Microwave Sounder Scan Bias Analysis From AIRS/AMSU Observations

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The Atmospheric Infrared Sounder (AIRS) instrument suite, which includes the Advanced Microwave Sounding Unit A (AMSU-A) as well as a near-copy of the AMSU-B - the Humidity Sounder for Brazil (HSB), was launched on the NASA Aqua satellite in May 2002. During the on-orbit checkout it became apparent that the microwave instruments, in particular AMSU-A, exhibit a significant scan angle dependent bias. This phenomenon has also been noticed in the AMSU instruments operated by NOAA on NOAA-15 through NOAA-17 and is expected to also be a feature of the next series of AMSU instruments, on NOAA-N and NOAA-N’ as well as on equivalent European satellites. The Advanced Technology Microwave Sounder (ATMS), to be launched first in 2006 on the NASA NPP satellite and thereafter on a number of NPOESS satellites, is also expected to have significant scan bias. This bias is a major hindrance to the effective use of the microwave observations, both operationally and in atmospheric research, and much effort has been devoted by NOAA as well as NASA to analyze it, with a view toward correcting the measurements on an objective basis from first principles. These efforts have not yet been entirely successful, and many data users have resorted to making empirically derived corrections instead. While that may be satisfactory for operational use, it is not desirable for climate research and similar applications. The effort to model the bias therefore continues. In this paper we report on work that has been done at the Jet Propulsion Laboratory in this regard, including some progress in modeling the bias.