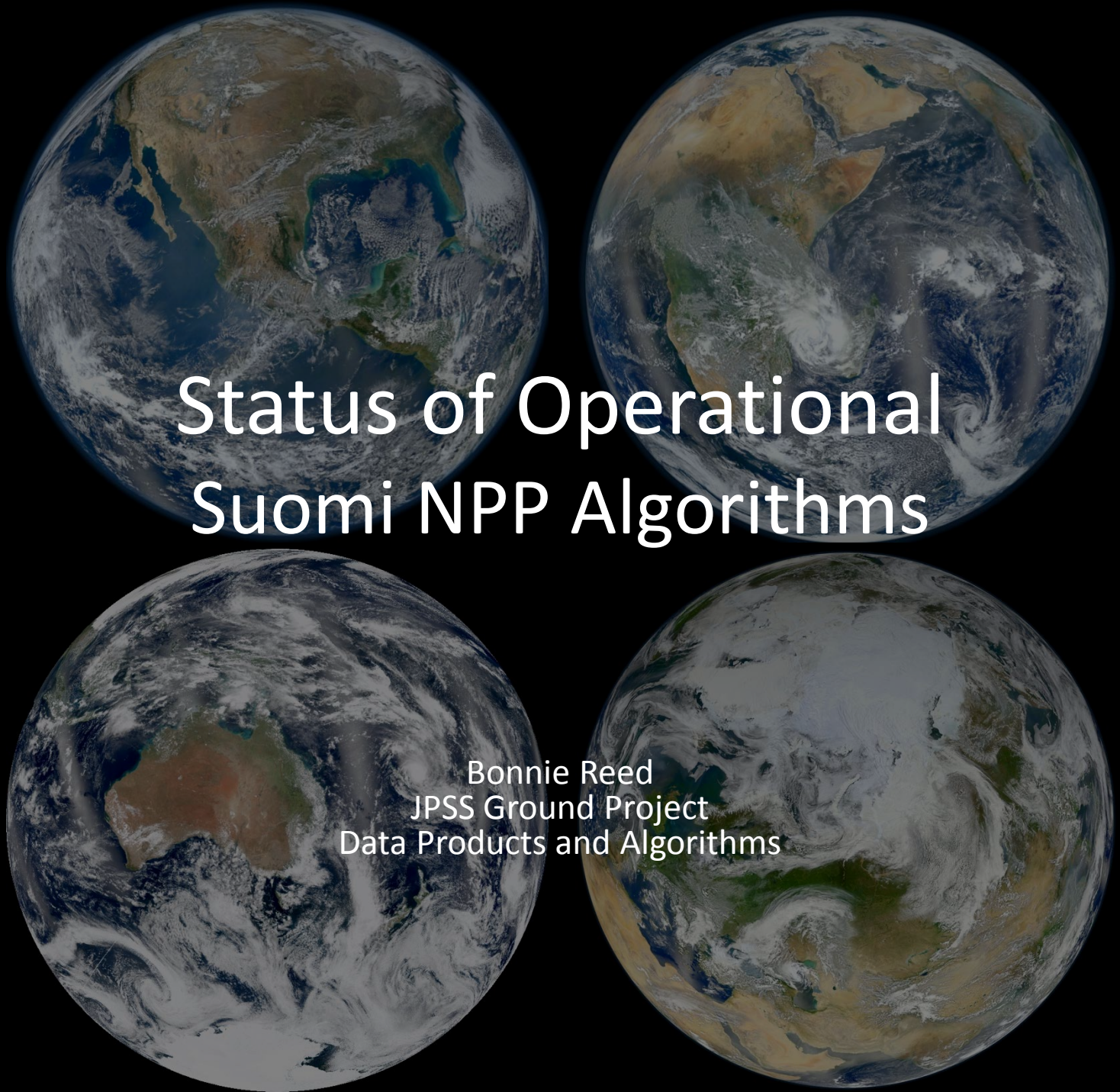


Status of Operational Suomi NPP Algorithms

Bonnie Reed
JPSS Ground Project
Data Products and Algorithms

Outline

- Overview of SNPP Data Products
- Algorithm Validation Process
- Algorithm Status
  - Algorithm Maturity Definitions
  - Algorithm Maturity Matrix
- S-NPP Data Products Status
  - Accomplishments
  - Issues/Concerns

Overview of SNPP
Sensor and Environmental Data Products

Visible Infrared Imager/Radiometer Suite (VIIRS) SDRs	
Imagery EDRs	**Ocean EDRs**
Day Night Band Imagery-Band (375m) Moderate-Band (750m)	Sea Surface Temperature Ocean Color/Chlorophyll
Aerosol EDRs	**Cryosphere EDRs**
Aerosol Optical Thickness Aerosol Particle Size Parameter Suspended Matter	Sea Ice Characterization Snow Cover Ice Surface Temperature
Land EDRs	**Cloud EDRs**
Active Fires Land Surface Temperature Surface Albedo Surface Type Vegetation Indices Quarterly Surface Type Surface Reflectance (IP)	Cloud Mask Cloud Cover/Layers Cloud Effective Particle Size Cloud Optical Thickness Cloud Top Height Cloud Base Height Cloud Top Pressure Cloud Top Temperature

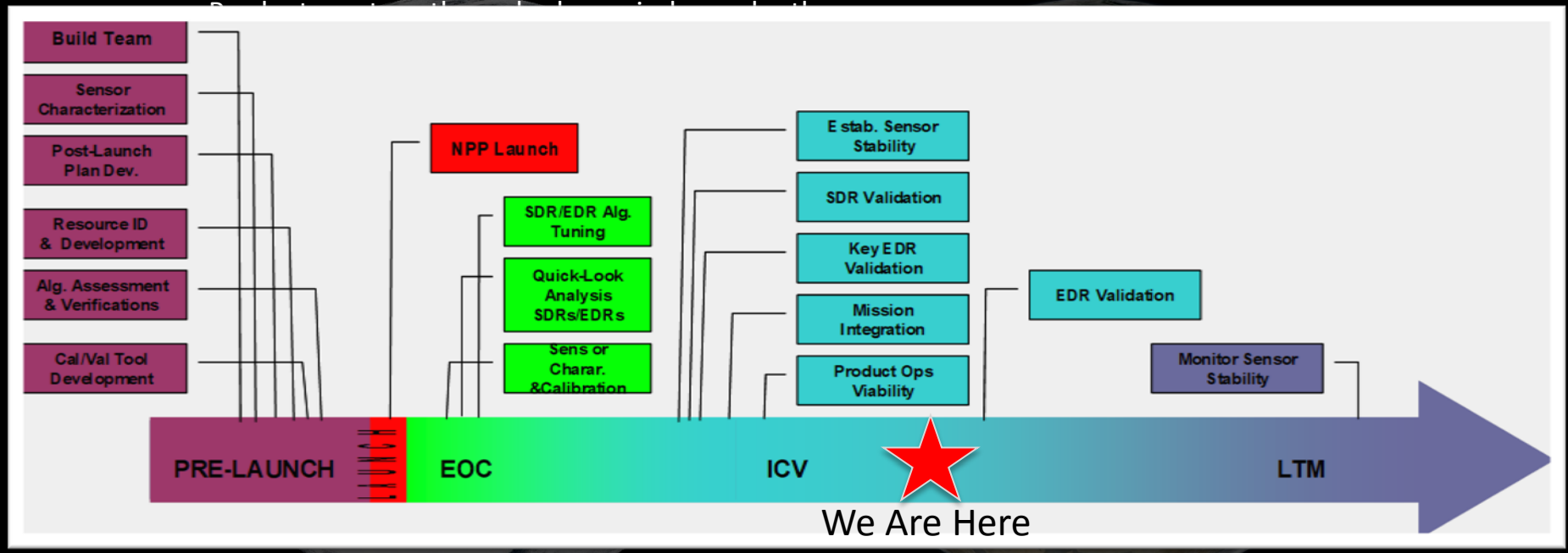
Ozone Mapping Profiler Suite (OMPS) SDRs
Ozone EDRs
Total Column Nadir Profile (IP)

Cross-track Infrared Sounder (CrIS) SDRs Advanced Technology Microwave Sounder (ATMS) SDRs
Sounding EDRs
Atmospheric Vertical Moisture Profile Atmospheric Vertical Temperature Profile

These SDRs and EDRs are currently generated within the JPSS Ground System

Algorithm Validation Process Timeline

- Four Phases of Calibration/Validation (Cal/Val):
  1. **Pre-Launch (all time prior to launch)** – Algorithm verification, sensor testing, and validation preparation
  2. **Early Orbit Check-out (first 30-90 days)** – System calibration and characterization
  3. **Intensive Cal/Val (extending to approximately 24 months post-launch)** – Product validation
  4. **Long-Term Monitoring (through life of sensors)**
- For each phase:
  - Exit Criteria established
  - Activities summarized



Algorithm Status
Algorithm Maturity Definitions

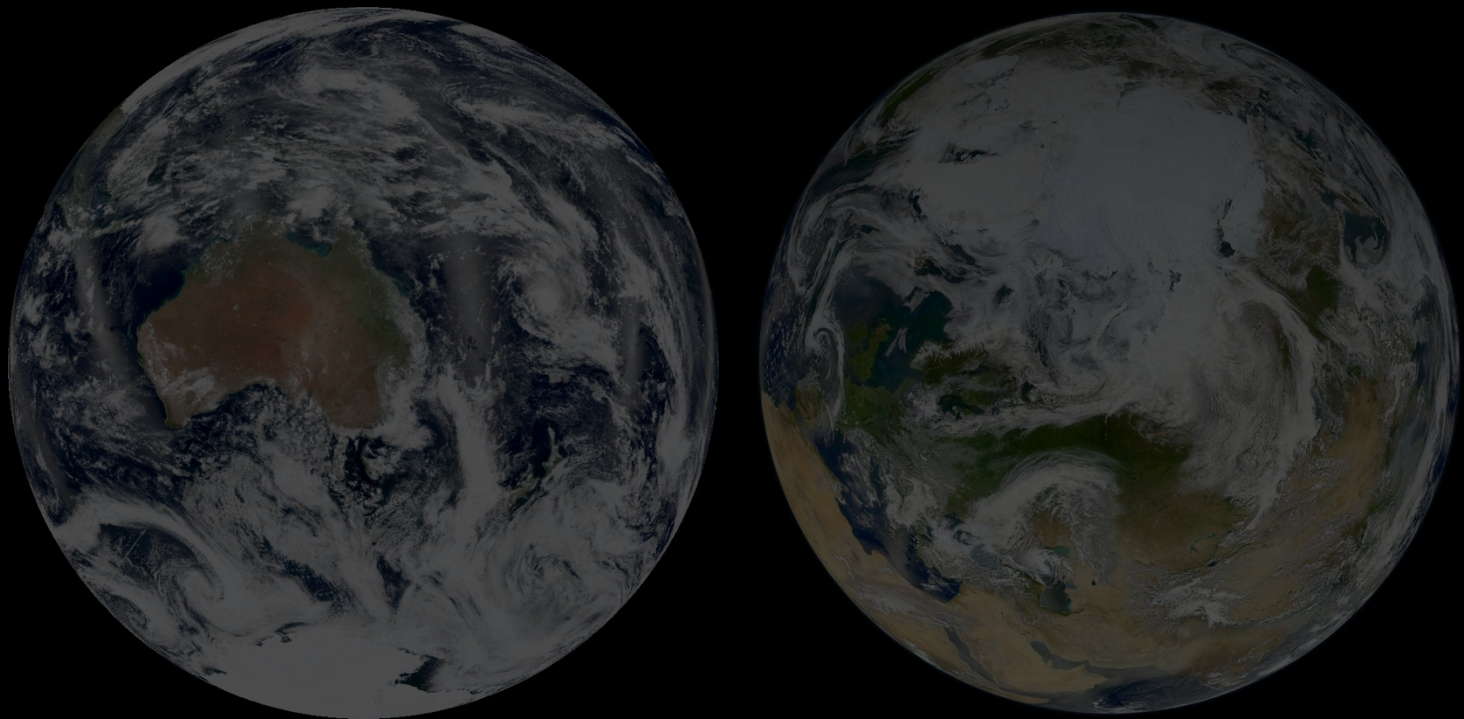
- **Beta**
  - Early release product
  - Initial calibration applied
  - Minimally validated and may still contain significant errors (rapid changes can be expected, version changes will not be identified as errors are corrected as on-orbit baseline is not established)
  - Available to allow users to gain familiarity with data formats and parameters
  - Product is not appropriate as the basis for quantitative scientific publications, studies and applications.
- **Provisional**
  - Product quality may not be optimal
  - Incremental product improvements are still occurring as calibration parameters are adjusted with sensor on-orbit characterization (versions will be tracked)
  - General research community is encouraged to participate in the QA and validation of the product, but need to be aware that product validation and QA are ongoing
  - Users are urged to contact JPSS NPP Cal/Val representatives prior to use of the data in publications
- **Validated/Calibrated**
  - On-orbit sensor performance characterized and calibration parameters adjusted accordingly
  - Ready for use by the users and in scientific publications
  - There may be later improved versions
  - There will be strong versioning with documentation
    - Stage 1: product accuracy has been estimated using a small number of independent measurements obtained from selected locations, periods, and associated ground-truth/field program efforts.
    - Stage 2: Product accuracy has been assessed over a widely distributed set of locations and periods via several ground-truth and validation efforts
    - Stage 3: Product accuracy has been assessed and the uncertainties in the product well established via independent measurements in a systematic and statistically robust way representing global conditions.

Algorithm Status
Algorithm Maturity Matrix

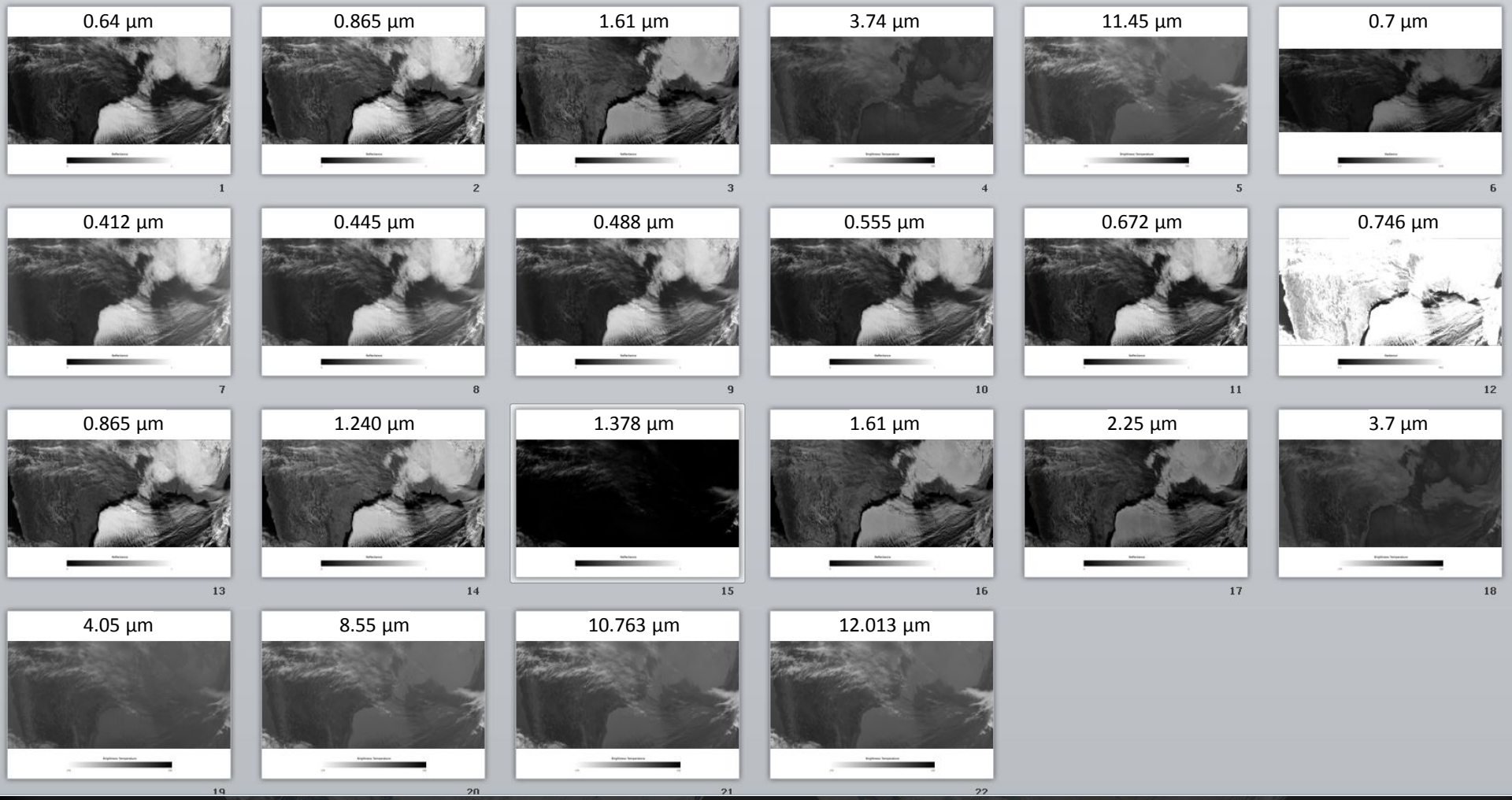
Algorith Maturity Status	Priority	Status	Date β	Date Prov	M-13	J-13	J-13	A-13	S-13	Q1-14	Q2-14	Q3-14	Q4-14	Q1-15	Q2-15	Q3-15	Q4-15	Q1-16	Q2-16
ATMS SDR	1	Prov	02/10/12	02/06/13						Valid									
CrIS SDR	1	Prov	05/02/12	02/13/13							Valid								
VIIRS SDR	1	Prov	05/02/12	03/13/13						Valid									
VIIRS EDR Imagery (not NCC)	1	Prov	05/30/12	02/20/13							Valid	V-2	V-3						
VIIRS EDR NCC Imagery	1	β	10/24/12				Prov				Valid	V-2	V-3						
ATMS TDR	2	Prov	12/10/10	02/06/13						Valid									
VIIRS EDR Ocean Color/Chlorophyll (OCC)	2	β	01/16/13					Prov				Valid			V-2				V-3
VIIRS EDR Sea Surface Temperature (SST)	2	β	02/27/13						Prov		Valid		V-2		V-3				
OMPS SDR Nadir Profile (NP)	3	Prov	03/07/12	03/12/13						Valid									
OMPS SDR Nadir Total Column Mapper (TC)	3	Prov	03/07/12	03/12/13						Valid									
CrIMMS EDR Atmospheric Vertical Moisture Profile (AVMP)	3	Prov	08/08/12	03/27/13						Valid				V-2				V-3	
CrIMMS EDR Atmospheric Vertical Temperature Profile (AVTP)	3	Prov	08/08/12	03/27/13						Valid				V-2				V-3	
CrIS IP Infrared Ozone Profile (will be EDR for J1)	3	Prov	08/08/12	03/27/13						Valid				V-2				V-3	
OMPS IP Ozone - Nadir Profile (NP) (will be EDR for J1)	3	Prov	07/25/12	04/17/13			Valid		V-2		V-3								
OMPS EDR Ozone - Total Column (TC)	3	Prov	07/25/12	04/17/13			Valid		V-2		V-3								
VIIRS IP Cloud Mask (VCM) (Delivered IP)	3	Prov	06/27/12	02/20/13						Valid		V-2			V-3				
VIIRS EDR Land Active Fires (AF)	3	β	10/10/12					Prov					Valid				V-2	V-3	
VIIRS EDR Sea Ice Characterization (SIC)	3	β	05/01/13		β					Prov			Valid	V-2		V-3			
VIIRS EDR Snow Cover (SC)	3	β	05/01/13		β					Prov	Valid		V-2		V-3				
VIIRS EDR Cloud Clover/Layers (CC/L)	3				β						Prov		Valid		V-2				V-3
VIIRS EDR Cloud Effective Particle Size (CEPS)	3				β						Prov		Valid		V-2				V-3
VIIRS EDR Cloud Optical Thickness (COT)	3				β						Prov		Valid		V-2				V-3
VIIRS EDR Cloud Top Height (CTH)	3				β						Prov		Valid		V-2				V-3
VIIRS EDR Suspended Matter (SM)	3				β					Prov		Valid		V-2				V-3	
VIIRS EDR Aerosol Optical Thickness (AOT)	4	β	09/12/12		Prov							Valid		V-2				V-3	
VIIRS EDR Aerosol Particle Size Parameter (APSP)	4	β	09/12/12		Prov							Valid		V-2				V-3	
VIIRS EDR Ice Surface Temperature	4	β	05/01/13		β				Prov	Valid	V-2		V-3						
VIIRS EDR Land Surface Temperature (LST)	4	β	12/19/12		Prov					Valid		V-2				V-3			
VIIRS EDR Surface Type (ST)	4	β	02/27/13							Prov			Valid				V-2	V-3	
VIIRS EDR Vegetation Indicies (VI)	4	β	02/06/13						Prov			Valid			V-2				V-3
VIIRS EDR Cloud Base Height (CBH)	4				β						Prov		Valid		V-2				V-3
VIIRS EDR Cloud Top Pressure (CTP)	4				β						Prov		Valid		V-2				V-3
VIIRS EDR Cloud Top Temperature (CTT)	4				β						Prov		Valid		V-2				V-3
VIIRS EDR Surface Albedo (SA)	4				β					Prov			Valid		V-2				V-3
VIIRS IP Quarterly Surface Type (QST) (Delivered IP)	4																		

