TA Post-mortem

19 November 2004

- TA Timing and Altitude
- TA Hydrazine Usage
- Radar Pointing Discrepancies
- VIMS Temperature through TA
- CIRS Temperature through TA
- TA Data Volume

TCA Timing

delta

Prediction OTM004 delivery – 300T15:31:13 (ET)

Actual TCA – 300T15:31:08 (ET)

300T15:30:04 (UTC)

5s

TCA Altitude

Prediction after OTM004 – 1200.0 km

Actual TCA – 1174.1 km

26km

~ 1.5 sigma

Hydrazine Consumption

-KPT predicted usage was 1.71kg (A. Feldman)

-TOST predicted 1.29 kg (D. Equils)

- Actual usage was 1.44kg for the TA flyby

  - 0.27kg less than AACS/KPT predicted

Note: TA is more hydrazine “expensive” than a typical flyby due to heavy Radar activity.

Deadband was (2,2,2) when transition to RCS first occurred.

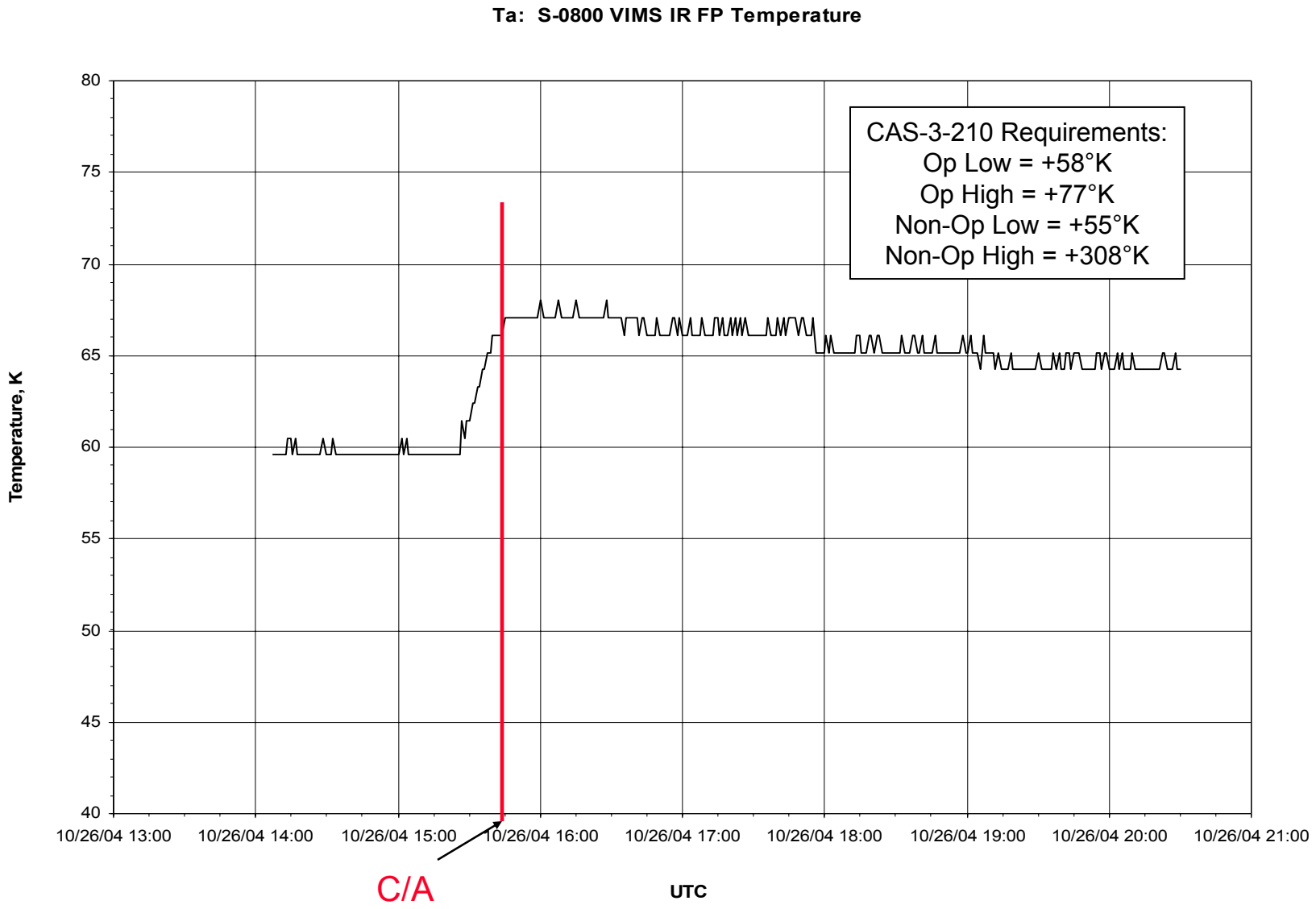
Deadband was ‘loosened’ to (2,2,20) just after C/A.

