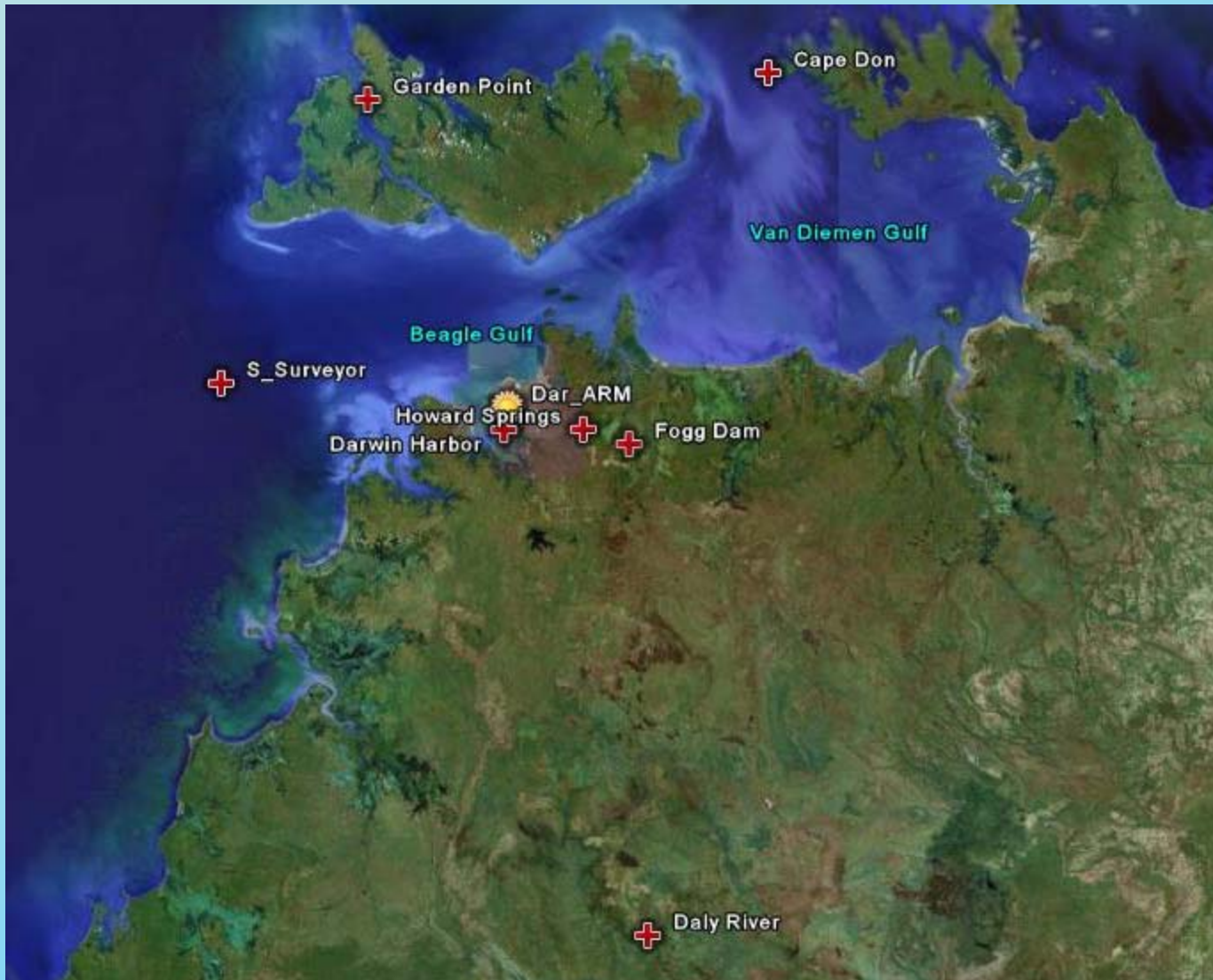


TWP-ICE: Surface Radiation

Chuck Long
PNNL

Radiation Sites



Available Data

Site	Lat. (S)	Long. (E)	Data Avail.
Darwin ARM	12.4241	130.8912	from Mar 2002
Garden Point	11.4085	130.4167	Jan 9 - Feb 13
Cape Don	11.3071	131.7654	Jan 11 - Feb 13
Howard Springs	12.4943	131.1524	Jan 24 - Feb 28**
Darwin Harbor	12.499	130.8866	Jan 14 - Feb 15
Fogg Dam	12.542	131.3069	Jan 25 - Feb 13**
Daly River	14.1593	131.388	Jan 28 - Feb 28
RV S. Surveyor	~12.4	~130.0	Jan 25 - Feb 13

