



Joint Polar Satellite System (JPSS) Requirements Evolution:

*Supporting Weather, Oceanic and Climatic Prediction
through an Enhanced Program Baseline*

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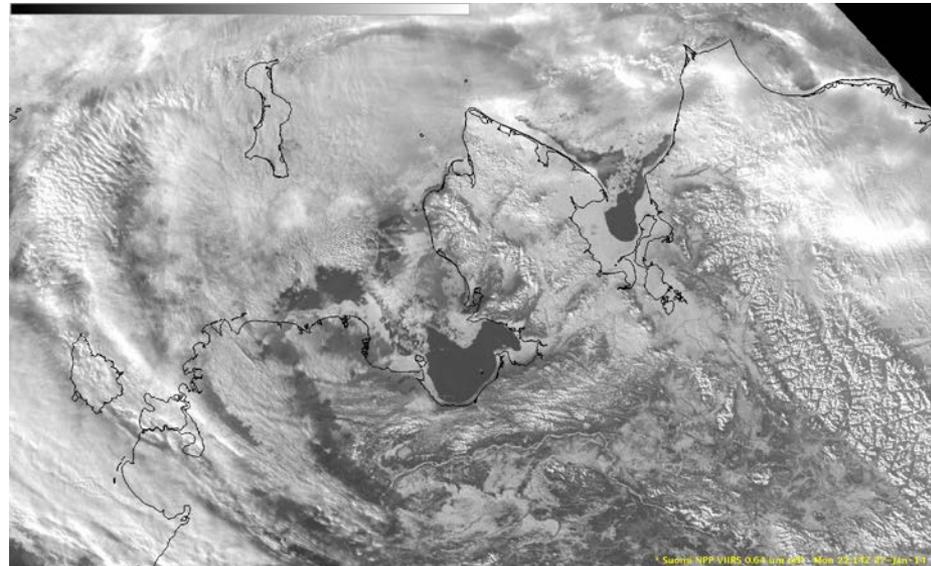


Importance of JPSS Product Requirements



JPSS provides essential data for all Line Office mission goals within NOAA

- The JPSS program directly supports:
 - Continuity of observations to support NOAA Operational Monitoring and Forecasting in the atmosphere and ocean.
 - Imagery for critical events that directly impact the public, especially in polar regions and Alaska.
 - Climate monitoring and prediction through sustained, high-resolution measurements of the atmosphere and earth surface.

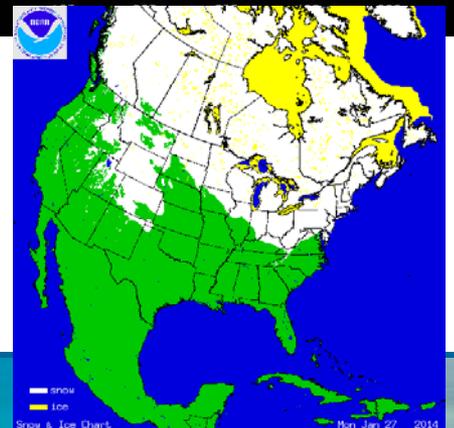
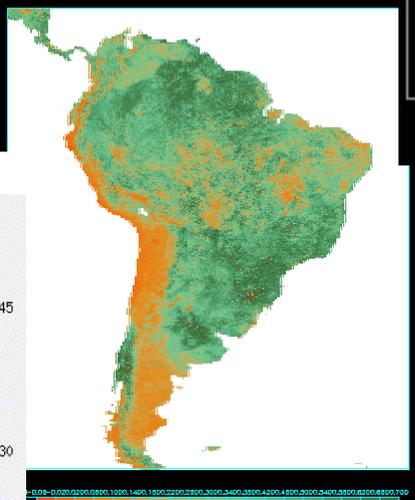
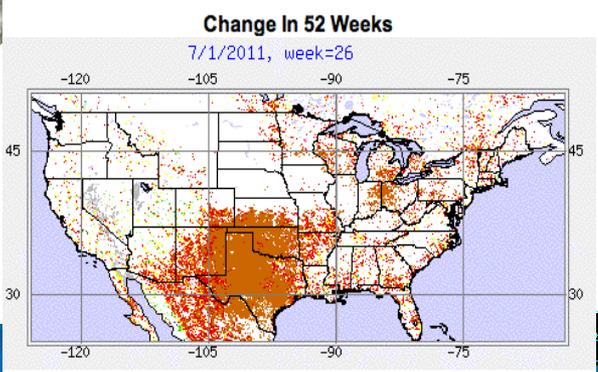
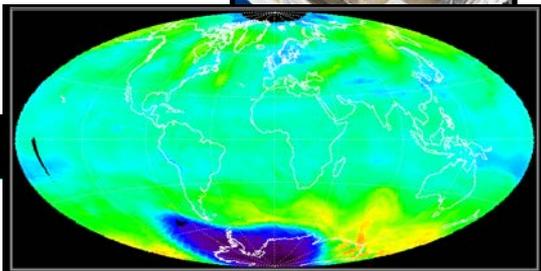
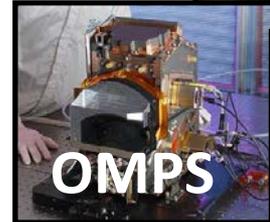


