

Proposal to Raise the 1 DEAMZT Planning and Caution Limits: May 2022

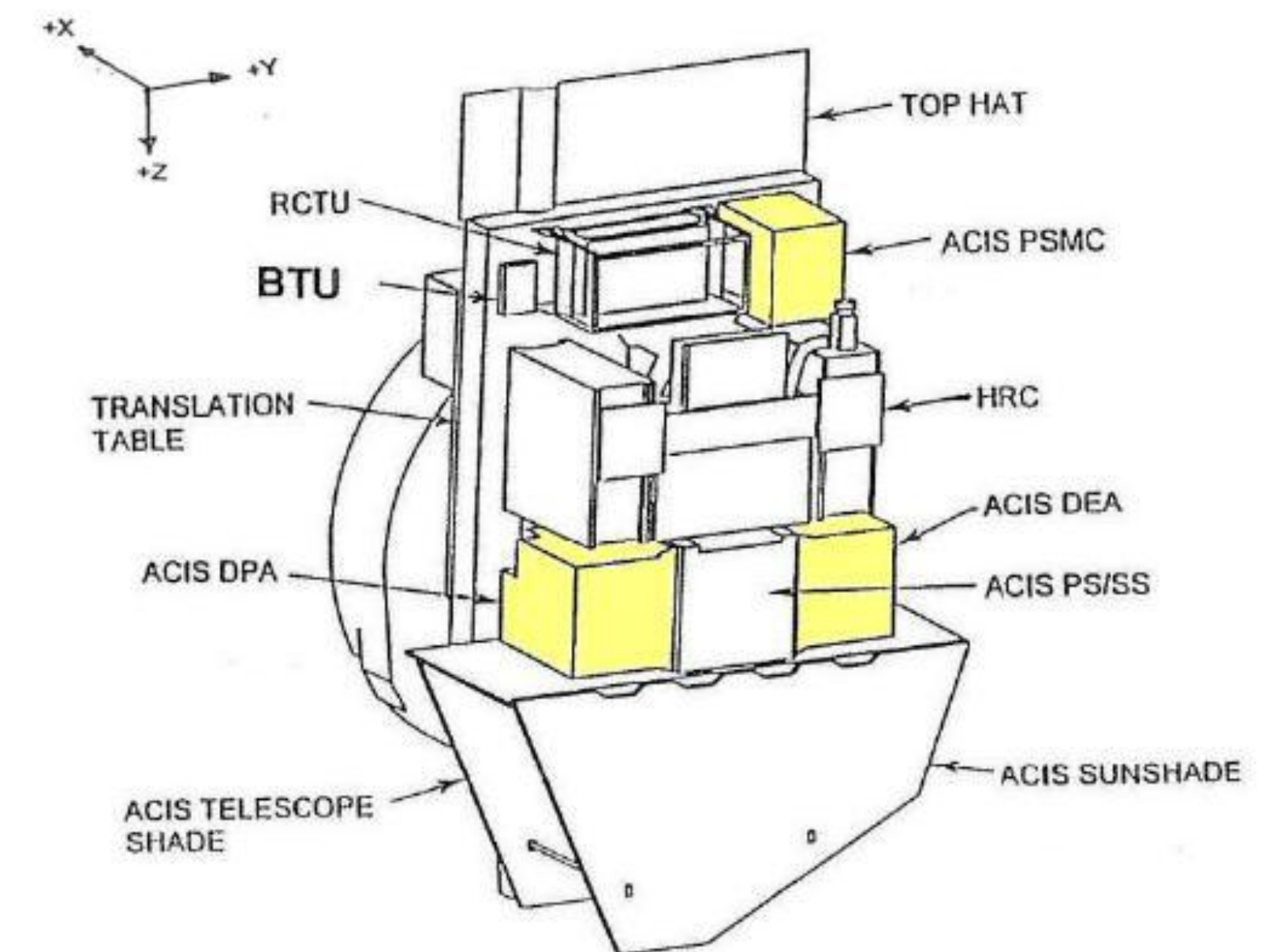
John ZuHone

Proposal

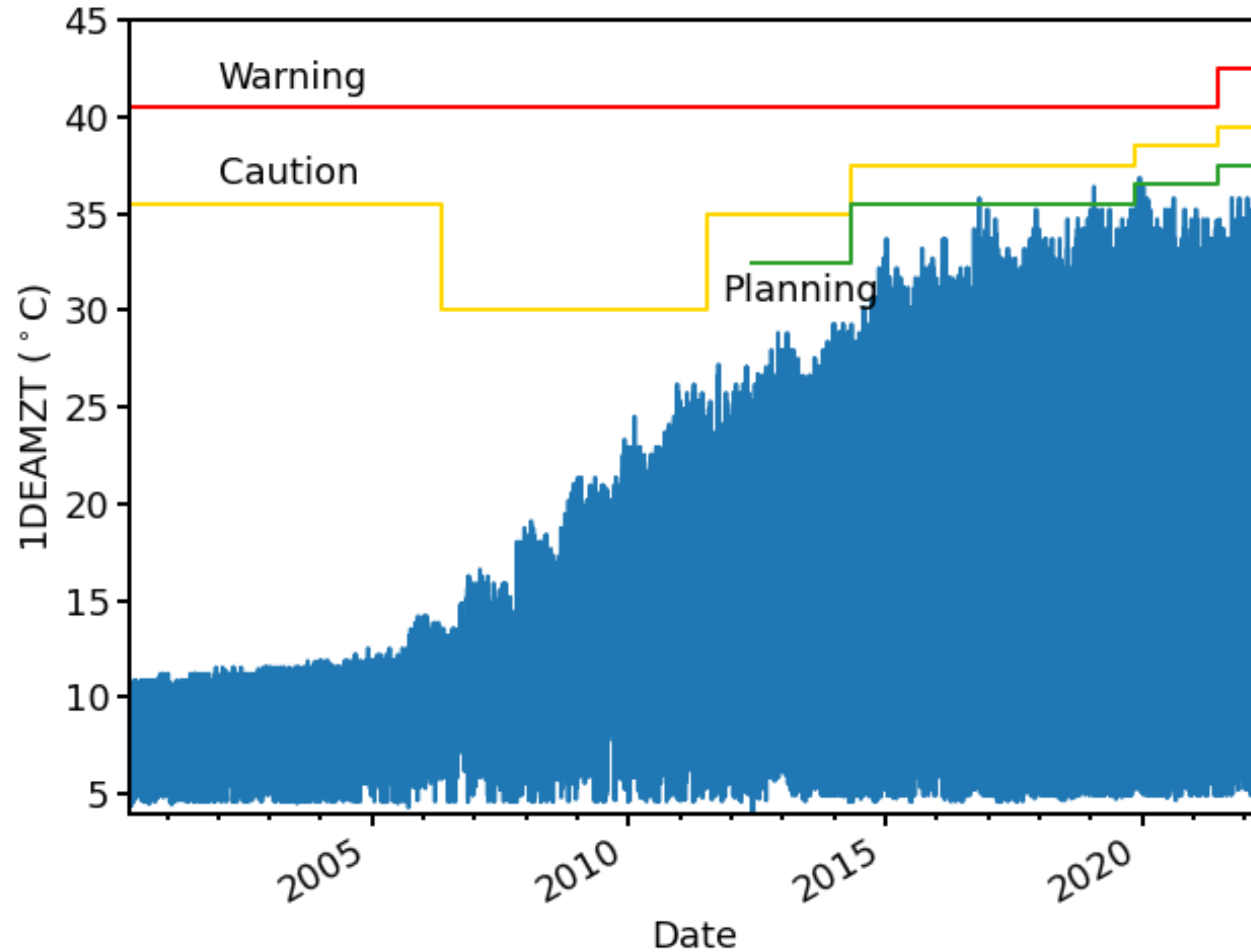
- *Raise* planning limit from 37.5 C to 38.5 C
- *Raise* yellow/caution limit from 39.5 C to 40.5 C
- *Keep* red/warning limit at 42.5 C—maximum temperature reached in pre-launch testing of 43 C

Rationale for Raising Limits

- 1DPAMZT is being raised to provide additional margin for MP and scheduling
- Hotter 1DPAMZT temperatures will result in hotter 1DEAMZT temperatures, since both are on the same side of the SIM (though note a dependence on roll angle)
- Both temperatures are hotter at tail-Sun attitudes
- This necessitates a raising of the Planning and Caution High limits for 1DEAMZT

