JPSS1 ATMS Thermal Vacuum Calibration Early Results

2014 STAR JPSS Science Team Meeting

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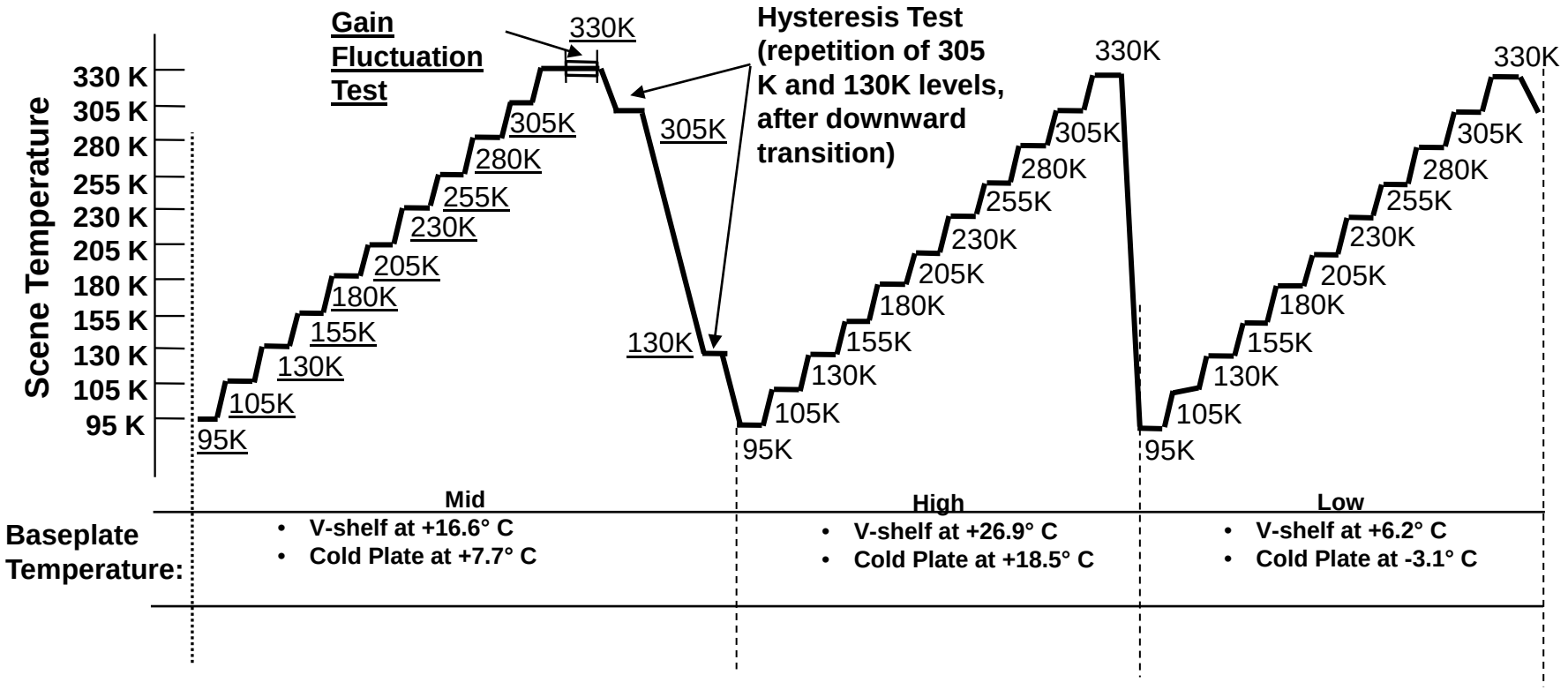
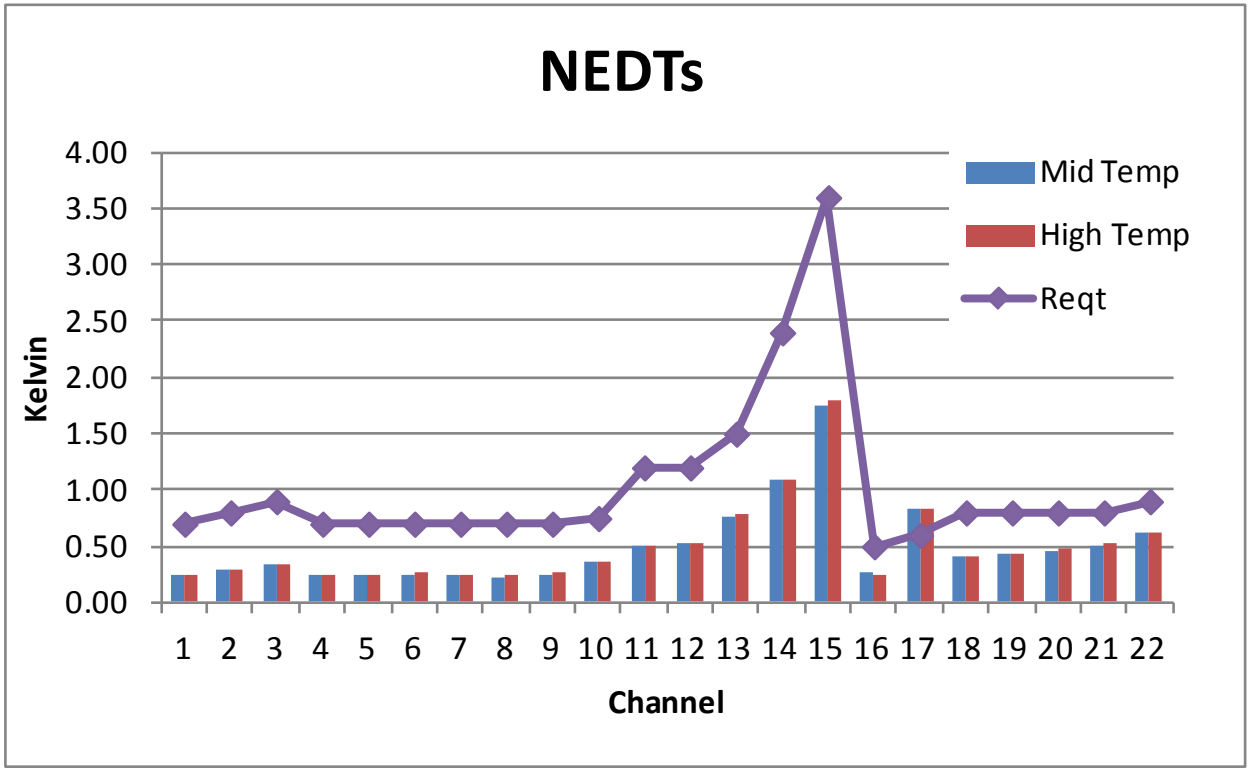
JPSS1 ATMS Instrument Calibration Test Profiles

- **Testing performed for 4 redundancy configurations at each calibration step**
- **For each calibration step, 278 scans of data processed to yield 271 scans of derived accuracy data**