Supersat NPP VIIRS 0.64 km 2014 Mon 22 13:27:47 Jan 31
Courtesy CIMSS Satellite Blog, 27 January 2014

Supporting Climate Change and Mitigation



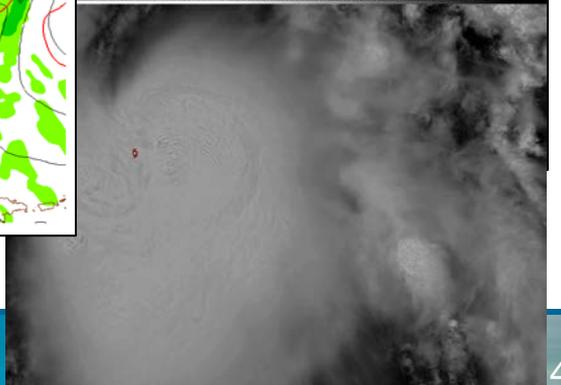
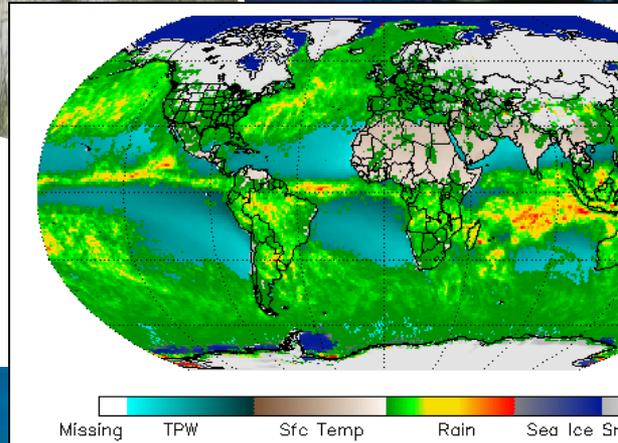
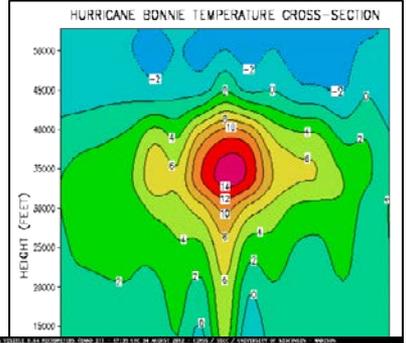
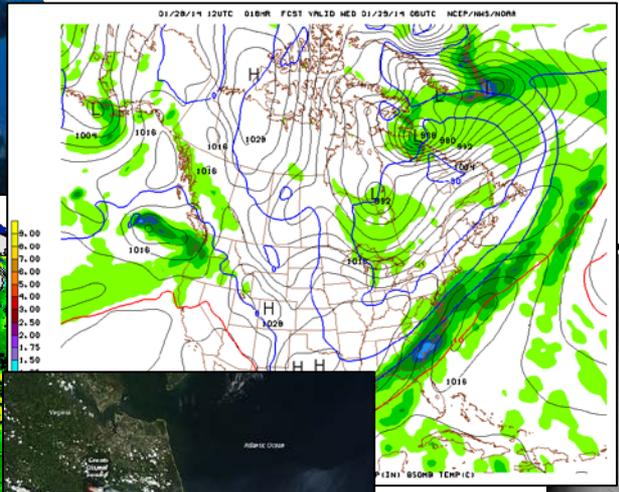
1. Assessments of **current and future states of the climate** system that identify potential impacts and inform science, service and stewardship decisions.
2. **Mitigation and adaptation efforts** supported by sustainable, reliable and timely climate services.
3. Improved scientific **understanding of the changing climate system**



