**Introduction**
The Cross-track Infrared and Microwave Sounder Suite (CrIMSS) will be flying on the National Polar-orbiting Operational Environmental Satellite System (NPOESS) and its Preparatory Project (NPP) satellites. It is designed to produce three Environmental Data Records (EDR) products, i.e., the Atmospheric Vertical Temperature Profiles (AVTP), Atmospheric Vertical Moisture Profiles (AVMP) and atmospheric Pressure Profiles. The CrIMSS EDR algorithm has been extensively tested by Northrop Grumman Space Technology (NGST) with proxy data and the effort is continuing. This presentation will summarize the test methodology, test data, and the test results.

**CrimSS EDR Retrieval Algorithm**
- The CrIMSS EDR algorithm was developed by Atmospheric Environmental Research (AER) and modified by NGST to produce AVTP and AVMP EDRs from the Sensor Data Record (SDR) measured by Advanced Technology Microwave Sounder (ATMS) and Cross-track Infrared Sounder (CrIS), using the Numerical Weather Prediction (NWP) surface pressure forecast data and other ancillary information. The Pressure Profile EDR is derived from the retrieved AVMP and AVTP EDRs.
- The CrIMSS EDR algorithm was largely based on the heritage EOS AIRS retrieval algorithm with some significant improvements:
  - Simultaneous retrieval of atmospheric temperature, moisture and ozone profiles and surface skin temperature and spectral emissivity.
  - Fast and accurate Optimal Spectral Sampling (OSS) Radiometric Transfer Model.
  - Using the Empirical Orthogonal Functions (EOFs) to characterize and measure the retrieved geophysical parameters.
  - Using a prior constraints (background and covariance) derived from a blended training dataset composed of NCEP, ECMWF and NOAA89 radiosonde data.
- The CrIMSS EDR algorithm consists of 7 modules:
  - Initialization.
  - Input and Pre-processing.
  - Microwave-only (MW) Retrieval.
  - Scene Classification.
  - Microwave and Infrared Combined (MW+IR) Retrieval.
  - Quality Control.
  - Output and Post-processing.
- The retrieved parameters include:
  - Temperature profile (reconstructed from 20 temperature EOFs).
  - Moisture profile (reconstructed from 10 moisture EOFs).
  - Surface temperature.
  - Surface MW emissivity (reconstructed from 5 MW emissivity EOFs).
  - Surface IR emissivity (at 12 frequency hinge points).
  - Surface IR reflectance (at 12 frequency hinge points).
  - MW cloud top pressure and cloud liquid water path.
  - Ozone profile (reconstructed from 7 EOFs).

**Algorithm Test Methodology and Process**
- Individual algorithm testing:
  - Input test data are the processed Sensor Data Record (SDR) and matching ancillary/auxiliary data.
  - To demonstrate the EDR algorithm’s performance and performance sensitivity to various environmental conditions and sensor effects.
- Chain algorithm testing:
  - Raw input data included Raw Data Record (RDR) (CrIS, ATMS) and NWP forecast fields (surface pressure) and surface type databases.
  - The CrIMSS algorithm chain included SDR and EDR algorithms and other algorithm processing utility functions.
  - Operational code testing vs. science code testing.
  - Operational code testing results are compared to the science code testing results to assess the errors caused by the algorithm’s operational implementation in the IDPS.
  - Presented here are individual algorithm testing results. Initial algorithm chain testing has been completed and results are still under assessment.

**Test Results on Simulated Data**
- The retrieved AVMP EDR meets the NPOESS system spec with good margin.
- The performance shows small but noticeable variation associated with scan geometry, scene moisture content, and geographic locations.

**Test Results on Real Data**
- The retrieved PP EDR meets the NPOESS system spec with good margin.
- The performance shows small but noticeable variation associated with scan geometry and locations and moderate seasonal variation.

**Conclusions**
- The CrIMSS EDR retrieval algorithm has demonstrated excellent performance on simulated test data and the retrieved moisture, temperature and pressure profile EDRs all meet the NPOESS/NPP EDR quality requirement specifications.
- The algorithm also demonstrated promising performance on limited testing using the test data derived from real AIRS/AMSU/HSB measurements. Some preliminary testing with IASI data is also being performed (by AER).
- The algorithm is currently under “chain testing” to verify its functional performance and operational implementation at IDPS.