

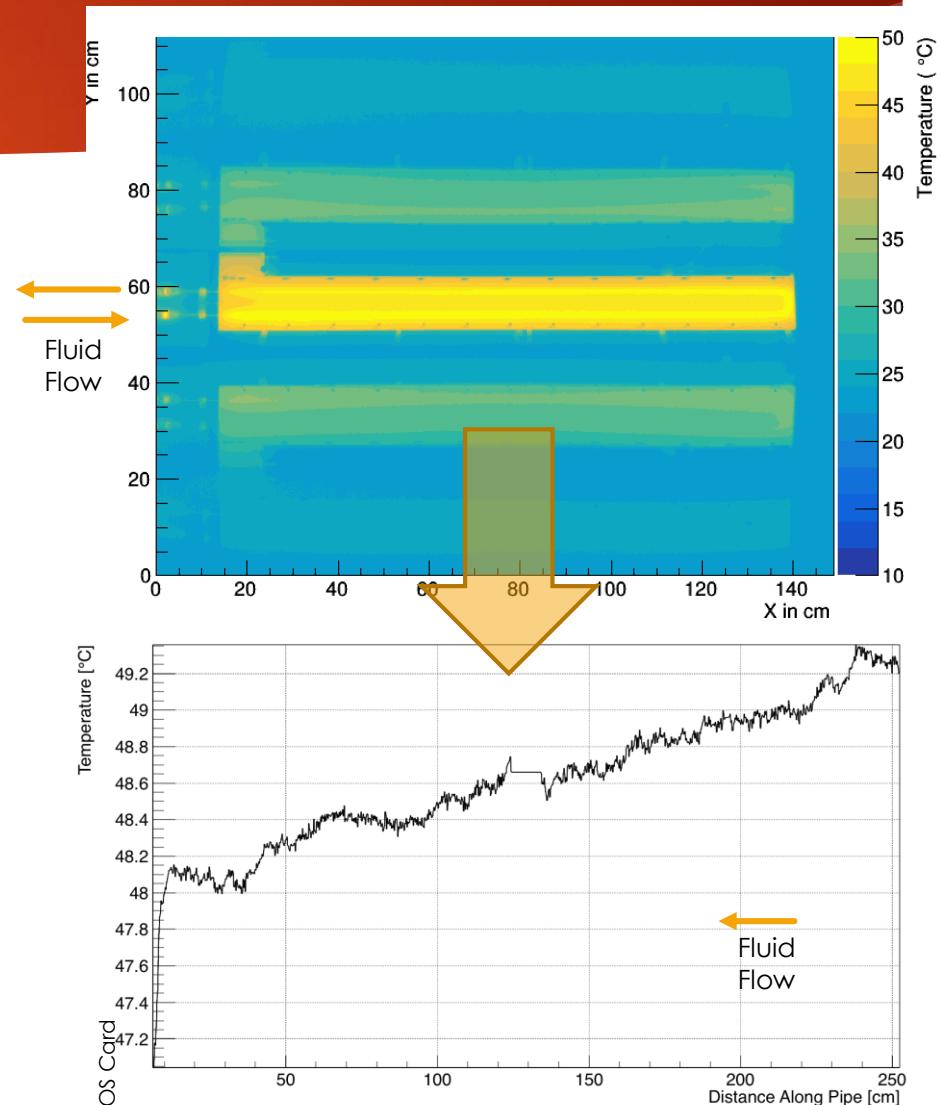
# Update: Stave 7

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ISU WEEKLY STAVE QA MEETING  
MAY 29, 2018

