

# SWS Instrument Status:

ARM RP and CM Working Group, Nov. 17 2008

ARM Mentor: Connor Flynn

ARM Developer: Sutanay Choudhury

Thanks to Scott Kittelman for much help, and also to Chris Martin and Pat Dowell at SGP.

# ARM SWS datastreams

Original SWS: “sgpswsC1.a1” from 1999-2000.

- Completely different instrument
- ASD spectrometer, nominal hemispheric view of a spectralon diffuser.

Current SWS: “sgpswsC1.b1” installed April 30, 2006

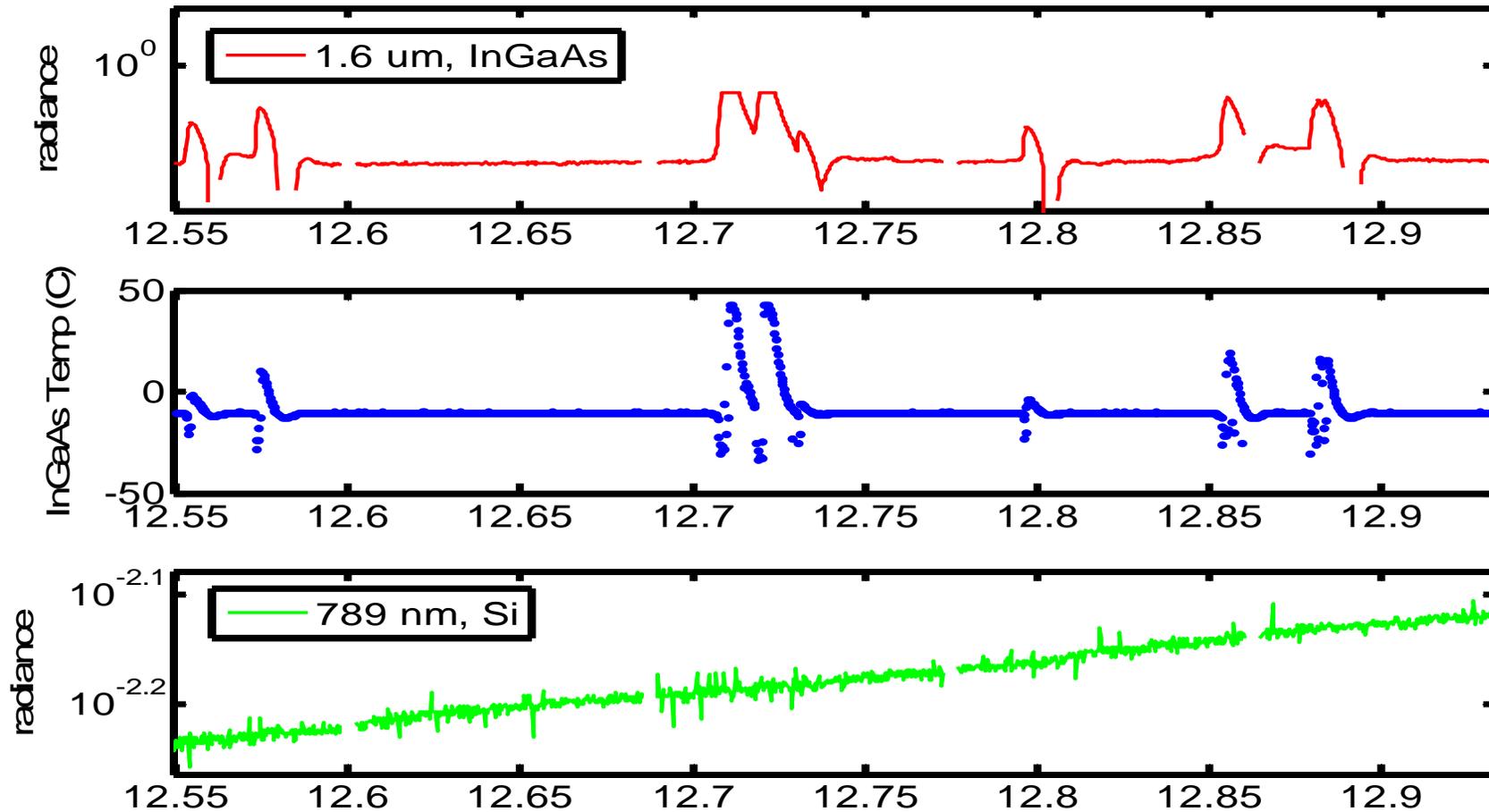
- ▶ Zen radiance,  $1.4^\circ$ , 300 nm – 2.2  $\mu\text{m}$  spectra @ 1 Hz
- ▶ Si linear array, 300-1100 nm
  - Zeiss MMS NIR-enhanced, ambient room temp.
  - 256 pixels, +/- 0.3 nm CWL, ~3.3 nm spacing, 10 nm FWHM
- ▶ InGaAs linear array, 900 nm – 2.2  $\mu\text{m}$ 
  - Zeiss PGS 2.2, Peltier TE cooled
  - 256 pixels, +/- 0.6 nm CWL, ~5 nm spacing, ~10 nm FWHM