JPSS1 ATMS NEDT Performance

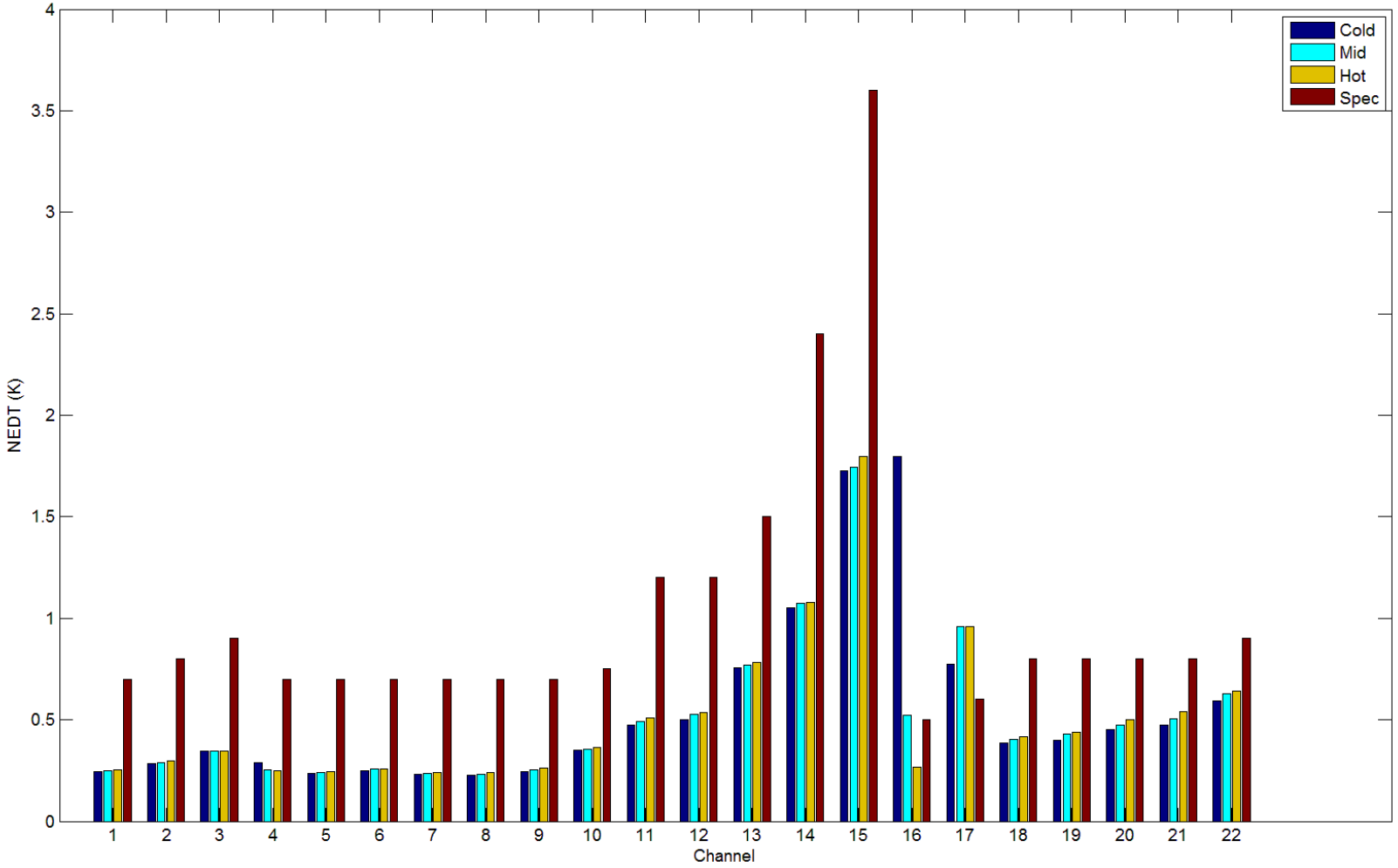
- Worst Case of 4 Redundancy Configurations
- Scene temperature at 300 K



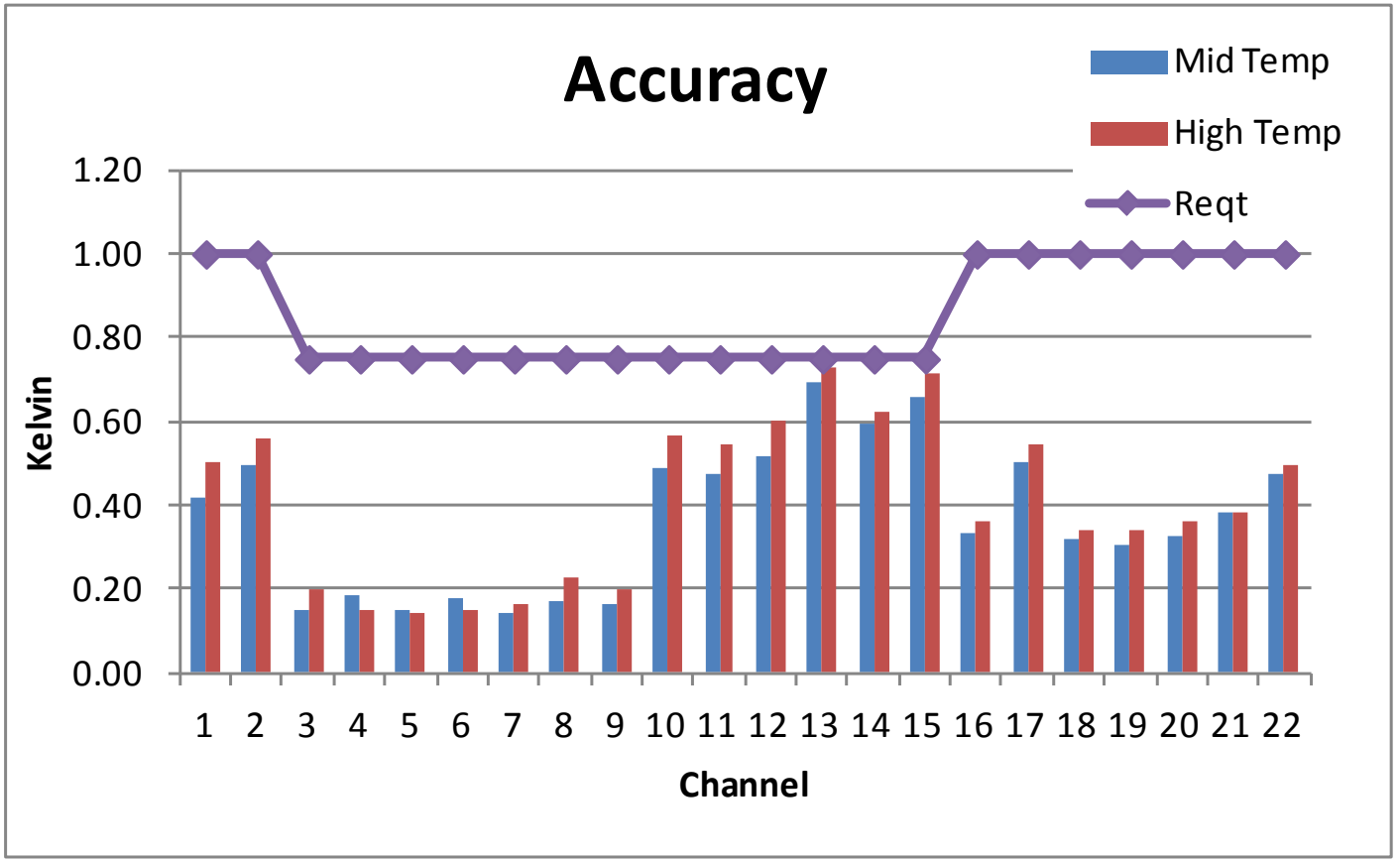
- Waiver request will be submitted for Channel 17 NEDT
- All other channels compliant

JPSS1 ATMS NEDT Performance

- Worst Case of 4 Redundancy Configurations
- Scene temperature interpolated to 300 K

