



STAR JPSS EDR Overview

Name of the Product: Surface Type EDR

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Outline



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- Summary and Path Forward (2 slides)



Algorithm Cal/Val Team Members



PI	Organization	Team Members	Roles and Responsibilities
Xiwu Zhan	NOAA/STAR		Surface type EDR team lead, user outreach
	UMD/Geography	Chengquan Huang	Algorithm development lead
	UMD/Geography	Rui Zhang	Algorithm development, validation, user readiness
	UMD/Geography	Huiran Jin	Validation
	STAR/AIT	Marina Tsidulko	Product delivery



S-NPP Product Overview

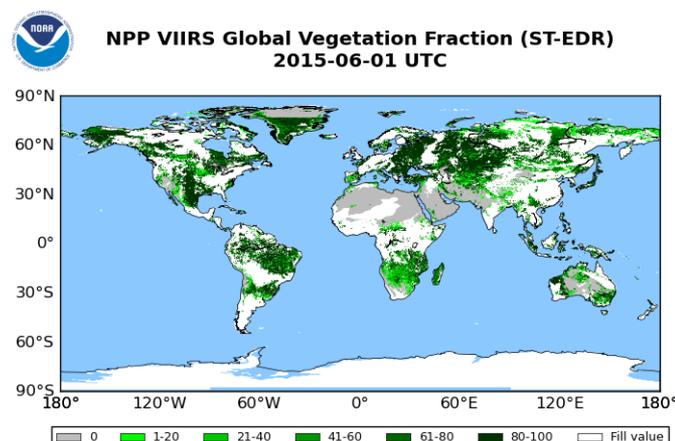
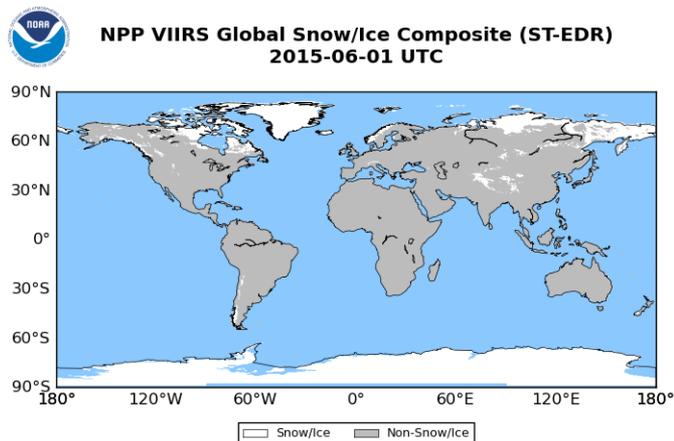
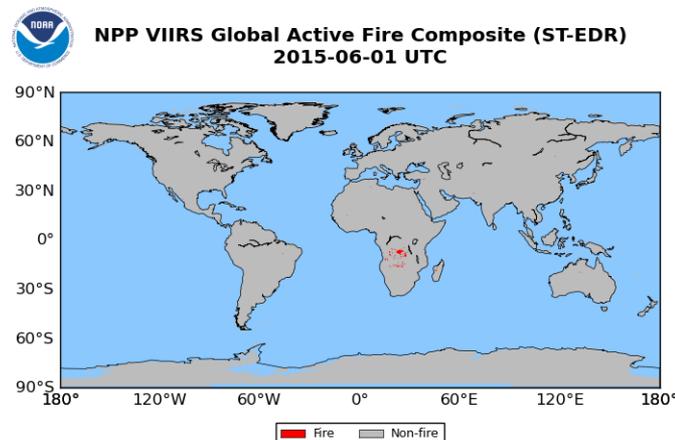
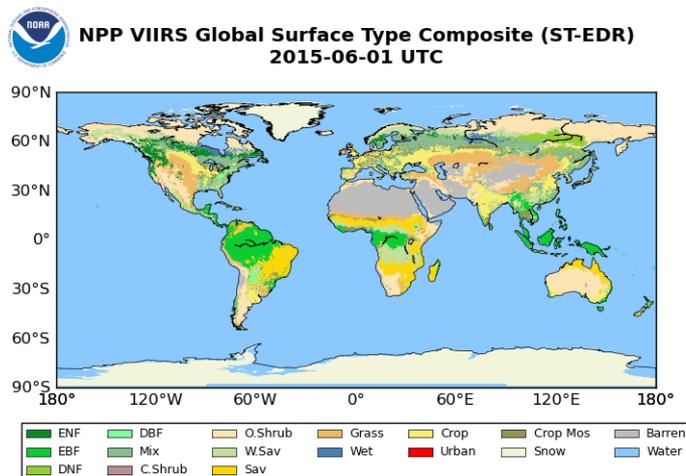


