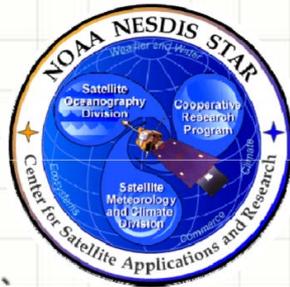




# ***THE AIT PROCESS SUPPORTING VIIRS***

**BIGYANI DAS**



---

**Bigyani Das<sup>1</sup>, Marina Tsidulko<sup>1</sup>, Weizhong Chen<sup>1</sup>,  
Qiang Zhao<sup>1</sup>, Valerie Mikles<sup>1</sup>, Walter Wolf<sup>2</sup>**

**<sup>1</sup>IMSG, Rockville, MD 20852, USA**

**<sup>2</sup>NOAA/NESDIS/STAR, College Park, MD 20740, USA**

STAR JPSS 2015 Annual Science Team Meeting  
NCWCP, College Park, MD, USA  
August 26, 2015

# Overview

---

1

- AIT and POCs for VIIRS Algorithms

2

- ADL Framework

3

- Testing and Troubleshooting

4

- Communication

5

- Quality Check & Reviews

# Algorithm Integration Team (AIT)

---

**AIT:** JPSS STAR Algorithm Integration Team (From 2012)

**Government Lead:** Walter Wolf

**Team Members:** Bigyani Das, Valerie Mikles, Marina Tsidulko, Weizhong Chen, Qiang Zhao, Vipuli Dharmawardane, Kristina Sprietzer, Yunhui Zhao, Mike Wilson

**Primary Responsibilities:** Support JPSS Mission in Science Transition to Operations

## **Strengths:**

- Degrees in Physical Sciences, Mathematics, Engineering
- Years of Experience in Programming in Fortran, C, C++
- Better Understanding of Science
- Years of Experience in Documentation, Communication, Programming, Presentation Skills, Manuscript Preparation, Results Analysis

# Role of STAR AIT

---

- Code Testing in Algorithm Development Library (ADL)
- Troubleshooting
- Code Integration
- Algorithm Package Preparation and Delivery
- Communication with Science Teams, DPES and Raytheon
- Attending Science Team Meetings
- Reviewing ATBD and OAD and Other Documents
- Consultancy to Science Teams
- Emulation of Various Operational Scenarios
- Code Research and Analysis and Result Analysis
- Lead Algorithm Lifecycle Reviews

# AIT POCs for VIIRS Algorithms

Algorithm	POC	Backup POC
VIIRS SDR	Weizhong Chen	Qiang Zhao, Bigyani Das
VIIRS EDR - Cryosphere	Marina Tsidulko	Bigyani Das
VIIRS EDR - Imagery	Marina Tsidulko	Bigyani Das
VIIRS EDR – Active Fire (AF)	Marina Tsidulko	Qiang Zhao, Bigyani Das
VIIRS EDR – NDVI	Qiang Zhao	Bigyani Das, Marina Tsidulko
VIIRS EDR – Surface Reflectance	Qiang Zhao	Marina Tsidulko, Bigyani Das
VIIRS EDR – Cloud Mask	Weizhong Chen	Bigyani Das
VIIRS EDR – Cloud Products	Weizhong Chen	Bigyani Das
VIIRS EDR - Aerosol	Bigyani Das	Weizhong Chen
VIIRS EDR - LAND	Qiang Zhao	Marina Tsidulko
Requirements, Reviews, Quality Checks, Documents	Valerie Mikles	Algorithm POCs
Software Installation/Maintenance	Weizhong Chen	Algorithm POCs
ADL Chain Run	Weizhong Chen	Algorithm POCs

