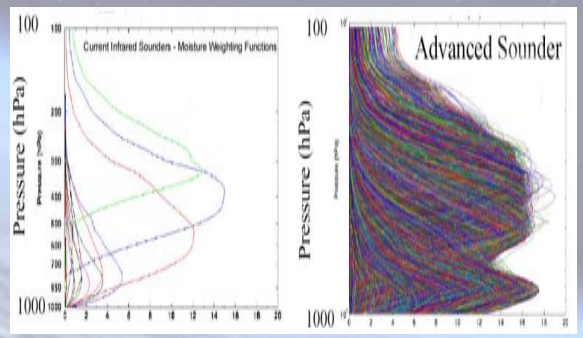
International TOVS Study Conference -15

The National Polar-orbiting Operational Environmental Satellite System (NPOESS) Sensor Suite

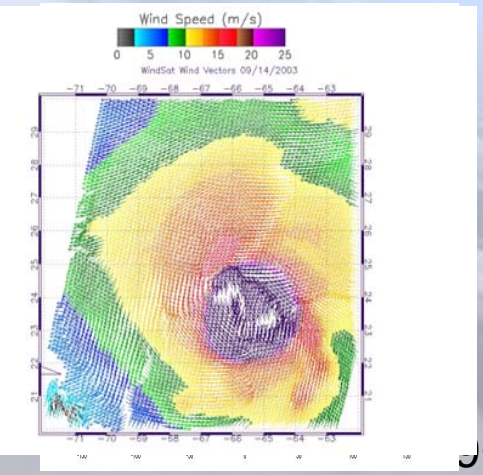
Hal J. Bloom, NOAA-NPOESS Payload Division Chief

*National Polar-orbiting Operational Environmental Satellite System

NPOESS Still Brings Phenomenal New Capabilities to Users



Soundings-CrIMSS



Wind Speed-MIS

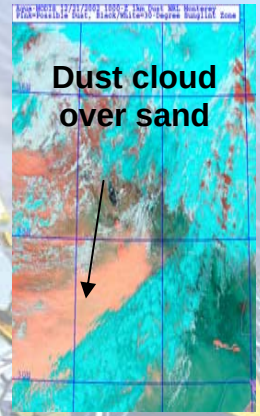
NPOESS

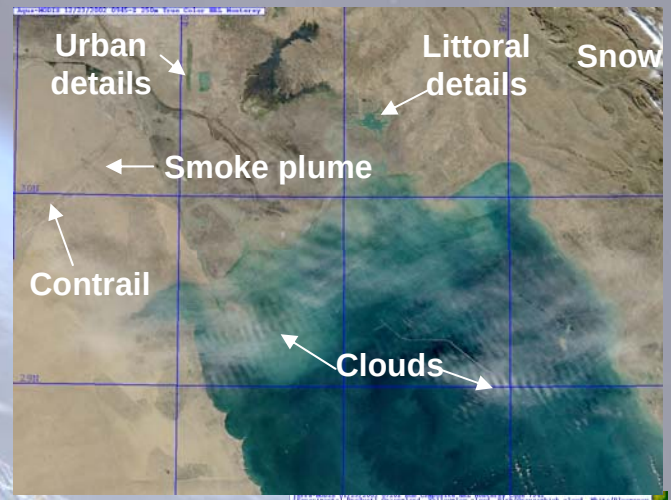
VIIRS

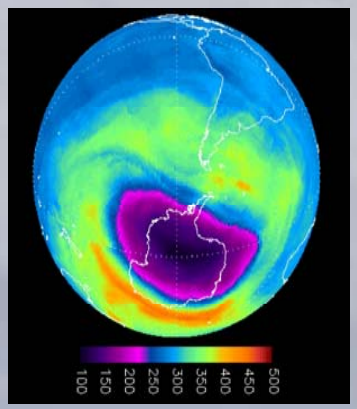
[MODIS Sim.]

9+ VIS/NIR bands

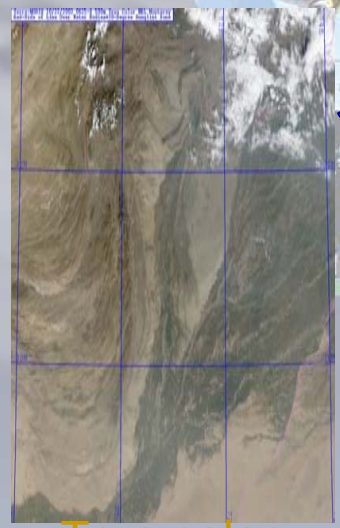
12 IR bands



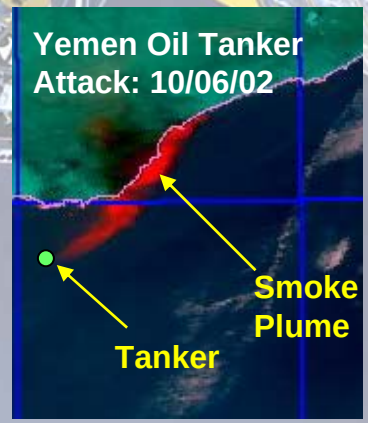


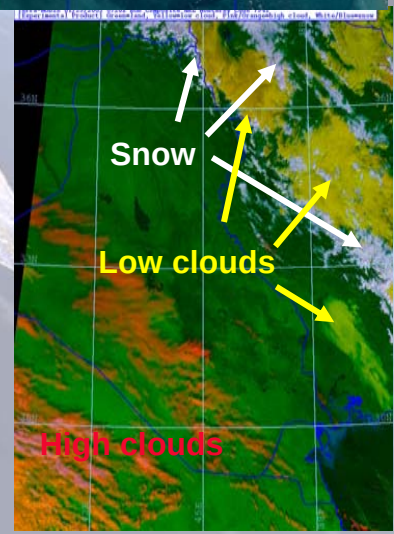


Ozone-OMPS



True color





NPOESS/NPP Data Products and date rate capability still sized for growth

Raw Data Records (RDRs)

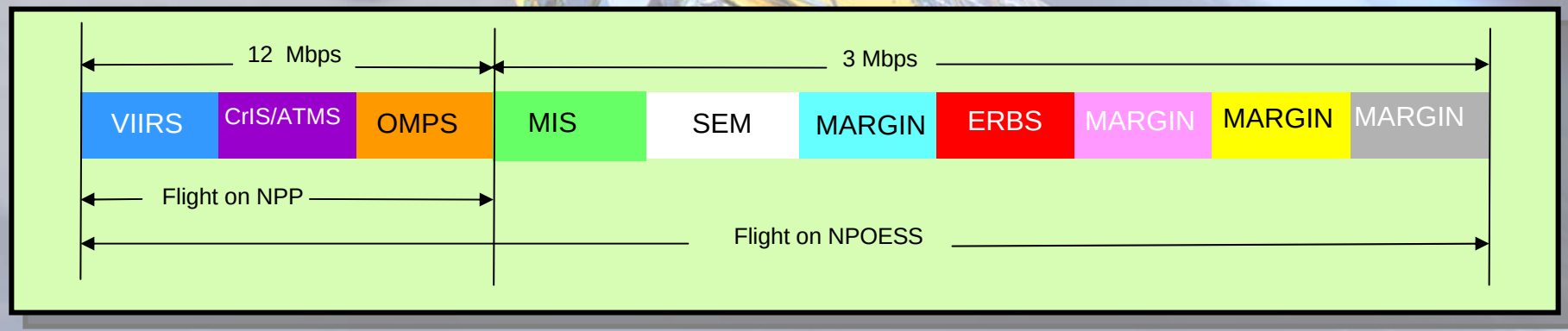
- Similar to Level 1A for CEOS/NASA.
- ~ 150 giga bytes per day (similar to Terra or Aqua).

