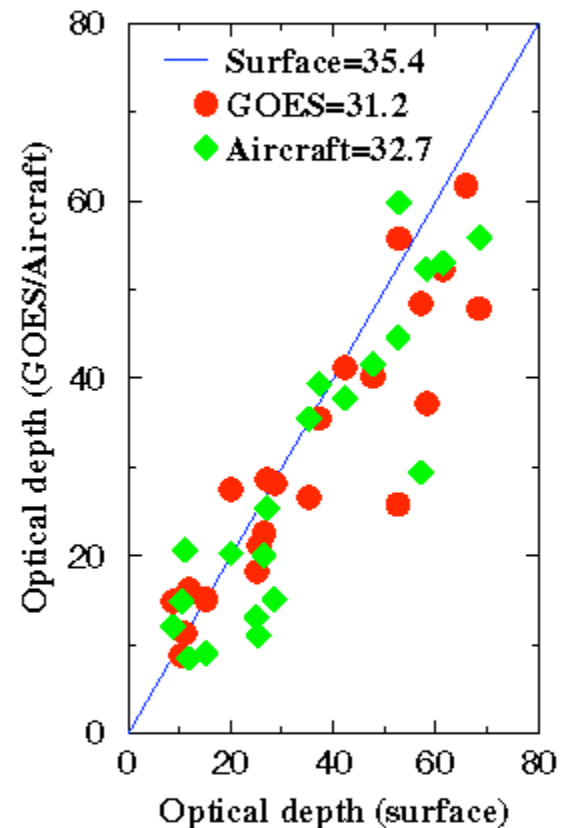
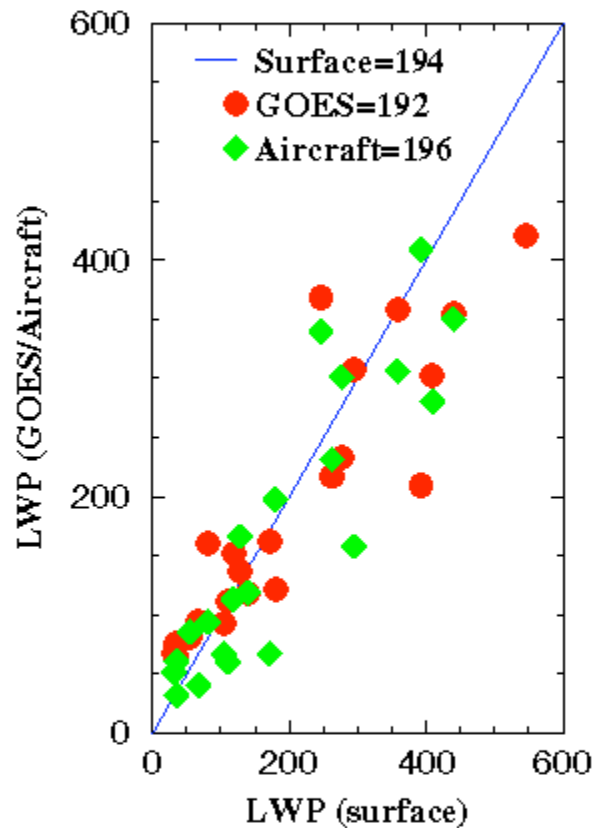
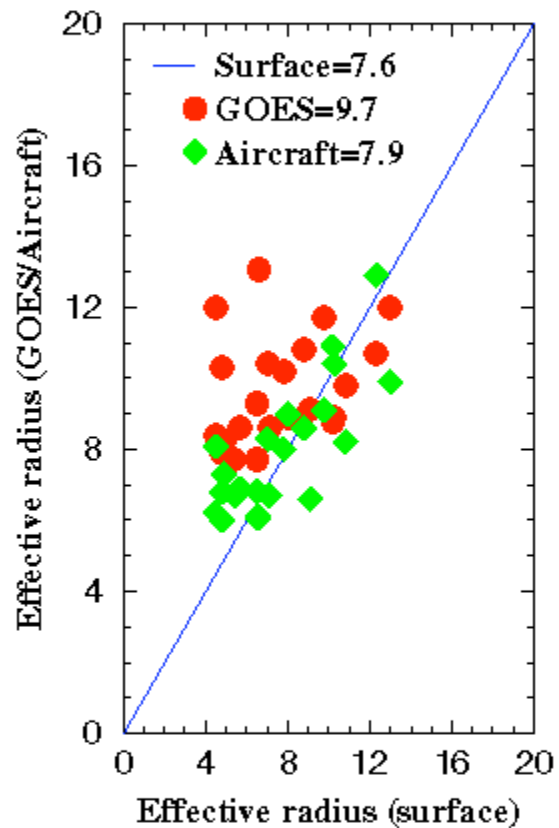


(Dong et al. 2002)

Comparison of Surface, GOES and Aircraft Results (~10 hours)



Angular Variations of MODIS Cloud Properties Over ARM SGP Site

Xiquan Dong and Baike Xi, University of North Dakota

Pat Minnis, Sunny Sun-Mack, and Yan Chen, NASA Langley

Outlines:

- 1) Single-layer stratus cloud height and temperature**
- 2) Single-layer stratus cloud microphysical properties**
- 3) Angular variations**

Data

Time period

Terra: From March 2000 to December 2004

Aqua: From July 2002 to December 2004

Surface:

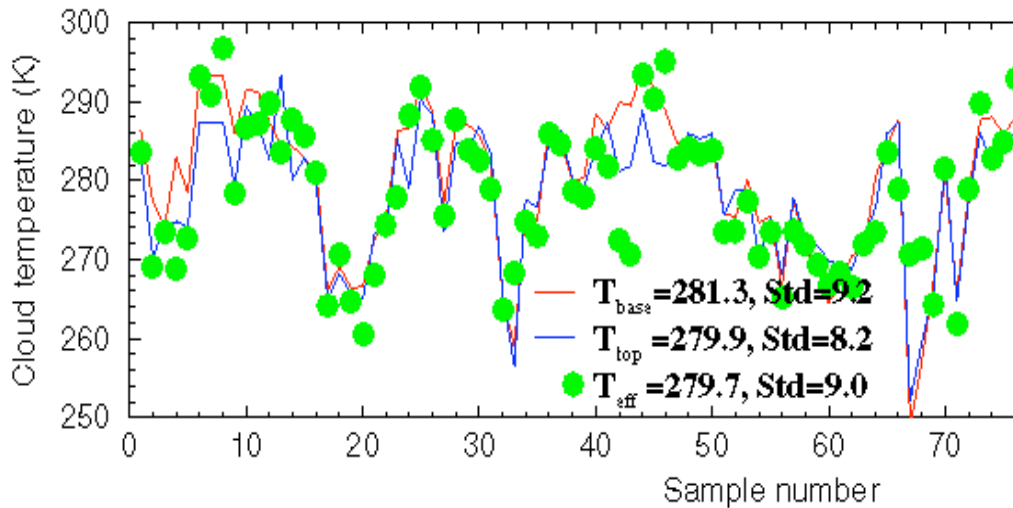
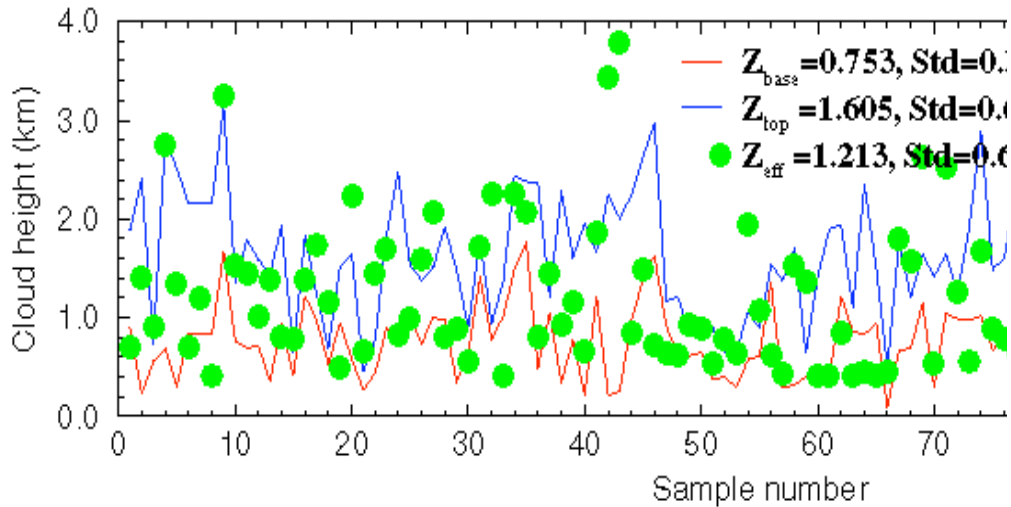
DOE ARM SGP measurements and retrievals averaged over a 1-hour interval centered at the time of the satellite overpass.