# ADL Framework

---

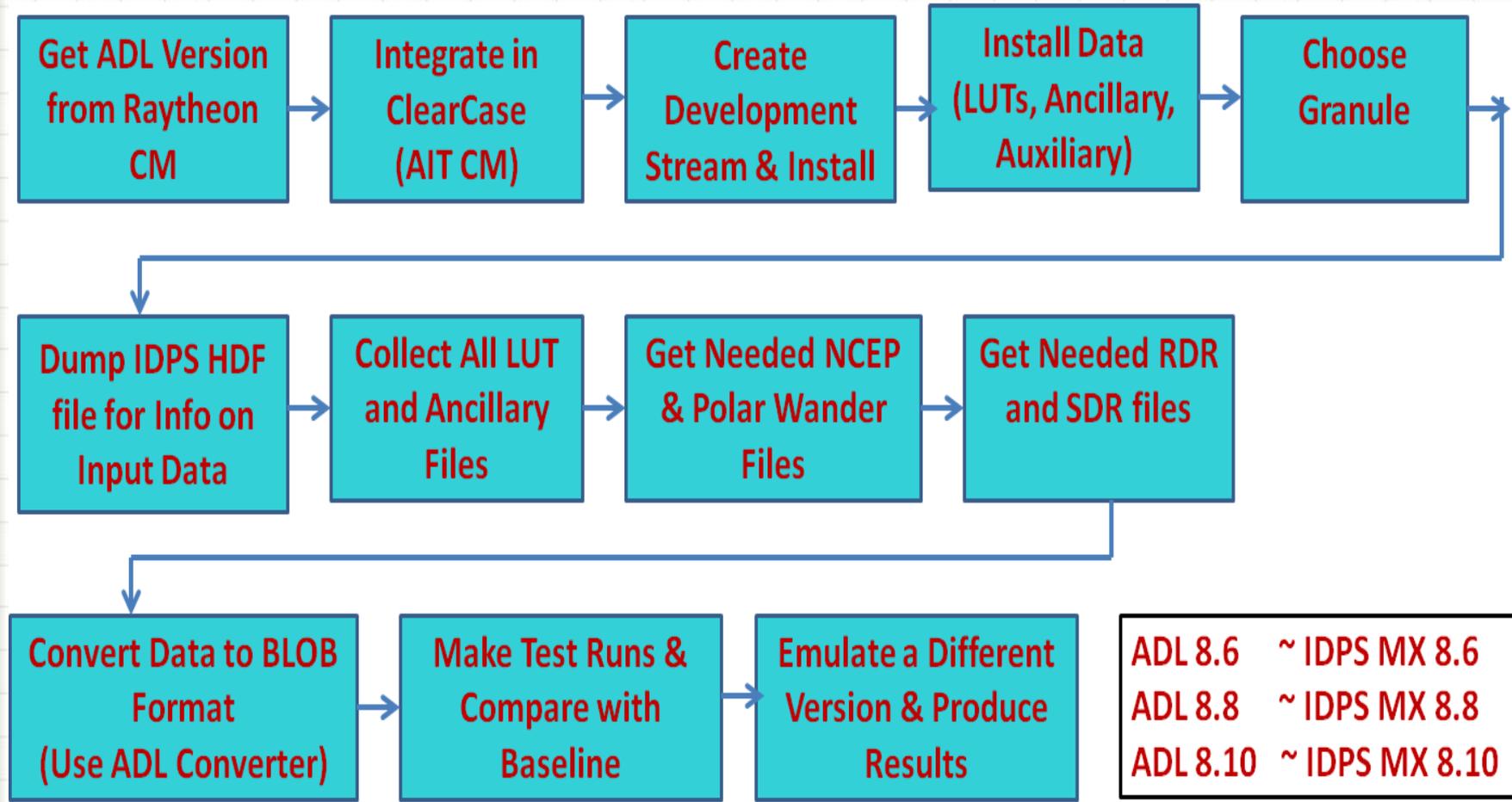
- ADL is the Test System - Developed by Raytheon
- ADL mimics Operational IDPS system
- ADL provides a Diagnostic Framework
- ADL is recommended by Data Products Engineering and Services (DPES)
- I-P-O Model (Input-Processing-Output)
- ADL Versions evolve with IDPS Versions (Example: IDPS MX8.10~ADL4.2\_MX8.10)

# Testing & Troubleshooting in ADL

---

- **Step 1:** Get ADL Version from Raytheon CM system
- **Step 2:** Put these versions in STAR AIT Common CM system giving this a distinct name to differentiate from other baselines
- **Step 3:** Create a Test Stream out of the above Main Integration Streams
- **Step 4:** Work with the Test Stream creating Future Emulation Scenarios
- **Step 5:** Commit changes so that others can use these changes with their algorithm updates to create a new emulation scenario
- **Step 6:** Use the Golden Day (special days for specific events) of interest recommended by the science teams
- **Step 7:** Organize all the needed input files for this test date
- **Step 8:** Build ADL and Run the Executables to generate Product Data

