
GOES EAST FULL DISK VISIBLE 18 JUL 08 17:45 SSEC: UW-MADISON
A Few Things We Have Learned From Inter-comparing Cloud Data Sets
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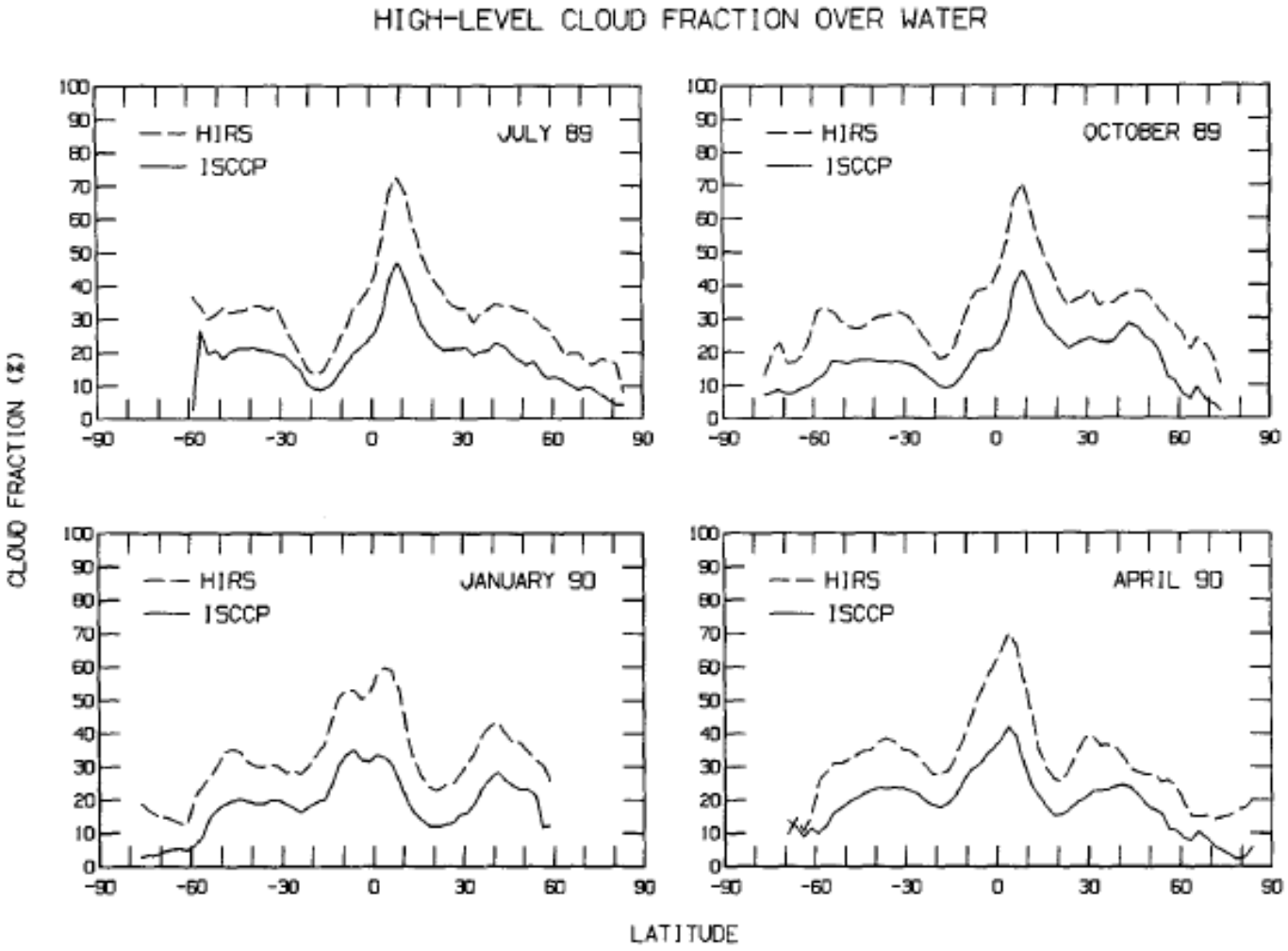
McIDAS

HIRS-ISCCP Comparison

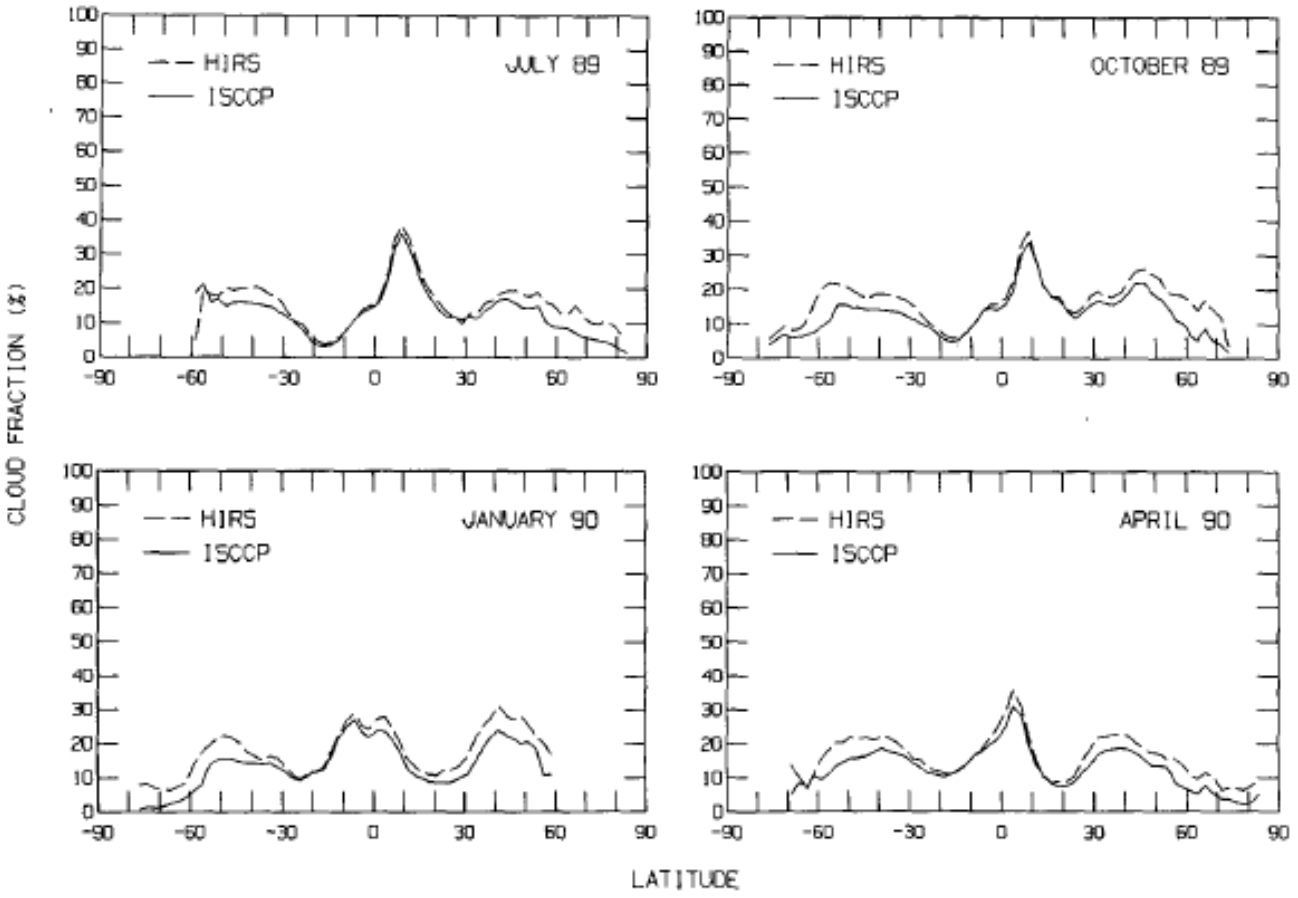
HIRS reports more light cirrus than ISCCP



Jin, Rossow, and Wylie, Monthly Wea. Rev., 1996.