**Missing Feb 1-5

Normalization

- **Howard Springs, Darwin Harbor, Fogg Dam, Daly River radiometer comparison pre-experiment**
- **Cape Don and Garden Point radiometer comparison post-experiment**
- **Southern Surveyor?**
- **Dimona post-experiment comparison failed**

PRP Tilt Correction

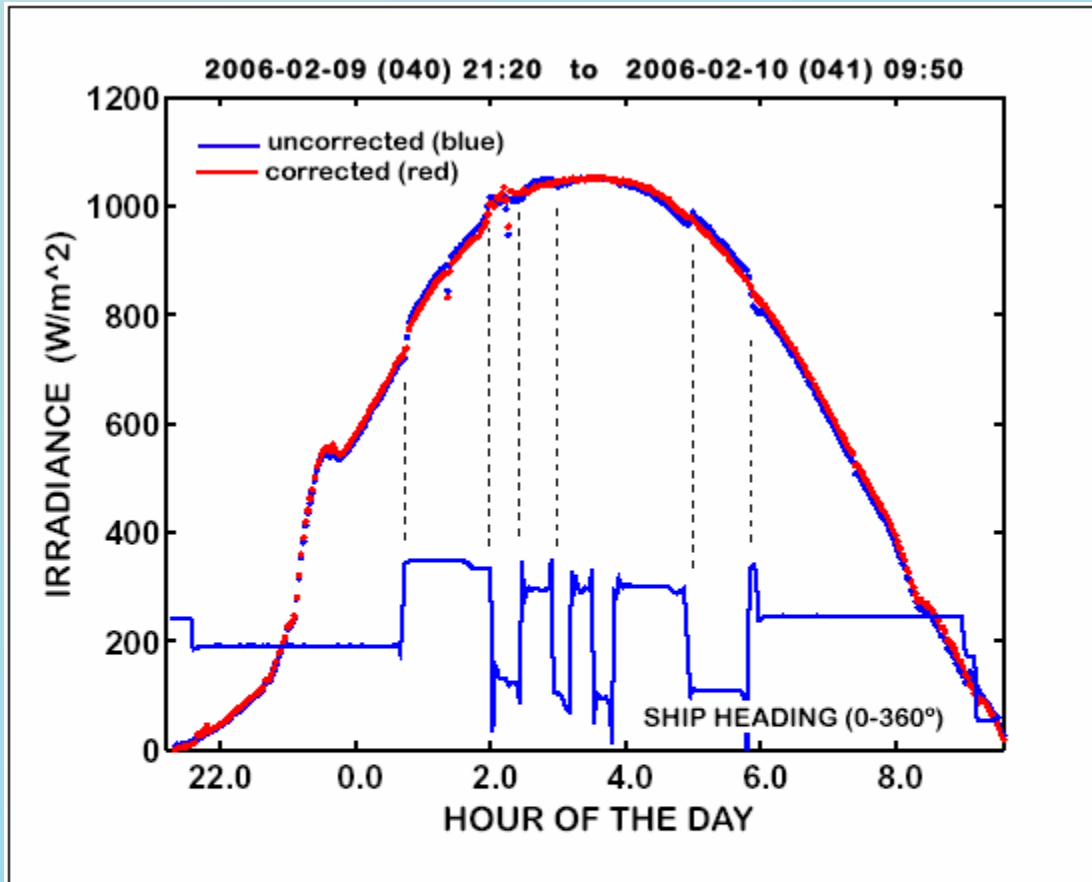


Figure 2: A sunny day during the TWP-ICE cruise off the coast of Darwin in January 2006. The ship made regular trackline reversals throughout the cruise. The instrument pitch angle was $+1.8^\circ$ and the roll angle was $+2.0^\circ$. These angles were related to the mounting of the instrument and not necessarily related to listing of the ship. The noon solar zenith angle was about 2° so changes at noon were negligible. However, at mid-morning and mid-afternoon the jumps in irradiance were quite apparent. The mean insolation for the uncorrected curve is 320.6 W m^{-2} and for the corrected curve is 322.4 W m^{-2} .

