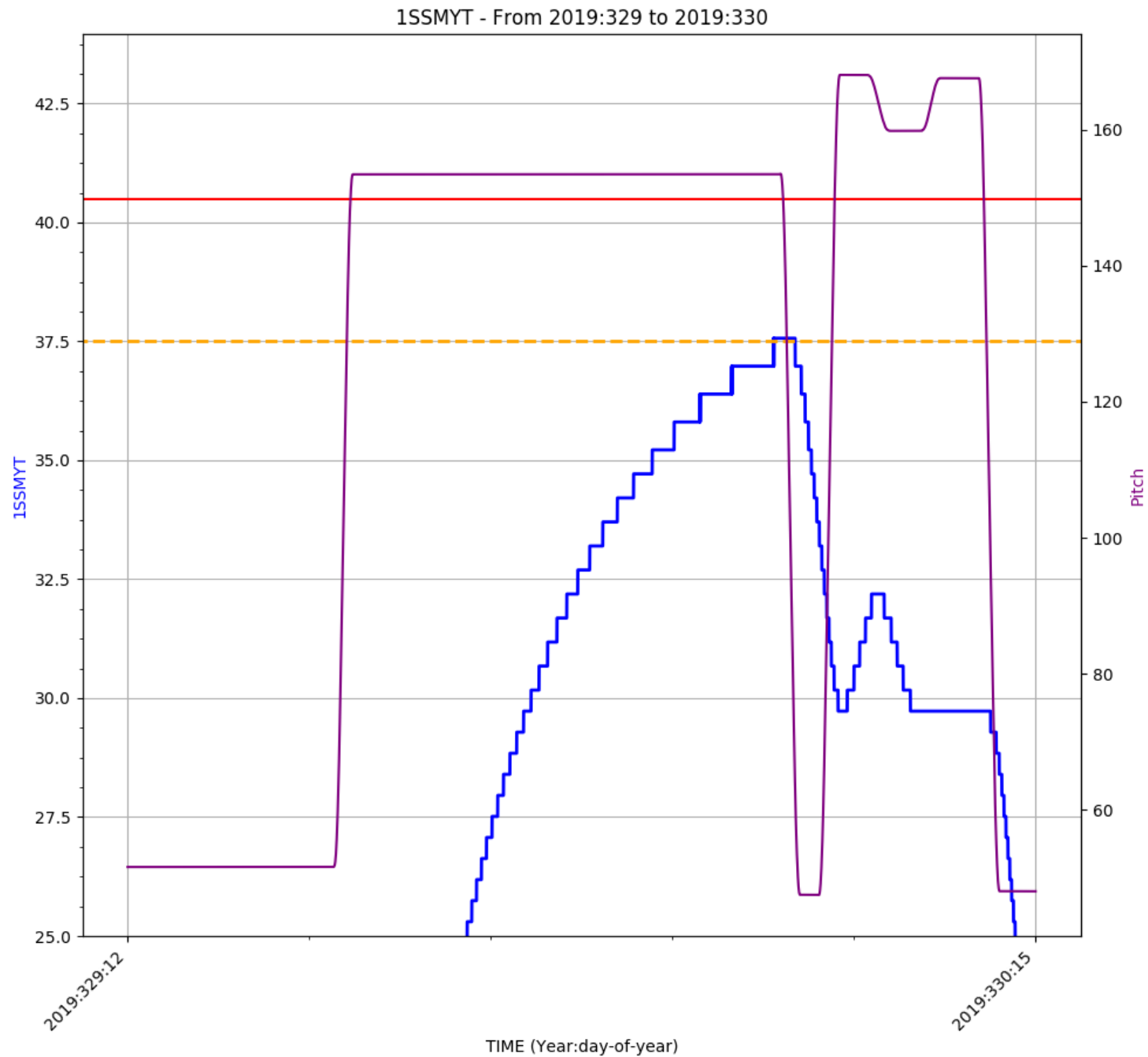


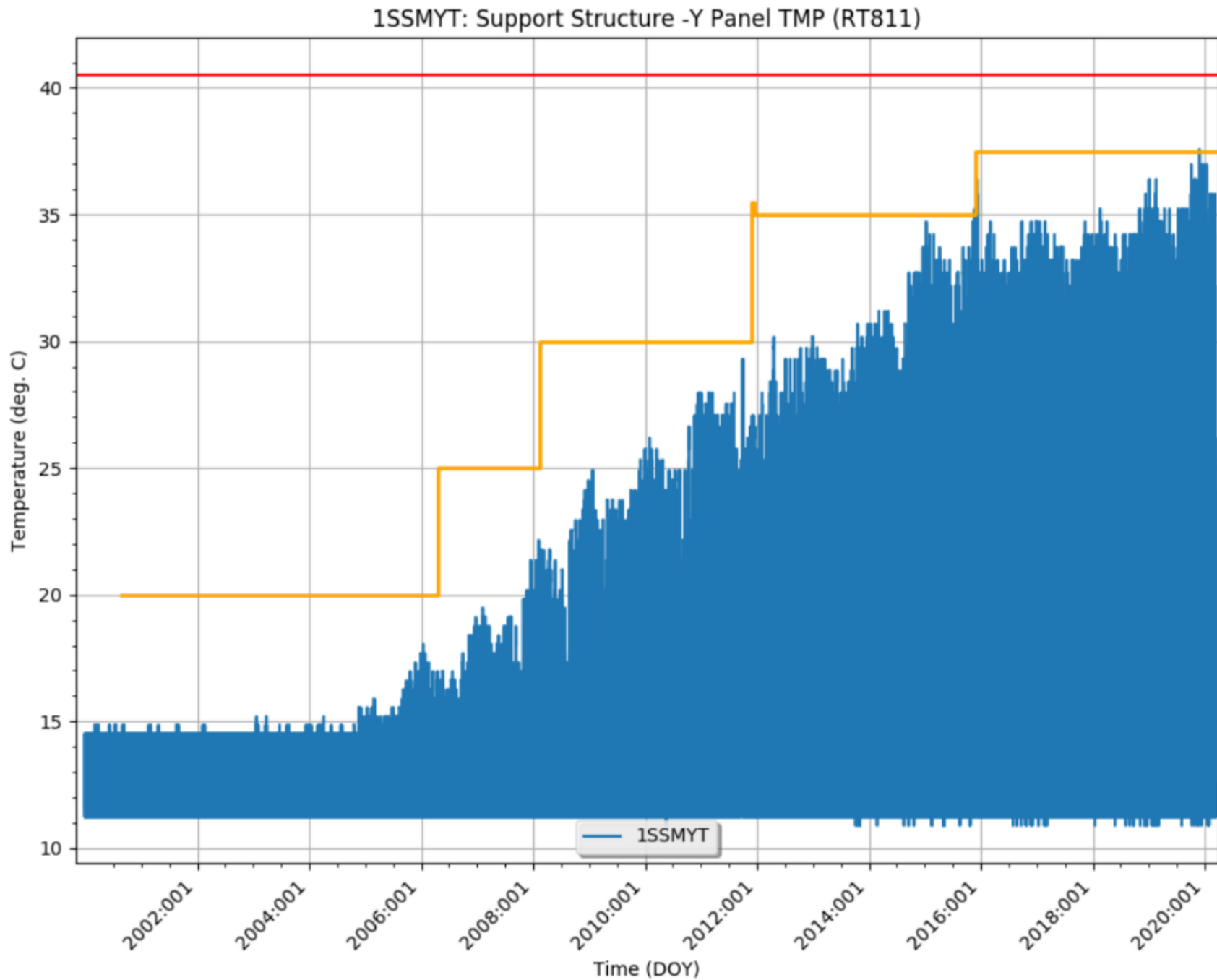
1SSMYT & 1SSPYT Limits Increase Proposal

- Present Limits for both msid's:
Yellow Caution = +37.50
Red Warning = +40.50
- 1SSMYT Yellow Caution Limit violation:
2019:330:07:12:43.71 with a value of: 37.5667
Obsid 22878
ACIS-S; 4 chips; no grating
46 ksec
Pitch = 153.24
Nominal Roll of 14.35, scheduled roll 14.79
- No Yellow Caution violations of 1SSPYT