HIRS-ISCCP

HIGH-LEVEL MINUS THIN CIRRUS CLOUD FRACTION OVER WATER

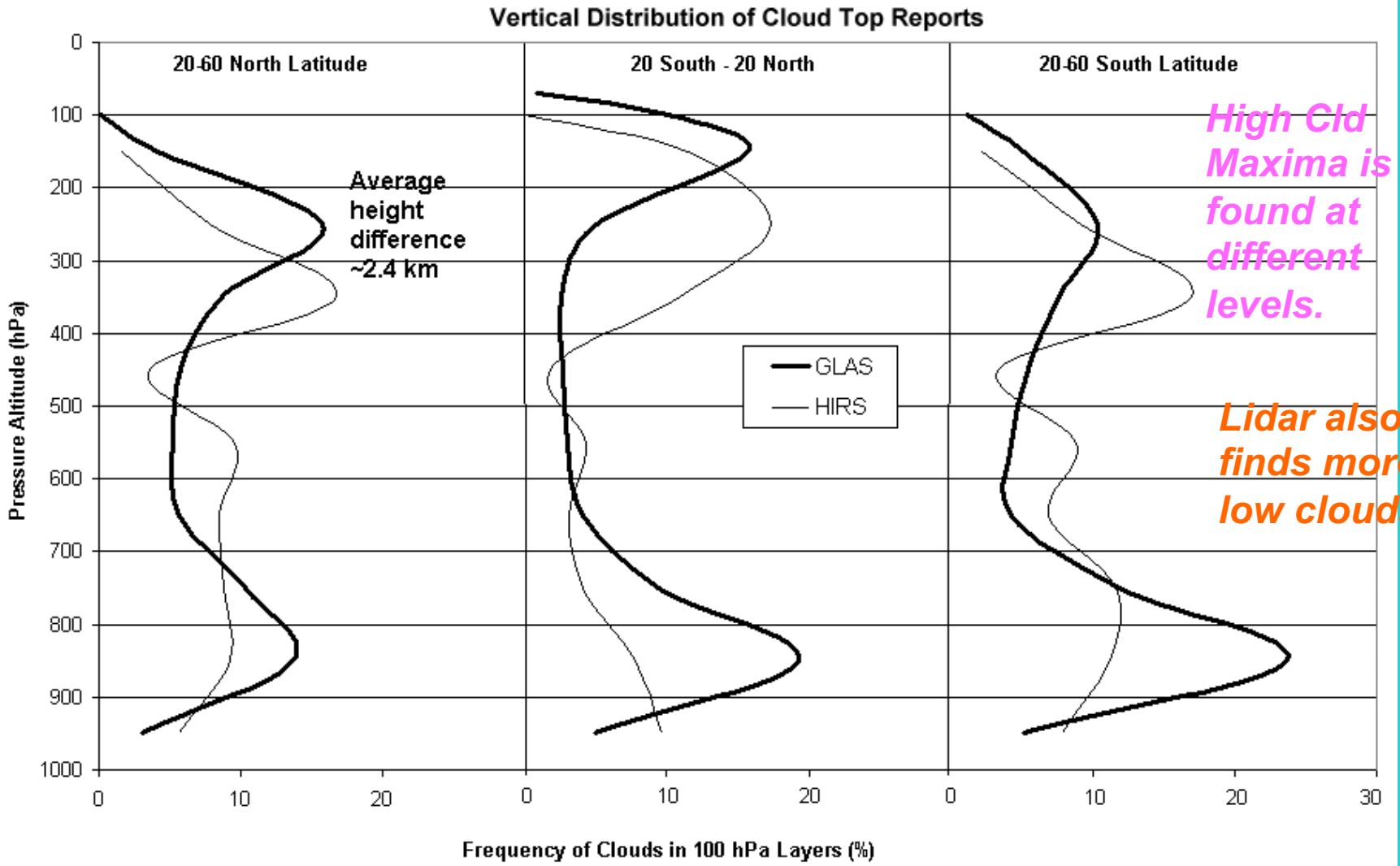


Same data without HIRS thin cirrus

Biggest disagreement is the thinner high cirrus.

The vertical profile of clouds depends on the sensor

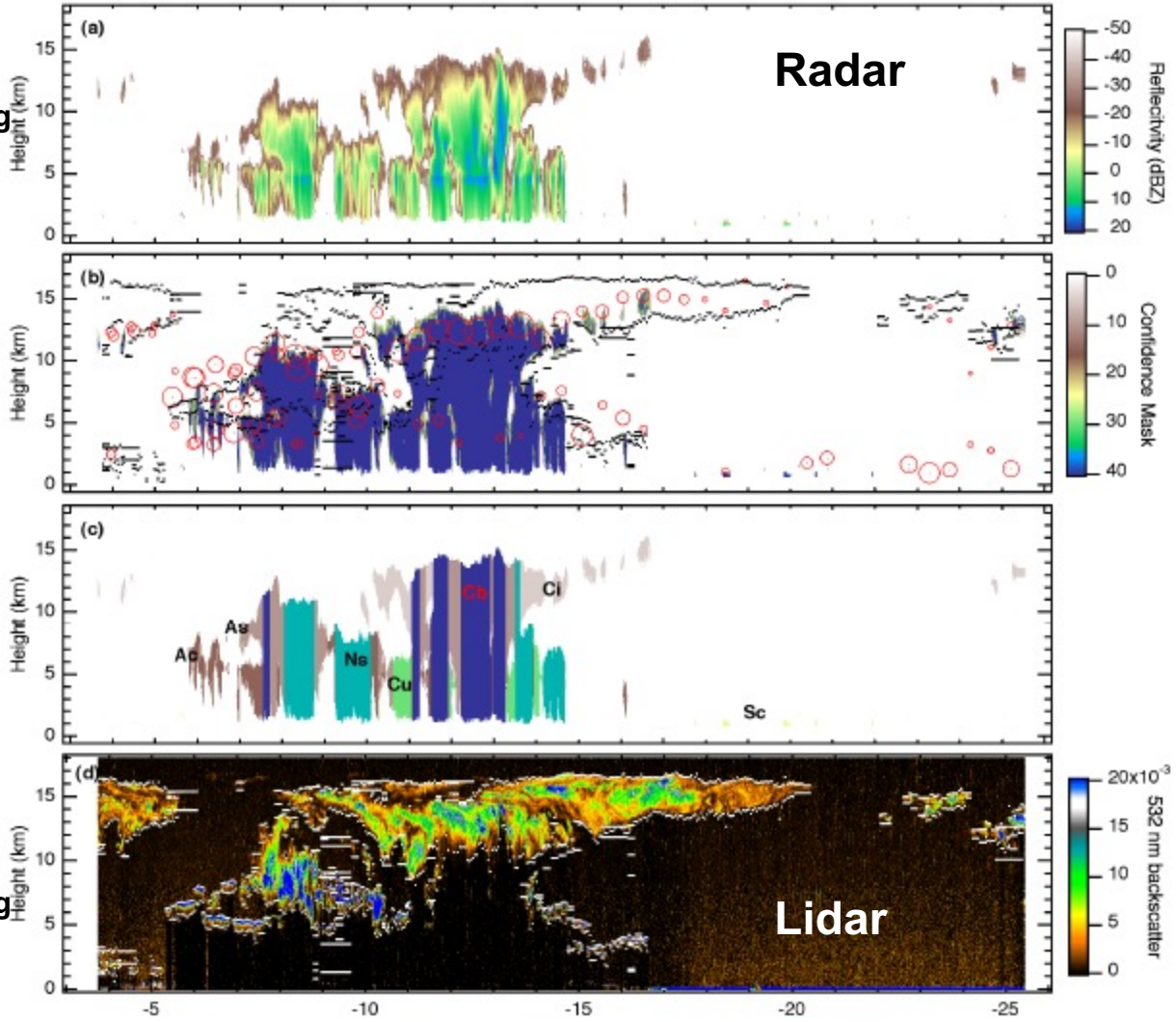
Spacecraft Lidar vs. HIRS (two top down views)