Radar Reported Pointing Problems

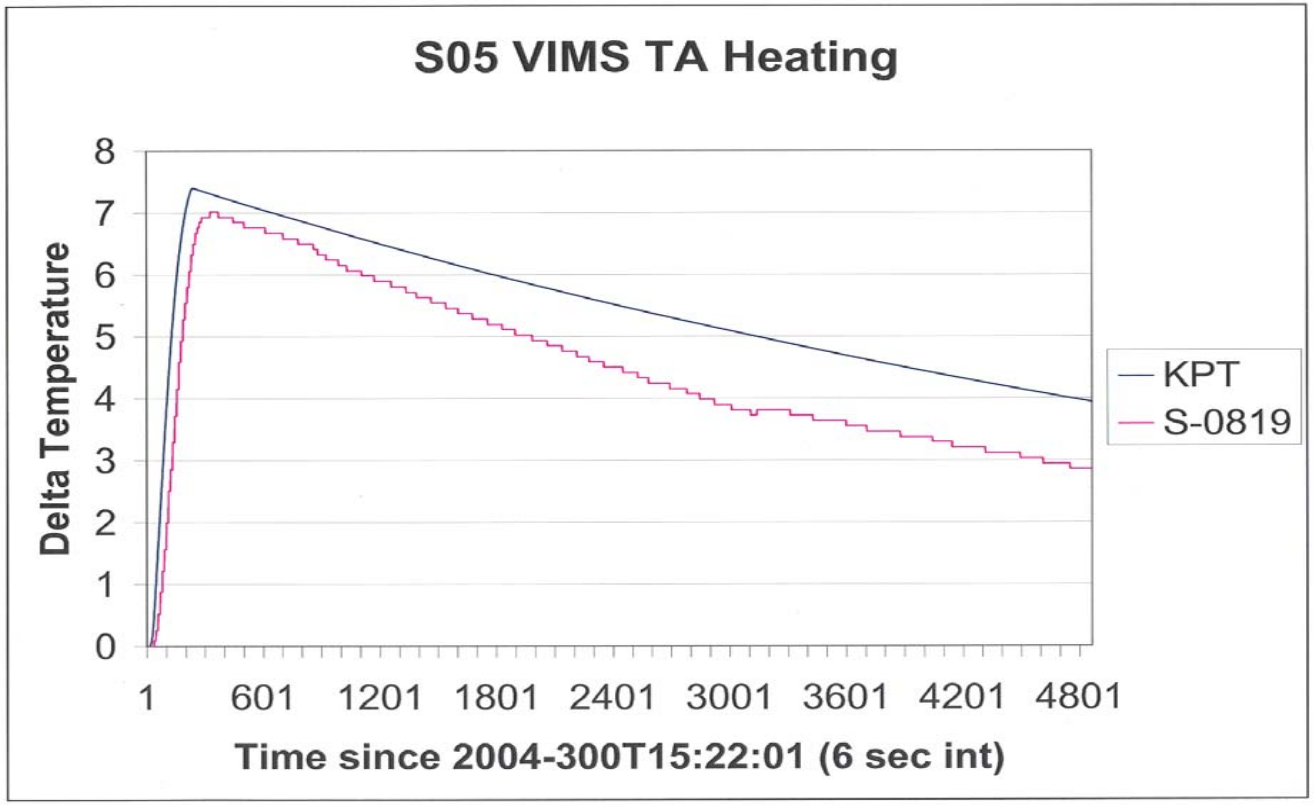
The next four slides show the predicted vs reconstructed Radar pointing.

For scatterometry, there were differences of 5-6mR.

