cris extended resolution calibration algorithm comparisons

**** DRAFT ****

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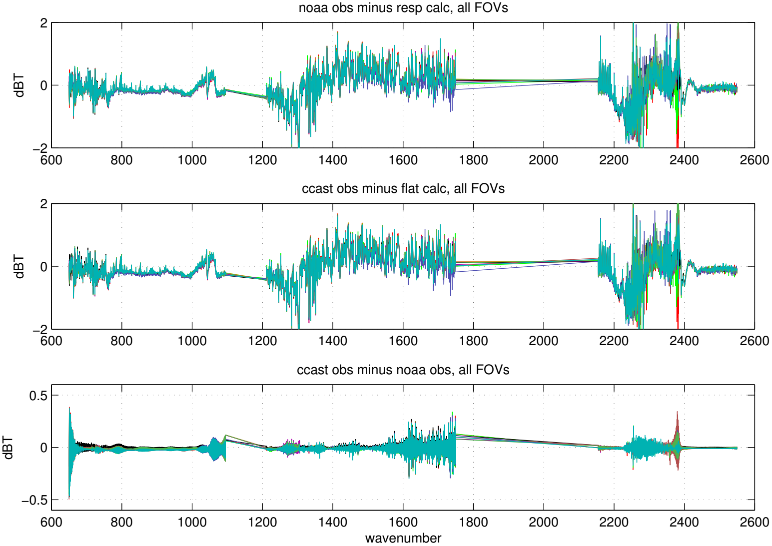
introduction

- we compare the UMBC CCAST implementations of our reference and the NOAA 4 calibration algorithms on extended resolution data
- this allows for identical ILS and processing details—the only difference in tests is the form of the calibration equation
- we show results for both clear matchups and FOV 5 relative tests. For matchups we compare the CCAST algorithm with flat reference truth and NOAA 4 with reference truth convolved with instrument responsivity

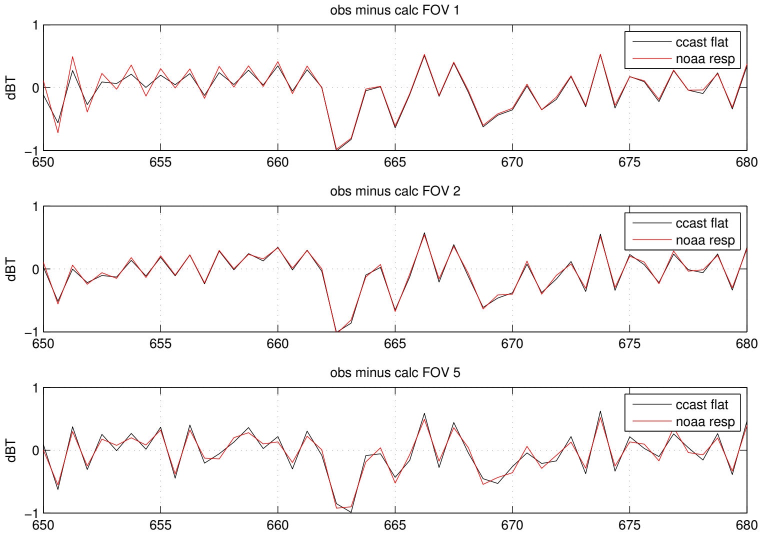
methods

- for tests with calculated radiance we start with 3782 clear matchups from ccast granule SDR_d20160120_t0304487 and calculate upwelling radiances with kcarta at a 0.0025 cm-1 grid
- for the "flat" tests the ccast processing filters are applied pointwise and the result is convolved to the CrIS user grid
- for the "resp" tests instrument responsivity is applied pointwise to the kcarta radiances, these are convolved to the user grid, and then divided pointwise by inverse responsivity
- relative tests are with data averaged over the three day test period, 18-20 Jan 2016
- all test are done with periodic sinc wrapping at the sensor grid, cosine apodization of the extended res points, the old a2 weights, and double Fourier interpolation to the user grid