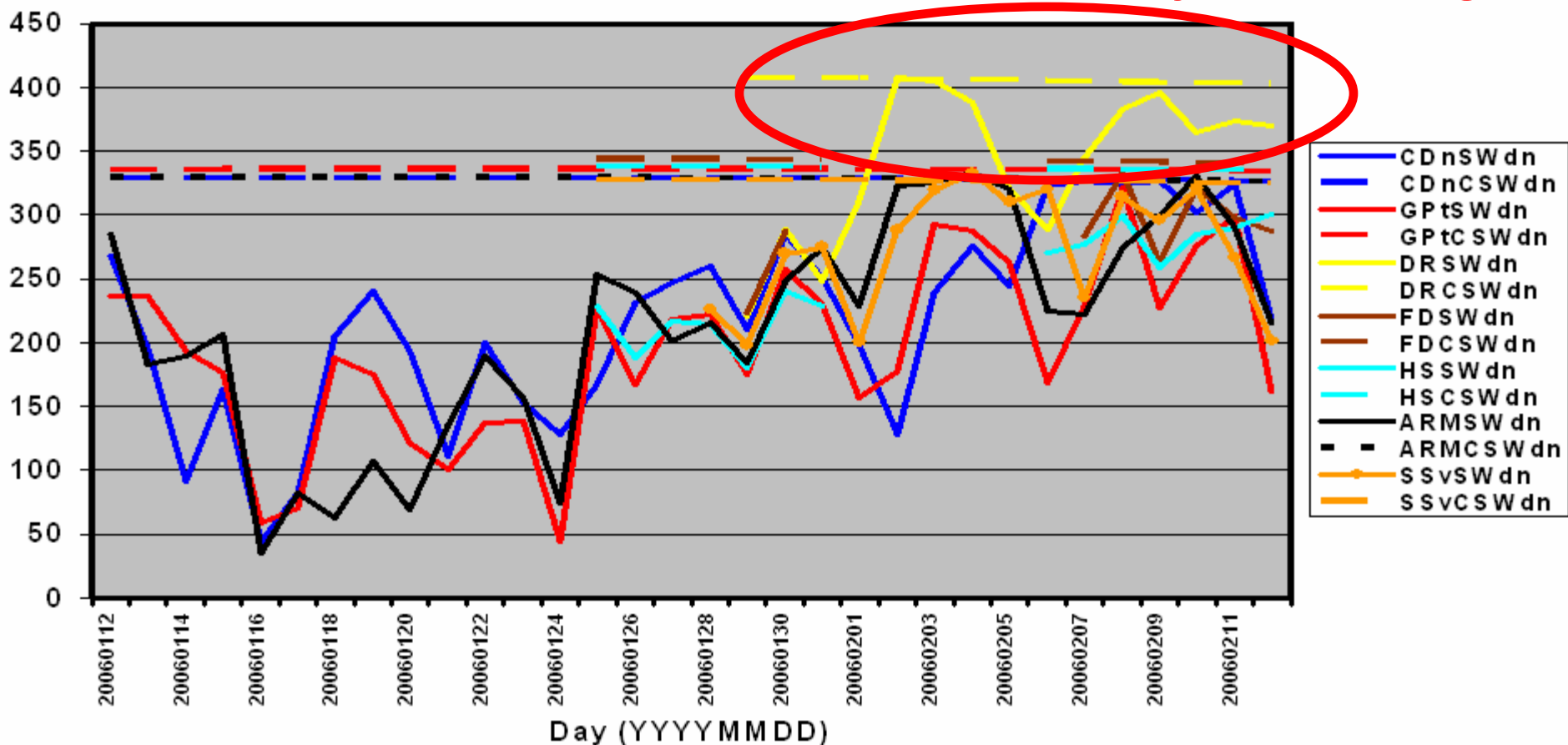
Current data not yet corrected for tilt.

For this relatively clear day, tilt correction adds $\sim 2 \text{ W m}^{-2}$ to the daylight average.