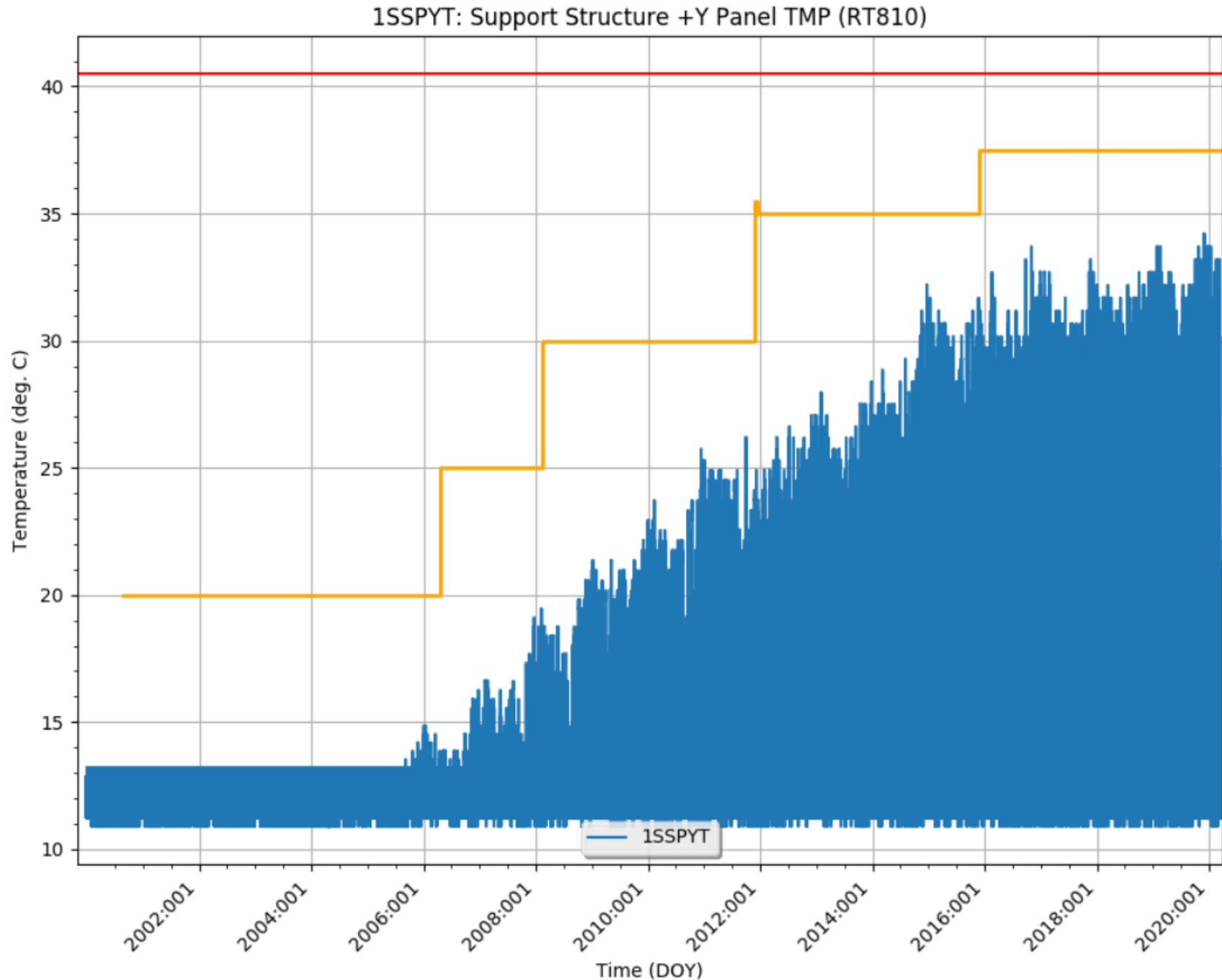
Violation



1SSMYT Increasing Over the Mission

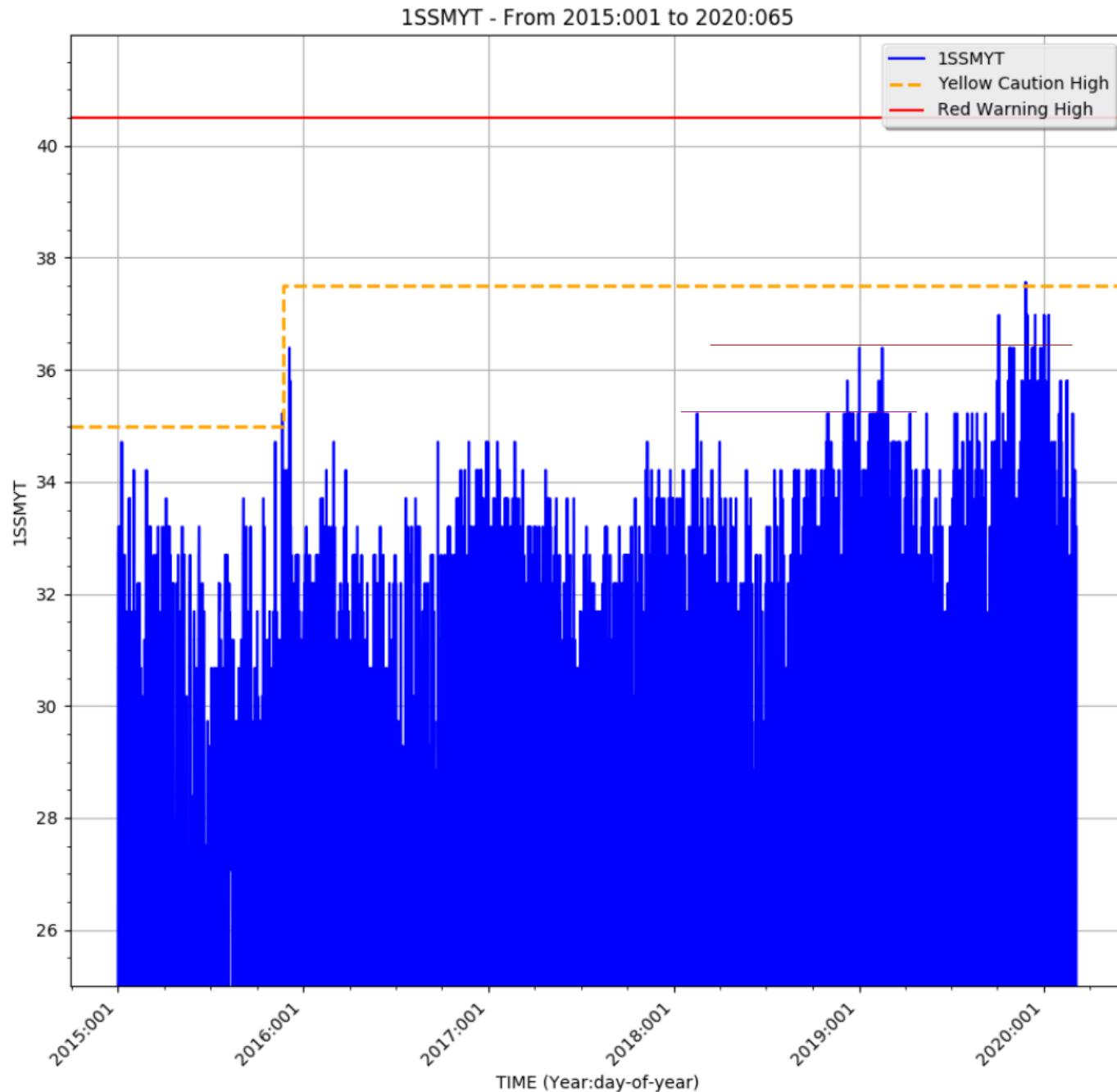


