



TVAC temperature profiles and pressure

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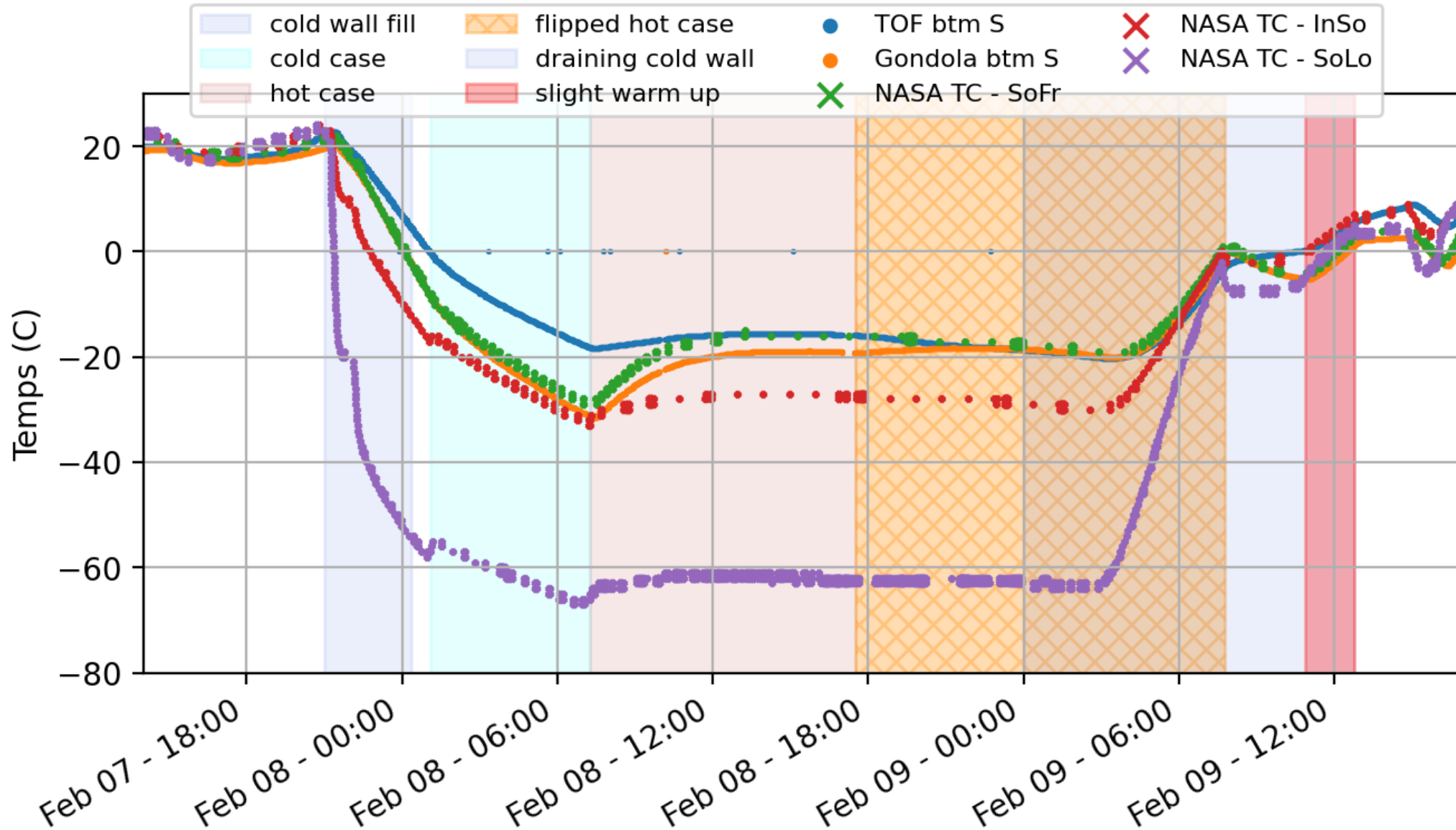
TVAC data for thermal simulations

- Simplified payload model but helpful thermal simulation– previously done by Scott Cannon – “TVAC testing while monitoring box exterior recommended”
 - Now we get Doug...
- We need to report temperatures that may be useful in simulation
- We have multiple thermal stress tests under vacuum
 - Without lamps on:
 - No cold wall -> about 2.5 hours (payload was hottest in this stage)
 - Cold wall -> post fill, 0.75 hours. If including filling, 4 hours (payload was cold and we probably would have broken something if we hadn't transitioned to lamps on).
 - With lamps on:
 - Hot, cold, and flipped hot.

Temperatures with main hsk
probes and NASA TCs

Lower half south face temp probes

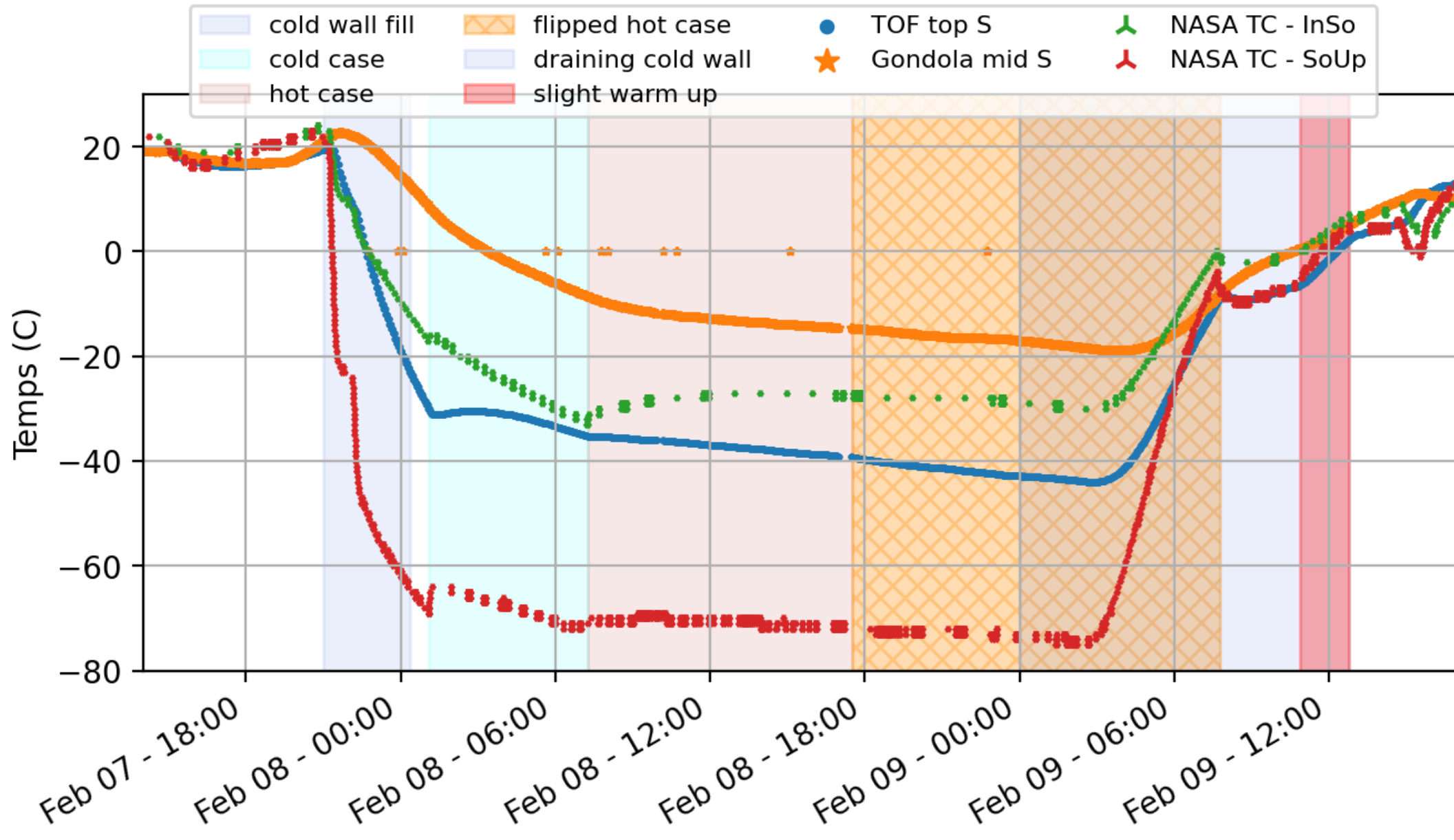
*Gondola Btm S (inside foam)
and NASA SoFr (outside foam)
are both measuring gondola



