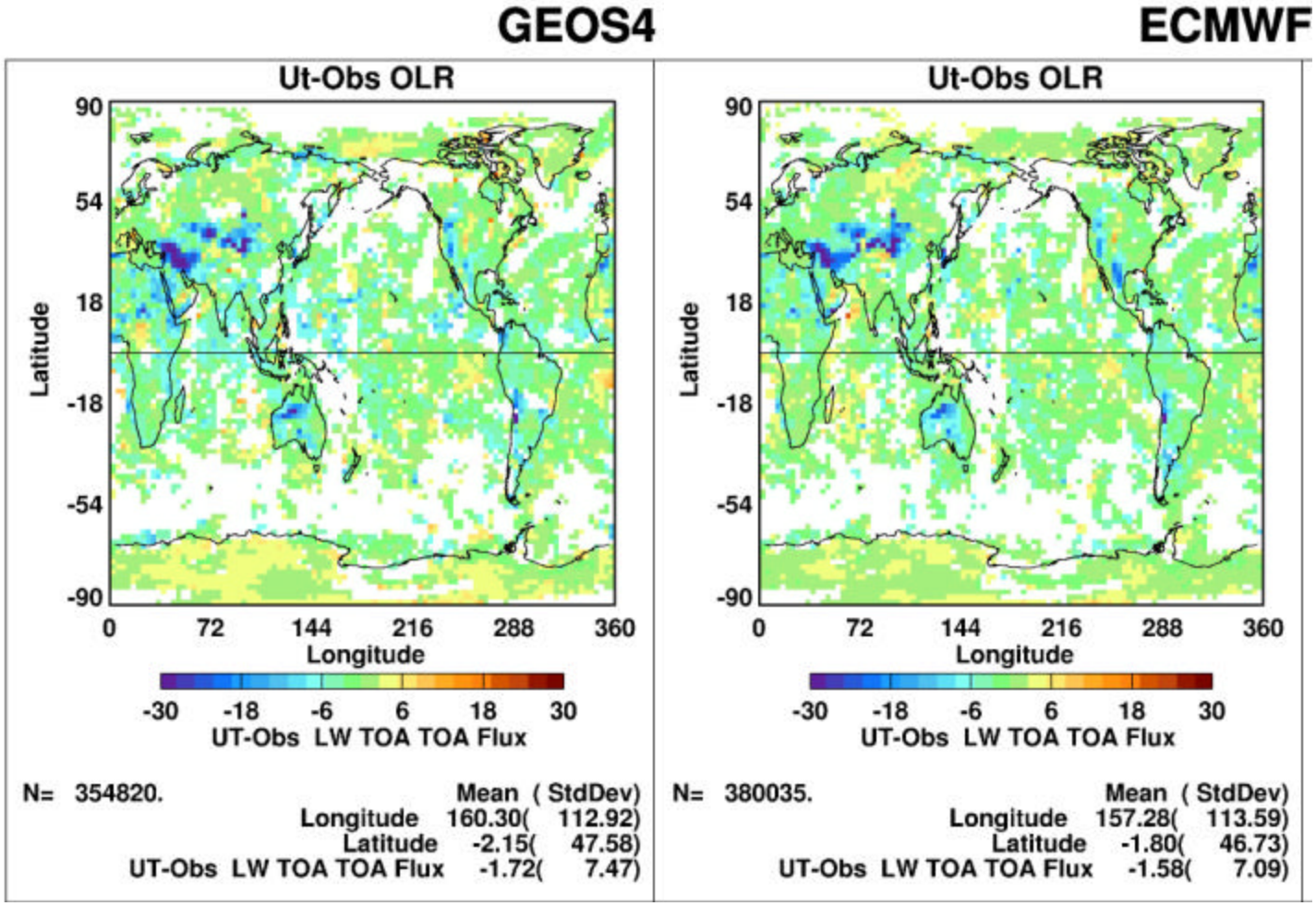
Clear Sky Summary Table of Fluxes (Wm-2)

Model minus Observed	GEOS			ECMWF		
	OLR Bias	**OLR Std**	**Window Bias**	**OLR Bias**	**OLR Std**	**Window Bias**
Clear	-1.7	7.4	-0.2	-1.6	7.0	-0.3
Clear Ocean	-1.2	4.6	1.0	-0.5	3.8	0.7
Clear Land	-4.7	9.8	-1.9	-4.2	9.3	-1.9
Clear Land Day	-5.2	11.3	-2.7	-5.1	11.5	-2.9
Clear Land Night	-3.4	5.5	-0.4	-3.0	4.8	-0.3