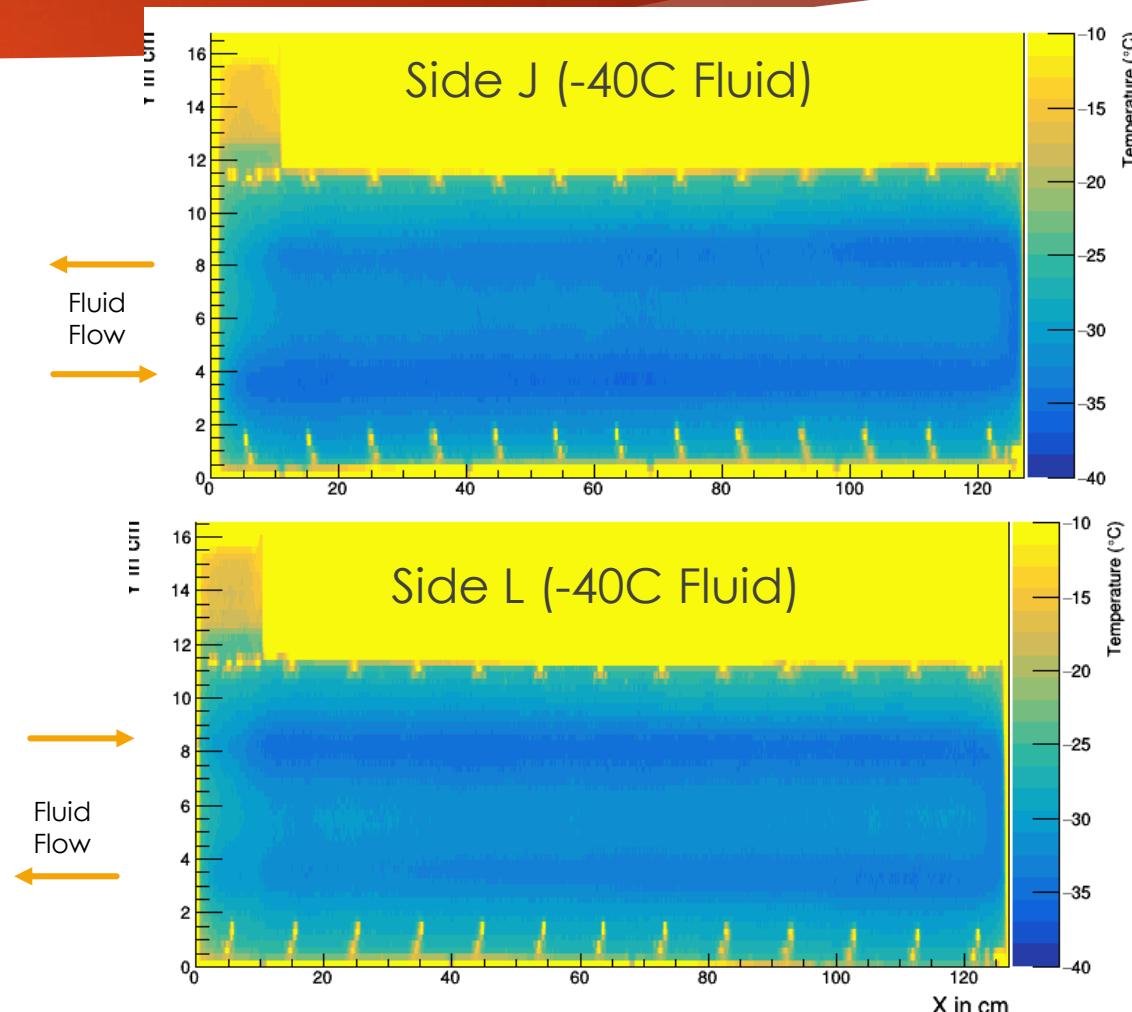
