



National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Resources at Sounder PEATE NPOESS Preparatory Project (NPP)

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Topics



Short Introduction to Sounder PEATE

Data and Software Available at Sounder PEATE

CrIMSS EDR Software and Data



Sounder PEATE Relationships

- **Sounder PEATE is one of 5 PEATEs and 1 CARS supporting NASA's role in the NPP Program**
- **The Sounder PEATE is:**
 - Part of the NPP Science Data Segment
 - Reports to Science Data Segment Manager, Robert Schweiss
 - Reports to Program Science Office Element (PSOE), Jim Gleason
 - The NPP Sounder PEATE is a resource of:
 - The NPP SDS
 - The NPP Sounder Science Team

NPOESS is renamed and reorganizing, but impact to NPP program should be minimal.



Chief Roles of the Sounder PEATE

- **Assist the Science Team in Cal/Val activities**
- **Assist the NPP Sounder Science Team in assessing the Climate Quality of EDR Products:**
 - Vertical Temperature Profile
 - Vertical Moisture Profile
 - Vertical Pressure Profile (including surface)
- **Assist the NPP Sounder Science Team in evaluating the NPP Retrieval Code**
 - Evaluate existing IDPS production and science code bases
 - Test and verify potential algorithmic improvements
 - Recommendations and observations sent to the PSOE



Sounder PEATE Responsibilities

- **Support Science Team in assessing and validating:**
 - Climate Quality of SDRs and EDRs
 - Calibration of Pre-Launch & Post-Launch xDRs
- **Provide data and analysis products to the Science Team**
 - All data in Sounder PEATE and AIRS archives are available
- **Develop tools for data comparisons :**
 - CrIMSS compared to other instruments and correlative data
- **Analyze IDPS Software**
 - Develop and Demonstrate Algorithm Enhancements
 - Provide compute resources to Science Team for local computations



Current Sounder PEATE Operational Status

- **Basic system features now available include:**
 - Data ingest and archive (MetOp-A, NOAA-18/19)
 - Granule maps (for MetOp-A: IASI, MHS, AMSU-A)
 - Calibration Subset (MetOp-A IASI)
 - Clear FOVs, Random FOVs, Fixed site matchups, Convective cloud FOVs
 - Analysis PGE (for IASI)
 - Simultaneous Nadir Observation (SNO)
 - Development of RTP3 file format
- **Sounder PEATE is collocated with AIRS Team Leader Science Computing Facility and has access to all AIRS/AMSU data.**



Radiative Transfer Profile – version 3

- **RTP-3 is a one-stop data product that includes both standard data product attributes and “*matched*” correlative attributes in the same file.**
 - Original RTP format was developed at UMBC
 - Sounder PEATE Match-Up products will be stored using the RTP-3 format.
- **RTP-3 is in NetCDF format for ease of use**
 - Currently NetCDF V3, but in the process of converting to NetCDF V4
 - Use of group, compression, and possibly compound data
- **“Almost” CF Metadata Convention compliant**
 - Metadata convention for Climate Research community
- **RTP-3 Reader APIs will be provided for: “C”, FORTRAN90, MATLAB and ID**



Software Development Status

- **Analysis Match-Up PGE**
 - IASI version. Others are planned
- **RTP3 Reader/Writer APIs (initial release for Fortran/C)**
 - Matlab/IDL readers are in the plan
- **Sounder PEATE L1 Reader**
 - Reads IASI, AIRS, AMSU-A, MHS and HSB
 - Other readers to follow
- **Simultaneous Nadir Observation (SNO) PGE**
 - Aqua to MetOp-A: IR to IR; MW to MW
 - Working on NOAA-18/19 to Aqua, to MetOp-A
 - CrIMSS to Aqua/MetOp-A is planned
- **Concatenation PGE (concatenates RTP3 files)**



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Data Archived at Sounder PEATE

- **Advanced Technology Microwave Sounder**
 - RDR,SDR,TDR, and Remapped SDR
- **Cross-track Infrared Sounder**
 - RDR,SDR
- **CrIMSS EDR, IP**

- **MetOp-A IASI and AMSU-A, MHS level 1 data**
- **NOAA-18/19 AMSU-A and MHS level 1 data**
- **Aqua data is available through AIRS TLSCF**

- **ECMWF and NCEP forecasts, NOGAPS(?)**
- **PREPQC from NCEP**

- **Sounder PEATE generated files**
 - Matchup files, level 3 gridded products



CrIMSS (CrIS and ATMS)