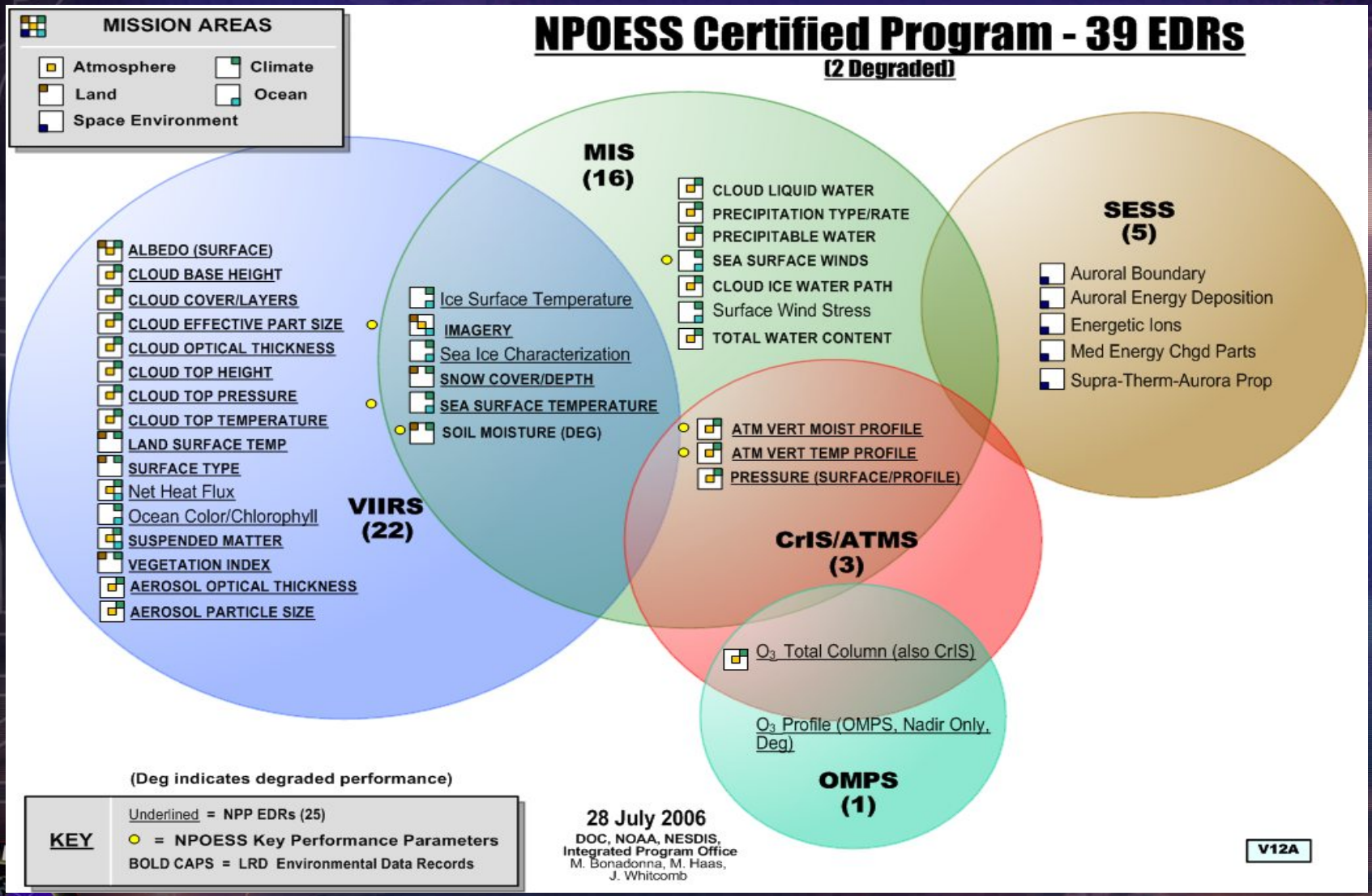
Sensor Data Records (SDRs)

- Similar to CEOS/NASA Level 1B

Environmental Data Records (EDRs)

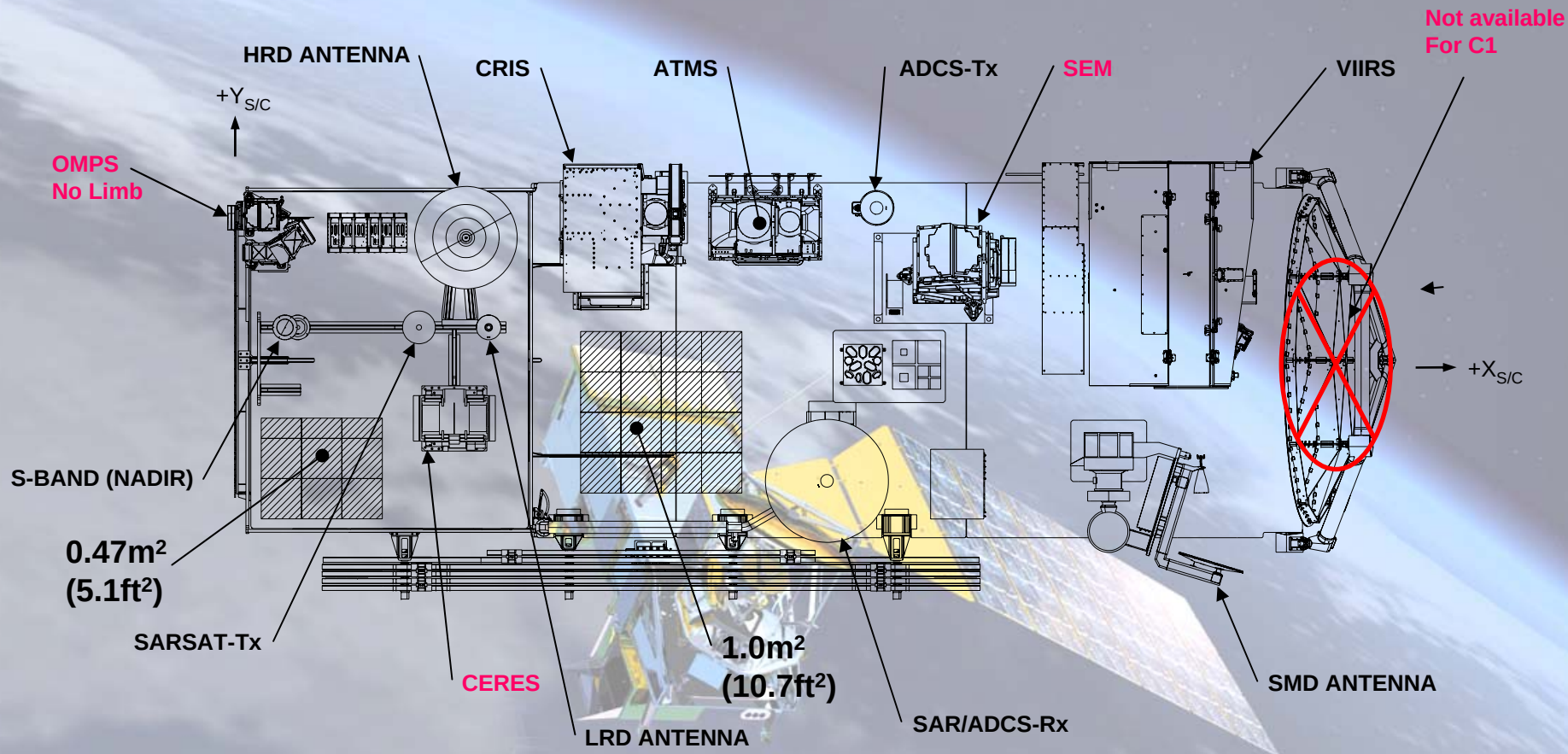
- Similar to CEOS/NASA Level 2.
- *NPP Provides 25 of 55 NPOESS EDRs.*





