



Suomi National Polar-orbiting Partnership (NPP) NASA VIIRS Level-1 Algorithm/Software Development

Fred Patt
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Background



- The SNPP ROSES AO (November 2013) stated that “NASA... is arranging for the NASA Level-1 Suomi NPP product algorithm development...”
- Jim Gleason chartered the formation of a working group with representation from the existing VIIRS PEATEs.
 - Goal: provide a fast efficient, easy-to-maintain, VIIRS Level-1 algorithm that provides diagnostic insight and that can be adapted for time-dependent changes in the instrument.
 - Fred Patt was asked to coordinate the WG.
- Kick-off meeting was held on December 12, 2013, and meetings have continued every 2 to 3 weeks.
- Members have been added as needed.



L1ASWG Membership



- **Fred Patt (Ocean lead and overall coordinator)**
- **Vincent Chiang (VCST lead)**
- **Liam Gumley (Atmosphere lead)**
- **Gary Lin (Geolocation lead)**
- **Ed Masuoka (Land lead)**
- Sam Anderson
- Sean Bailey
- Carol Davidson
- Sadashiva Devadiga
- Gene Eplee
- Gene Feldman
- Gwyn Fireman
- Bryan Franz
- Jon Fulbright
- Alfreda Hall
- James Kuyper
- Ning Lei
- Mash Nishhama
- Chengbo Sun
- Kevin Turpie
- Jack Xiong
- Robert Wolfe
- Zhangshi Yin



Primary Objectives Defined by L1ASWG



- VIIRS Level-1 processing starting from EDOS Level-0 data feed.
- Modular, well-documented, efficient, robust, portable software, owned and maintained by NASA.
- Straightforward implementation of instrument calibration equations and support for calibration updates.
- Data product formats developed and maintained by NASA. Level-1B and Geolocation will be the standard final products.
- Separate executables and products for Level-1A, Geolocation and Level-1B.
- Reasonable granule length chosen by NASA.
 - 6 minutes was requested by the Atmosphere team and agreed to by other teams.
- Reduce number of calibrated data files (i.e., eliminate separate files for each VIIRS band).
 - One file per resolution (M-band, I-band, DNB).
 - Currently IDPS generates over 22,000 SDRs per day.



Further Objectives



- Product formats compatible with both NetCDF4 and HDF5
 - Serve the largest possible user community
- Modular calibration and geolocation software
 - Run standalone or link with existing software
- Rapid-prototyping development methodology
 - Schedule and resource constraints
- Compliance with metadata standards (ISO, CF)



Proposed Processing Strategy



- Land SIPS maintains master copies of processing software.
- EDOS pushes L0 files to Land SIPS landing zone.
- Land SIPS processes data to generate Level-1A, OBC, Geolocation and Level-1B data products and archives in LAADS.
 - LUTS provided by VCST.
- Atmosphere and Ocean SIPS pull Level-0 and/or Level-1A products from LAADS.
- LAADS acts as the official distribution site for all Level-1 data products; Atmosphere and Ocean also support distribution.
- All VIIRS SIPS process science data using NASA Level-1 products.



Accomplishments



- ATBD updates submitted in July 2014.
- Authorization to proceed from J. Gleason in October 2014.
- Data product formats developed and nearly finalized.
 - Quality flags still being worked.
- EDOS testing started in November 2014
 - Week-in-the-Life testing completed on May 19 (today!).
 - Level-1 products generated from EDOS test data.
- Build 2 software completed at end of April.
 - Capable of generating NASA product formats.
 - Accuracy verified against current IDPS products.
- Data product formats (netCDF CDL) and sample products will be posted on <ftp://samoa.gsfc.nasa.gov> in pub/VIIRSL1.



RDR-to-L0 Conversion



- In order to have a complete mission archive of Level-1A data, the existing VIIRS RDR archives held by the SIPSs need to be converted to Level-0 (EDOS PDS) format.
- The Ocean SIPS developed a utility to read an ordered list of RDR products and generate PDS files.
 - This process has been verified by comparison of results with EDOS PDSs, Level-1A processing tests and internal analysis.
- The Ocean and Land SIPS RDR archives through April 2015 have been reconciled.
- Following the commencement of routine EDOS data deliveries, a mission set of PDSs will be generated from the RDR archive and made available to the VIIRS SIPSs.



Future Milestones



- EDOS continuing data deliveries start – May 19, 2015
 - May be interrupted, e.g. for software updates.
- VIIRS Level-1 software complete – June 30, 2015
 - Further refinements will be made as needed based on testing results or to improve efficiency.
- Configuration of Level-1 software and routine production in Land SIPS – mid-August 2015.
- EDOS operational data deliveries – August 2015.
- End of RDR acquisition by SIPSs – December of 2015.



QUESTIONS?



BACKUP



Allocation of Responsibilities



- Ocean SIPS
 - L0-to-1A and OBC file processing software
 - I/O routines for other teams
 - Data product formats
 - Calibration ATBD support
- Geolocation Team
 - Geolocation ATBD updates
 - L1A-to-Geolocation processing software
- VCST
 - Calibration ATBD updates
 - L1A-to-L1B processing software
- Land SIPS
 - Data product formats
 - Software development and testing support
- Atmosphere SIPS
 - Data product formats
 - Software development and testing support



Issues, Concerns, Challenges



- Aggressive development schedule
 - Frequent, informal tag-ups to monitor progress
 - Mid-term peer review to make course corrections if needed
- Resource contention (e.g., J1 testing for VCST and Geolocation Teams)
 - Other VIIRS teams can provide additional resources if needed
- Verification of RDR data set for Level-0 retrospective archive
 - Number of granules makes comparisons difficult
 - CLASS interface makes it very tedious to determine whether they have better versions of data products
- Support for Science Team algorithm interface to / testing with NASA Level-1 products
- Need for parallel operation with both IDPS and EDOS data deliveries
 - Block 2.0 implementation schedule
- Granule period
 - Atmosphere ST members have requested 6 minutes as per CrIS/ATMS