CrIS on JPSS-2,3,4: Summary of instrument, bus, integration, and test changes

STAR JPSS Annual Meeting
08/09/2016

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Overview

• CrIS on JPSS-2,3,4 are intended to be copies of SNPP/J1 CrIS

• However, some minor changes could not be avoided, including:
  – Vendor changes
  – Part changes due to obsolescence
  – Replacement of aging test equipment

• Performance requirements have not changed
  – A robust test program is in place to verify that changes will not impact performance
Instrument Changes

• Part changes due to obsolescence include:
  – Neon lamp
  – Metrology laser
  – More details on next slide

• Vendor changes include:
  – Beamsplitter coating
    • New vendor means new coating prescription but same performance requirements
  – Power supplies
    • Again, new vendor but same performance requirements

• Changes to improve manufacturability include:
  – Detector chip size increased to improve assembly yield
    • No change to active area diameter
  – Chamfer added to lens retainer to avoid contacting singlet
    • Corrective action following discovery of chip on J1 LW singlet
Neon lamp and Metrology laser

• **Neon lamp part obsolescence resulted in search for new supplier**
  - Testing established that new lamp meets glow stability and lifetime requirements

(Generic neon lamp image)

• **Metrology laser part obsolescence resulted in search for new supplier**
  - Testing established that new laser meets requirements for wavelength, beam quality, radiation tolerance, and mission assurance.
Instrument Test Changes

- Bench test replaced by pre-environmental tvac test
- External calibration target (ECT) and control rack
  - New ECT for reduced thermal gradients
    - Details on following slide
  - New rack for better heater control, more accurate temperature sensor readout, and improved reliability
  - NIST calibration scheduled for January 2017
- Gas cart being rebuilt
  - Will correct the gas pressure readout error discovered during J1 testing
- Improvements to coregistration test setup
  - More complete FOV mapping in less time
  - Enables early detection of obscurations or defects in detector assembly
- EMI/EMC testing as well as vibration testing has been moved to Rochester facility
  - Test equipment has also been consolidated in Rochester
  - Change in location only, not a test change
ECT and ST for Instrument TVAC

• The Space Target (ST) will be unchanged from J1/SNPP

• Issues with current ECT:
  – Brightness temperature gradients across the ECT aperture exceeding 150 mK were observed during J1 testing;
  – Gradient generally increased with heater power/setpoint temperature;
  – Difference between supplemental sensor temperature readings and brightness temperature also depended on heater power.

• New ECT design:
  – Preserves current cavity design and surface treatment;
  – Adds additional temperature sensors that are better integrated with primary plate;
  – Uses temperature-controlled fluid loop rather than LN2 radiative sink to reduce transition time and minimize heater power (and gradients) at each set point.
    • Gradients are predicted to be <10mK at all temperature setpoints.
Satellite Bus and Integration Changes

• The bus provider for JPSS-2,3,4 has changed from Ball Aerospace to Orbital ATK
  – The spacecraft orientation during tvac testing will change from vertical (like at launch, as at Ball) to horizontal
  – The Earth target provider for spacecraft tvac testing will also change from Ball to Orbital ATK.
    • The space target will continue to be provided by Harris
    • Requirements for the targets are unchanged

• The ATMS scan plane will be rotated slightly in yaw relative to CrIS to provide better alignment of the geolocated footprints
  – Geolocated crosstrack scans are currently misaligned due to the combination of the different crosstrack scan rates and the satellite ground track velocity
Current and Proposed ATMS/CrIS Alignment

Current S-NPP (from Chris Barnet)

Proposed (from C-H Joseph Lyu)
J1/J2 STATUS UPDATE
JPSS-1 Test Update

• As of 7/29, the spacecraft-level TVAC test schedule is:
  – 8/8: Move spacecraft to TVAC chamber (with ATMS EDU unit)
  – 8/13: Start Open Door tests
  – 8/16: Close door and start TVAC

• TVAC expected to last 50 days

• Tests include:
  – Day-in-the-life testing
  – Jitter tests
  – Diagnostic mode data collection
  – Full spectral resolution diagnostic mode test

• Two slides describing data access follow:
  – One slides from Lisa McCormick
  – One from Leland Chemerys
Access to Test Data

• SMD data will be provided on GRAVITE for each instrument
  • Format
    • ATMS: RDR files, HDF5 wrapped CCSDS packets (.h5)
    • CERES: RDR files, HDF5 wrapped CCSDS packets (.h5)
    • CrIS: RDR files, HDF5 wrapped CCSDS packets (.h5)
    • OMPS: RDR files, HDF5 wrapped CCSDS packets (.h5)
    • VIIRS:
      • All test data: raw CCSDS format (.dat)
      • Full Swath Test data: RDR files, HDF5 wrapped CCSDS packets (.h5)
  • Frequency of data arrival
    • End of every shift (time of day not yet known)
    • BATC plans 3 shifts per 24hrs, 7days a week

• Ancillary Data (targets, event logs, etc.) provided on eRooms
  • My eRooms > Flight Integration and Test > JPSS-1 I&T > Satellite Test Ancillary Data
  • Access is Need-to-Know. BATC NDA is not required.
• BATC pushes all raw SMD and HRD data to the NASA server
• The SMD files will be processed for the science team using the DRL Satellite Telemetry Processing System (STPS) software
  – DRL is the Direct Readout Lab in GSFC building 28
• Arrival of new data triggers processing of each SMD file with the STPS software
  – STPS can generate either HDF-formatted RDRs or raw CCSDS packet files for each instrument
  – An STPS config file controls the output formats
  – An iteration may be required to generate a config file that satisfies each instrument science team
    • This task is complicated a bit by non-flight APID mappings during the ground testing.
JPSS-2 CrIS Status Update

• **Subcontractors working on major subassemblies, including:**
  – Optomechanical assembly (interferometer)
  – Telescope
  – Detectors
  – Electronic Circuit Card Assemblies

• **Major project milestone dates:**
  – 7/18/2017: Pre-environmental TVAC
    • Replaced the bench test on NPP/J1
  – 4/1/2018: Full TVAC performance testing
  – 5/3/2018: Pre-ship review