Supporting Weather Ready Nation



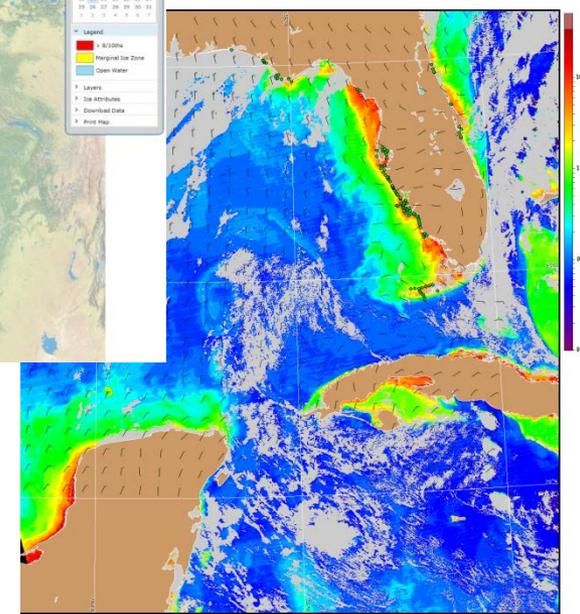
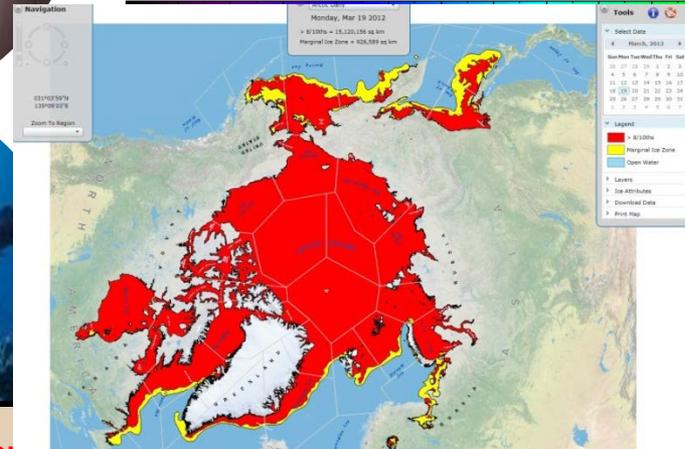
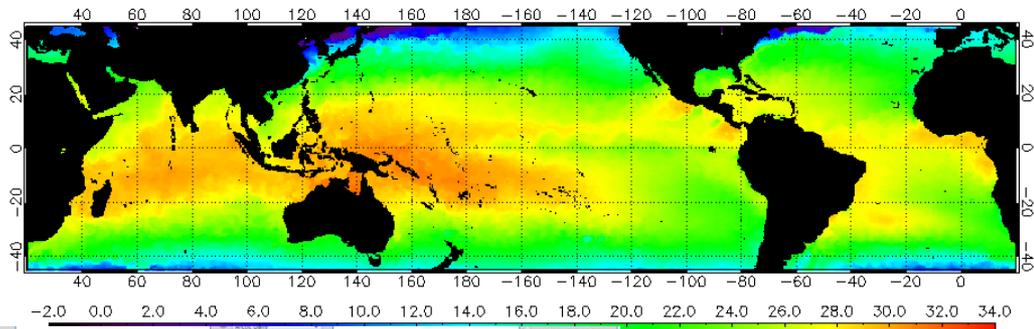
1. **Reduced loss of life, property and disruption** from high-impact events.
2. More productive and efficient economy through relevant **environmental information**.
3. Healthy people and communities due to improved **air and water quality services**.
4. Improved **transportation** efficiency and safety.



Supporting Resilient Coastal Communities and Economies



NOAA/NESDIS 50 km Nighttime Sea Surface Temperature (deg C), 1/27/2014

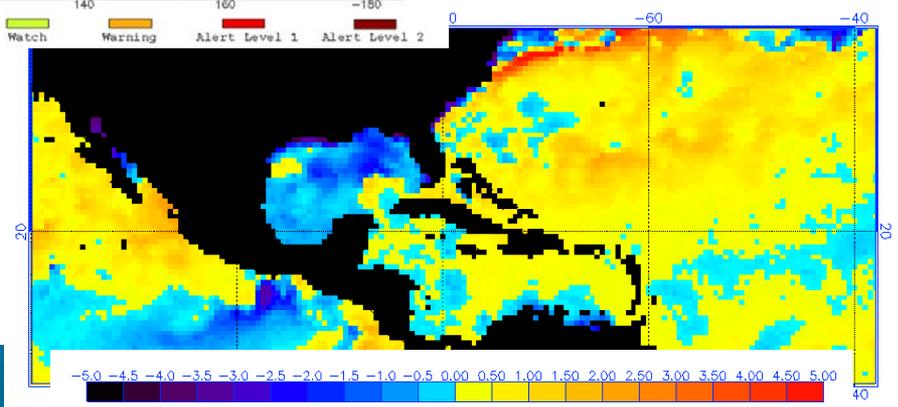
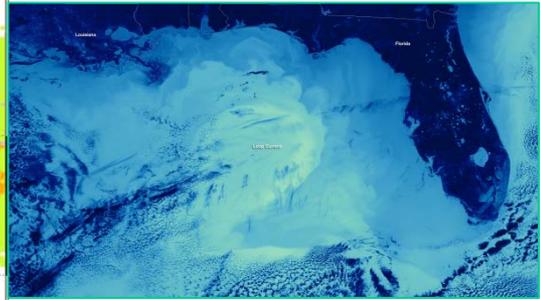
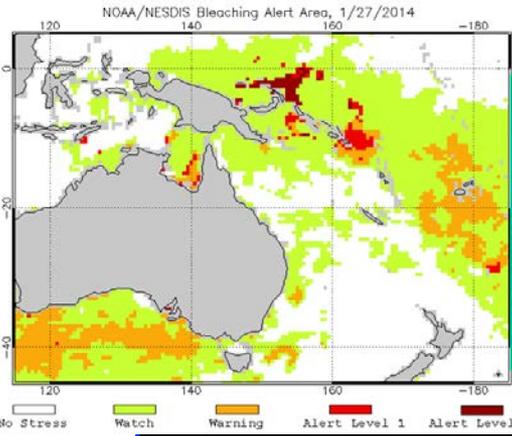
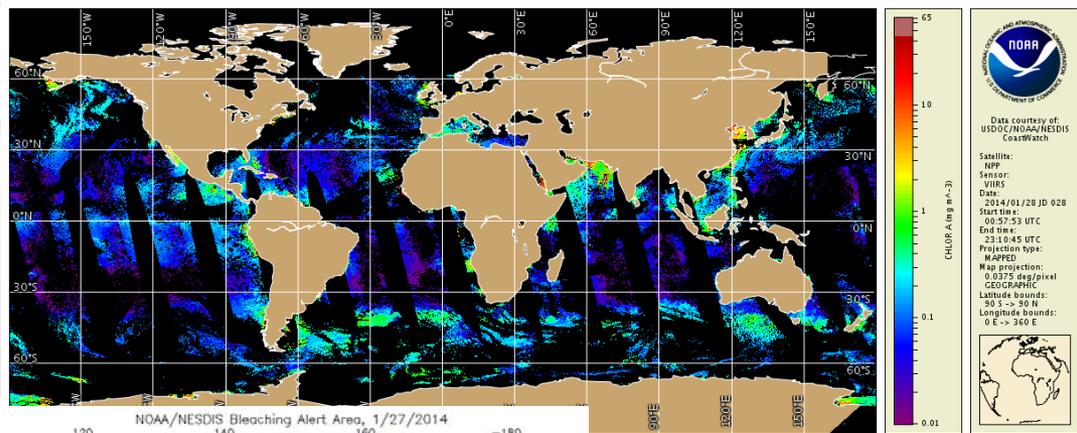