1SSPYT Increasing Over the Mission

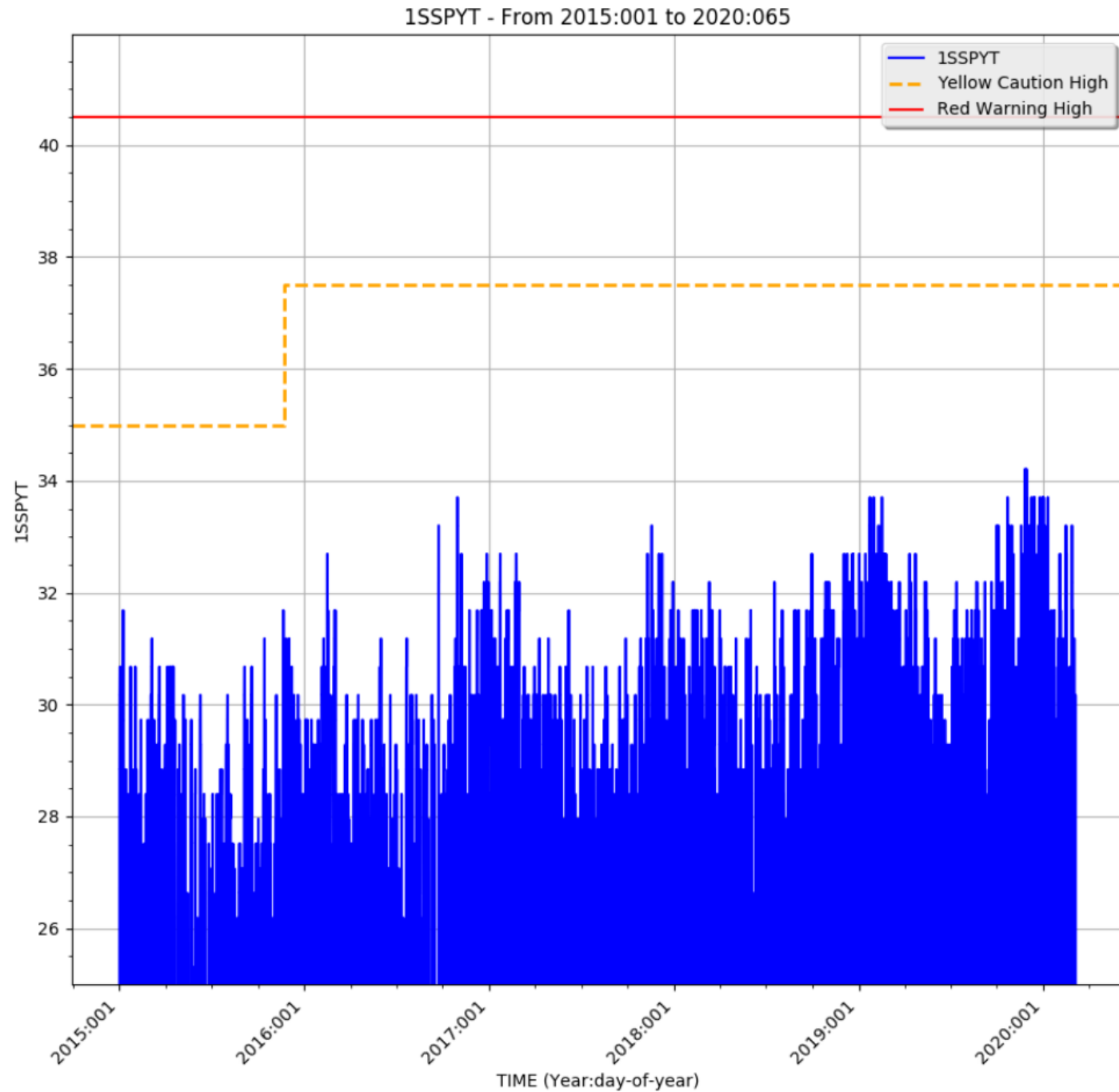


1SSMYT History since 2015

- Note seasonal effects
