

# Standard and periodic sinc ILS for the CrIS high resolution tests

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## abstract

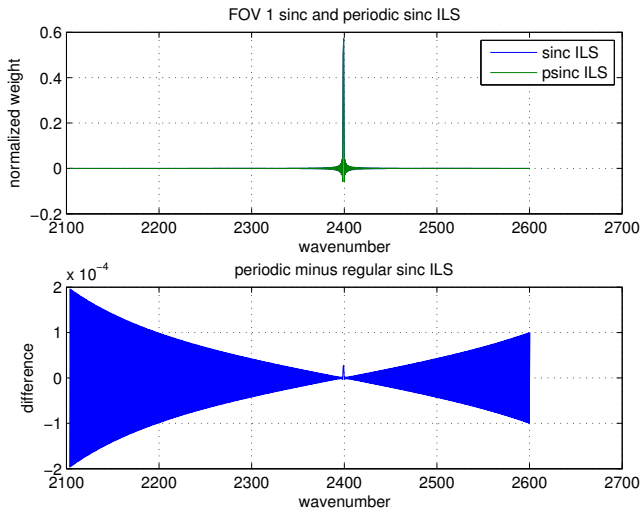
Using data from the 2013 high res tests, a comparison of FOV means for the SW band shows a significant reduction in variation with periodic sinc as the ILS basis function. The periodic sinc ILS also gives a significant reduction in obs minus calc for a clear subset from the 27–28 Aug 2013 tests that we made available earlier.

Thanks to Dan Mooney for the derivation of the periodic sinc ILS basis, and for his advice in applying those derivations.

## test design

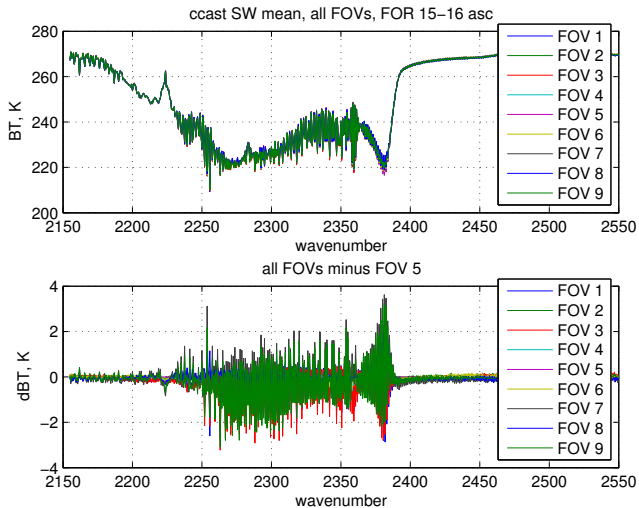
- ▶ we take the average of each FOV over the high res test for FOR 15 and 16 ascending, and compare these with the average for FOV 5
- ▶ to the extent that different FOV views disappear in the averages, this can reveal differences in detector response or FOV-related problems with modeling or processing
- ▶ we also look at the standard deviation of each FOV over the high res test, and compare these with the standard deviation for FOV 5
- ▶ for the obs minus calc, we start with a clear subset of around 100 profiles from the Aug 2013 high res test, and calculate expected upwelling radiances
- ▶ in addition to simple obs minus calc, we compare biases with and without Hamming apodization

# sinc and psinc ils



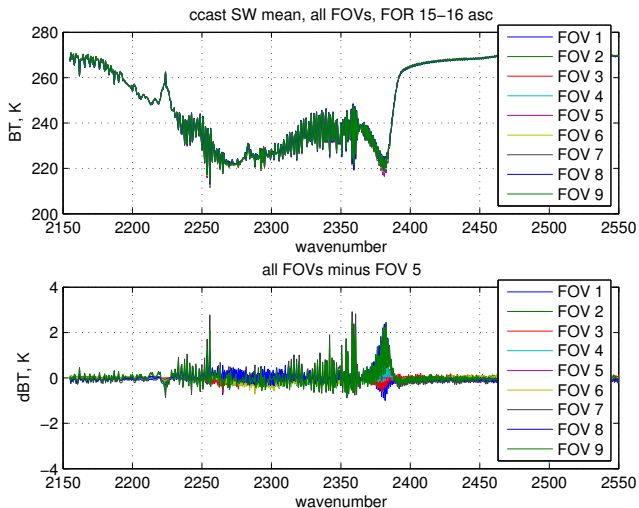
sensor grid regular and periodic sinc ILS functions