1. Improved **coastal water quality** supporting human health and coastal ecosystem services.
2. Safe, environmentally sound **Arctic access** and resource management.
3. **Coastal communities that can adapt** to the impacts of hazards and climate change.

Supporting Healthy Oceans



1. Improved **understanding of ecosystems** to inform resource management decisions.



JPSS Requirement Scrub Activities



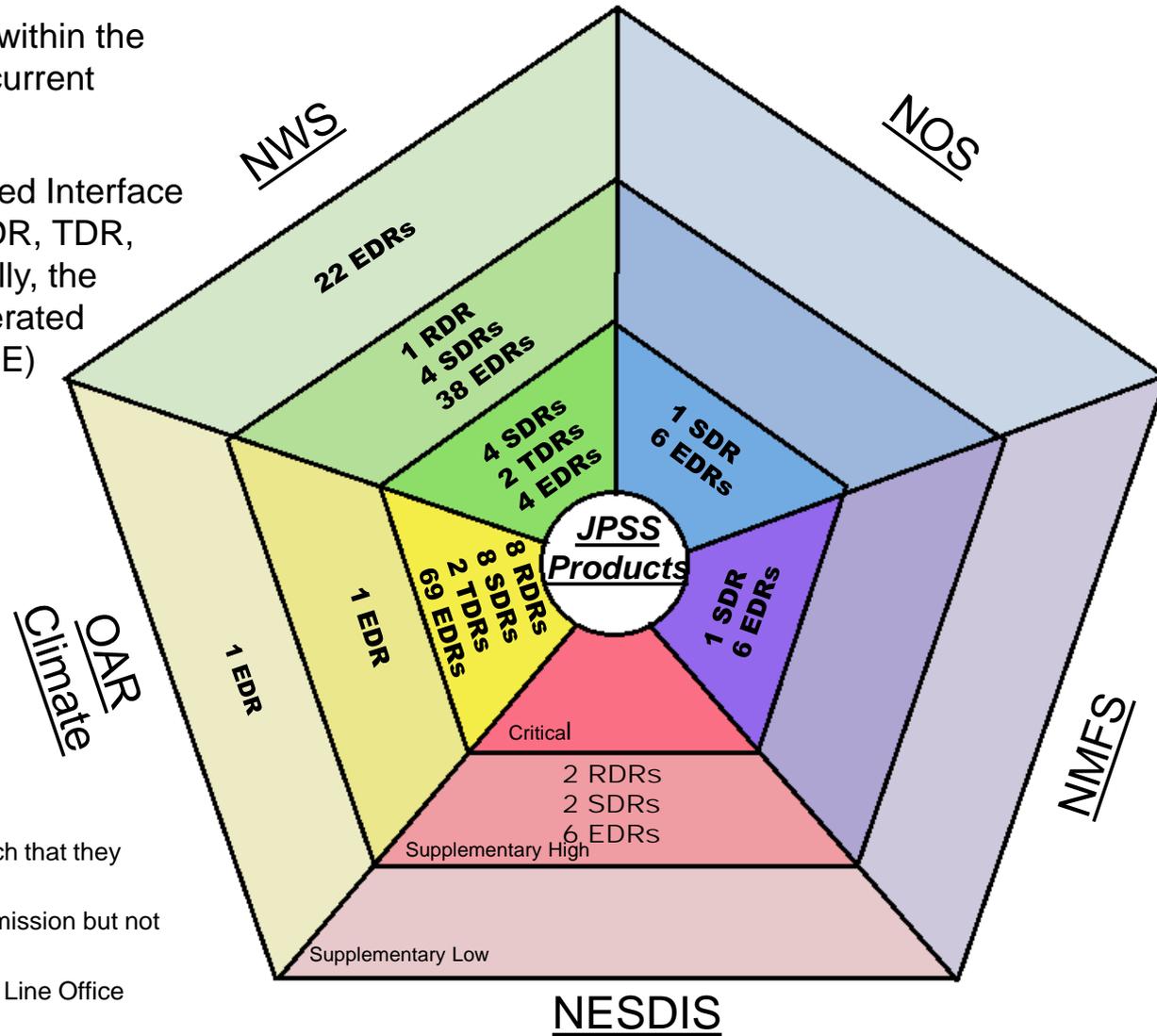
Is JPSS working the right path for the next generation polar-orbiting satellite system? What are the key polar products for the NOAA users and are we procuring them?