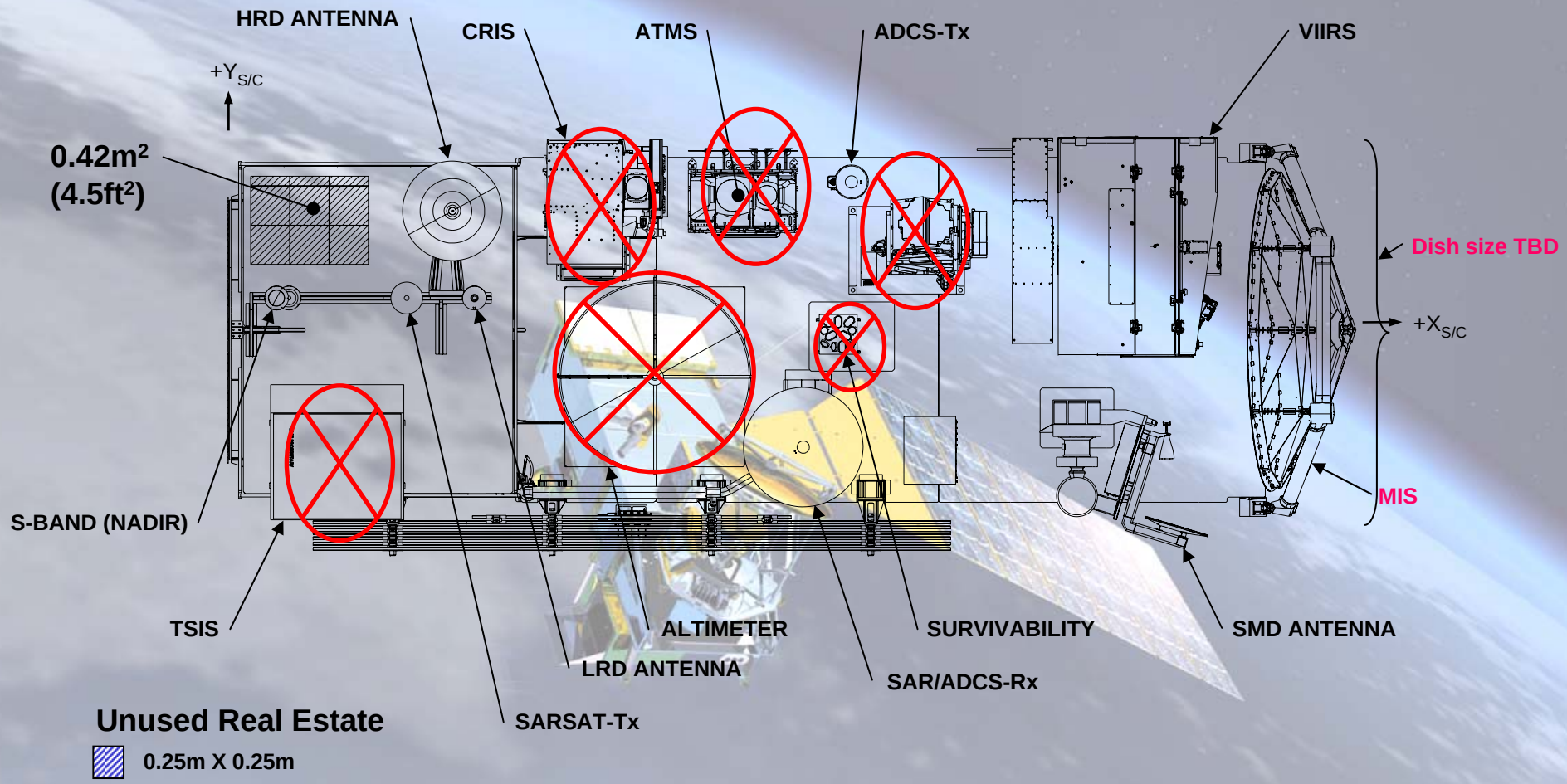
*National Polar-orbiting Operational Environmental Satellite System

1330 CONFIGURATION for NPOESS C1 Still provides Soundings, Imagery, Surface, Space Environment, and Climate monitoring Capability



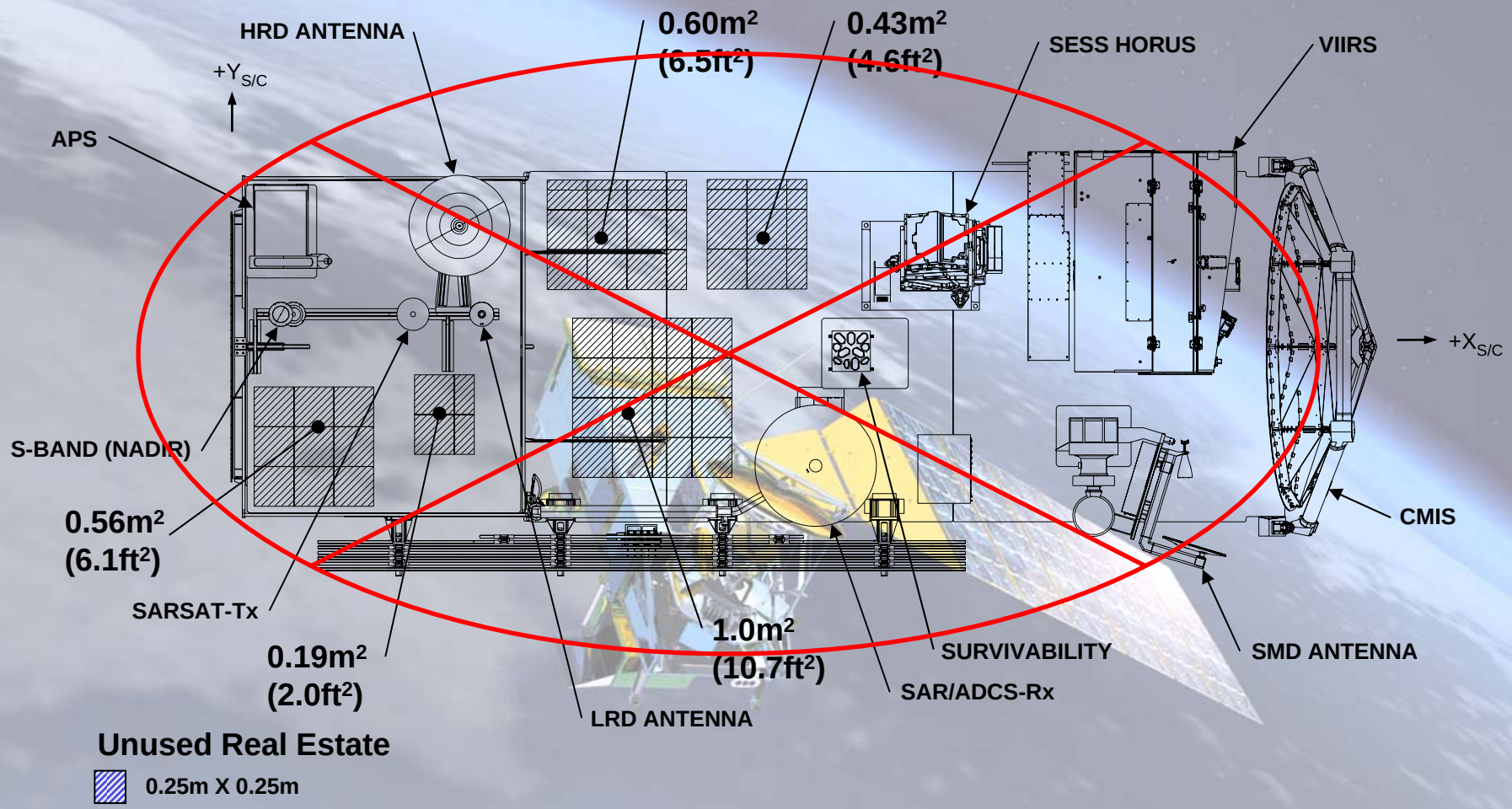
STOWED CONFIGURATION

1730 CONFIGURATION



STOWED CONFIGURATION

Reliance on METOP allows us to Remove the 2130 Plane



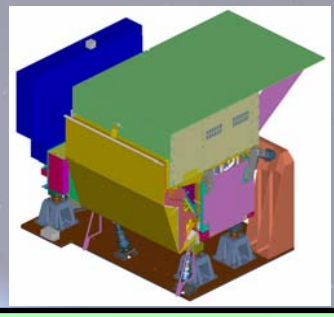
STOWED CONFIGURATION

Payload Overview (1 of 2)