VIMS Temperature through TA (Jerry Millard)



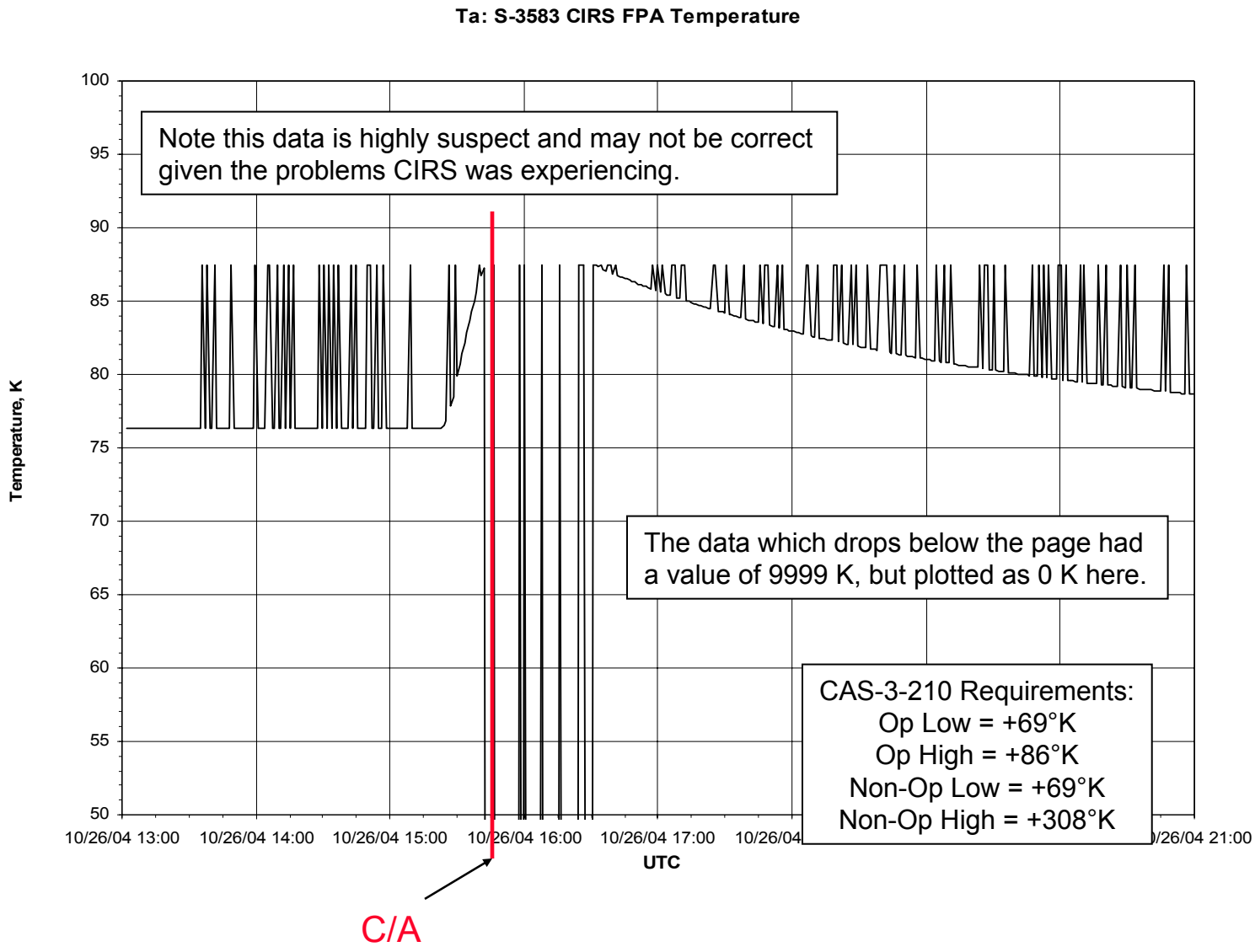
VIMS Temperatures Near Max T (Instrument Ops)



Predict: Delta T = 7.4 at 2004-300T15:45:32

Actual: Delta T = 7.0 at 2004-300T15:54:58

CIRS Temperature through TA (Jerry Millard)



CIRS Temperatures from CIRS

Here is a plot showing the intersection point of the two extrapolated mid-IR focal plane (FPA) temperature curves observed during the Ta radar pass sequence, where there is a gap in the CIRS data. The extrapolated intersection temperature = 90.8K.

CIRS adjusted the heat capacity of CIRS to the value 1450 J m-2 K-3 in order to obtain the best theoretical fit to the decaying temperature, which is call "Temperature 2."