- List of Product(s) and L1RD Requirements Table(s)

Attribute	Threshold	Objective
Geographic coverage	Global	Global
Vertical Coverage		
Vertical Cell Size	N/A	N/A
Horizontal Cell Size	1 km at nadir	1 km at edge of scan
Mapping Uncertainty	5 km	1 km
Measurement Range	17 IGBP classes	17 IGBP classes
Measurement Accuracy	70% correct for 17 types	70% correct for 17 types
Measurement Precision	10%	10%
Measurement Uncertainty		

- S-NPP Cal/Val Status
 - Reached validated 2 maturity stage
 - No known deficiencies

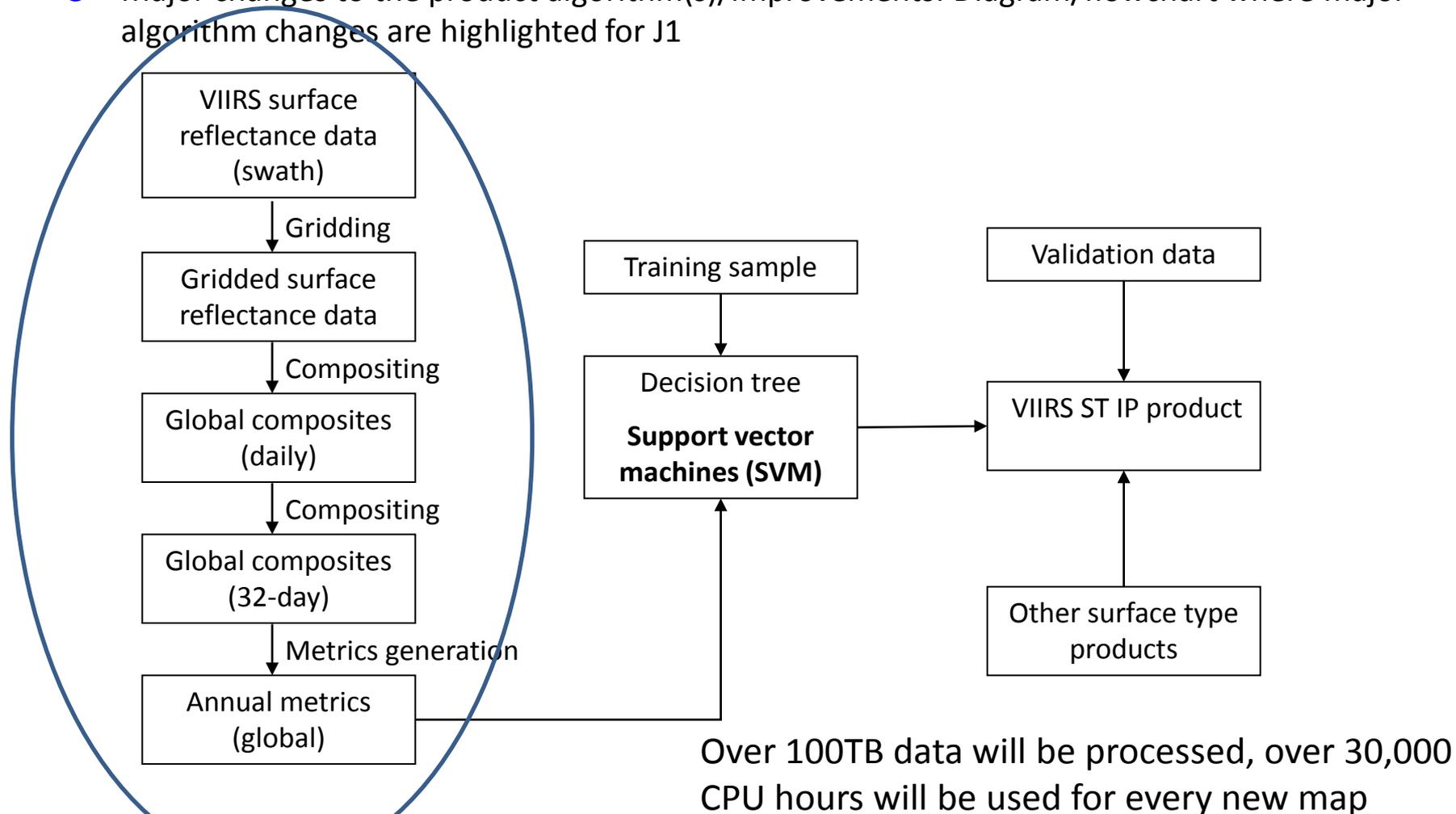
- LTM: Monitoring website links for the data product(s)
 - http://www.star.nesdis.noaa.gov/jpss/EDRs/products_surfacetype.php (in prep)



