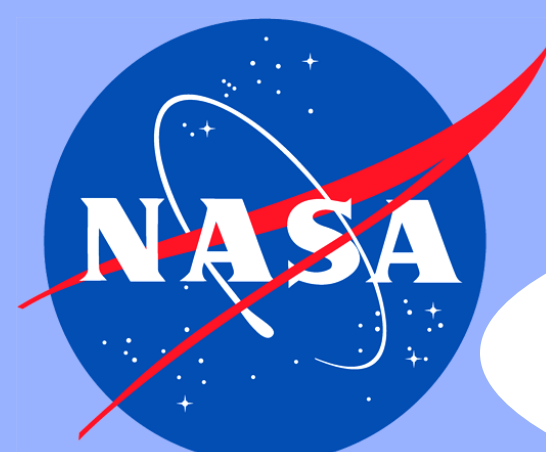




LAND SURFACE EMISSIVITY DERIVE FROM SUOMI NPP CrIS

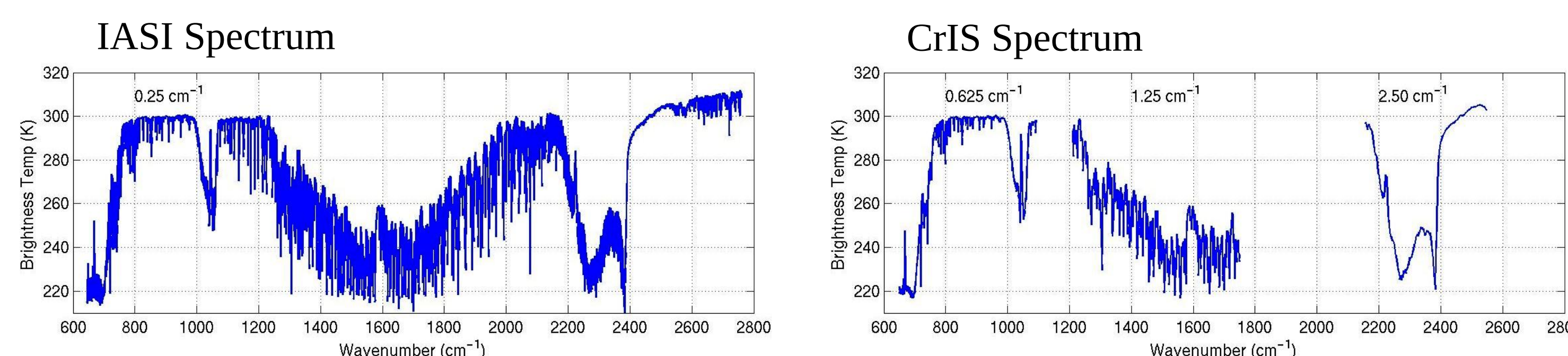
DANIEL K. ZHOU*, ALLEN M. LARAR, AND XU LIU

*Corresponding author: daniel.k.zhou@nasa.gov, NASA Langley Research Center, Hampton, VA 23681