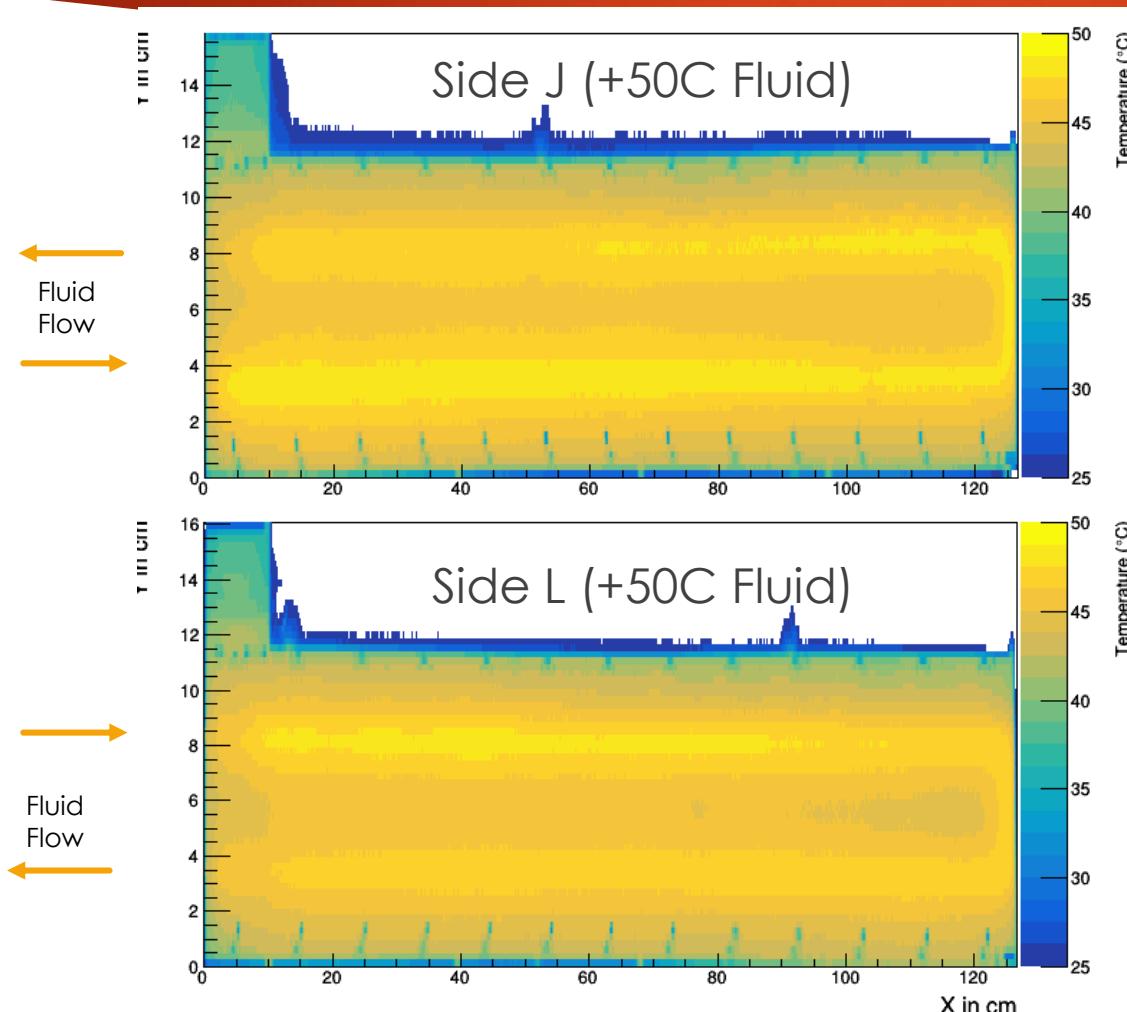