Cloudy Sky Summary Table of Fluxes (Wm-2)

Model minus Observed	GEOS			ECMWF		
	OLR Bias	**OLR Std**	**Window Bias**	**OLR Bias**	**OLR Std**	**Window Bias**
All Sky	1.0	8.4	0.7	1.0	8.0	0.6
Partly Cloudy	1.4	7.7	1.2	1.5	7.3	1.0
Overcast	1.2	9.1	0.4	0.9	9.0	0.3
Overcast Water Cloud	1.5	8.0	0.6	1.3	8.0	0.5

Untuned Clear Sky Model – Observed OLR



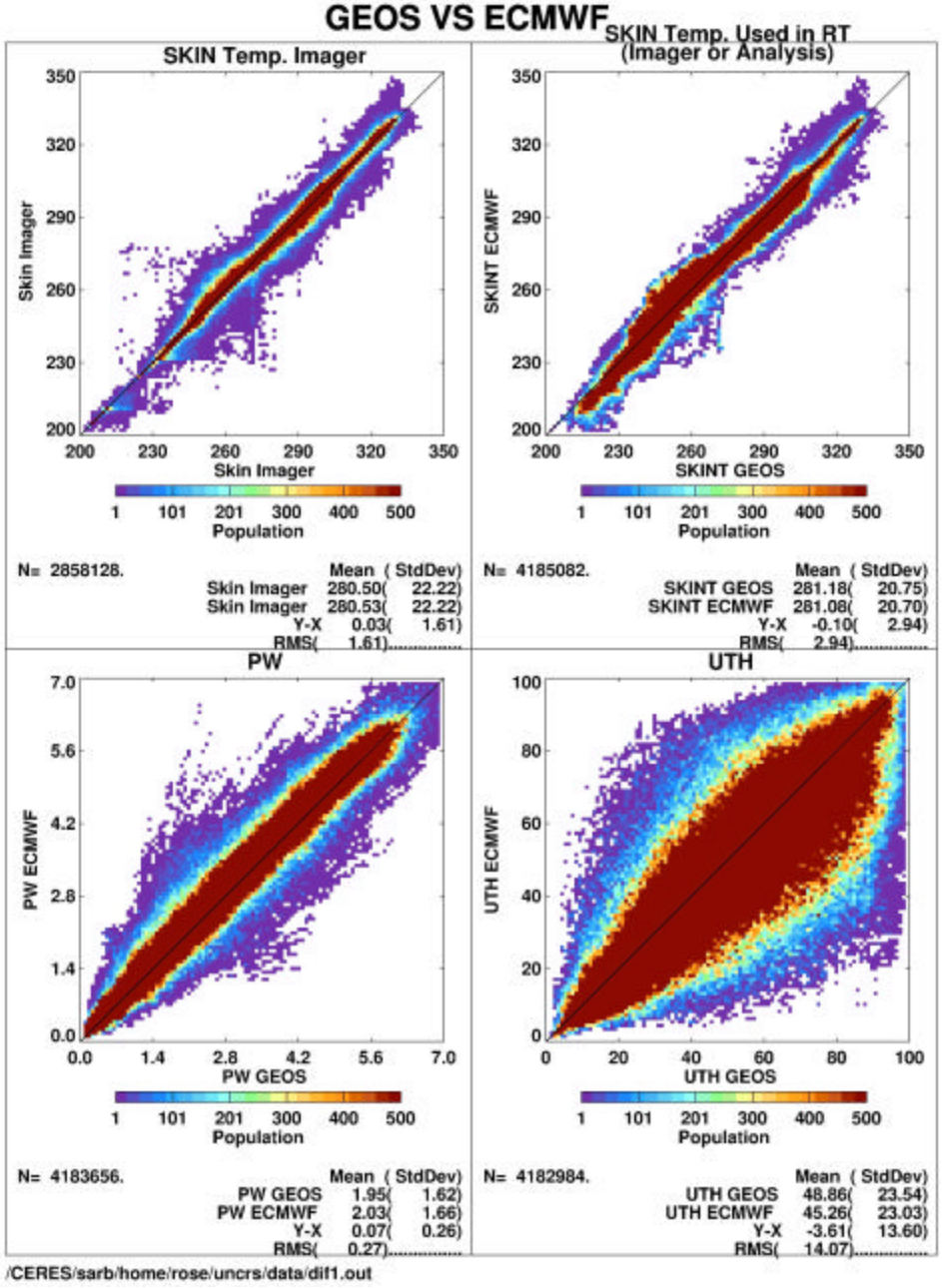
When clear, CERES uses MODIS imager & NWP sounding to produce a skin temperature.