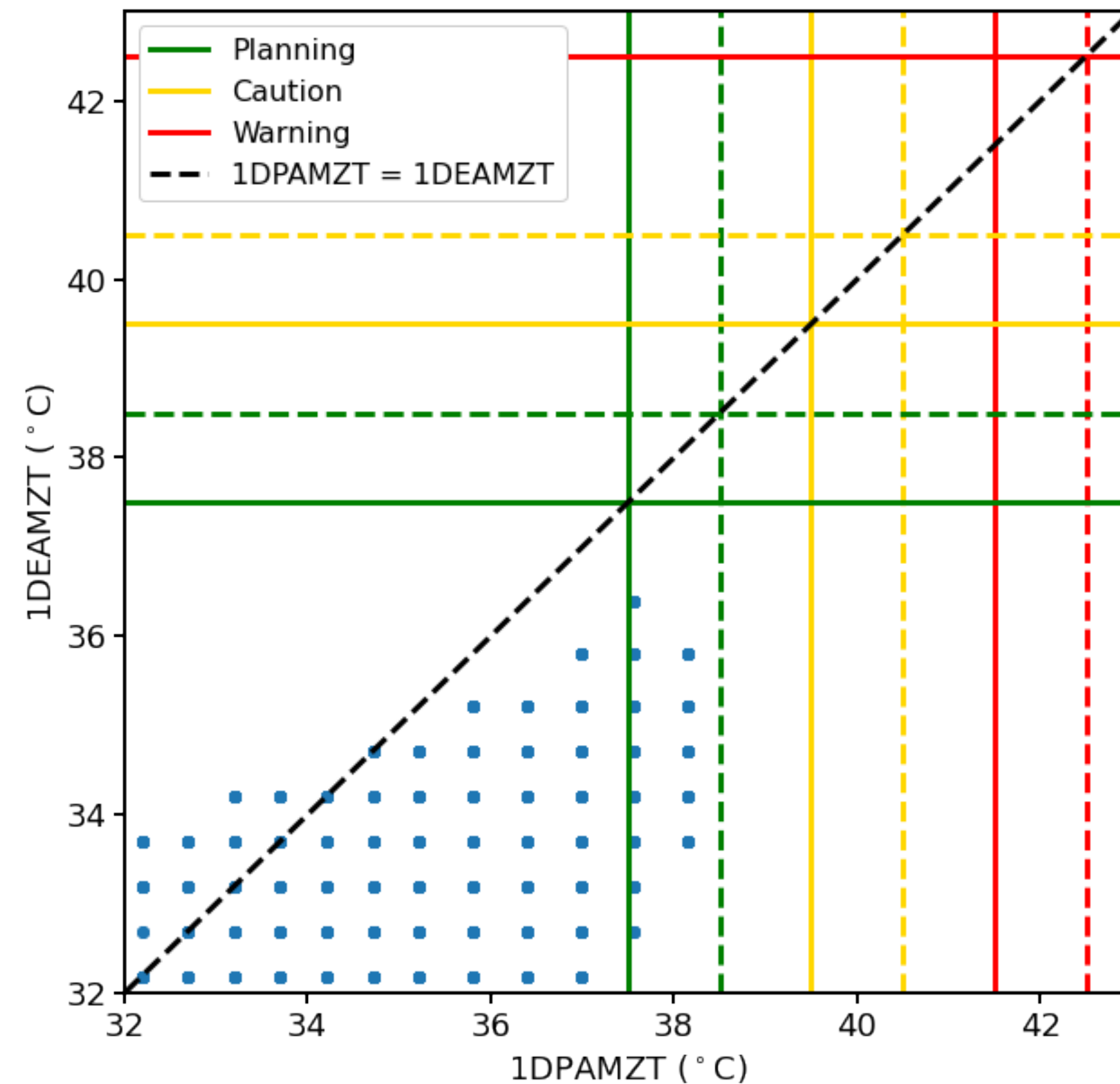
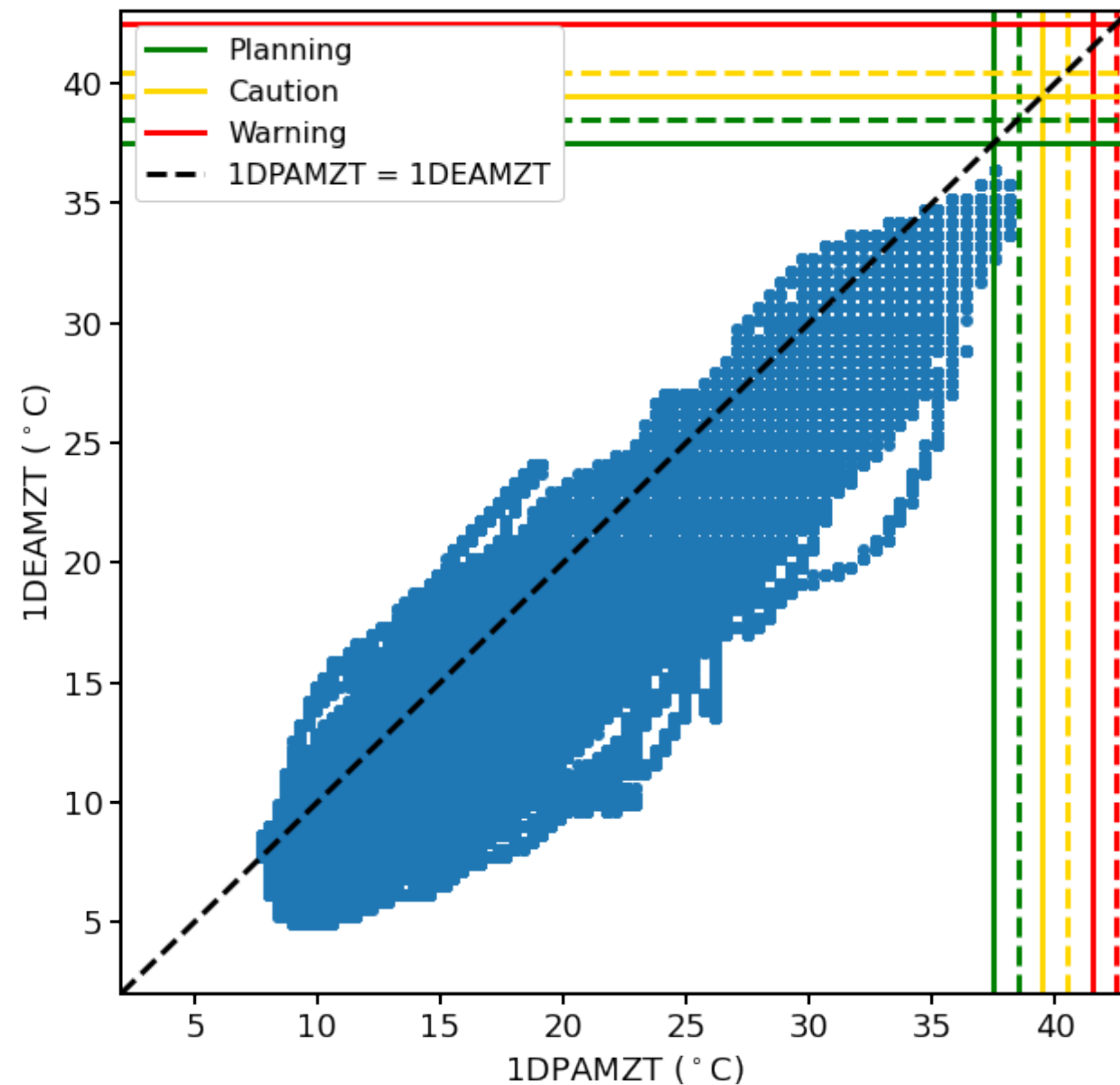