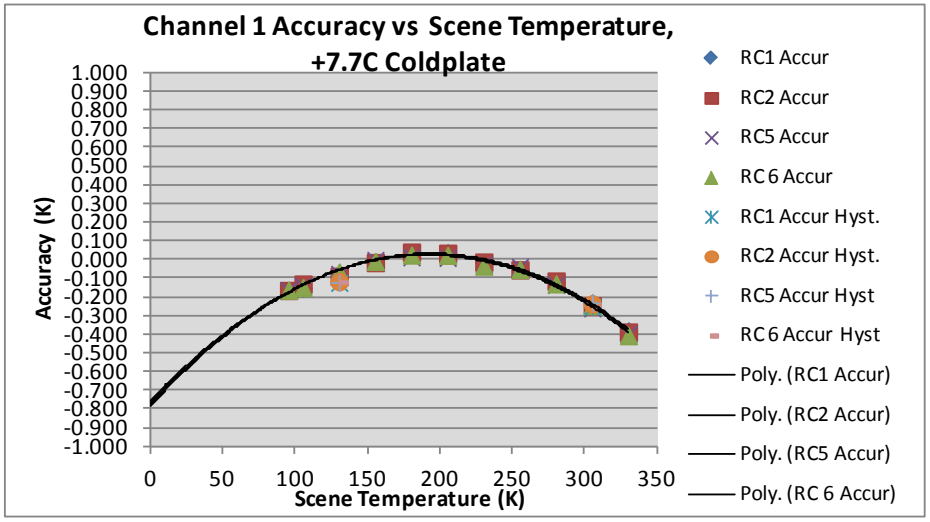


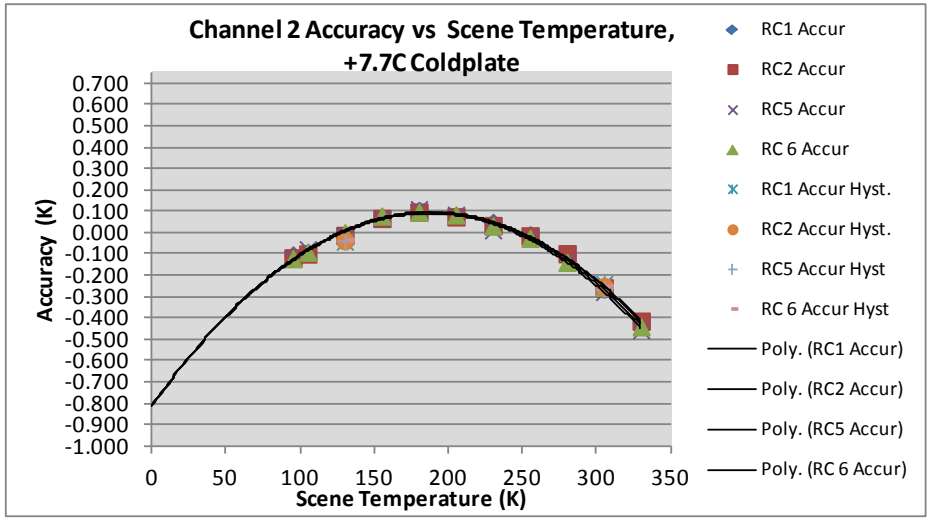
JPSS1 ATMS On-Orbit Accuracy

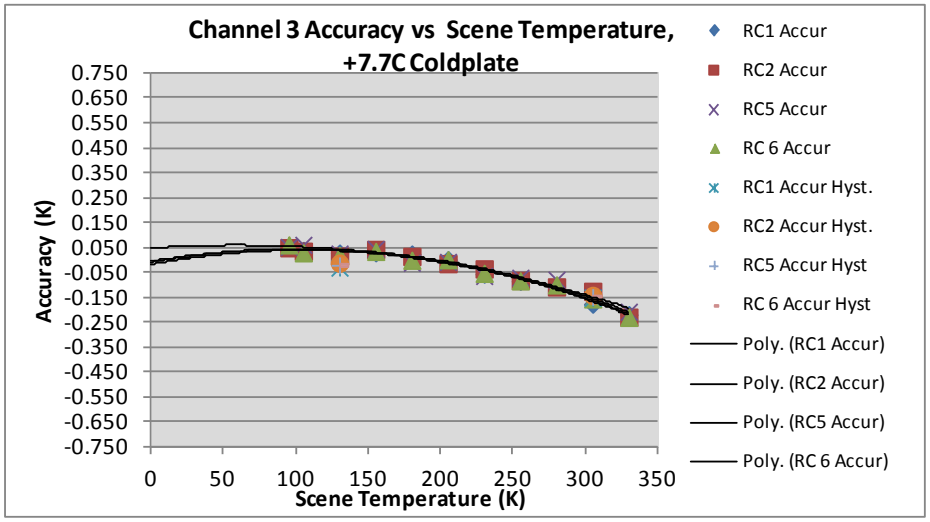


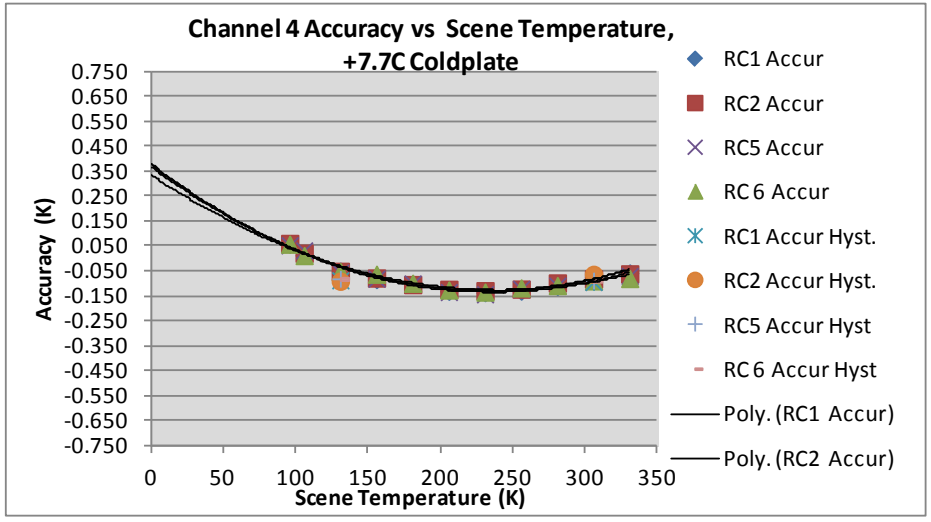
- Worst Case of 4 Redundancy Configurations
- All channels compliant