SNPP Data Products Status
VIIRS Sensor Data Records

Status	Accomplishments	Challenges
• VIIRS SDR (P) (P)=Provisional Maturity	• Stray-light NCC fix currently being tested and to be implemented in late-2013 • Automation of VIIRS Reflected Solar Band (RSB) calibration	• Un-anticipated NCC Imagery stray-light hardware issue • Mirror degradation, currently performing weekly table uploads



VIIRS bands (I1-I5, DNB/NCC, M1-M16)



26 December 2012, 19:23 UTC

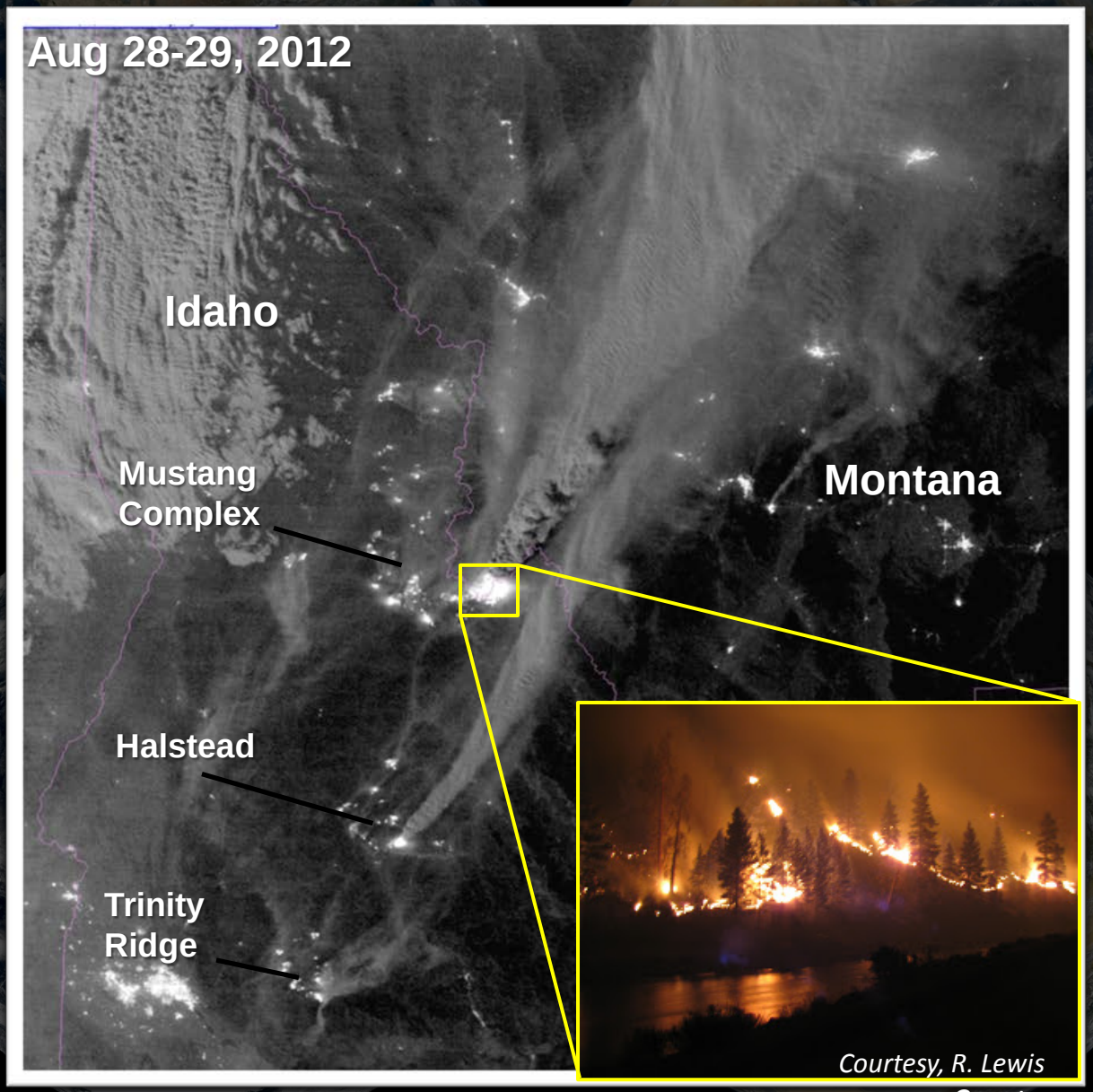
Courtesy of Don Hillger

SNPP Data Products Status
VIIRS Imagery EDRs

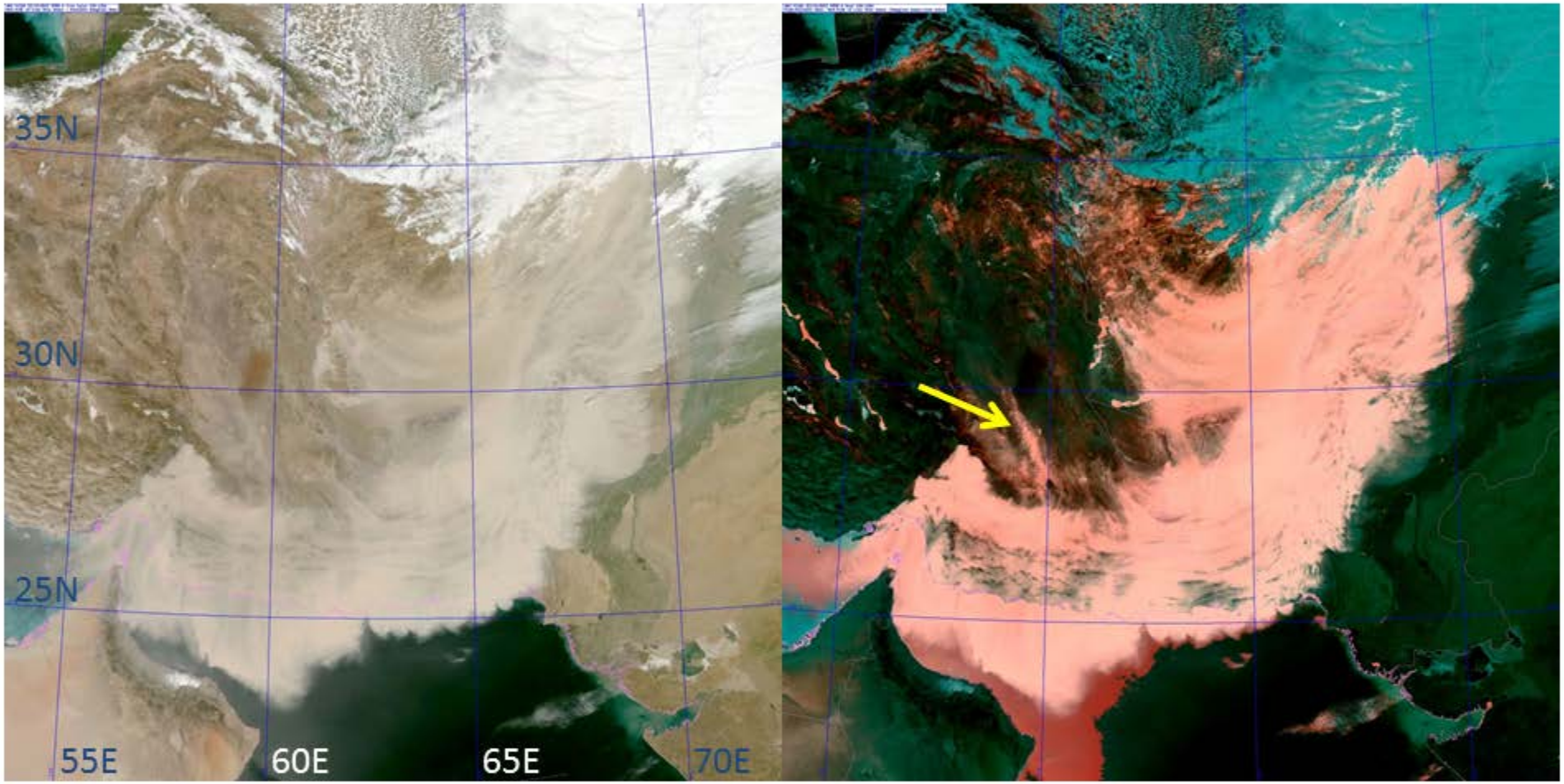
Status	Accomplishments	Challenges

• M- and I- Bands: (P)
  • 22 VIIRS Moderate-bands @ 750m
  • 5 VIIRS Imagery-bands @ 375m
• (NCC) DNB: (B)
 	
(P)=Provisional Maturity
(B)=Beta Maturity
	• New Non-NCC Imagery LUT developed based on VIIRS Imagery (not simulations)
	
	• Stray-light NCC fix currently being tested and to be implemented in late-2013.
		• Un-anticipated NCC Imagery stray-light hardware issue
		  • Software fix is in final stages of development, based on feedback from VIIRS SDR Team and EDR Imagery Team.
		  • Stray light fix requires both software and major/expansive LUT changes.
		  • Software fix may need to be adjusted as necessary over time, depending on operational NCC Imagery outcome.
		
		• NCC Imagery stray-light hardware issue will NOT be resolved for JPSS-1.
		  • Software fix may need further updates, as the effect of stray light on future spacecraft may not be identical to that on NPP.

Forest Fires & Smoke by Moonlight



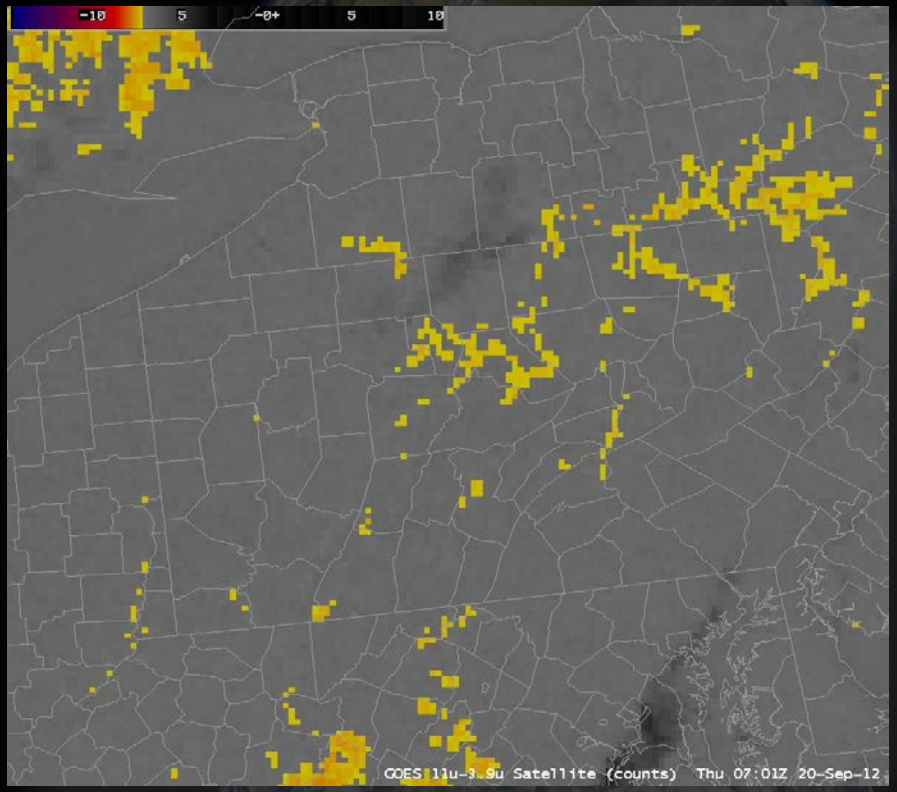
Courtesy of Steve Miller

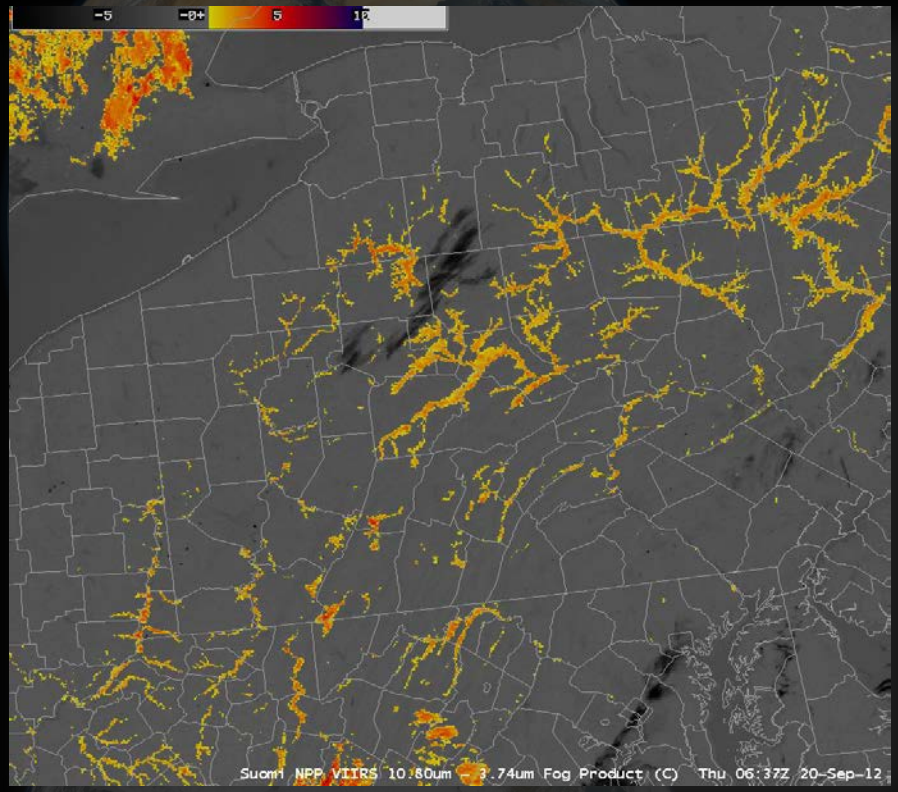


Suomi NPP VIIRS true color (left) and enhanced dust (right) imagery over Middle East. Dust appears as pink, clouds in cyan, and land in shades of green. Images are from 19 March 2012 at 0905 UTC. The enhanced imagery is particularly useful for identifying dust over bright land surface backgrounds, such as the narrow plume indicated in the enhancement by the yellow arrow.

Courtesy of Don Hillger

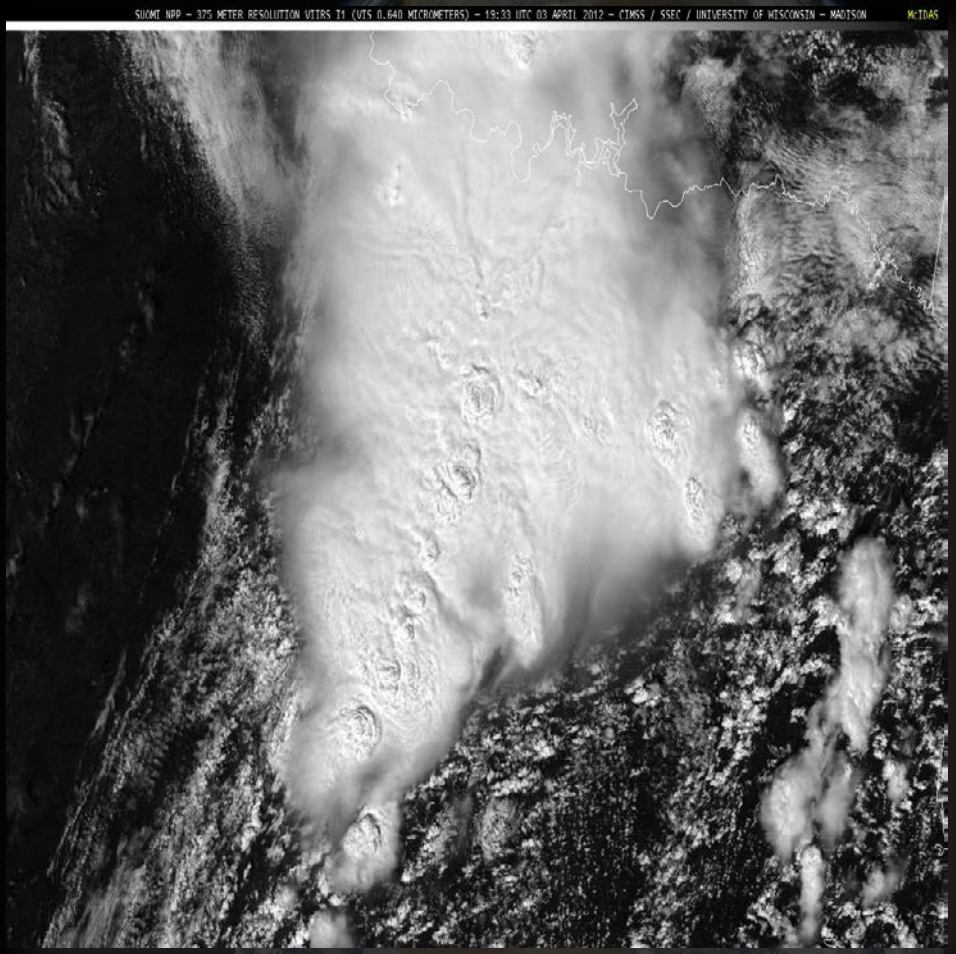
Comparison of VIIRS versus GOES/Imager for Cloud (Fog) Detection

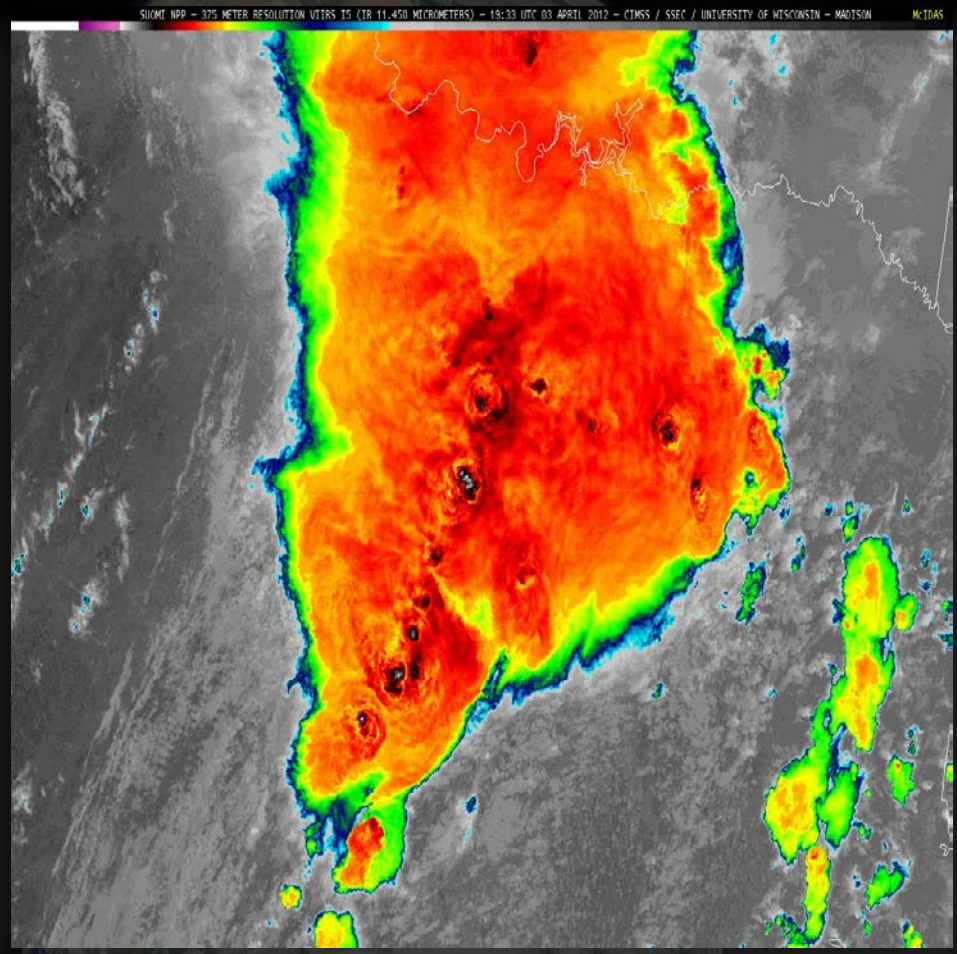




- The images above show the standard fog detection imagery served in AWIPS to NWS forecasters.
- The two images show the 11 – 3.75 μm brightness temperature difference and yellow/orange colors indicate the presence of fog.
- The GOES Imager (on the left) has a spatial resolution of roughly 5 km at these latitudes.
- The VIIRS data on the right is from the I-bands and has a resolution of 0.4 km.
- The VIIRS data improves the ability of NWS forecasters to detect fog at small spatial scales such as river valleys.
- Imagery taken from the CIMSS Blog (http://cimss.ssec.wisc.edu/goes/blog).