So, we believe the NASA thermocouple values, this one agrees with our sensor.

In cold case, would have gotten even colder. In hot cases, equilibrium reached.

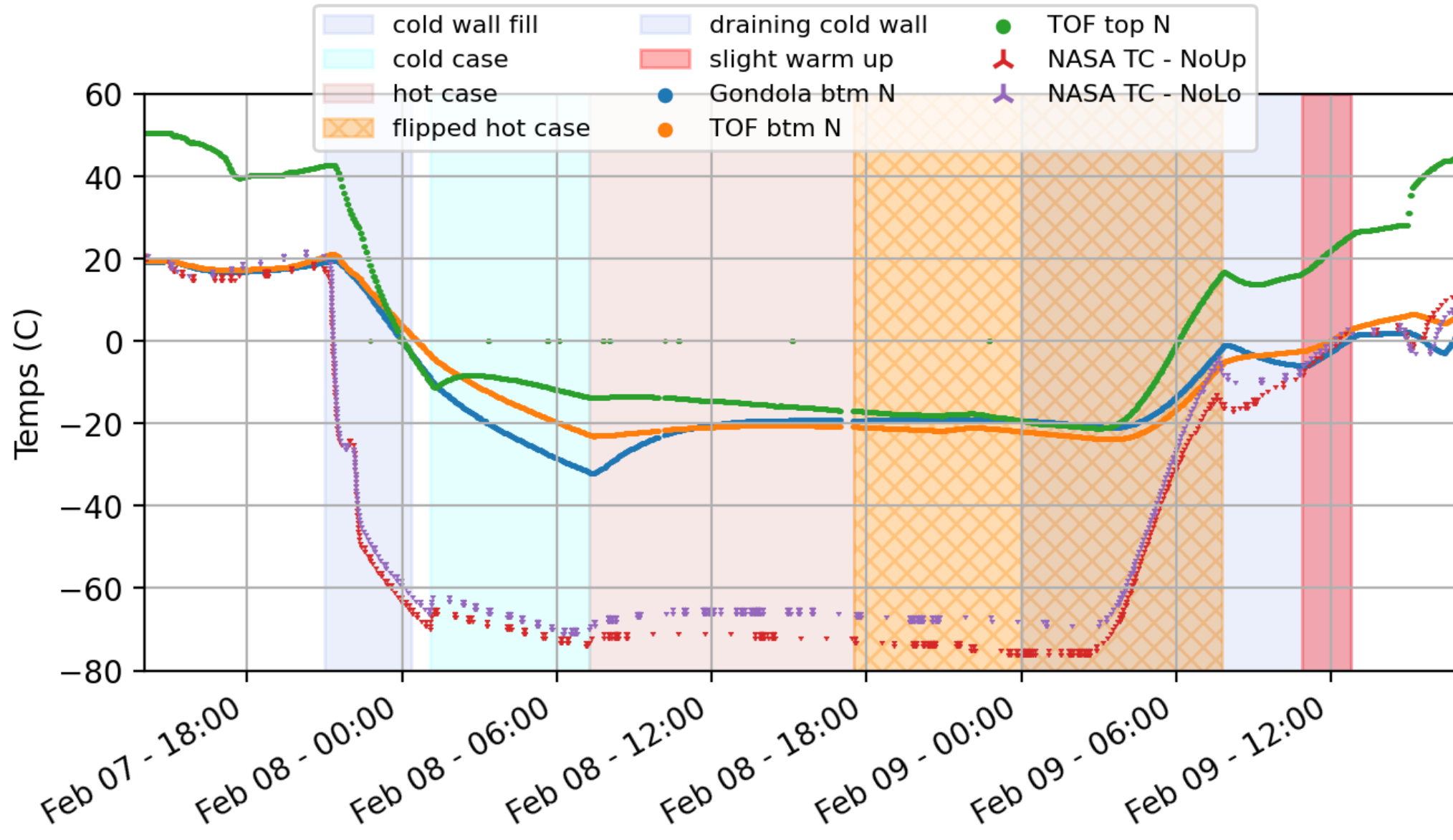
Upper half south face temp probes



Would the top have gotten even colder?
Seems so over long timescale.