## sinc fov means



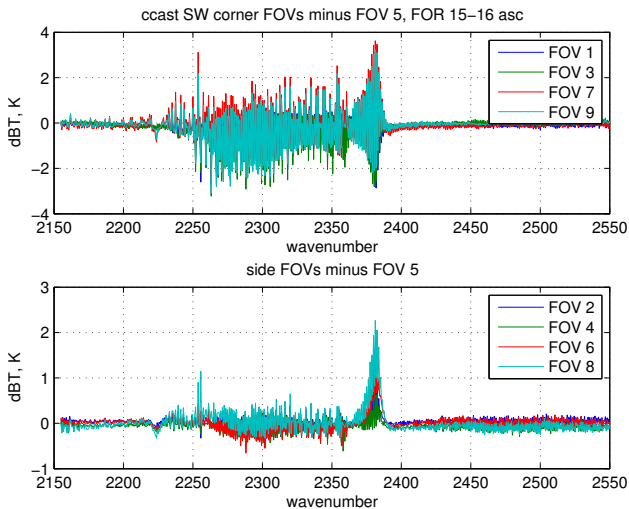
FOV means and differences from FOV 5, for the regular sinc ILS

# psinc fov means



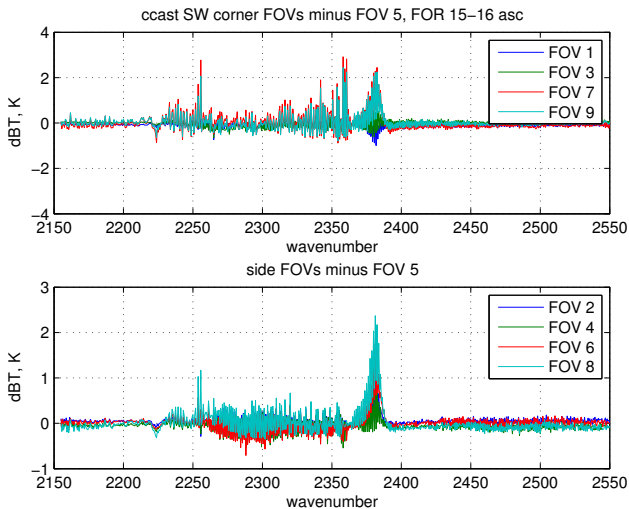
FOV means and differences from FOV 5, for the periodic sinc ILS