Satellite:

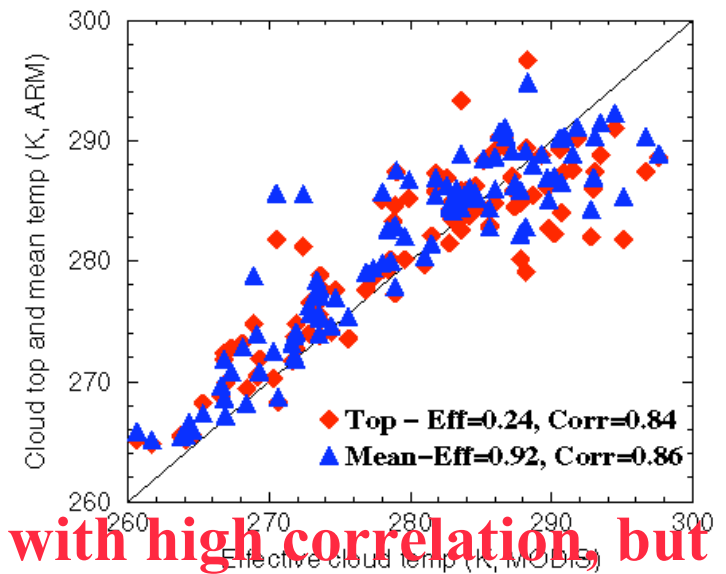
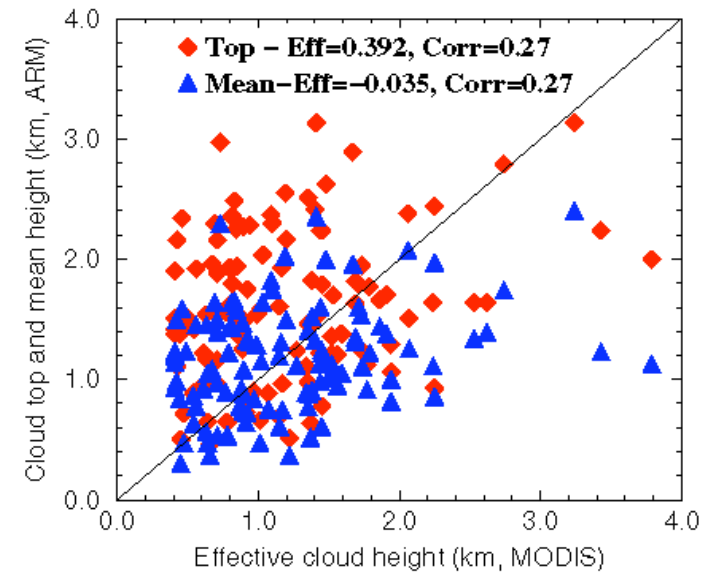
Average all pixels within a 30-km x 30-km area centered on the ARM SGP site

TERRA_Day

Low-level cloud height and temperature comparison at the ARM S
(3/2000 => 12/2004)



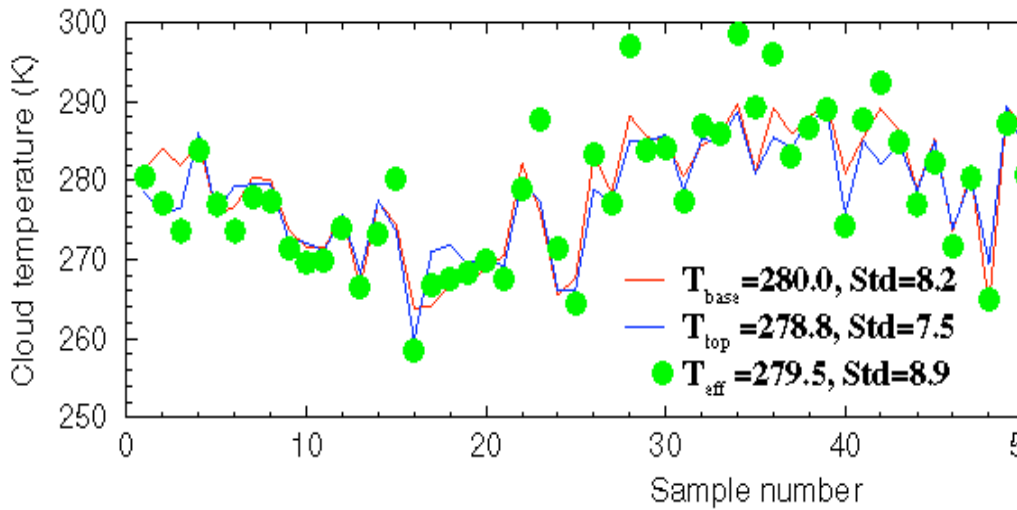
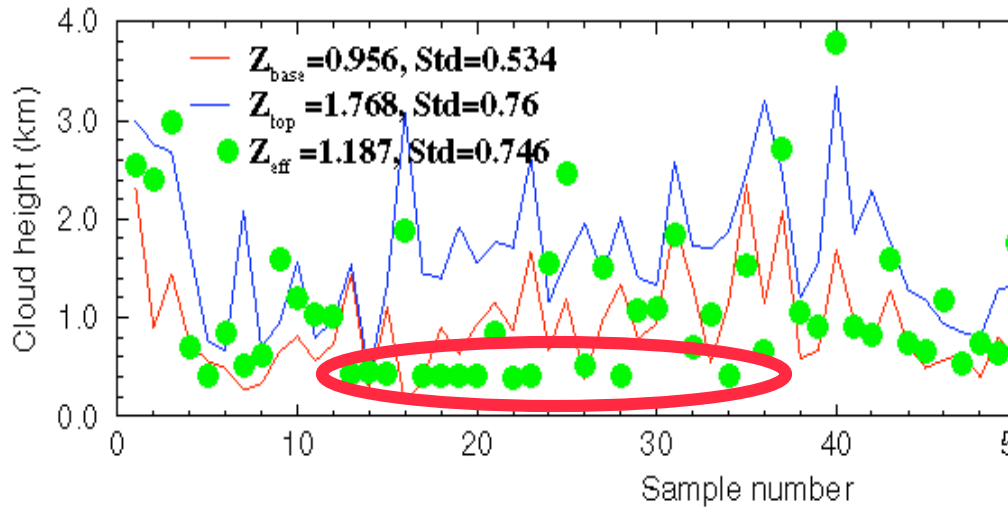
Low-level cloud height and temperature at the ARM S



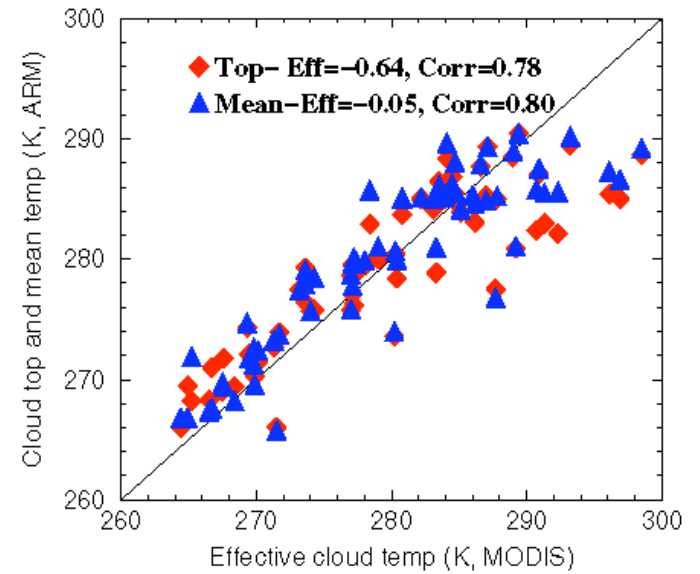
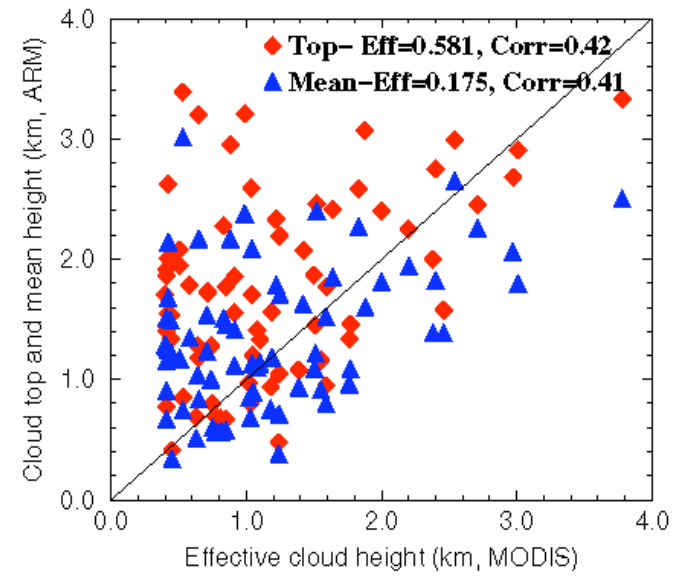
MODIS's temps agree well with ARM data with high correlation, but MODIS-derived cloud heights are scattering with low correlation.

AQUA_Day

Low-level cloud height and temperature comparison at the (7/2002 => 12/2004)

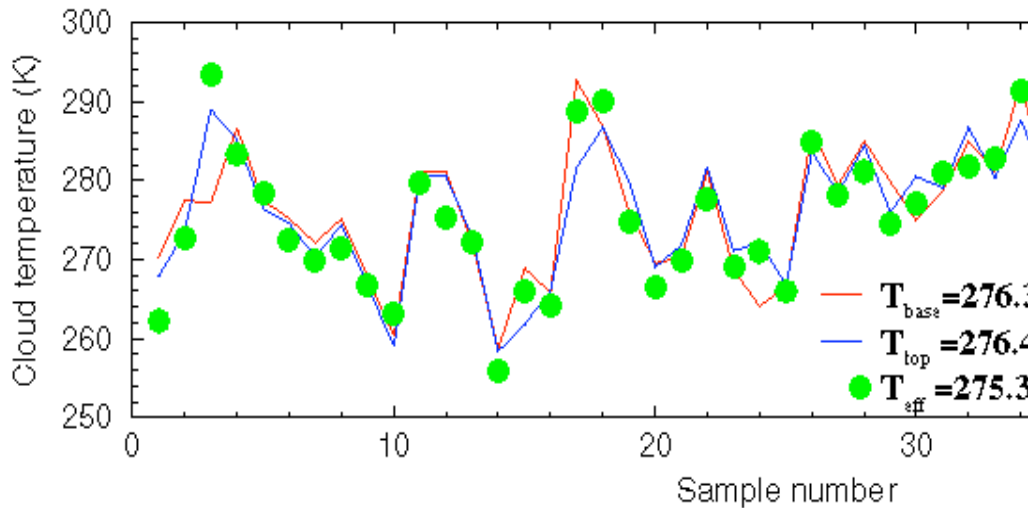
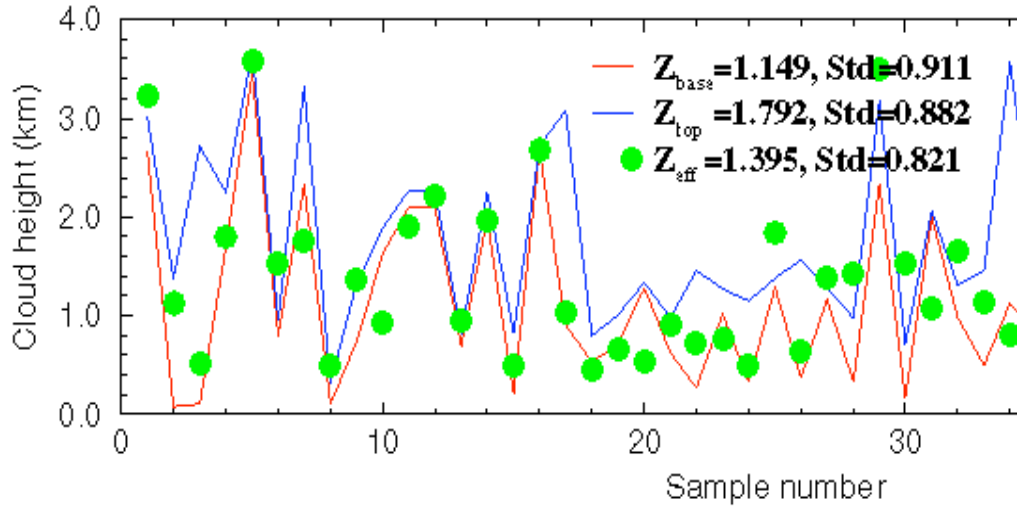