North side of payload

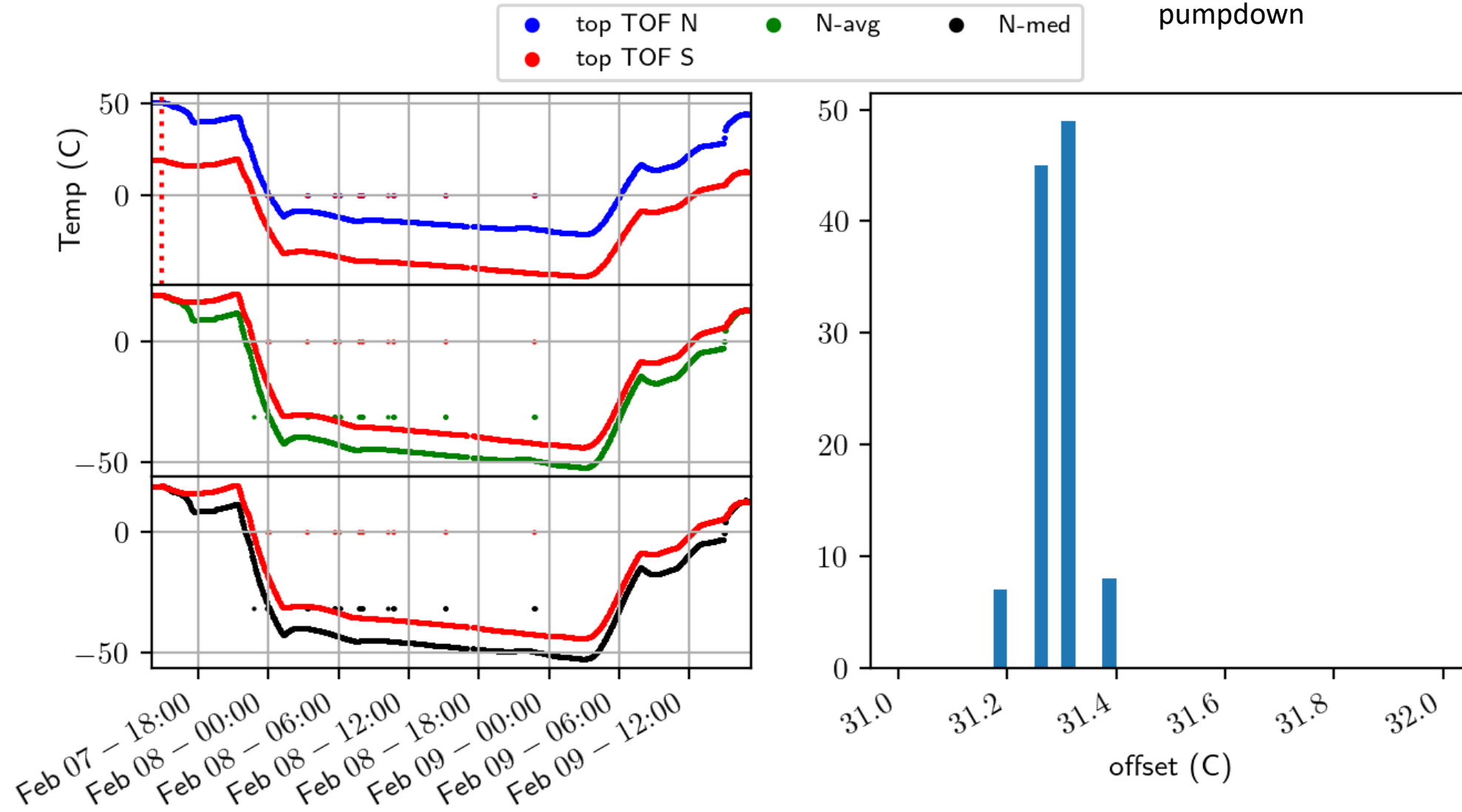
*Top sensor was reading too high?



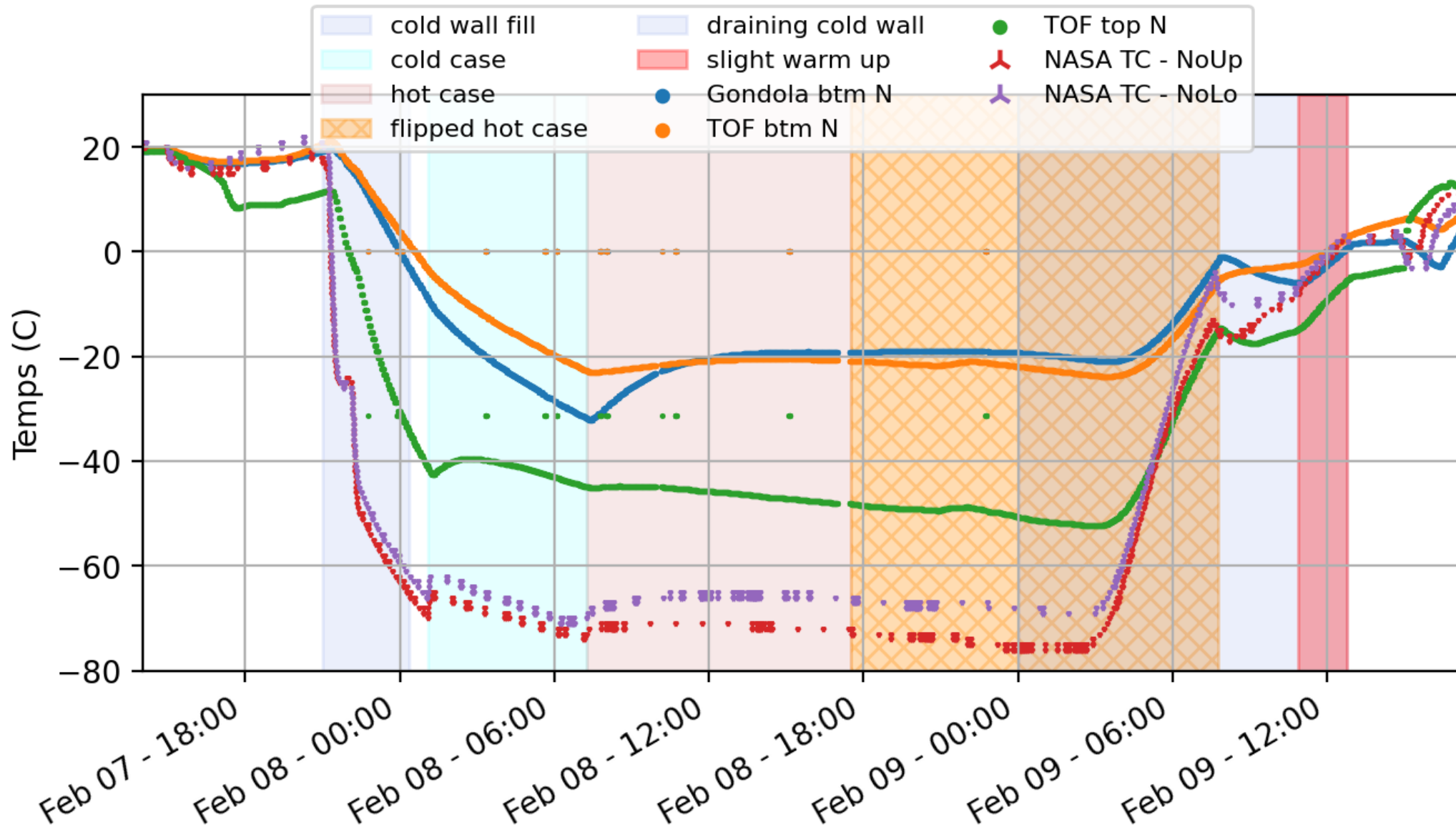
Same trends as south sensors.