Comparison of VIIRS Imagery in Severe Convection





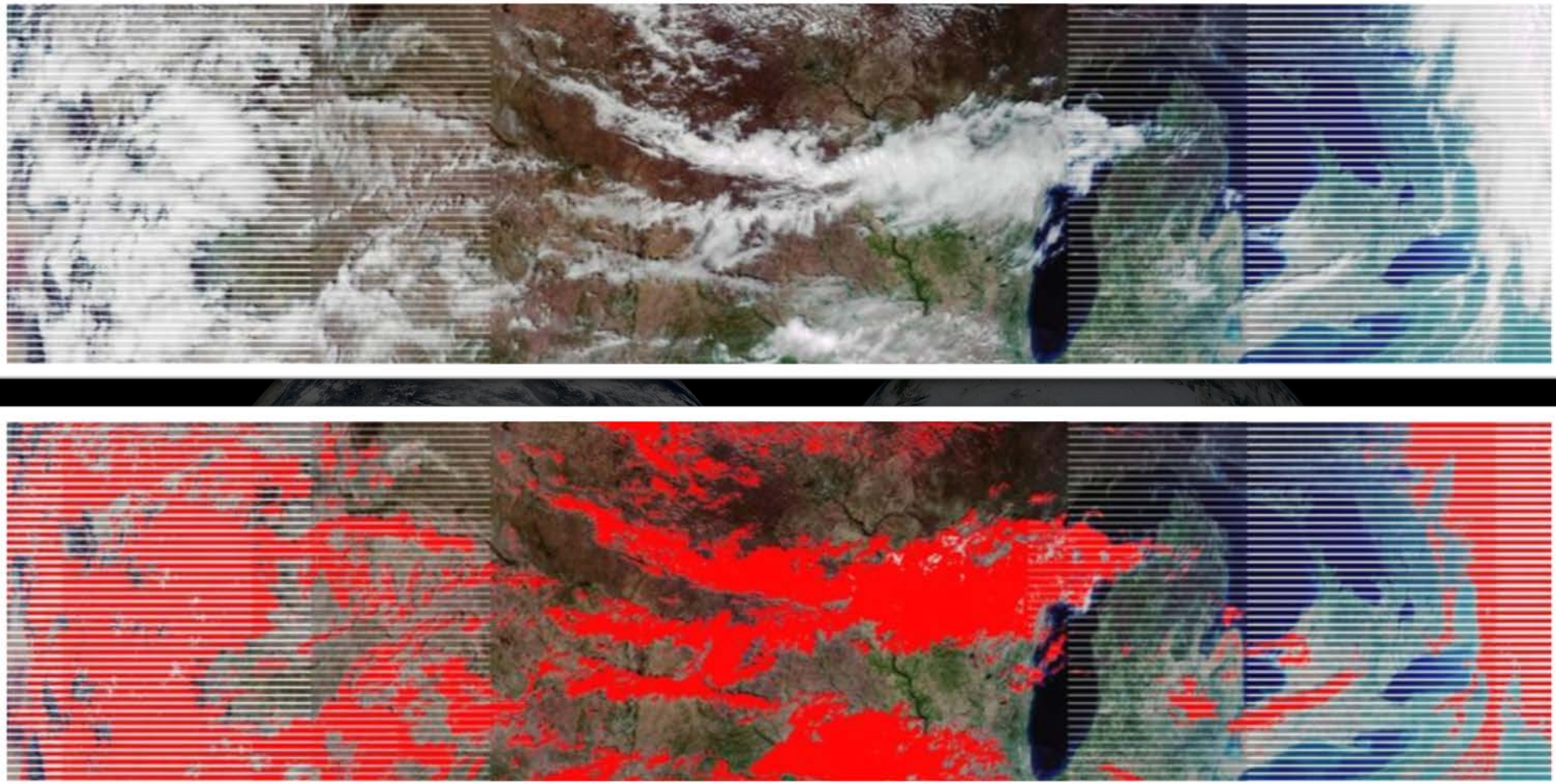
- The images above show S-NPP 0.65 μm (left) and 11 μm (right) imagery during a severe convection outbreak in the central USA (April 03, 2012)
- The fine spatial features of S-NPP allow quantifying the height of the convective towers which provides information to forecasters on storm intensity.
- These images are generated with McIdas and similar images are provided within AWIPS from UW/SSEC S-NPP direct broadcast data.
- Imagery taken from the CIMSS Blog (http://cimss.ssec.wisc.edu/goes/blog)

SNPP Data Products Status
VIIRS Cloud EDRs

Status	Accomplishments	Challenges
• Cloud Mask: (P) • Cloud Cover/Layers: (-) • Cloud Effective Particle Size: (-) • Cloud Optical Thickness: (-) • Cloud Top Height: (-) • Cloud Base Height: (-) • Cloud Top Pressure: (-) • Cloud Top Temperature: (-) (P)=Provisional Maturity (-) Remaining Cloud products are expected to achieve Beta Maturity Status June 2013	• FEB 2013, VCM achieved Provisional status • January 2013, Fix in height to temperature conversion in IDPS VIIRS cloud height solves a major issue in cloud heights seen in CALIPSO/CALIOP comparisons. • April 2013, COP LUT and cloud phase updates implemented into IDPS. COP LUTS are now linked to NOAA GOES-R AWG LUTs. MAJOR IMPROVEMENT – will achieve β status. • VCM team has worked in modifications in every IDPS build including a large post-launch set of threshold changes.	• COP issues remain that are not tied to LUTs. Continued issues with performance over land • CTH still suffers biases for thin high clouds. Update to scattering models are being explored • IDPS Quality Flags are not optimal (no high quality results over glint zone in land) • Replacement of current cloud algorithms with NOAA-developed cloud algorithms is being considered

VCM example

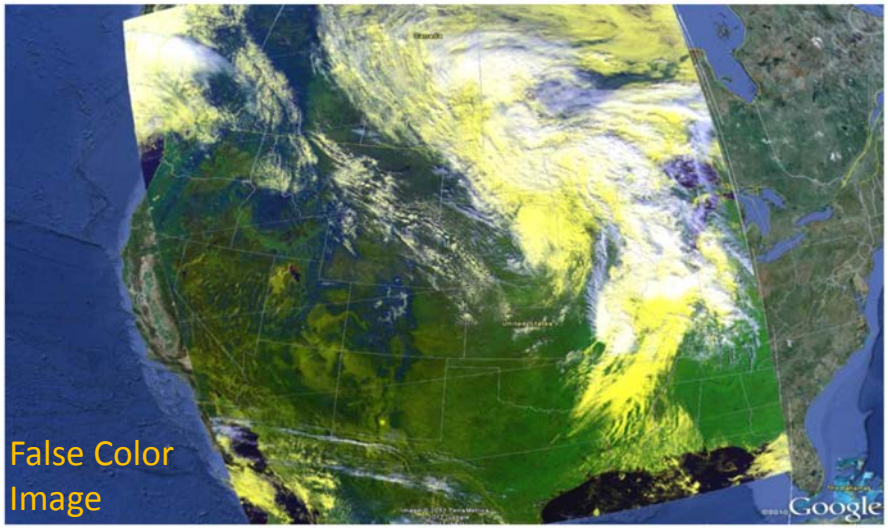
Pseudo True Color: Red = M5, Green = M4, Blue = M3
VCM: Red = Confidently Cloudy

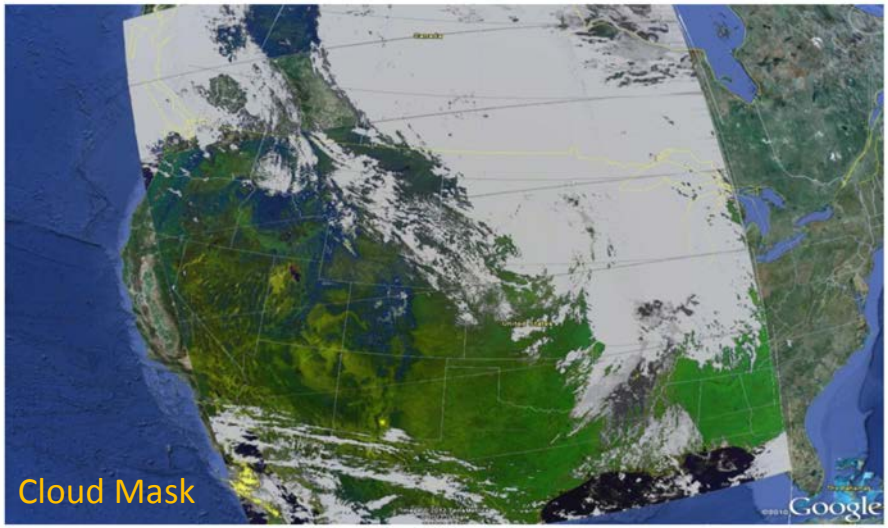


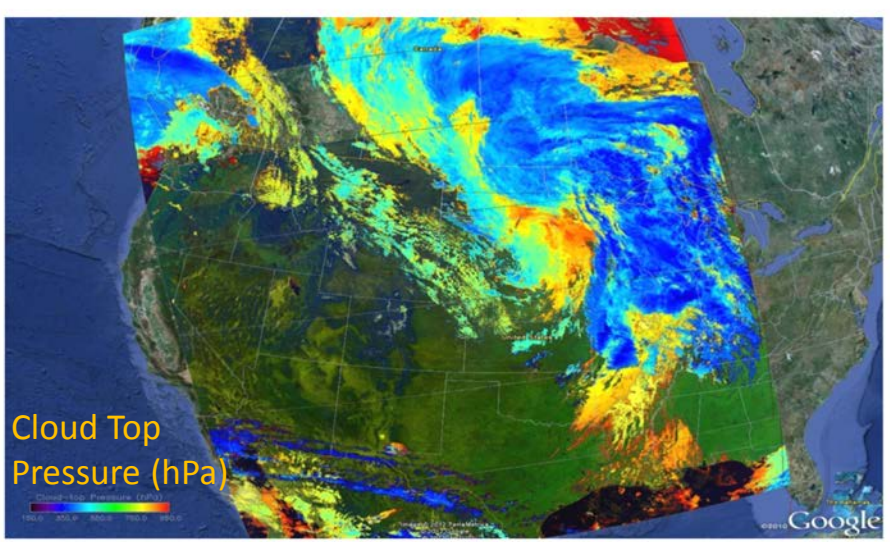
Courtesy of Tom Kopp

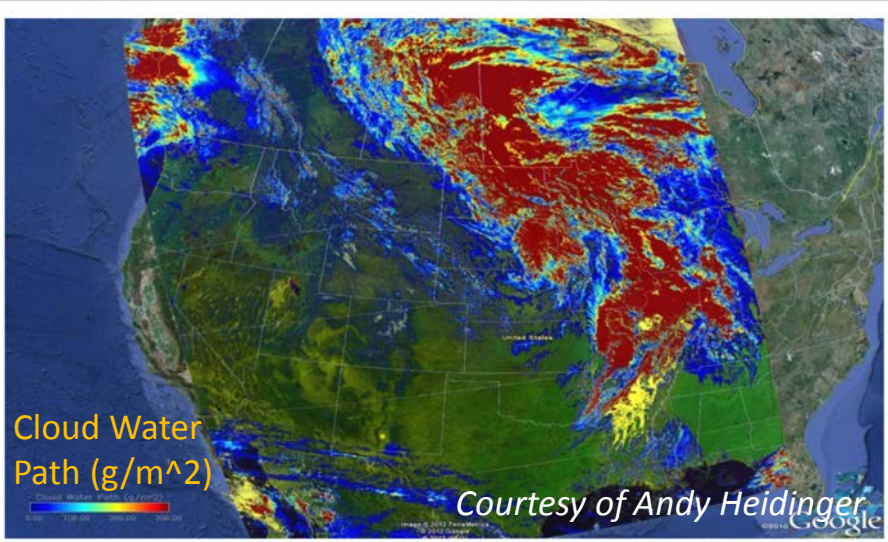
Real-time VIIRS Cloud Products from UW/SSEC Direct Broadcast S-NPP Data

NOAA VIIRS cloud products are being generated in real-time from the UW/SSEC direct broadcast NPP data. NPP imagery are being served with AWIPS. Cloud products are being served in Google Earth and will move into AWIPS as part of the JPSS Proving Ground. Data below show examples from one pass of S-NPP recorded at UW/SSEC. The images show a false color image (upper left), the cloud mask (upper right). The cloud-top pressure (lower left) and the integrated cloud water path (lower right). IDPS Cloud Algorithms will be available in CSPP later this year.