VIIRS

- **Purpose:** Land, ocean, atmospheric parameters at high temporal resolution
- **Precursors:** AVHRR, OLS, MODIS, SeaWiFS
- **Developer:** Raytheon
- **Approach:** Multi-spectral scanning radiometer, 3000 km swath width
- **TRL:** 6.5

CrIS



- Purpose: **Temperature and moisture profiles at high temporal resolution**
- Precursors: **HIRS, AIRS, IASI**
- Developer: **ITT**
- Approach: **Michelson interferometer, 2300 km swath width. Co-registered with ATMS**
- TRL: **6.5**

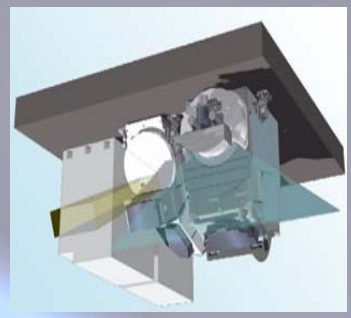
NPP Overview - Instruments

(2 of 2)

ATMS

- Purpose: **Temperature and moisture profiles at high temporal resolution**
- Precursors: **AMSU, MHS**
- Developer: **Northrop Grumman**
- Approach: **Scanning passive microwave radiometer, 2300 km swath width. Co-registered with CrIS.**
- TRL: **6.5**

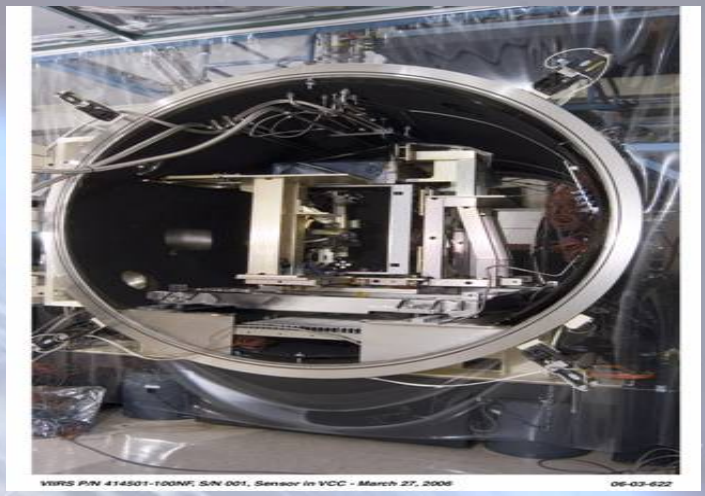
OMPS



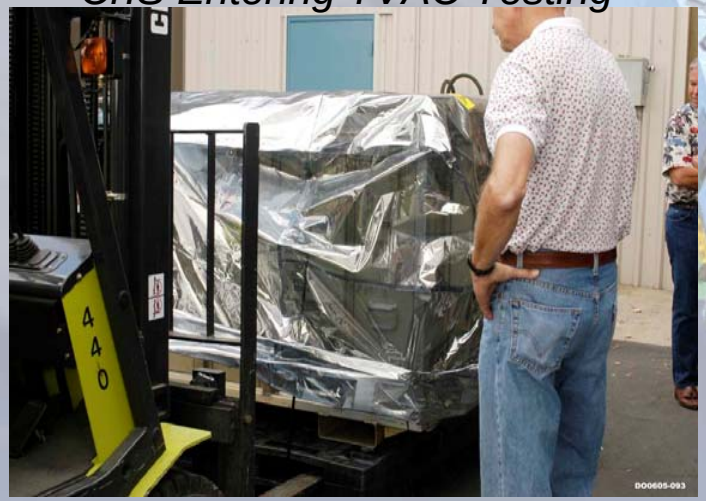
- **Purpose:** Monitors total column, vertical ozone profile
- **Precursors:** TOMS, SBUV, GOME, OSIRIS, SCHIAMACHY, OMI
- **Developer:** Ball
- **Approach:** Nadir and limb push broom CCD spectrometers, 2600 km swath width
- **TRL:** 6.5