Radiometric Transfer Functions

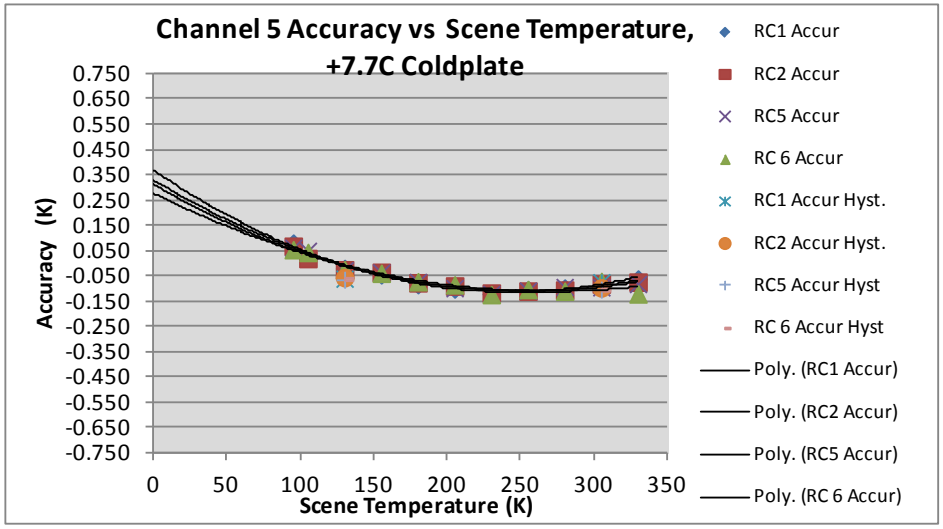


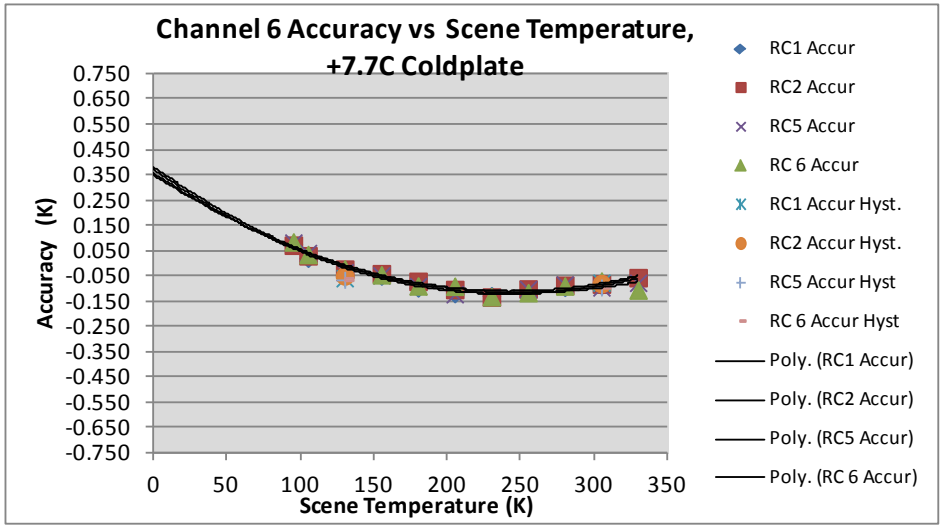


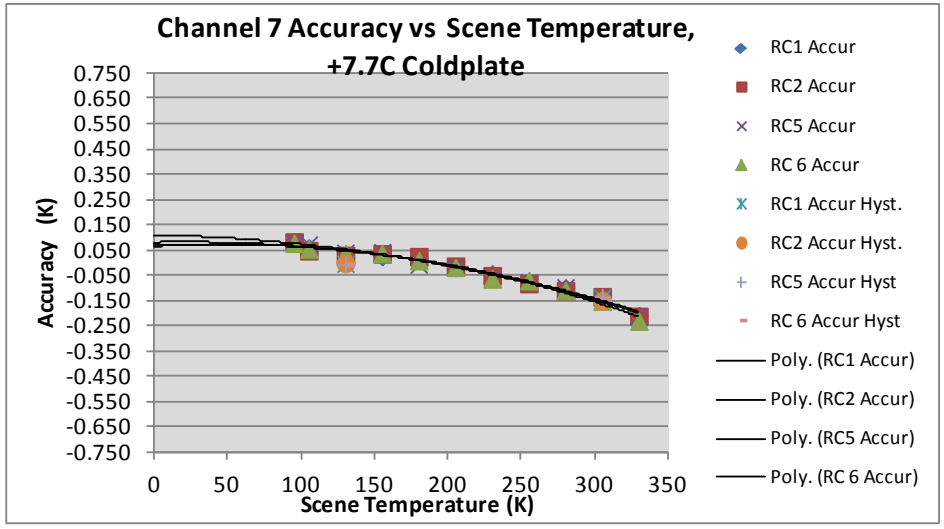


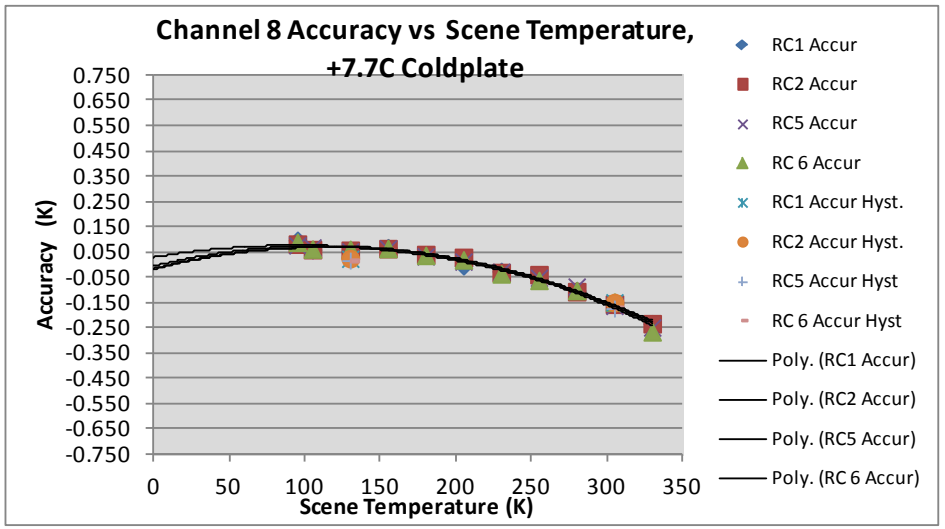


Radiometric Transfer Functions(cont.)