- 2 bit jump from last hot season peak



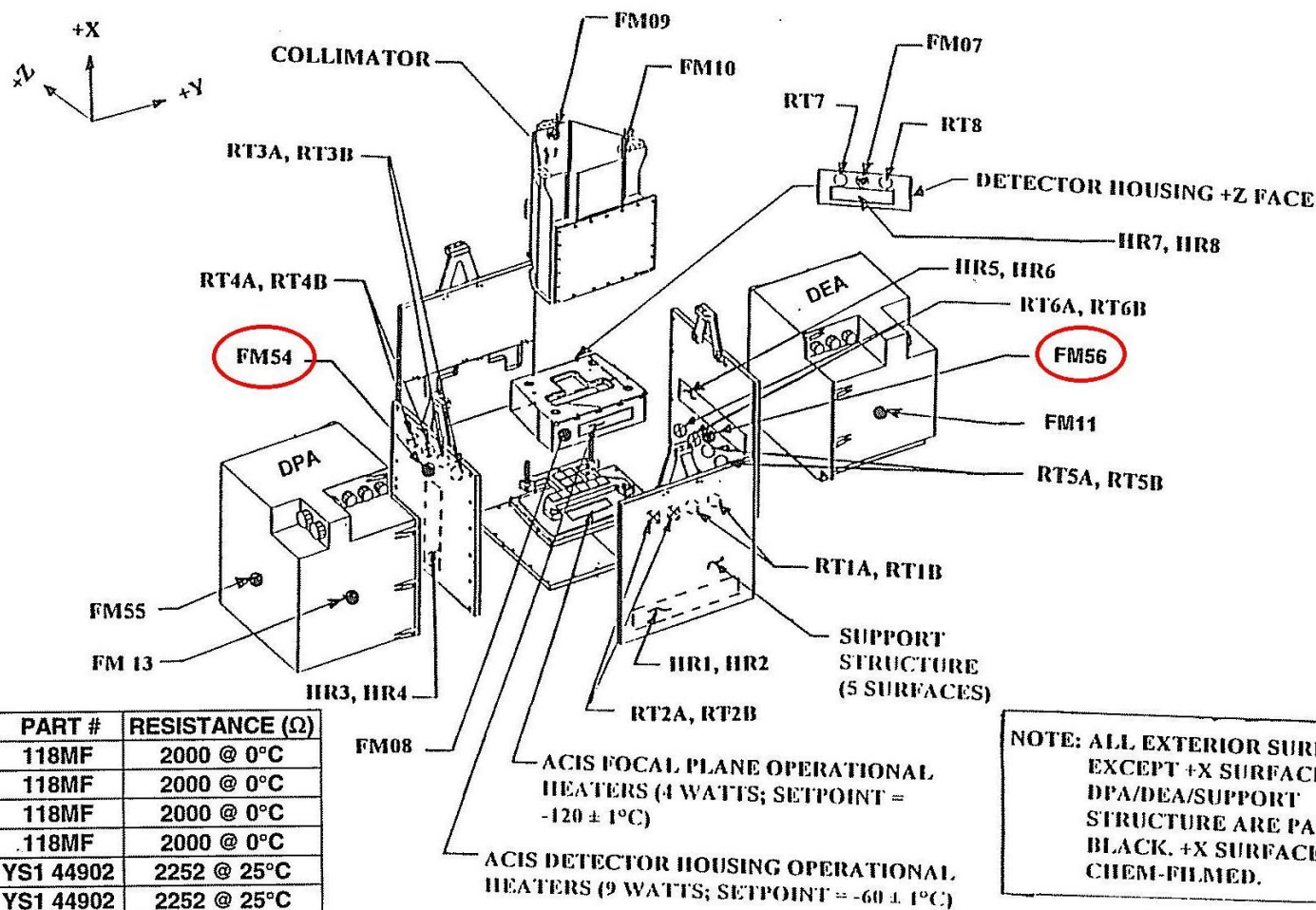
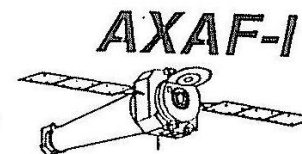
1SSPYT Since 2015