Low-level cloud height and temperature at the ARM SG

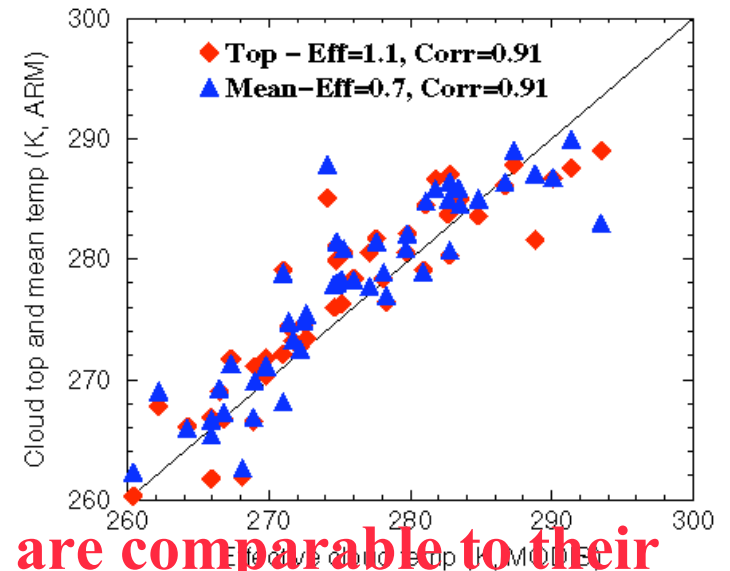
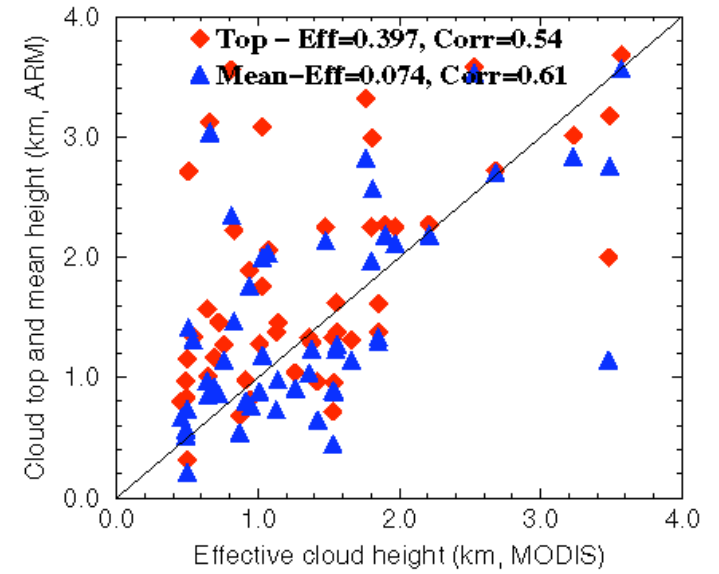


TERRA_Night

Low-level cloud height and temperature comparison at 1 (3/2000 => 12/2004)



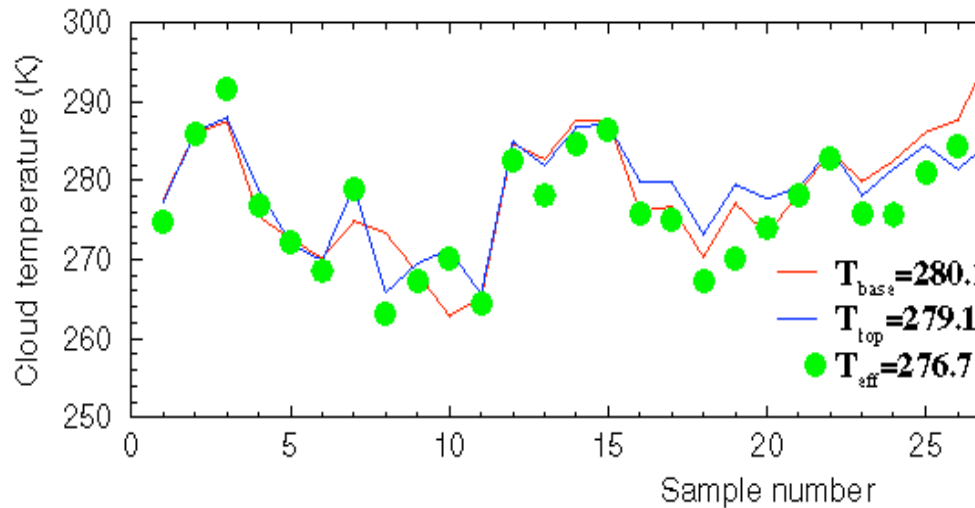
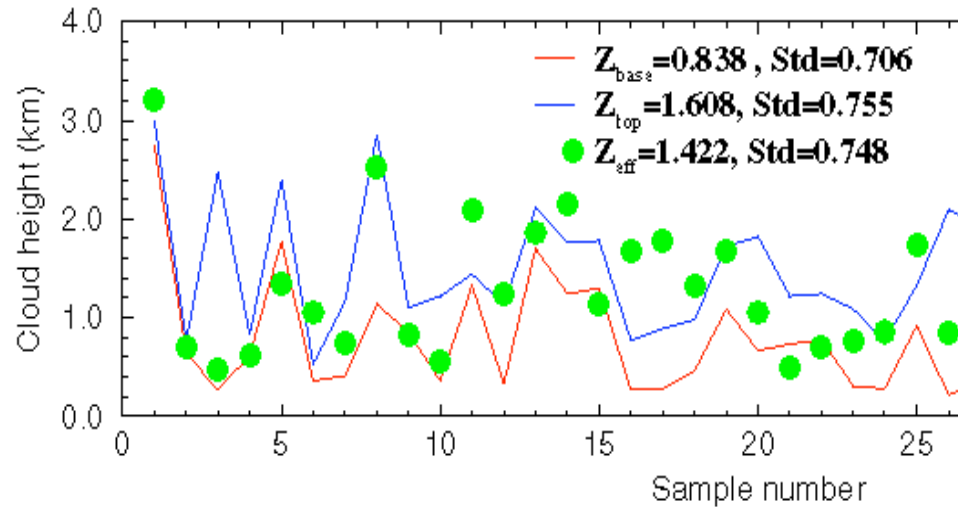
Low-level cloud height and temperature at the ARM.



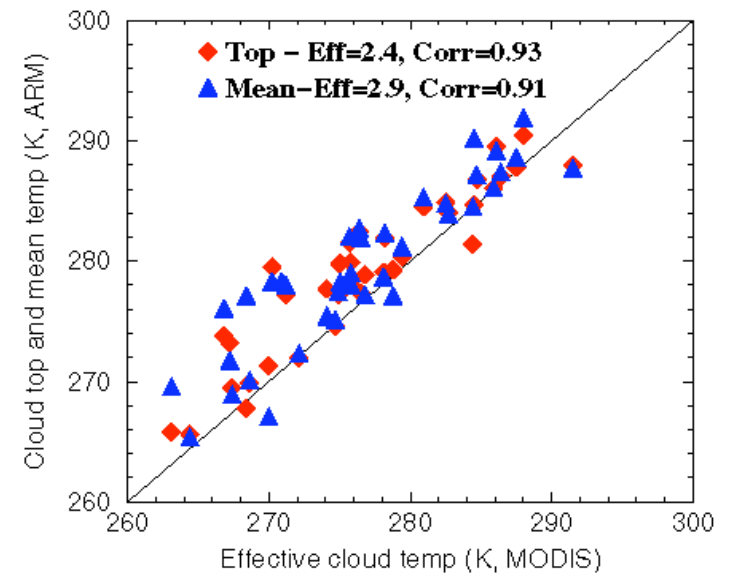
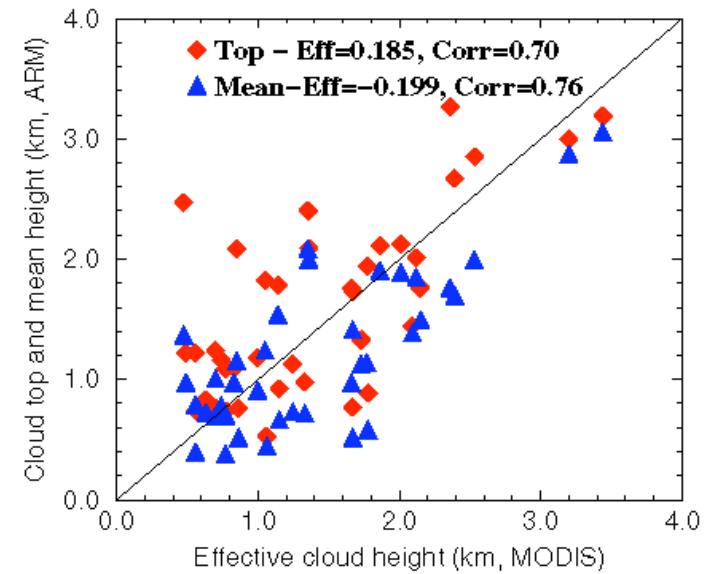
Nighttime MODIS cloud heights and temps are comparable to their daytime counterparts.

