NPOESS Preparatory Project (NPP) Status

Jim Gleason
NPP Project Scientist

Nunn-McCurdy Certification of NPOESS

NPOESS Program was certified by DoD

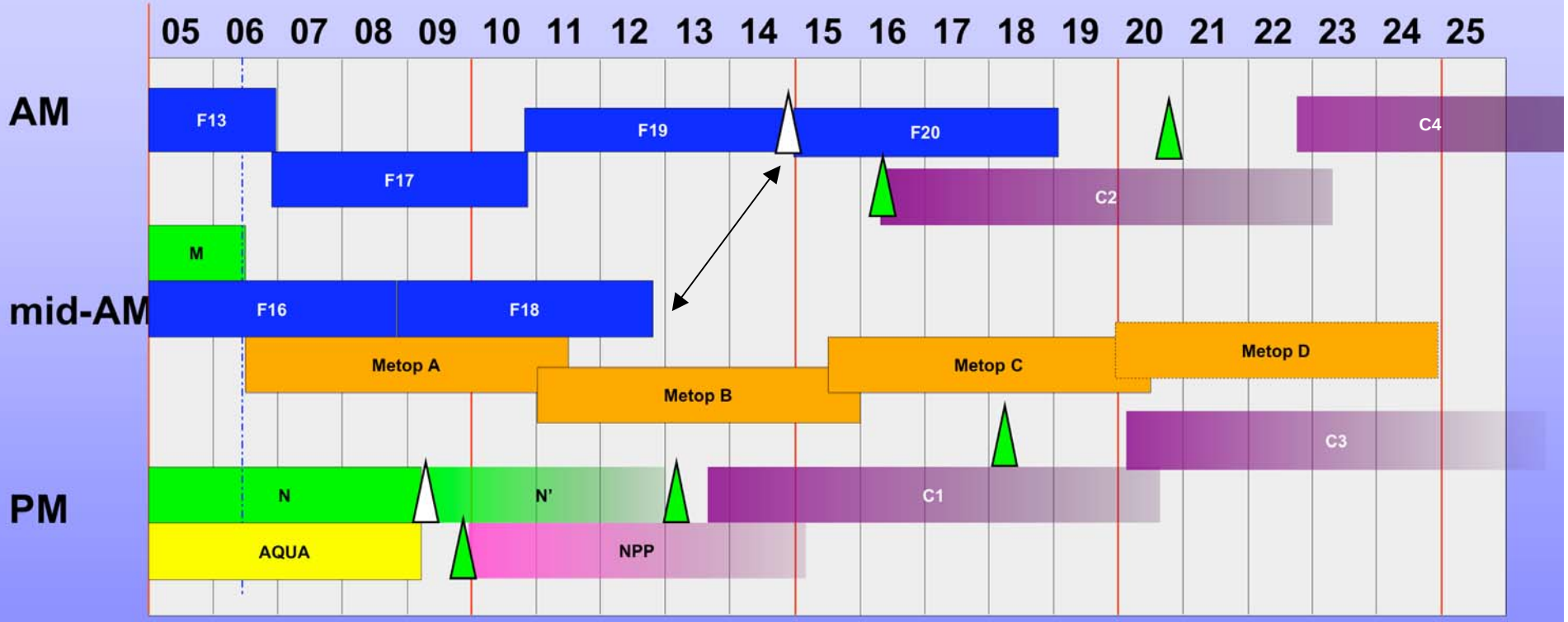
- Number of spacecraft reduced from 6 to 2+2
- EUMETSAT will provide mid-morning coverage

- Operational Data Continuity was Primary Requirement
- Instruments cancelled and de-scoped
- Instruments removed from program “De-manifested”
  - Spacecraft resources maintained should instruments be provided
- Launch schedules shifted
  - NPP September 30, 2009
  - C1 January 2013
  - C2 January 2016

Orbit Configuration Changes

	Crossing Time	
Old NPOESS	0530	2 satellites
	2130	2 satellites
	1330	2 satellites
New NPOESS	0530	1 satellite + 1 option
	2130	EUMETSAT METOP
	1330	1 satellite + 1 option

NPOESS Schedule



Instruments Changes

Instrument Descopes

- CMIS — Conical-scanning Microwave Imaging/Sounding
  - Imaging: SST, Soil Moisture, Ice/Snow Cover
  - Polarimetric Ocean Wind speed
  - Atmospheric Temperature/Moisture Sounding
- SESS — Space Environment: Electron/Particle energy spectrometers, UV imagery, Fly SEM