Y axis skin temp:

ECMWF & imager

X axis skin temp:

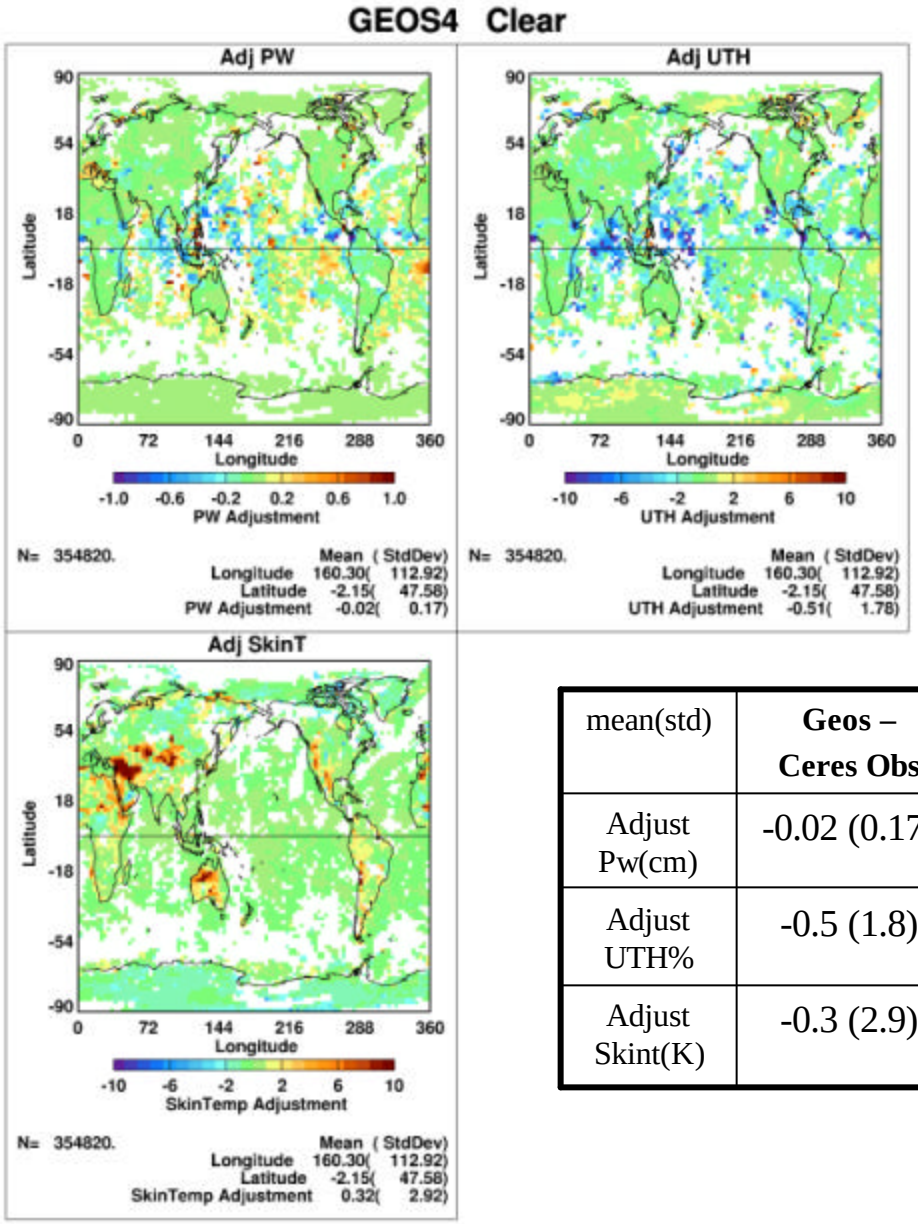
GEOS & imager



Compare all-sky skin temperatures used by SARB on right.