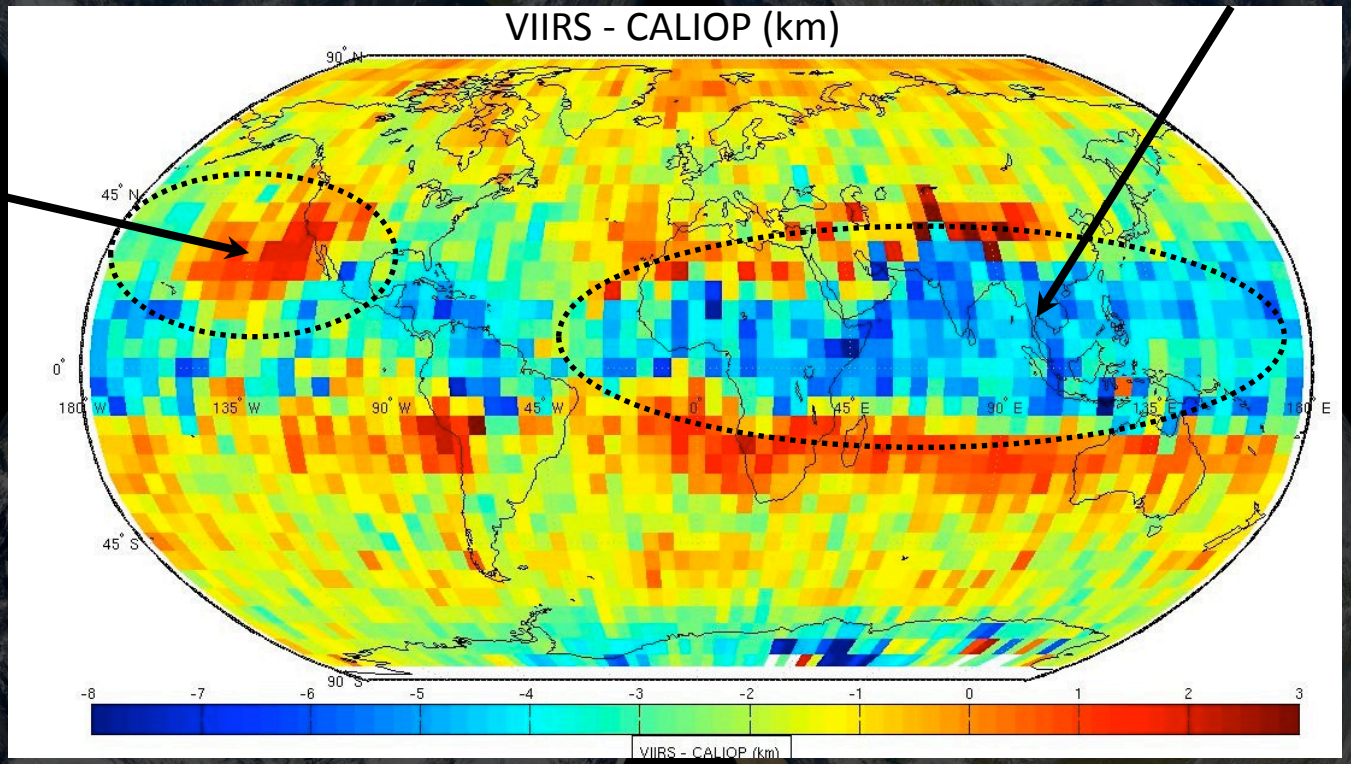




VIIRS Cloud Top Height
Global 5 deg Gridded Results

High Cloud
Low Bias

Low Cloud
High Bias

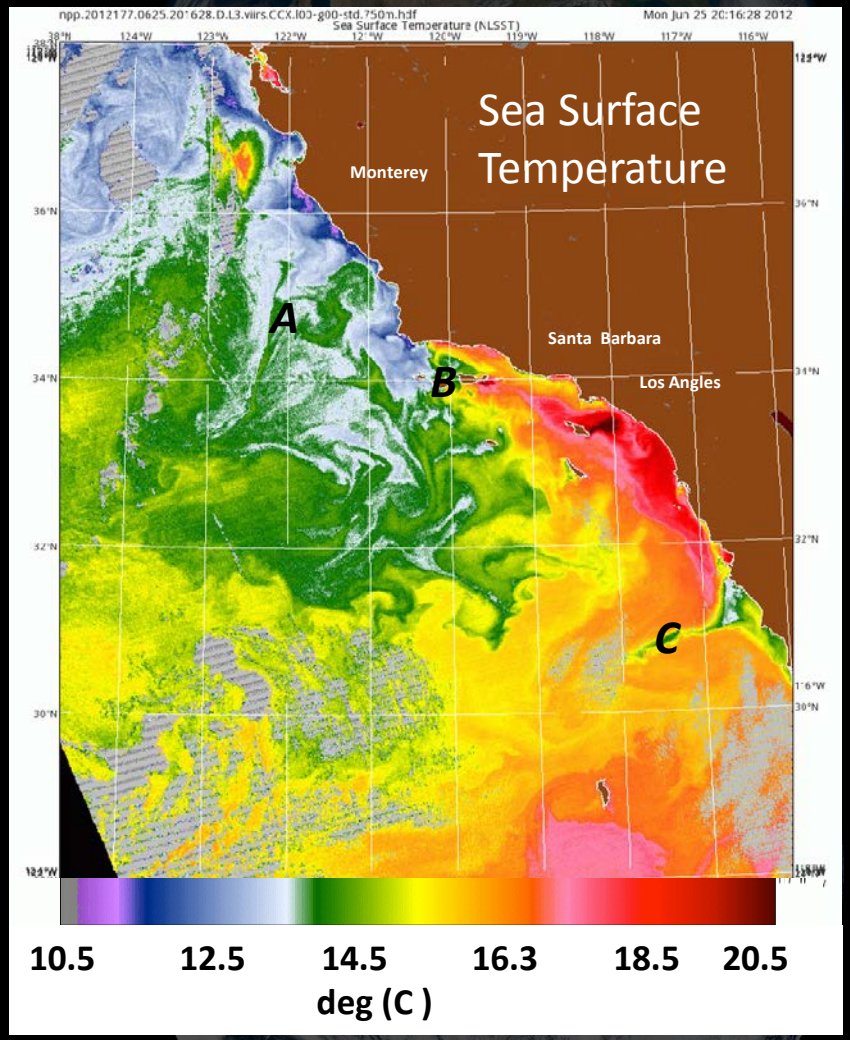


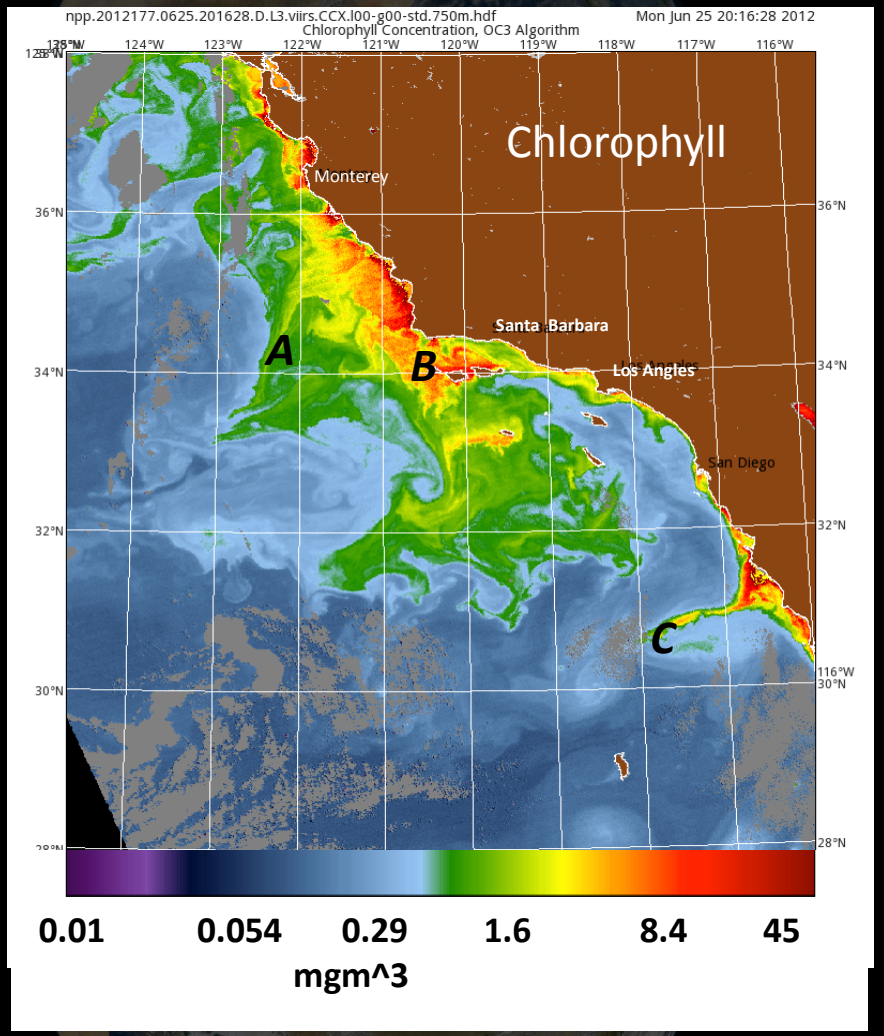
Courtesy of Bob Holtz

SNPP Data Products Status
VIIRS Ocean EDRs

Status	Accomplishments	Challenges
• Ocean Color/Chlorophyll: (B) • Sea Surface Temperature: (B) (B)=Beta Maturity	• VIIRS chlorophyll-a data in support of near-real time NOAA cruise/operation/applications • 3 new AERONET-OC sites operational (Level-2 data) for VIIRS data validation, and in situ data collections • Global monitoring and evaluations of VIIRS ocean color EDR products • Routine generation of daily, 8-day and monthly global Level-3 VIIRS ocean color products and images	• There is no vicarious calibration applied to ocean color EDR • "One size" Cloud Mask needs to be tweaked for SST • Replacement of current SST algorithm with community consensus SST algorithm • Introduction of new ancillary data item for SST algorithm processing

VIIRS Ocean Products for the Southern California Bight

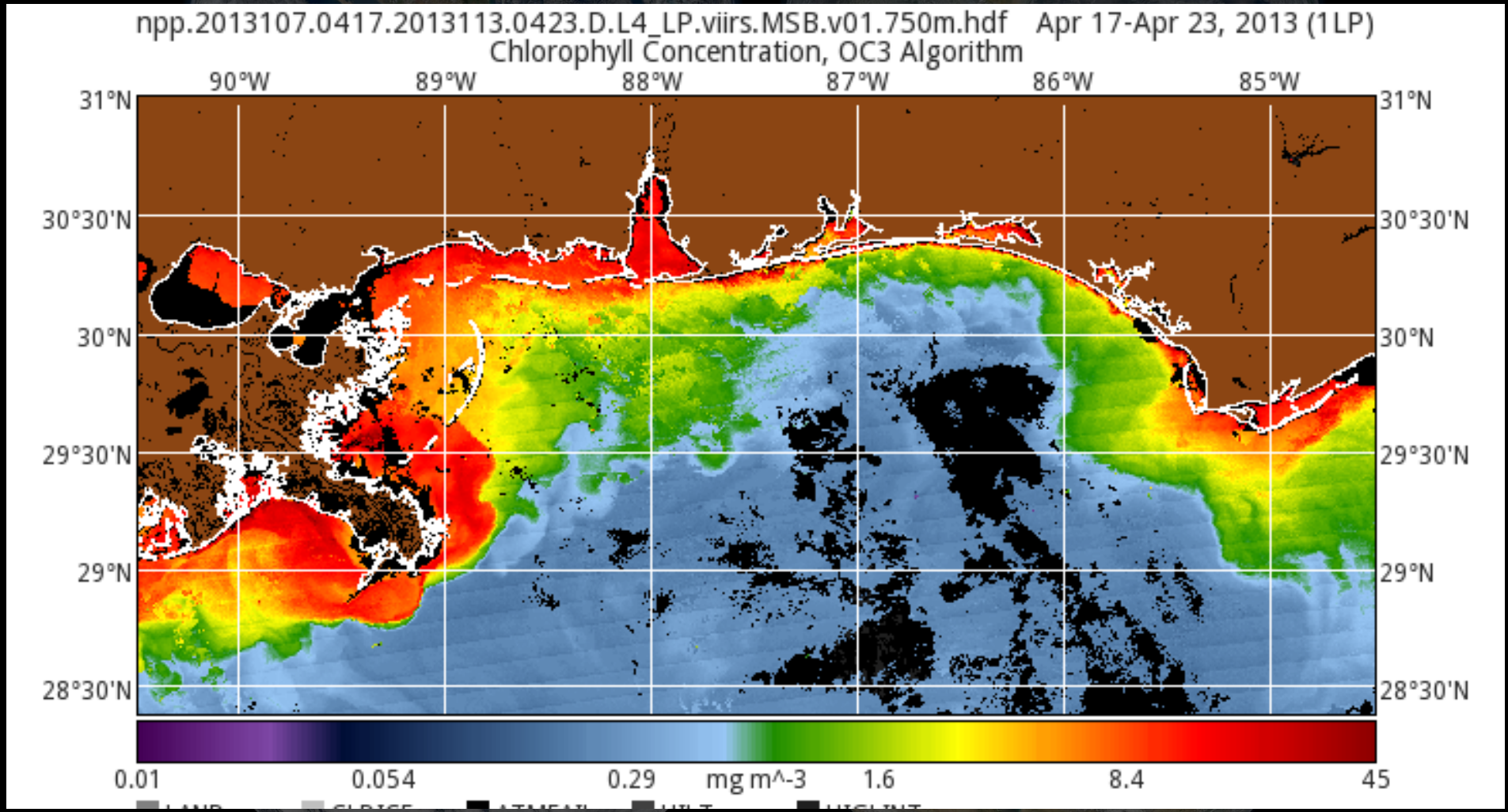




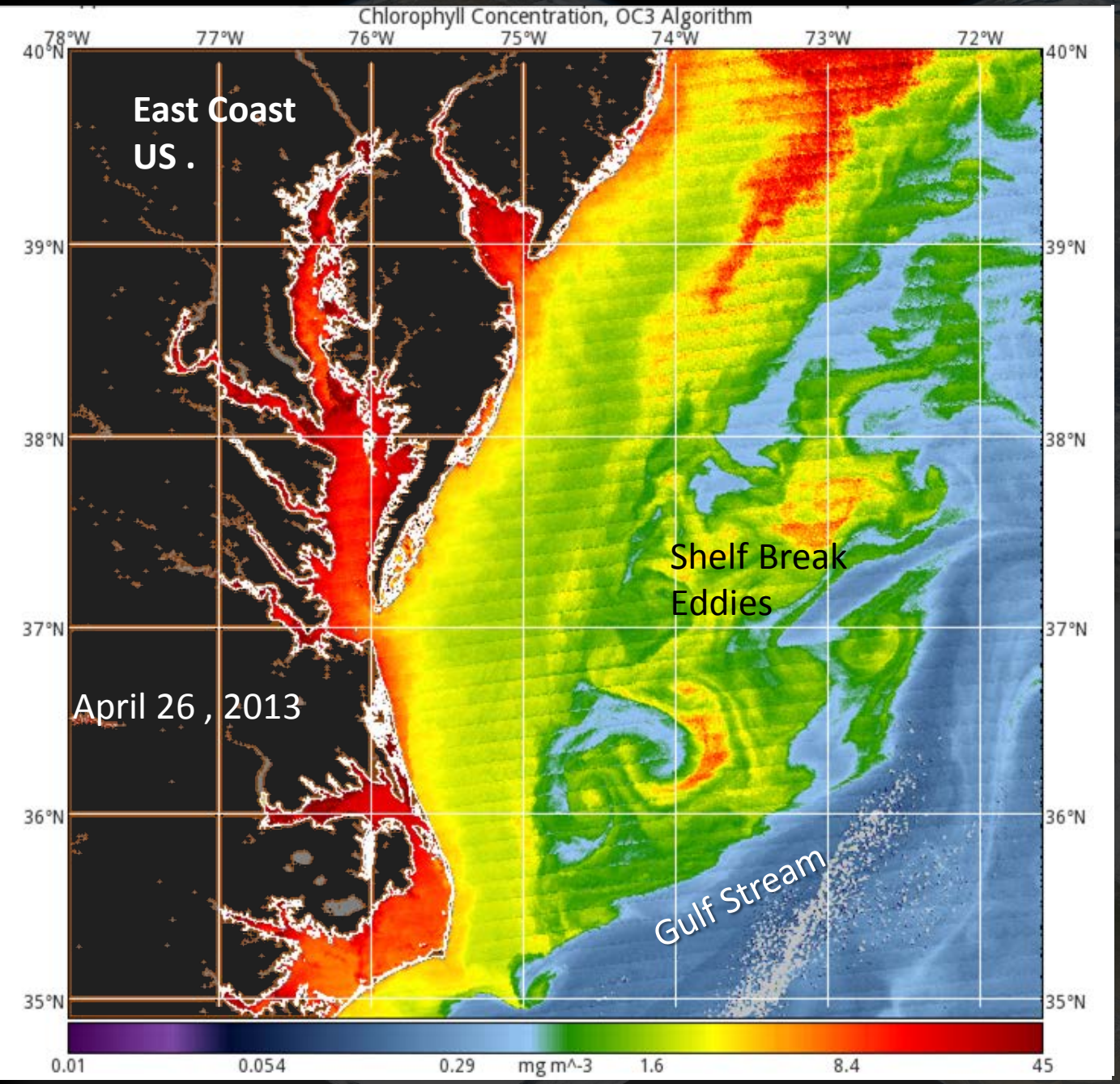
Coastal upwelling filaments at A, B, and C, show satellite retrievals of complex coastal and offshore interaction of SST and color response

Courtesy of Bob Arnone

VIIRS Chlorophyll - Mississippi Bight
Coastal sequence showing changes in Chlorophyll April 2- 23, 2013



Courtesy of Bob Arnone



VIIRS Chlorophyll
For Chesapeake Bay
and the Gulf Stream

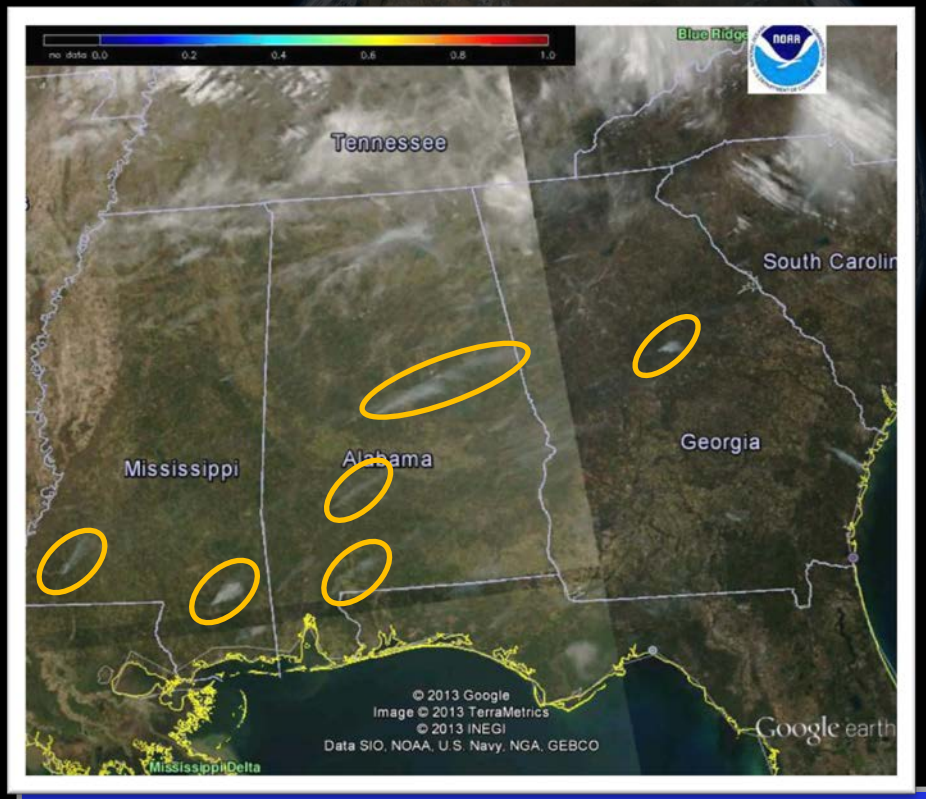
April 6, 2013
April 26, 2013

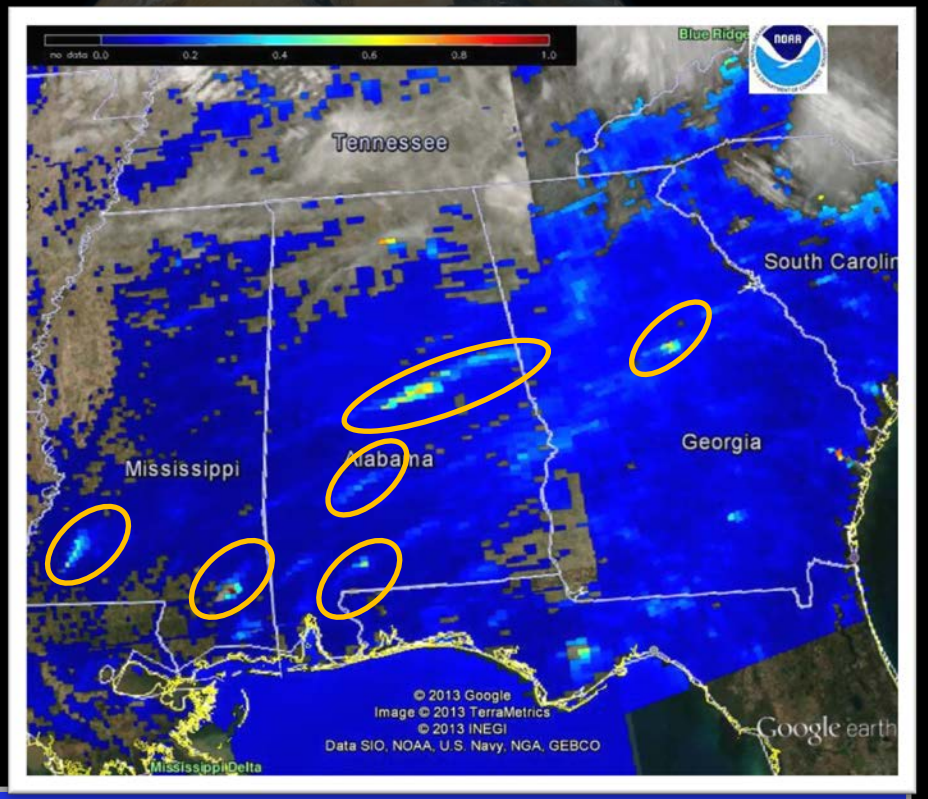
Norfolk

SNPP Data Products Status
VIIRS Aerosol EDRs

Status	Accomplishments	Challenges
• Aerosol Optical Thickness: (B) • Aerosol Particle Size Parameter: (B) • Suspended Matter (dust, smoke, ash): (-) (B)=Beta Maturity (-)=Pre-Beta Maturity Note: AOT and APSP are expected to reach Provisional Maturity by end of May 2013. SM is expected to become Beta Maturity also by the end of May 2013.	• Improved AOT product performance since launch • Found source for high bias in VIIRS AOT over land and implemented a preliminary fix to ground processing (phase 1) and a phase 2 fix is coming • Revisions to LUTs for aerosol over ocean retrieval algorithm is being tested for potential improvements to fine mode fraction and SM product • Updated documentation to be consistent with the code • After 18 months, VIIRS is producing AOT and APSP with an accuracy comparable to MODIS - that took MODIS 4 to 6 years to accomplish!	• SM product needs substantial changes or a new algorithm approach • Exploring new approach for the heavy aerosol flag generated in VCM

Aerosol Optical Thickness



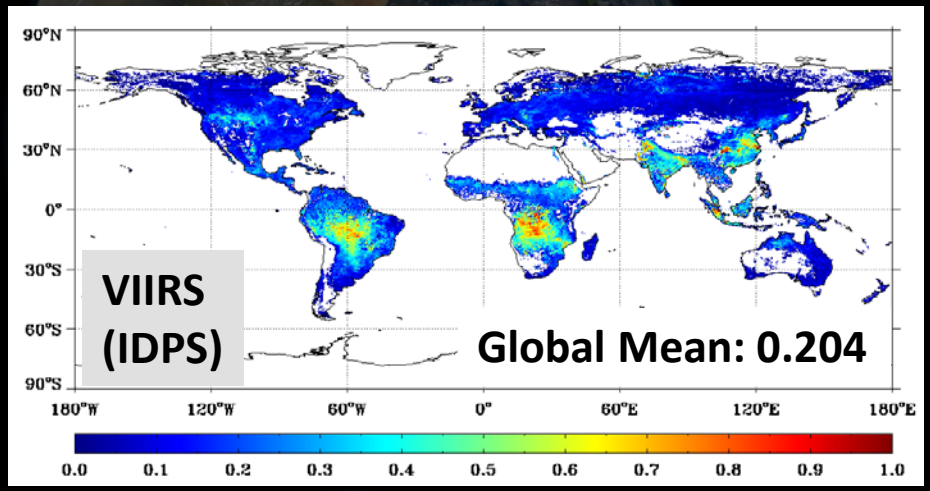


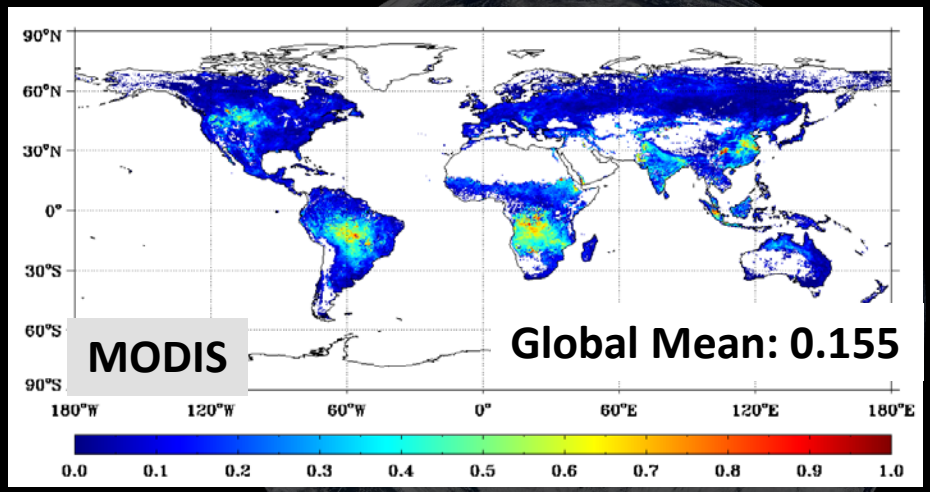
Smoke from fires on March 15, 2013 seen in the visible RGB image (left panel) nicely captured in the quantitative retrieval of aerosol optical thickness (right panel). These images are generated at the STAR IDEA (Infusing satellite Data into Environmental Applications) website using direct broadcast SDRs, VCM, and fire hot spot data from UW. The website (www.star.nesdis.noaa.gov/smcd/spb/aq/) is routinely accessed by air quality forecasters for satellite aerosol imagery that provides the spatial extent of smoke, dust, and haze.