# sinc breakout



breakout of mean differences for the regular sinc ILS

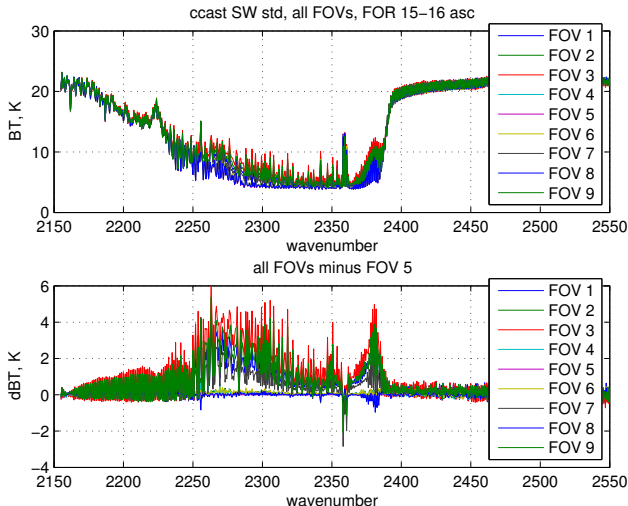
# psinc breakout



breakout of mean differences for the periodic sinc ILS

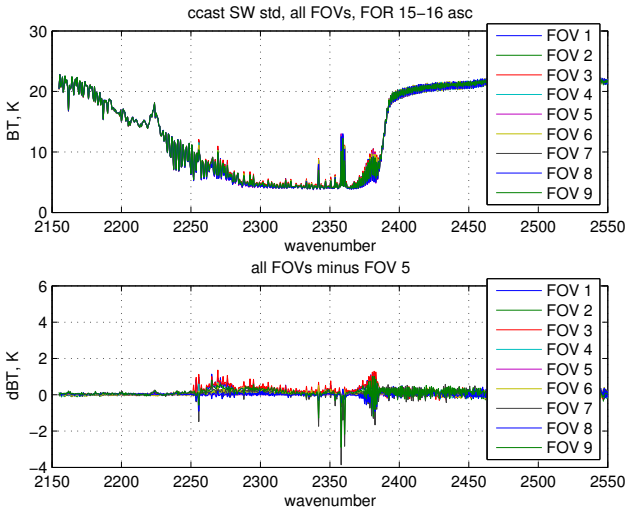


# sinc fov stds



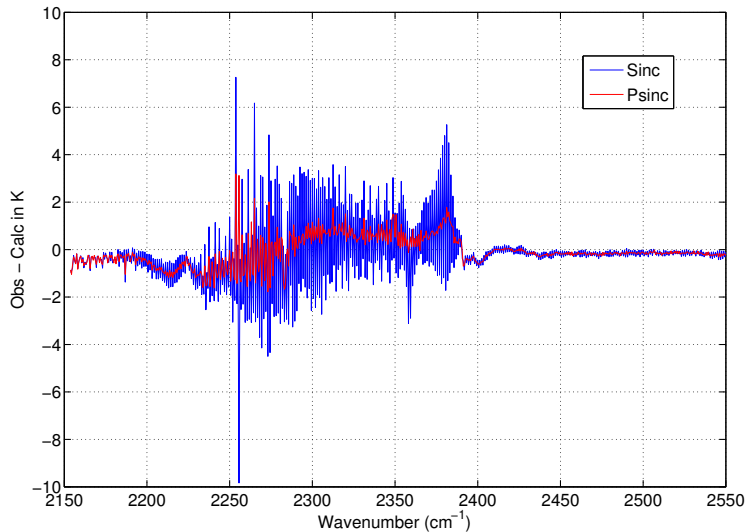
FOV standard deviations and the differences of the standard deviations from FOV 5, for the regular sinc ILS

## psinc fov stds



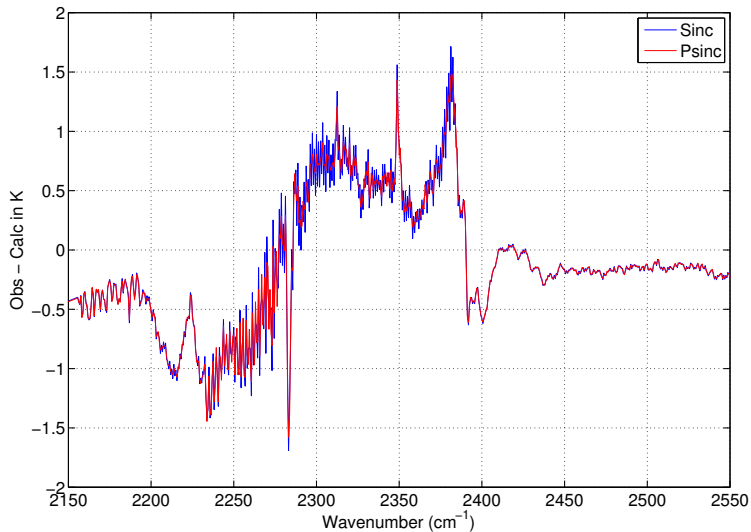
FOV standard deviations and the differences of the standard deviations from FOV 5, for the periodic sinc ILS