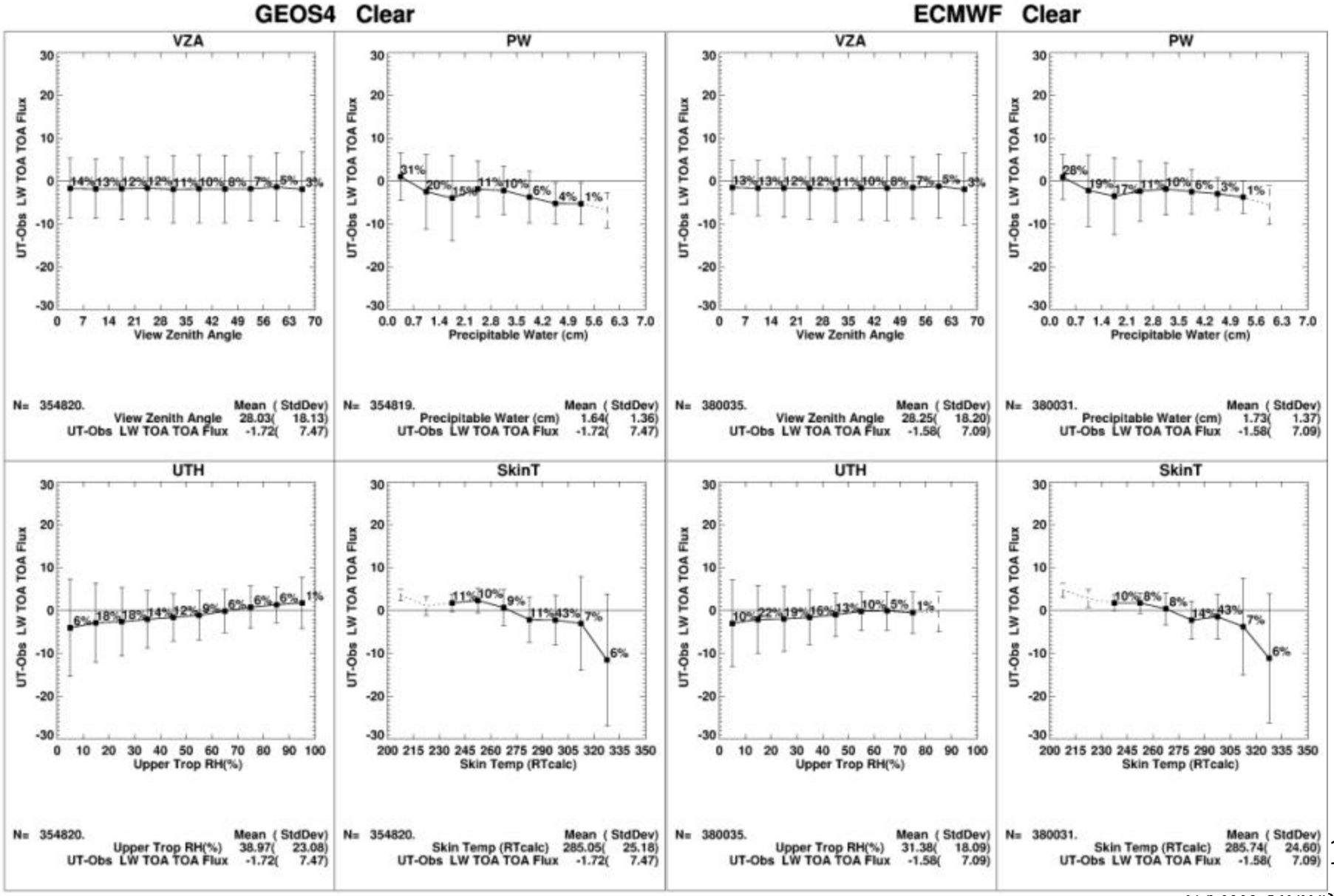
Imager-based skin temperature is used only over clear land. Everything else uses NWP file for skin temperature (over ocean, that's SST from AVHRR).