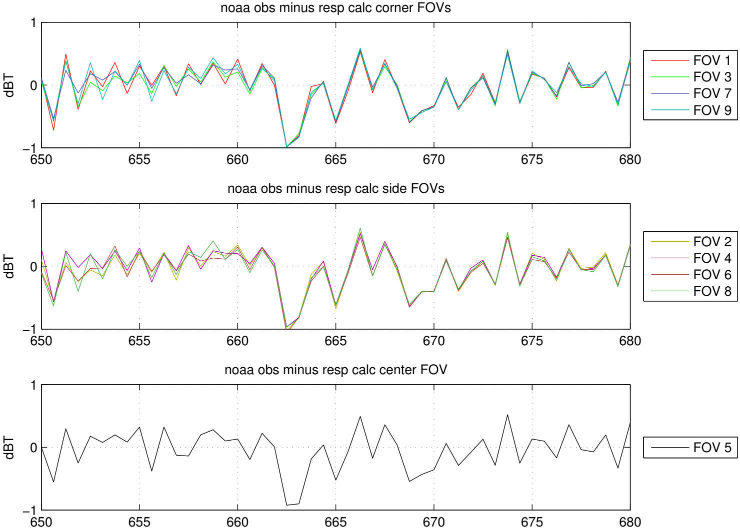
obs minus calc overview



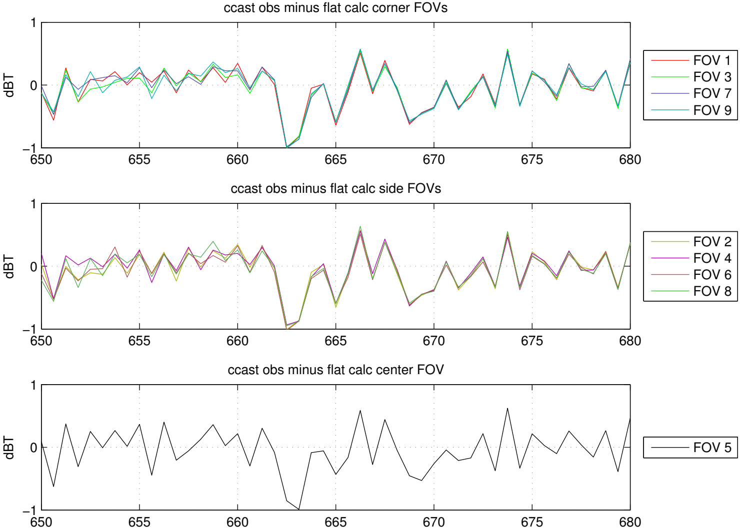
obs minus calc LW detail



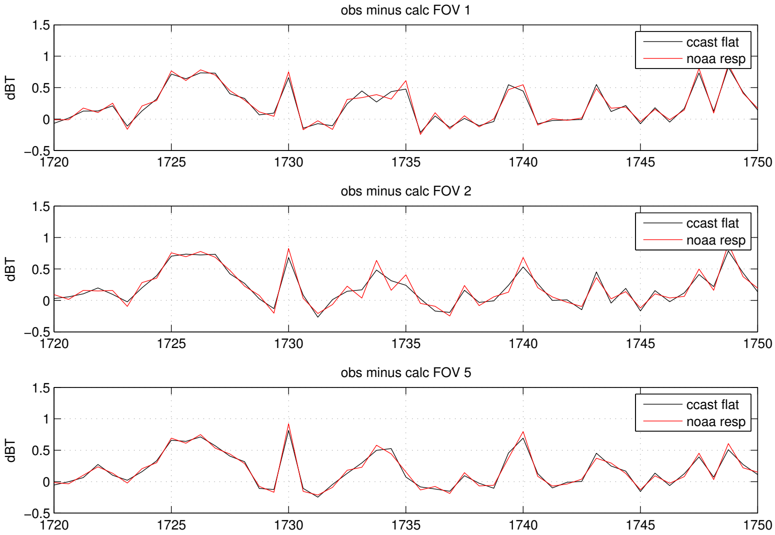
noaa all fovs LW detail



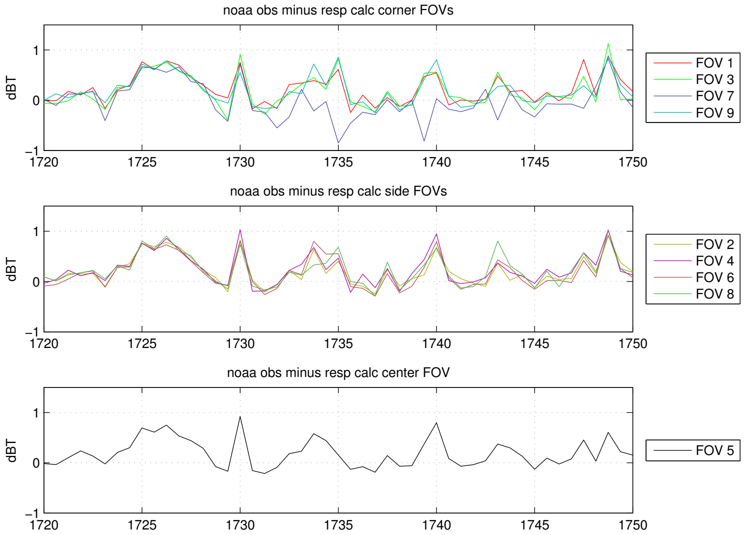
ccast all fovs LW detail



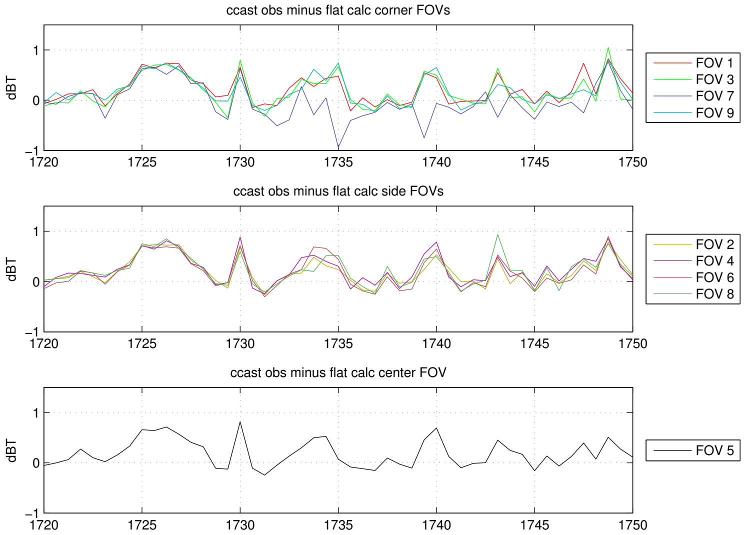
obs minus calc MW detail



noaa all fovs MW detail



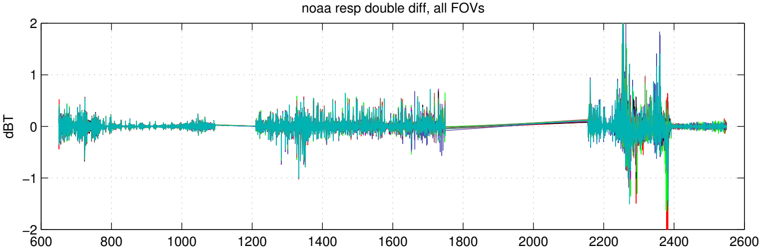
ccast all fovs MW detail

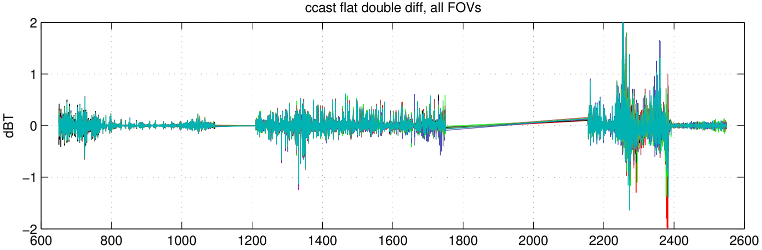


obs minus calc summary

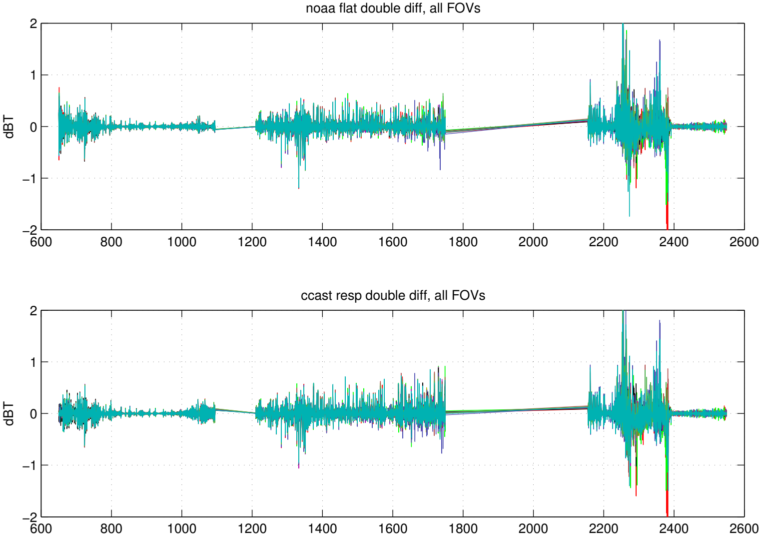
- CCAST minus flat and NOAA minus resp residuals are similar, significantly more so than for regular resolution processing
- the spectral intervals shown here here are regions where the differences between the algorithms was greatest for our 15 Aug 2015 regular high resolution comparison
- below 680 cm^{-1} we see CCAST does slightly better for the side and corner FOVS, while NOAA is slightly better for FOV 5. The CCAST residuals are more consistent across FOVs
- in the MW detail we see CCAST does slightly better for all FOVs. These results are with the old a2 weights; the new UMBC a2 weights give a significant further reduction in the MW residuals

noaa resp and ccast flat double diffs





noaa flat and ccast resp double diffs



double difference summary

- the NOAA double difference is

  $$(\text{noaa obs} - \text{noaa resp}) - (\text{noaa apodized obs} - \text{noaa apodized resp})$$

  the CCAST double differences are analogous
- NOAA with responsivity and ccast with flat reference truth are similar, with CCAST slightly worse at the low end of the MW but slightly better in MW above around 1600 cm-1
- comparing NOAA with flat reference truth and CCAST with responsivity, we see both do slightly worse overall than when compared with their default reference truths.