- The Program must first define mission priorities and success criteria—redefined Key Performance Parameters (KPPs).
- Generate a new Level 1 Requirements Document (L1RD), Supplement (L1RD-S) and Program Implementation Document (PID).
- The need to characterize and understand both product generation systems, the inherited Interface Data Processing Segment (IDPS) and the legacy NPP Data Exploitation (NDE).
- Assess how each NOAA line office uses or plans to use JPSS data and how the loss of a data type would affect the LO's operational and research efforts.
- The L1RD-S product science specification attributes need to be scrubbed to reflect accurate and attainable threshold requirements.

Low-earth Orbiting Requirements Working Group (LORWG) JPSS Priorities



- JPSS engaged all NOAA line offices within the LORWG to review and prioritize the current JPSS product suite by its mission.
- The product suite includes the inherited Interface Data Processing Segment (IDPS) RDR, TDR, SDR and some EDR data. Additionally, the NOAA Unique Products (NUPs) generated within the NPP Data Exploitation (NDE) and the Environmental Satellite Processing Center (ESPC).
- Product latency requirements were also evaluated by each line office.



Definitions-

RDR = Raw Data Record

SDR = Sensor Data Record

TDR = Temperature Data Record

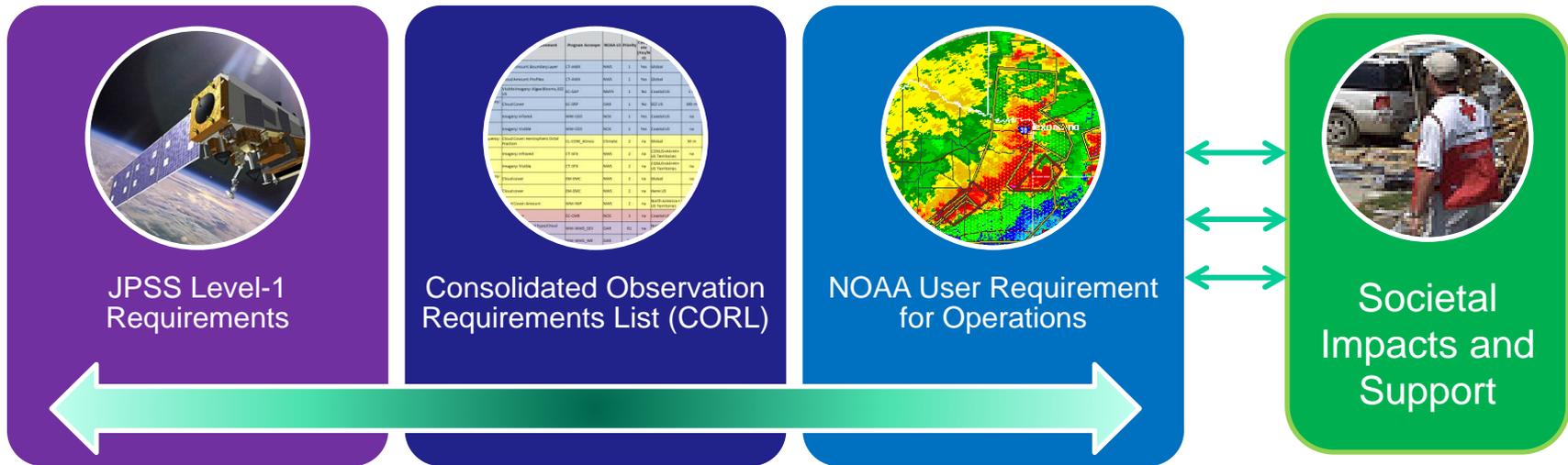
EDR = Environmental Data Record

Critical: Product vital to the Line Office's mission such that they cannot operate without it