AUQA_Night

Low-level cloud height and temperature comparison a
(7/2002 => 12/2004)

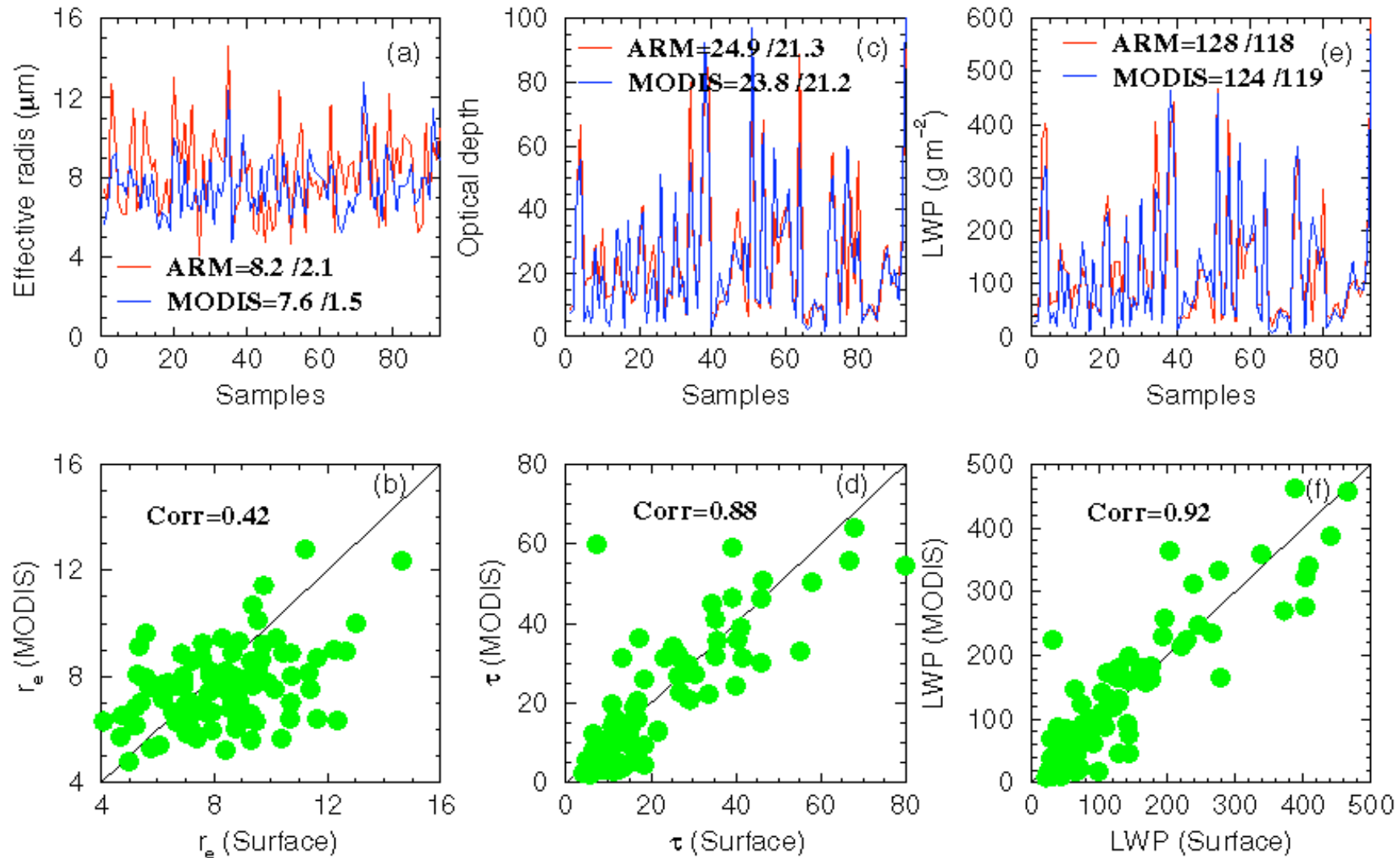


Low-level cloud height and temperature at the ARM.



TERRA_Day

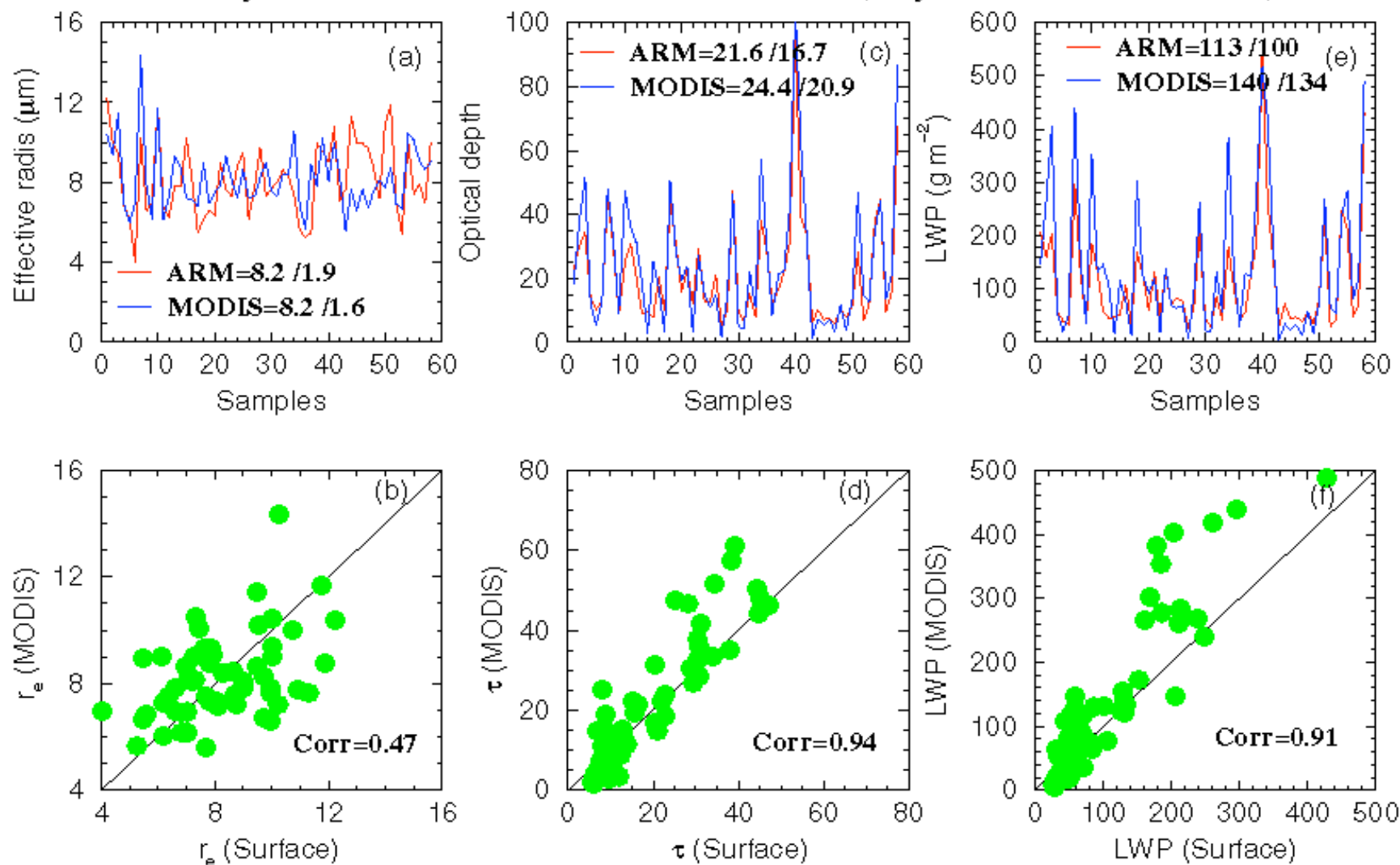
Daytime stratus clouds at the ARM SGP Site (March 2000 – December 2004)



They just agree well as we expected.