Clear Sky Adjustments (SARB tuning of PW, UTH, skin temperature)



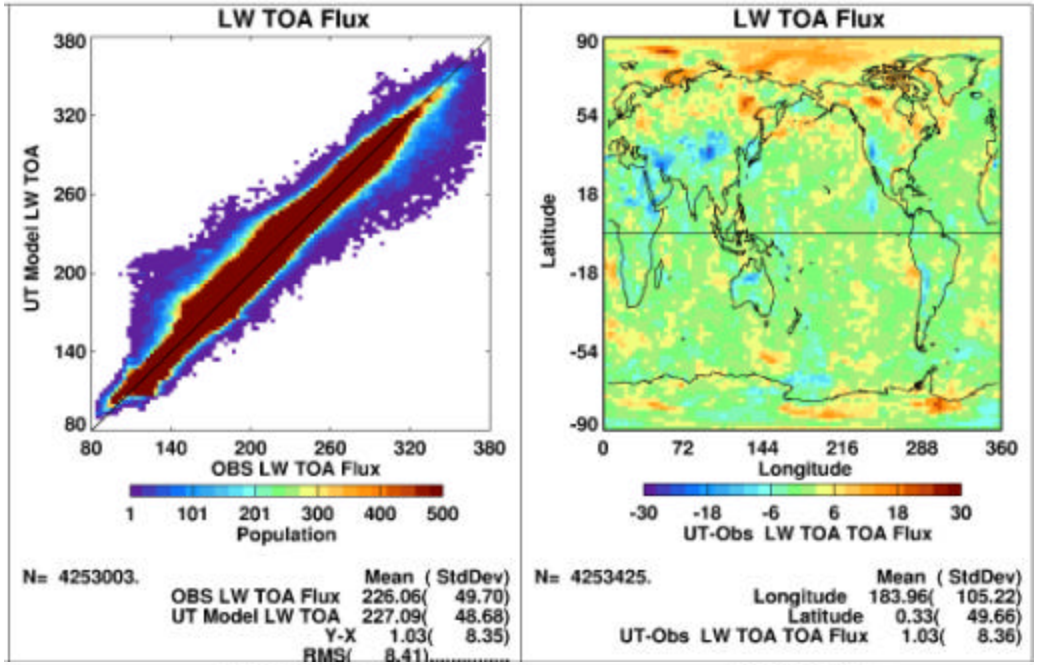
mean(std)	**Geos – Ceres Obs**	**Ecmwf- Ceres Obs**
Adjust Pw(cm)	-0.02 (0.17)	-0.01 (0.15)
Adjust UTH%	-0.5 (1.8)	-0.4 (1.2)
Adjust Skint(K)	-0.3 (2.9)	0. 4(3.0)

Clear Sky OLR Error vs. (VZA, initial PW, UTH & skin T)