1 DEAMZT Whole Mission



1 DEAMZT vs. 1 DPAMZT

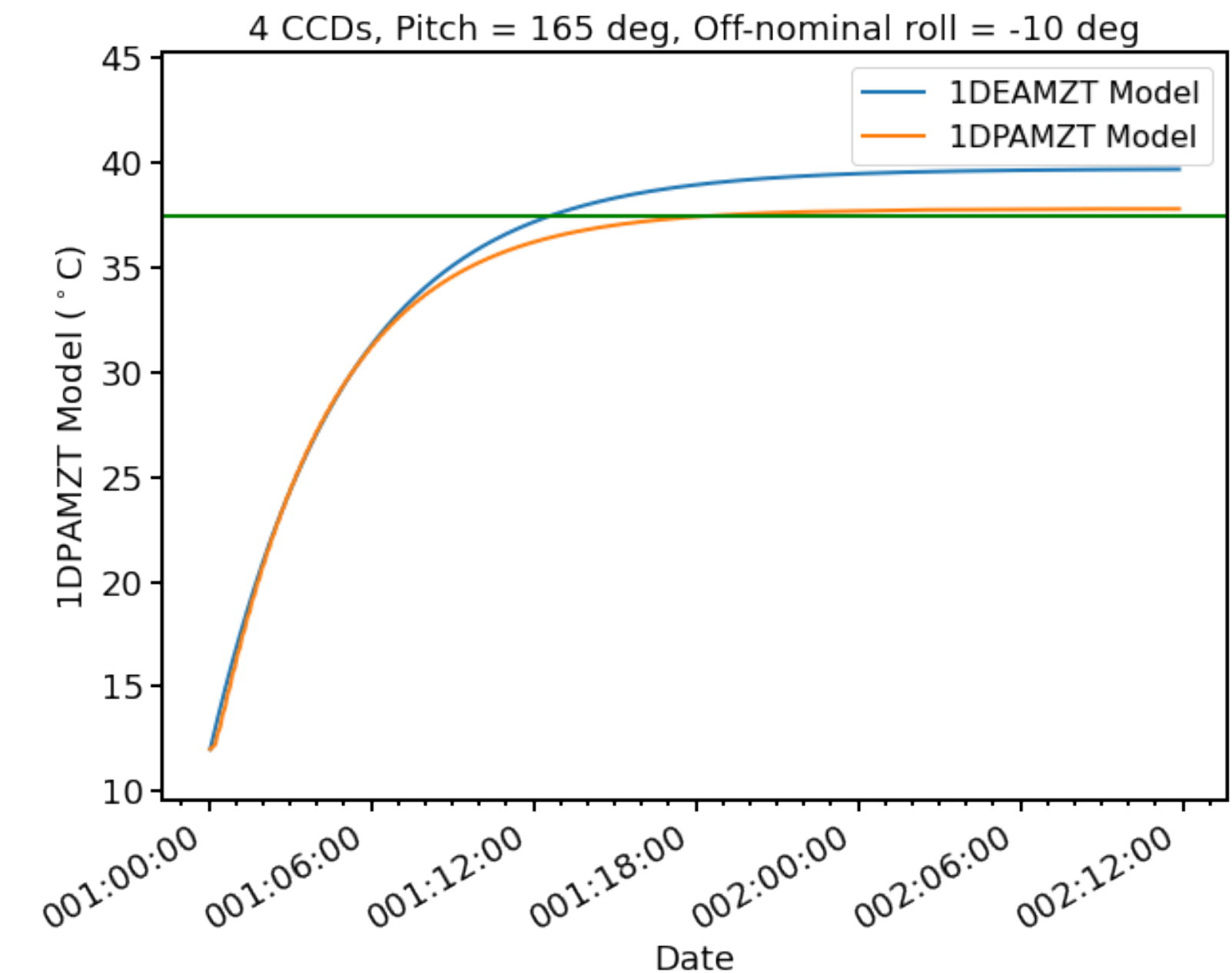