## obs minus calc



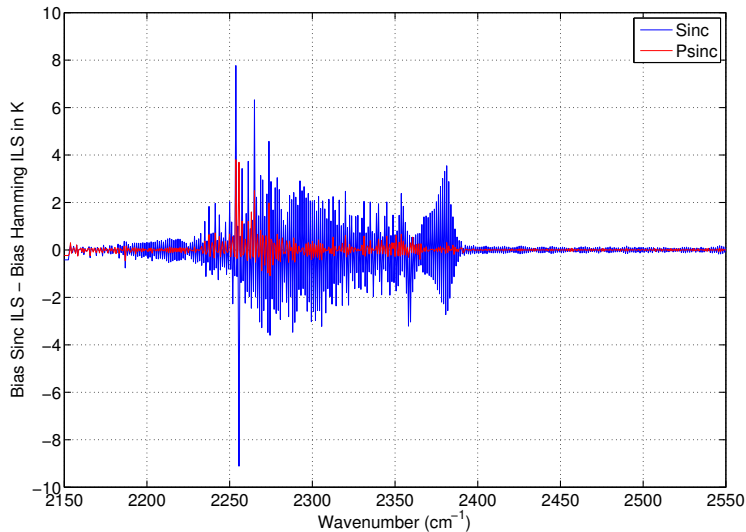
clear subset obs - calc brightness temps, for sinc and psinc

# hamming obs minus calc



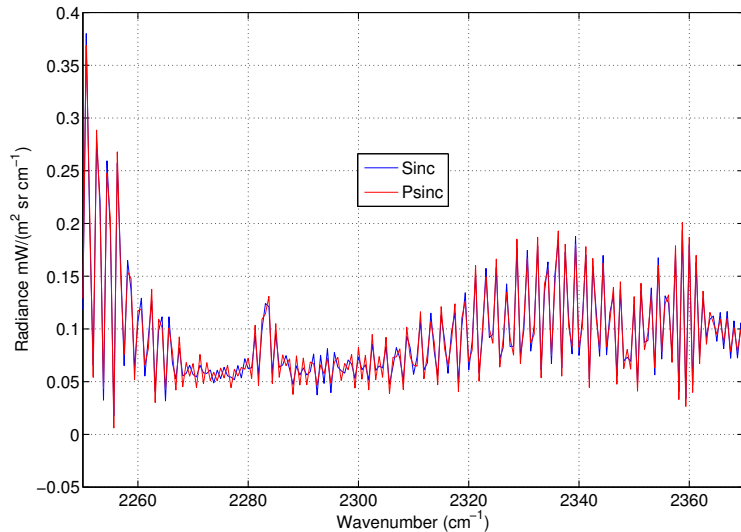
clear subset  $H(\text{obs}) - H(\text{calc})$  BT.  $H$  is Hamming apodization.

## residual comparison



clear subset  $(\text{obs} - \text{calc}) - (H(\text{obs}) - H(\text{calc}))$  BT