De-Manifested Instruments, could be provided GFE

- TSIS - Total and Spectral Solar Irradiance
- ERBS - Earth Radiation Budget
- Alt - Sea Surface Altimetry
- APS - Aerosol Polarimetry Sensor
- Full SESS - Descoped SESS
- OMPS Limb - Ozone Profile

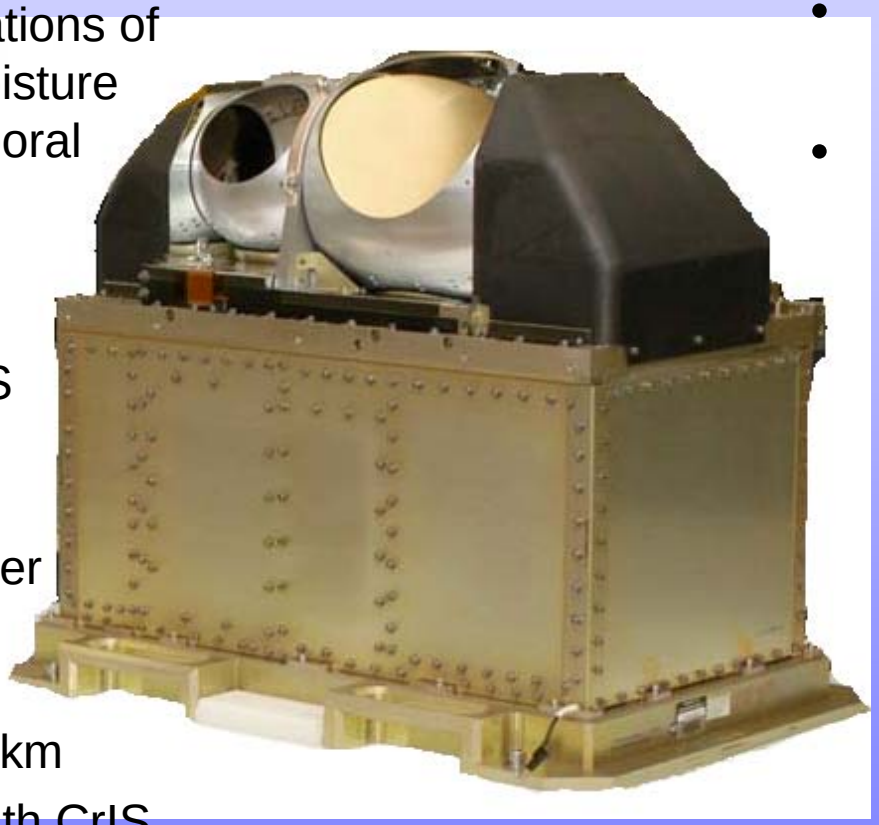
Sensors and Platforms

	NPP	C1	C2	C3	C4
Launch	Oct 2009	2013	2016	2020	2022
Nodal Time	1330	1330	530	1330	530
VIIRS**	X	X	X	X	X
CrIS**	X	X		X	
ATMS**	X	X		X	
OMPS Nadir	X	X		X	
New Microwave Imager			X	X	X
SEM		X		X	
CERES	?	X			
SARSAT		X	X	X	X
ADCS		X		X	
OMPS Limb					
ERBS					
ALT					
TSIS					
APS					

Advanced Technology Microwave Sounder (NASA / Northrop Grumman Electronic Systems)

Description

- **Purpose:** In conjunction with CrIS, global observations of temperature and moisture profiles at high temporal resolution (~ daily).
- **Predecessor Instruments:** AMSU A1 / A2, MHS
- **Approach:** Scanning passive microwave radiometer (22 channels (23GHz - 183GHz)
- **Swath width:** 2300 km
- **Co-registration:** with CrIS



