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Interactive comment on “Uncertainties of satellite-derived surface skin temperatures in the polar oceans: MODIS, AIRS/AMSU, and AIRS only” by H.-J. Kang et al.

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Received and published: 17 June 2015

General comments

This paper is a worthwhile contribution to the literature. While the study is small, it serves as an indication of possible ways of comparing AIRS and MODIS data in challenging regions. The specific results are also of interest in estimating polar warming, although the short period of data used each year causes substantial uncertainties in the trend estimates.

The comparison between the AIRS/AMSU results and the AIRS-only results is of con-

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siderable interest, as not much has been published looking at the AIRS-only results, which would become the mainline AIRS product should the AMSU instrument fail. Both AIRS and AMSU are currently operating beyond their design lifetimes, but the AMSU instrument is more likely to substantially degrade than is AIRS; hence the AIRS-only product was developed to ensure data processing can continue in near-real time should AMSU fail.

The authors have evaluated one of the main degradations which occurs in the retrieval processing when AMSU data are absent, namely the difficulty in assigning a surface classification between sea water and sea ice from infrared data only. The ocean and ice emissivities in the infrared are close enough that infrared data alone have difficulty making a certain determination between the surface types. Since the two emissivities are very different in the microwave region, the AIRS/AMSU combination can accurately determine sea ice fraction and assign a correct surface emissivity to each retrieval, while the AIRS-only retrieval does not always do this correctly.

Specific comments

The authors should be more clear about which forecast model data the AIRS-only system uses to determine its surface classification. The only data value which is used is a surface temperature from the forecast, used to determine whether the surface should be treated as liquid or frozen (and not used in any way as a temperature first guess.) The AIRS-only retrieval system uses a temperature rather than a sea ice fraction from the forecast; this study shows the extent to which an ice forecast derived other microwave satellite data might improve the AIRS-only product.

Technical corrections

Technical corrections were submitted as part of a quick review and it does not appear that quite all of them were made.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 4451, 2015.

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