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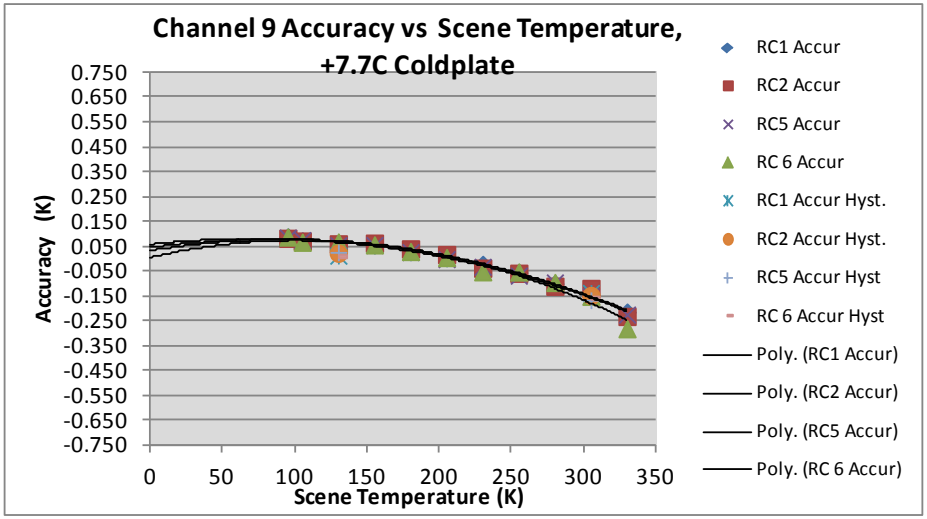
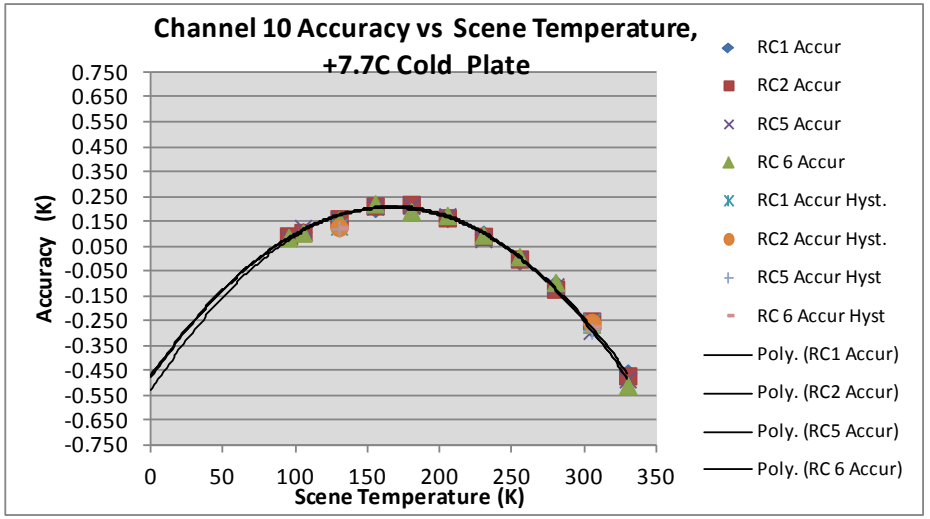
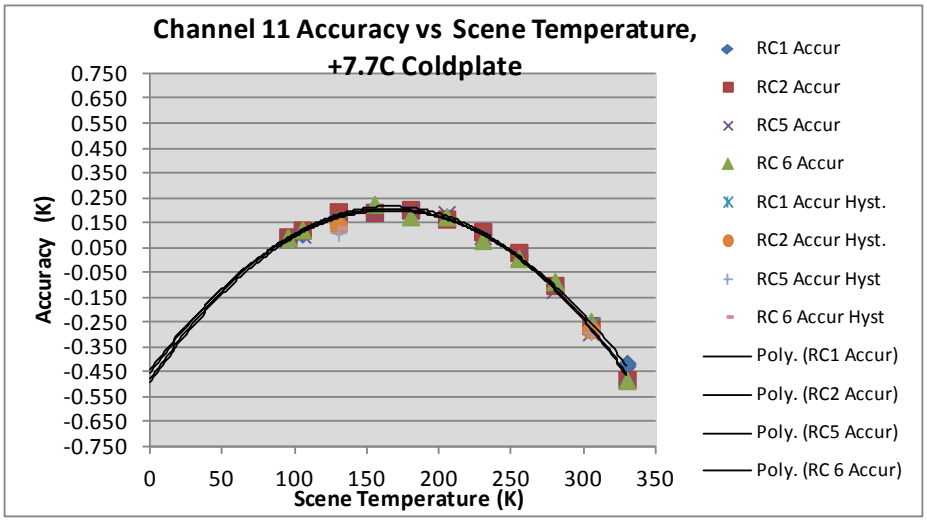
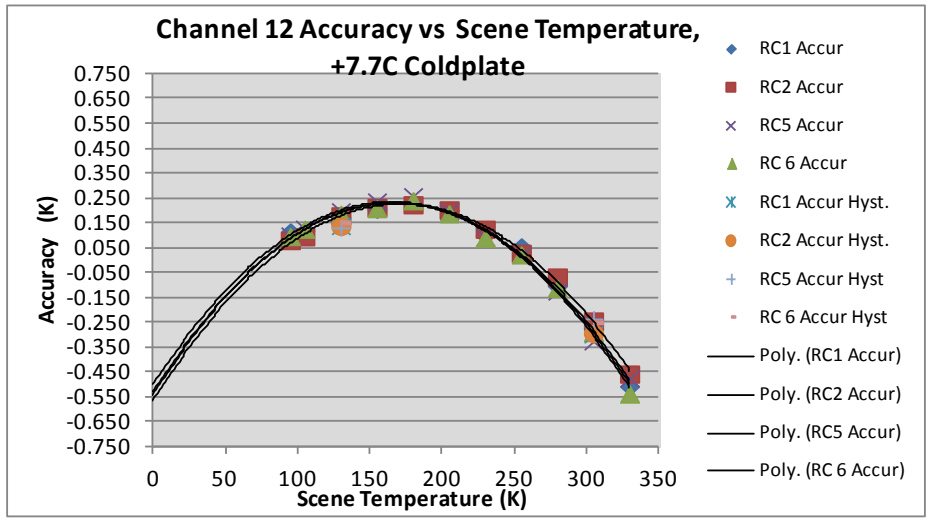
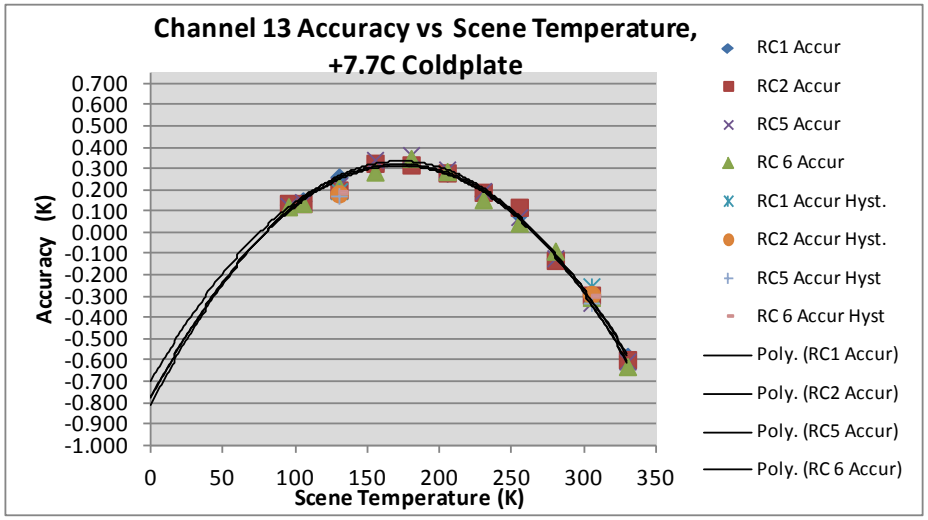