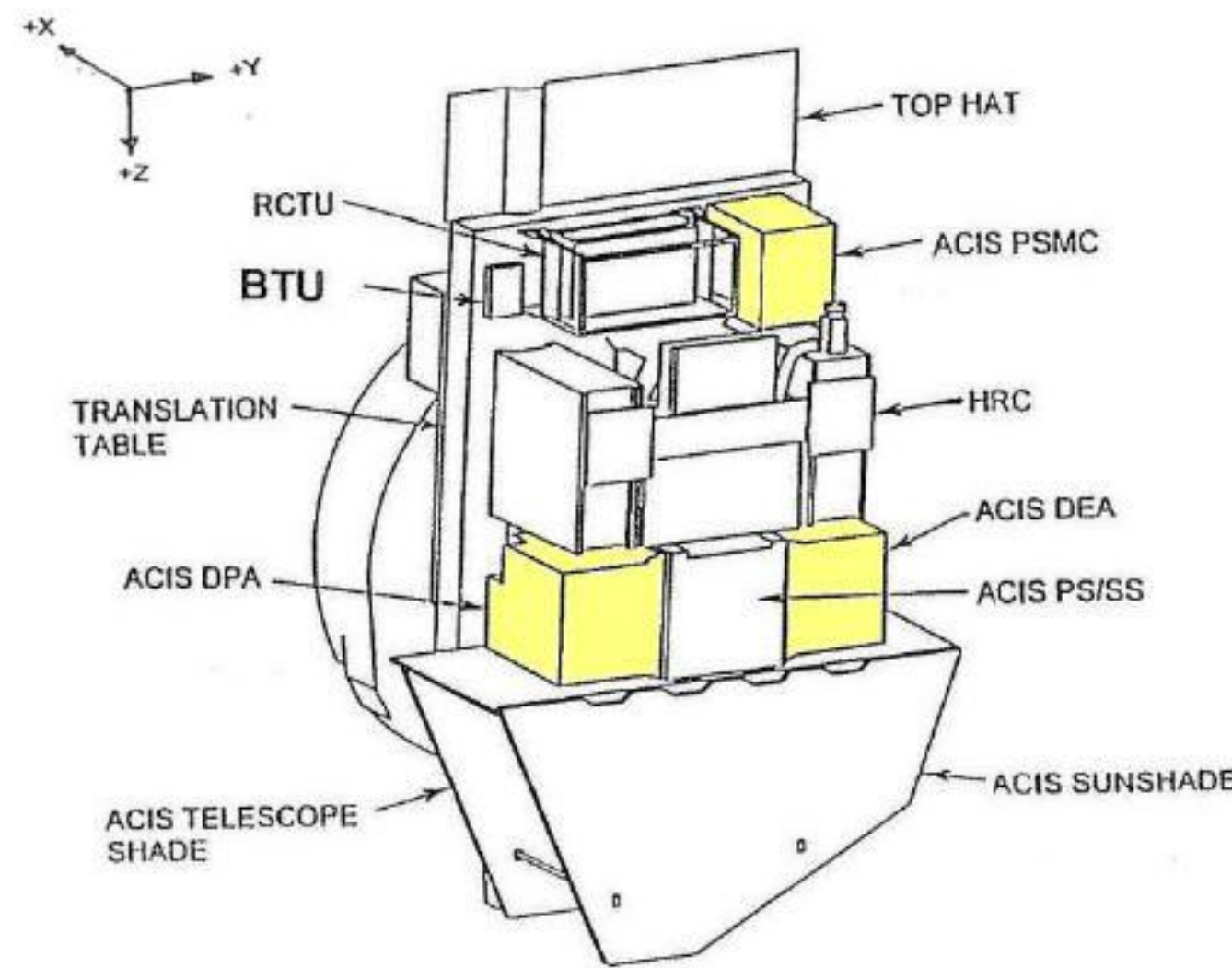
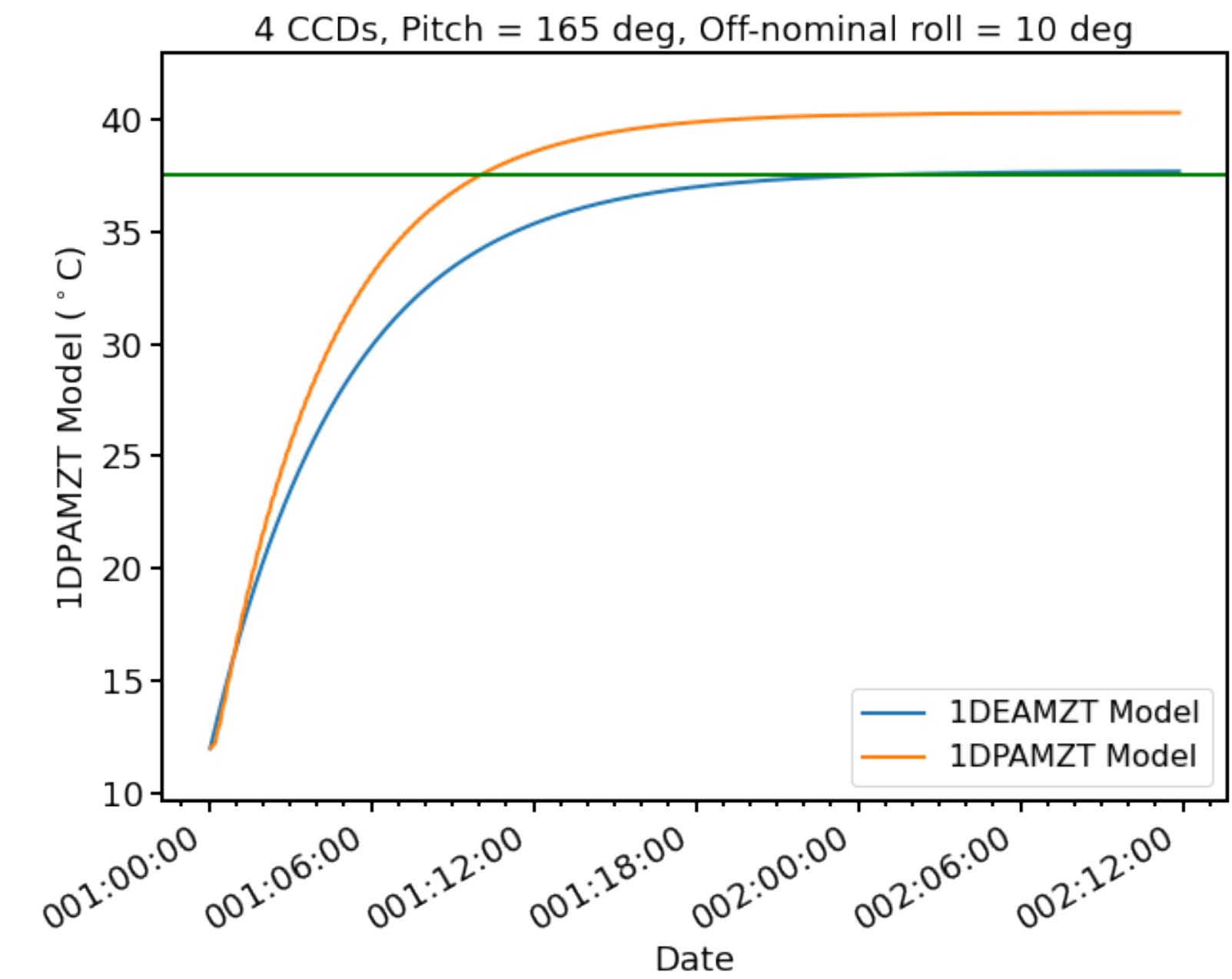
