ABSTRACT:

ATMS is a new satellite microwave sounding sensor designed to provide operational weather agencies with atmospheric temperature and moisture profile information for global weather forecasting and climate applications. ATMS will continue the microwave sounding capabilities first provided by its predecessors, the Microwave Sounding Unit (MSU) and Advanced Microwave Sounding Unit (AMSU). The first ATMS was launched October 28, 2011 on board the Suomi National Polar-orbiting Partnership (S-NPP) satellite. Microwave soundings by themselves are the highest-impact input data used by Numerical Weather Prediction (NWP) models; and ATMS, when combined with the Cross-track Infrared Sounder (CrIS), forms the Cross-track Infrared and Microwave Sounding Suite (CrMSS). The microwave soundings help meet NWP sounding requirements under cloudy sky conditions and provide key profile information near the surface.

SCAN PROFILE SELECTION AND SCAN BIAS:

After activating ATMS on orbit, the primary task is to determine the optimal Scan Profile (SP). This selects the least obstructed space view profile among 4 Space View sectors (SPs 1–4) centered at 6.66°, 8.33°, 10.0°, and 13.33° (below NPP+Y axis). The goal of this task is to assess the impact either of spacecraft or Earth limb infringements, to obstructed space view profile among 4 Space View sectors (SPs 1–4) centered at 6.66°, 8.33°, 10.0°, and 13.33° (below NPP+Y axis). On-orbit Performance Verification

On-orbit Performance Verification

Temperature Stabilization:

Parameters to be characterized are stability of: Calibration target temperatures, Receiver shelf temperatures, and Radiometric gain

Scope: Data from orbit 164 was used to determine that spec-compliant stabilization was achieved; Data from orbit 182 was used to characterize full stabilization (thermal steady-state)

Criteria for spec-compliance assessment:

Drift in calibration target temperatures < 0.001°C / sec

Gain drift: < 0.00008 dB/sec for channels 1-11, 16-2

< 0.0001 dB/sec for channels 12-15

Example results shown in following charts: Requirements are satisfied by orbit 164, Steady state achieved by orbit 182

Geolocation Verification Method

• Pick multiple regions with high coastline contrast and orbits with coastal crossing close to nadir (BP 24-74)
• Fit a cubic polynomial through points in the in-track or cross-track direction
• The inflection point is taken as the shore crossing point
• Compare points to actual cost (GIWSS fine resolution dataset)
For each approximate coastline point, the intersection of the perpendicular is found on the actual cost. This distance is separated into a North-South and East-West error.

SUMMARY:

ATMS on S-NPP is the first of a new series of operational microwave sounders. We have presented a summary of the new microwave sounder ATMS on Suomi-NPP. Early on-orbit performance is good and Cal/Val activities are continuing for this important operational weather and climate sensor.