# radiance obs and calc

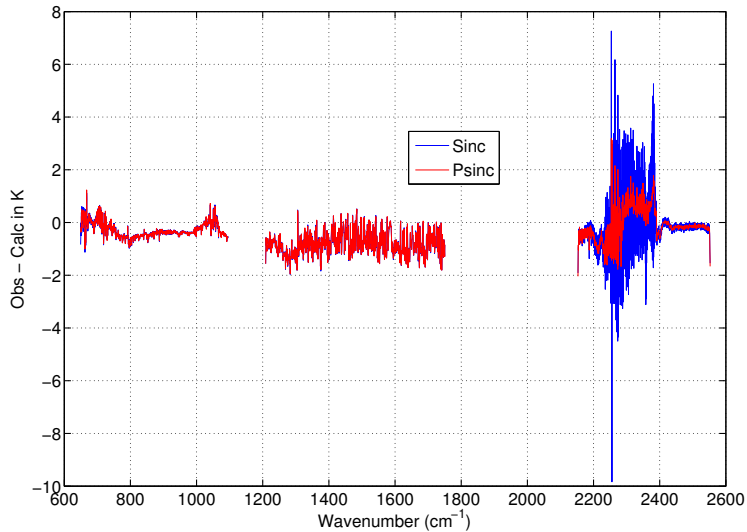


clear subset zoom of radiance obs and calc

## conclusions

- ▶ we see significant reductions in the variation of FOV response and in observed and calculated residuals with the periodic sinc for the Aug 2013 high res tests
- ▶ we saw a similar significant reduction in the variation of FOV response with the periodic sinc for the March 2013 high res tests
- ▶ analyzing data from the gas cell bench tests last fall, we did not see an improvement using periodic sinc for the LW CO<sub>2</sub> tests. But there are hints of it here, shown in the supporting slides.
- ▶ all processing and tests were done with ccast, changing a couple of lines of code to switch from regular to periodic sinc

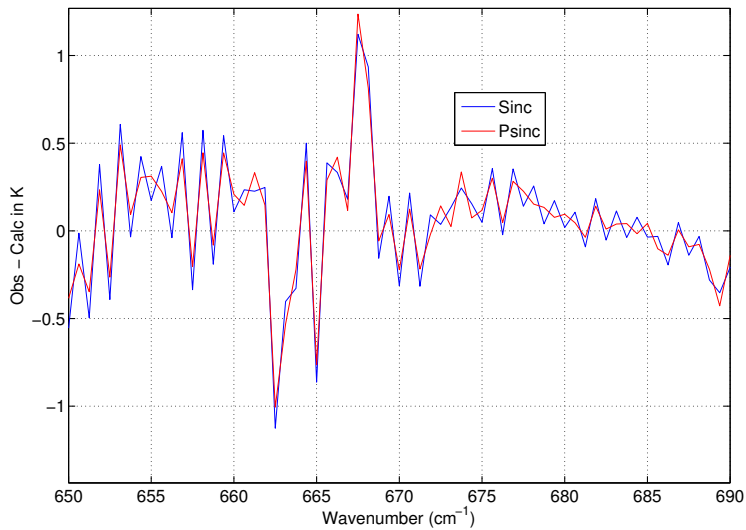
obs minus calc



all bands obs - calc BT

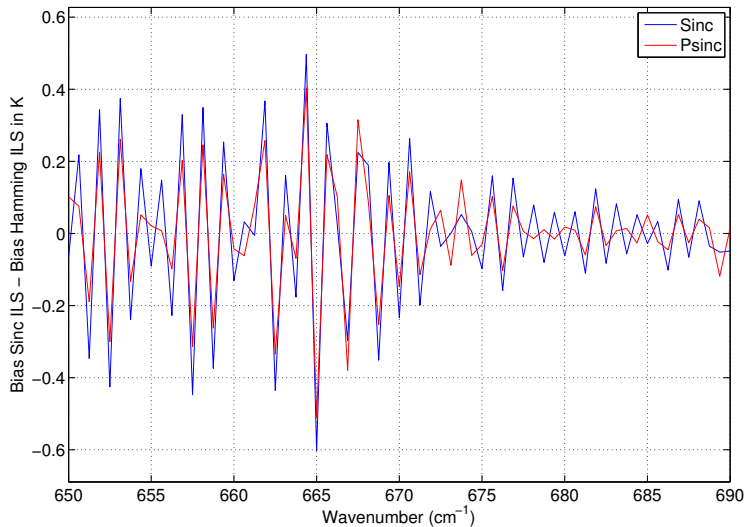


## obs minus calc zoom



LW zoom of obs - calc BT

## residual comparison



LW zoom of  $(\text{obs} - \text{calc}) - (H(\text{obs}) - H(\text{calc}))$  BT