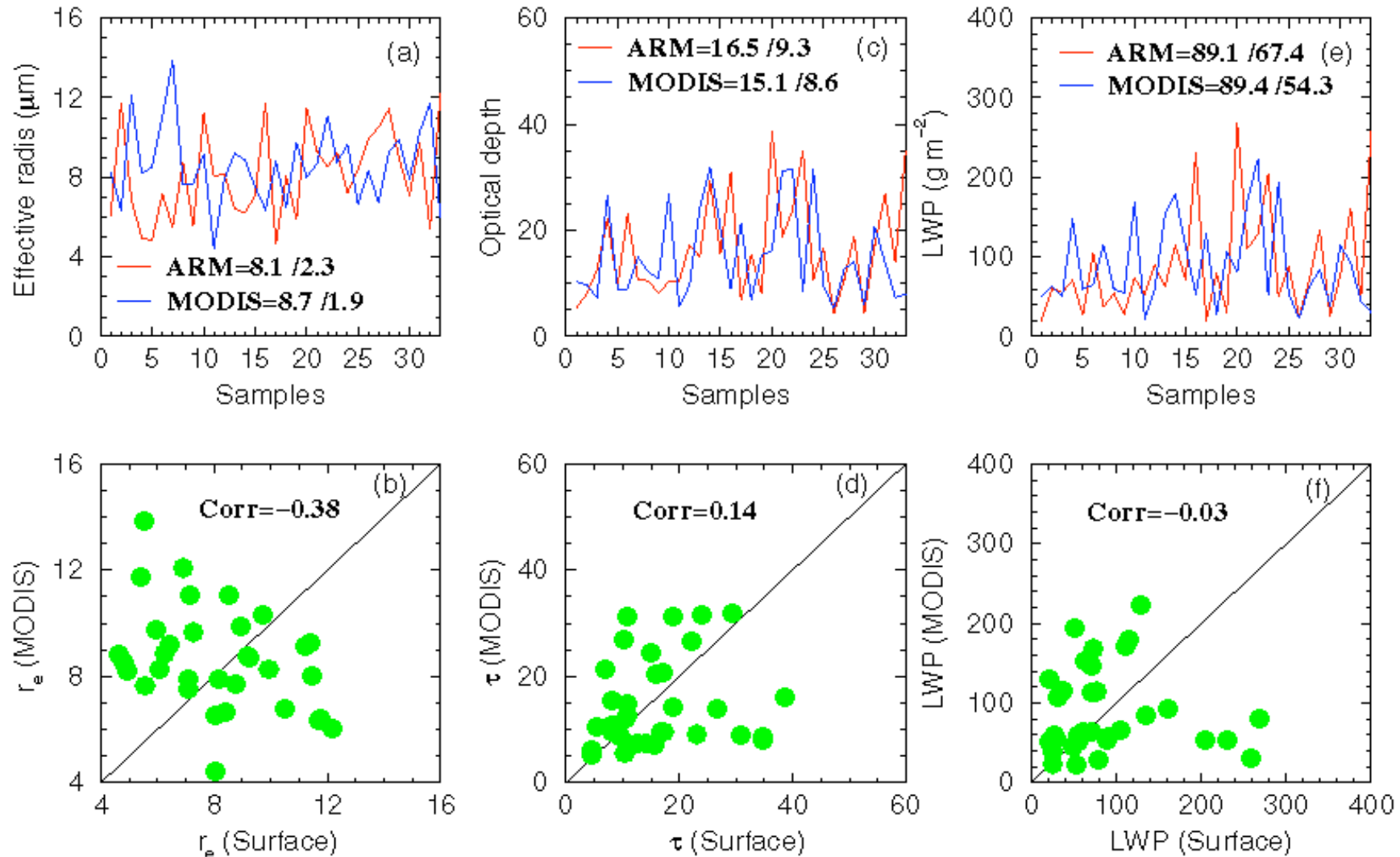
AQUA_Day

Daytime stratus clouds at the ARM SGP Site (July 2002 – December 2004)



TERRA_Night

Nighttime stratus clouds at the ARM SGP Site (March 2000 – December 2004)



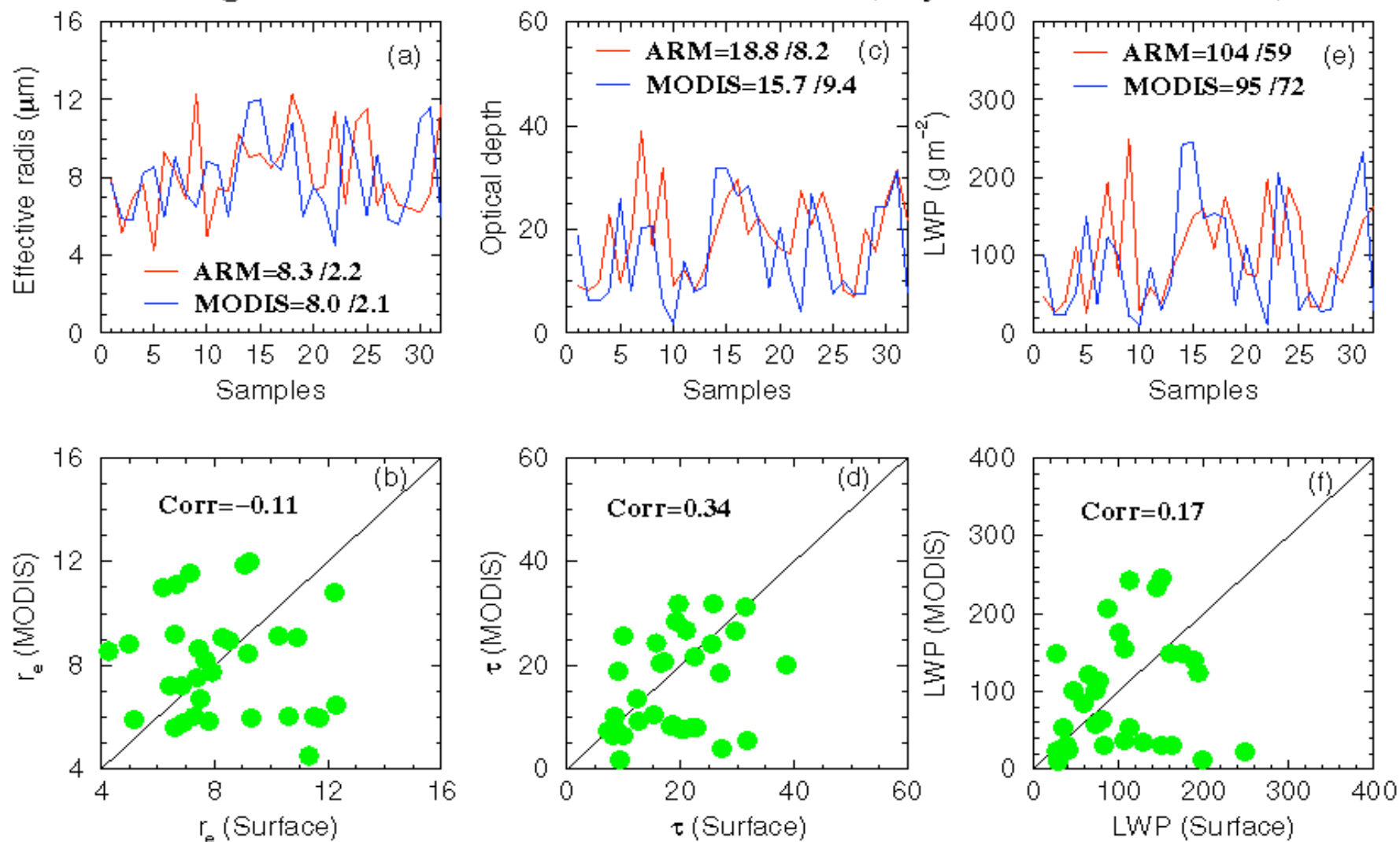
(1) Only compare cases for $\tau < 40$

(2) Even though the mean values agree well between ARM and MODIS, it does not mean that MODIS night retrievals are correct (low correlations)

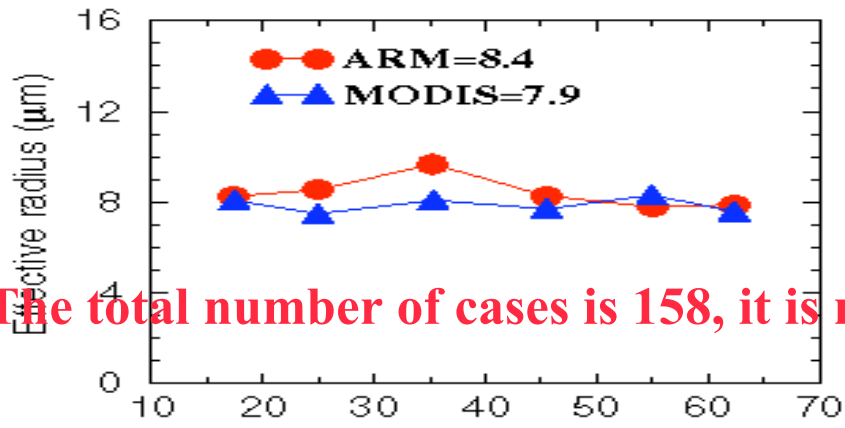


AQUA_Night

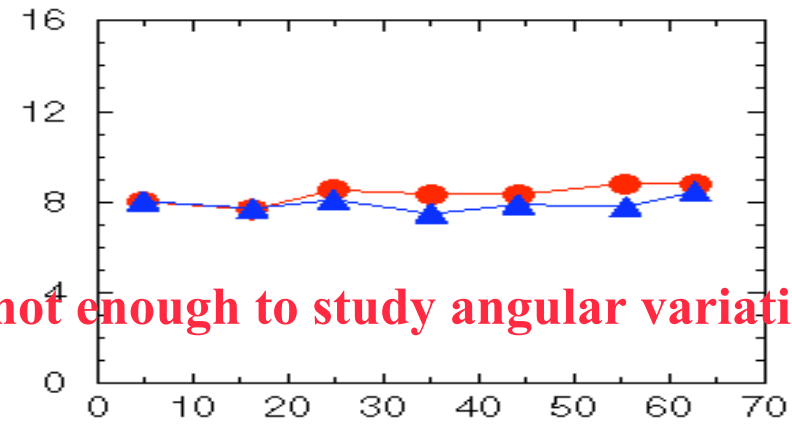
Nighttime stratus clouds at the ARM SGP Site (July 2002 – December 2004)