# Review: Thermal Measurement Method

- ▶ The thermal measurements were made with fluid flow through the stave of  $\sim 1$  l/min with high(+50C) or low (-40C) temperature fluid.
- ▶ Before data is taken, 10 minutes are waited without any nitrogen flow in the enclosure.
- ▶ A series of 200 frames were taken at 25 frames/second with the FLIR A655sc camera with an 80 degree lens
- ▶ The 200 frames of raw data are averaged into a single frame using an emissivity value of 0.95 (read\_sequence.sh)
- ▶ The stave location is then extracted from the image (configFinder.py) and the thermal profile along the cooling pipes of the stave excluding the end regions are found. (frameanal.py)
- ▶ The defect finding algorithm is then used to find any defects on the stave and create plots. (defectFinder.py)

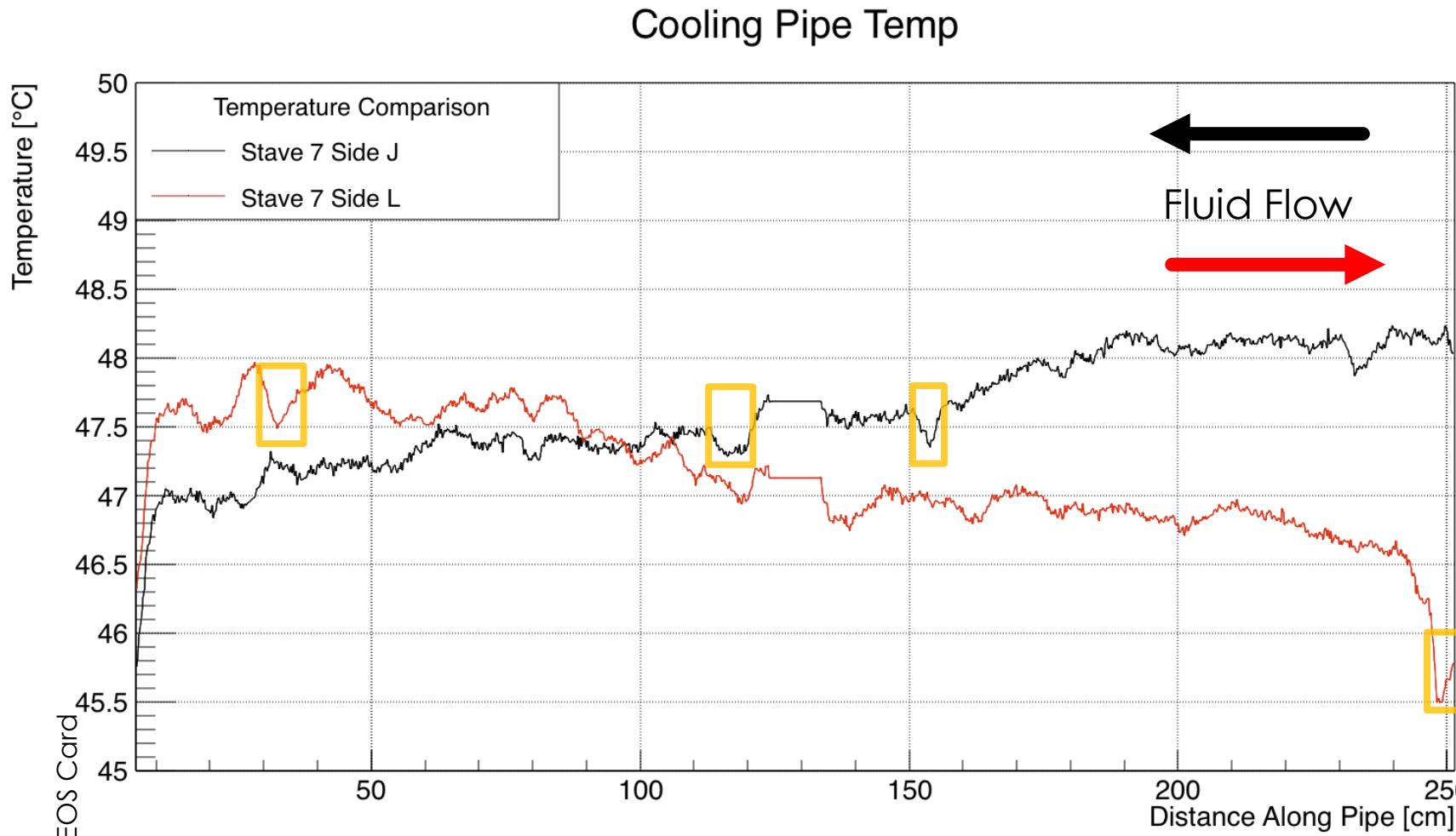


# Stave 7: Thermal Measurements (Thermal images)



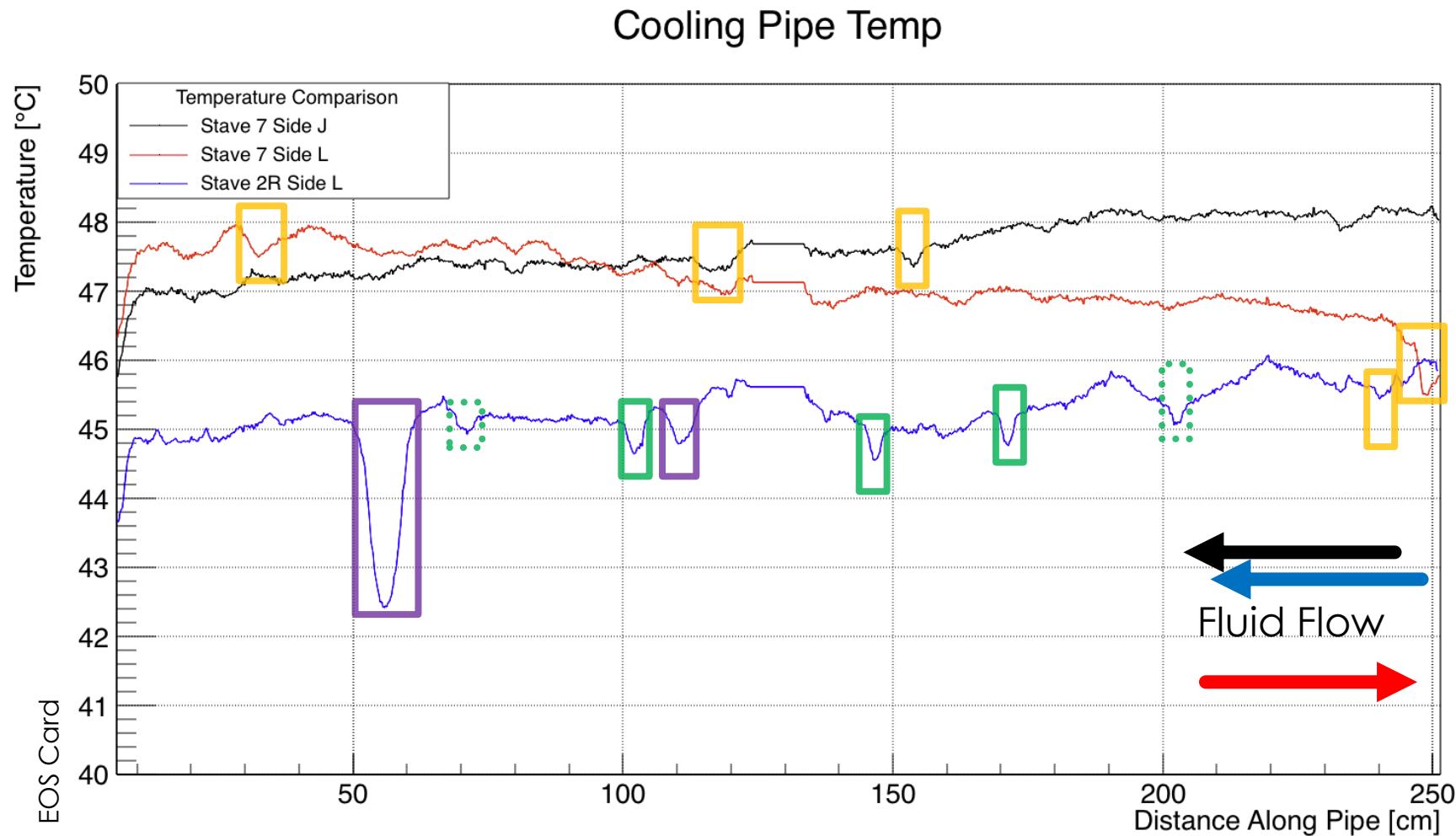
# Stave 7: Thermal Measurement Hot

- Thermal measurements were taken on both sides of the stave with 50 C fluid flowing into the stave core
- The defect finder found 4 possible defects. Only the side L defects are reproduced in the cold thermal profile
- Linear Fit RMS was found (Stave 6 Results also given for comparison)
  - J Side: 0.13 C (0.12 C)
  - L Side: 0.21 C (0.09 C)