- No Danger of Y.C. violation.

Thermistor Locations

ACIS SS & DETECTOR HOUSING TRIM & SURVIVAL HEATERS & TEMP. TELEMETRY

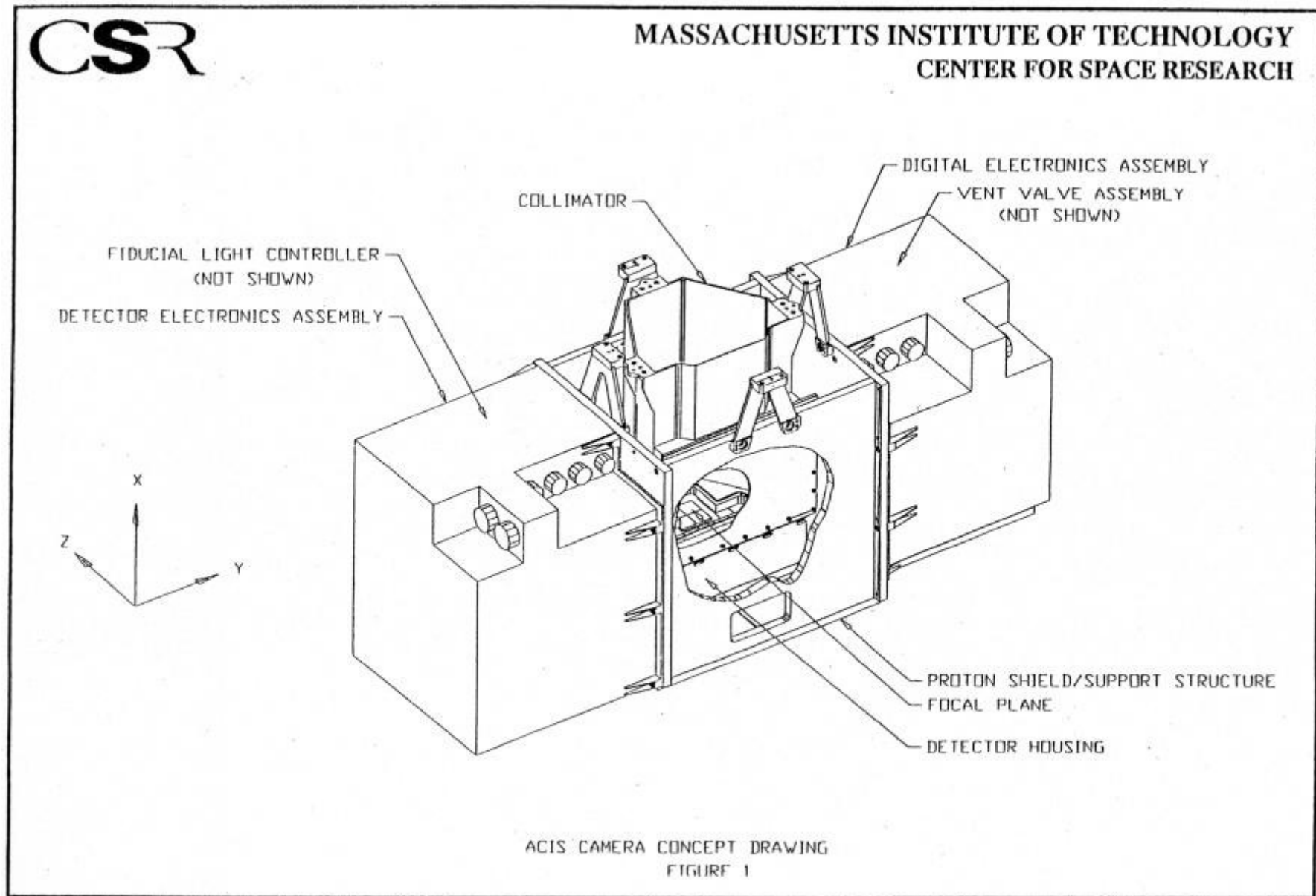


ID	MNEMONIC	PART #	RESISTANCE (Ω)
FM07	1CBAT	118MF	2000 @ 0°C
FM08	1CBBT	118MF	2000 @ 0°C
FM09	DELETED	118MF	2000 @ 0°C
FM10	1DACTBT	118MF	2000 @ 0°C
FM11	1DEAMZT	YS1 44902	2252 @ 25°C
FM13	1DPAMZT	YS1 44902	2252 @ 25°C
FM54	1SSMYT	YS1 44902	2252 @ 25°C
FM55	1DPAMYT	YS1 44902	2252 @ 25°C