# SWS history and reliability

- ▶ Designed and built by Warren Gore, NASA Ames in collaboration with Peter Pilewskie.
- ▶ Mentored by Peter Pilewskie, Scott Kittelman, Pat McBride
- ▶ Highly reliable with excellent uptime except for annual calibrations at NASA Ames in Nov-Dec timeframe.
- ▶ Until April 2008...

# Measurement problem

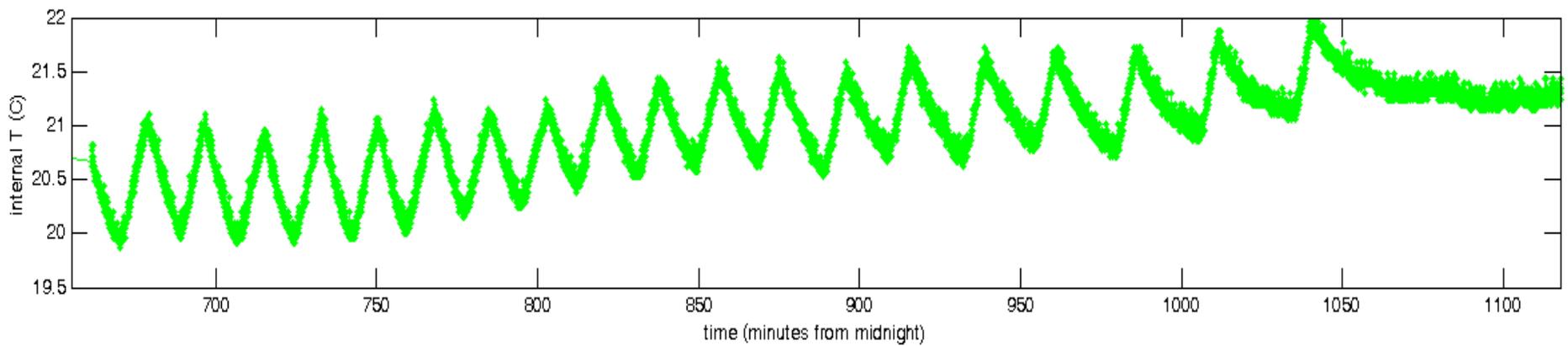
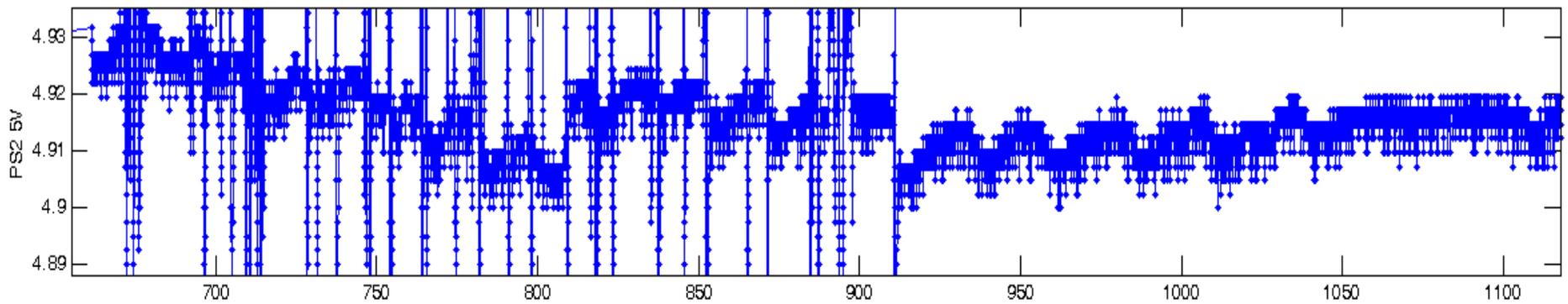
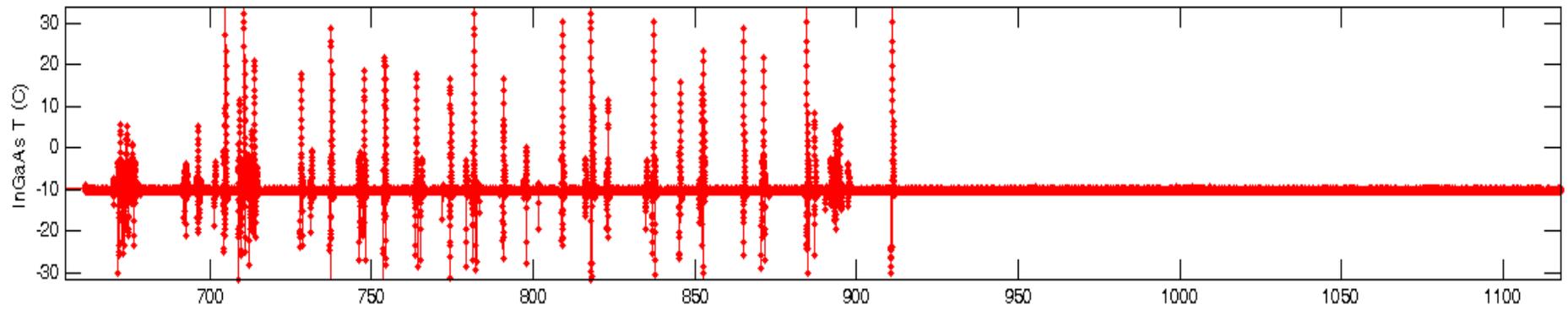
SWS InGaAs problem