High Cld Maxima is found at different levels.

Lidar also finds more low clouds

High clouds missing



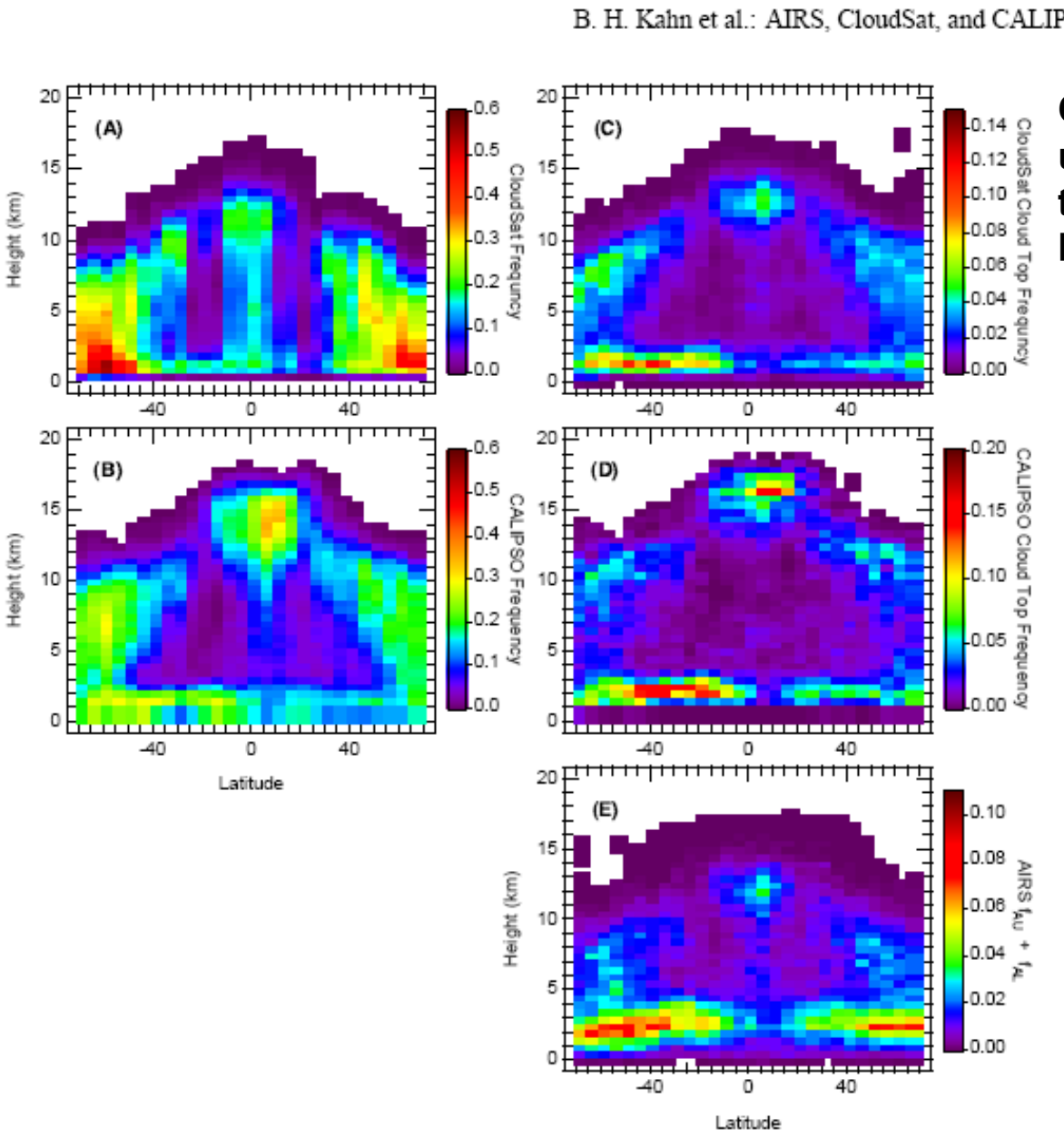
Low clouds missing

Cloud type comparisons of AIRS, Cloudsat, and CALIPSO cloud heights and amount by Kahn, Chahine, Stephens, Mace, Marchand, Wang, Barnet, Eldering, Holz, Kuehn, and Vane, *Atmos. Chem., Phys., 8, 1231-1248, 2008*

Red circles are AIRS

Fig. 2. Vertical cross-sections of CloudSat, CALIPSO, and AIRS cloud fields for the AIRS granule introduced in Fig. 1. **(a)** CloudSat 94 GHz reflectivity from the 2B-GEOPROF product. **(b)** CloudSat cloud confidence mask from the 2B-GEOPROF product restricted to cloud confidence ≥20 (Mace et al., 2007). The 5 km CALIPSO cloud feature mask cloud top heights and bases are shown in black. The centers of the red circles show the AIRS V5 (up to) two layer Z_A and associated f_A (smallest to largest circles are f_A from 0→1). Likely unphysical cloud layers with $f_A \leq 0.01$ not included. **(c)** CloudSat cloud classification from the 2B-CLDCLASS files (Wang and Sassen, 2007). **(d)** CALIPSO 532 nm total attenuated backscatter (colorized) and 5 km cloud feature mask cloud top heights and bases shown in white.