Payload Overview- 3 NPP instrument in various stages of Test

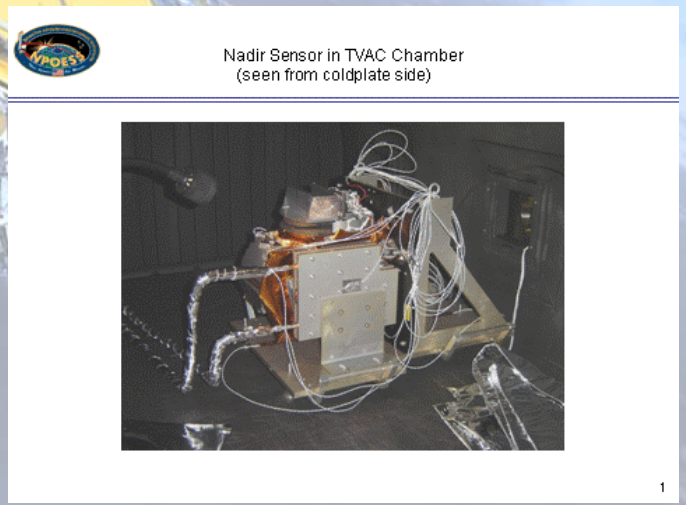
CrIS Entering TVAC Testing



VIIRS EDU Finished TVAC



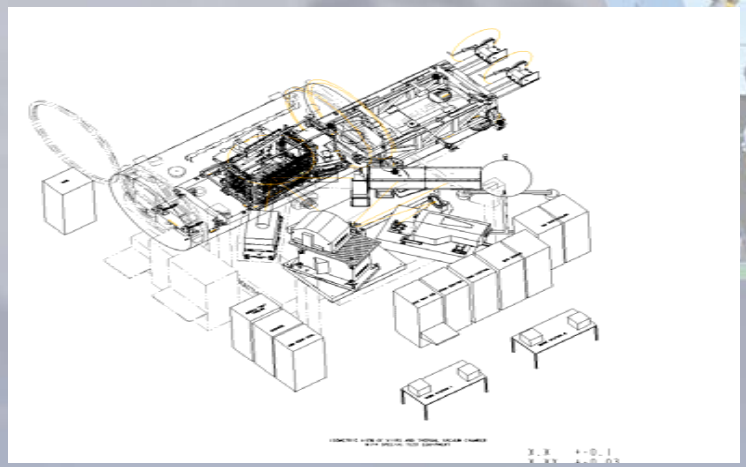
ATMS Delivered to S/C



OMPS FU1 Finished TVAC

VIIRS EDU finished TVAC and in Data Analysis phase

VIIRS P/N 414501-100NF, S/N 001, Sensor in VCC - March 27, 2006 06-03-581



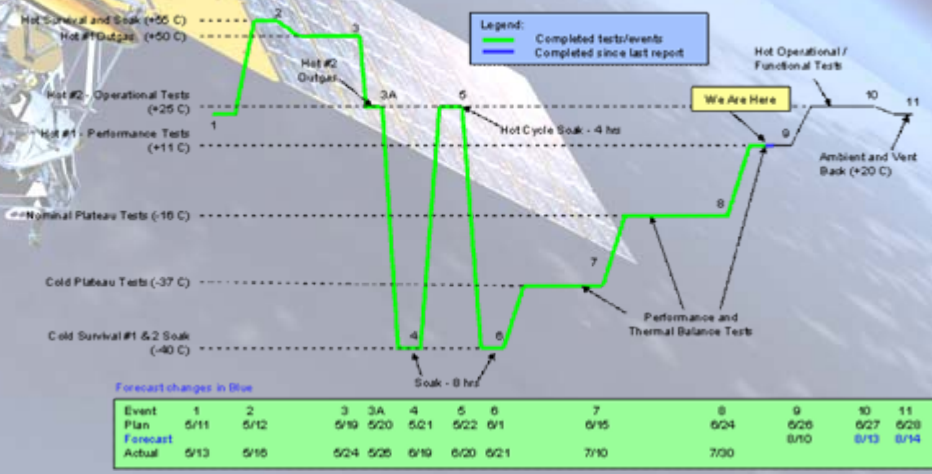
EDU TVAC Test Plans and Status**

ID	Test Procedure	Part	Cold Plateau Voltage 28V	Cold Plateau Voltage 22V	Cold Plateau Voltage 34V	Nominal Plateau Voltage 28V	Nominal Plateau Voltage 22V	Nominal Plateau Voltage 34V	Hot Performance Plateau Voltage 28V	Hot Performance Plateau Voltage 22V	Hot Performance Plateau Voltage 34V	Hot Operational Plateau Voltage 28V	Hot Operational Plateau Voltage 22V	Hot Operational Plateau Voltage 34V
SI-2	Focal Plane Integration / Video Throughput / Electronic Waveform	1.1		X										
		1.2		X										
SI-5	Electronic Self Test	1.1	X			X						X		
SI-6	Noise	1.1	X	X	X	X						X	X	X
		1.2		X	X	X						X	X	X
		1.3	X	X	X	X						X	X	X
		2	X	X	X	X						X	X	X
FP-4	Spectral Band Registration	1	X			X			X					
		2	X			X			X					
FP-6	MTF and HSR	2,3	X			X			X					
FP-7	Mechanical Functions	1		X										X
		2		X		X								X
FP-9	Sensor Modes	1	X	X	X							X	X	X
		2	X	X	X							X	X	X
FP-15	Rel. Spectral Response - In Band	2				X								
FP-16	Rel. Spectral Response - Out of Band	2				X								
RC-1	Radiometric Resp. & Sensitivity Ambient	4		X		optional			optional					
RC-2	Reflective Band Radiometric Resp & Sens.	1	X	X	X	X			X	X	X			
		2	X	X	*	X			X	*	X			
RC-3	Radiometric Response Stability	1				X			X					
RC-5	Emissive Band, Radiometric Resp & Sens	1	X	X	X	X			X	X	X			
		2	X			X			X					
TV	TV- Thermal Control Test - Output	QQ											X	
	TV- Thermal Control Test - Thermal Stability	TB	X			X			X					

Test Completed
Test Completed Since Last Report
Test In Progress

* test deleted per agreement with customer community 6-29-06
** Test matrix updated for consistency with TV procedure 7-3-06

EDU TVAC Test Profile

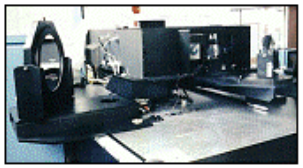


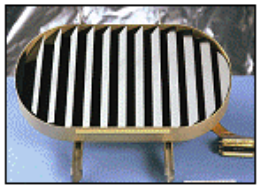
Forecast changes in Blue

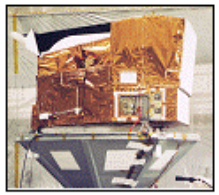
Event	1	2	3	3A	4	5	6	7	8	9	10	11
Plan	5/11	5/12	5/19	5/20	5/21	5/22	6/1	6/15	6/24	6/26	6/27	6/28
Forecast										8/10	8/13	8/14
Actual	5/13	5/16	5/24	5/25	6/19	6/20	6/21	7/10	7/30			

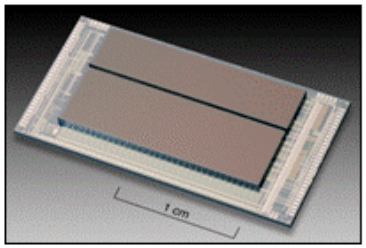
VIIRS Flight Hardware making good progress