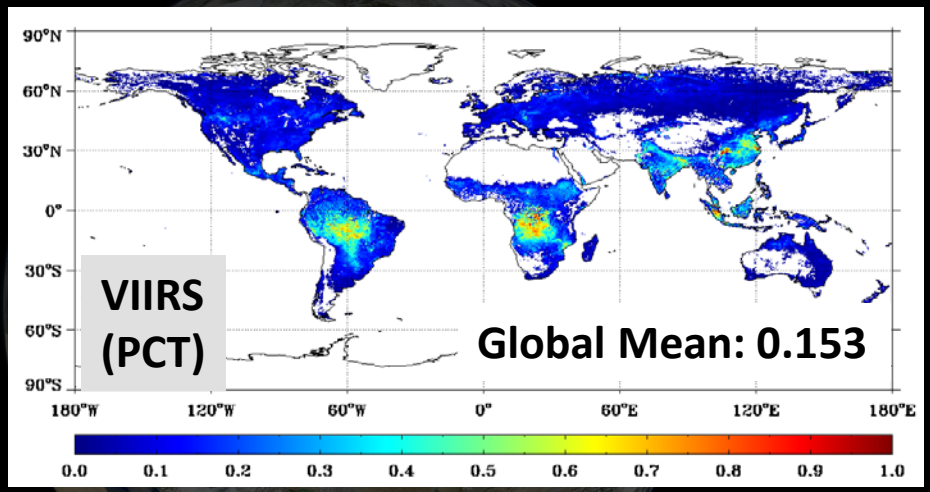
Courtesy of STAR aerosol team

VIIRS Monthly Mean Aerosol Optical Thickness
for September 2012

- Demonstration of the effect of surface band ratio (BR, PCT) update on global scale
  - VIIRS AOT retrievals for Sept 2012 were re-processed with updated BR
- Best quality EDRs are gridded to 0.25° regular grid
- Only common grids are used
- Monthly averages (arithmetic average of daily data) are plotted







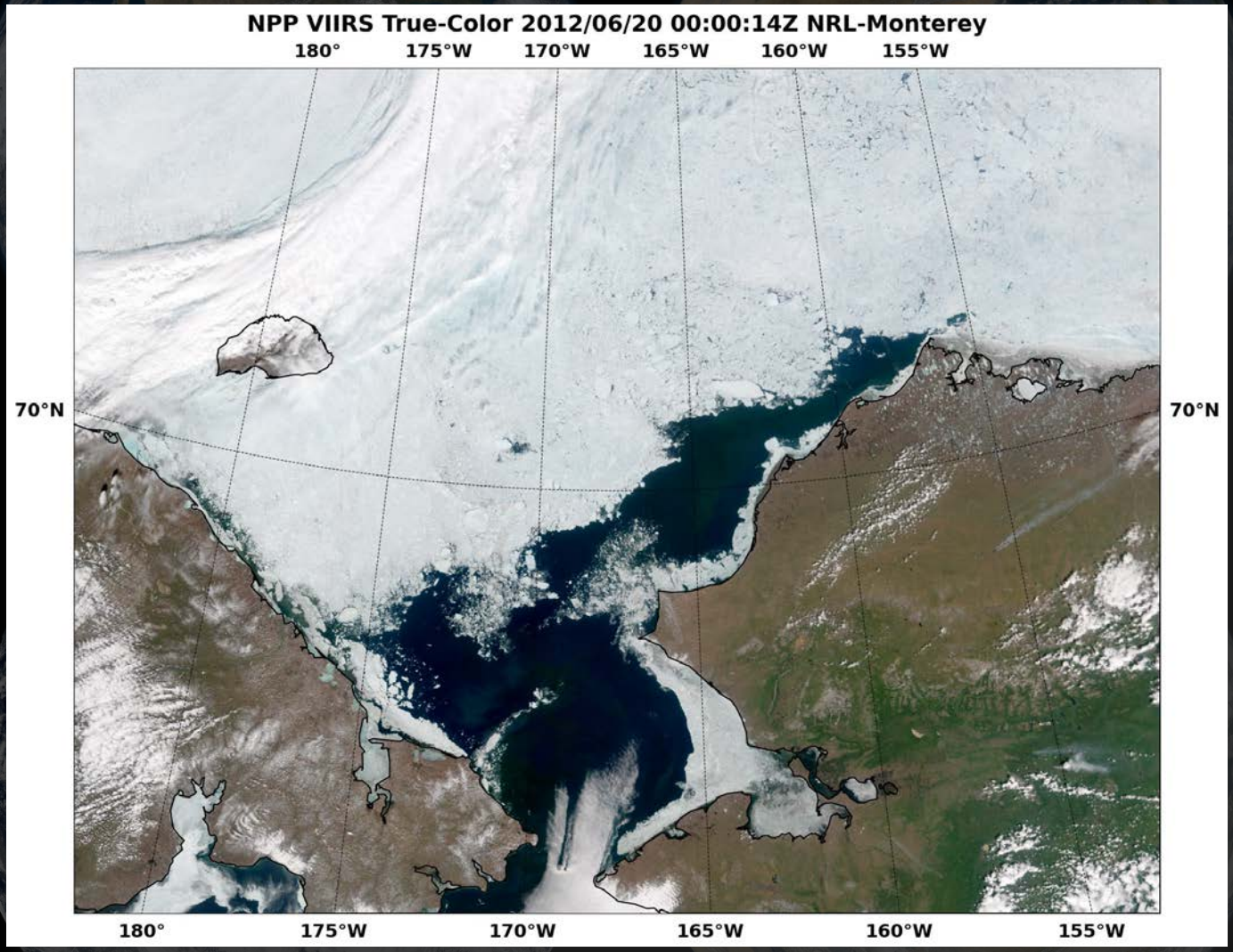
Courtesy of STAR aerosol team

SNPP Data Products Status
VIIRS Cryosphere EDRs

Status	Accomplishments	Challenges

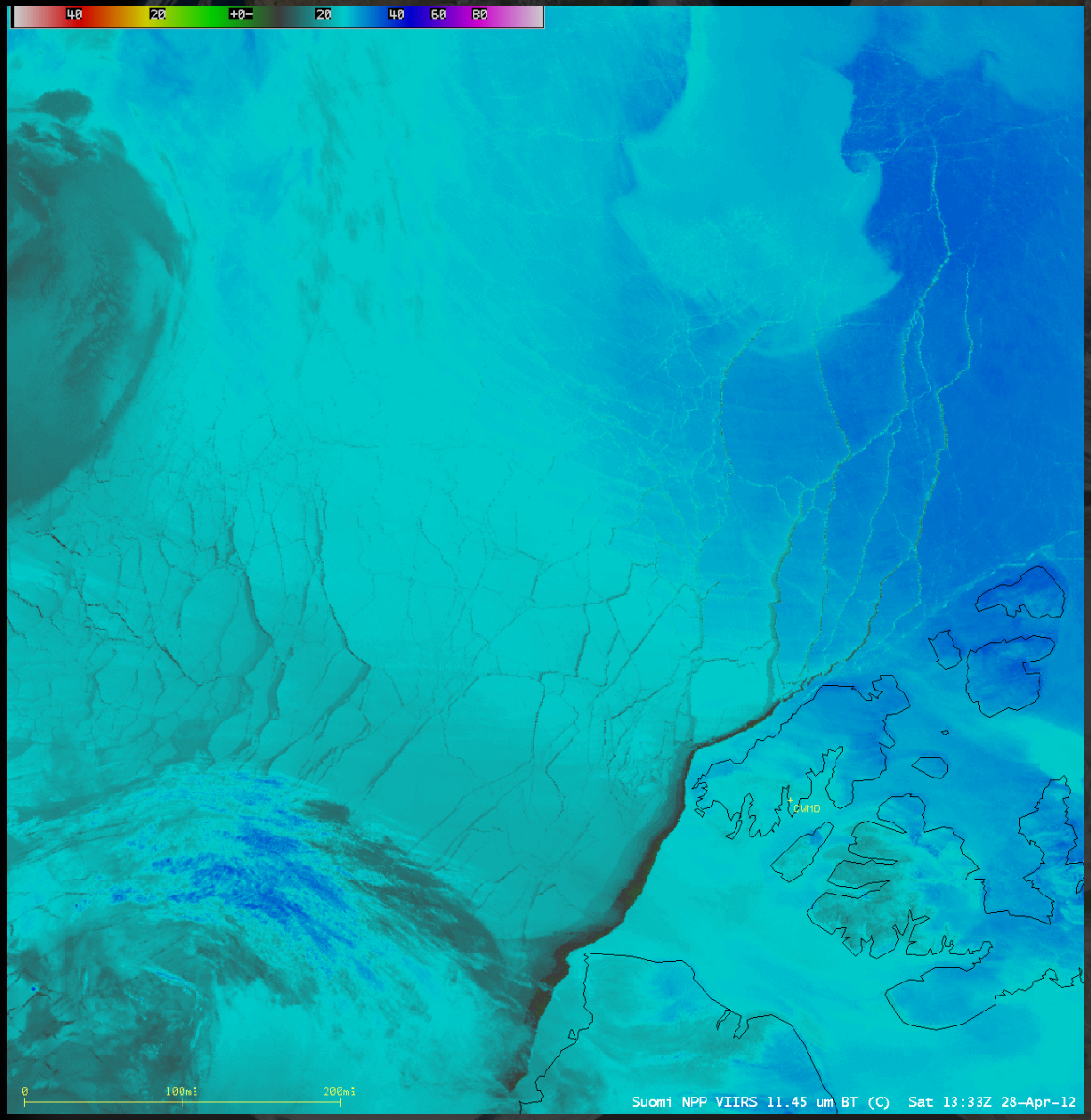
• Sea Ice Characterization: (B)
• Snow Cover: (B)
• Ice Surface Temperature (B)
 	
(B)=Beta Maturity
	• Validation of all products has been performed using similar satellite products from other sensors, surface-based data, and aircraft measurements
	  • Binary snow cover compares well to MODIS snow cover and to in situ snow cover
	  • IST EDR shows good agreement with aircraft (IceBridge) data and MODIS IST
	  • Ice concentration looks good, but is biased high relative to passive microwave
	• A number of issues in VCM were identified that led to VCM threshold changes and other adjustments
	• Recent improvements in the VCM have resulted in dramatic improvements in snow and ice products in certain conditions
		• Challenges in resolving issues with the Snow/Ice Gridding routines in the Ground System
		• Sea ice characterization (age) does not perform well at night. Other algorithms need to be evaluated if simple remedies cannot be found
		• The snow fraction product (part of the Snow Cover EDR) is of limited utility because it is a simple average of 2x2 pixels of the binary snow mask. Other algorithms are being considered

VIIRS True Color Imagery



True color image example for the Arctic (Chukchi Sea) on 20 June 2012. (Image courtesy of Jeff Hawkins, NRL, Monterey)

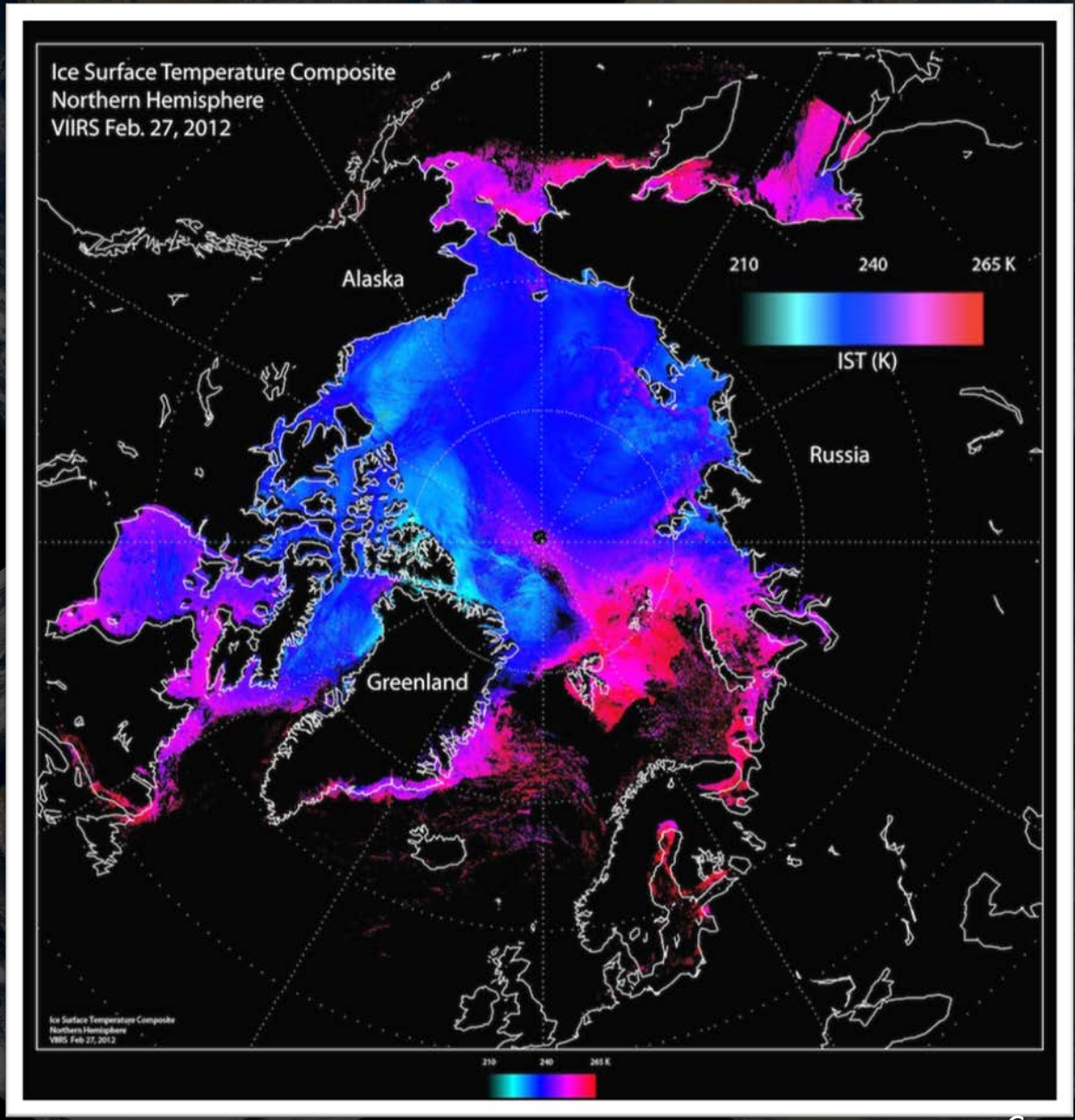
VIIRS Imagery



VIIRS IR (11.5 m) animation from consecutive overpasses of Suomi NPP over Prince Patrick Island (located in the far northwestern portion of the Canadian Arctic Archipelago) on 28 April 2012.

