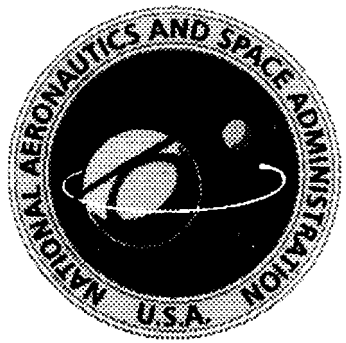


National Polar-orbiting Operation Environmental Satellite System

NPOESS

Presentation to MODIS Science Team

May 14-15, 1997

NPOESS Notional Payloads to Satisfy IORD-I

USG Payloads	0530	1330	EUM* *
VIS/IR imager/radiometer with ocean color* (VIIRS)	**X**	**X**	**X**
Low-light vis imager (VIIRS)	**X**	**X**	**X**
Cross-track MW temp sounder * (CrIMSS/AMSU-A)		**X**	**X**
Cross-track IR sounder* (CrIMSS/ITS)		**X**	
Conical MW imager/sounder * (CMIS)	**X**	**X**	**X**
Ozone profiles (OMPS)		**X**	
Data Collection System (DCS)	**X**	**X**	**X**
Search and Rescue (SARSAT)	**X**		**X**
Space Environmental Suite (SES)	**X**	**X**	**X**
Earth Radiation Budget Sensor (ERBS)		**X**	
Solar Irradiance Sensor (TSIS)	**X**		
Radar altimeter (ALT)	**X**		

*** Assumed critical payload**

****** Assumes European IR sounder (IASI) included

VIIRS Overview

- **What**
  - A single sensor or suite of sensors that address visible and IR imagery and radiometric measurements. Development plan includes concept study through risk reduction, technology insertion and delivery of 7 flight units
    - 5 for NPOESS, 2 for METOP
- **Why**
  - Meets critical NPOESS requirements for imagery, sea surface temperature, and soil moisture (clear)
  - Other IORD requirements include various atmospheric, cloud, earth radiation budget, land, ocean, and space environmental (auroral imagery) EDRs
  - Potential for early flight on “flights of opportunity” to meet user requirements in advance of first NPOESS launch (DMSP, POES, EOS)
- **When**
  - Concept studies begin in July 97
  - Delivery of first flight unit in Jan 04

Requirements Allocation to Payload of Primary Responsibility

- Atmos Vertical Moisture Profile
- Atmos Vertical Temp Profile
- Imagery
- Sea Surface Temperature
- Sea Surface Winds
- Soil Moisture
- Aerosol Optical Thickness
- Aerosol Particle Size
- Albedo (Surface)
- Auroral Boundary
- Auroral Imagery
- Cloud Base Height
- Cloud Cover/Layers
- Cloud Effective Particle Size
- Cloud Ice Water Path
- Cloud Liquid Water
- Cloud Optical Depth/Transmitance
- Cloud Top Height
- Cloud Top Pressure
- Cloud Top Temperature
- Currents (Ocean)
- Dwn Longwave Rad (Surface)
- Electric Field
- Electron Den Profiles/Ionospheric Spec
- Fresh Water Ice
- Geomagnetic Field
- Ice Surface Temperature
- In-situ Ion Drift Velocity
- In-situ Plasma Density
- In-situ Plasma Fluctuations
- In-situ Plasma Temperature
- Insolation
- Ionospheric Scintillation
- Land Surface Temperature
- Littoral Sediment Transport
- Net Heat Flux
- Net Short Wave Rad (TOA)
- Neutral Den Profiles/Neutral Atmos Spec
- Normalized Difference Veg Index
- Ocean Color/Chlorophyll
- Ocean Wave Characteristics
- Ozone Total Column/Profile
- Precipitable Water
- Precipitation Type/Rate
- Pressure (Surface/Profile)
- Rad Belt/Low Energy Solar Particles
- Sea Ice Age and Edge Motion
- Sea Surface Hgt/Topography
- Snow Cover/Depth
- Solar EUV Flux
- Solar Irradiance
- Solar/Gal Cosmic Ray Particles
- Supra - Thermal - Auroral Particles
- Surface Wind Stress
- Suspended Matter
- Total Auroral Energy Deposition
- Total Longwave Rad (TOA)
- Total Water Content
- Turbidity
- Upper Atmospheric Airglow
- Vegetation Index/Surface Type