Supplementary High: Important to the Line Office's mission but not required for critical functions

Supplementary Low: Requested of JPSS to achieve Line Office objectives but not required

JPSS Product Traceability to the CORL



JPSS traces these and other product requirements directly to the user community, employing vetted processes to make this connection. This procedure is as follows:

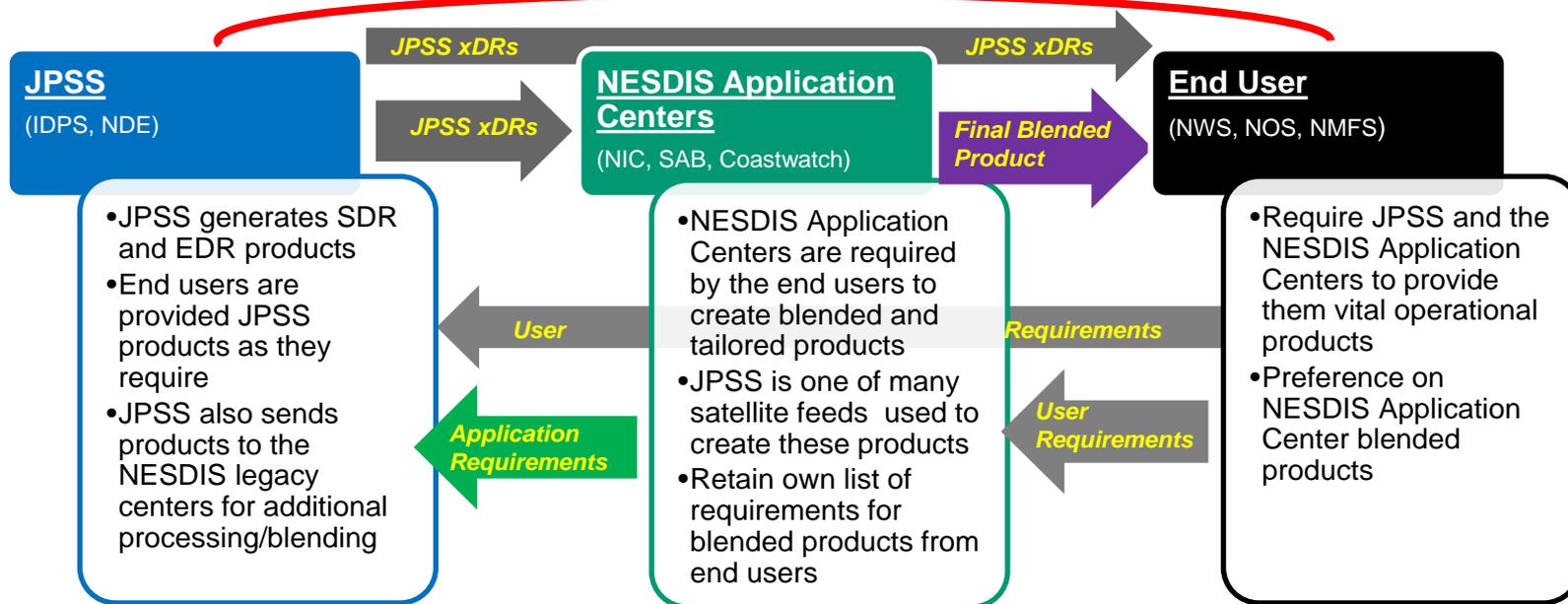
1. NOAA users (through their respective Line Office) formally request products through the NOAA Observing Systems Council (NOSC), having proven and vetted the product validity internally and tied it to specific societal impacts.
2. The NOSC allows the requirement to enter the NOAA-wide Consolidated Observation Requirements List (CORL) where it is then allocated to ANY platform or observational tool which can fulfill it.
3. JPSS is allocated requirements that it can fulfill from the CORL, which it is required to meet.
4. JPSS then engaged the Low-earth Orbiting Requirements Working Group (LORWG) to vet the current JPSS product list and rank their level of criticality to each Line Office. All feedback from the LORWG was tied directly to the JPSS allocation from the CORL.

NESDIS Application Requirements



- NESDIS Application Centers include the National Ice Center (NIC), Satellite Analysis Branch (SAB), and legacy processing hub CoastWatch and they rely on multiple satellite data feeds and internal models to create final, end-user required products such as:
 - Ocean Color, Sea Ice Concentration, Volcanic Ash to name a few from JPSS
- JPSS is a vital source of data to these Application Centers, though not the only one
- The Application Centers maintain a suite of products required by the end user
 - Application Centers must understand their required input files to maintain their product suite, and which are required of upstream providers like JPSS