North side sensor broken

- Calibrate the top N value with values before pumpdown



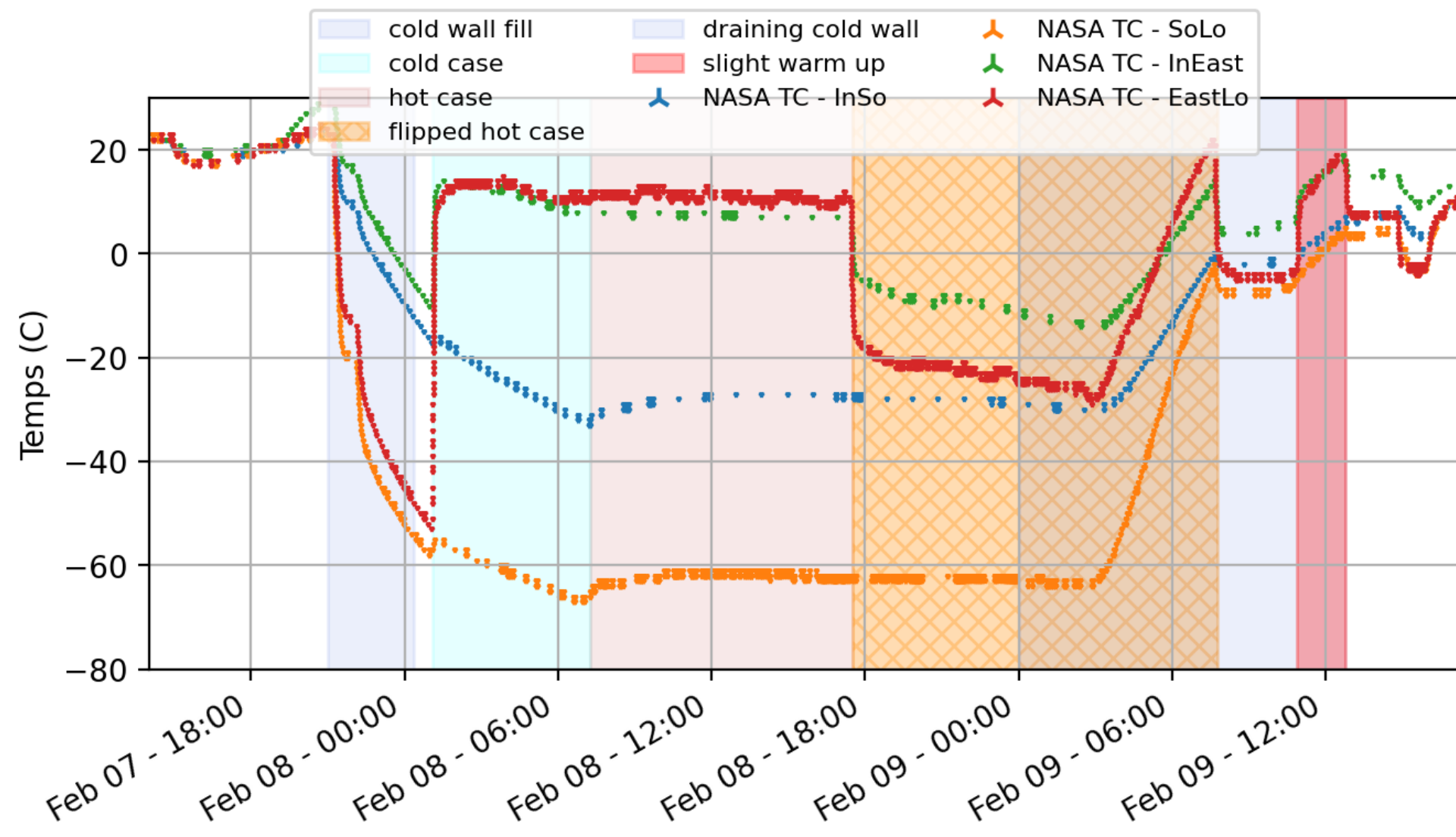
North side of payload with possible correction



Maybe north side honeycomb is cooler than south?

TOF top N could have gotten colder, too.

In and out foam temps (lamps on/off)



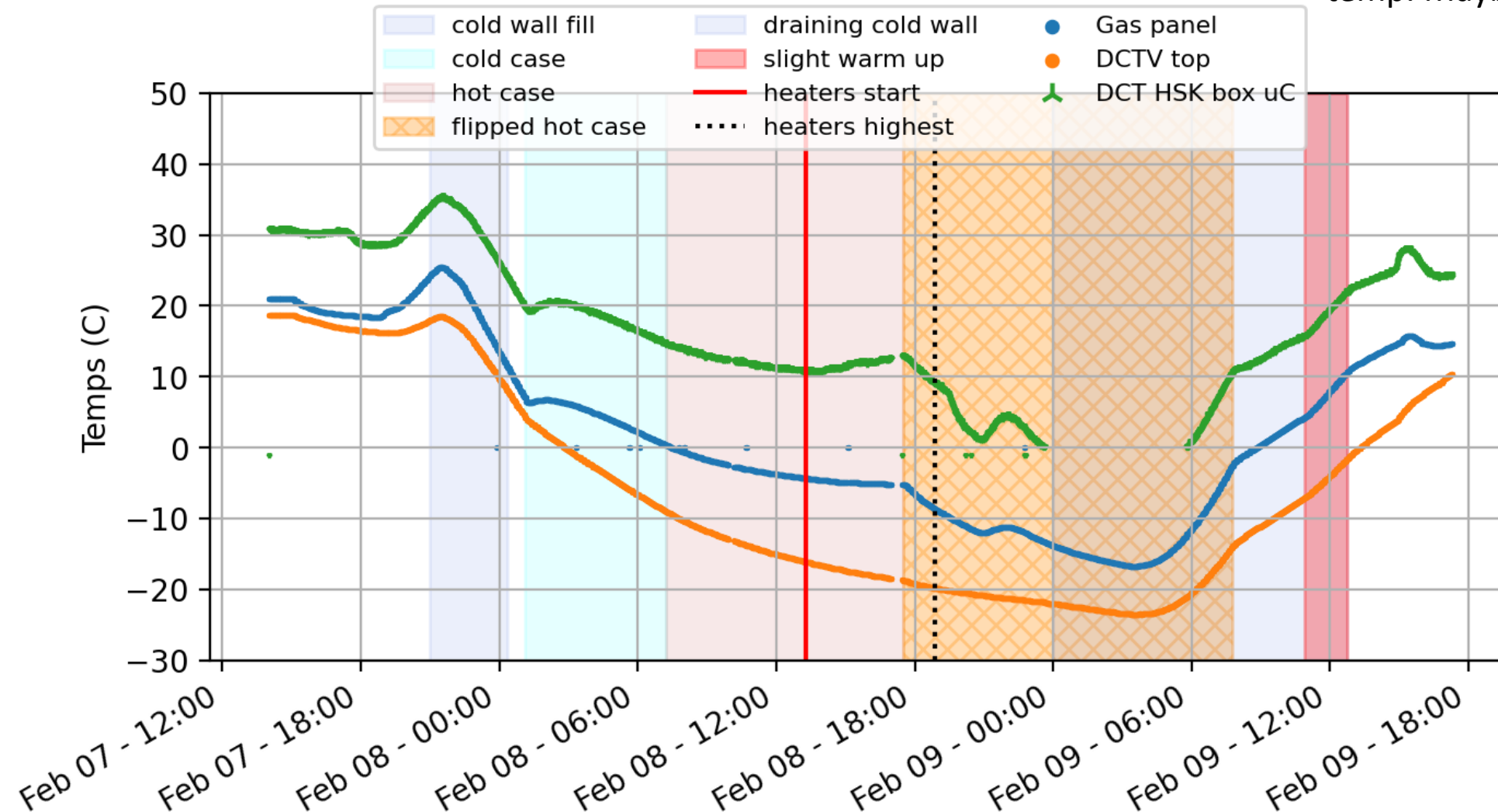
Inner and Outer of East is higher than Inner and Outer of South during cold wall fill, more radiation.

The flipped hot case dropped inner East foam temp by ~20 C, outer by ~40 C

We do not have a measurement of the temperature across foam for any other besides East and South, which are the same thickness.