VIIRS CMIS VIIRS/CMIS CrIS/CMIS OMPS GPSOS

Algorithm Development

- **Payload developers responsible for defining payload suites and algorithm**
  - Part of effort to allocate requirements from Environmental Data Records (EDRs) to Sensor Data Records (SDRS) to Raw Data Records (RDRs)
- **Requires close interaction with Government Operational Algorithm Teams (OATS)**
  - Iterative process must be established
- **Government will ensure algorithms are compatible with ground processing systems**
- **Leverage existing on-going algorithm efforts (i.e.: EOS algorithm teams, Algorithm Theoretical Basis Documents (ATBD's), etc.)**

Operational Algorithm Teams (OATS)

Teams composed of scientists and engineers from Government agencies and laboratories, FFRDC'S, Academia, and Cooperative Institutes funded to provide the IPO with the scientific expertise necessary to define payload instrument performance, refine ERDs, and oversee development of data processing algorithms

Initial OATS Tasking

- Review EDR-to- payload allocations
- Review algorithms used to obtain similar EDRs today
- Review payload procurement documentation
- Evaluate algorithm options to produce EDRs

OATS Interaction

- OATS are primarily advisory panels to the IPO and its contractors
  - Principal/contributing members from algorithm development, operational processing, and user communities
  - Tasking, input, and output controlled through an IPO POC
- **OATS** are a resource for the payload development team
  - Clarify requirements as needed
  - Document latest algorithm science
  - Describe existing algorithms and their current use
  - Review concepts/designs for operational viability

Operational Algorithm Teams
(Four Teams)

- Atmospheric Sounding (including Ozone)
- Visible/ InfraRed Imagery and Radiometry
- Microwave Imagery and Radiometry
- Space Environment

OATS Potential Team Members

Soundings

- Paul Menzel NOAA
- Mitch Goldberg NOAA
- Joel Susskind NASA
- Mike Griffin PL
- R. Bevilacqua NRL
- Bill Smith UWisc
- Dave Staelin MIT/LL
- E. Shettle NRL
- Ozone Sub-group
  - Walt Planet

VIS/IR

- J. Schaefer AF
- Jim Purdom NOAA
- Larry Stowe NOAA
- Robert Murphy NASA
- Jim Bunting PL
- Jeff Hawkins NRL
- Bill Snow MIT/LL

Conditions for Supplying NASA Research Instruments to the Converged Operational (NPOESS) Platform

Appendix 1 to NPOESS MOA

"If the decision is made to fly a NASA instrument on the (NPOESS) platform instead of continuing to fly it on a NASA research spacecraft, because the research instrument will meet the convergence operational requirements in a cost-effective manner and continues to provide data so as to fulfill primary NASA research mission requirements, NASA will provide additional copy(s) of the instrument for flight on the NPOESS platform at no unit cost to the NPOESS program. This policy of supplying instruments at no cost will apply as long as NASA continues to need data supplied by the instrument to fulfill its primary research mission objectives ..."

NPOESS/MTPE Process

- **Establish Integrated Instrument/Algorithm Assessment Teams**
  - IPO POC, NASA Instrument Manager, NASA Instrument Scientist with supporting expertise as required
  - Focus initially on selected NPOESS/MTPE instruments/algorithms
    - CERES/ERBS
    - AIRS(IMAS)/CrIMSS
    - MODIS/VIIRS
  - Expand Assessment to all MPTE instruments
- **Prepare Requirements Comparisons Baseline**
- **Conduct Instrument, Component, and Algorithm Evaluation**
  - common requirements and areas that require further study
  - identification of relevant “core” technologies
- **Consider Programmatic Factors**
  - Accommodation and Systems level requirements
  - Alignment in terms of major milestones, need and key decision dates

NPOESS/MTPE Process

(continued)

- **Designate Points of Contact (POC) for each sensor type (responsible for science, algorithm, and technical design interactions between NPOESS & MTPE programs):**
  - IPO POC:
    - monitors MTPE hardware development and attends contractor reviews
    - attends MTPE science team meetings
    - participates in MTPE sensor selection process
    - participates on MTPE algorithm team activities
  - NASA POC:
    - monitors NPOESS hardware development and attends contractor reviews
    - attends NPOESS science team meetings
    - participates in NPOESS sensor selection process
    - participates on NPOESS algorithm team activities
- **Points of Contact to report on a regular basis and at critical milestones to IPO Director and GSFC MTPE Director on potential for sensor convergence.**