Different structure from AIRS, Cloudsat and Calipso



Cloudsat

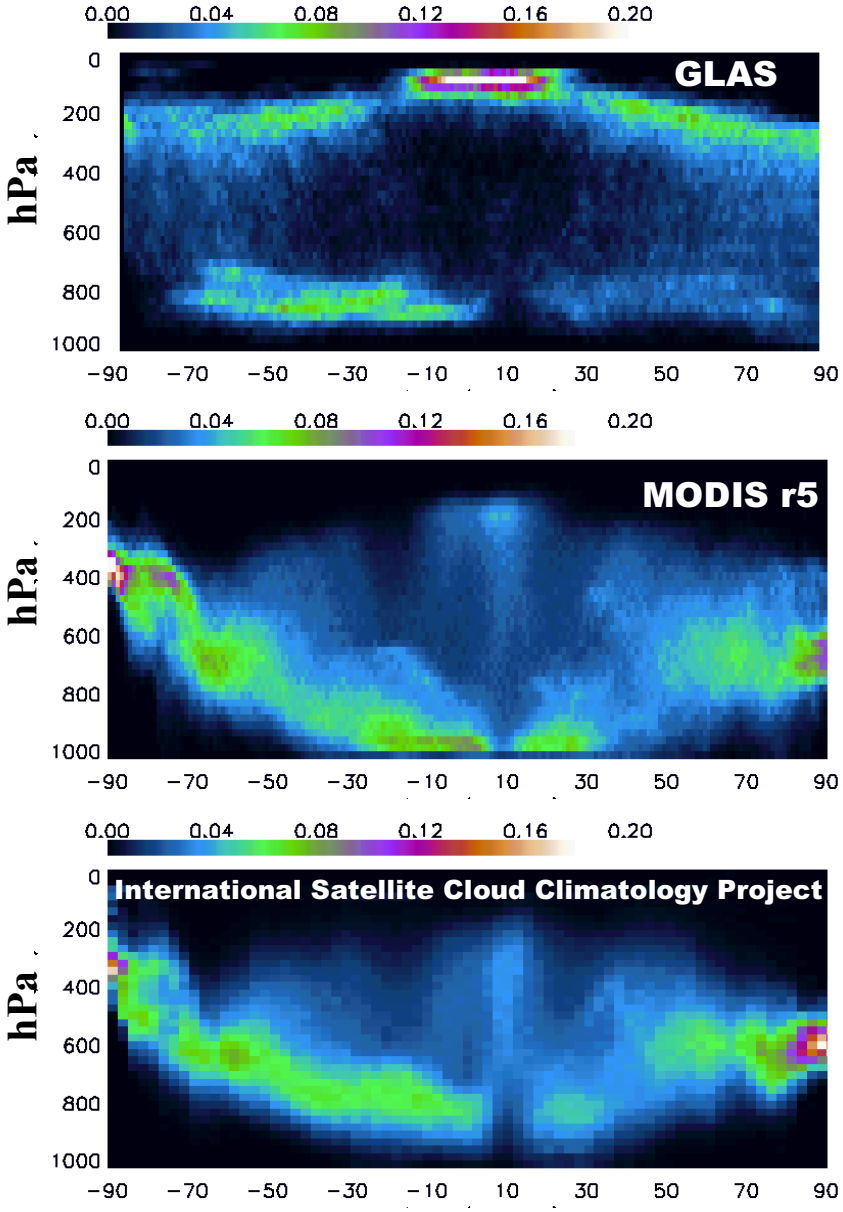
Calipso including cld base reports

Cloudsat using only the highest height

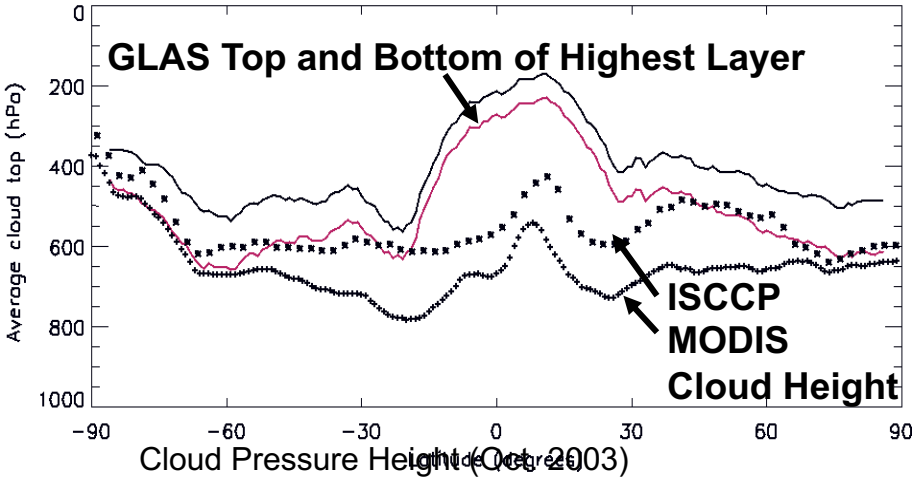
Calipso highest cloud only (possibly including base)

AIRS upper and lower cloud reports

Cloud Measurements by GLAS



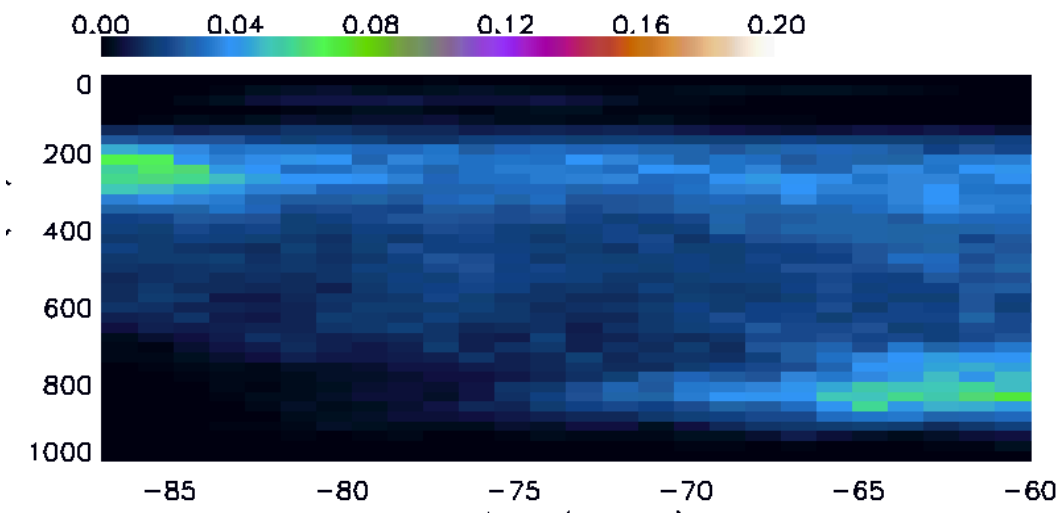
Analysis of Global Cloud Height Climatologies