# Testing & Troubleshooting in ADL



# Testing & Troubleshooting in ADL

- ❑ **Step 1: Get ADL Version from Raytheon CM system at <https://199.46.132.15/cqweb/>**

ADL Source Tar Packages:

- [ADL4.2.2 + Mx8.5 Code and Data Packages](#)
- [ADL4.2.2 + Mx8.6 Code and Data Packages](#)
- [ADL4.2.2 + Mx8.8 Code and Data Packages](#)
- [ADL4.2.2 + Mx8.10 Code and Data Packages](#)

- ❑ **Step 2: Put these versions in STAR AIT Common CM system giving this a distinct name to differentiate from other baselines**

**Examples:**

- ❑ ADL42\_MX87\_DEV\_INT
- ❑ ADL42\_MX88\_DEV\_INT

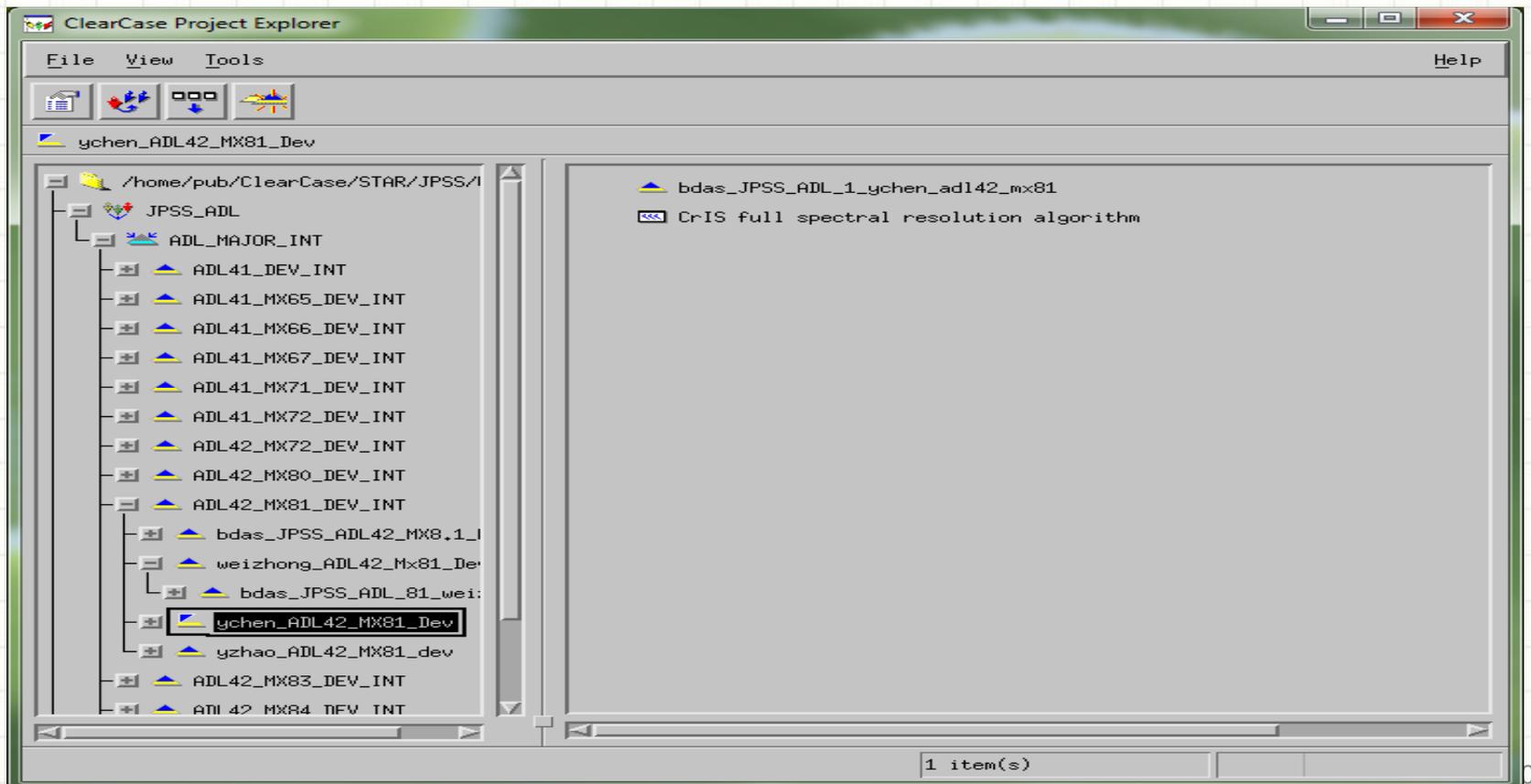
**Note:** We have installed COTS from University of Wisconsin site at [https://jpss-adl-wiki.ssec.wisc.edu/mediawiki/index.php/ADL\\_Installation](https://jpss-adl-wiki.ssec.wisc.edu/mediawiki/index.php/ADL_Installation). We obtained previous versions of ADL from this site