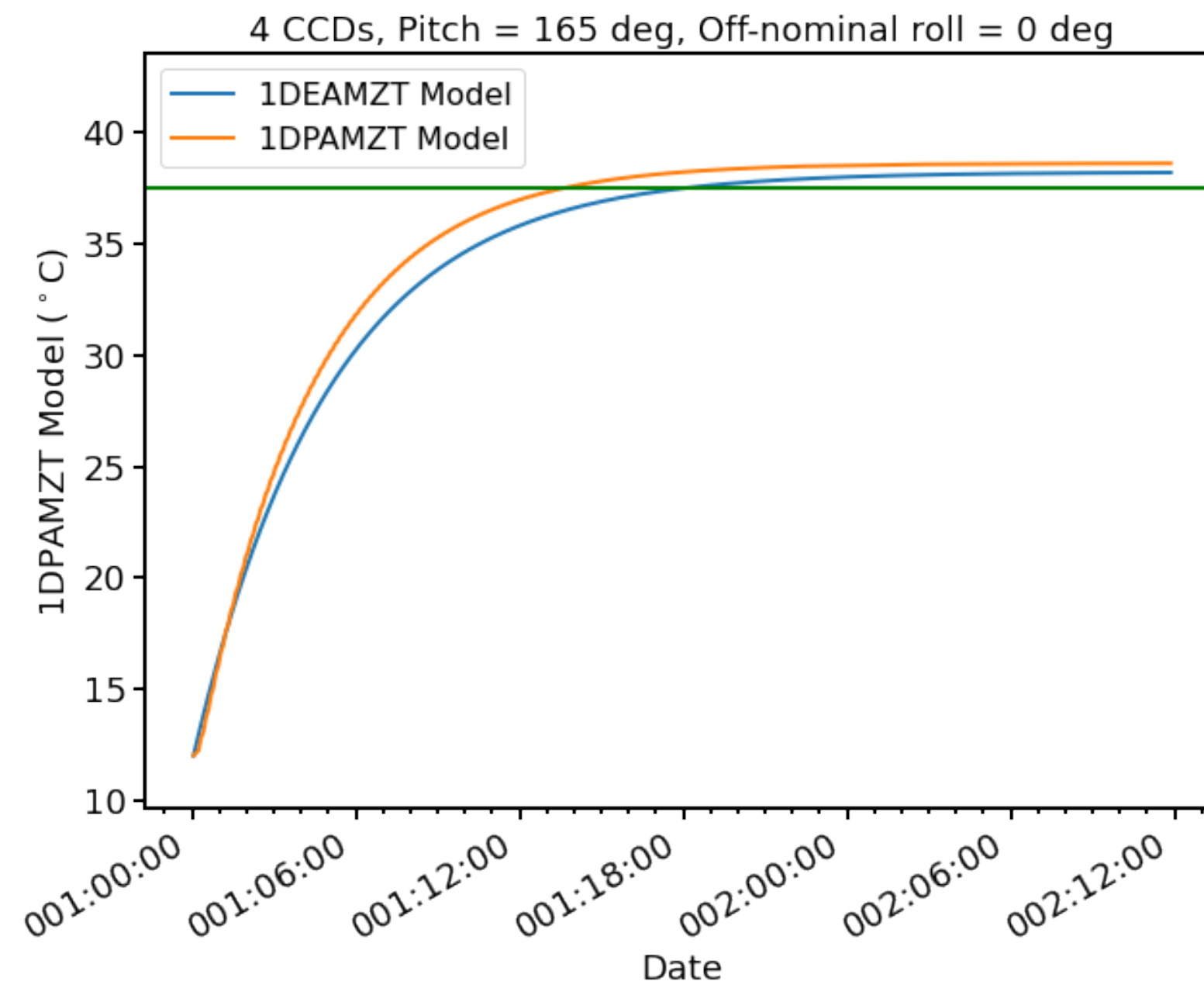
Last year's worth of data



