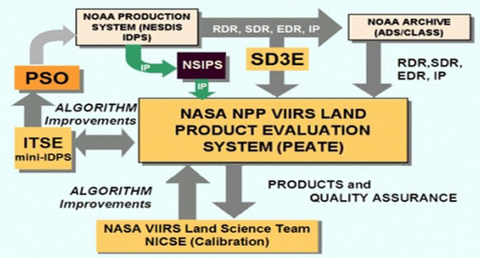
The NPP VIIRS Land PEATE

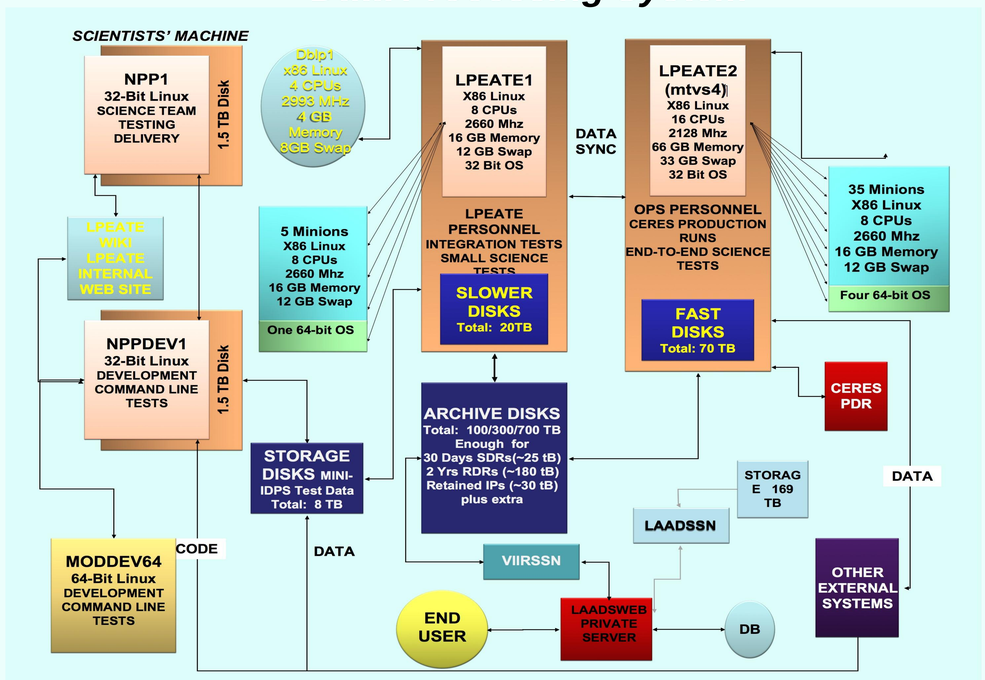
The NPOESS Preparatory Project (NPP) Science Data Segment (SDS) is based at Goddard Space Flight Center. It is the research arm for evaluation of products and algorithm improvement for NPP instruments. The Land PEATE (Land Project Evaluation and Test Element) exists to support the NPP VIIRS Land Science Team in the scientific evaluation of land data products of the Visible Infrared Imager/Radiometer Suite (VIIRS) instrument.

THE ALGORITHM EVALUATION PROCESS



The algorithm evaluation process starts with VIIRS data being furnished to the LPEATE. The LPEATE will normally furnish the Land Science Team or NICSE with those data and quality assurance information generated by the LDOPE team. If proposed algorithm improvements are given to the LPEATE, they are integrated into the system and tested. If the Science team want to submit an algorithm change to the Project Science Office, it is tested in a machine environment like that of the IDPS and the results given to the PSO, which renders a decision regarding the proposed change based on the test results and other factors relevant to the NPP/NPOESS missions, such as latency.