# Testing & Troubleshooting in ADL

❑ **Step3:** Create a Test Stream out of the above Main Integration Streams

**Examples:** bdas\_JPSS\_ADL\_ADL4.2\_MX8.8\_Dev

weizhong\_JPSS\_ADL\_ADL4.2\_MX8.10\_Dev



# Testing & Troubleshooting in ADL

- ❑ **Step 4:** Work with the Test Stream creating Future Emulation Scenarios

## Examples:

- ❑ Use changes for VIIRS SDR to a Baseline Version, Say MX8.10
- ❑ Use changes for Aerosol EDR to the Baseline Version, Say MX8.10

- ❑ **Step 5:** Commit these changes so that others can use their changes over your changes and create a new emulation scenario

## Examples:

Use both the above changes to test a Future Emulation Scenario for Aerosol EDR

# Testing & Troubleshooting in ADL

- ❑ **Step 6: Find out the Golden Day (special days for specific events) of interest from the science team member**

Get this information from the scientists. The special granules may be chosen according to the product of their interest.

- ❑ **Step 7: Organize all the needed input files for this test date**

Some files for VIIRS SDR are first track: VIIRS-SDR-GEO-DNB-PARAM-LUT, VIIRS-SDR-DNB-COEFFS-LUT, VIIRS-SDR-DG-ANOMALY-DN-LIMITS-LUT etc. The data that come with a particular version of ADL might have all of these recent files.

Updated LUTs, compatible first track files and compatible ancillary files such as Polar Wander, NCEP, NAAPS files etc. should be compatible for the date we choose for the test

- ❑ **Step 8: Build ADL and Run the Executables to generate Product Data**

# Communication

---

- Science Teams, Raytheon and DPES
- Attend Science Team Meetings
- Attend Meetings with Raytheon for Discussions on ADL
- Verify code updates, results with science team
- Resolve discrepancy in ADL version and results with DPES
- Verify input tables, LUTs, ancillary data etc.
- Verify change request package, functional test results, regression test results
- Provide support for the AERB review process

# Quality Control

---

## **ADL Version Check**

Run sample SDR and EDR cases for each new ADL version and compare the results with IDPS results

## **Science Check**

Communicate with the Science Team for Result Verification

## **Document Check**

- ATBD documents
- OAD documents
- Other presentations, publications, review documents, and requirement documents required by the science teams