A33N-0344

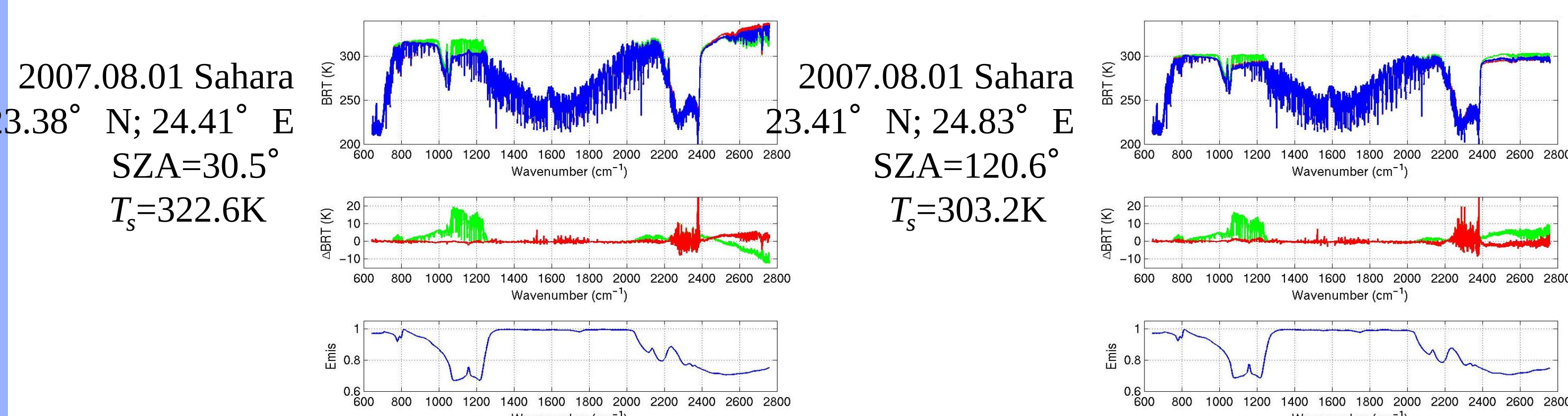
INTRODUCTION & SUMMARY

Presented here is the land surface IR spectral emissivity retrieved from the Cross-track Infrared Sounder (CrIS) measurements. The CrIS is aboard the Suomi National Polar-orbiting Partnership (NPP) satellite launched on October 28, 2011. We describe the retrieval algorithm, demonstrate the surface emissivity retrieved with CrIS measurements, and inter-comparison with the Infrared Atmospheric Sounding Interferometer (IASI) emissivity. We also demonstrate that surface emissivity from satellite measurements can be used in assistance of monitoring global surface climate change, as a long-term measurement of IASI and CrIS will be provided by the series of EUMETSAT MetOp and US Joint Polar Satellite System (JPSS) satellites. Monthly mean surface properties are produced using last 5-year IASI measurements. A temporal variation indicates seasonal diversity and El Niño/La Niña effects not only shown on the water but also on the land. Surface spectral emissivity and skin temperature from current and future operational satellites can be utilized as a means of long-term monitoring of the Earth's environment. CrIS spectral emissivity are retrieved and compared with IASI. The difference is small and could be within expected retrieval error; however it is under investigation.

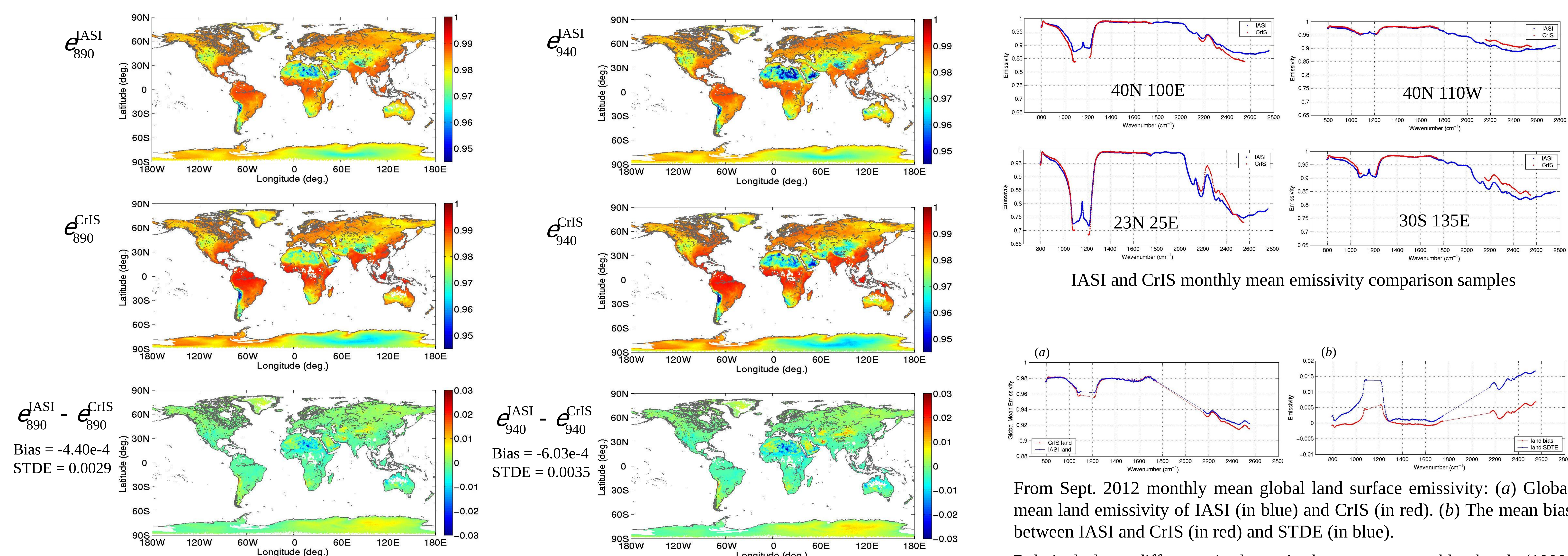


RETRIEVAL ALGORITHM

The retrieval algorithm only relies on measured radiance and instrument noise; no other "truth" data from satellite or surface-based instruments or from numerical weather analysis/prediction models is utilized in assisting or constraining the retrieval products. The fast transmittance model used herein is a combination of the Stand-alone AIRS Radiative Transfer Algorithm (SARTA) Version 1.07 and the physically-based cloud RTM is based on the DIScrete Ordinate Radiative Transfer (DISORT) calculations performed for a wide variety of cloud microphysical properties. An all-season, global EOF regression database is used. The regression coefficients are classified with respect to cloud-free and cloudy conditions. A multi-stage statistical regression retrieval algorithm is to derive IR ultraspectral emissivity and skin temperature from the CrIS instrument on Suomi NPP satellite. The algorithm details are found elsewhere (Zhou *et al.*, 2011, *IEEE TGRS* **49**, 1277–1290). Retrieval samples are shown.



FIRST CRIS RETRIEVAL SAMPLES AND INTER-COMPARISON WITH IASI (2012 SEPT. MEAN)



IASI and CrIS monthly mean continental surface emissivity at 890 cm⁻¹ and 940 cm⁻¹; and the differences between IASI and CrIS.

SURFACE EMISSIVITY MONITORING WITH IASI