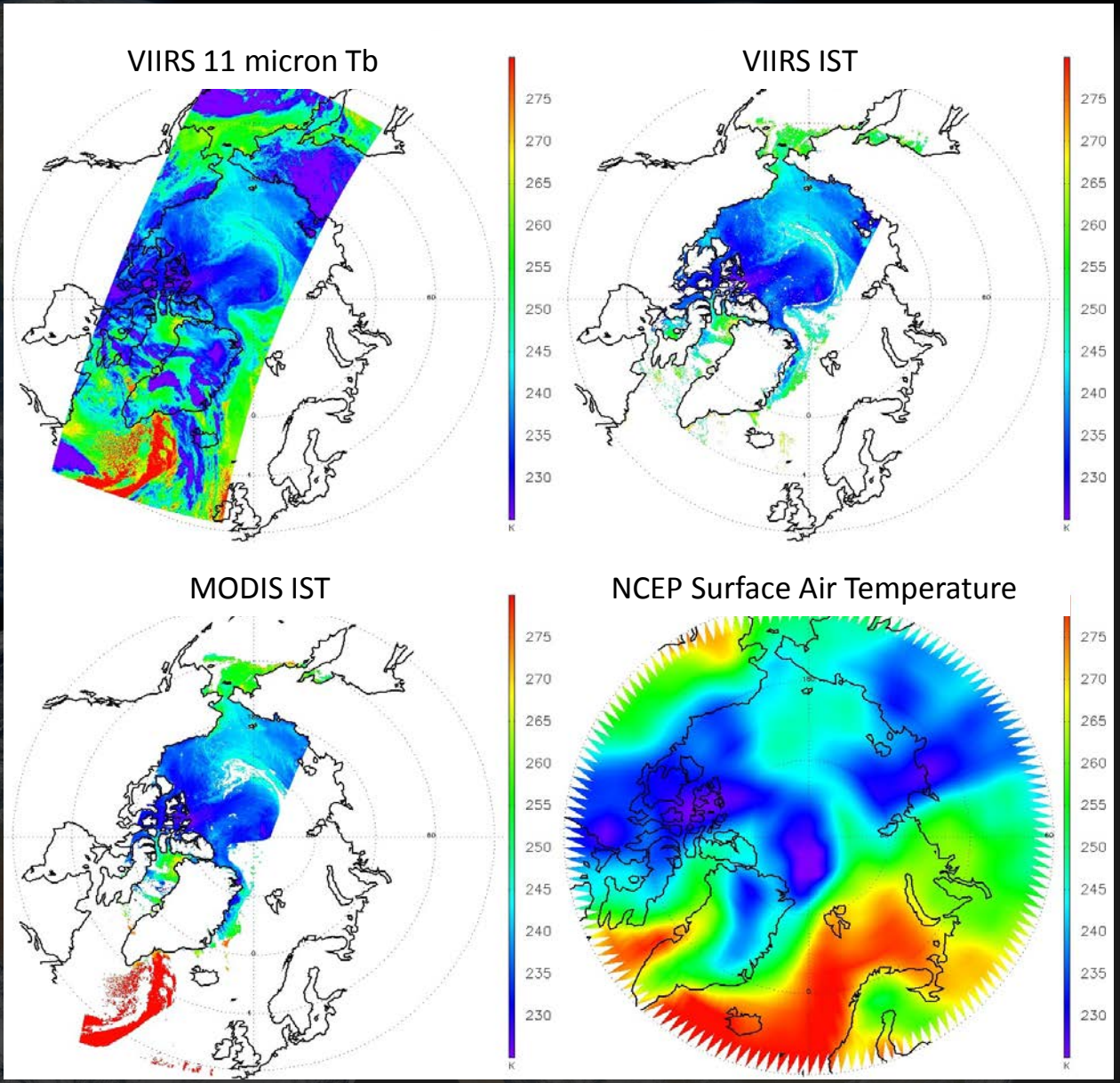
Courtesy of Jeff Key

VIIRS Ice Surface Temperature



Courtesy of Jeff Key

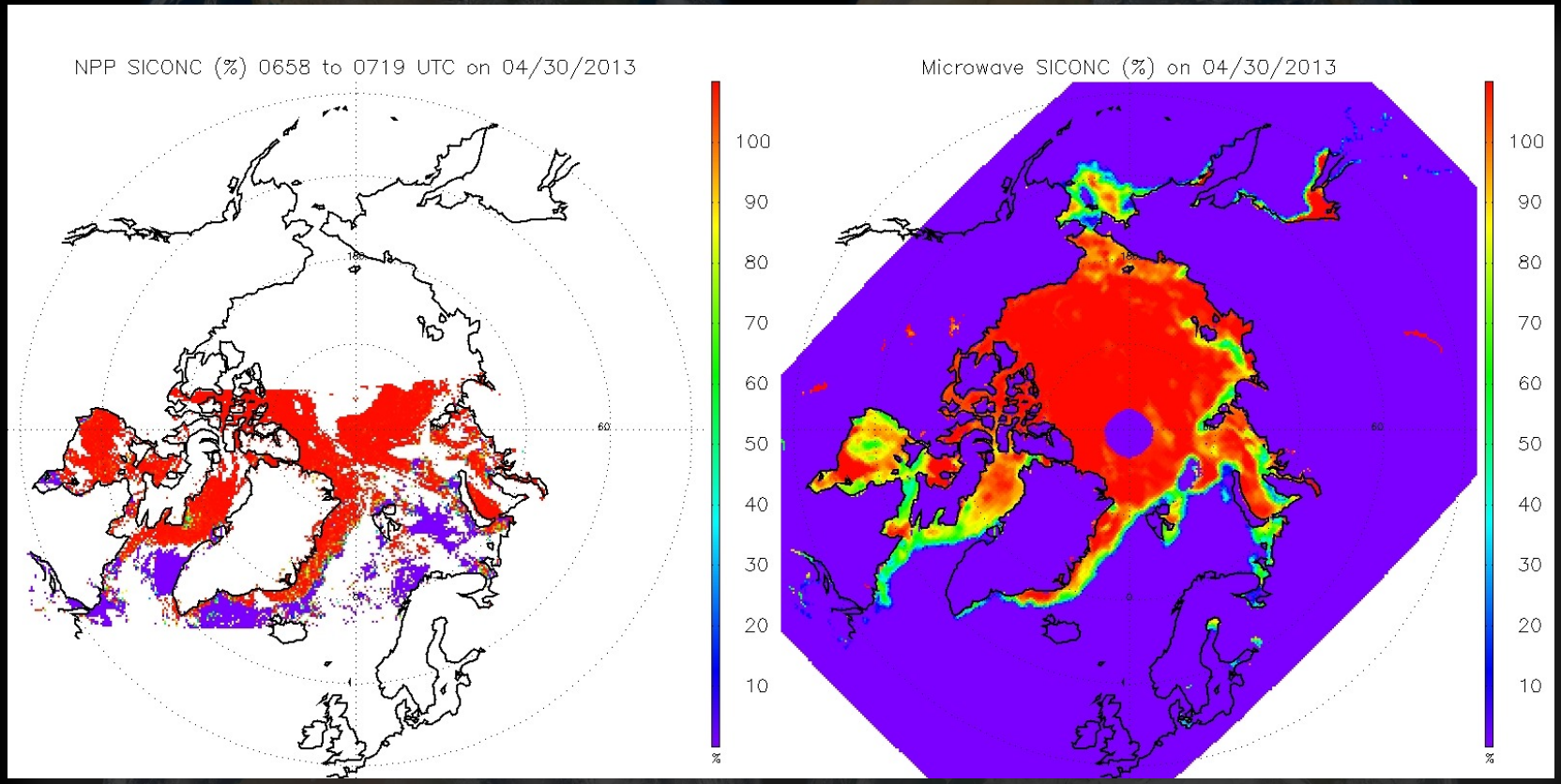
Ice Surface Temperature



S-NPP VIIRS 11 micron Brightness (upper left) Temperature, and ice surface temperature from S-NPP VIIRS EDR (upper right) and MODIS Aqua products (lower left), and NCEP surface air temperature (lower right) on February 6, 2013.

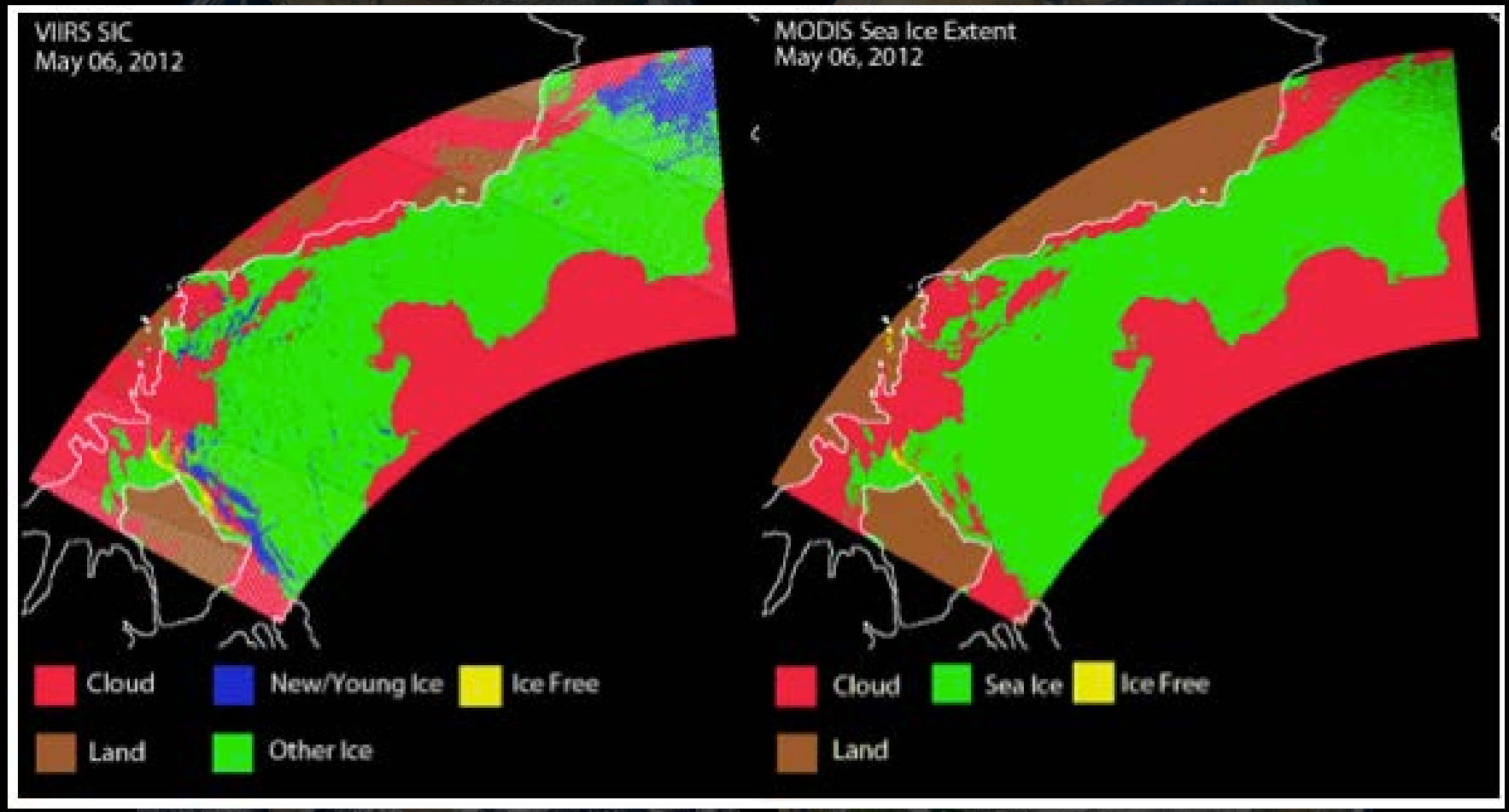
Courtesy of Jeff Key

VIIRS Sea Ice Concentration



Sea Ice Concentration from S-NPP VIIRS IP (left) and from microwave using NASA team algorithm (right) on April 30, 2013.

Courtesy of Jeff Key

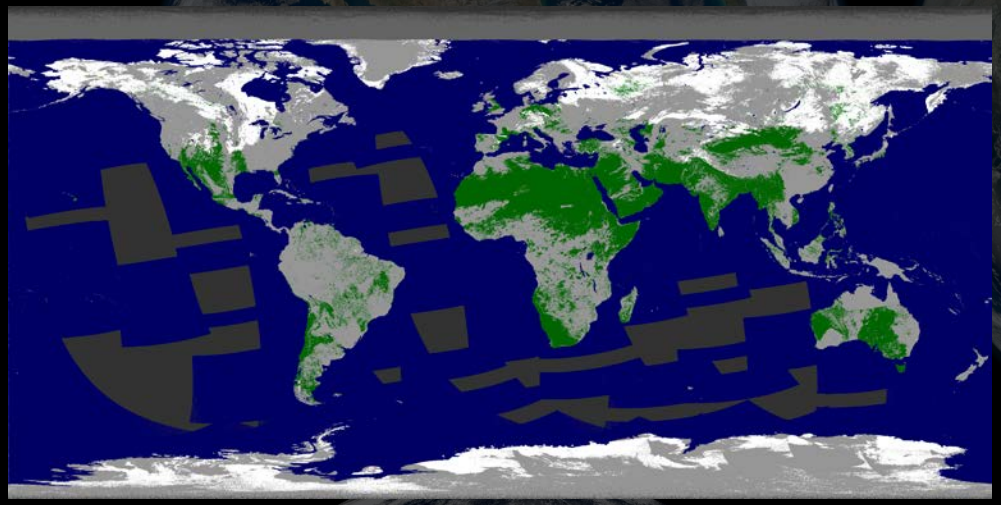


VIIRS Sea Ice Characterization EDR (left) and MODIS Sea Ice Extent (right) over the Beaufort Sea during May 6, 2012.

Courtesy of Jeff Key

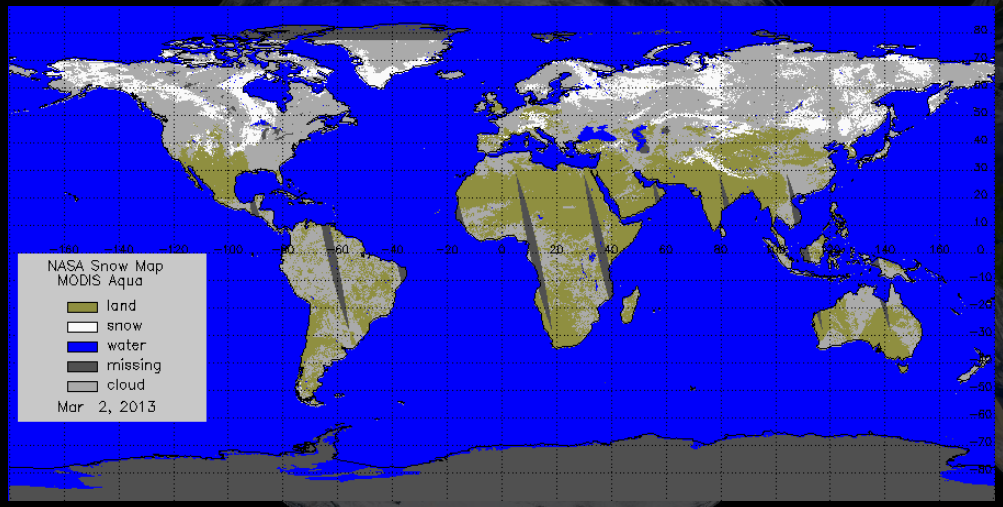
VIIRS vs MODIS Binary Snow Map

NPP-Suomi VIIRS snow cover map



Visual analysis has shown that VIIRS binary snow maps compare well to MODIS Aqua snow maps. There are some differences in the cloud mask applied in the two products.

MODIS Aqua snow cover map



No severe overestimates or underestimates of the snow cover have been found in the VIIRS snow product.

March 2, 2013

Courtesy of Jeff Key

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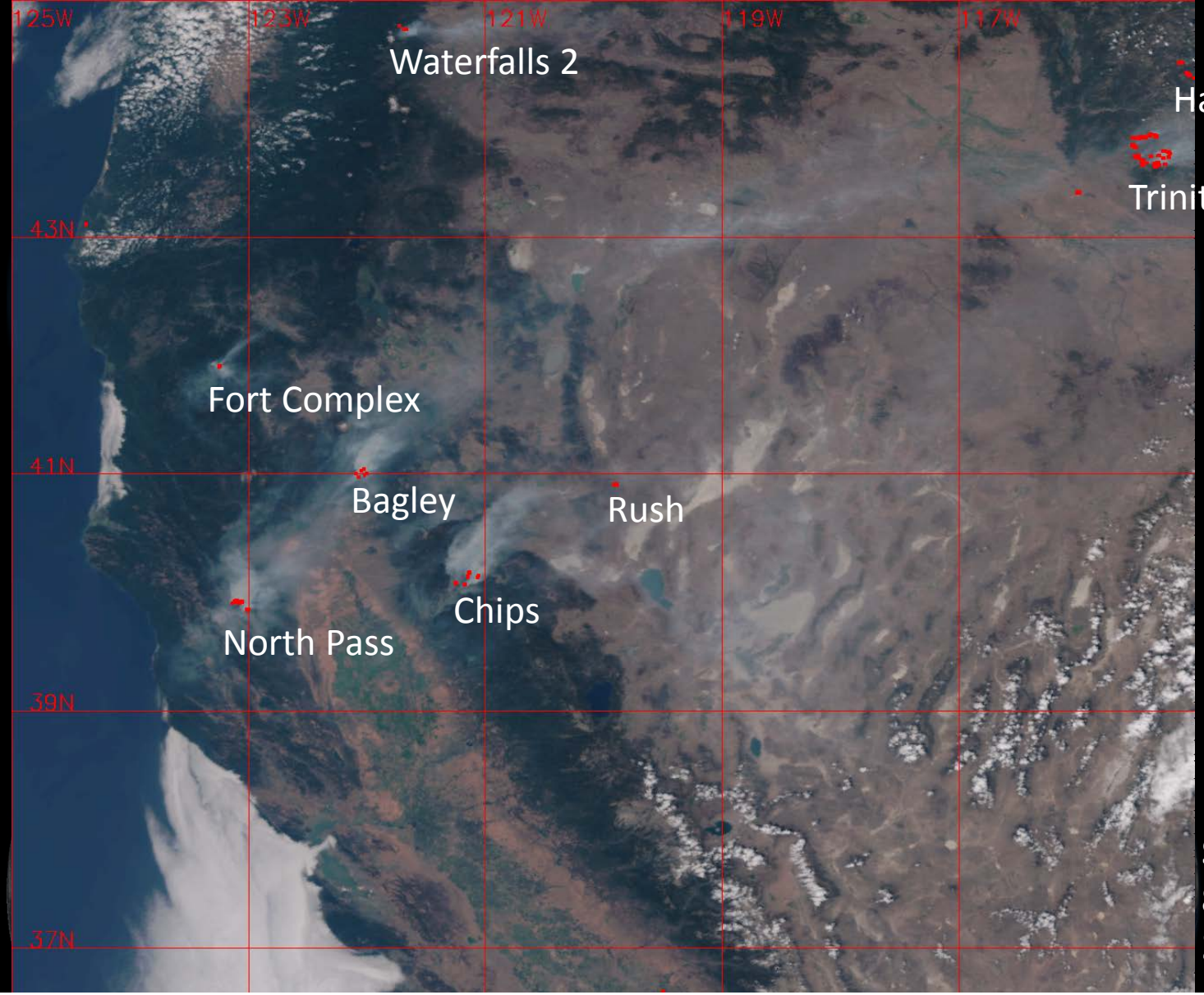
SNPP Data Products Status
VIIRS Land EDRs

Status	Accomplishments	Challenges

• Active Fires: (B)
• Land Surface Temperature: (B)
• Surface Albedo (-)
• Surface Type: (B)
• Vegetation Indices: (B)
  • TOA NDVI
  • TOC EVI
• Surface Reflectance (IP): (B)
 	
(-)=Pre-Beta Maturity
(B)=Beta Maturity
	• New J1 requirements for Active Fires – new algorithms to implement
	  • Addition of Full fire mask and fire radiative power
	• Active Fires website: http://viirsfire.geog.umd.edu
	• Updated the BPSA LUT due to the VIIRS SRF led to improved performance
	• Training dataset for Surface Type now consists of 5 years (2007-2011)
	• Coordinated Land gridding update activation (surface reflectance gridding)
		• For LST, cloud residual is still a problem and introduces significant noise in the LST validation
		• Surface Albedo ground measurement data are very limited
		• Surface Type would like to include burned areas, deforestation, urbanization, and flooding classifications
		• New J1 requirements for Vegetation Index – TOC NDVI EDR
		• Surface Reflectance product is not easily accessible



The larger fires in **California** observed in the images include the **Fort Complex, Bagley, North Pass, Chips, and Rush**. In **Oregon**, the **Waterfalls 2** fire can be seen near the top-left portion of the image. And to the east, in **Idaho**, the **Trinity Ridge** and **Halstead** fires can easily be seen.