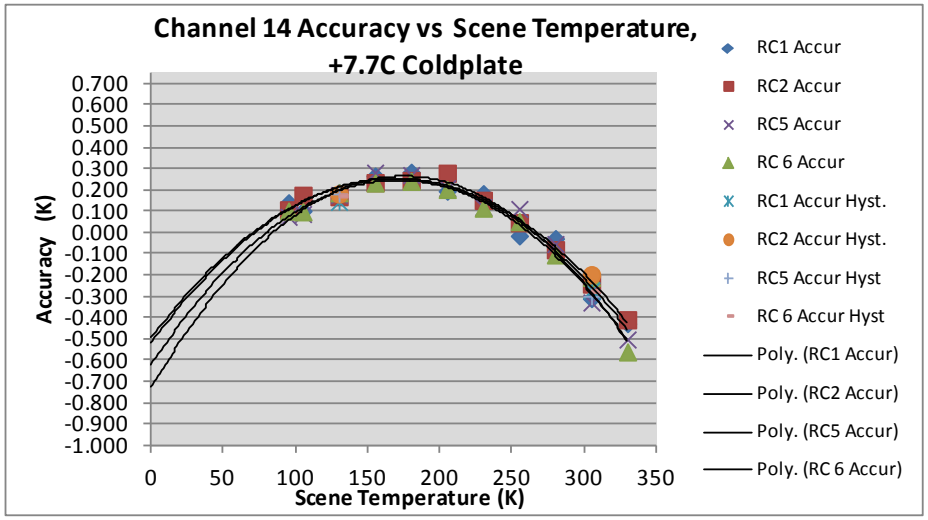


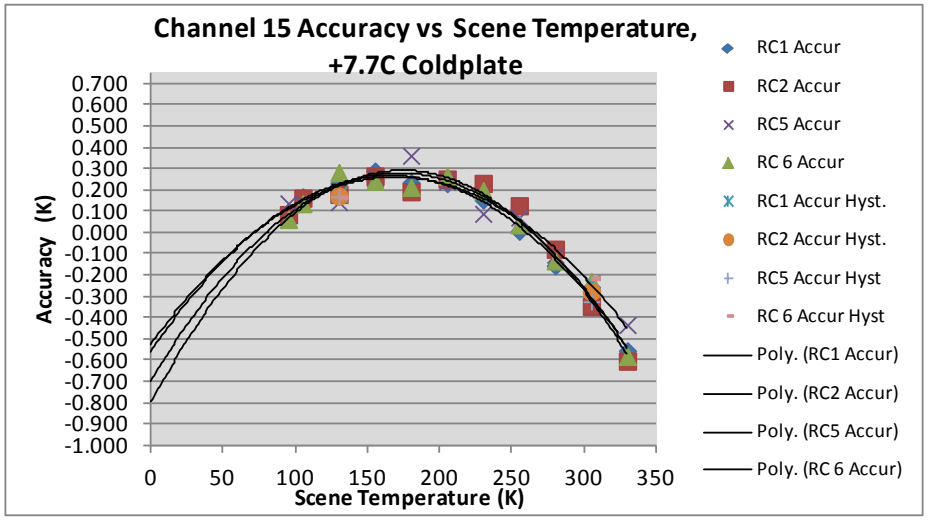


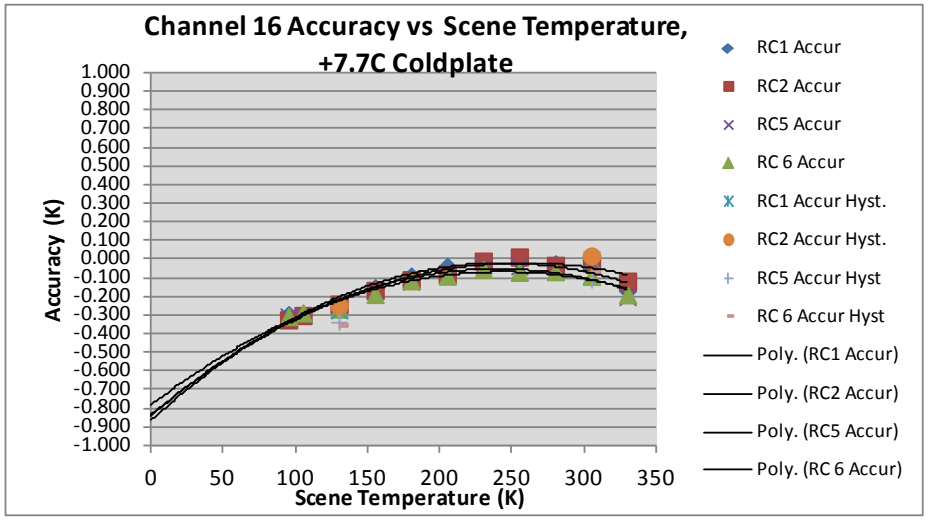


Radiometric Transfer Functions (cont.)

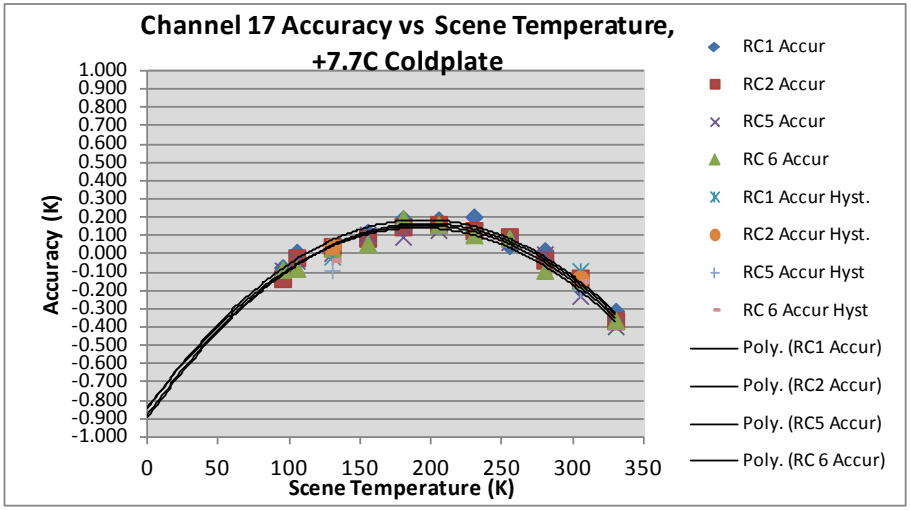


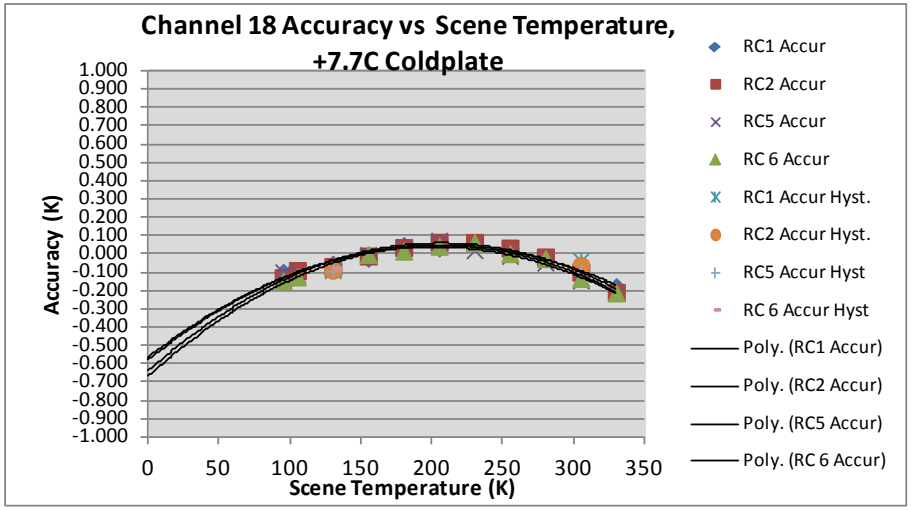


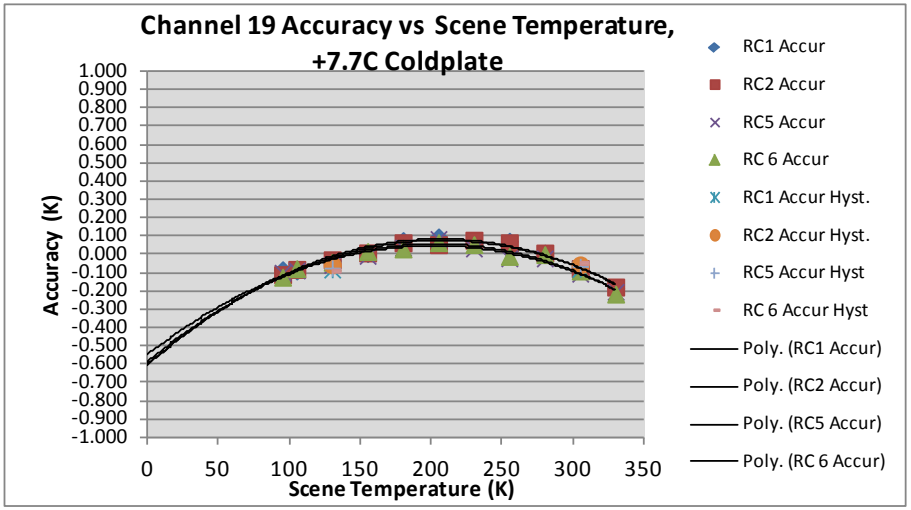


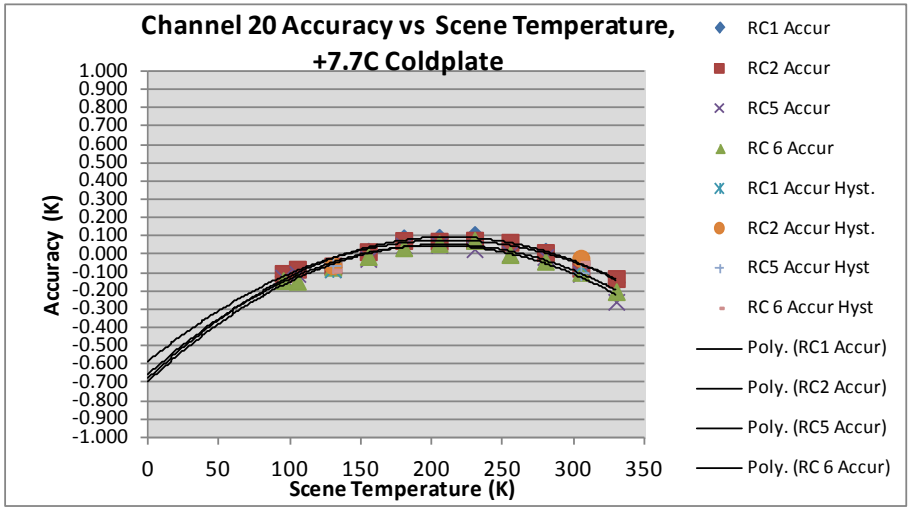


Radiometric Transfer Functions (cont.)

