

Review of “AIRS Deconvolution and the Translation of AIRS to CrIS Radiances with Applications for the IR Climate Record” by Motteler and Strow

This paper studies the method to deconvolve AIRS channel radiances to an enhanced intermediate spectral resolution. The deconvolved radiance then reconvolved to CrIS spectral resolution, with applications for the infrared climate record. This is a very important application since now we have hyper-spectral infrared sounder observation data from AIRS (more than 16 years), IASI (more than 12 years), and CrIS (more than 6 years). CrIS was formally designated a key IR reference sensor by the Global Space-based Inter-Calibration System (GSICS) this March. To translate AIRS and IASI to CrIS, and to merge the data together will create a long-term infrared radiance data record for climate trending. The paper is well written and well organized. I recommend it to be published with minor revisions.

Comments:

1. Page 2 right column, line 26,  $\|r_0\|_2$  should be  $\|r_0\|^2$ , there are several other places need to be corrected
2. Page 2, right column, lines 36-39 in the generalized Gaussian equation, please replace  $c$  with other symbol. It is very confusing since it is also used as channel radiance in the previous lines
3. In Fig 3 subplots 2 and 3: why we see some overshoot and ringing in the deconvolution, especially at the shortwave CO<sub>2</sub> absorption lines?
4. The AIRS L1c channel spacing and resolving power  $R$  is around 1200 in Fig 2 (after deconvolution), why the direct convolution choose a resolving power of 2000 instead of 1200? The generalize Gaussian function could be adjusted to use a resolving power of 1200 to better match the deconvolved radiances.
5. Page 4 right column, line 46, “The constant or DC bias is...” What is DC?
6. Page 4 right column, lines 53-54, “Up to this point there as been no statistical...” please correct this sentence
7. Page 5, regarding the NEdN. I am not clear how do you measure the AIRS-to-CrIS NEdN. If you know AIRS NEdN at 280 K, how do you translate that NEdN to CrIS observation? I don’t understand the sentence: “This is done repeatedly and the noise after translation is measured”

8. Page 6 left column, line 48, “variation is due the AIRS...” should be “variation is due to the AIRS...”