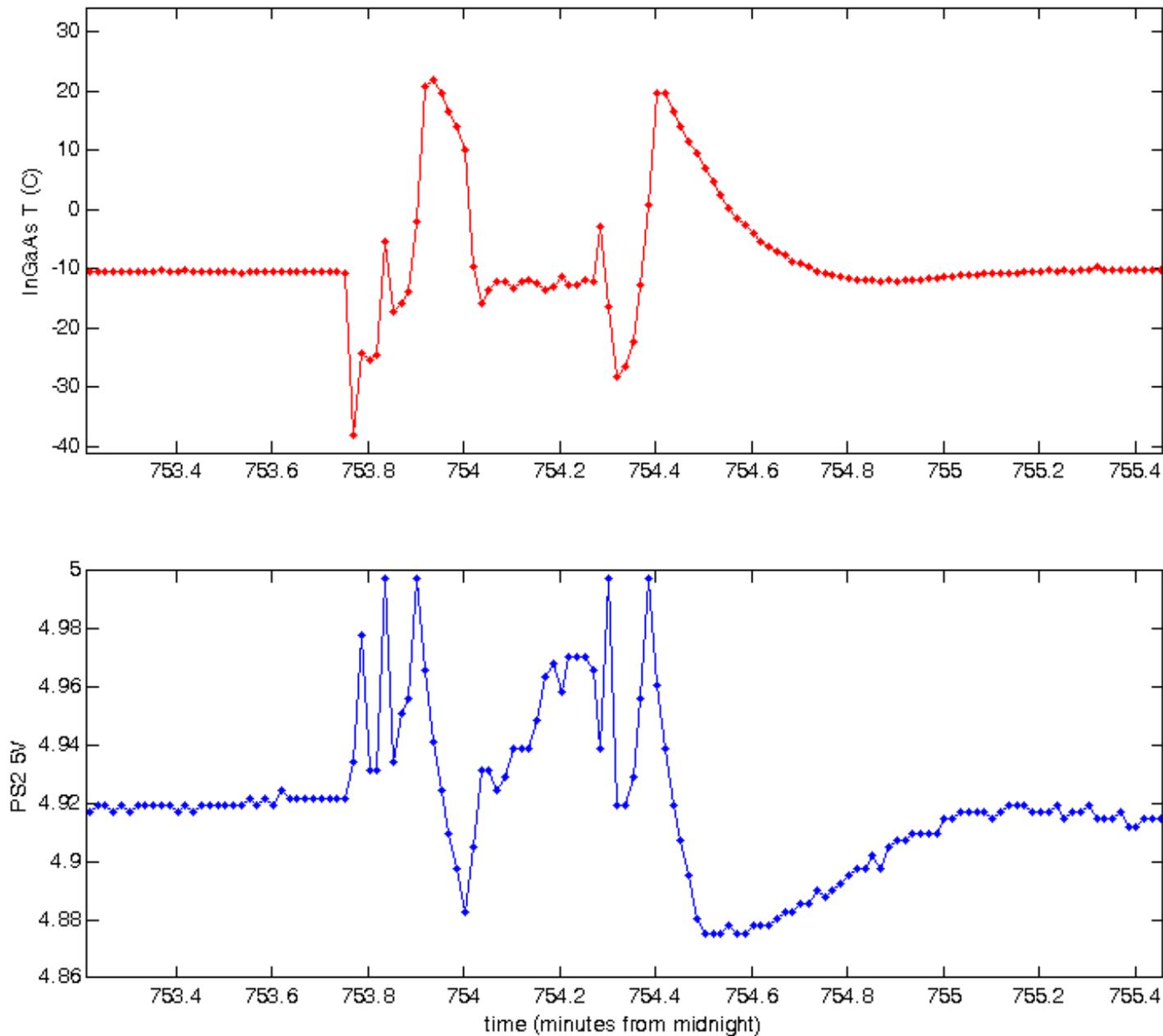
## From bad to worse...

- ▶ What started as an infrequent and intermittent problem
- ▶ Became frequent and serious by Aug. 2008.
- ▶ The existing mentor team replace two power supplies and the InGaAs TE controller to no avail.
- ▶ Eventually the problem became continuous....
- ▶ Leading to shut down toward the end of August.
  
- ▶ At which point the instrument was handed off to me!