FM56	1SSPYT	YS1 44902	2252 @ 25°C

K-35

NOTE: ALL EXTERIOR SURFACES EXCEPT +X SURFACES OF DPA/DEA/SUPPORT STRUCTURE ARE PAINTED BLACK. +X SURFACES ARE CHEM-FILMED.

ACIS Camera Concept Drawing



Support Structure

Support Structure is made from aluminum with titanium brackets.

Passive element: no electronic components nor any other sources of power dissipation.

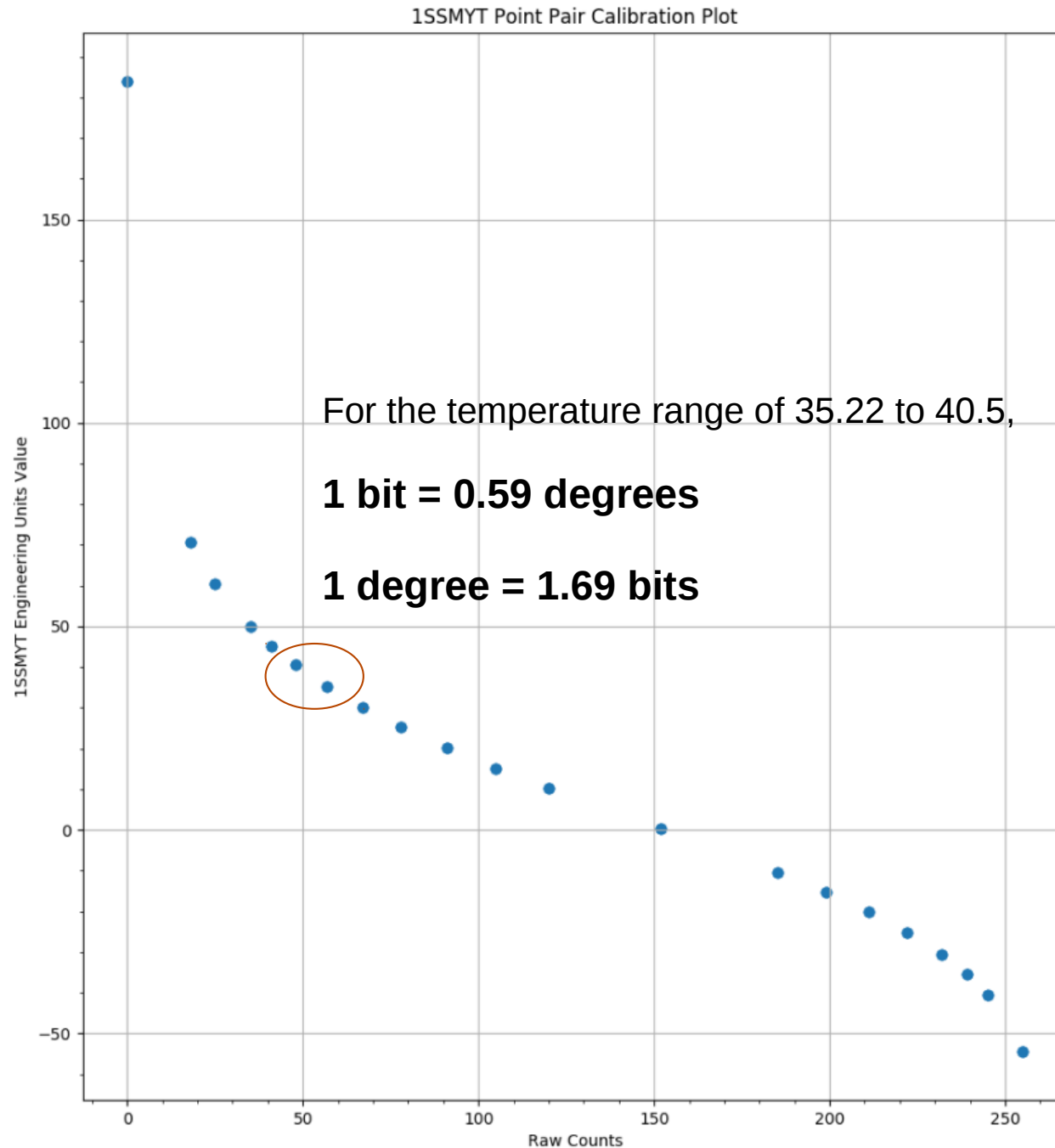
Temperature range slightly warmer than room temperatures.