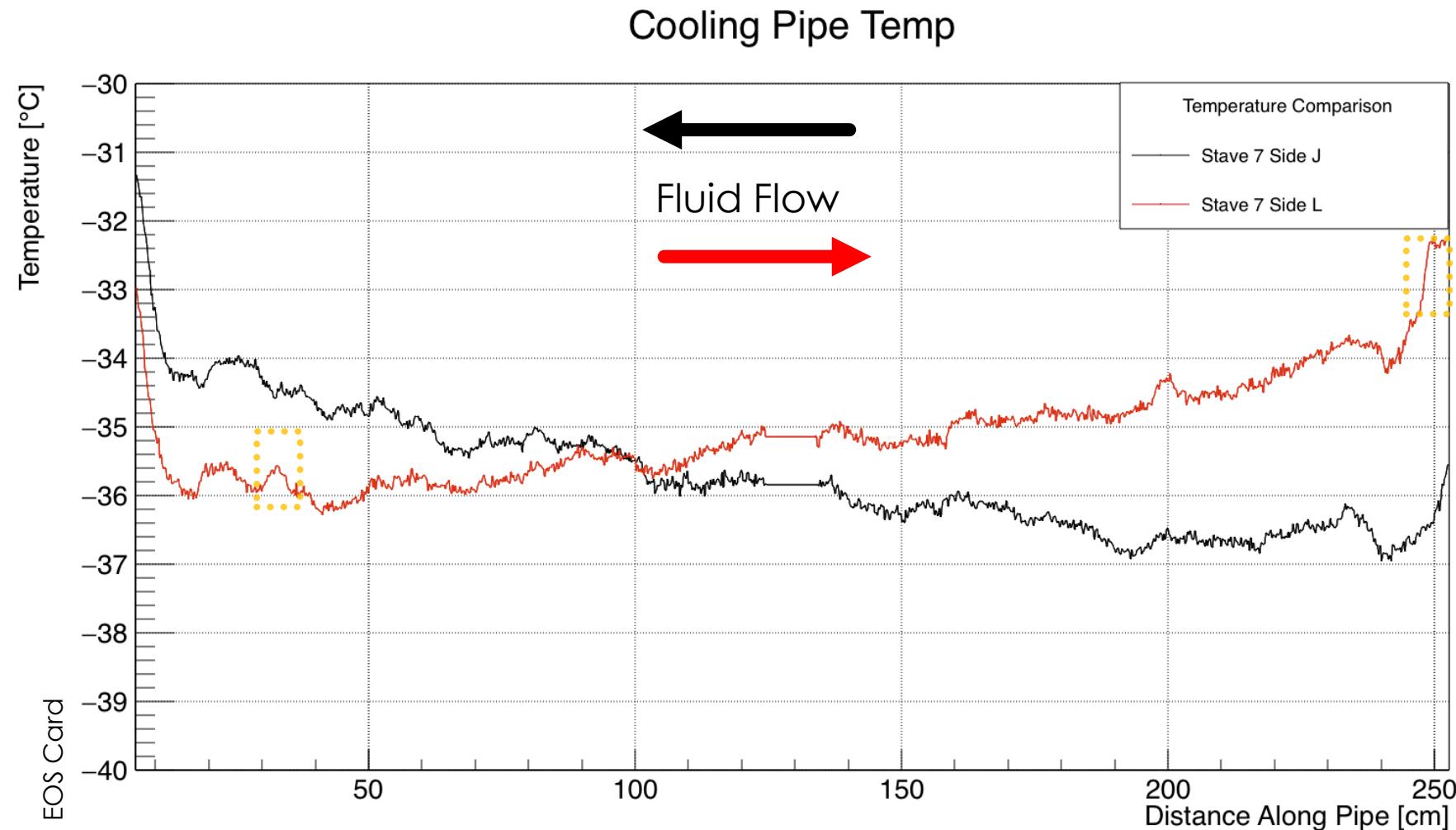
# Stave 7 Comparison with Stave 2R Hot

- ▶ This is a comparison between stave 6 and 2R with +50C fluid flowing
- ▶ The defects found are boxed on the 2R profile
  - ▶ **Purple:** Pipe-Foam
  - ▶ **Green:** Foam-Facing
  - ▶ **Green Dotted:** Partial Foam-Facing
  - ▶ **Orange:** Unimplemented