Hardware Photos

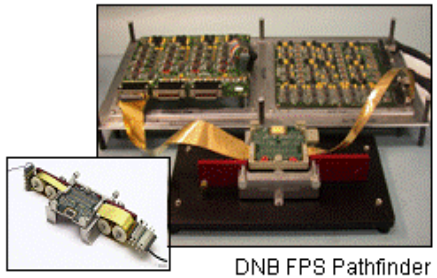

Ground Support Equipment

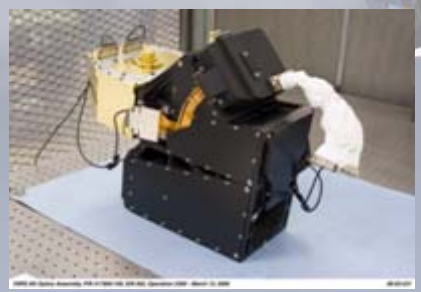

On-Board Blackbody


Integration & Test



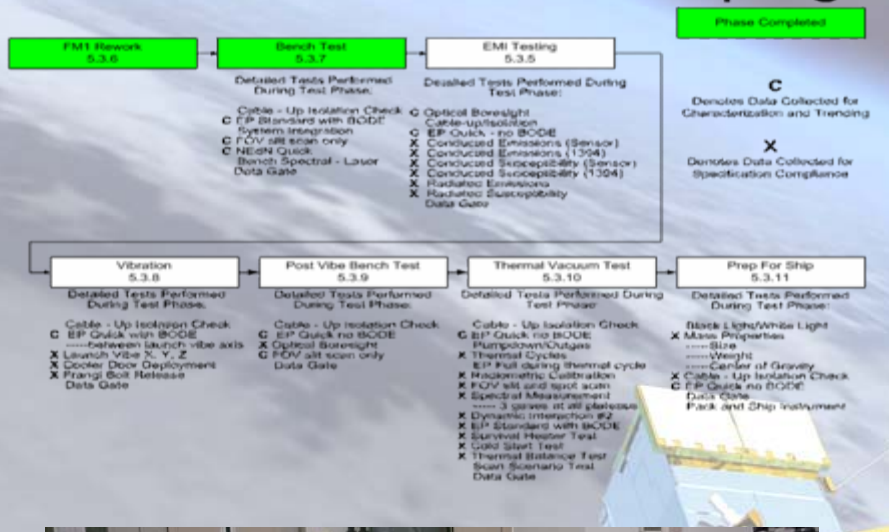
LWIR Sensor Chip Assembly

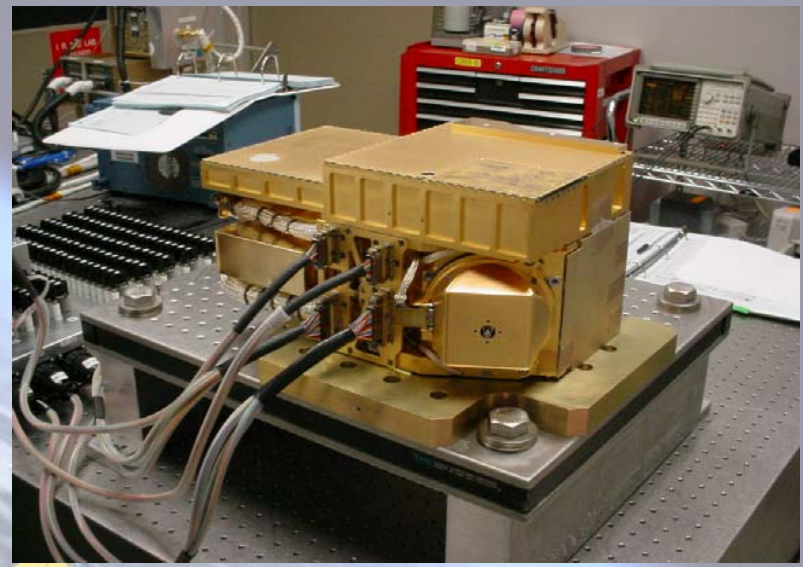

DNB FPS Pathfinder

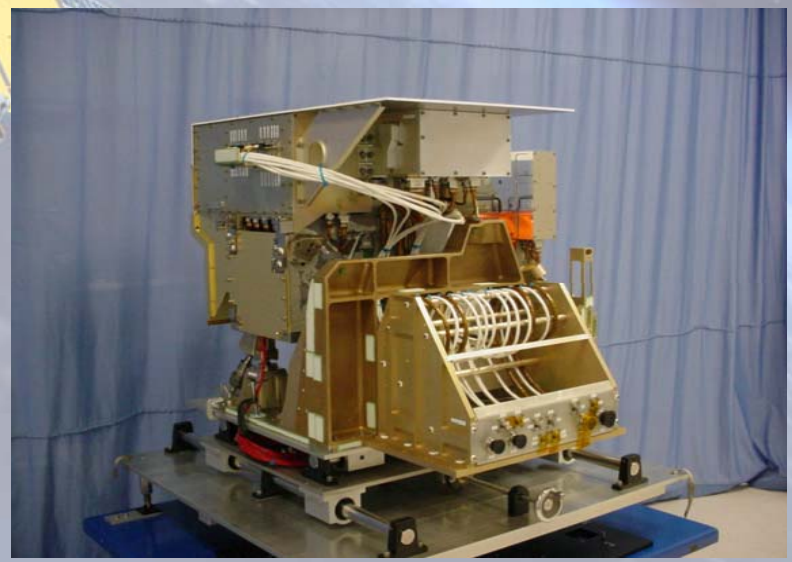


CrIS Is integrated and has gone through Bench, EMI and in TVAC Testing

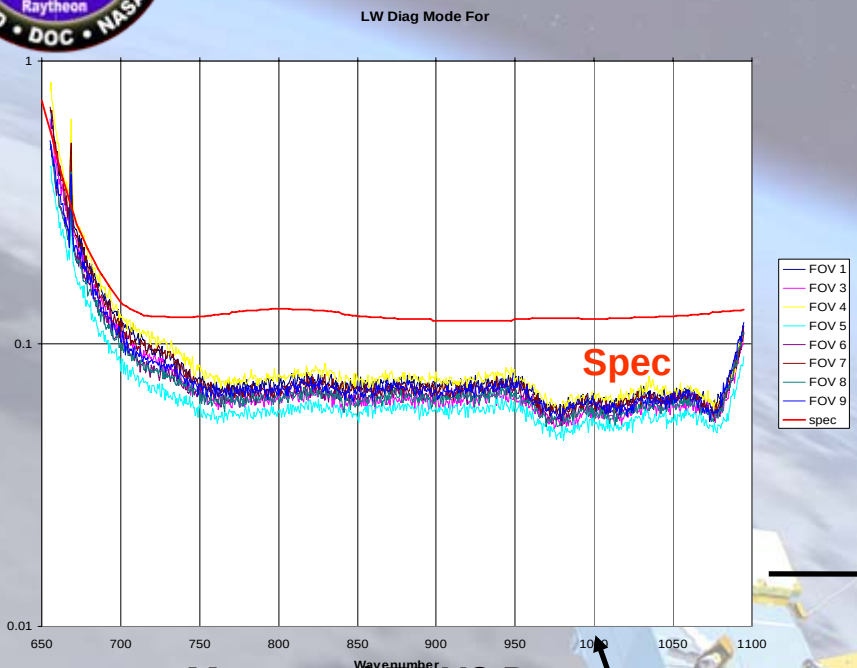
CrIS FM1 Test Flow Campaign



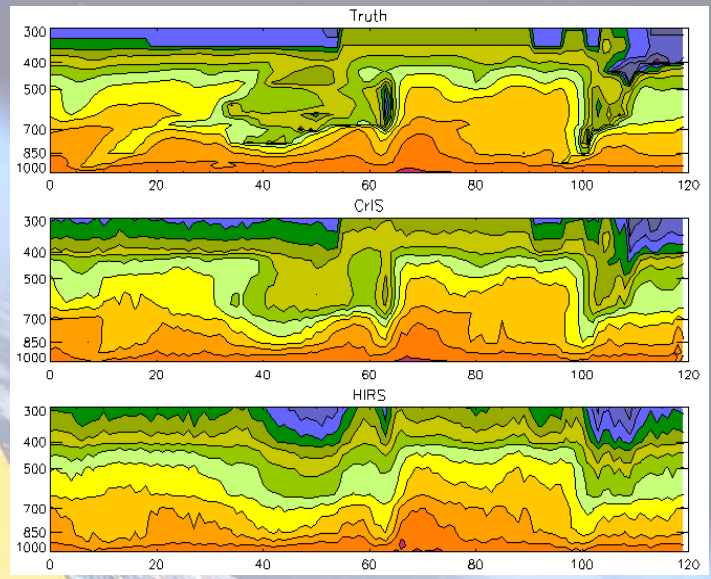


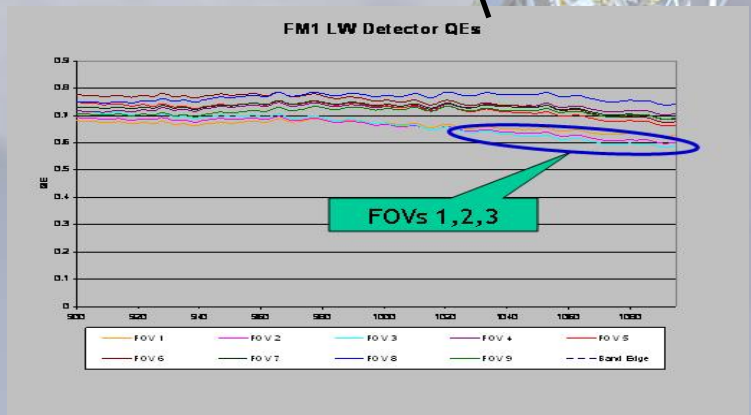


CrIS is meeting performance with low NEdN



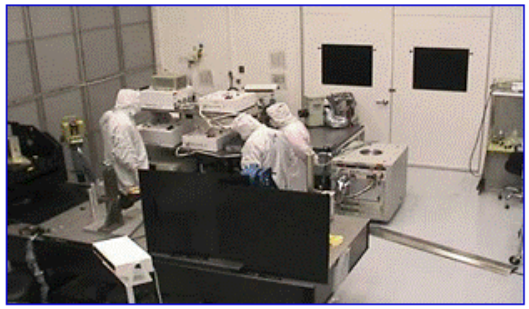
Measured EDU3 Data





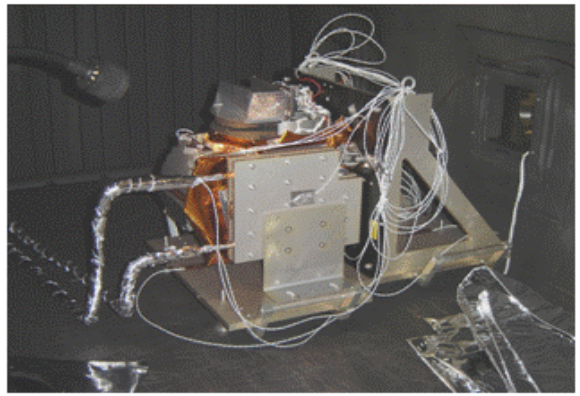
OMPS in Acceptance Testing and ahead of schedule

OMPS Cleanroom with EGSE and Nadir Sensor (far left)