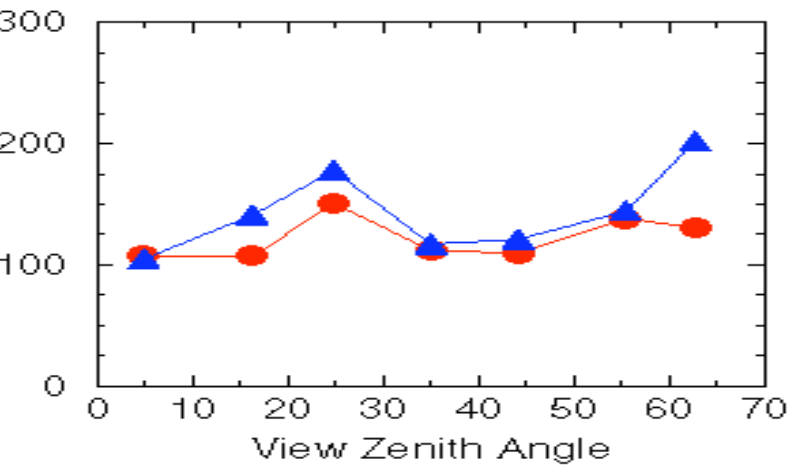
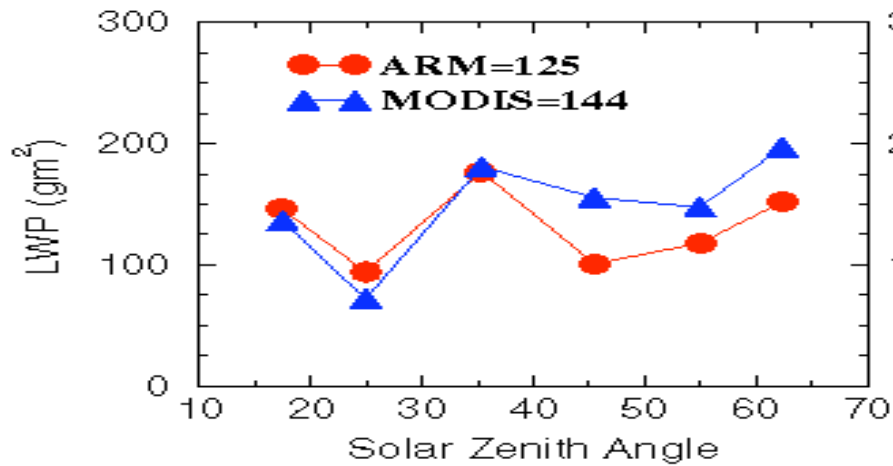
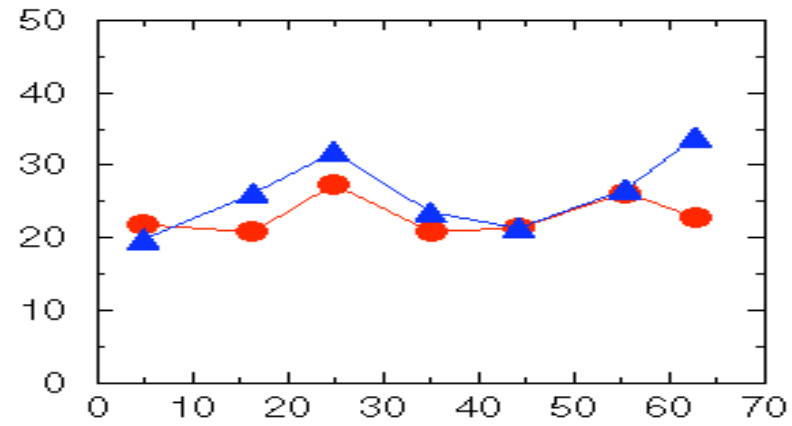
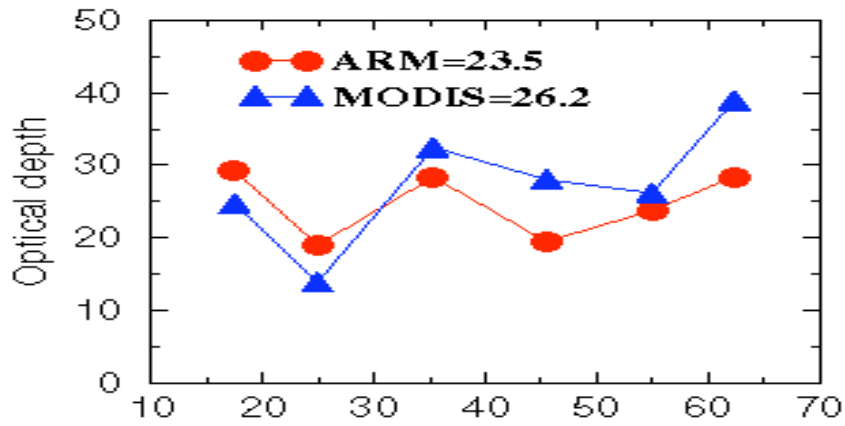
SZA Variations

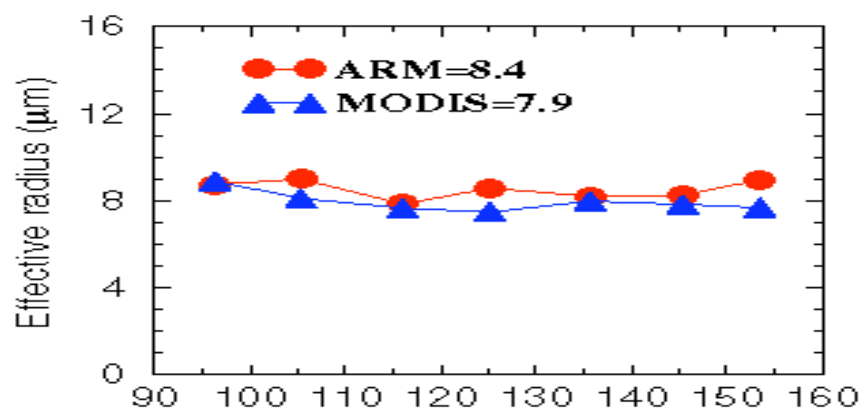
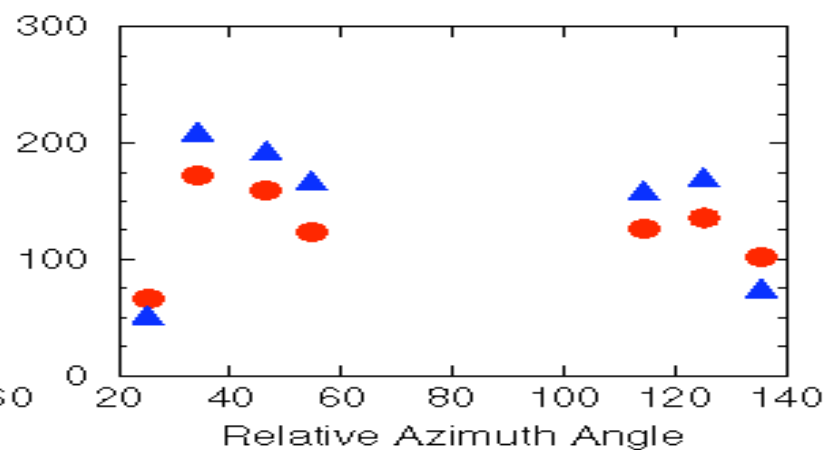
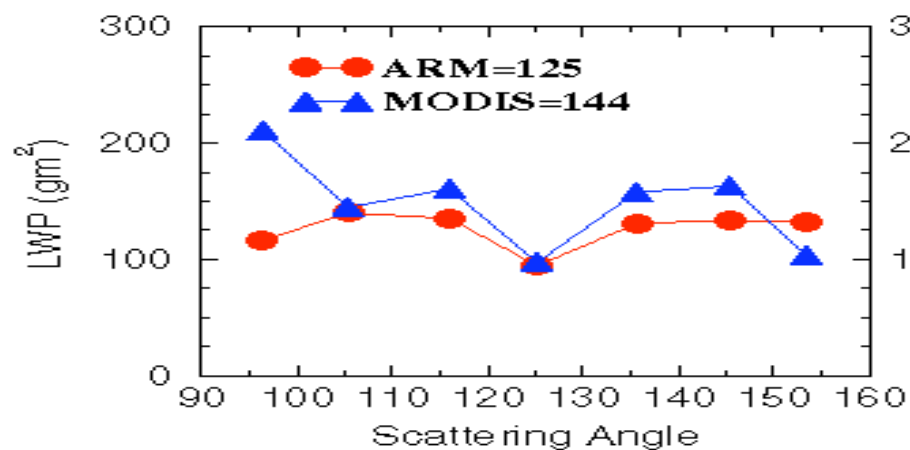
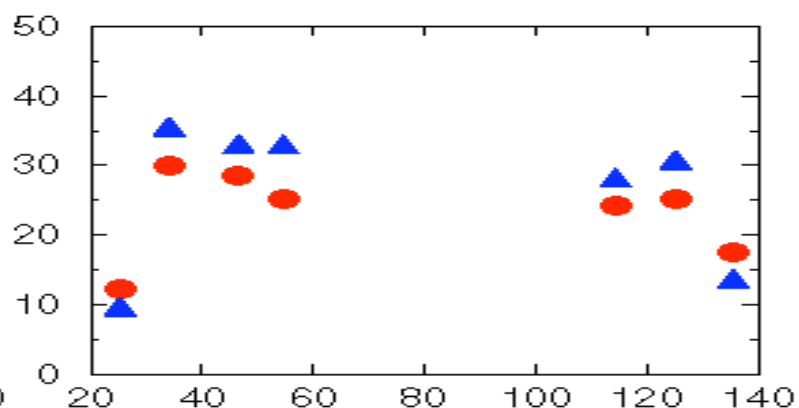
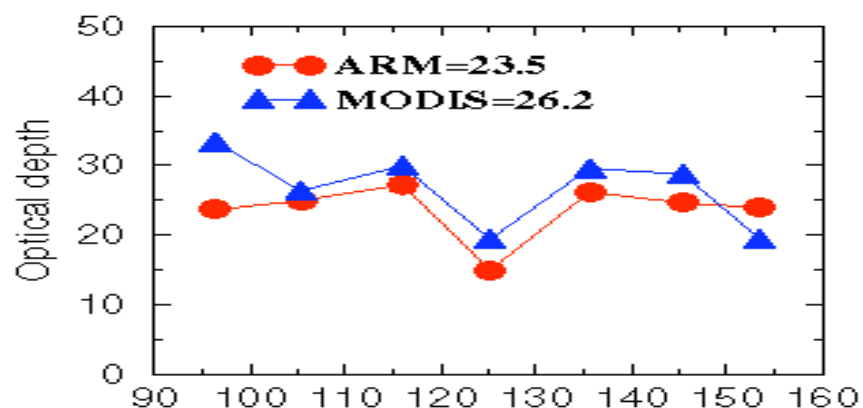
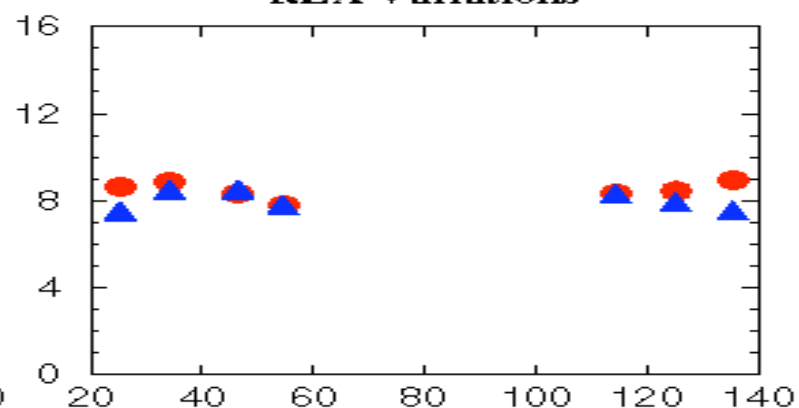