Comparisons reveal concerns

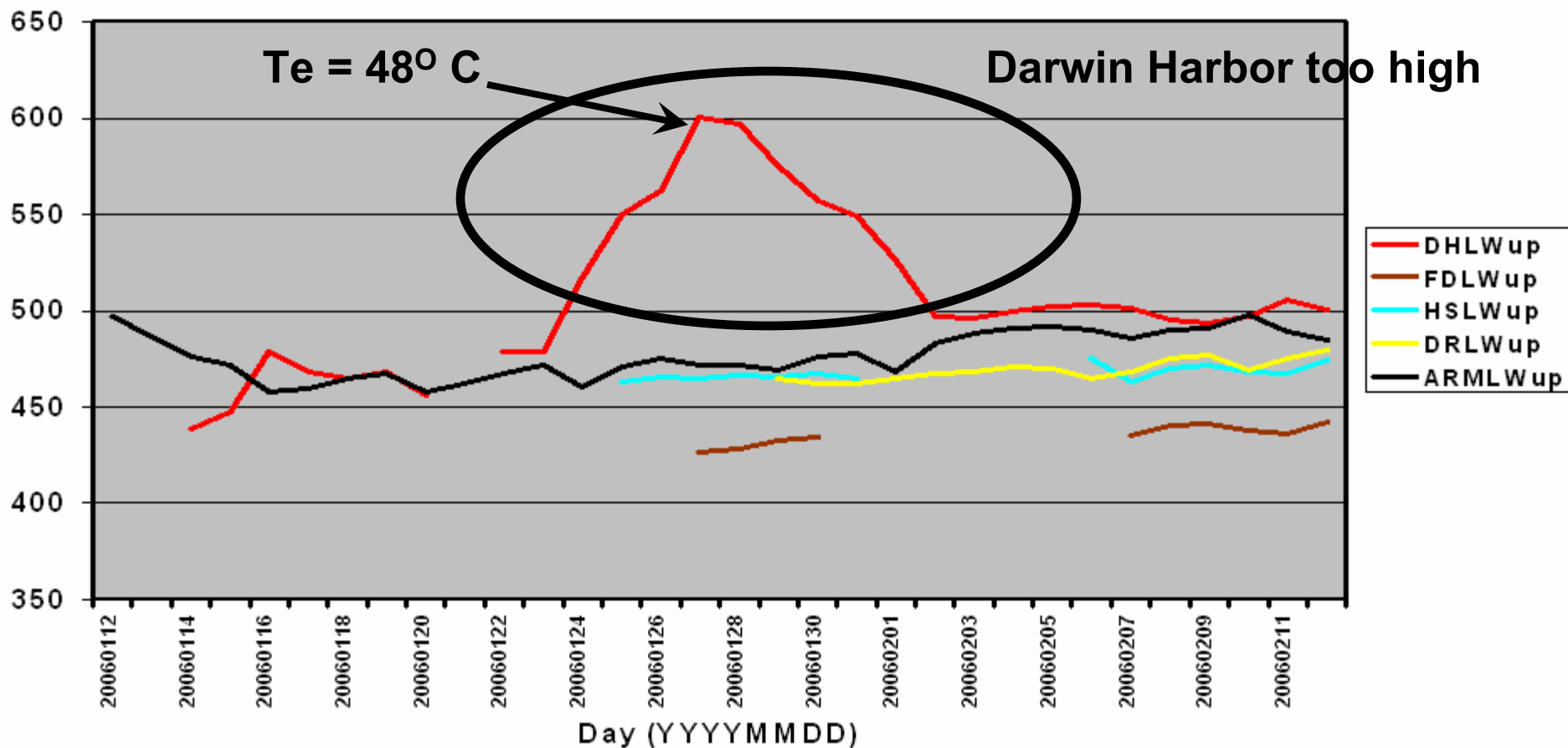
TWP-ICE Clear and All-Sky SW dn

Daly River too high