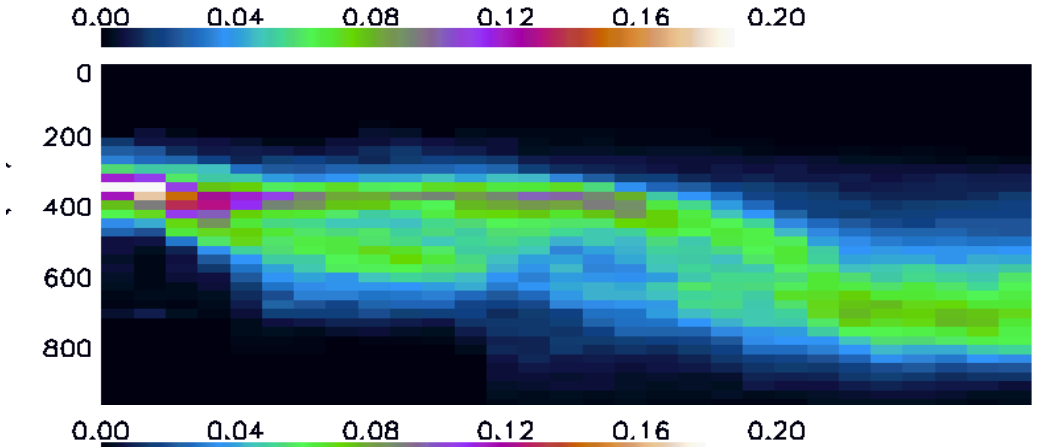
- Zonal Average Distribution of Derived Cloud Height for October 2003
- Laser Derived Altitude Defines Significant Limitations of Passive Retrievals