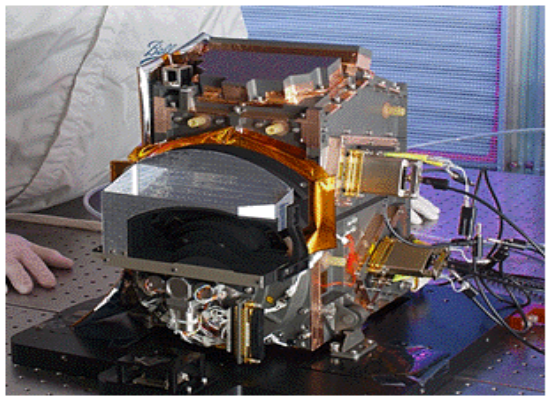
3

Nadir Sensor in TVAC Chamber
(seen from coldplate side)



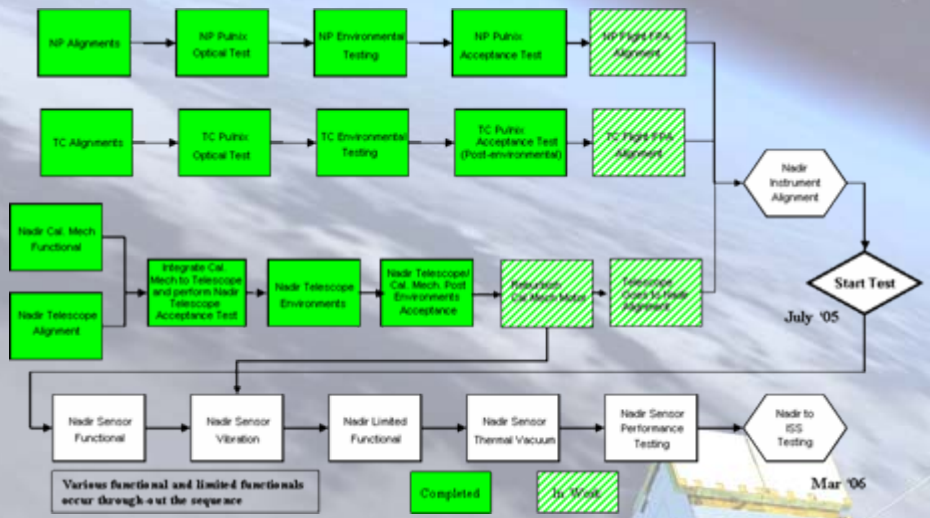
1

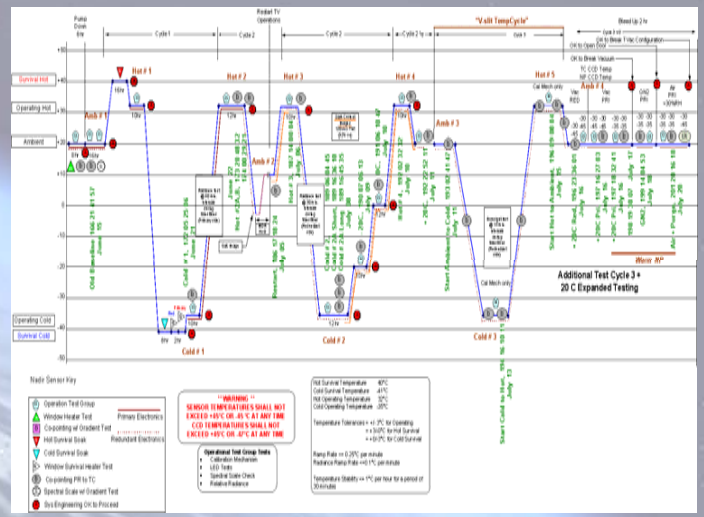
Nadir Sensor on Optical Bench in Cleanroom