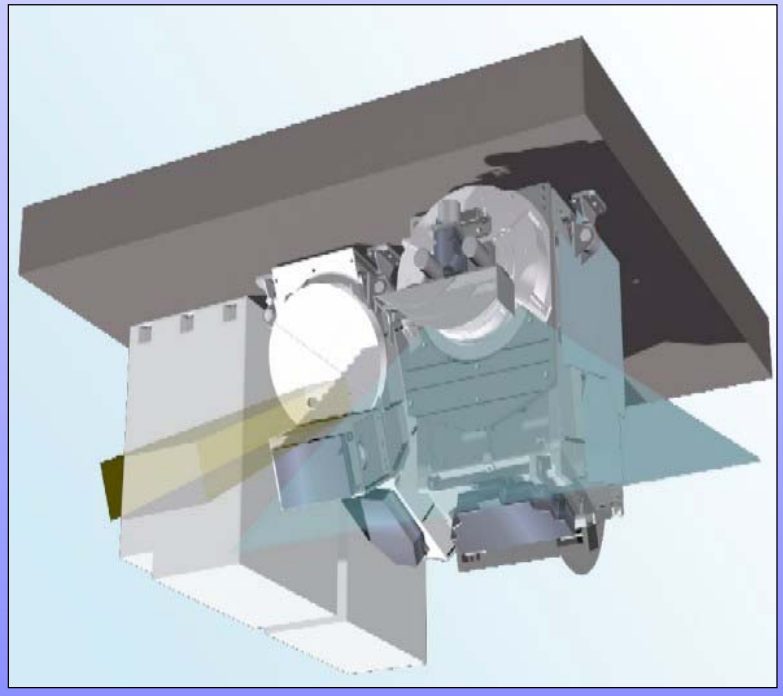
Status

- **Engineering Unit on Spacecraft**
- **Flight Model calibration complete**

Ozone Mapping Profiler Suite
IPO / NGST / Ball Aerospace and Technologies Corp.

Description

- **Purpose:** Monitors the total column and vertical profile of ozone
- **Predecessor Instruments:** TOMS, SBUV, GOME, OSIRIS, SCIAMACHY
- **Approach:** Nadir and limb push broom CCD spectrometers
- **Swath width:** 2600 km



Status

- Brass Board Main Electronics Box complete
- Flight Unit #1 Assembly underway
- Boresight shifts observed after vibration test
- Mechanical studies ongoing
- Limb removed

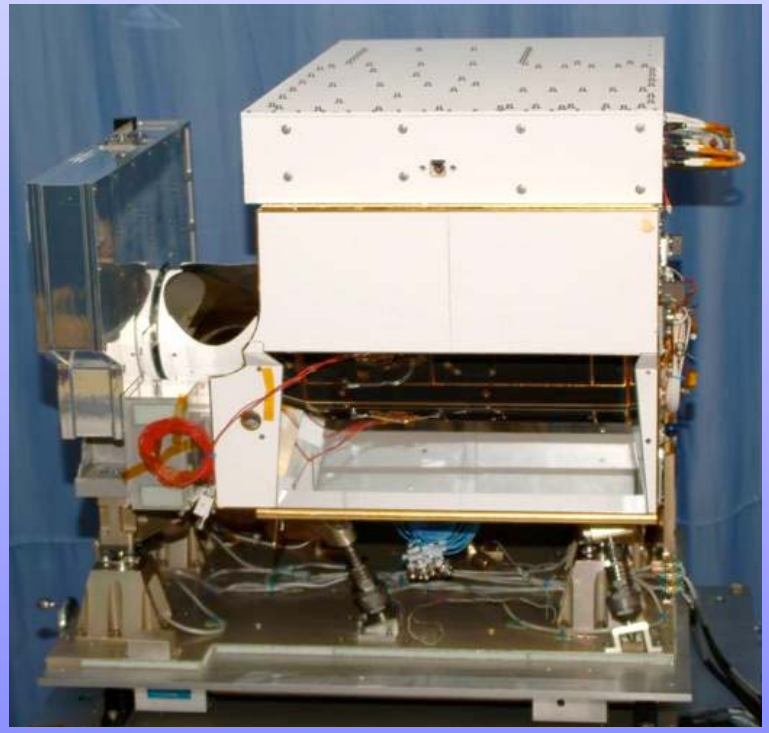
Algorithm Status: Using TOMS/SBUV heritage approaches for Nadir Instruments Limb profile still in development using new space-based limb observation data

Cross-Track Infrared Sounder
IPO / NGST / ITT Industries

THREE AGENCIES • ONE MISSION

Description

- **Purpose:** In conjunction with ATMS, global observations of temperature and moisture profiles at high temporal resolution (~ daily)
- **Predecessor Instruments:** HIRS, AIRS, IASI
- **Approach:** Michelson Interferometer (1142 channels in 3 bands (3.5 μm - 16 μm)
- **Swath width:** 2300 km
- **Co-registration:** with ATMS



Status

- **EDU qualification complete and has been delivered to Ball**
- **Flight Unit #1 Assembly underway**
- **Flight Unit #1 failed during vibe test**
- **Braze joints in instrument frame cracked**
- **Assessment is on-going**

Visible Infrared Imaging Radiometer Suite
IPO /NGST/ Raytheon Santa Barbara Remote Sensing

THREE AGENCIES • ONE MISSION

Description

- **Purpose:** Global observations of land, ocean, & atmosphere parameters at high temporal resolution (~ daily)
- **Predecessor Instruments:** AVHRR, OLS, MODIS, SeaWiFS
- **Approach:** Multi-spectral scanning radiometer (22 bands between 0.4 µm and 12 µm) 12-bit quantization
- **Swath width:** 3000 km

Status

- EDU Finished T/Vac testing
- Flight Unit #1 Development continues

VIIRS Status

- Top Three issues from EDU T/Vac testing
  - Band-to-Band registration
    - Band registration shifts with temperature
  - Line-spread function
    - Instrument focus changes with temperature
  - Detector Cross-talk
  - Special testing is still on-going. Working to separate optical from electrical crosstalk.