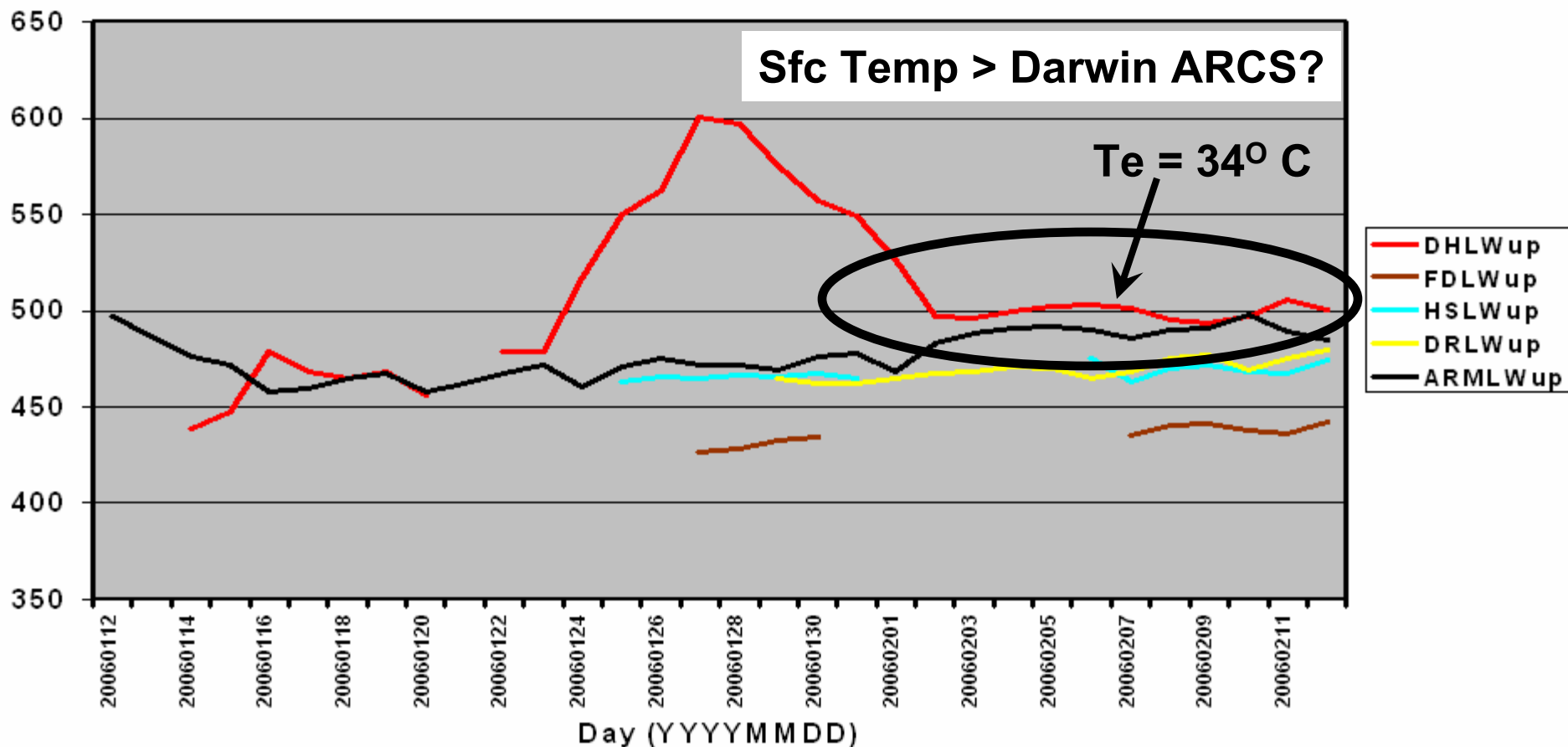
Comparisons reveal concerns

TWP-ICE Upwelling LW



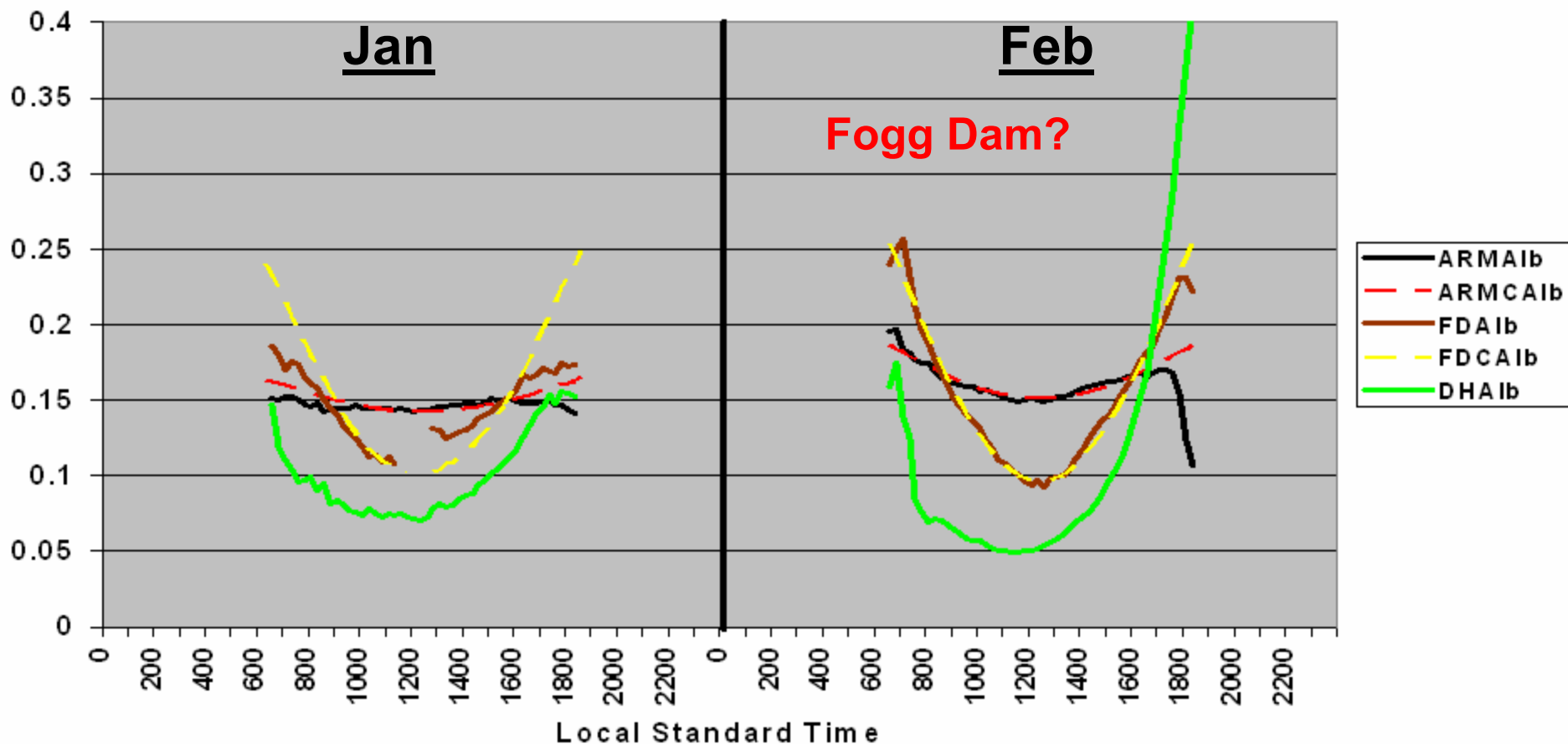
Comparisons reveal concerns