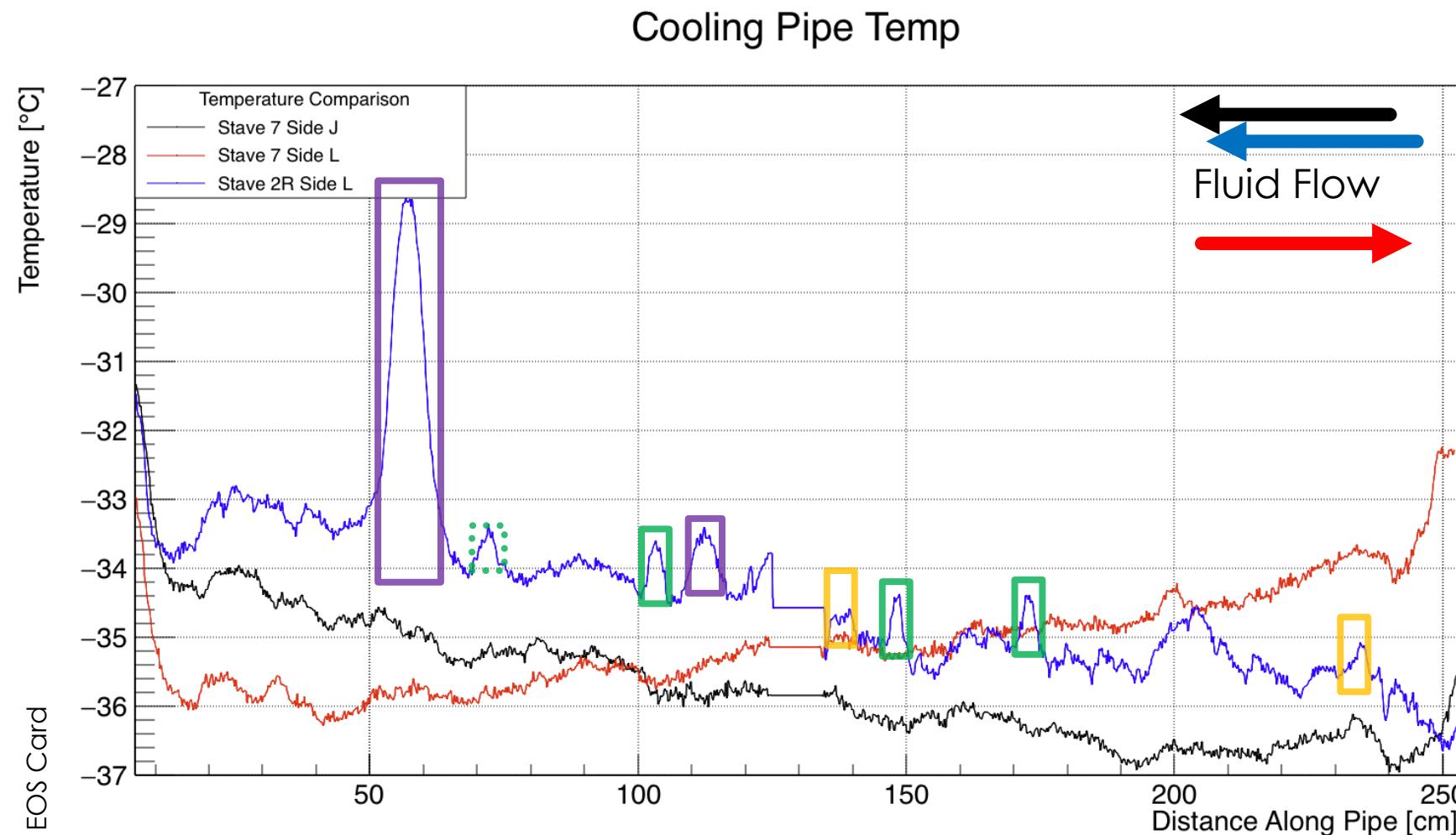
# Stave 7: Thermal Measurement Cold

- ▶ Thermal measurements were taken on both sides of the stave with -40C fluid flowing into the stave core
- ▶ Dry nitrogen was turned off at least 10 minutes before measurements were taken
- ▶ The defect finder found no flaws
- ▶ The yellow boxes show the repeated flaws from the hot measurements
- ▶ Linear Fit RMS was found (Stave 6 Results also given for comparison)
  - ▶ J Side: 0.3 C (0.6 C)
  - ▶ L Side: 0.3 C (0.6 C)



# Stave 7 Comparison with Stave 2R Cold

- ▶ This is a comparison between stave 6 and 2R with -40C fluid flowing
- ▶ Profiles are more chaotic...
- ▶ The defects found are boxed on the 2R profile
  - ▶ **Purple:** Pipe-Foam
  - ▶ **Green:** Foam-Facing
  - ▶ **Green Dotted:** Partial Foam-Facing
  - ▶ **Orange:** Unimplemented



# Stave 7 Conclusions

- ▶ Flaws were found by the defect finding algorithm in the hot thermal profiles, but not in the cold profiles. Similar features are still found in the cold profile for side L. This would indicate that there could be a few unimplemented flaws on this stave.