Raytheon is closing Santa Barbara facility.

NPP VIIRS will be the last instrument assembled in Santa Barbara.

FM-2 will be assembled in El Segundo

Wayne Esaias presenting VIIRS details in 4 pm Ocean Color Splinter

Questions?

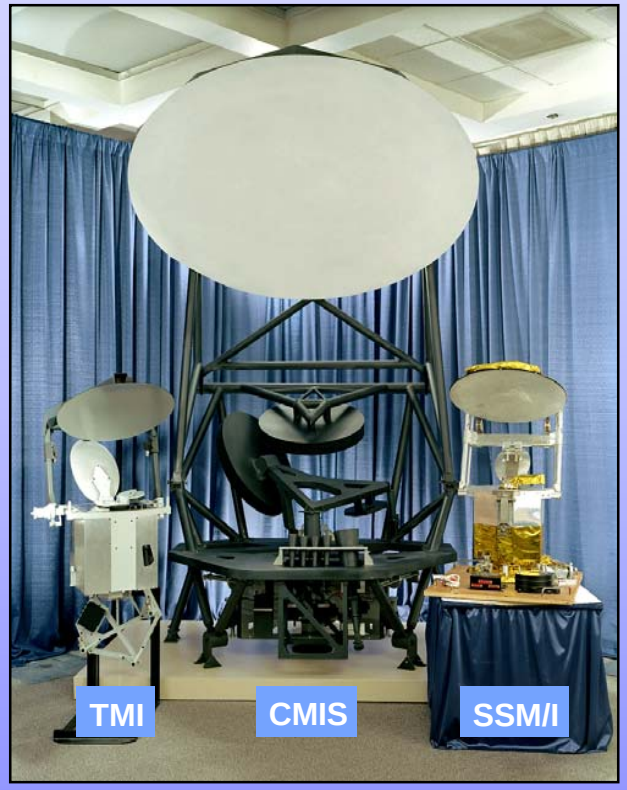
NPP Science Team Meeting
March 13-15, 2007
Annapolis, MD

Nunn-McCurdy Statute

(Title 10, Section 2433, USC)

- If unit costs of a Major Defense Acquisition Program increase >25%, then DoD (as delegated to USD(AT&L) must certify that all of the following four criteria are met, or no further appropriated funding can be obligated on major contracts:
  - **Such acquisition program is essential to national security**
  - **There are no alternatives to such acquisition program which will provide equal or greater military capability at less cost**
  - **The new estimates of the program acquisition unit cost or procurement unit costs are reasonable**
  - **The management structure for the acquisition program is adequate to manage and control program acquisition unit cost or procurement unit cost**
- Certificate must apply to whatever program goes forward, which is not necessarily the program of record
- If program going forward differs too much from program of record, then cannot certify; such a program must instead be proposed as a "new start"
- Even if a program is certifiable, USD(AT&L) can choose not to certify

CMIS Overview



CMIS has heritage to TMI and SSM/I

Mass, kg	458
Momentum, N-m-s	348
Average power, W	393
Average data rate, kbps	500

CMIS contributes to all KPP EDRs

- Primary: Soil Moisture, SSW
- Supports: AVMP, AVTP, SST, Imagery

CMIS flies on all NPOESS Configurations

- Produces 16 EDRs total
- Spins at 31.6 RPM
- 83 primary channels, plus redundancy
- Surface measurements at 6,10,18,36,89,166 GHz
- Profiling at 23, 50/60, 183 GHz
- Polarimetry at 10, 18, 36 GHz
- Two main parabolic reflectors:
  - Low Freq.: 2.2 m (12-horn feed farm)
  - High Freq: 0.7 m (4-horn feed farm)
- Passive 2-point calibration every scan:
  - Warm Load, Cold Space Reflector

Supplier: Boeing Satellite Systems, El Segundo, CA

- Key Subcontractors:
  - Atmospheric Environmental Research (AER), algorithms
  - Remote Sensing Systems (RSS), ocean algorithms
  - Millitech, High Frequency receivers

OMPS Scanning Track