TWP-ICE Upwelling LW



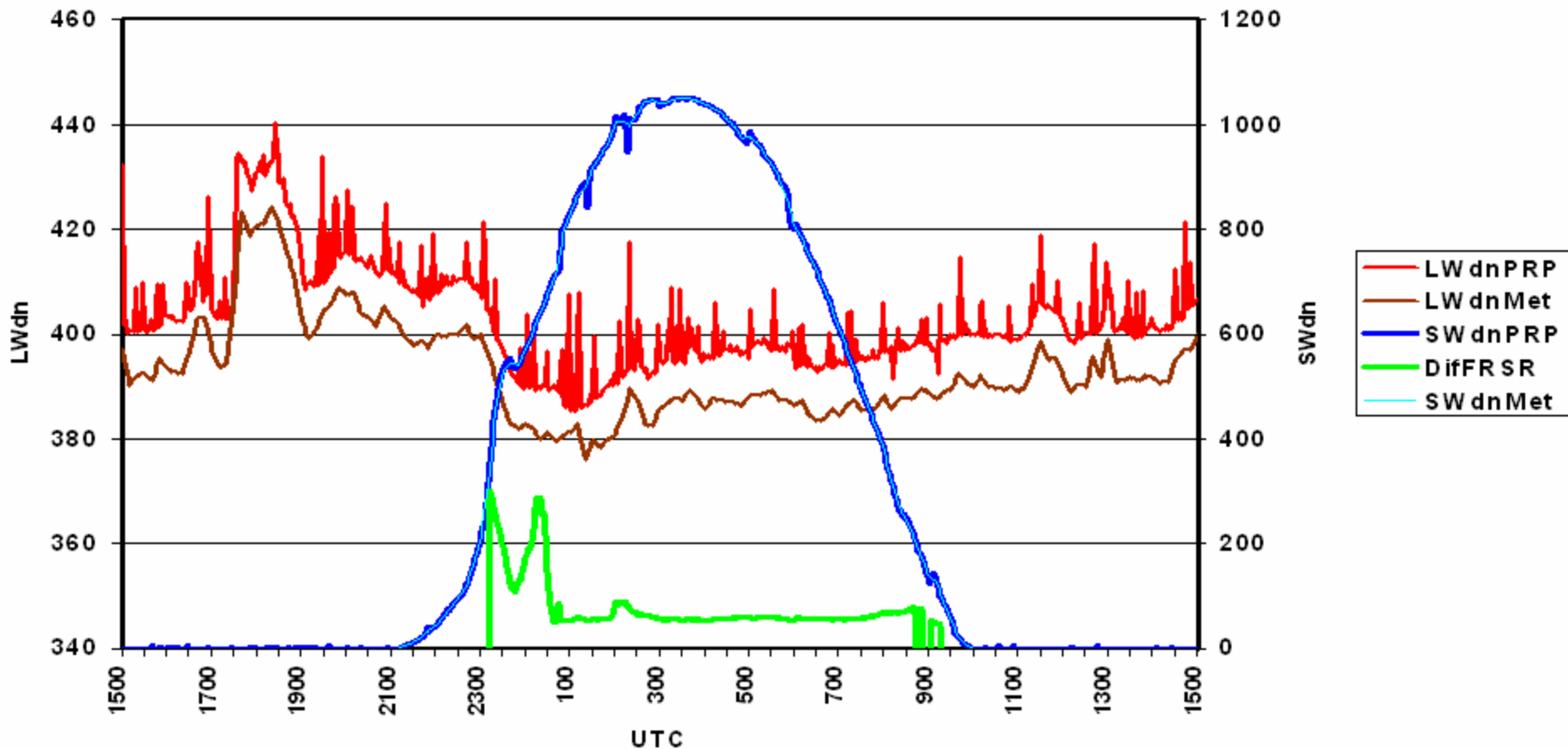
Comparisons reveal concerns

TWP-ICE Avg Diurnal Albedo



Southern Surveyor LWdn?