DCT related temps

-Gas panel probe near flowmeter
-DCTV top near HV connector.
*We didn't monitor the gas rack temp. Maybe we want this in future.



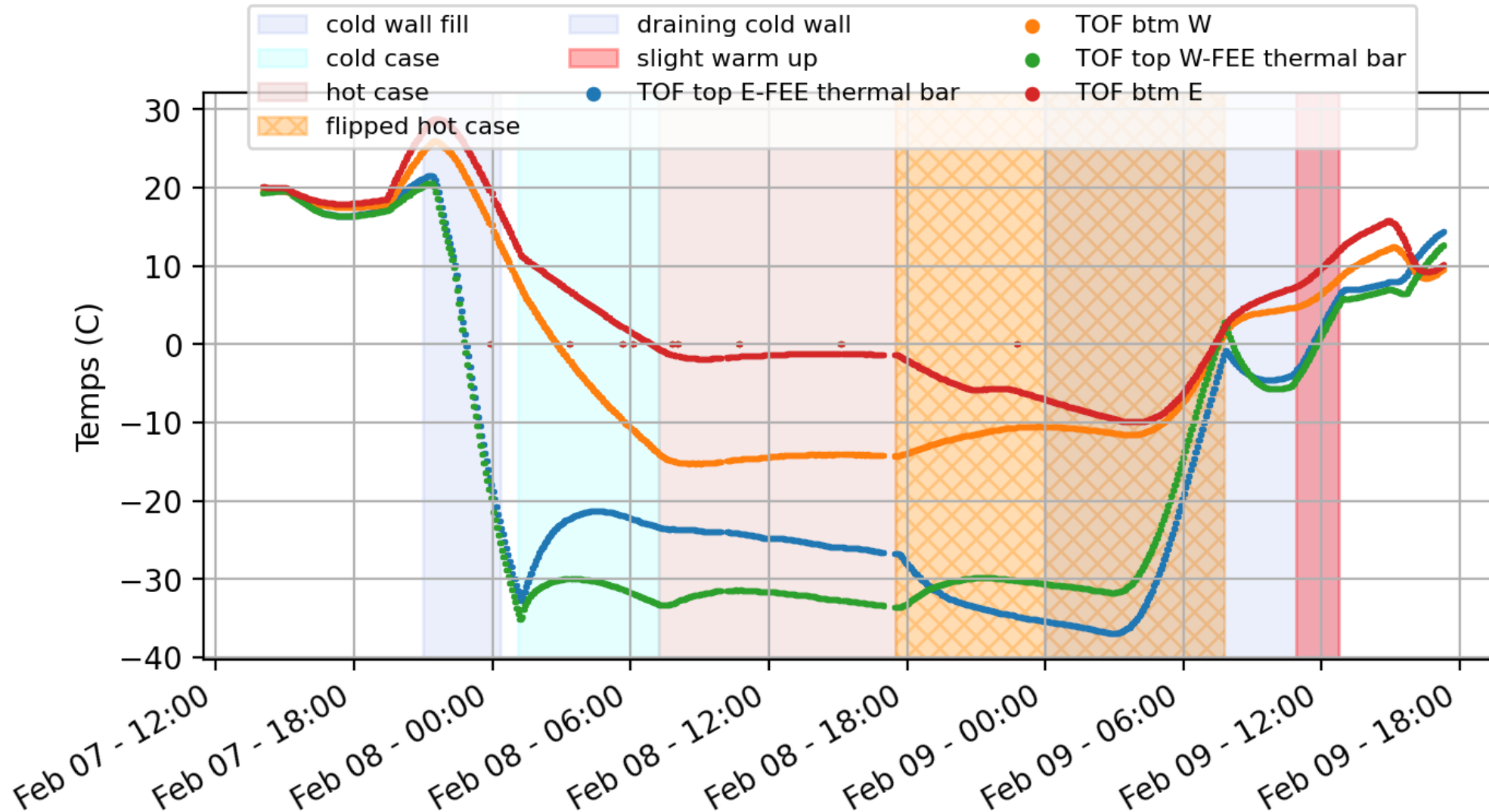
Thermal braids from DCT box to flowmeter mount screws.
DCT HSK box did increase in temp when heaters were on. Entire gas panel did not increase so much and then the sun side flipped so even harder to tell.

DCT HSK uC internal temp underflow issue.