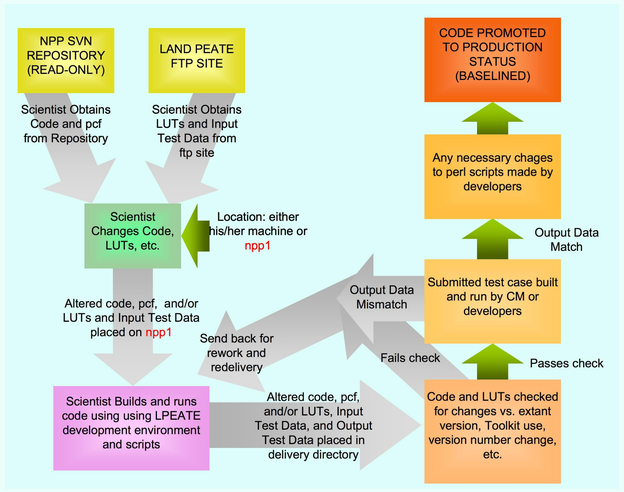
Data Processing System



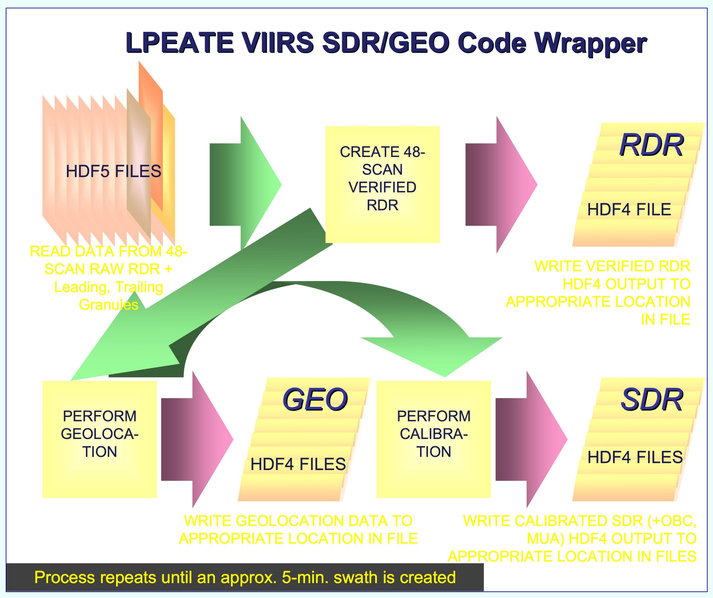
Code Integration Status

	Science Code	OPS Code V 1.5 v3A	OPS Code V 1.5 v48	LPEATE Code
Level 2 Products				
•Fire Mask	★	★	★	
•Cloud Mask	★	★	★	
•EVI and NDVI	★	★	★	
•Cld Optical Prop	★	★	★	
•Snow Cover	★	★		
•Sea Ice Char		★	★	
•Land Surface Reflectance	★	★	★	
•AOT, ASPS, SM		★		
•Land Surface Temperature		★		
•Land Surface Type		★		
•Surface Albedo		★		
L2G and Level 3 Products				
•Fire, L2G, 8, Daily L3, 8-Day L3				★
•Vegetation Indices, L2G, 16-Day L3				★
•Snow Cover L2G				★
•Land Surface Reflectance, L2G, 8-Day L3				★
•Land Surface Reflectance Daily				★
•Land Surface Temperature L2G, L3				★

Code Delivery Process



LPEATE VIIRS SDR/GEO Code Wrapper



Land Algorithm Testing

- Algorithms used in the Chain test
  - OPS version: Build1.5 v3A code from Mini-IDPS
  - LPA version: Ops code updated at Land PEATE to relax certain exclusion conditions (e.g. Surface Reflectance – retrieve when cloudy and set AOT lower limit)
- Proxy Data used in the test
  - MODIS Proxy: MODIS data mapped to VIIRS bands with MODIS geometry (one day global data for day 2002/222)
  - VIIRS Proxy: MODIS data mapped to VIIRS bands with VIIRS geometry (16 day global data for days 2003/193 – 2003/208)
- Objectives of Land PEATE Chain Test
  - Main goal is to be able to integrate the PGEs and produce expected results
  - Identify and understand the outstanding issues, communicate the issues to the science team and the algorithm developers, and confirm that the issues have been addressed.
  - We know that most of the algorithm updates are not included in this build

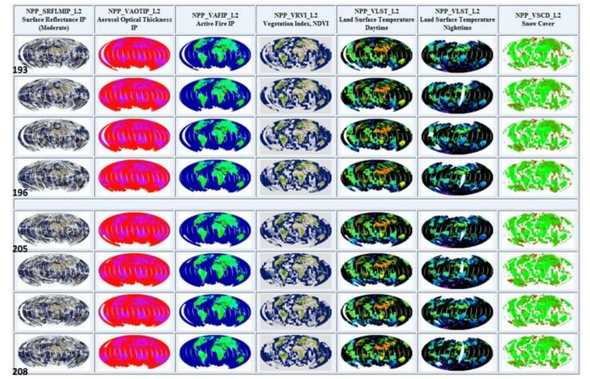
Land 51-Day Chain Test

- 51 days of Level 2, Level 3, and DDR data produced using proxy data
- Level 2 data and Level 3 data (Daily Surface Reflectance only) – OPS Version 1.5.0.25.2 with some Land PEATE adjustments
- Purpose: exercise new machine; produce enough data to test gridding algorithm functionality
- Processing completed Sept. 15 at a rate of 8X
- Data volume: 101 Tb including proxy SDRs

Web Resources

LPEATE WiKi:
https://modx.nascom.nasa.gov:10283
LPEATE Internal Website: https://modx.nascom.nasa.gov:10283/
NPP/VIIRS LDOPE Site: http://landweb.nascom.nasa.gov/NPP

Global Browses: Global browse images of the coarse resolution xDRs are generated with fixed contrast stretching and color look-up tables to enable consistent temporal comparison.