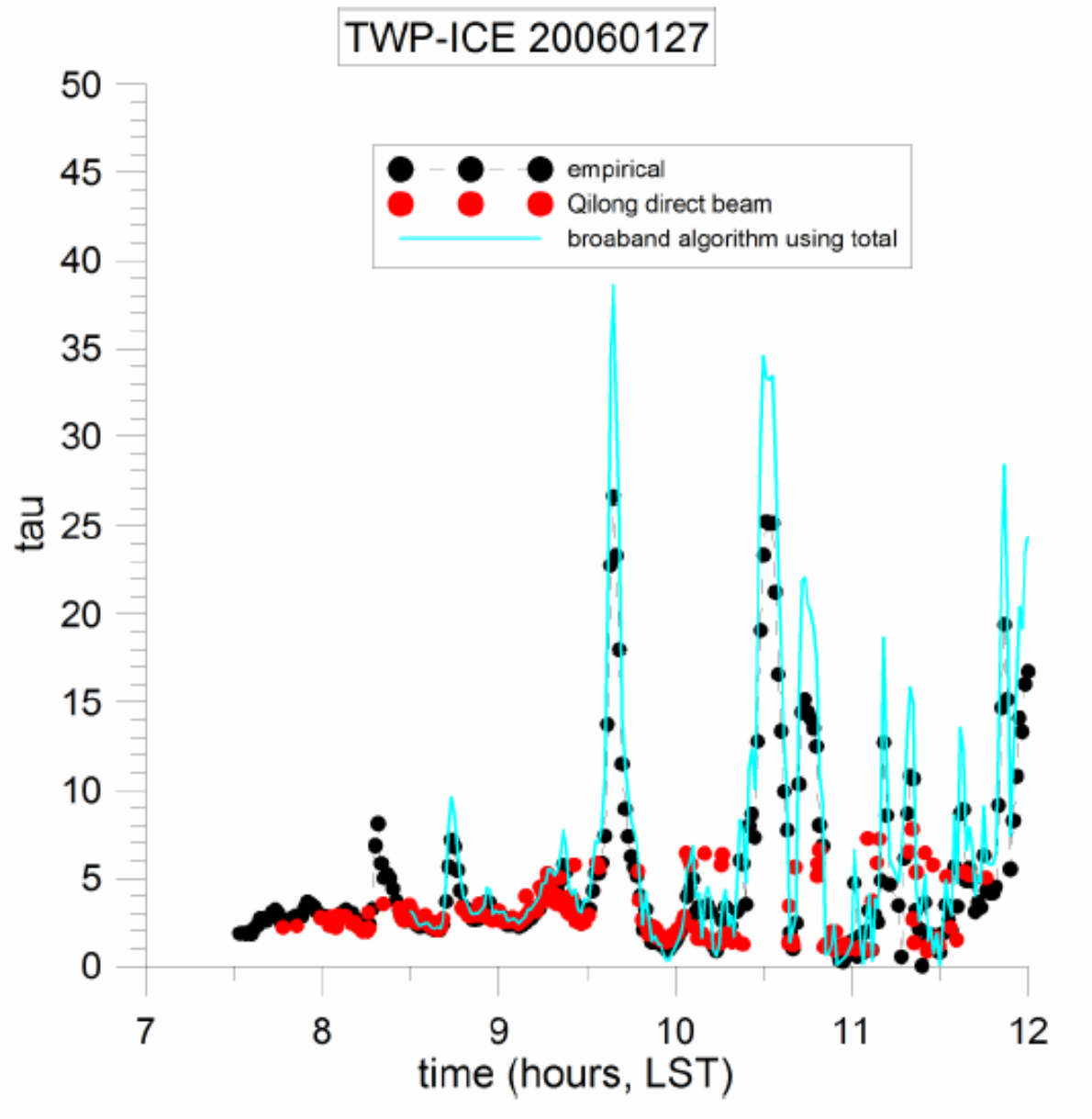
PRP Rad, 20060210



Good News

- **Have worked with Delta-T to deconvolve BF-3 total and diffuse SW to “raw” measurements**
 - Gives more realistic diffuse SW
- **Recent improvements to Flux Analysis cloud vis optical depth retrievals**
 - Better thin cloud retrievals
 - Use cloud temperature to determine whether to use liq/ice asymmetry parameter

TWP-ICE Case, Jan. 27, 2006



New formula uses total SW rather than diffuse SW.