(Image courtesy of Ivan Csiszar)

Trinity Ridge

Photo courtesy of Chuck Redman
NWS IMET

SNPP Data Products Status
CrIS and ATMS Sensor Data Records

Status	Accomplishments	Challenges

• ATMS SDR (P)
• CrIS SDR (P)
 	
(P)=Provisional Maturity
	• ATMS being evaluated for use in data assimilation models
	• CrIS requirements have been met
	  • NEdN and radiometric, spectral and geolocation uncertainties are stable and significantly better than the requirements
	• CrIS full spectral test – successful, investigating ways to provide data routinely (data rate trades)
		• ATMS
		  • Striping in Imagery
		• CrIS
		  • Latency in IDPS code updates
		  • Unexpected large efforts in code fixes to deal with various cases of missing data packets
		  • Longer time needed to build and correct data quality paradigm than was anticipate

SNPP Data Products Status
CrIMSS Environmental Data Records

Status	Accomplishments	Challenges
• Atmospheric Vertical Moisture Profile (P) • Atmospheric Vertical Temperature Profile (P) (P)=Provisional Maturity	• Many problems were uncovered during provisional maturity evaluation, solutions were evaluated, change packages submitted, implemented in the ground system • Online product has been enhanced: yield of successful IR+MW has increased from 20% to 40% with less than 15% poor (likely precip contaminated) • Off-line EDR (Mx7) product performance has higher IR+MW yield (50%) and is meeting requirements in mid troposphere • Successful launch and integration of dedicated RAOBs concurrent to CrIMSS overpass for use in Stage 1 validation	• Outstanding issues related to quality control during rare events (ie, intermittent scene mis-classification at start of granule) • Known problem with surface pressure over rugged terrain; small number cases • Precipitation flag approach out of date (AMSU vs ATMS) and particularly ineffective in tropics - needed to screen cases from the performance validation • Known problems with surface emissivity calculation affecting retrieval and CrIS cloud cleared radiance • Enticing users through reliable information dissemination on product performance characteristics

Provisional Maturity Evaluation (8/35)
T(p), q(p) Global RMS for May 15, 2012

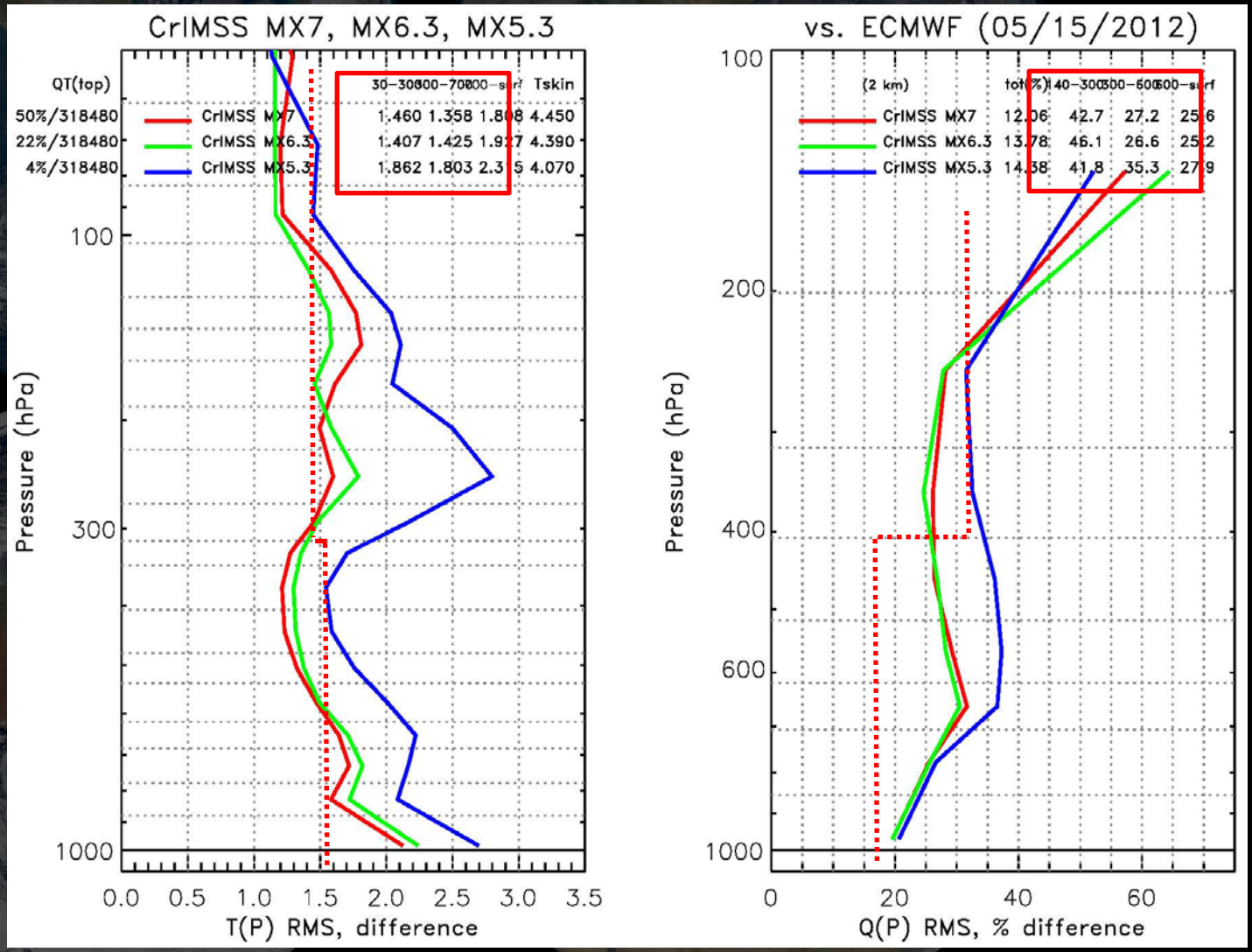
IDPS 5.3 (Past; Blue), IDPS 6.4 (Present; Green) and IDPS 7.1 (future; Red) Yield : IR+MW

Yield has increased from 4% (Mx5.3) to 50% (Mx7.1) →

Results are shown w.r.t. ECMWF

Specifications shown as dotted red line (only relevant for GLOBAL RMS) and numerical (red boxes)

Performance has improved with IDPS version

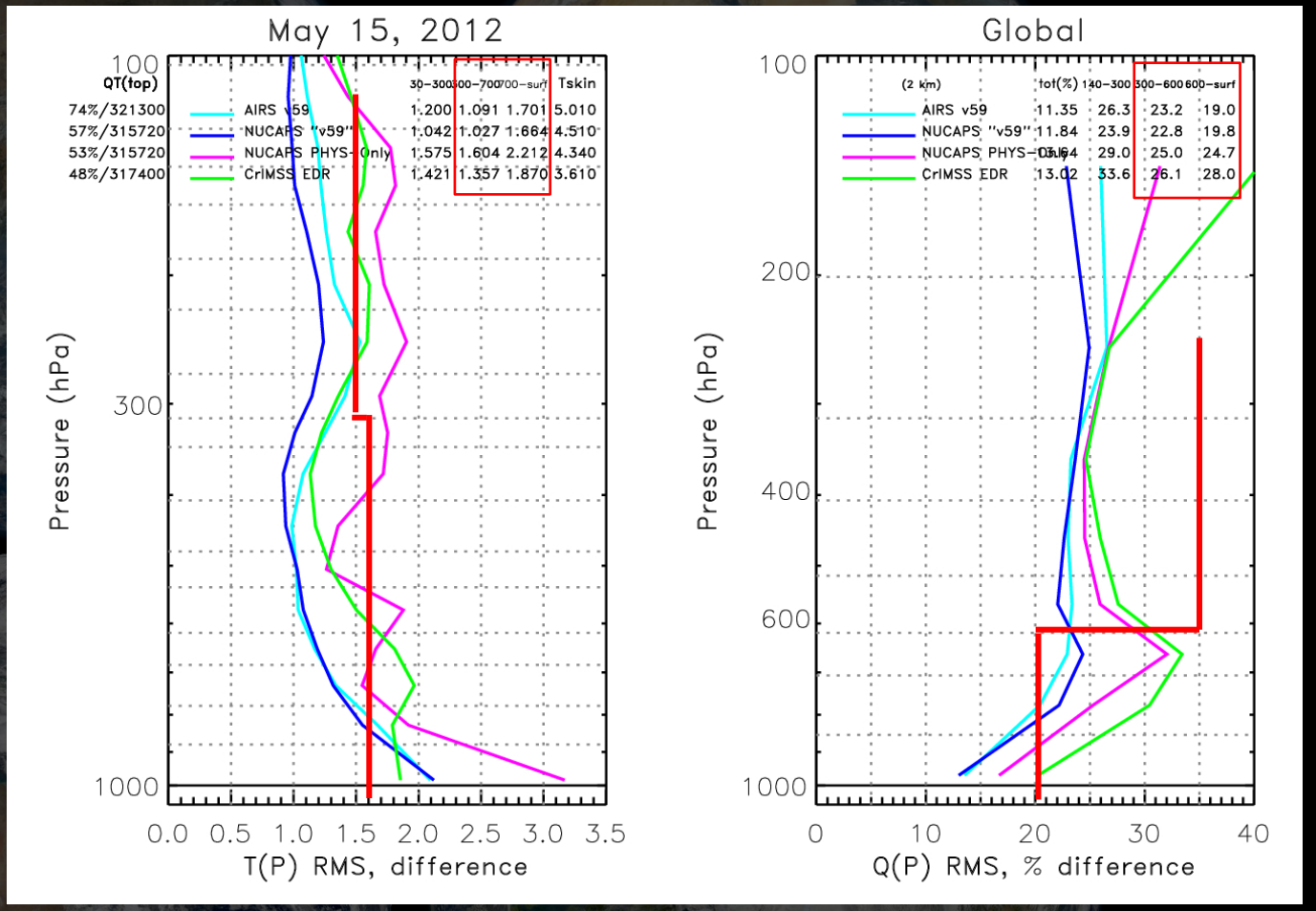


Courtesy of Tony Reale

Comparison of CrIMSS-EDR, NUCAPS, AIRS

Results:

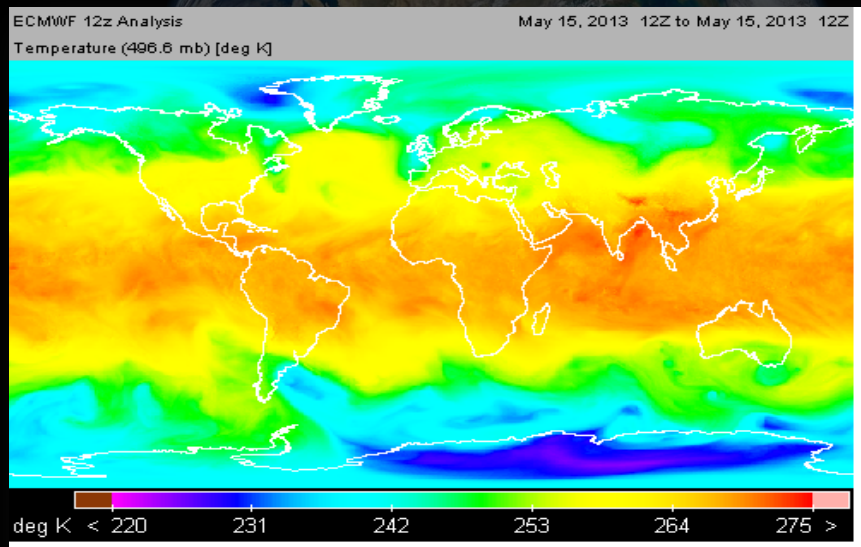
- Statistics for May 15, 2012 focus day in which Aqua and NPP orbits has high coincidence.
- NUCAPS - PHYS(Magenta) and CrIMSS EDR (GREEN) have similar yield and performance
- AIRS v5.9 and NUCAPS statistics are remarkably close
- NUCAPS outperforming CrIMSS, and algorithm is consistent with METOP IASI/AMSU

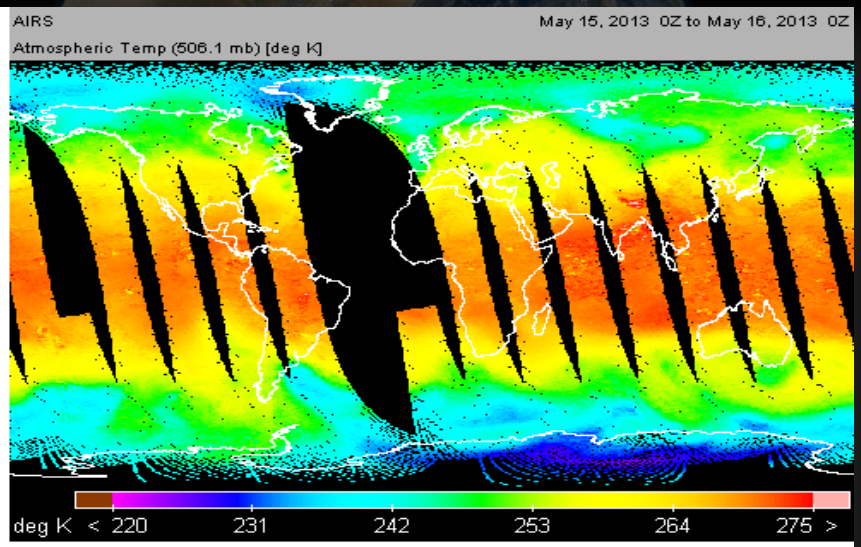


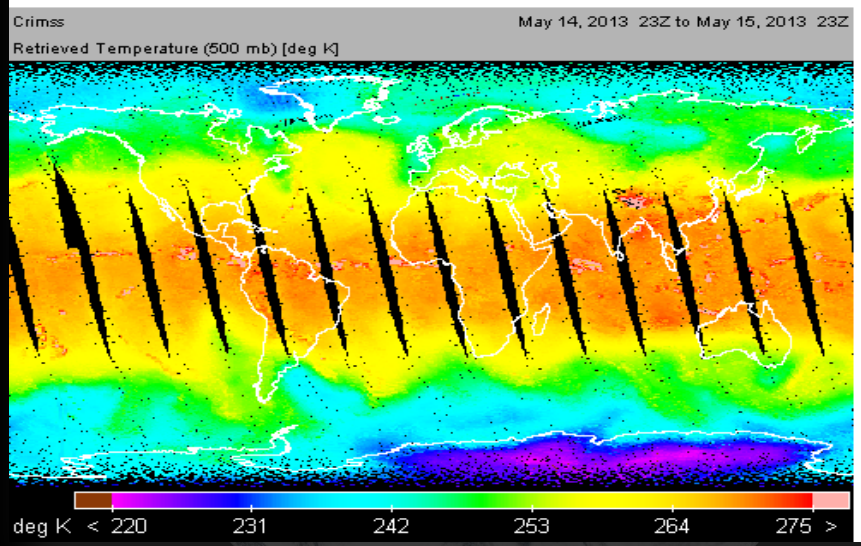
Key:

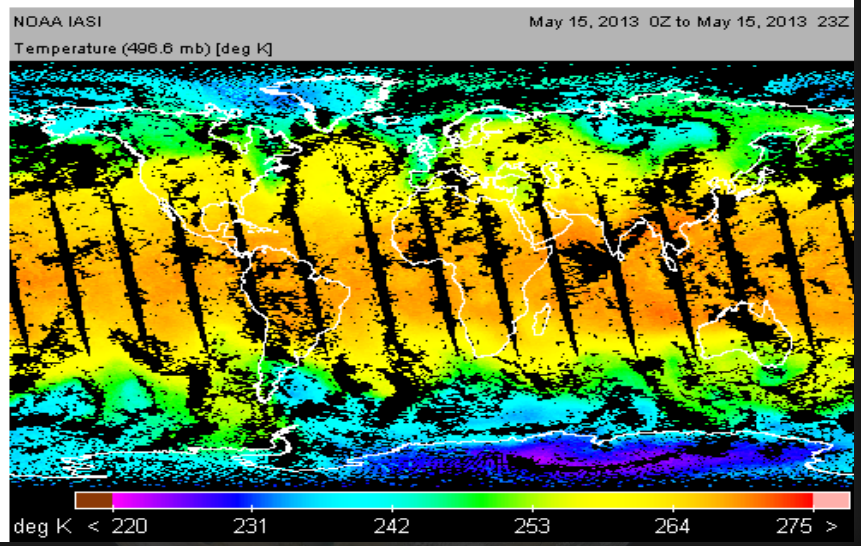
- **AIRS/AMSU v5.9 (Cyan)** = AIRS v5 with correction for instrument changes
- **NUCAPS "v5.9" (Blue)** = CrIS/ATMS and the same spectroscopy and retrieval methodology as AIRS v5.9
- **NUCAPS PHYS-only (Pink)** = no statistical operators
- **CrIMSS-EDR (Green)** = all changes installed (it is an emulation of Mx7.1 (May 2013) system)

Orbital EDR Intercomparisons for
ECMWF, AIRS (v6), CrIMSS IDPS (v 6.6) and IASI legacy (passed qc only)