CIRS calculated the predicted FPA Temperature 2 as follows:

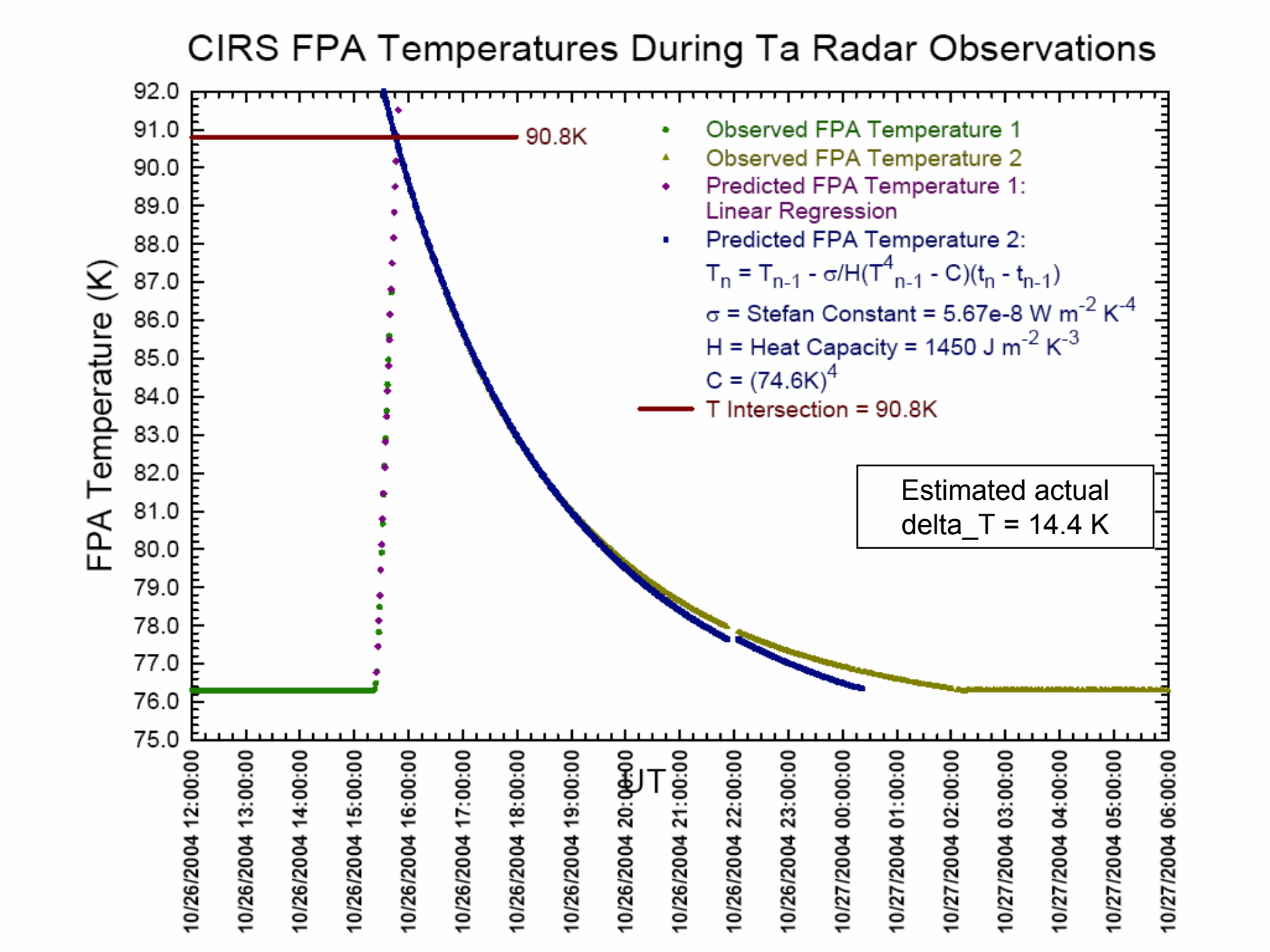
Tn = Tn-1 - sigma/H(Tn-1**4 - C)(tn - tn-1)