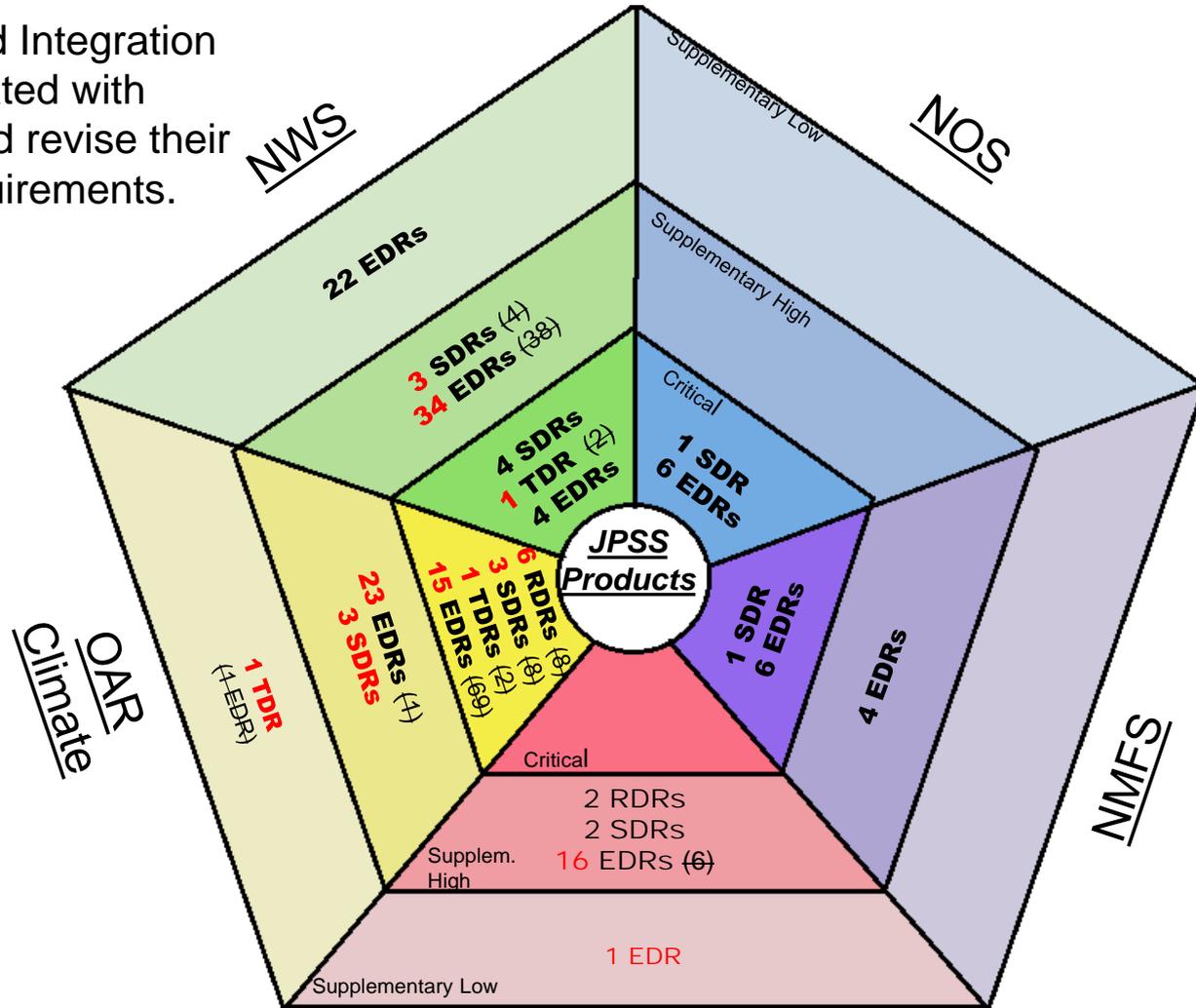
Traceability from JPSS to CORL via Application Centers



Updated JPSS Level 1 Science Requirements (1/16/14)



- NOAA Technology, Planning and Integration for Observation (TPIO) coordinated with each Line Office to reconcile and revise their previously stated JPSS L1 Requirements.
- All JPSS user requirements are **now consistent with the CORL and verified** through the NOAA Observing Systems Council (NOSC).
- The JPSS L1 Requirements are currently being updated to reflect these updates—it is expected that some of the priorities will change in the lower level products.



Definitions-

- RDR = Raw Data Record
- SDR = Sensor Data Record
- TDR = Temperature Data Record
- EDR = Environmental Data Record

NESDIS Application Requirements

Reviewing the JPSS Baseline



- JPSS evaluates Configuration Change Requests (CCRs) to the product suite to reduce costs and streamline the product processing systems, including those submitted by the science teams and user community.