Commonality Issues to be Reviewed During NPOESS/MTPE Study

- **Observation Requirements:** *Spatial resolution (horizontal and vertical, refresh rate (frequency of observation), orbit and nodal crossing time, calibration (absolute and relative), data continuity*
- **Instrument Characteristics:** *Spectral selection and resolution, scan geometry (i. e.: cross track, biaxial, conical, constant resolution), signal/noise, scan rate, lifetime*
- **Instrument Accommodation:** *Size, mass, fields of view, power, thermal, pointing, data storage, data downlink*
- **Synergism Requirements with Other Sensors**
- **Ground System/ Data Processing Requirements**
- **Cost and Availability**

MODIS/VIIRS
INITIAL FINDINGS

- NPOESS Visible and Infrared Imaging Radiometer Suite (VIIRS) planned for flight on all three operational orbits (0530, 0930, and 1330)
- MODIS and the proposed NPOESS VIIRS differ significantly as *currently* planned
  - higher spectral resolution required by mtpe
  - higher spatial resolution required by npoess
  - differing approaches to calibration
  - possibility for cooperation at modular level i.e..; ocean color
  - AMODIS for EOS AM-2 will be needed 3 years before NPOESS readiness date

INITIAL
FINDINGS SUMMARY

- Excellent potential for MTPE/NPOESS cooperation in measurements related to ACRIM, AIRS/IMAS, AMSR, MODIS ocean color channels, GPSOS, and TOMS.
- Requirements for measurements provided by an afternoon CERES could be assumed by NPOESS, but simulation work needs to be done.
- Requirements for measurements from a Radar Altimeter may be met with NPOESS Altimeter but orbits need further study
- Sea surface wind vectors maybe provided by NPOESS but passive microwave radiometry techniques (Stokes Channels) must be validated from Space
- Development and launch schedules need to be worked further

NPOESS SENSOR PROCUREMENT INFORMATION

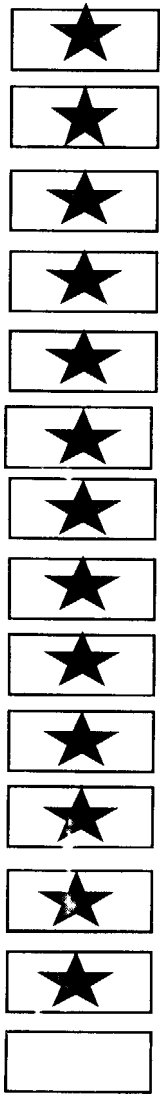
Payload Development Strategy

Payload	Development Strategy
VIIRS	IPO Ph I
CMIS	IPO Ph I
CrIS	IPO Ph I; **possibly NASA IMAS;** fly on POES N'
OMPS	IPO Ph I; Fly on POES N'
GPSOS	IPO Ph I; Fly on POES N' & DMSP F18-20
SES	IPO Ph I after internal concept study
CrMTS	**Modify NASA AMSU-A or use IMAS**
TSIS	**Modify NASA ACRIM**
ERBS	**Modify NASA CERES**
ALT	**Leverage NASA/Navy development**
DCS	**Fly French ARGOS (Free to US)**
S&R	**Fly French/Canadian SARSAT (Free to US)**

At least half of planned payloads will be developed by other organizations

Near-term Optimized Convergence Schedule

• **IORD-1 Validated by tri-agencies**	***28* Mar 96**
• **SAE Acquisition Roundtable**	**26 Jun 96**
• **OIPT**	**12 July 96**
• **EXCOM**	**30 July 96**
• **Draft RFP Release**	**19 Nov 96**
• **Industry Day**	**21 Nov 96**
• **Single Acq. Master Plan (SAMP)**	**14 Feb 97**
• **Final POE**	**14 Feb 97**
• **Independent Cost Estimate (ICE)**	**14 Feb 97**
• **OIPT**	**04 Mar 97**
• **DAB Readiness Meeting**	**10 Mar 97**
• **MS I EXCOM**	**17 Mar 97**
• **RFP Release**	**19 Mar 97**
• **Contract Award**	**29 Jul 97**



Top- level Source Selection Schedule

• MS I EXCOM	17 Mar 97	★
• RFP Release	19 Mar 97	★
• Proposals Received	28 Apr 97	
• Oral Presentations	29 Apr -3 May 97	
• Conduct Electronic Eval	4 May -27 May 97	
• Competitive Range Briefing	2 Jun 97	
• Issue CR and DRs	2 Jun 97	
• Issue BAFO	3 Jul 97	
• Final SSA Briefing	23 Jul 97	
• Contract Award	29 Jul 97	

Visit the NPOESS Web Site

http://www.laafi.af.mil/SMC/PK/NPOESS/rfp.htm