VZA Variations



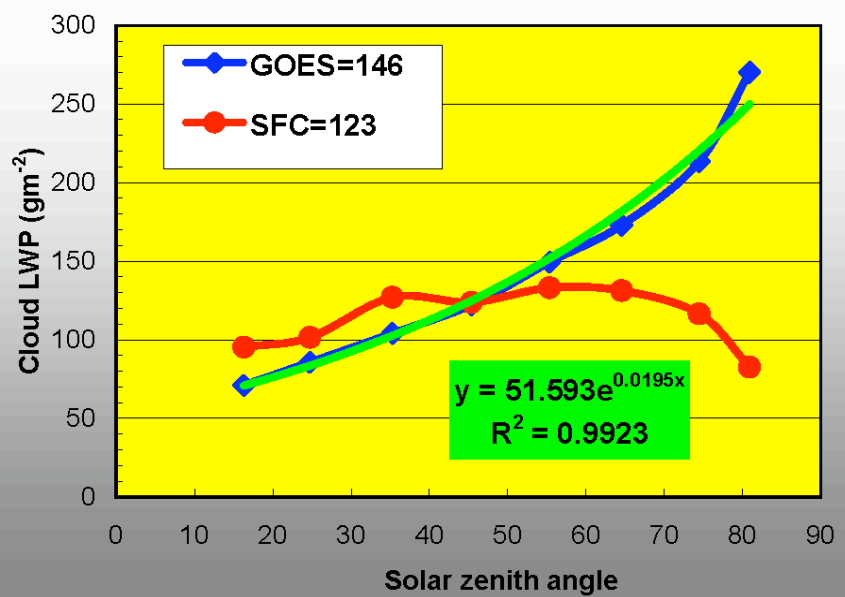
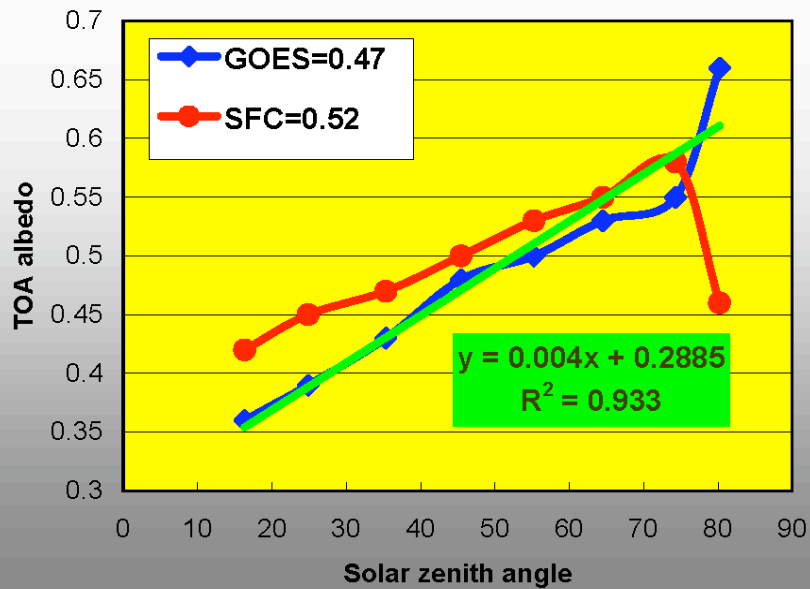
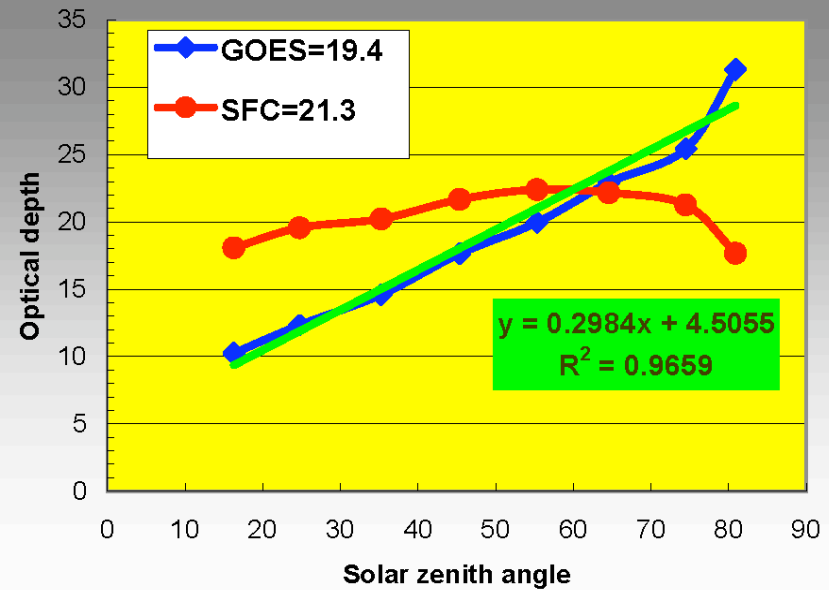
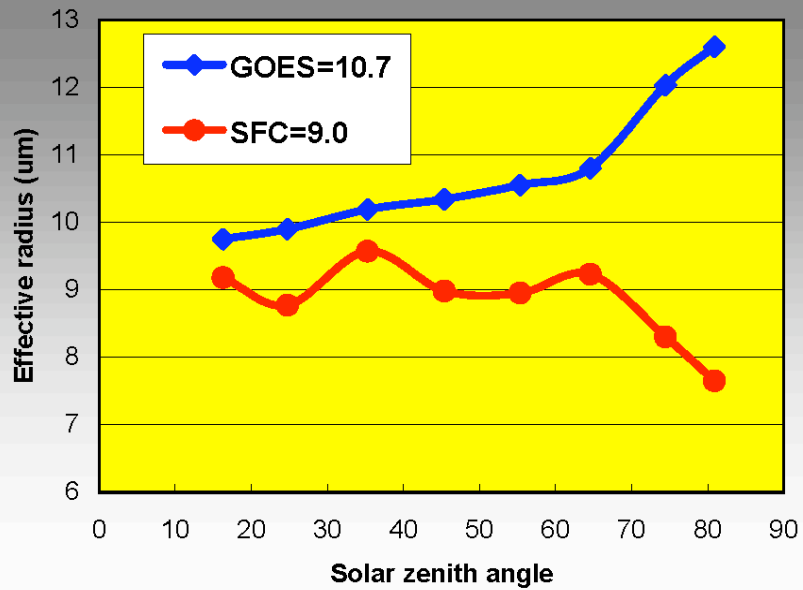
The total number of cases is 158, it is not enough to study angular variations