GLAS,South Pole,Oct. 2003
Relative top frequency
By pressure height

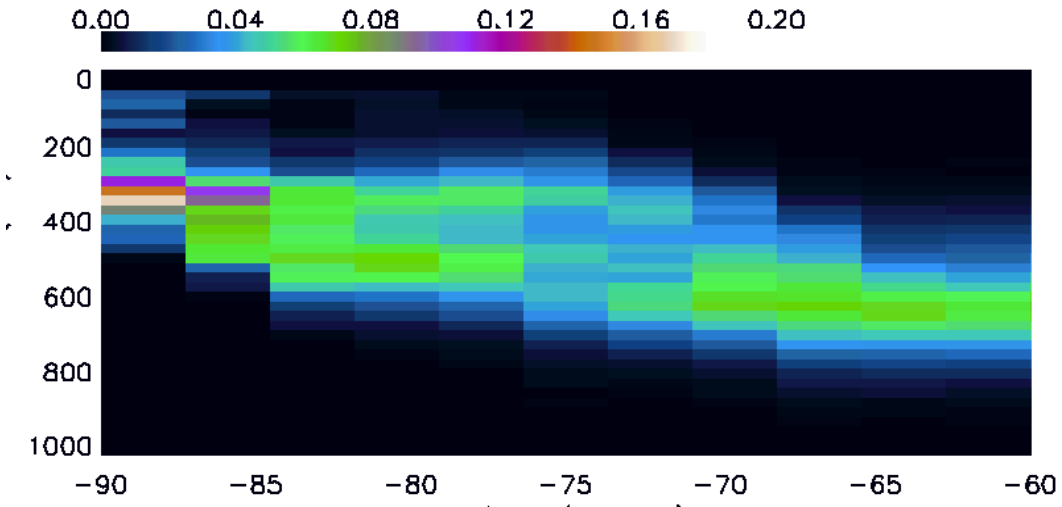
GLAS



MODIS-5

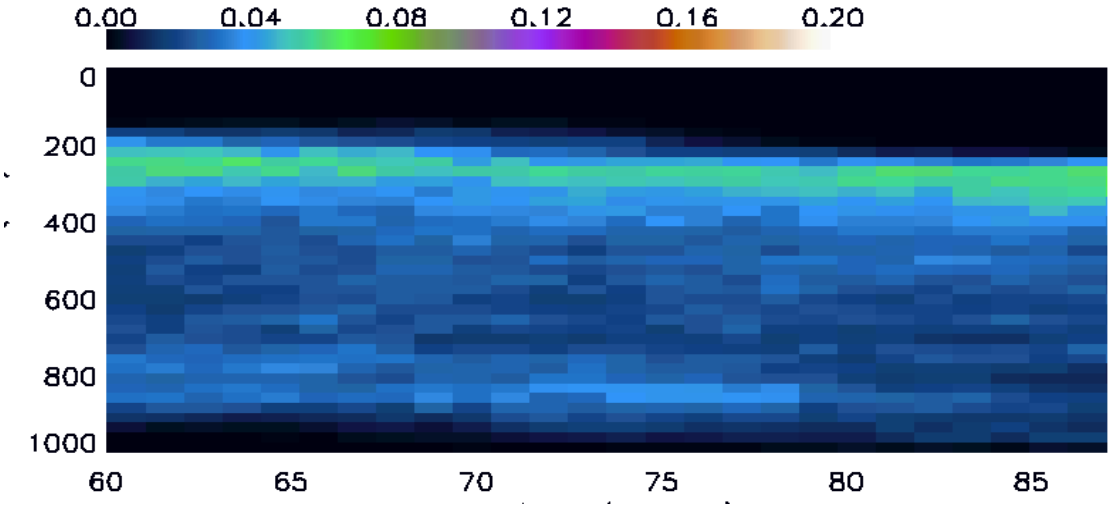


ISCCP

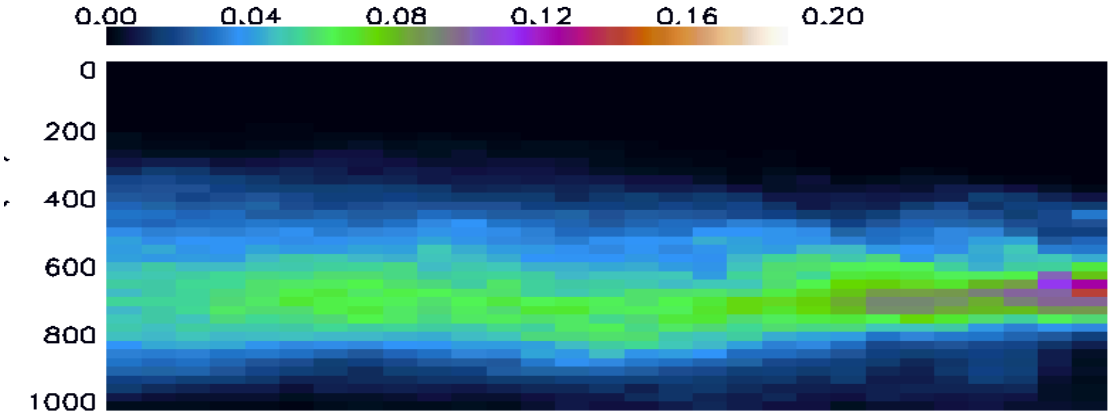


GLAS,Arctic,Oct. 2003
Relative top frequency
By pressure height