SWS Aux data: 2008-08-23

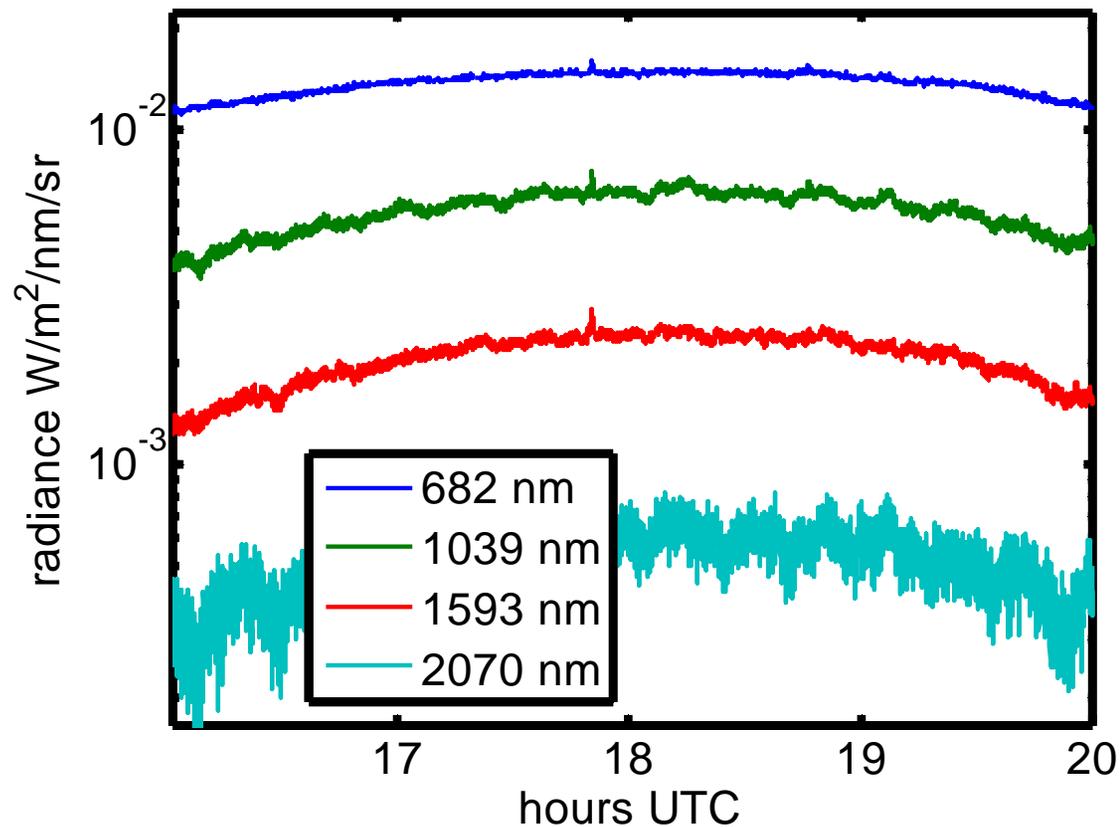


# Smoking gun found ...



# Intermediate conclusion: a loose connection?

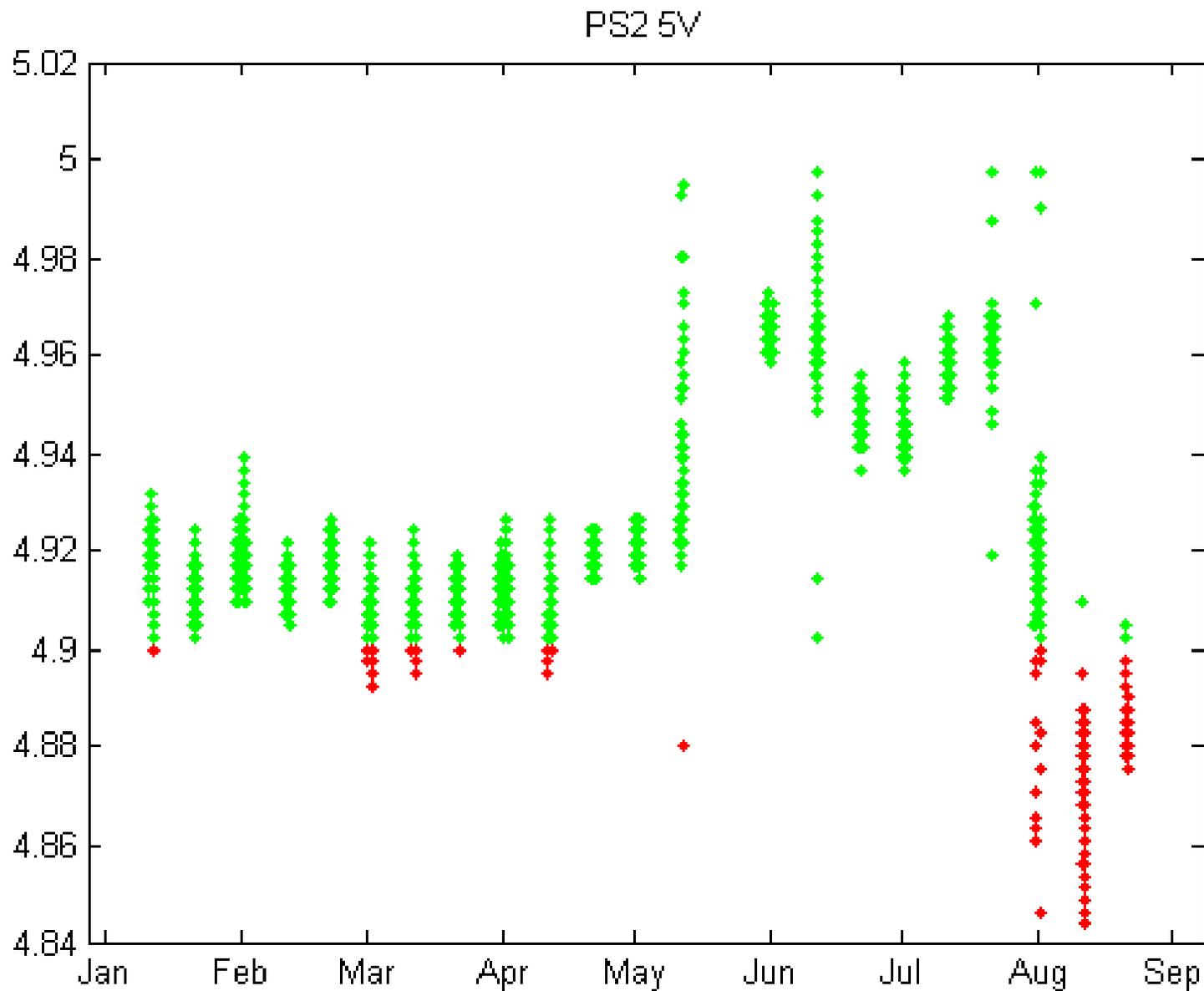
- ▶ Returned to service on Oct. 15.
- ▶ For several weeks SWS appears to be operating well.
- ▶ Sharp excursions in InGaAs temperatures are gone.
- ▶ InGaAs spectra appear well-behaved relative to Si.