- **Cross-track Infrared Sounder (CrIS)**
 - Interferometer manufactured by ITT
 - One scan per 8 seconds (30 FORs)
 - 9 sets of detectors, one set for each FOV
 - 1305 channels, not counting 12 guard channels
 - SDR contains unapodized spectra
 - CrIMSS EDR algorithm uses Blackman-Harris apodization
 - NOAA is planning to use Hamming apodization instead
- **Advanced Technology Microwave Sounder(ATMS)**
 - 22 channels
 - AMSU-A and MHS channels and three additional channels
 - One scan per 8/3 seconds
 - 96 FOVs per scan line
 - EDR uses ATMS SDR data resampled at CrIS FORs, 3x3 CrIS FOVs



Studying CrIMSS EDR Software

- **CrIMSS EDR Algorithm is developed by AER for NGAS**
 - AER software is called the science software
 - Sounder PEATE has a running copy of the science software
 - Science software runs on synthetic data to test the performance of EDR algorithm.
- **NGAS/Raytheon converted the science software for IDPS**
 - Called Ops software (or IDPS software)
 - Sounder PEATE has a copy of old version, but unable to run due to hardware differences
 - Will utilize mini-IDPS at SDS to run the Ops software
 - Mini-IDPS at GSFC has not been able to reproduce NGAS/Raytheon products
 - Ops software runs on proxy data generated from AIRS/AMSU/HSB data to test the throughput.
- **The two software programs are functionally equivalent.**



Studying CrIMSS EDR Data

- **Comparing data products produced from same versions of IDPS code (V1.5.0.48) from various sources (NSOF, NPP SDS mini-IDPS) has been interesting.**
- **Some products are not identical**
 - Perhaps run-time parameters are different
- **NGAS synthetic data seem to be too simple and easy**
 - No inhomogeneity within an FOR
 - Not enough cloud
- **NGAS proxy data are based on AIRS/AMSU data and inconsistent with EDR software**
 - Proxy CrIS Data has Hamming apodization
 - Scan angles are not properly simulated
 - Aqua AMSU-A channels have different polarity
 - Noisy Aqua AMSU-7 should not have been used



- **All data products are in HDF5 format.**
 - CDFCB describes NPP file format and contents.
 - ITAR restriction has been removed and now in the public domain.
- **Granules are almost 32 seconds long**
 - So most granules are 4 scan lines
 - Sounder PEATE will be getting 8 minute aggregates
- **Input to CrIMSS EDR**
 - Remapped ATMS SDR
 - CrIS SDR
- **Output of EDR processing**
 - Geolocation for EDR products
 - EDR (T, q at pressure levels, p at heights)
 - Intermediate Products (MW only and IR+MW T, q at OSS levels, IR and MW Surface Emissivity, ozone)
 - Only Ozone IP is retained



CrIMSS Related Data Products

Data Product ID	Collection Short Name	Definition and/or Collection Long Name	Geolocation File
RATMS	ATMS-SCIENCE-RDR	ATMS Science RDR	
RCRIS	CRIS-SCIENCE-RDR	CrIS Science RDR	
SATMR	ATMS-REMAP-SDR	ATMS Remapped to CrIS SDR	ATMS-REMAP-SDR-GEO
SATMS	ATMS-SDR	ATMS Science SDR	ATMS-SDR-GEO
SCRIS	CrIS-SDR	CrIS Science SDR: LWIR, MWIR, and SWIR bands	CrIS-SDR-GEO
TATMS	ATMS-TDR	ATMS Science TDR	ATMS-SDR-GEO
REDRO	CrIMSS-EDR	CrIMSS Atmospheric Vertical Profile (AVP) EDR	CrIMSS-EDR-GEO-TC
IIROO	CrIS-IR-OZ-Prof-IP	CrIS Infra-Red Ozone IP	CrIMSS-EDR-GEO-TC

IIROO is the only retained IP products



Intermediate Products

Data Product ID	Collection Short Name	Definition and/or Collection Long Name
GCRIO	CrIMSS-EDR-GEO-TC	EDR Geolocation
ICALI	CrIMSS-CrIS-AVMP-LOS-IR-IP	Vertical Moisture Profile at 101 levels
ICALM	CrIMSS-CrIS-AVMP-LOS-MW-IP	MW Only Vertical Moisture Profile at 101 levels
ICCCR	CrIMSS-CrIS-CLOUD-CLEARED-RAD-IP	Cloud Cleared Radiance
ICISE	CrIMSS-CrIS-IR-SURF-EMISSIVITY-IP	IR Surface Emissivity
ICMSE	CrIMSS-CrIS-MW-SURF-EMISSIVITY	MW Surface Emissivity
ICTLI	CrIMSS-CrIS-AVTP-LOS-IR-IP	Vertical Temperature profile at 101 levels
ICTLM	CrIMSS-CrIS-AVTP-LOS-MW-IP	MW Only Vertical Temperature profile at 101 levels



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Summary

- **Sounder PEATE is a NASA NPP task designed to support the Science Team and the Cal/Val activity of CrIMSS**
- **The Sounder PEATE will be “launch ready” by the end of fiscal year 2010.**
- **Thanks**