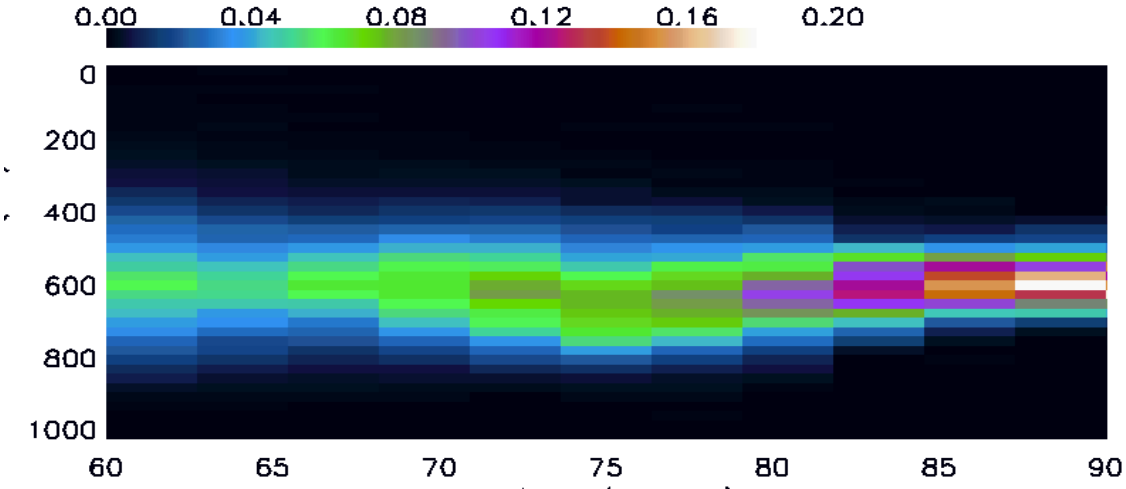
GLAS



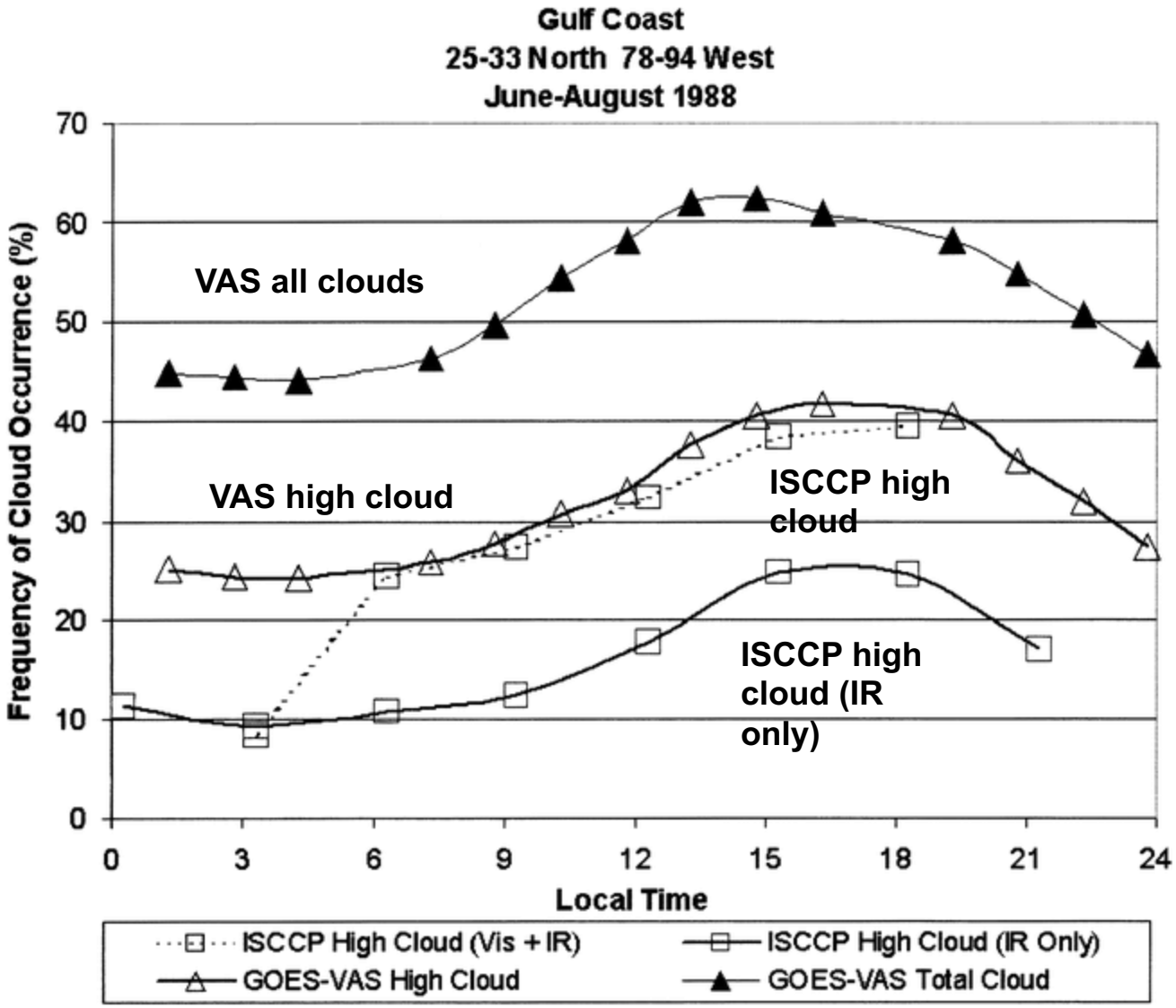
MODIS-5



ISCCP



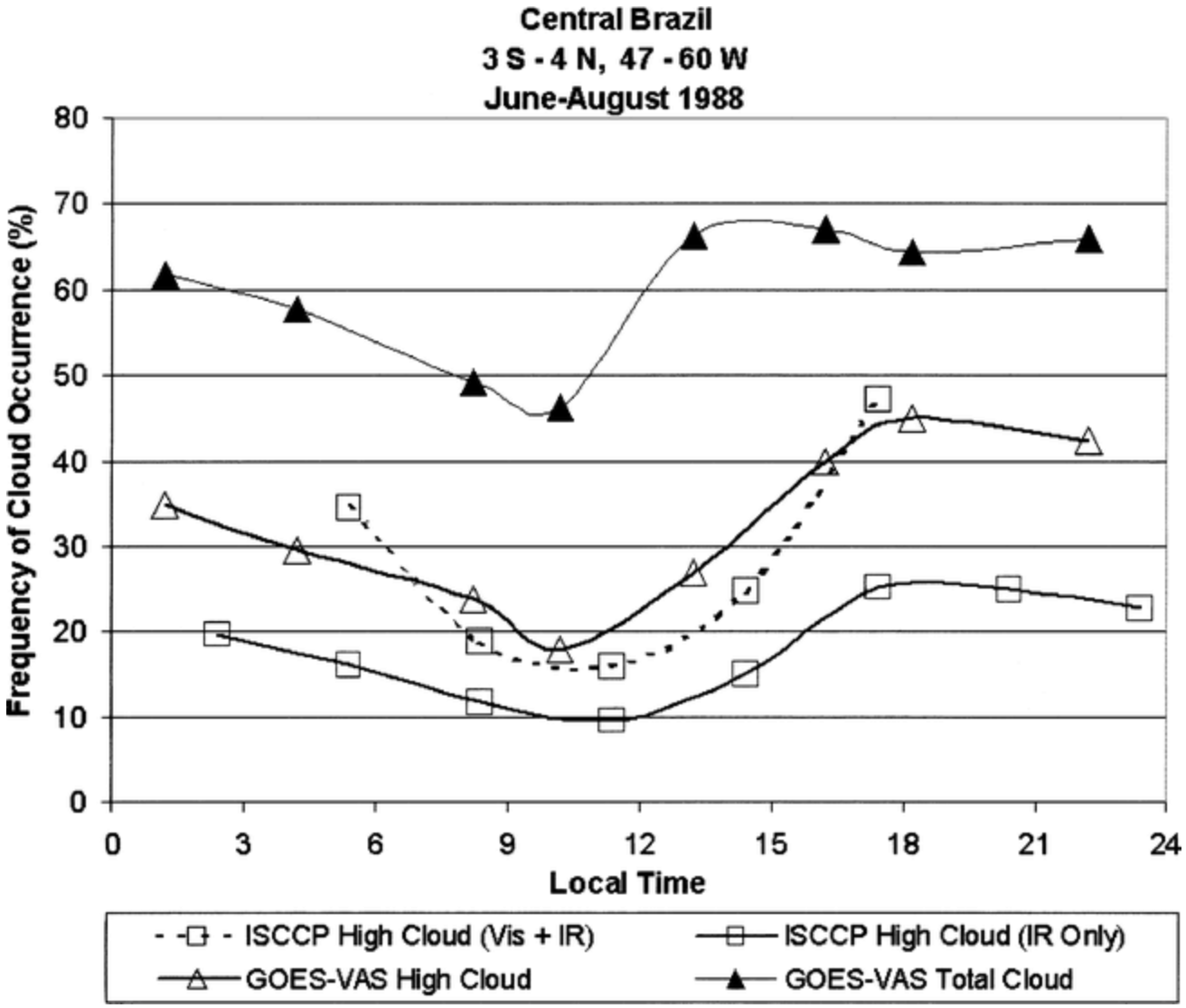
Diurnal Cycle



Wylie and Woolf, MWR, 2002

VAS and ISCCP agree on the shape of the diurnal cycle. The CO2 sensor (VAS) reports more high clouds.