# Quality Control (Continued)

---

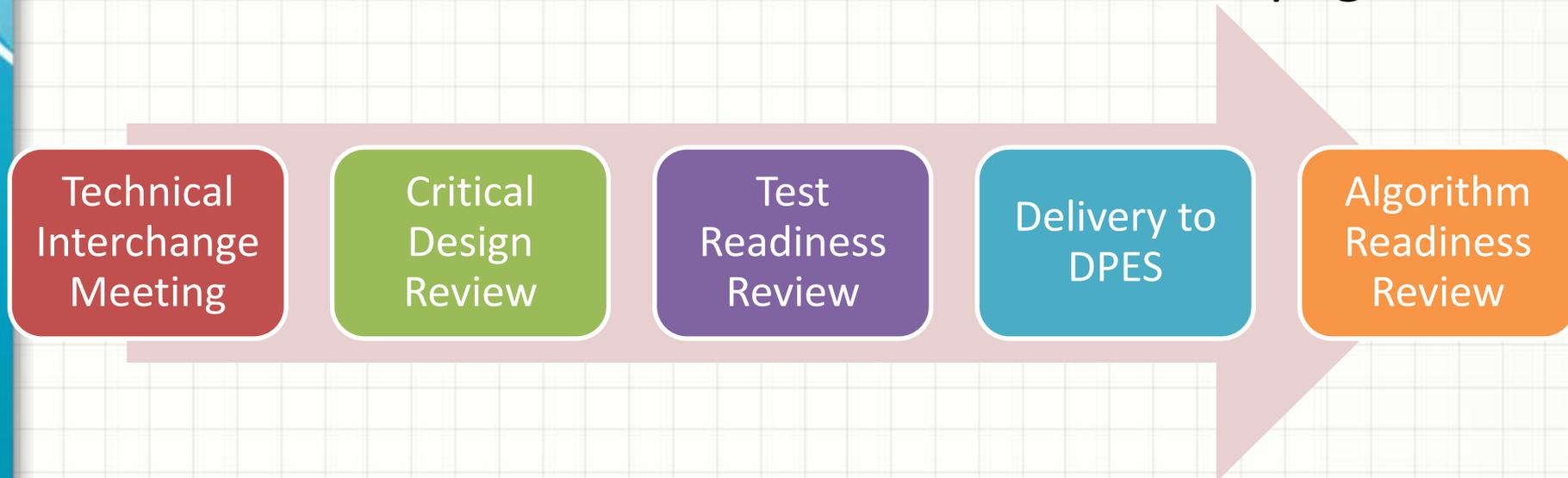
## Algorithm Package Check

- ATBD Documents
- OAD Documents
- Test Data Sets
- Updated Software
- Baseline and Updated Results
- DPE Processing Request Form
- Algorithm LUT PCT or Algorithm Delivery Checklist
- Update Delivery Report
- Any Other Supporting Documents

# Life Cycle Reviews for J1 Algorithms

STAR AIT Review Process for J1 is based upon the Capability Maturity Model Integration Level 3 Process.

- Shows understanding of the requirements
- Shows the algorithm development to meet the requirements
- Ensures all stakeholders are on the same page



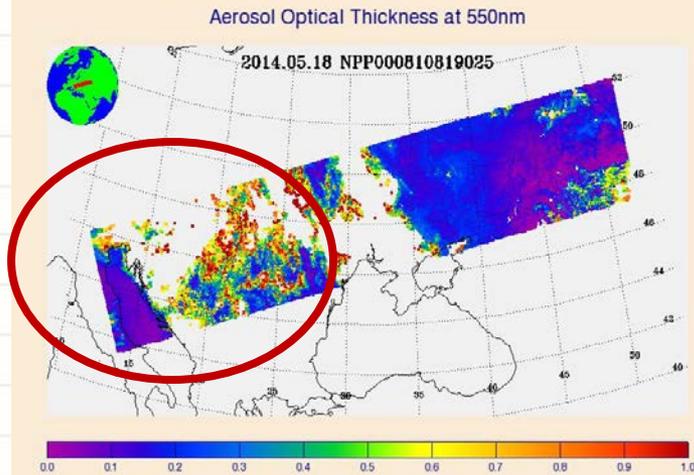
# AIT Work Examples (VIIRS)

---

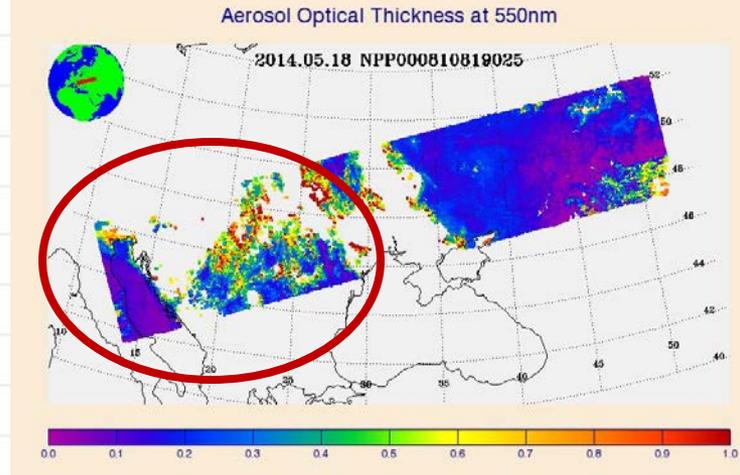
- VIIRS GEO Code Updates and LUT Update for J1
- VIIRS SDR Testing with Updated LUTs for J1
- Add Quality Check for Active Fire (AF)
- Complete Testing and Prepare AF Algorithm Package for NDE
- Land Surface Albedo LUT updating
- Equation Modification for Sea Surface Temperature and Evaluating Downstream Impact
- Roll Back LST LUT from Provisional to Beta Version
- Conducting sensitivity tests for Ice Age algorithm
- Implementing NOAA Global Multisensor Automated Snow/Ice Map (GMASI) Tile

