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.**

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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 1data**
- **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

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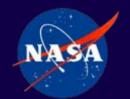Pasadena, California

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

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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

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- **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

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CrIMSS Data Products

- **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

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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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- **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**