sigma = Stefan Constant = 5.67e-8 W m-2 K-4

H = CIRS Heat Capacity = 1450 J m-2 K-3

C = (74.6K)**4

Contact: "Ronald C. Carlson" <rcarlson@pop600.gsfc.nasa.gov>


CIRS FPA Temperatures During Ta Radar Observations
FPA Temperature (K)
92.0
91.0
90.0
89.0
88.0
87.0
86.0
85.0
84.0
83.0
82.0
81.0
80.0
79.0
78.0
77.0
76.0
75.0
90.8K
Observed FPA Temperature 1
Observed FPA Temperature 2
Predicted FPA Temperature 1:
Linear Regression
Predicted FPA Temperature 2:
$T_n = T_{n-1} - \sigma/H(T^4_{n-1} - C)(t_n - t_{n-1})$
σ = Stefan Constant = 5.67e-8 W m^{-2} K^{-4}
H = Heat Capacity = 1450 J m^{-2} K^{-3}
C = $(74.6K)^4$
T Intersection = 90.8K
Estimated actual
delta_T = 14.4 K
10/26/2004 12:00:00
10/26/2004 13:00:00
10/26/2004 14:00:00
10/26/2004 15:00:00
10/26/2004 16:00:00
10/26/2004 17:00:00
10/26/2004 18:00:00
10/26/2004 19:00:00
10/26/2004 20:00:00
10/26/2004 21:00:00
10/26/2004 22:00:00
10/26/2004 23:00:00
10/27/2004 00:00:00
10/27/2004 01:00:00
10/27/2004 02:00:00
10/27/2004 03:00:00
10/27/2004 04:00:00
10/27/2004 05:00:00
10/27/2004 06:00:00
UT

TA observation Period

				CAPS	CDA	CIRS	INMS	ISS	MAG	MIMI	RADAR	RPWS	UVIS	VIMS
SMT	OBSERVATION_NOR	299T16:31	301T00:16	213.7	11.4	214.9	19.5	828	94.1	118.7	567.7	304	114.5	714
SMT	OBSERVATION_SI	299T16:31	301T00:16	0	0	10	0	0	0	0	0	0	0	0
	Sum			213.7	11.4	224.9	19.5	828.0	94.1	118.7	567.7	304.0	114.5	714.0
TDS	Observation period file size listing (bytes)	184 01:06	184 17:51	30457750.0	1734876.0	10689250	3218882.0	119764258.0	13480748.0	12543050.0	81459400.0	39383276.0	12443138.0	36252064.0
	number of records from sfducheck			36485.0	0.0	9295.0	5569.0	108679.0	11846.0	10907.0	74054.0	35738.0	10051.0	40944.0
	150 bytes per SFDU record			43.8	0.0	11.2	6.7	130.4	14.2	13.1	88.9	42.9	12.1	49.1
TDS	Observation Science data (no housekeeping)	184 01:06	184 17:51	243.7	13.9	85.5	25.8	958.1	107.8	100.3	651.7	315.1	99.5	290.0
	files size - header (Mbits)			199.9	13.9	74.4	19.1	827.7	93.6	87.3	562.8	272.2	87.5	240.9
	Difference (actual downlinked-planned in SMT)			-13.8	2.5	-150.5	-0.4	-0.3	-0.5	-31.4	-4.9	-31.8	-27.0	-473.1
	% Difference			-6.47%	21.75%	-66.94%	-2.21%	-0.04%	-0.50%	-26.49%	0.00%	-10.47%	-23.59%	-66.26%

TA downlink

				CAPS	CDA	CIRS	INMS	ISS	MAG	MIMI	RADAR	RPWS	UVIS	VIMS
SMT	SP_000EA_G70METNON184_PRIME	301T00:16	301T09:16	32.4	3.2	0	2.2	0	16	29.2	0	42.4	2.5	0
TDS	Downlink period file size listing	184 01:06	184 17:51	4623000.0	490672.0	0.0	362406.0	0.0	2276000.0	2723200.0	0.0	4086216.0	279788.0	0.0
	number of records from sfducheck			4020.0	728.0	0.0	627.0	0.0	2000.0	2368.0	0.0	3708.0	226.0	0.0
	150 bytes per SFDU record			4.8	0.9	0.0	0.8	0.0	2.4	2.8	0.0	4.4	0.3	0.0
TDS	Observation Science data (no housekeeping)	184 01:06	184 17:51	37.0	3.9	0.0	2.9	0.0	18.2	21.8	0.0	32.7	2.2	0.0
	files size - header (Mbits)			32.2	3.1	0.0	2.1	0.0	15.8	18.9	0.0	28.2	2.0	0.0
	Difference (actual downlinked-planned in SMT)			-0.2	-0.1	0.0	-0.1	0.0	-0.2	-10.3	0.0	-14.2	-0.5	0.0
	% Difference			-0.74%	-4.63%	0.00%	-2.42%	0.00%	-1.20%	0.00%	0.00%	-33.40%	-21.32%	0.00%

Notes) Query data from TDS (use file size to estimate data returned); compare to SMT (data requested)
Fixes) Need to incorporate gap report findings int this analysis
T. Ray November 18, 2004

ISS continued to take dark frames until data policing cut them off.