# SWS has arrived at NASA Ames for annual calibration where I'll meet it tomorrow.

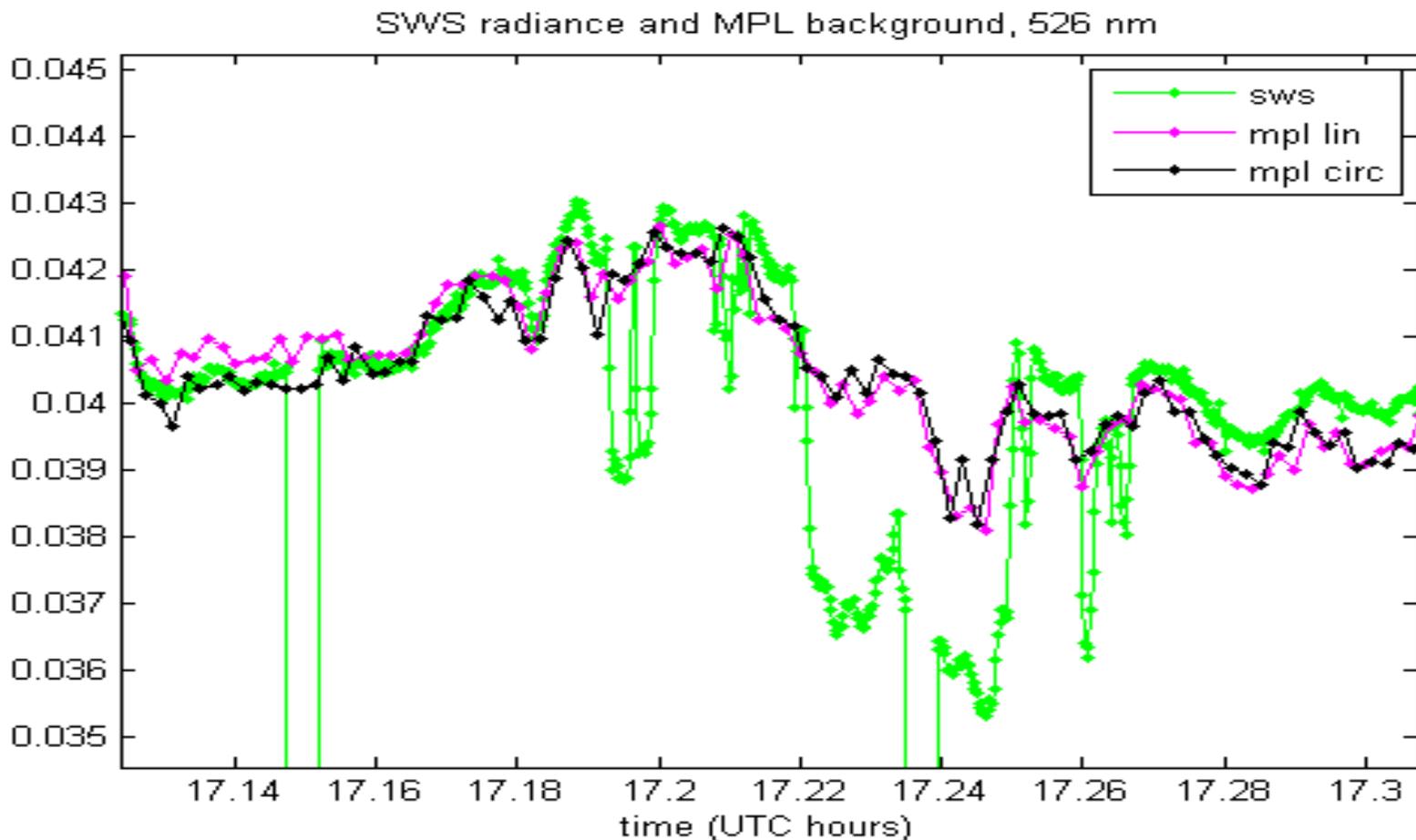
- ▶ Calibrate versus NASA Ames 30" sphere, NIST-traceable.
  - Also determine linearity curves.
  - Also calibrate as function of integration time.
- ▶ Re-establish 12" Labsphere as secondary standard.
- ▶ Collect existing Labsphere calibration files from PC.
  - Examine calibration record to assess change over time.
- ▶ Resolve dark counts into time-constant and time-dependent components.

# Next efforts: Investigate long term trends...



# Work with DQO to generate quicklooks and instrument comparisons.

- ▶ Compare to MPL and RL zenith background
- ▶ Compare to NFOV and NFOV2 (2006-2007)
- ▶ Compare to IRT (qualitative only)



## Other possible changes...

- ▶ Review/revise calibration procedure.
- ▶ New netcdf file with separate Si and InGaAs radiances.
- ▶ Include full calibration information in file:
  - Dark counts
  - Calibration results including annual and weekly indications.
  - Wavelength registration of both spectrometers.