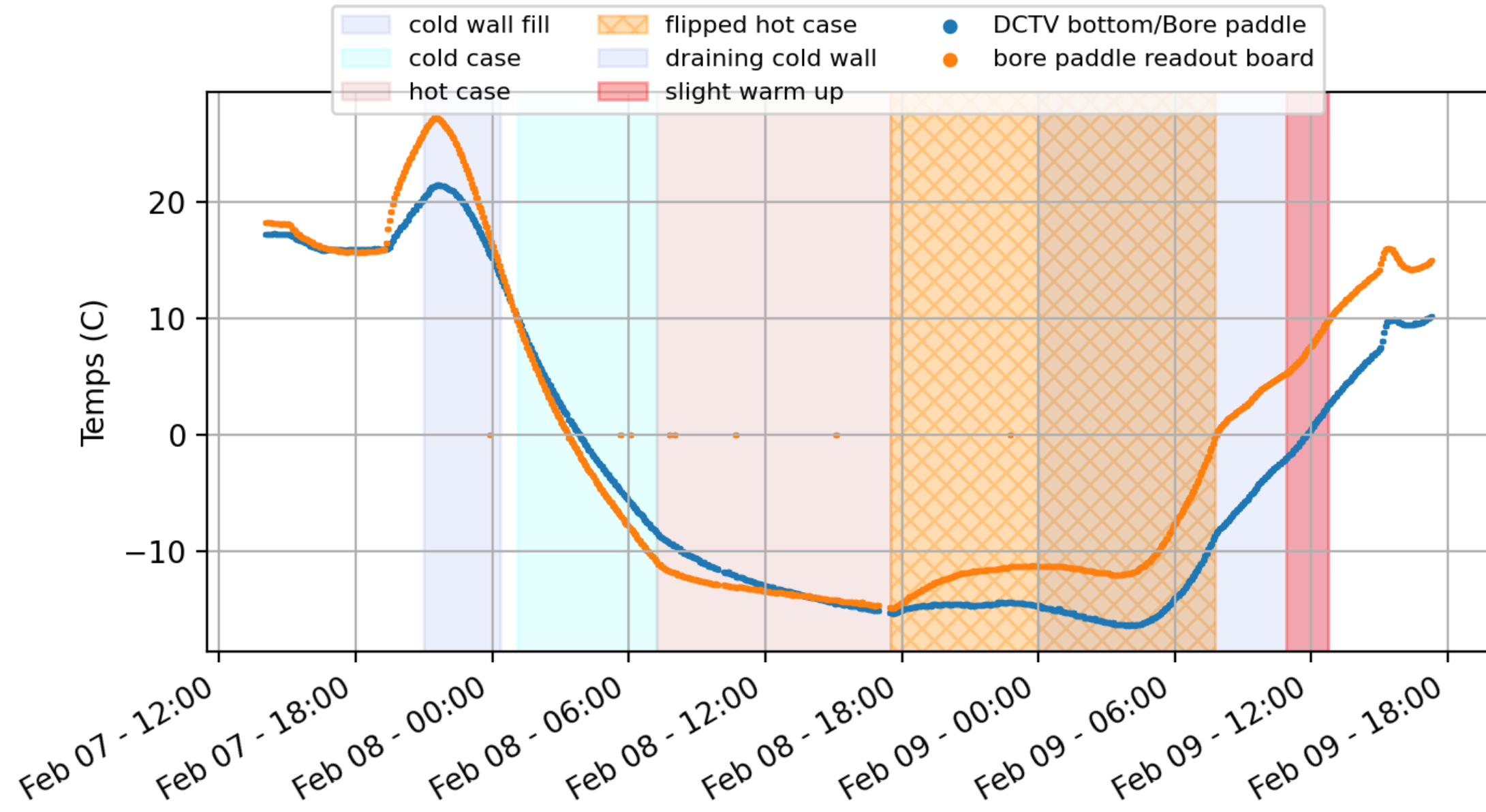
TOF FEE's

All of these temperatures are on the FEE thermal bars.

East warmer than West from more heat on that side of the payload.

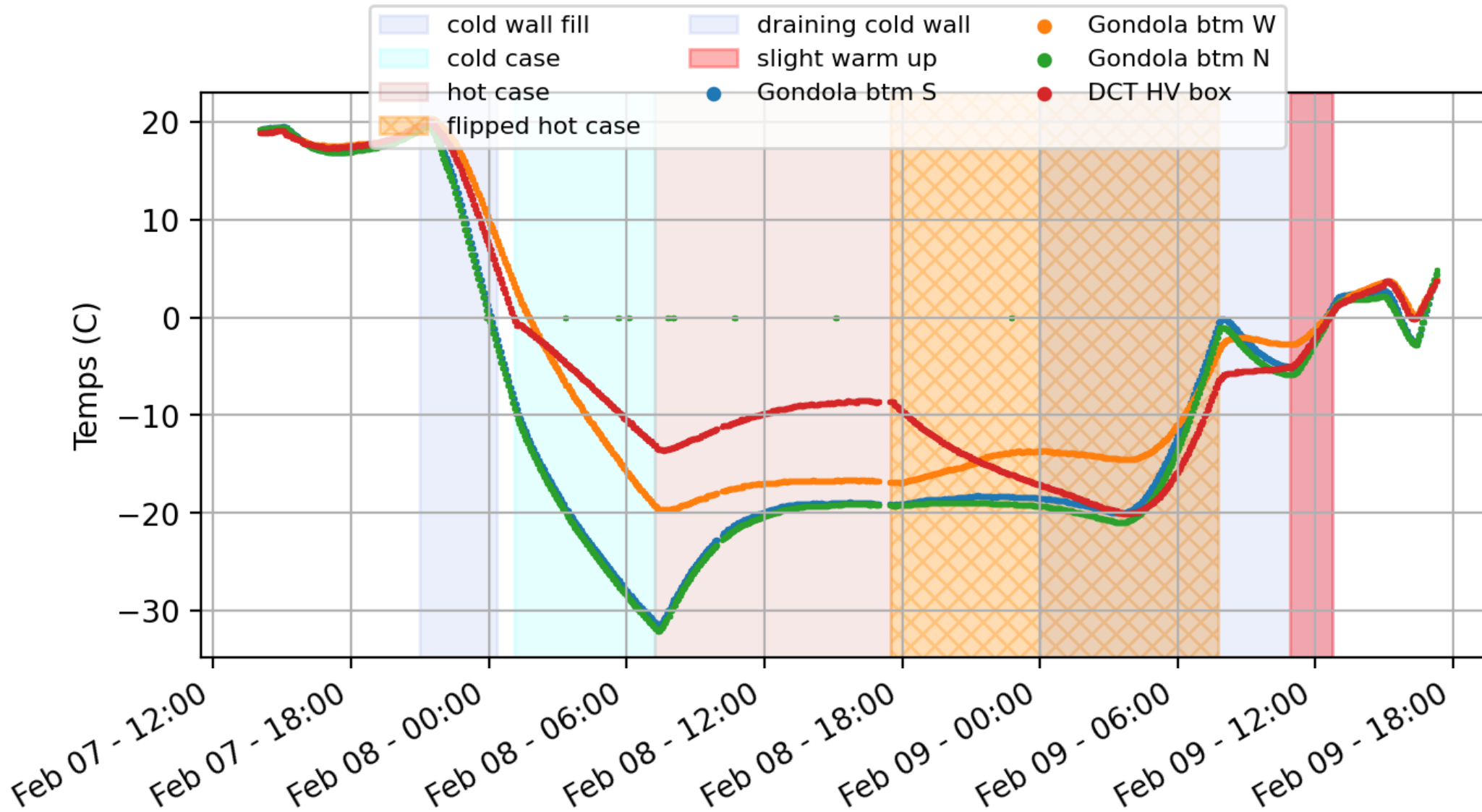


Bore paddle stuff



Gondola Bottom

- East is warmer than West even at bottom frame of payload
- DCTHV box is strapped to frame.