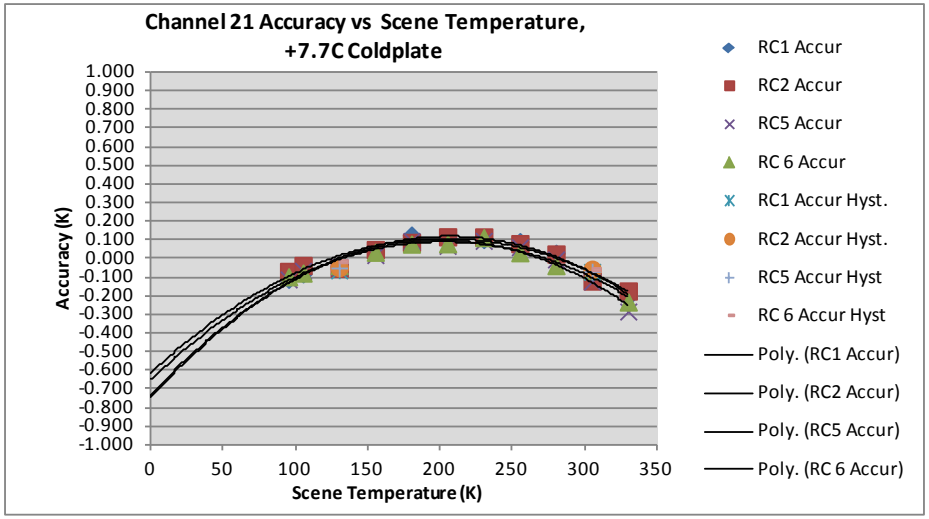


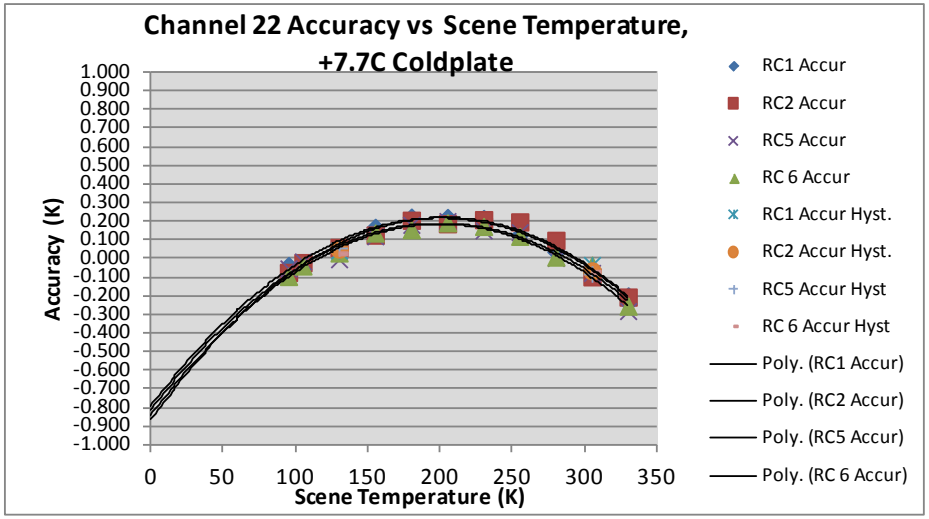






Radiometric Transfer Functions (cont.)

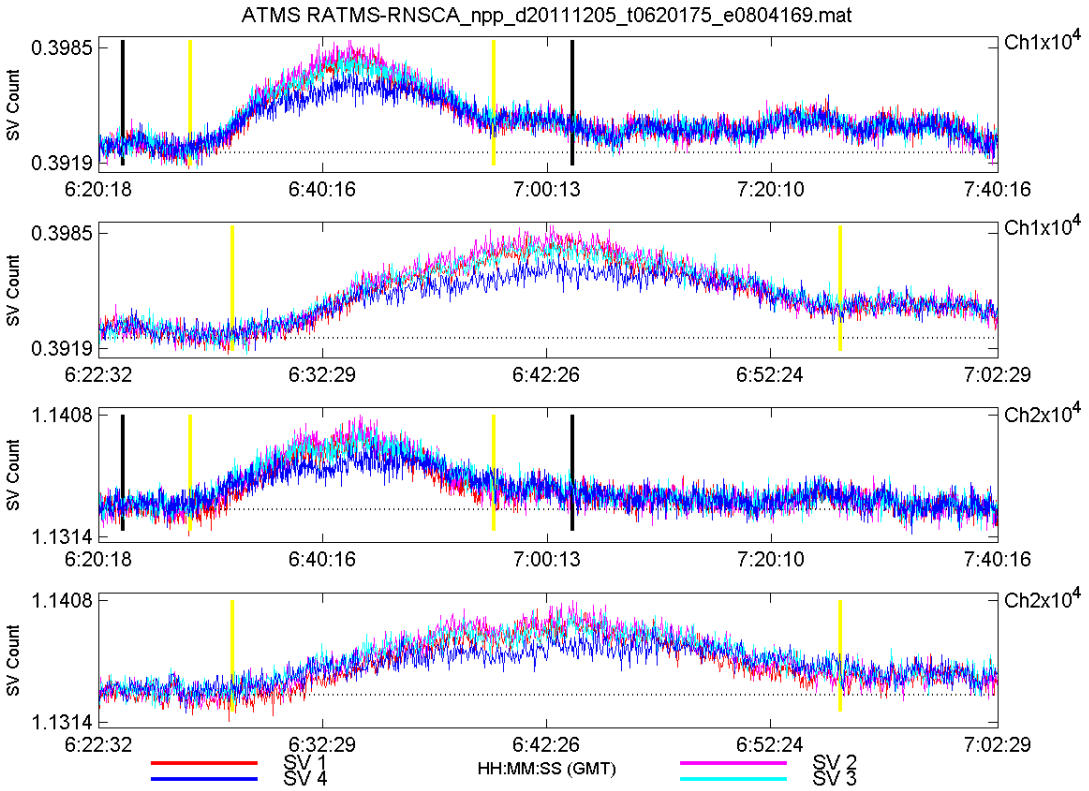




- Consistency between 4 redundancy configurations
  - Indicator of measurement repeatability
  - Feasible to use one set of curves for all 4 redundancy cases

Lunar Intrusion Alternate Scheme

Get *actual* cold space obs by changing to an uncontaminated scan profile (SP #1 ->#4) during LI. Example LI case below. The data outside the yellow ticks are good SV data. The dashed line is treated as previously good SV, which is adopted to replace the contaminated SV data. **Note the TB offset that could result unless gain variations can be predicted.**