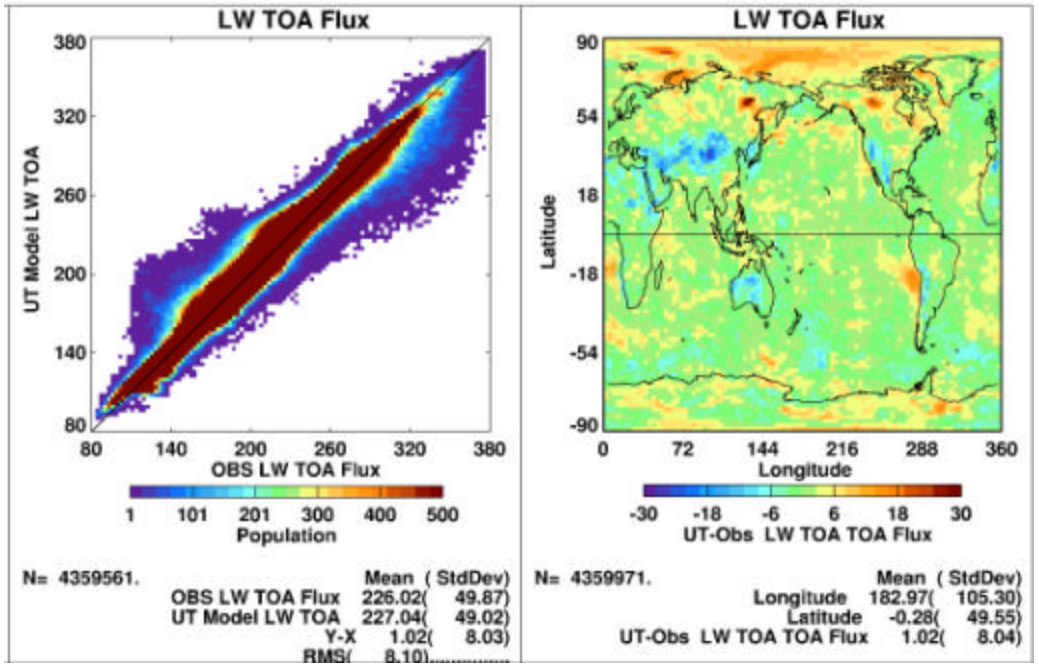


All Sky OLR

GEOS

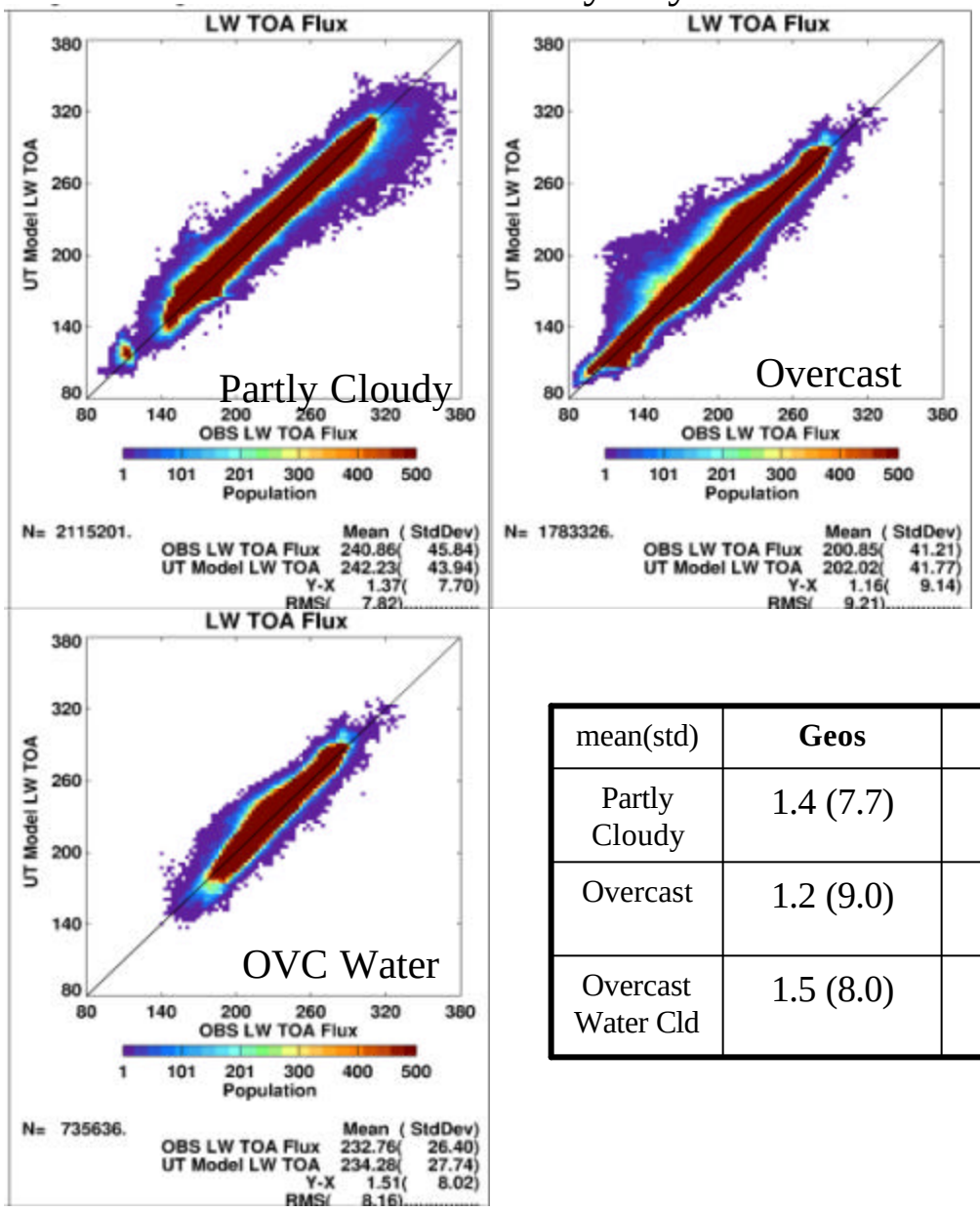


ECMWF



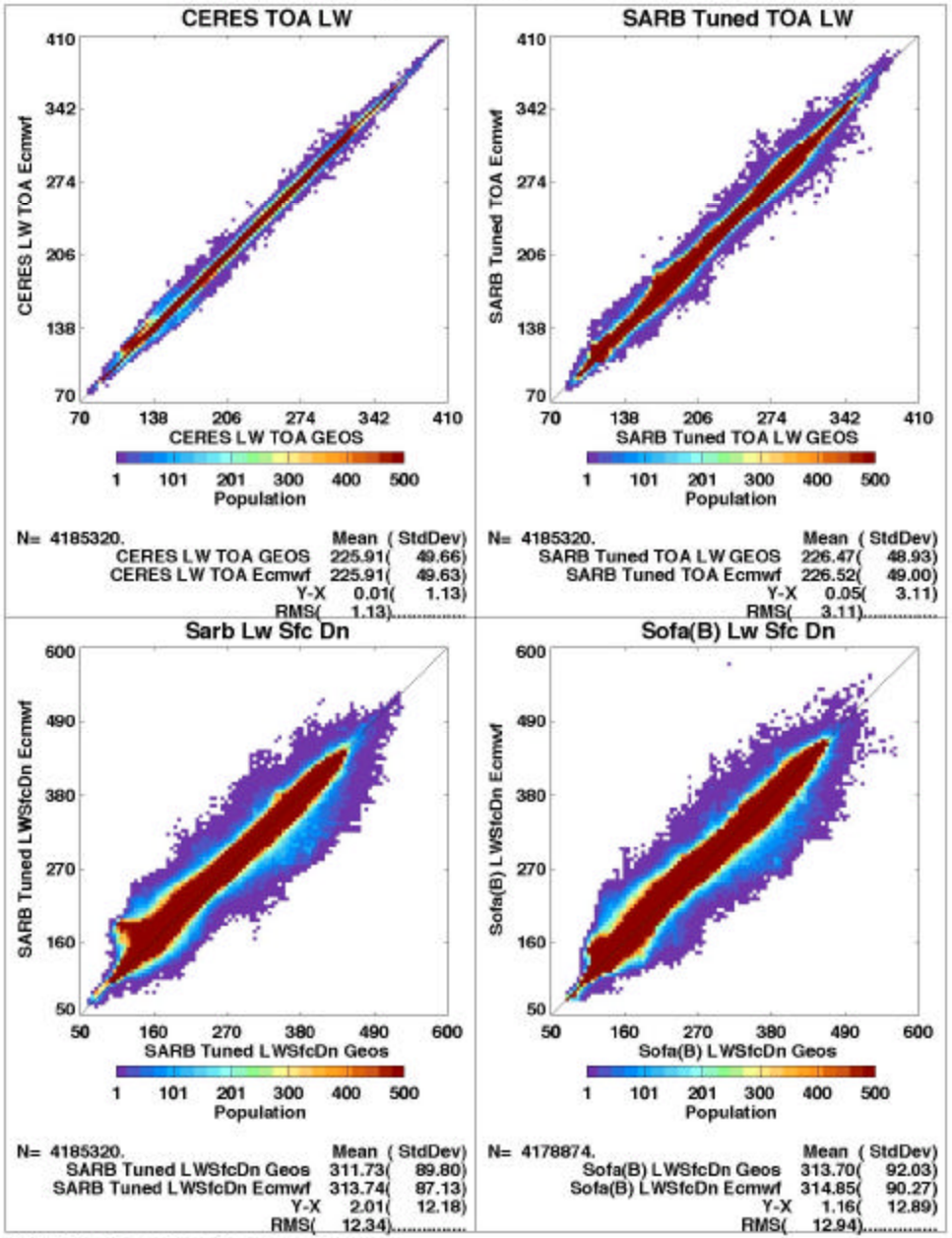
Cloudy Sky OLR

GEOS Cloudy Sky



mean(std)	**Geos**	**Ecmwf**
Partly Cloudy	1.4 (7.7)	1.5 (7.3)
Overcast	1.2 (9.0)	0.9 (8.9)
Overcast Water Cld	1.5 (8.0)	1.3(8.0)

GEOS VS ECMWF



/CERES/sarb/home/rose/uncrs/data/dif2.out

Conclusions

- Flux differences are small for use of GEOS or ECMWF
- Spatial Resolution finer in ECMWF
- Limited Comparison (1 day each in 2 seasons)