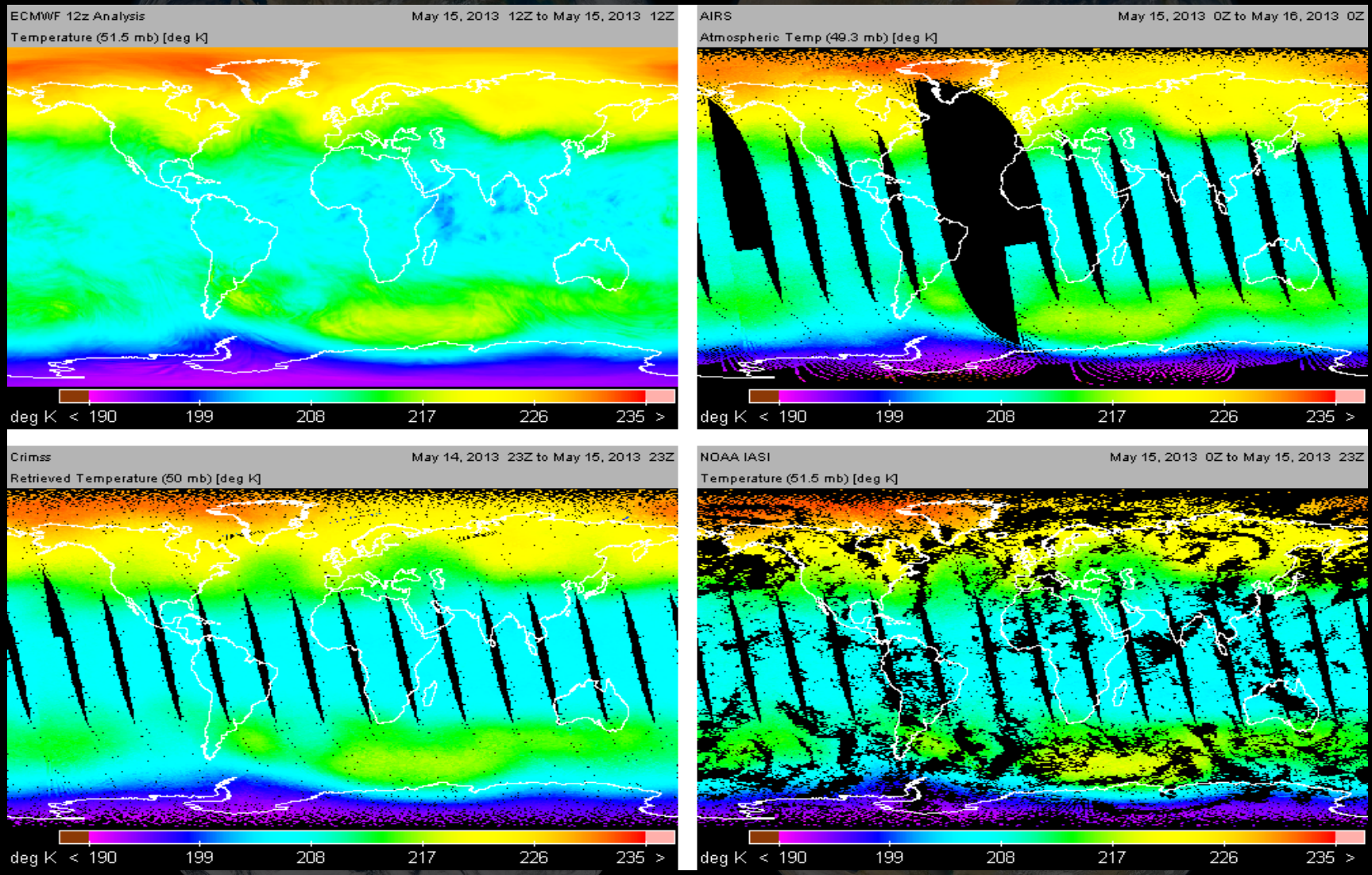




500 hPa Temperature

Courtesy of Tony Reale

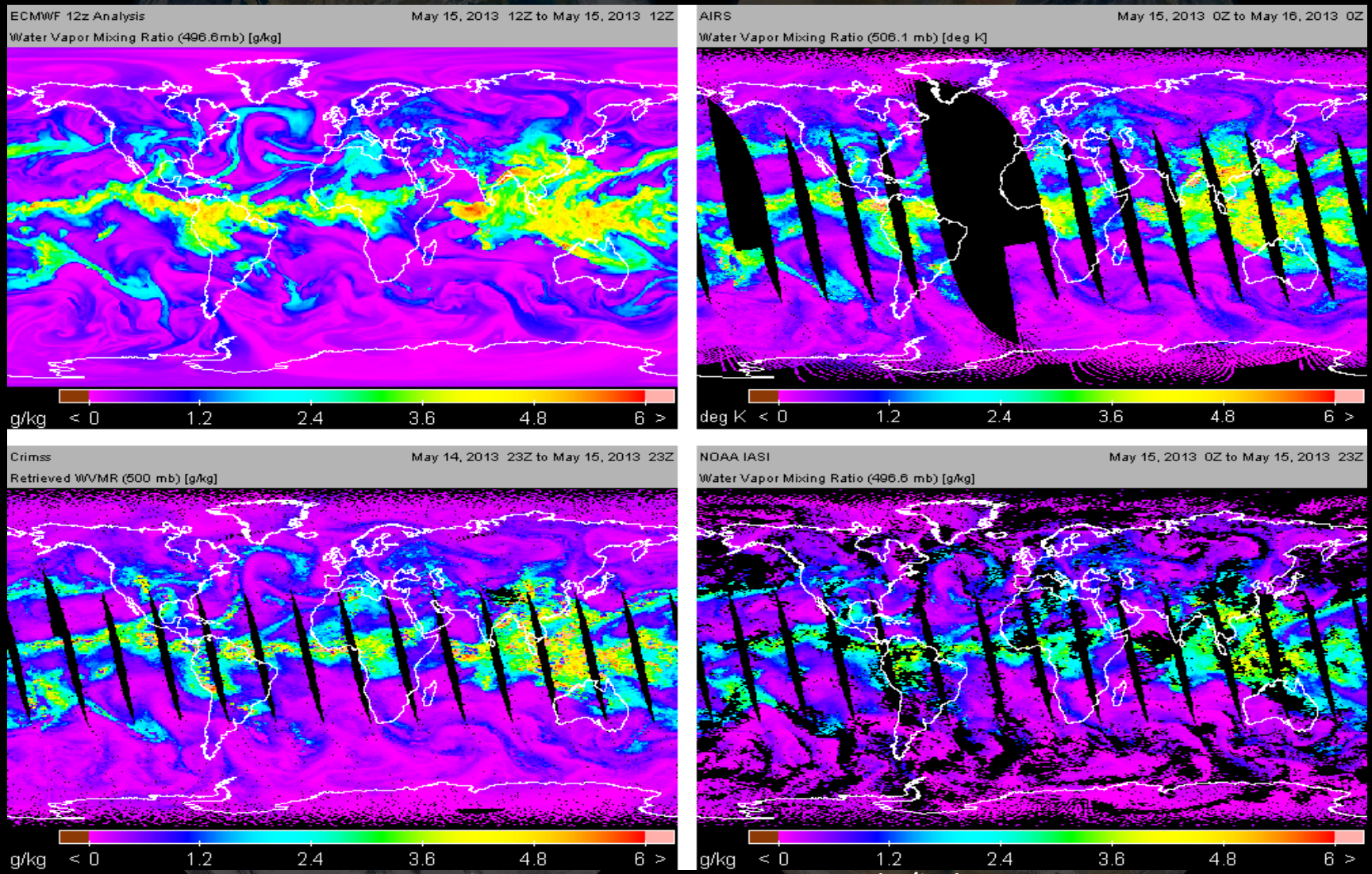
Orbital EDR Intercomparisons for
ECMWF, AIRS (v6), CrIMSS IDPS (v 6.6) and IASI legacy (passed qc only)



50 hPa Temperature

Courtesy of Tony Reale

Orbital EDR Intercomparisons for
ECMWF, AIRS (v6), CrIMSS IDPS (v 6.6) and IASI legacy (passed qc only)



500 hPa water vapor mix ratio (g/kg)

Courtesy of Tony Reale

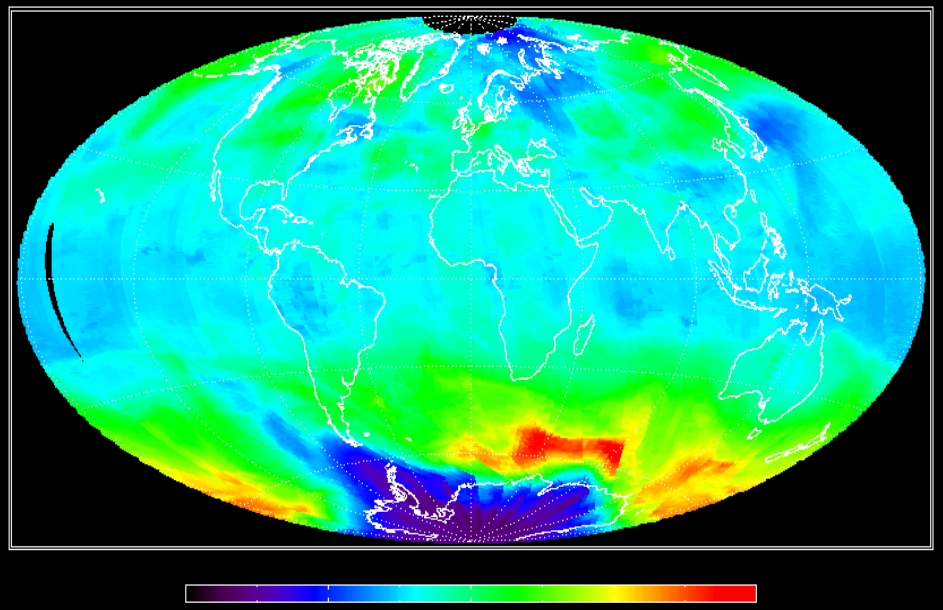
SNPP Data Products Status
OMPS Sensor Data Records

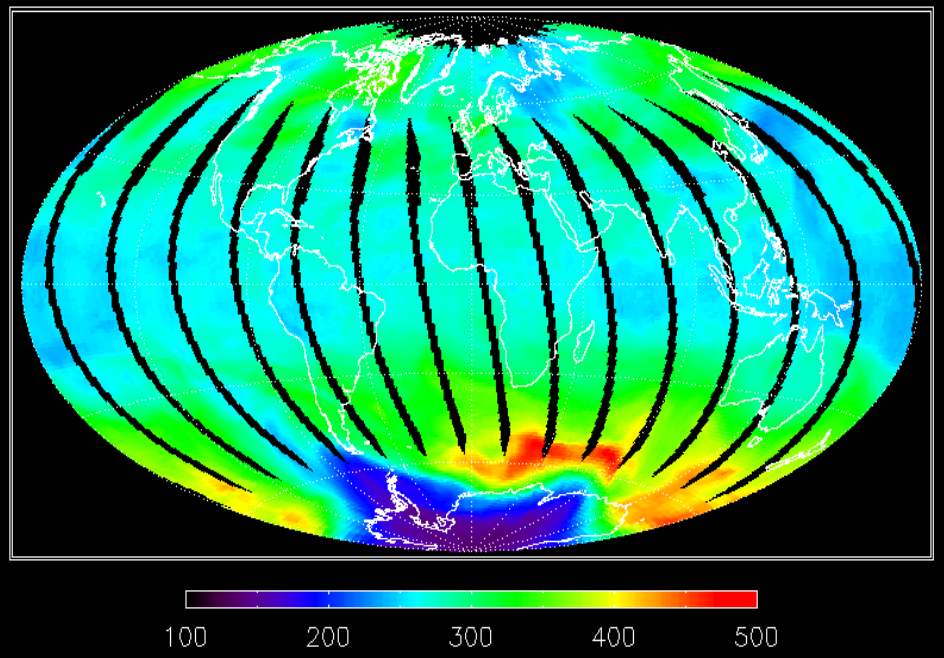
Status	Accomplishments	Challenges
• OMPS SDR Total Column: (P)	• Stray light correction tables have been developed and will be implemented in the next build	• Modifications to allow smaller Fields-of-View are in testing. • Small orbital and inter-annual wavelength scale drifts need to be characterized
• OMPS SDR Nadir Profile: (P)	• Stray light corrections are nearing completion	• Adjustments for solar variability by using Mg II Index scale factors need to be implemented
• Both	• Weekly updates to dark current tables are provided to IDPS	• Soft calibration adjustments are under development
(P)=Provisional Maturity	• Day 1 solar spectra and revised wavelength scales from in-flight measurements were provided to IDPS	• Working and reference solar diffuser measurements are undergoing analysis to characterize instrument changes

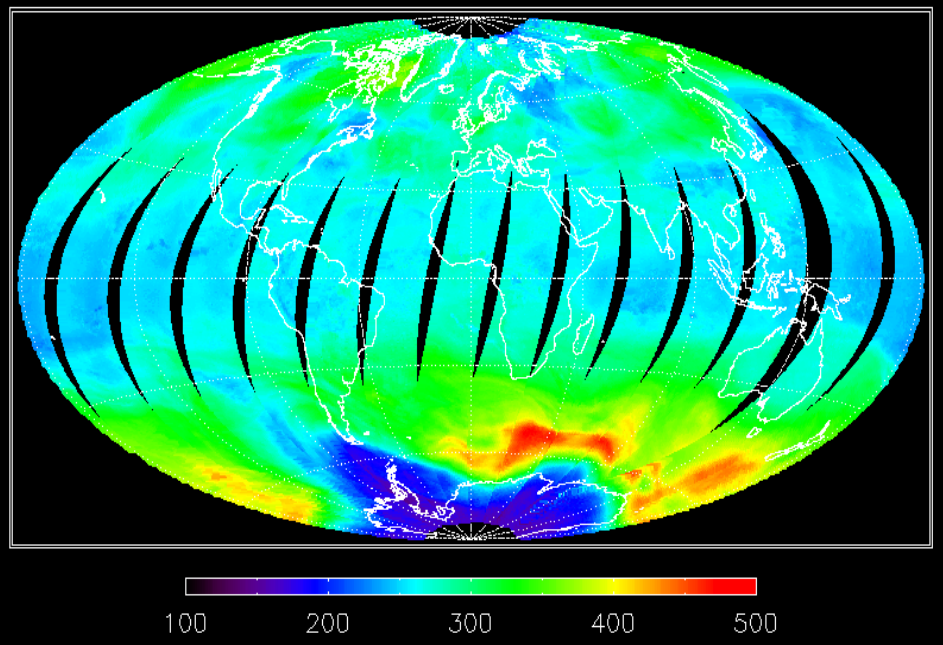
SNPP Data Products Status
OMPS Environmental Data Records

Status	Accomplishments	Challenges
• OMPS EDR Ozone – Total Column: (P)	• The Total Column EDR is producing good values for total column ozone, effective reflectivity and an aerosol index • The algorithm has been revised for improved modeling of cloud top pressures and partial clouds.	• Sulfur Dioxide (SO2) Index and Aerosol Index values show large variations with cross-track view angle and latitude due to inter-channel biases
• OMPS IP Ozone - Nadir Profile: (P)	• The Nadir Profile IP is producing reasonable values for vertical ozone profiles	• The Version 8 profile algorithm has been tested in ADL and will be delivered as an upgrade the existing Version 6 profile algorithm in use at IDPS
• Both	• Most error flags for both products are functioning as designed	• Soft calibration adjustments to reduce biases with correlative measurements and for indices are under development and validation

(P)=Provisional Maturity







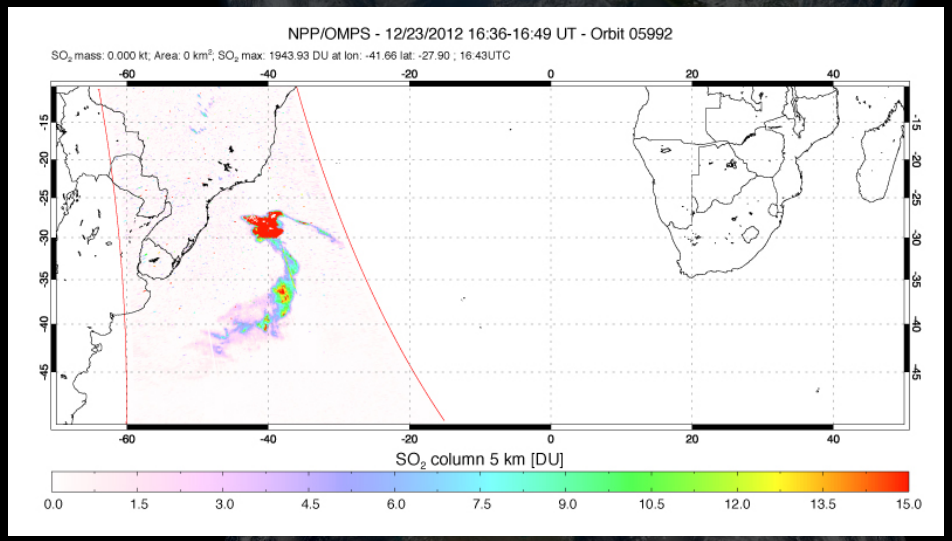
Total Ozone (DU) from S-NPP OMPS (top left), NASA EOS Aura OMI (top right) and MetOp-A GOME-2 (lower left) maps for October 4, 2012. Ozone Hole conditions (< 220 DU) are present at the southern tip of South America.

OMPS instruments provide the measurements to continue monitoring atmospheric ozone.

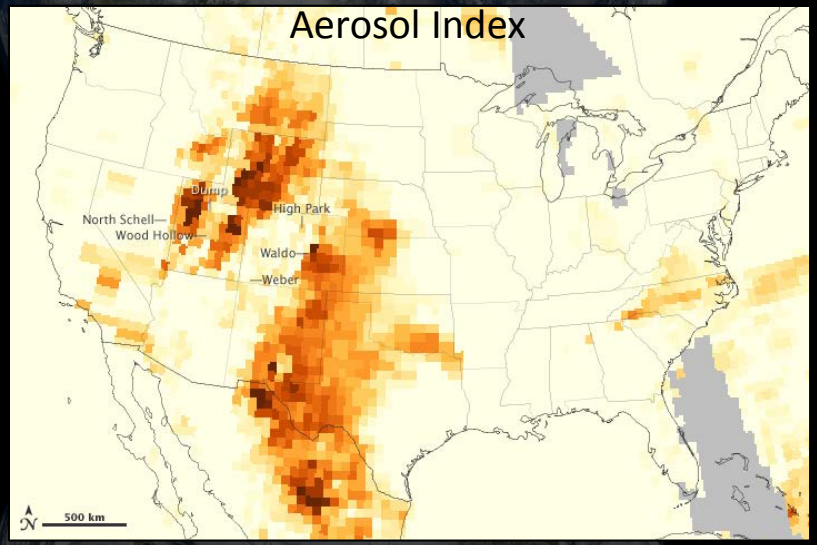
Slide courtesy of L. Flynn;
Maps by W. Yu with data from given sources

OMPS Aerosol and SO_2 Index

Copahue Eruption Dec. 13, 2012

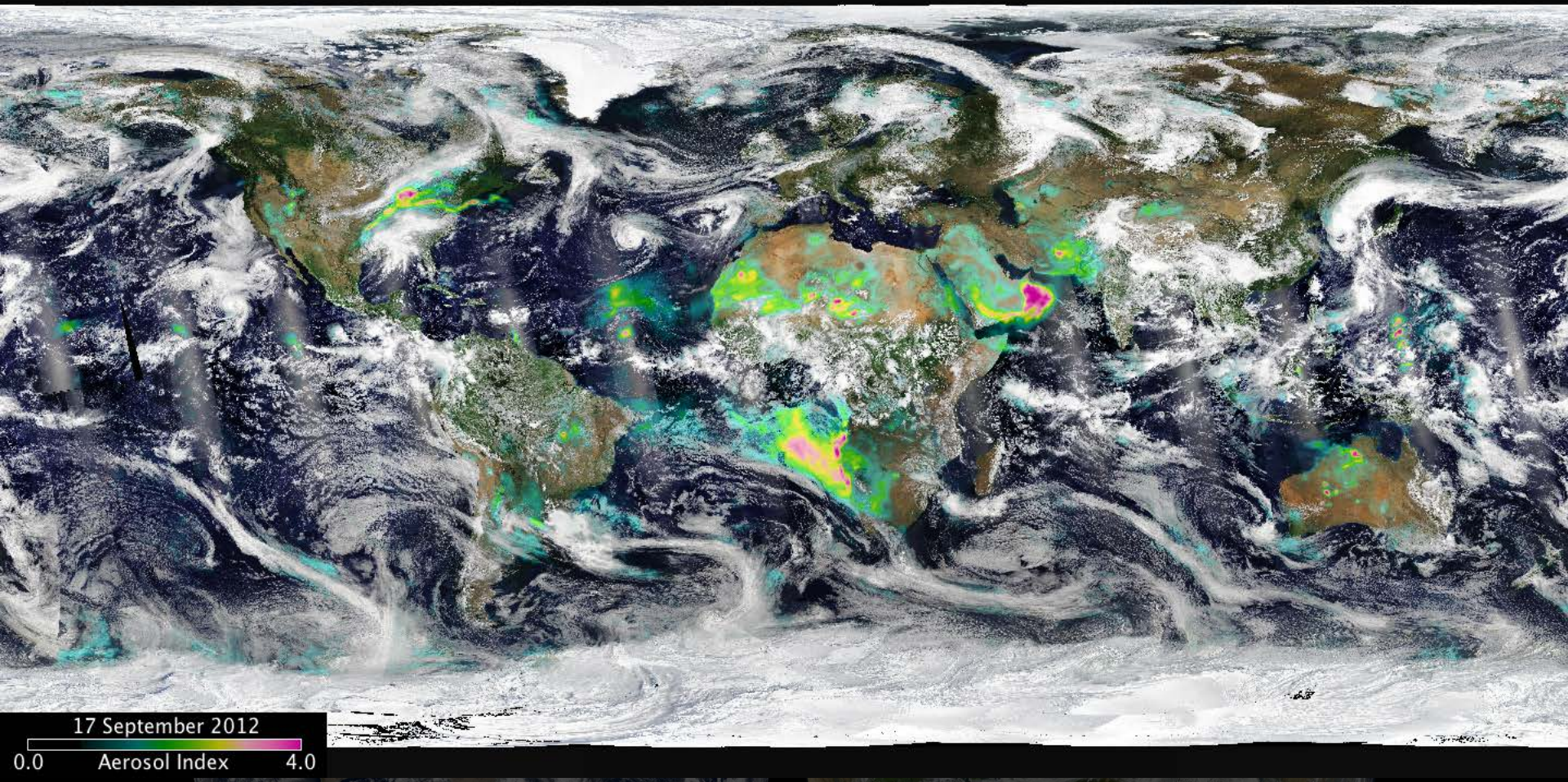


June 23, 2012



(Courtesy of NASA Science Team)

OMPS Aerosol Index overlaid with VIIRS RGB Imagery



This image is a combination of a SNPP VIIRS RGB image with OMPS aerosol index data for September 17, 2012, which shows the smoke over the U.S. moving over the Midwest and stretching all the way to the Mid-Atlantic, with additional smoke appearing over Australia due to many wildfires burning there.

Summary

- Ground System is routinely producing S-NPP data records
- Algorithm Validation Process is well under way to achieve Validated products over the course of the next year
- S-NPP Data Products Status are performing comparable to MODIS and other similar instruments (IASI, GOME-2)