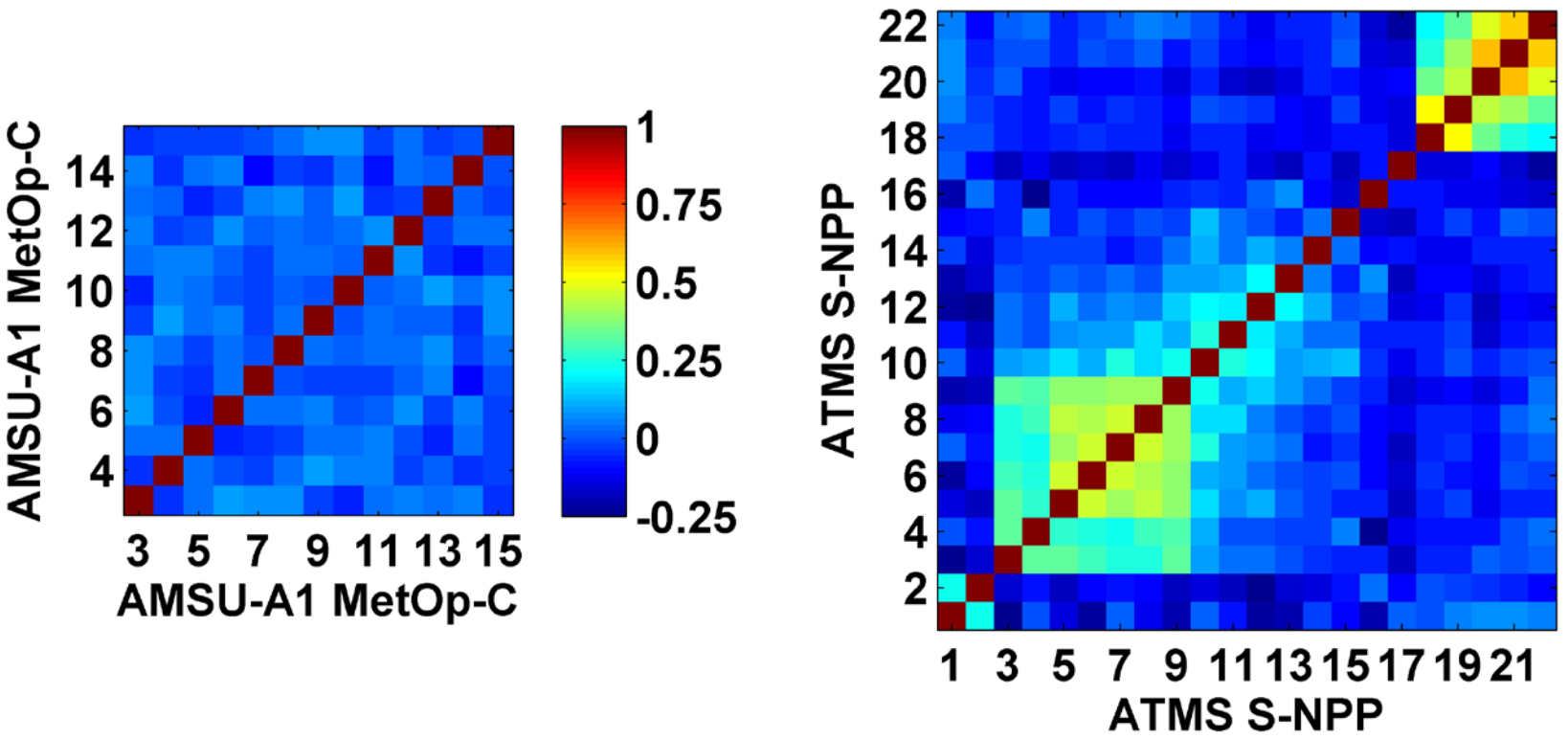


All 4 Ch 1 SV pixels are LI contaminated between yellow tick lines. Note that **the SV counts did not return to the level prior to LI (due to random gain changes).**

Remarks on Alternate LI Mitigation

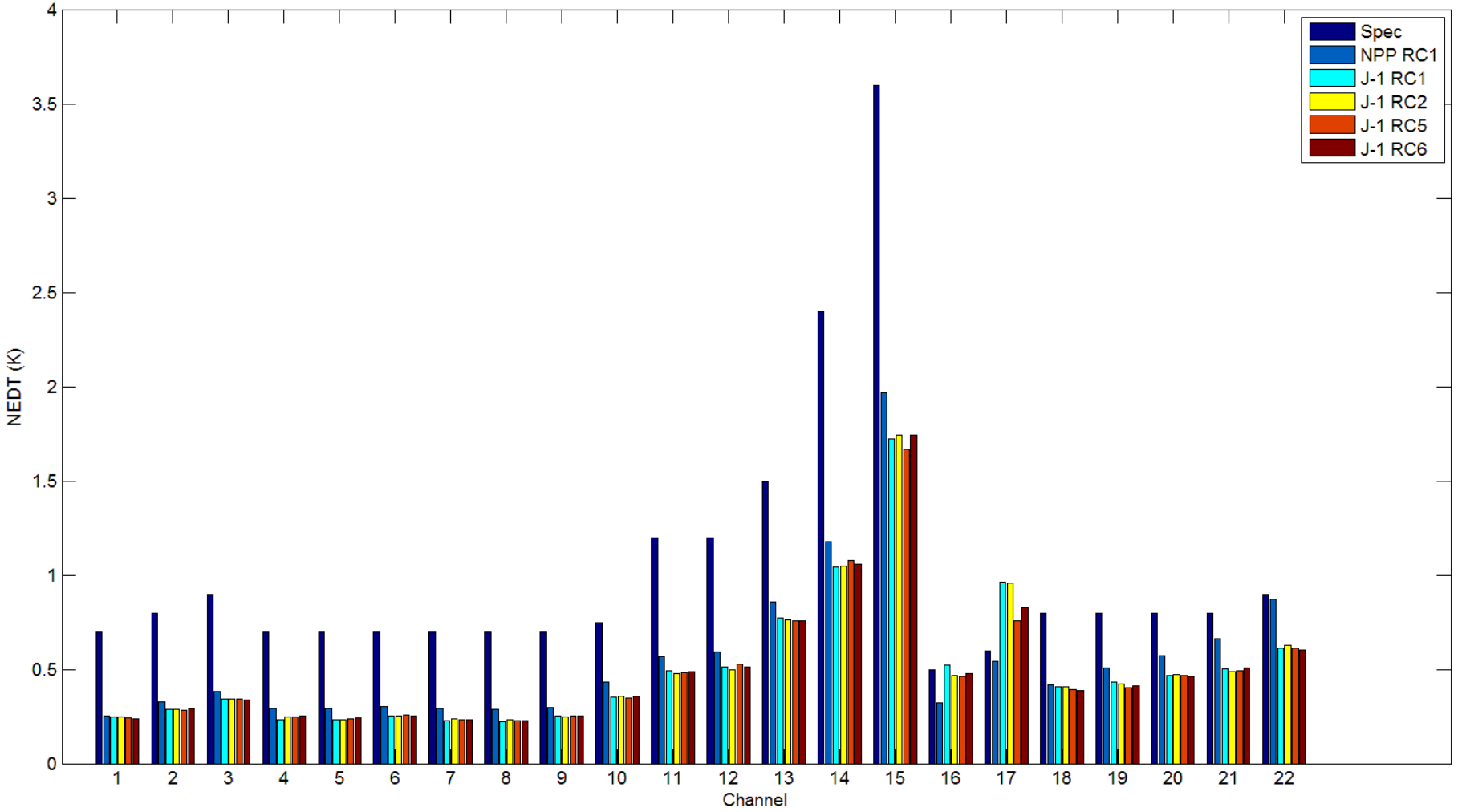
- Switching scan profiles has already been done on orbit with S-NPP, and can be done over polar regions to minimize impact.
- Losing a few scans over the polar region is better than the worst LI correction cases, which could last for 25 min or longer.
- Since contaminated obs are replaced by un-contaminated actual obs, there should be no additional error.
- During commissioning, after switching between SP #1 and #4, no bias was found.
- This LI mitigation approach by switching between different SPs should work for all ATMS 22 channels. Namely, with proper SP selection (when applicable), there should be sufficient number of SV pixels that can be used for producing the SDR product uncontaminated by LI.

Inter-channel Correlation Coefficients



Correlation Coefficients of (left) AMSU-A1 and (right) ATMS Channel Gains.

NEDT for J-1 and NPP at Mid Cold Plate Temp Interpolated to 300K



“Striping”

- All microwave imagers exhibit striping at some level—e.g., evidence is now being found of striping on AMSU, MHS, etc.—yet no NWP users saw striping-related issues with forecasts that used AMSU, MHS, etc data.

- The striping observed with S-NPP ATMS is not exceeding any hardware specs.

- Even so, ground processing changes (averaging) are being considered to somewhat reduce the existing striping. Such changes can be applied to S-NPP & J1-J3 ATMS without requiring any hardware changes.

- NWP users must therefore demonstrate the quantitative impact on forecasts from ATMS striping before any hardware changes can be considered. Even then the timeframe would be J4+.