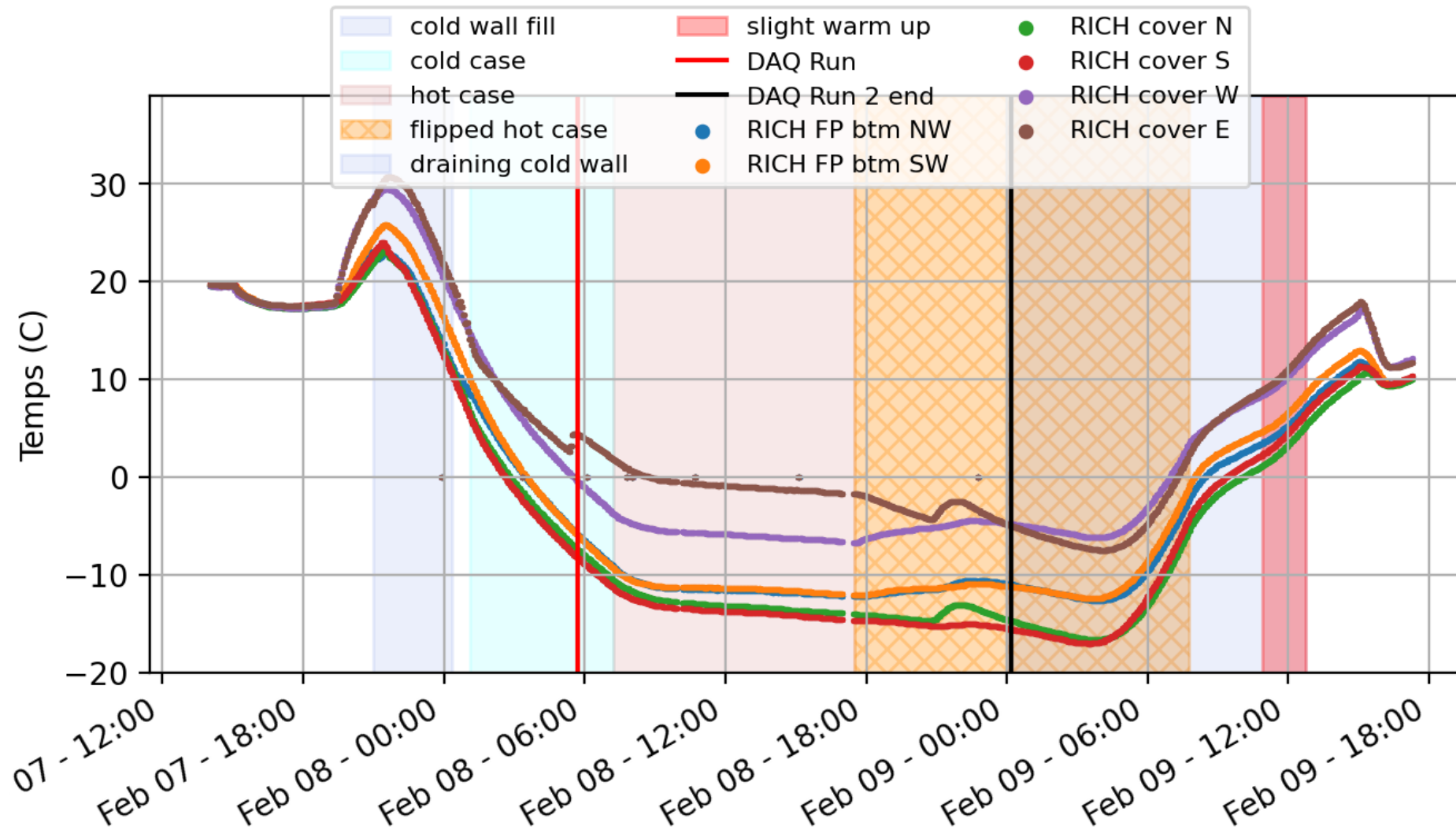


North and South
are the same.

Cold case to hot case - biggest change is the output of the bottom lamp (Earth albedo). The bottom leveled off.

RICH temps

-Labels called “cover” are on the white RICH enclosure near focal plane connection
 -labels called “FP btm” are taped onto the bottom of the coal plane in the corners.



Bump during the flipped hot case is from DAQ run I hope.. Logs only say “DAQ HSK back up”

East warmer than west as usual.

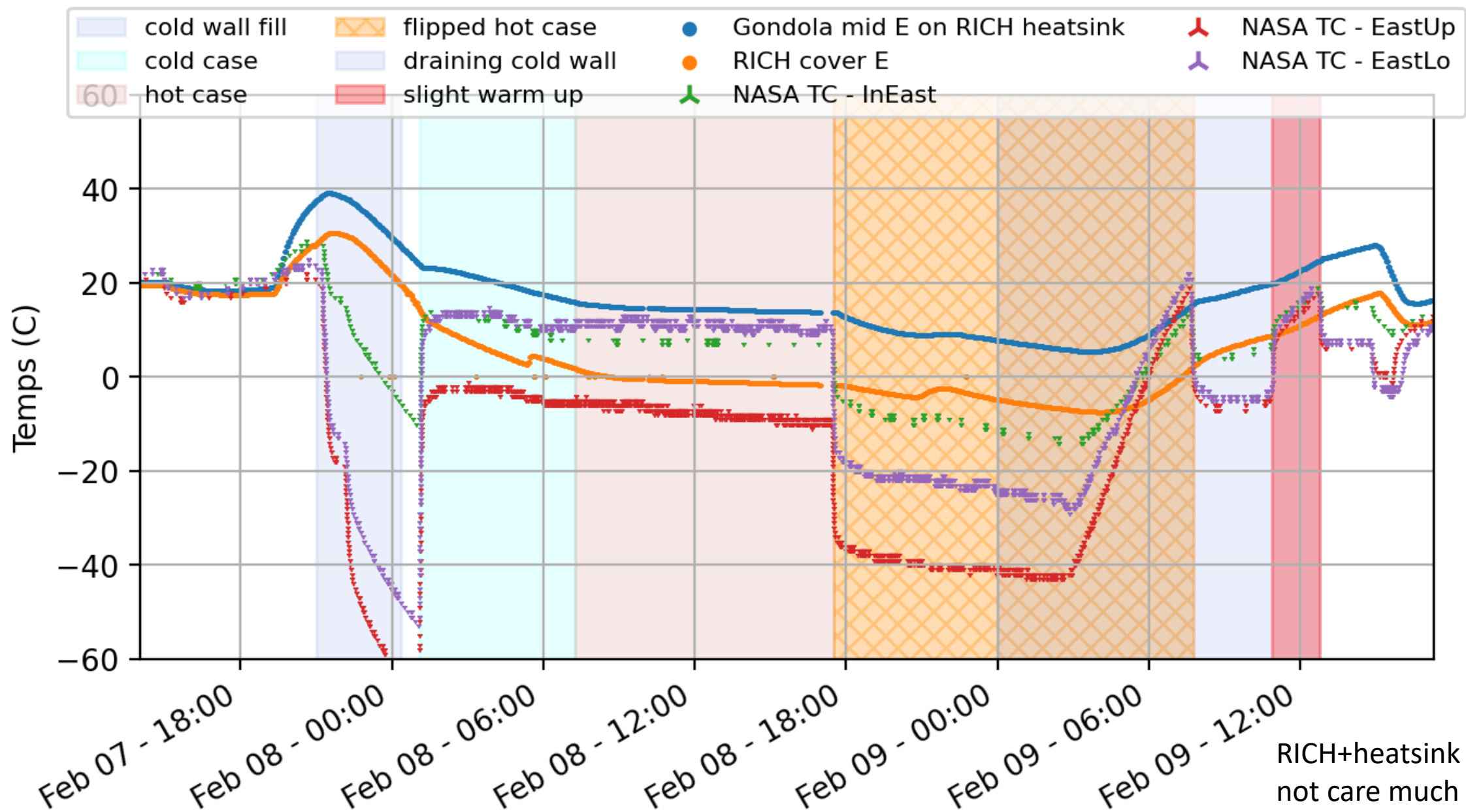
I don't see the RICH thermal at work early in the test.