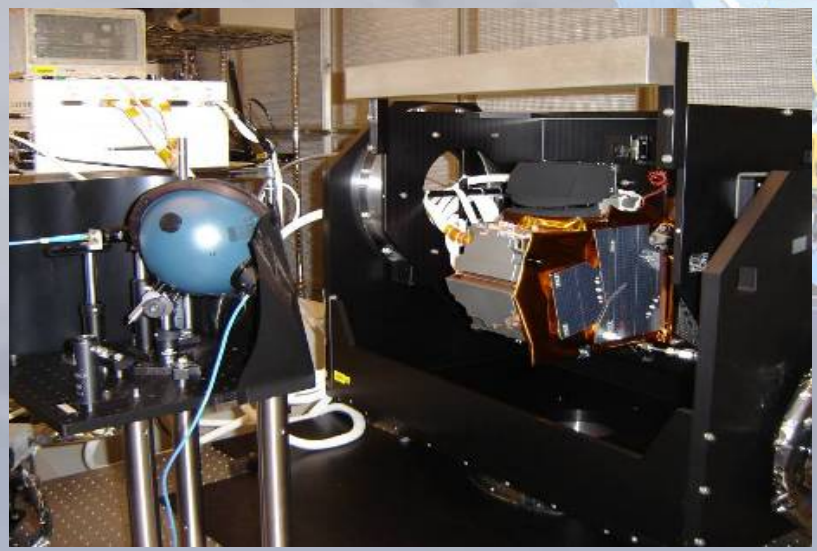


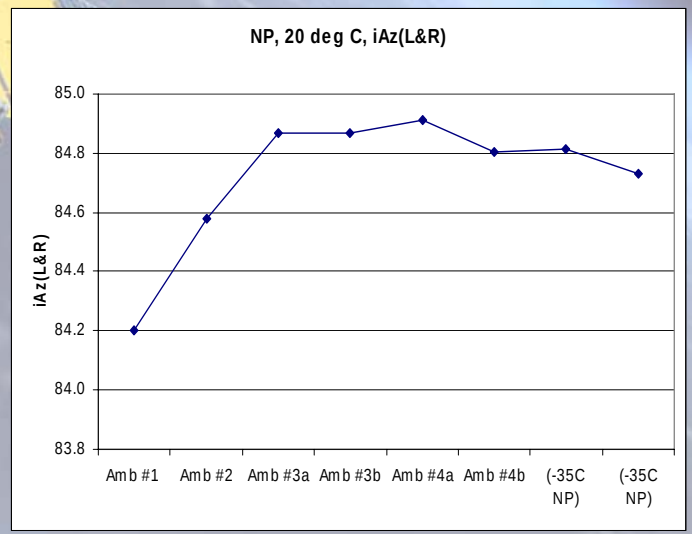
2

OMPS In test data analysis phase

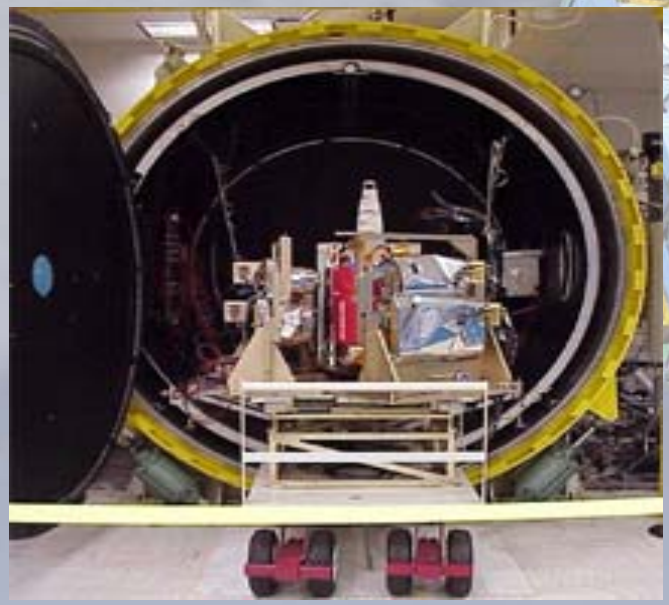


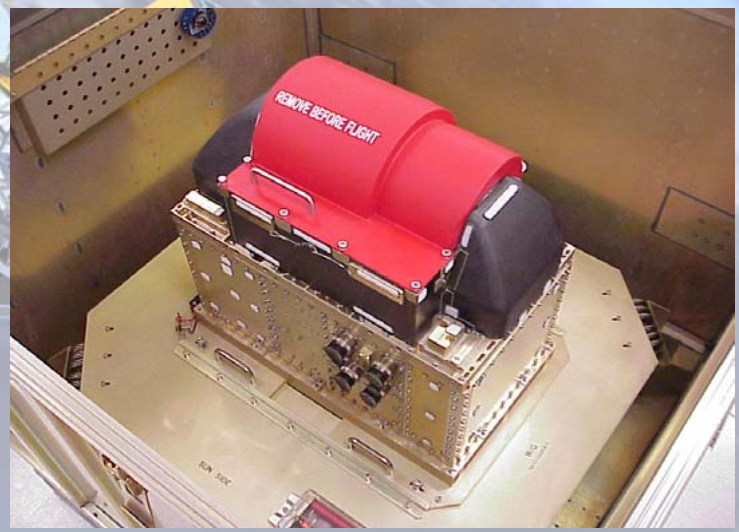




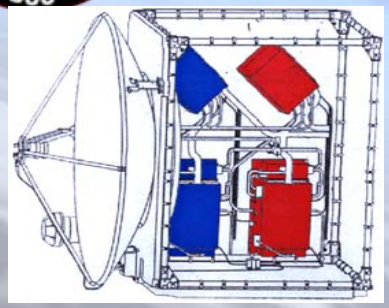


ATMS is delivered and integrated on the NPP Spacecraft





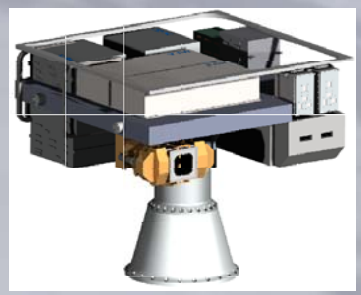
NPOESS Retains the growth and accommodation potential to bring Leveraged Sensor back



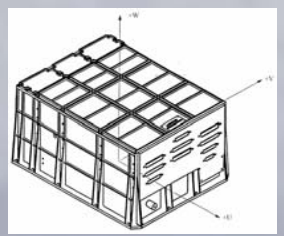
- **Radar Altimeter (ALT)**

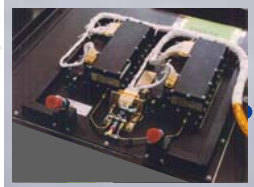
  Measures range to ocean surface with a radar at 13.5 GHz

  - Corrects for ionosphere with 5.3 GHz radar
  - Corrects for atmosphere with CMIS water vapor measurements
  - Precise orbit determination with GPS



- Total Solar Irradiance Sensor (TSIS)
  - Two sensors for total irradiance (TIM) & spectral irradiance (SIM)
    - TIM measures total solar irradiance
    - SIM measures spectral irradiance 200 to 2000 nm
  - Pointing platform and sensor suite to be provided by CU LASP





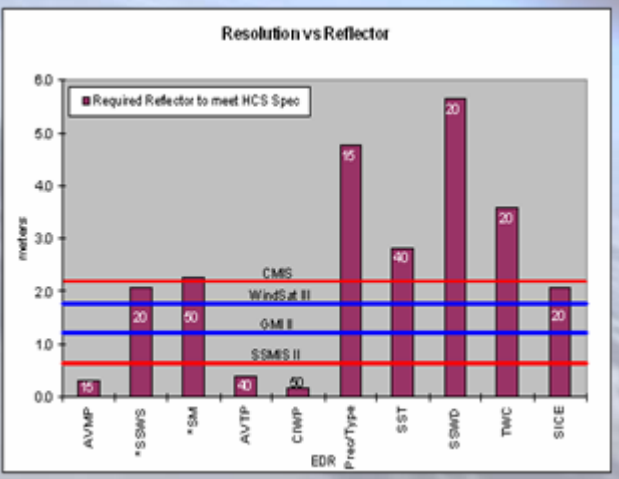
- Aerosol Polarimetry Sensor (APS)

  Aerosol characterizations of size, single scattering albedo, aerosol refractive index, aerosol phase function

  - Multispectral (broad, 0.4 to 2.25 μm)
  - Multiangular (175 angles)
  - Polarization (all states)

- Additional Space Environment Sensor Suite (SESS)
  - UV disk imager (BATC), and thermal plasma sensors

NPOESS Studying a Capable Microwave Imager for Implementation on NPOESS C2 (1730)



- **Exploring the concept based on Heritage Designs and planned systems**
  - The expectation is to meet heritage performance while meeting key performance parameters
  - Produce a system that is available for 2nd NPOESS launch
  - How to handle Soundings?

	X-Track	Conical
Radiometric Calibration		
Horizontal Cell Size		
Polarization		
Imagery		
Slant Path		
Weighting Function		
Heritage Application		

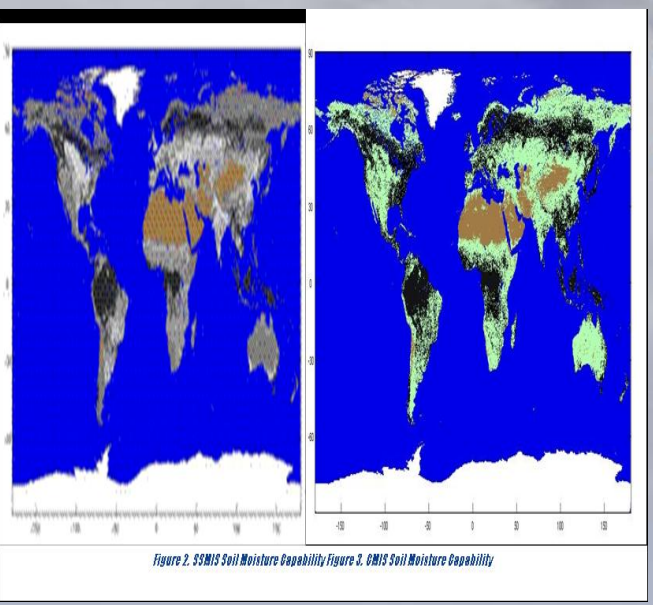
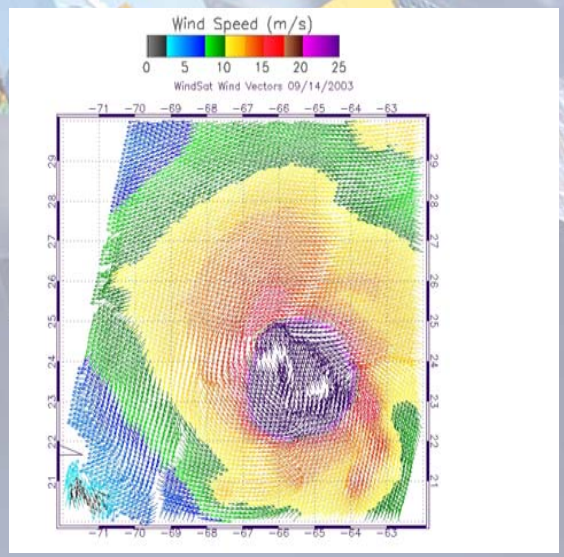


Figure 2. SSMIS Soil Moisture Capability Figure 3. CMIS Soil Moisture Capability



Summary

- Post NPOESS Restructure Still brings enhanced capability for NPOESS and NPP
- NPP still provides an opportunity for early NPOESS data utilization and sensor risk reduction
- All four NPP sensors are either in test or post test analysis phase
- Preparations are being made for PFM and or EDU accommodation on the NPP spacecraft for early risk reduction testing
- There is no redesign of the NPP or NPOESS spacecrafts: thus allowing accommodation of de-manifested sensors
- NPOESS is actively studying conical microwave concepts to fly post NPOESS C1