Solid lines: current limits, dashed lines: proposed limits

Roll Dependence

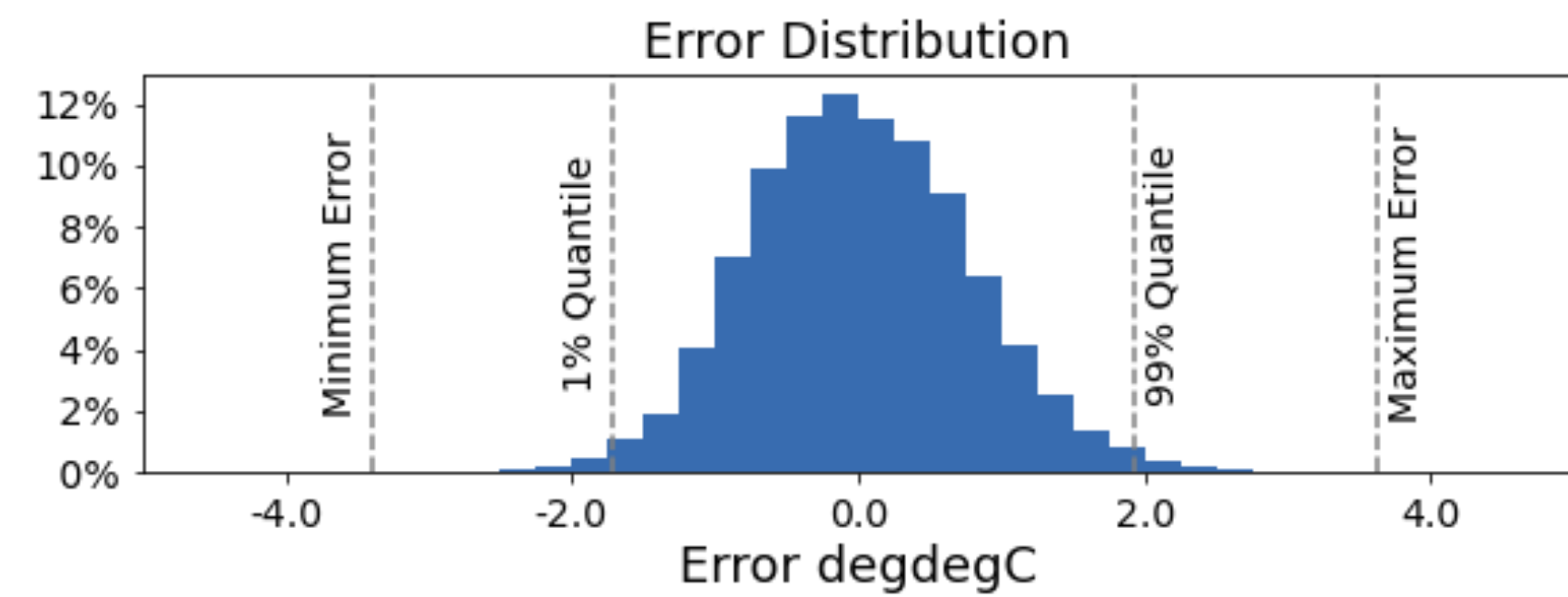
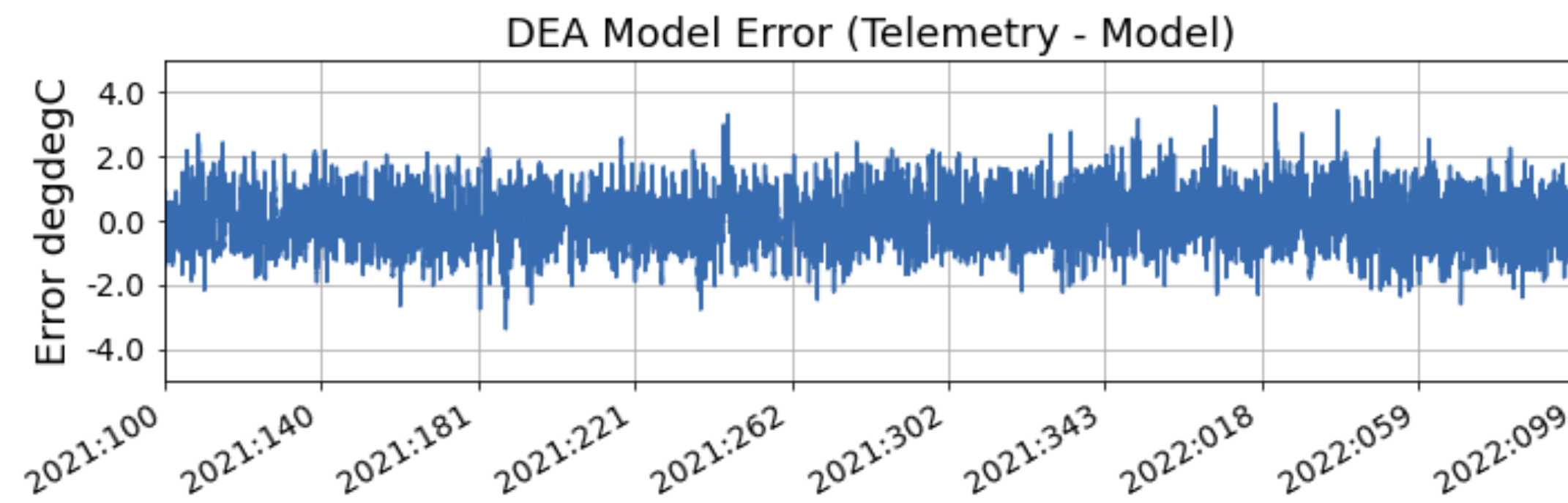
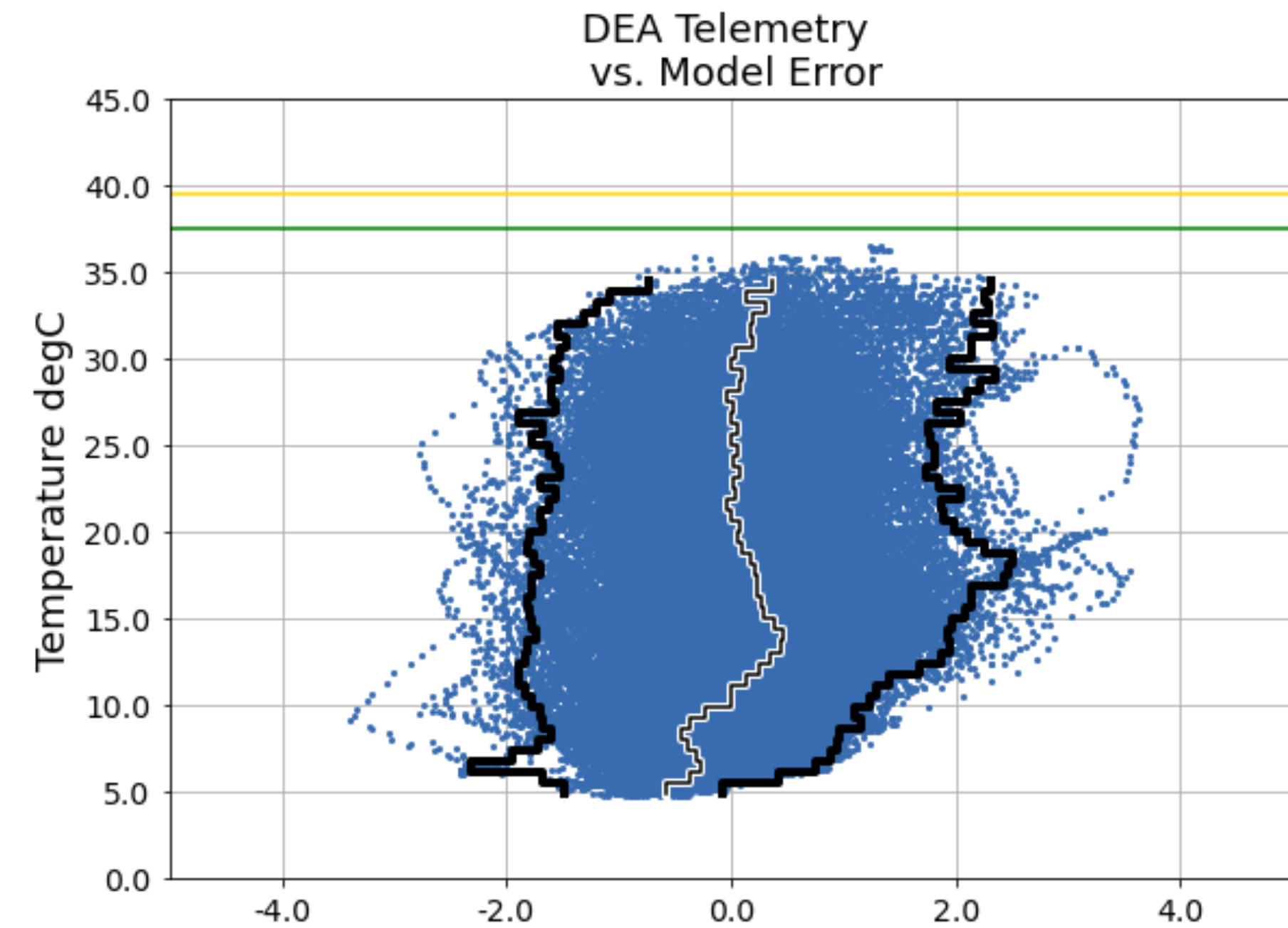