# AIT Work Examples (VIIRS)

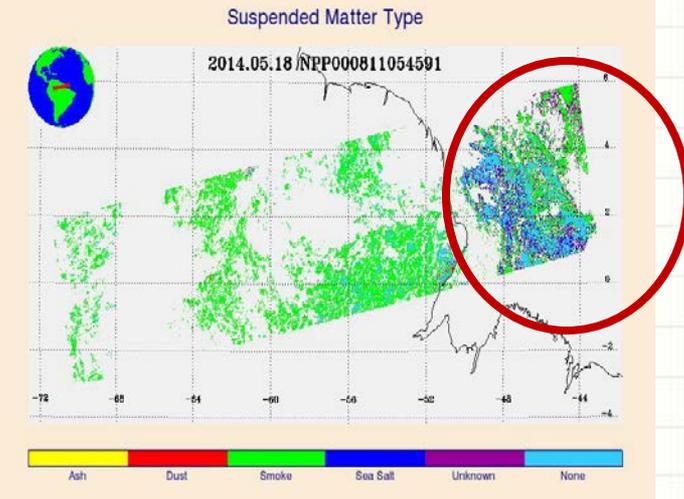
VAOO\_npp\_d20140518\_11045028\_e1046269\_b13238\_c20140815010400286401\_devl\_dev.h5



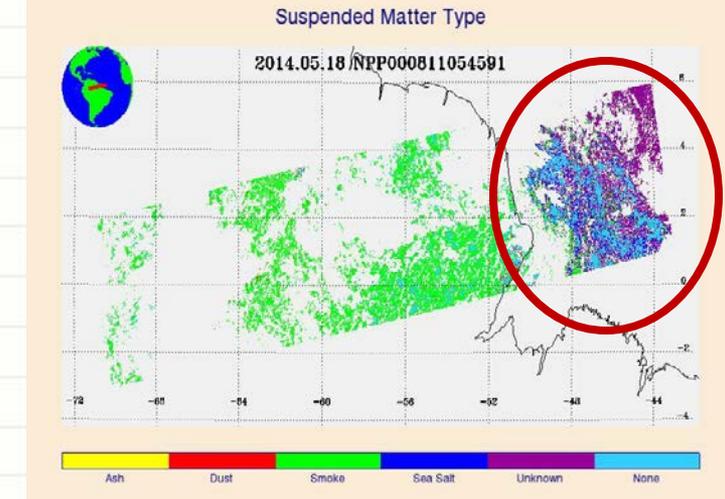
VAOO\_npp\_d20140518\_11045028\_e1046269\_b13238\_c20140911021202381626\_devl\_dev.h5



VSUMO\_npp\_d20140518\_11717385\_e1719027\_b13241\_c20140815041800235105\_devl\_dev.h5



VSUMO\_npp\_d20140518\_11717385\_e1719027\_b13241\_c20140911043939100230\_devl\_dev.h5



MX8.4 Baseline

MX8.4 Baseline with new internal snow test

# AIT Work Flow Sequence

---

- Science teams find a discrepancy
- Science teams file an algorithm discrepancy report (ADR) (at times AIT POC also helps filing the ADR)
- AIT POC is notified about this ADR
- ADR is discussed in DRAT and AIT POC participates
- Science Teams formulate hypothesis, try solution ideas, engage AIT POC in testing, integration and verification process
- AIT POC participates in Technical Interchange Meeting (if held)
- Once AIT testing and integration results are verified by the science team, AIT POC prepares change request package and submits to DPES.
- DPES verifies AIT testing in GADA (AIX system)
- Algorithm JAM files a CCR
- AERB review is held and changes accepted

# Summary

---

## Accuracy of Algorithms -> Product Accuracy

### STAR AIT ROLES:

#### ❖ Testing and Troubleshooting

- Facilitates Structured Tests
- Performs Emulation Experiments with Chain Run Tests
- Performs Code Updates, Tests and Delivery
- Facilitates Review Process
- Produces Product Test Data

#### ❖ Communication Facilitation

- ❖ Quality Control: Algorithm Check, Science Check & Documentation Check



**QUESTIONS?**

*Thank  
You*