"AIRS In-flight Special Test Results and Operational Lessons Learned". D. Elliott, T. Pagano, S. Gaiser, S. Broberg, T. Hearty, K. Overoye, M. Weiler, J. Gohlke, and S. Licata.

Abstract

"The Atmospheric Infrared Sounder (AIRS) was launched on the EOS Aqua spacecraft in May of 2002. Several "special test" sequences were developed to transfer the calibration from pre-flight to the on-orbit environment, and characterize the performance observed in the flight configuration. Tests include gain stability, radiation circumvention, spectral channeling characterization, and noise characterization. Test results show excellent in-flight sensitivity and improved radiometric, spectral and thermal stability (albeit at lower than expected temperatures).

AIRS outgassing took longer than originally estimated, which led to icing of the optical and cooler surfaces once the cooler was activated. Operational techniques employed to counteract the effects of icing will be presented, including the method used to extend the time between defrost cycles.

The fact that Aqua uses polar ground stations instead of TDRSS had a significant impact on the design and implementation of the calibration sequences. Some tests require nearly continuous commanding for as long as 35 minutes. But contacts with the ground stations, even in cases involving handoff from one polar station to another, are typically about ten minutes long and never exceed 20 minutes. The AIRS operations team made extensive use of the AIRS flight software's support for macros and time-delayed commands. They also took advantage of the Aqua spacecraft's stored command sequence capability. The resulting automation of the calibration procedures significantly reduced risk both to the instrument and to science data quality. Automation also enabled precise timing of the tests, which was especially important in the case of radiation circumvention.

Monitoring of the AIRS calibration will continue throughout the mission. The technique used to track the calibration will be described.

Finally, operational lessons learned will be presented.