Daily global surface type, active fire, snow/ice and vegetation fraction maps are composited from the ST-EDR data for the long term monitoring

- J1 Algorithm Summary

- Major changes to the product algorithm(s)/Improvements: Diagram/flowchart where major algorithm changes are highlighted for J1



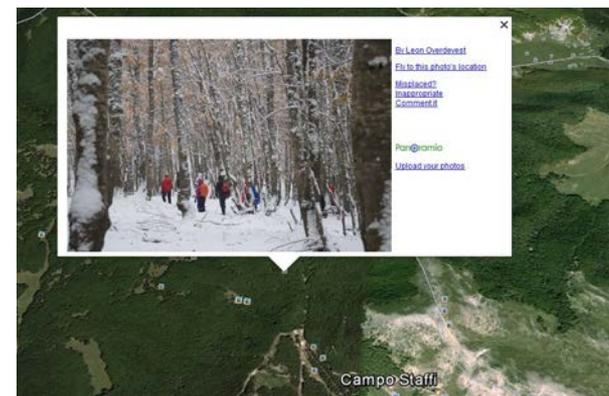
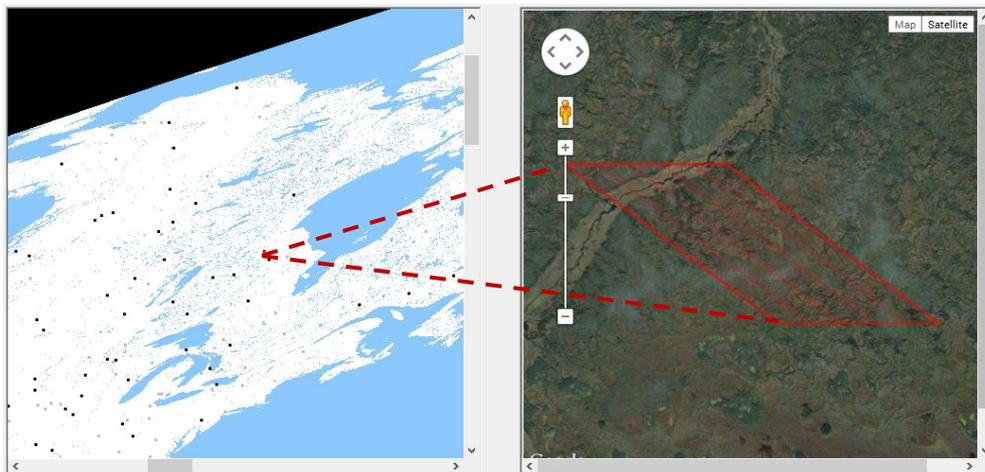


JPSS-1 Readiness

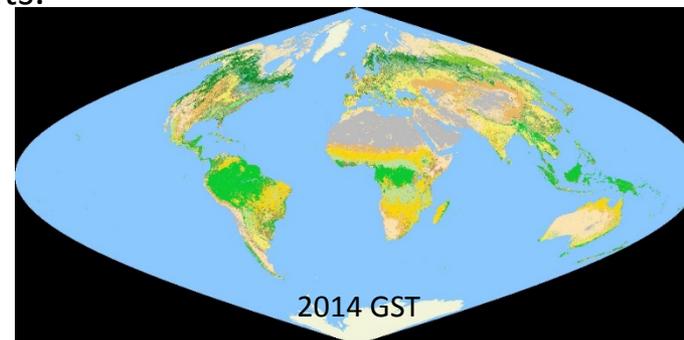
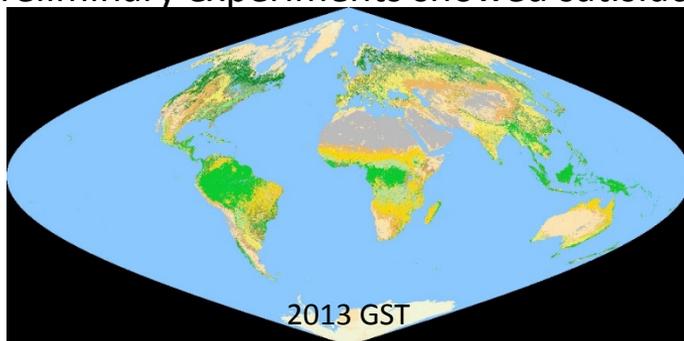