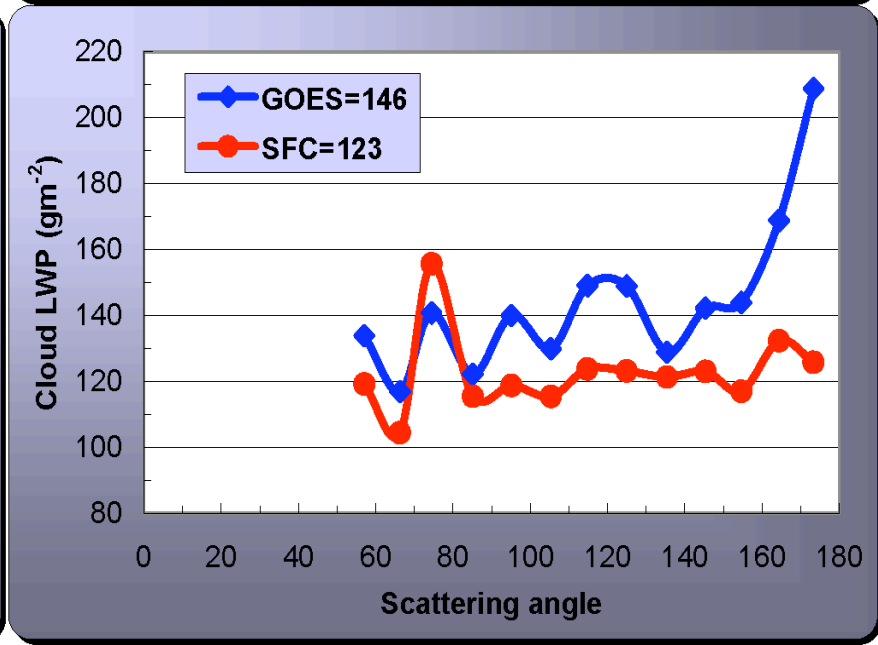
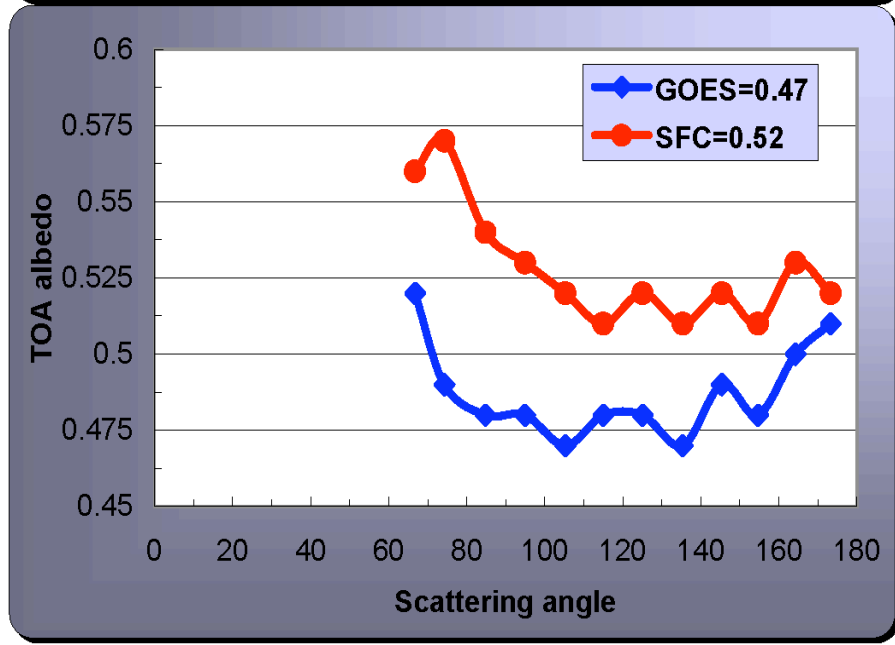
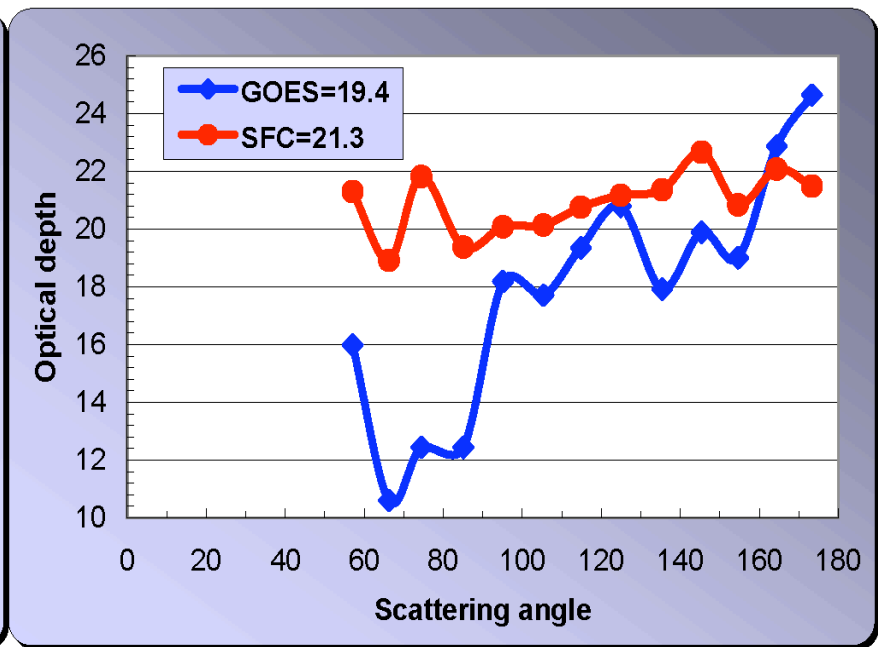
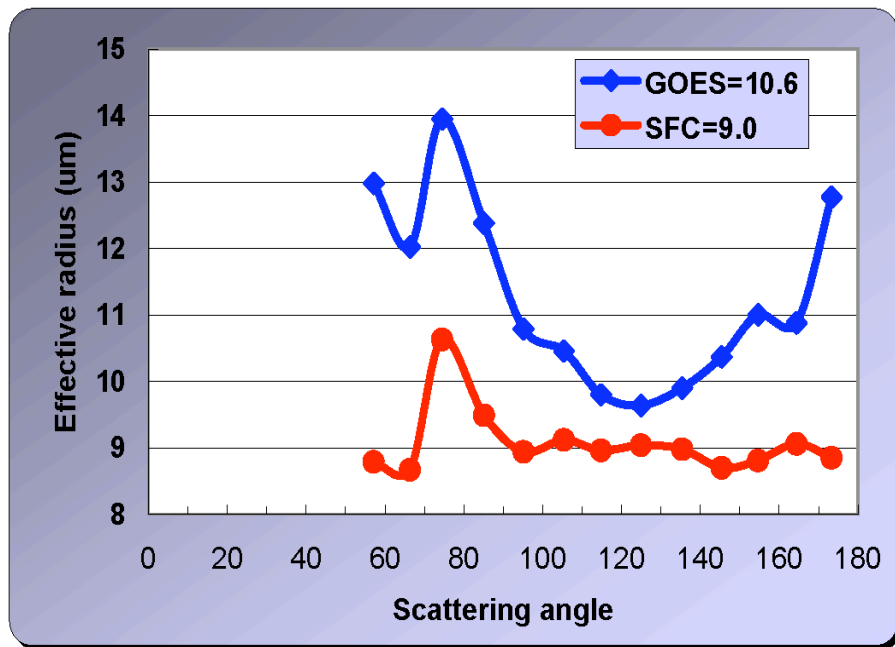


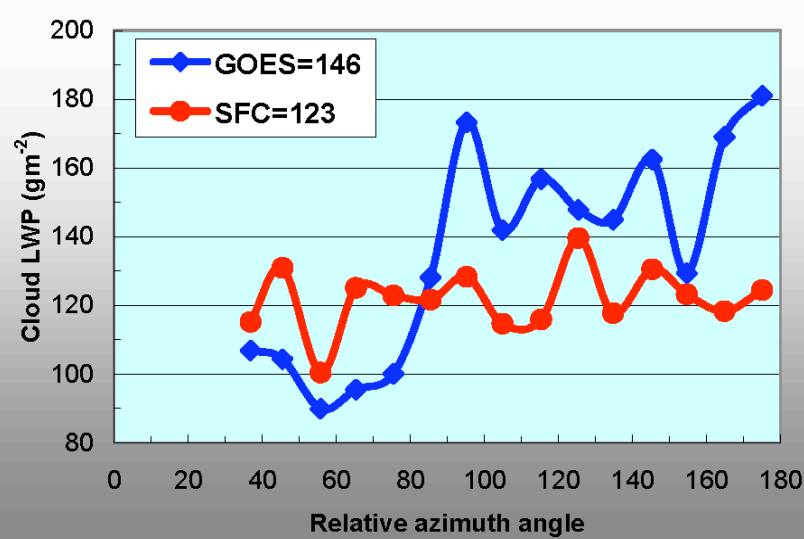
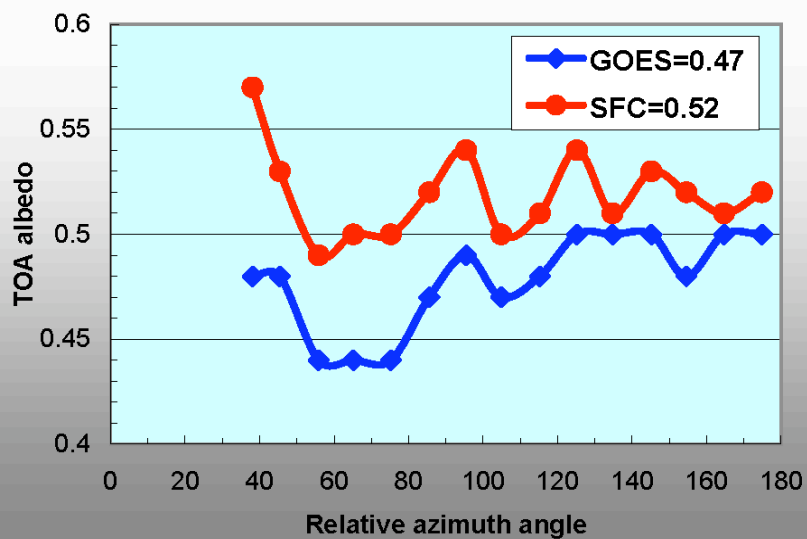
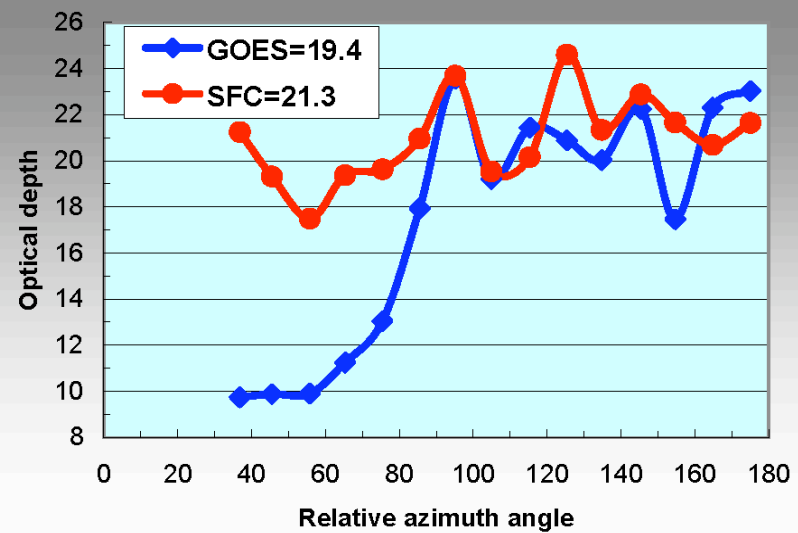
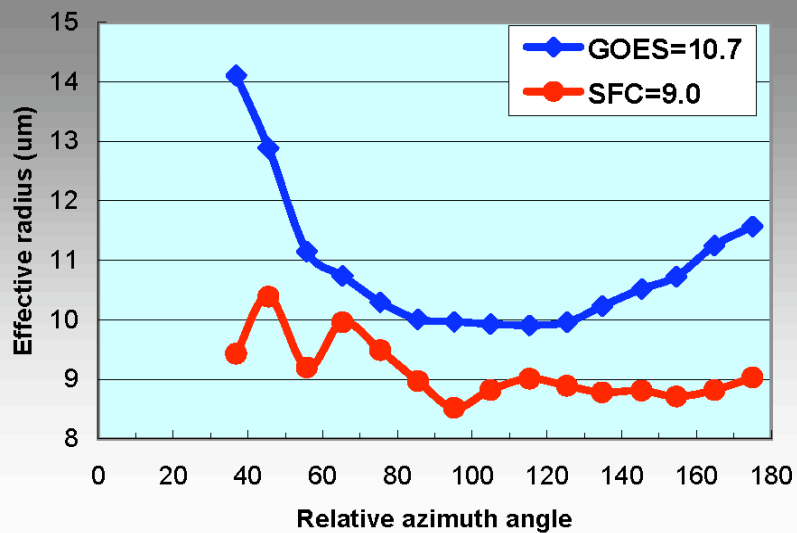
SCA Variations**RZA Variations**

Conclusions

- (1) MODIS measured cloud temp agree well with ARM data, but the algorithm to derive cloud height needs improvement.**
- (2) Microphysical properties of ARM and MODIS:
Daytime: Agree well
Nighttime: OK from a statistical point of view**
- (3) We should collect enough samples to study angular dependent of MODIS cloud properties, like we did for GOES cloud results.**







The total number of samples: 1914