Supports the DPA and DEA boxes.

1SSPYT Limits Also Increased

- When we updated 1SSMYT limits at the end of 2015, we also updated 1SSPYT's limits to the same values.
- 1SSPYT not nearing its Yellow Caution limits.

1SSMYT and 1SSPYT Resolution



Objective and Proposals

Objective: Avoid unnecessary Yellow Caution alerts for 1SSMYT.

- From hot season to hot season we often see that the maximum temperature increases by 2 bits or $0.59 * 2 = 1.18$ degrees C
- Yellow Caution (37.5 dec C) is presently 3 degrees (5+bits) away from Red Warning (40.5 deg C)
- No 2 degree “planning limit” required as we don’t plan to 1SSMYT

Proposal 1

Raise Yellow Caution 1 degree C. to 38.5 or 1+ bits (1.69)

- The violation was at 37.57, 0.93 degrees C or 1+ (1.58) bits away from 38.5
- Y.C. 2.0 degrees C (3.39 bits) away from 40.5 – our usual buffer though no pad needed to account for model error.
- If the 2 bit year to year increase occurs in the 2020-2021 hot season, a one degree increase is not enough to prevent Yellow Caution alerts during the hot season.
$$37.75 + (2 * 0.59) = 38.75$$

Proposal 2

Raise Yellow Caution 1.5 degrees to 39.0 degrees C

- Y.C. 1.5 degrees or 2+ (2.54) bits away from Red Warning
 - No Pad needed for model inaccuracy.
- Probably avoids Yellow Alert for the next year:
 $37.57 + (2 * 0.59) = 38.75 \text{ deg C}$
- Does not buy you 2 years... $37.57 + (4 * 0.59) = 39.93 \text{ deg C}$

2 degree C Y.C. increase to 39.5 doesn't give you 2 years:
 $37.57 + (4 * 0.59) = 39.93$

Proposal 3

Raise Yellow Caution 2.5 degrees C to 40.0 degrees C or 4+ (4.24) bits

Raise Red Warning 1.5 degrees C to 42.0 degrees C or 2+ (2.54) bits

- New Y.C. is 2.43 degrees C above the violation
 - 4+ (4.12) bits
- New R.W. is 2.0 degrees or 3+ (3.39) bits away from Y.C.
 - 4.43 degrees or 7+ (7.51) bits above the violation
- Buys you 2 hot seasons before we do this again.
 $37.57 + (4 * 0.59) = 39.93$

Is it Safe?

- Can we safely raise the 1SSMYT and 1SSPYT Yellow Caution limits by 2.5 degrees C and Red Warning by 1.5?
 - MIT ACIS Engineering team deems it completely safe: Could be 100C – misapplication of “Red Limit” in this case.
 - Red Warning Limit not a Health and Safety issue. MIT
- Various Ground tests saw a 1SSMYT maximum of just under 40 deg C.
- Is the 20 degree temperature rise since launch a problem?
 - MIT ACIS Engineering team says no.
- Support structures do not dissipate heat; get warm at tail sun attitudes; limited by carefully limited DPA and DEA temperatures.
- 1SSMYT and 1SSPYT are not proxies for other values.

Appendix

Pre-Launch 1SSMYT and 1SSPYT ($^{\circ}\text{C}$)