NOAA JPSS Configuration Change Request		CCR #:
		<i>For NJO CMO Use Only – Leave Blank</i>
1. Description/Title:	Date Submitted:	
2. Sponsor:	E-mail:	
	Telephone:	
3. Priority: High <input type="checkbox"/> Normal <input type="checkbox"/> Low <input type="checkbox"/>		
4. Related CCRs:		
5. Related Change Proposals:		
6. Document affected:	Document ID:	
7. Problem:		
8. Proposed Solution:		
9. Impact Statement:		
10. Affected Organizations:		

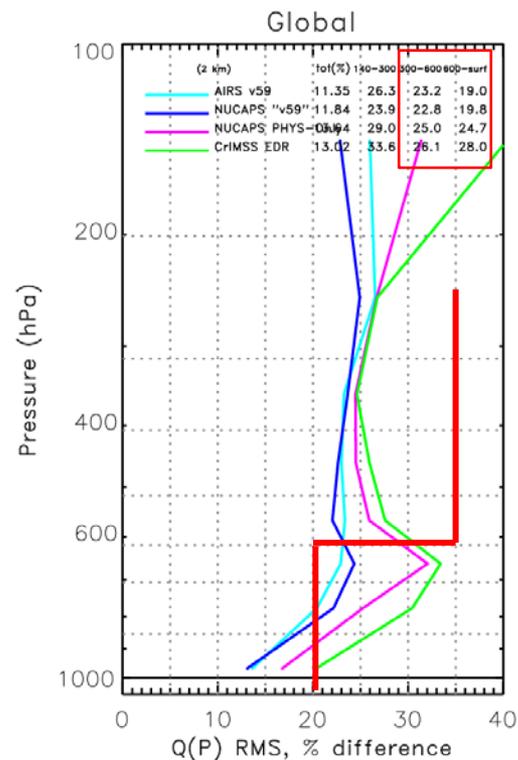
Updated 7/15/2013

- Program System Engineering then evaluates the CCR for impact to system and whether or not to recommend the change. PSE specifically looks at the following categories:
 - Cost Impact
 - Schedule Impact
 - Latency Impact
 - Attribute Performance
 - Legacy Continuity
 - Product Assurance/Risk
 - Validation Maturity
 - User Preference
 - User Readiness
 - Product Interdependency
 - Transportability
 - Maintenance Impact
 - Evolution Potential
 - Direct Readout Support
 - Instrument Development Support
 - Data Availability

Past and Current CCRs



- JPSS is evaluating CCRs for four duplicative products in both IDPS and NDE, in an effort to reduce costs:
 1. The Program evaluated and approved a CCR to reallocate sole generation responsibility for the CrIS/ATMS Temperature and Moisture Soundings products to NOAA legacy implementation, the NOAA Unique CrIS/ATMS Product Suite (NUCAPS)
 - NUCAPS performed better than the IDPS product
 - No NOAA operational or research users were found for the IDPS product, only for NUCAPS
 - JPSS obtained substantial cost savings with this decision
 2. Two additional CCRs on Sea Surface Temperature (SST) and Ocean Color are currently being drafted in response to science oversight review of the IDPS EDR products.
- JPSS Program Science has funded a risk reduction project to update current NOAA legacy enterprise algorithms to utilize NPP data, resulting a product suite duplication of 85%.
- A broad reallocation strategy for most of the EDR generation to NDE is being considered by the JPSS Program.



Key:

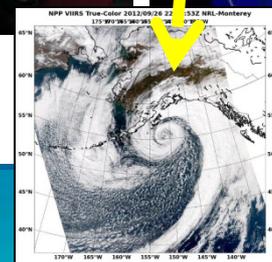
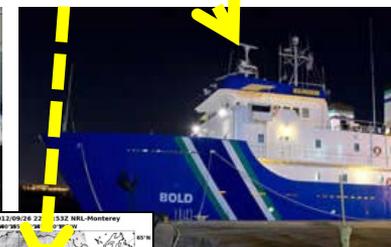
- AIRS/AMSU v5.9 (Cyan)
- AIRS v5, ccorrection for instrument changes
- NUCAPS "v5.9" (Blue)
- CrIS/ATMS, retrieval methodology of AIRS v5.9
- NUCAPS PHYS-only (Pink)
- No statistical operators
- CrIMSS-EDR (Green)
- All changes installed, Mx7.1 (May 2013) build

Future Work

JPSS is working to ensure development and process consistency across its product generation systems by working closely with the user community and leveraging NOAA legacy work.

Continued work includes:

- Revised L1RD priorities consistent with the CORL, though no high level changes are anticipated
- Consistent software development standards, documentation requirements and algorithm change processes across all systems
- User feedback on required level of validation for each product and revised requirements
- One clear process is in place for future product enhancements and additions, likely based on NOAA heritage process (SPSRB)



Continuing Algorithm Activities



- JPSS is working with the NOAA users across all line offices to document current and planned algorithm use of JPSS products such that:
 - Calibration and validation activities are better aligned with user timelines with the expected resulting in cost savings.
 - Products with no users can be eliminated.
- JPSS is evaluating the cost of algorithm implementation/integration, operations, and sustainment in both JPSS product generation systems (IDPS and NDE):
 - Time of integration, level of effort required and user risk acceptance are all being considered
 - A broad reallocation of most, or all, of the EDR generation to NDE is being evaluated