Next steps

- Compile list of all the thermal data we want to send to Doug
 - This has begun and will update again next week
- Format and clean data
- Updated payload model

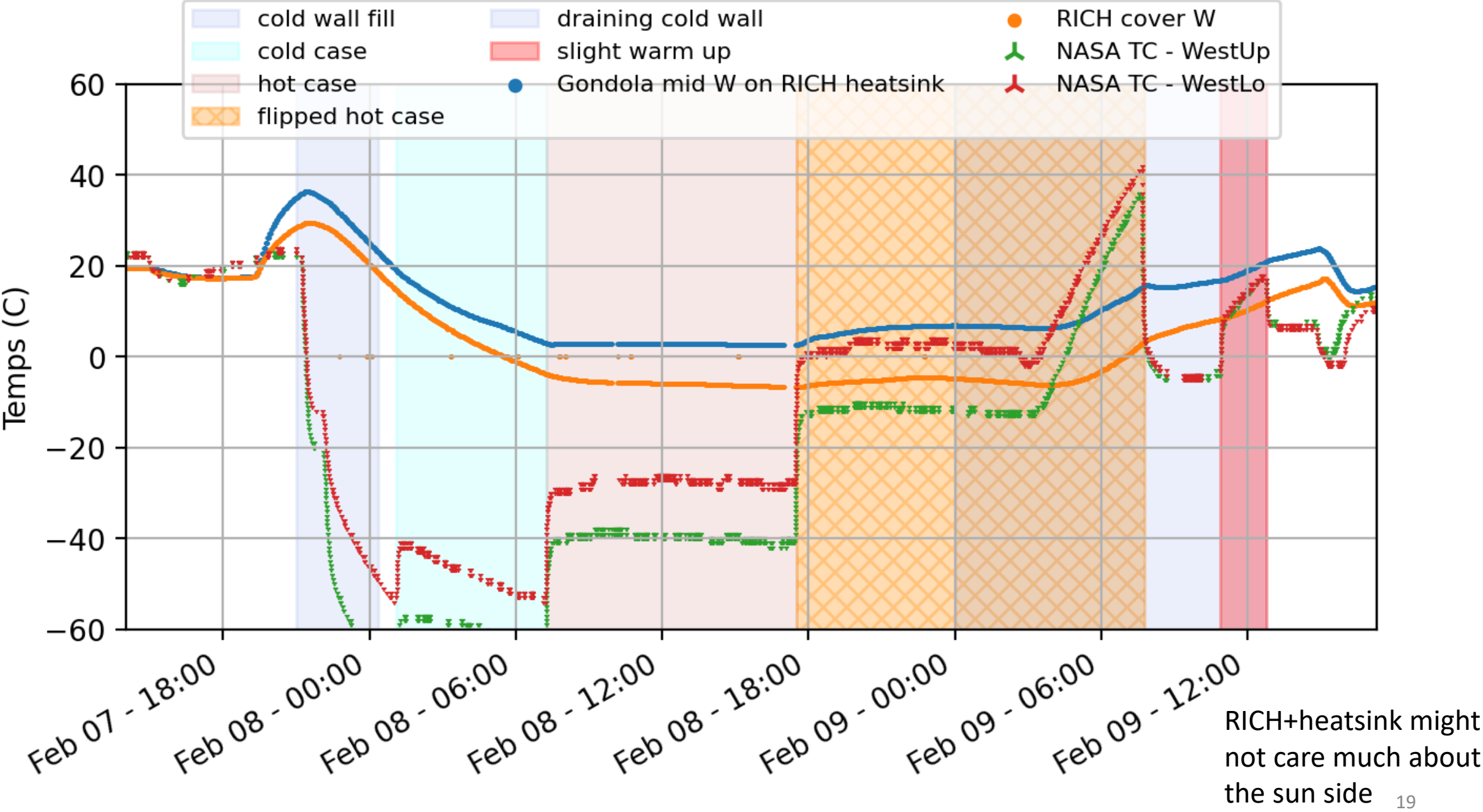
Backup slides

East face



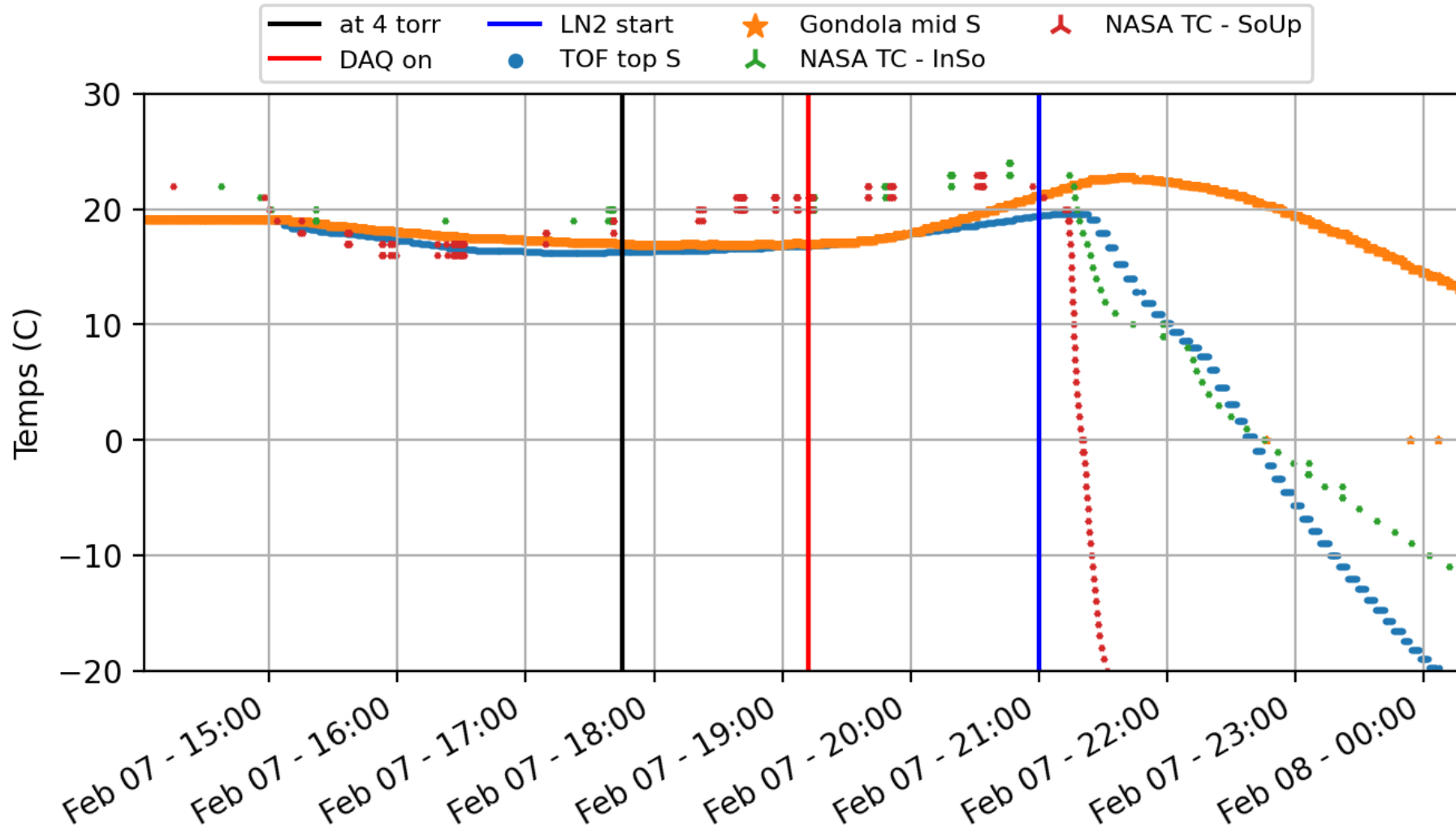
RICH+heatsink might not care much about the sun side

West Face of payload



Before lamps on

Visualize how the foam keeps the gondola insulated from the outside environment



We can see the external state of foam immediately reacts to the cold wall. This makes sense. It takes more time for the gondola south to cool off. Foam doing its job. But we also notice the top TOF is in between these.

Is it possible the frame sticking out is providing a bigger cooling path?