- J1 Cal/Val Overview
 - Timelines for Beta, Provisional and Validated Maturity
 - Beta: Launch (L) + 6 months (m) for ST-EDR with S-NPP proxy
L+18months for GST using J-1 data
 - Provisional: L+9months for ST-EDR with S-NPP proxy
L+21m for GST using J-1 data
 - Validated: L+12m for ST-EDR with S-NPP proxy
L+24m for GST using J-1 data
 - Pre-Launch Calibration/Validation Plans
 - S-NPP and MODIS will be used as the proxy data in the pre-launch phase
 - Support Vector Machines (SVM) will replace C5.0 as the main classification algorithm. Evaluations and comparisons will be conducted.
 - Improve the validation tool, refine validation points sampling strategy
 - Post-Launch Calibration/Validation Plans
 - Earth orbit surface reflectance data will be checked.
 - Intensive validation using the interactive validation tool.
 - Collect more representative samples for product refinement
 - Long term monitoring

- Major Accomplishments and Highlights Moving Towards J1
 - Interactive validation tool has been developed, and a comprehensive validation has been conducted on the S-NPP GST. Error matrix and overall accuracy suggested the product accuracy exceeds the requirement of the J1RD. The ST-EDR reached the validated 1 maturity.



- New SVM classification algorithm has been used in the production of 2013 and 2014 S-NPP GST. Preliminary experiments showed satisfactory results.





JPSS-1 Readiness



- Issues/Mitigation
 - No major issues.
 - Lack of computing resources for archiving gridded surface reflectance data is limiting the capability of the surface type science team to use multi-year data for the classification. Since the production of GST requires at least one full year global VIIRS surface reflectance data for the classification metrics, multi-terabytes have to be stored locally. Leveraging other teams' efforts on global daily VIIRS data processing is also limited the data downlinks between different team. Therefore, the surface type team computing resources may become a concern in the JPSS era.



JPSS-1 Readiness



- Stake Holder Interactions, Users and Impact Assessment Plans
 - Downstream product users:
 - Land surface temperature. LST check GST to determine proper ground type for accurate parameters in a LUT.
 - Cloud mask, aerosol products, other products require global land/water location information. General surface types separations are required by many algorithms and products.
 - National Center for Environmental Prediction (NCEP) in NOAA/NESDIS – point of contact: Dr. Mike Ek will be a major internal user for this product.
 - Production system user:
 - IDPS relies on Master Land Index (MLI) tiles to perform all Grid/Gran productions. The MLI tiles are created with the GST-Land/Water Mask, which is generated and maintained by the ST-EDR team. The GIP_GSTLWM_TILE update necessitates an update to the IDPS MLI tiles, which has high impact to the whole production system.
 - Science community users:
 - land surface parameterization (Feddema 2005, *Science* 310 (5754): 1674–78),
 - modeling of biogeochemical cycles (Cramer et al. 1999, *Global Change Biology* 5 (S1): 1–15),
 - carbon cycle studies (Friedlingstein et al. 2006, *Journal of Climate* 19 (14): 3337–53).



Summary & Path Forward



- Summary
 - S-NPP GST and ST-EDR have been successfully validated. The results suggested that the ST-EDR meets the accuracy requirement defined in the J1RD.
 - Validation protocol has been successfully established, including validation dataset, validation tool, and accuracy reporting approaches.
 - New classification algorithm SVM has been successfully tested, and preliminary results showed promising improvements. The SVM will replace the C5.0 decision tree in future data productions.
 - Long term monitoring for the ST-EDR has been created. Daily composited surface type, active fire (quality flag bit, provided by Active fire ARP), snow/ice (quality flag bit, provided by Snow EDR), and vegetation fraction (calculated from annual maximum minimum data and surface reflectance input) have been generated and posted into the LTM website.



Summary & Path Forward



- Path Forward
 - FY16 Milestones
 - Comparison of results from S-NPP VIIRS surface type EDR with other existing surface type products.
 - Improvement of the training samples and validation points, which are collected globally and incrementally.
 - delivery of a VIIRS global gridded surface type (GST) product based on 2012-2015 S-NPP VIIRS observations.
 - J2 and Beyond: Future Improvements
 - Better compositing algorithm to the data preparation, use multiple year data to stabilize the unnecessary annual variabilities.
 - Post-classification improvements, introduce more external data and product sources to improve the accuracy of the GST and ST-EDR
 - Different classification legend to better serve the users, such as Biome classification type.
 - More useful dataset or flags to be included into the ST-EDR, such as dynamic water information, which will be invaluable for flood monitoring.