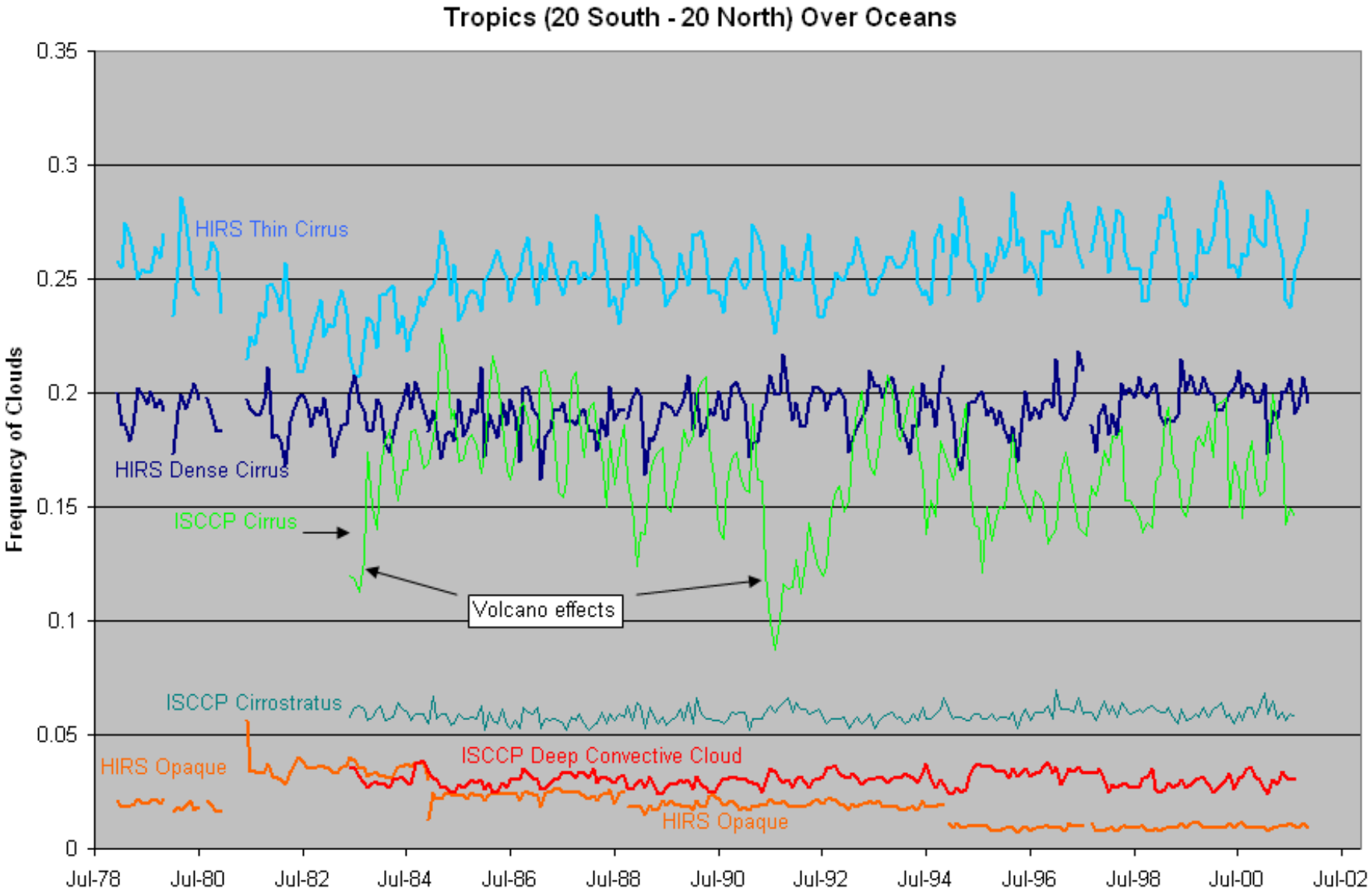
Diurnal Cycle in the Tropics



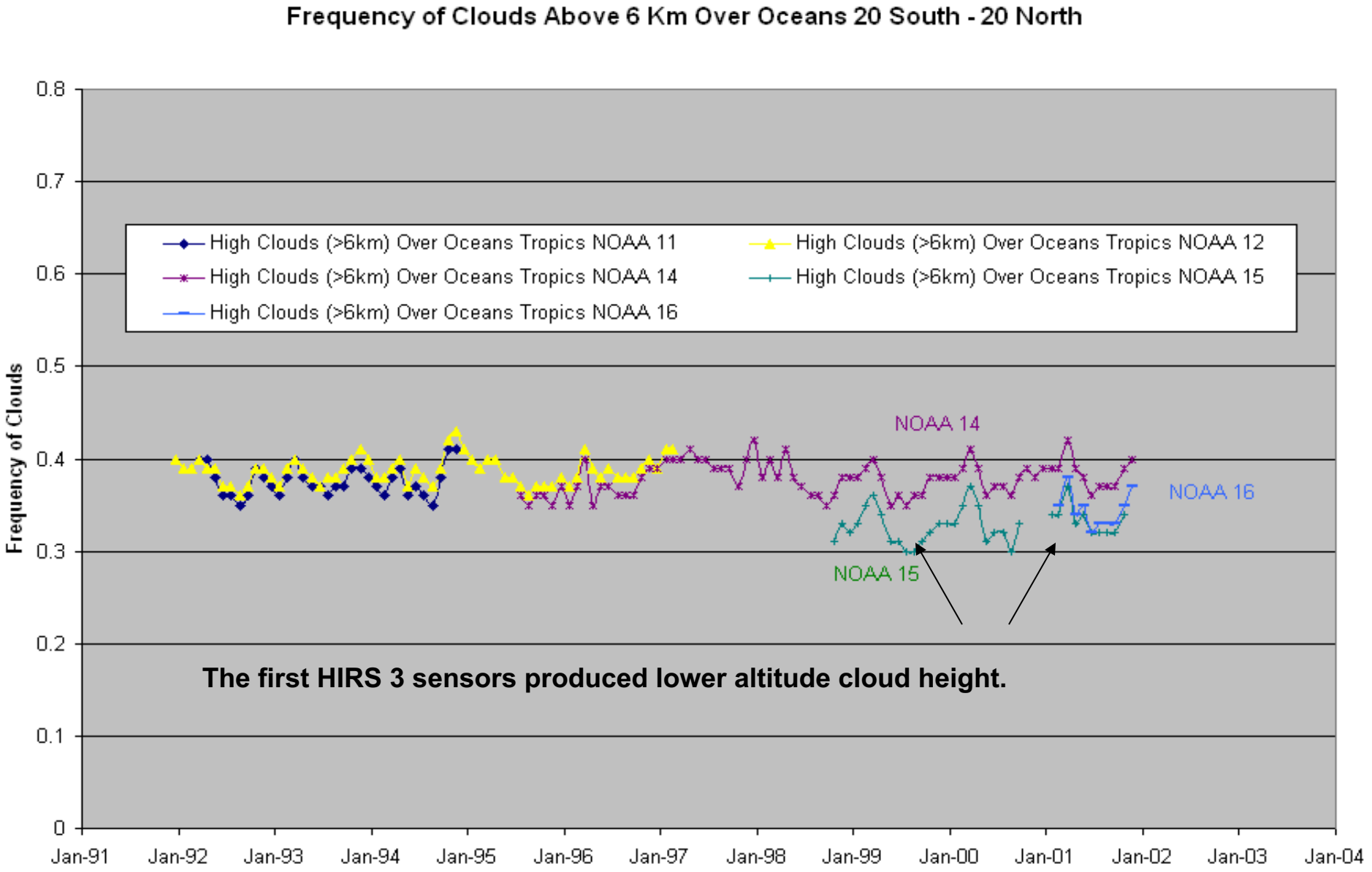
Wylie and Woolf, MWR, 2002

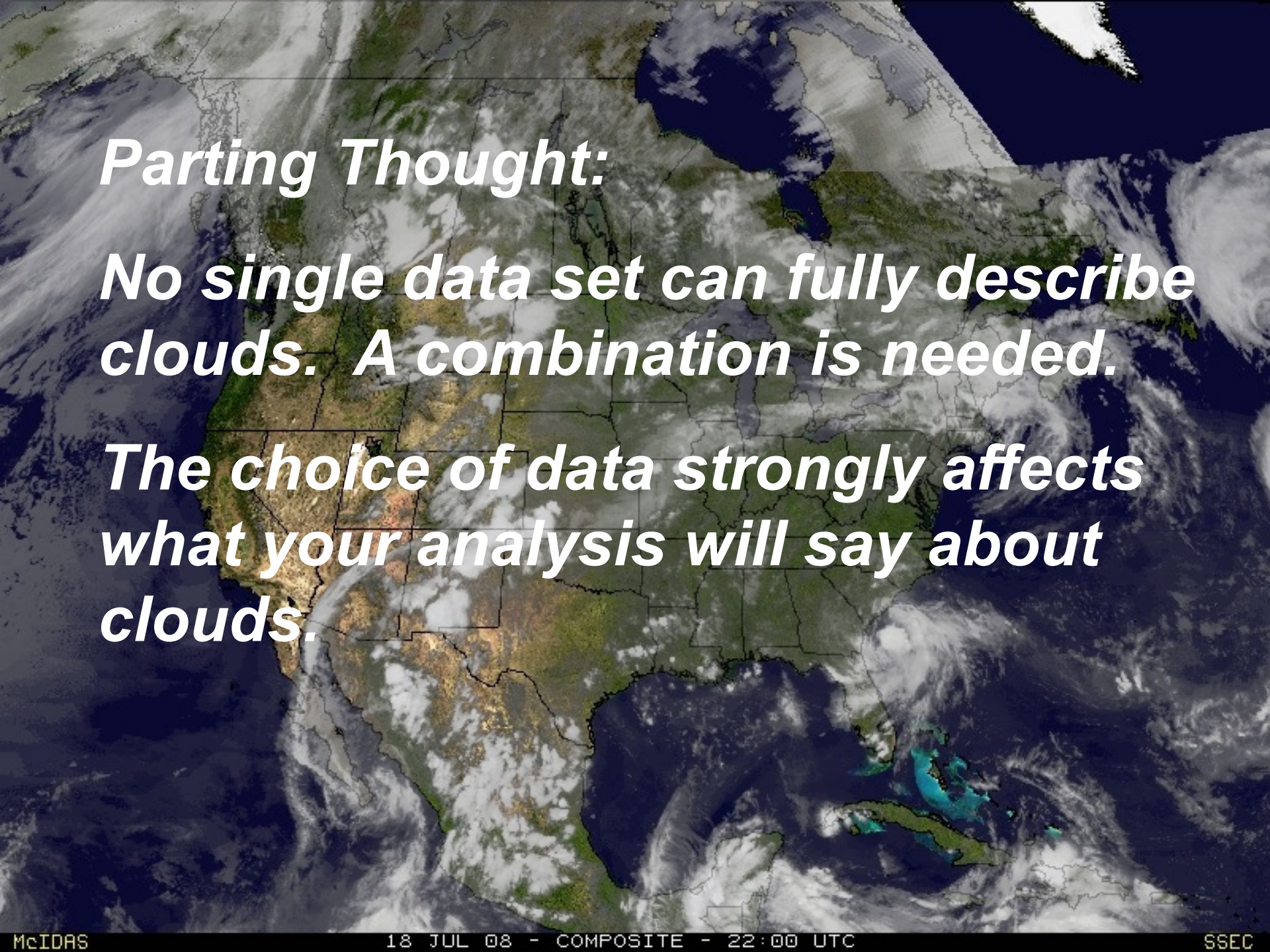
Same general agreement as the previous slide

Cirrus Time Series from HIRS and ISCCP



The Problem – HIRS 3 Sensors Produced Lower CO2 Cloud Heights




Parting Thought:
No single data set can fully describe clouds. A combination is needed.
The choice of data strongly affects what your analysis will say about clouds.
McIDAS
18 JUL 08 - COMPOSITE - 22:00 UTC
SSEC