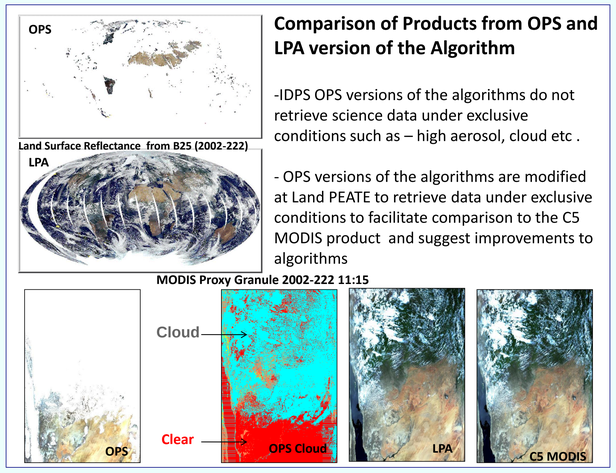


Global browse images of daily EDRS/IPs from the 51-day Test (2003/170 – 2003/222)

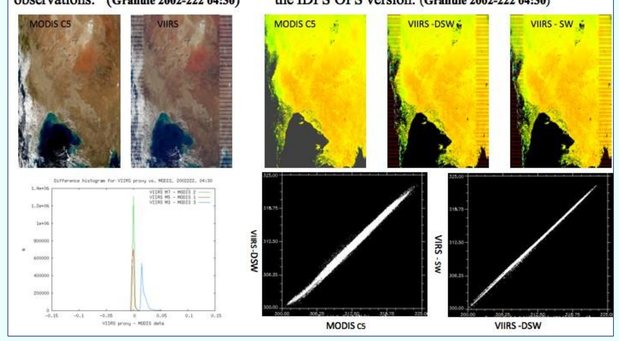
Comparison of Products from OPS and LPA version of the Algorithm

-IDPS OPS versions of the algorithms do not retrieve science data under exclusive conditions such as – high aerosol, cloud etc .

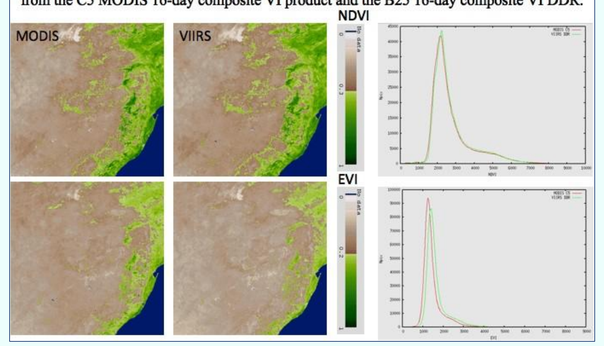
- OPS versions of the algorithms are modified at Land PEATE to retrieve data under exclusive conditions to facilitate comparison to the C5 MODIS product and suggest improvements to algorithms



- Following example shows analysis of LSR by computing the histogram of difference where the pixel level difference in retrieved reflectance between the MODIS and VIIRS LSR product are computed for good quality observations. **(Granule 2002-222 04:30)**
- Following example shows analysis of LST by computing the 2D scatter plot. The plot on the left shows the correlation of LST retrieved from MOIDS and VIIRS. The plot on the right shows the correlation of LST retrieved by the main dual split window and the back-up split window algorithm in the IDPS OPS version. **(Granule 2002-222 04:30)**



Evaluation Using Diagnostic Data Records (DDRs): DDRs are VIIRS equivalent of the daily and n-day MODIS gridded products generated from VIIRS L2 xDRs. The MODIS C5(C6) algorithms are modified to read the VIIRS xDRs with proper mapping of the spectral bands and the associated QA flags. The DDRs will be of same resolution and tile size as the MODIS C5 products. Following example shows histogram of NDVI and EVI from the C5 MODIS 16-day composite VI product and the B25 16-day composite VI DDR.



Robert Wolfe, Edward Masuoka

NASA GSFC

Carol Davidson, Gang Ye, Sadashiva Devadiga

Sigma Space Corporation