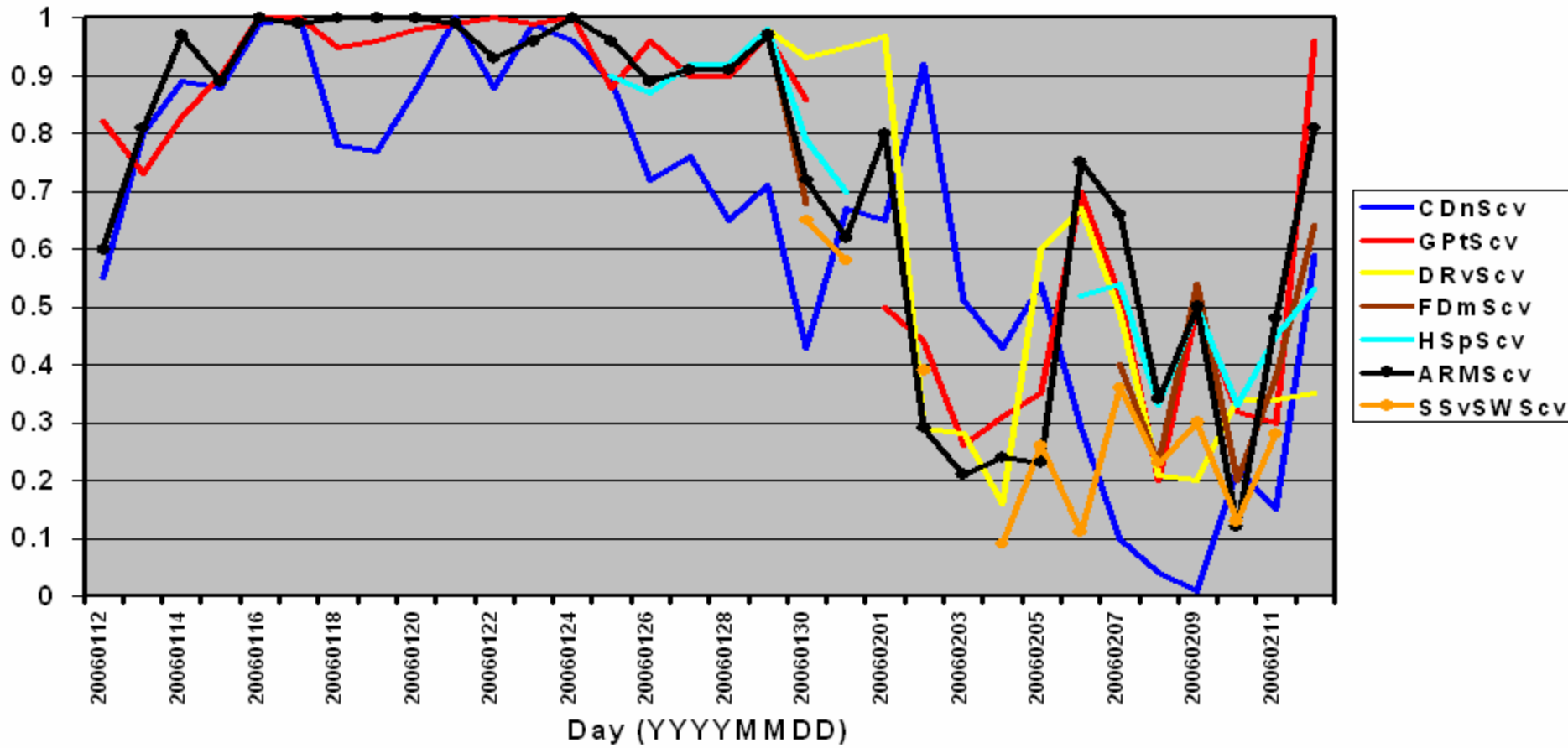
Matches MFRSR direct beam retrievals well.

Also well matches SW model calculations using Jennifer Comstock and Evgueni Kassianov ice microphysics retrievals.

Experiment-scale Variability

TWP-ICE SW Sky Cover

Cape Don



Summary

- **Measurements for Darwin ARCS, Cape Don, Garden Point look good**
- **Use a bit of caution just yet for some of the other sites**
 - **Working with Nigel, Jason, and Mike to investigate and address issues**
- **Data being reprocessed for improved diffuse SW, then Flux Analysis**
- **Much yet to do!...**