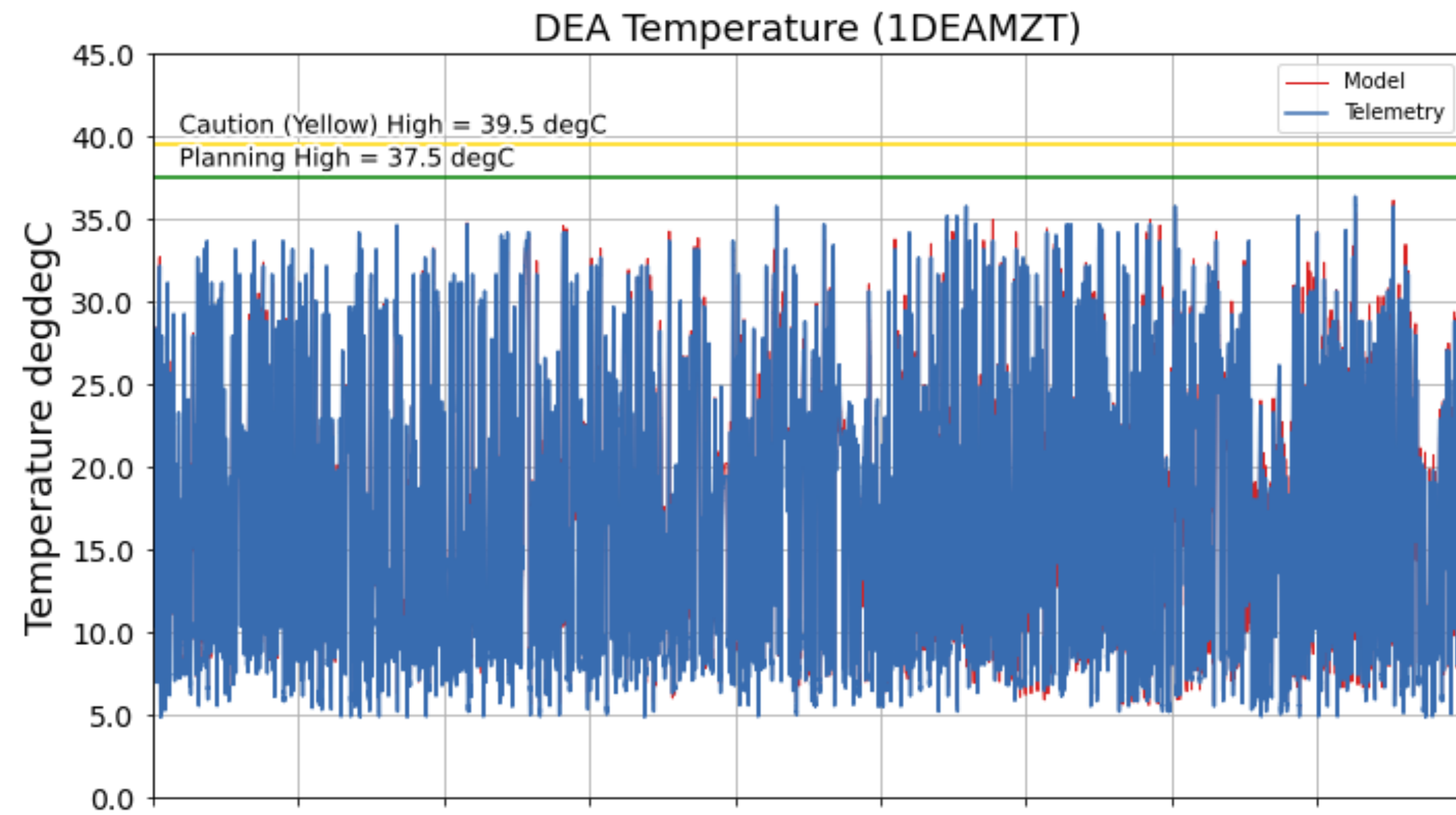
- Normally, 1DPAMZT > 1DEAMZT
- For negative off-nominal rolls, the opposite is the case
- 1DEAMZT can reach a few degrees higher for large and negative off-nominal rolls



Reasons We Cannot Raise the Warning High Limit

- No boards within DEA are instrumented with thermistors, in contrast to the DPA, so we cannot base limit values on internal temperature values
- Component temperatures on the DEA boards closely track the external box temperature (unlike the DPA which has specific high dissipation components).
- Each video board in the DEA is hard-wired to a specific CCD—if we lose a video board, we lose a CCD
- Maximum temperature reached in thermal vac testing was 43 °C

1 DEAMZT Model Accuracy



1 DEAMZT Limit Rationale and Budget

Limit	Value	Budget	Rationale
Warning High	42.5 °C	0.5 °C	Highest temperatures reached in thermal vac testing of 43 °C. Maintain 2 °C on all limits.
Caution High	40.5 °C	2 °C	Limit provides warning before Warning High Limit is reached; ACIS Instrument team concurs a 2 °C pad is sufficient
Planning High	38.5 °C	2 °C	Model error of ≈ 2 °C indicates that a 2 °C pad between this limit and the Caution High is sufficient with a well-calibrated thermal model

NOTE: for 1DEAMZT, 1 bit ~ 0.66 °C

Summary

- Proposal:
 - *Raise* planning limit from 37.5 C to 38.5 C
 - *Raise* yellow/caution limit from 39.5 C to 40.5 C
 - *Keep* red/warning limit at 42.5 C—maximum temperature reached in pre-launch testing of 43 C
- These changes have been approved by the ACIS Team (Ops and Instrument)
- Risks are low of violating 1DEAMZT Warning High Limit:
 - We keep 2 °C margins between the three temperatures and will maintain model accuracy
 - In most cases, we will be limited first by 1DPAMZT or the ACIS FP temperature, except perhaps for large and negative off-nominal rolls