The Future of NOAA's Space-based Observing Capabilities

NOAA Satellite and Information Service

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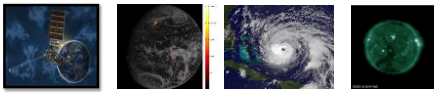
Why Observing Capabilities Matter

- NESDIS helps to keep our **public safe** and our **economy strong**
- NESDIS' 24x7 satellite data and products:
  - Feed models predictions and real-time watches and warnings
  - Support Search and Rescue Satellite Aided Tracking (SARSAT)
  - Emergency Managers Weather Information Network
  - Space Weather – Vulnerability of power, telecommunications banking and transportations systems prompts a need for enhanced space-weather readiness

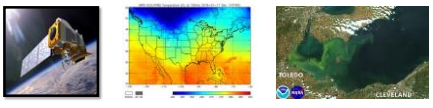
Today's Generation of Observational Capability

Game-changers for weather forecasting

GOES-R Series

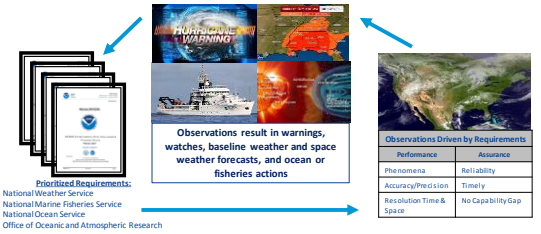


JPSS



Planning for the Future

- NOAA is evolving toward a mission-effective, integrated, adaptable, and affordable portfolio
- Responding to changing technology, emerging partnerships, and national trends



NSOSA Study – Informing Future Investments

- NESDIS recently completed its NOAA Satellite Observing System Architecture (NSOSA) Study
- End-user requirements driven by NOAA operational needs
- Study examined ~100 constellation options from legacy to major conceptual change post GOES-R/S/T/U and JPSS-1/2/3/4
- Leveraging commercial, public and academia for innovative solutions

NSOSA Study – Strategic Objectives

Availability of All Capabilities
Ensures moderate availability of non-core capabilities

Availability of Core Capabilities
Ensures the highest availability where mission critical

Compatibility with Fixed Budgets
Favors architectures that lend themselves to strict fiscal environments

Develop and Maintain International Partnerships
Makes use of and encourages greater access to available data

Programmatic Flexibility and Adaptability
Favors architectures that are easily adaptable

Low Risk at Constellation Level
Allows tolerance for risk associated with new business models and new technology while maintaining reliability

NSOSA Study – Architecture Analysis

- Complete, end-to-end designs of multiple alternative architectures
- Three full architecture cycles enable user engagement, learning, fine tuning
- Tool that can continually be leveraged to analyze and inform future decisions

NOAA User Prioritized Requirements

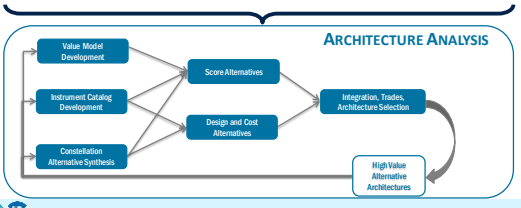
Strategic Priorities

National Weather Service
National Marine Fisheries Service
National Ocean Service
Office of Oceanic and Atmospheric Research

Operational Considerations (NOAA/DoD/Partners)

Policies & Standards

Technology Opportunities



NSOSA Study – Observation Objectives

- Value model was driven by 37 observation requirements that encompass NOAA's operational needs

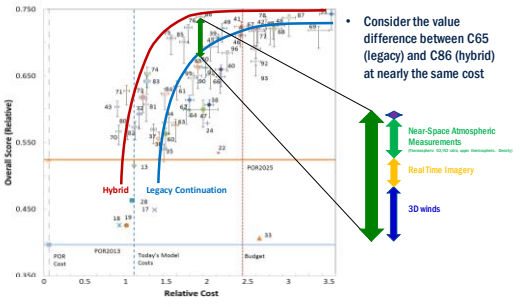
TERRESTRIAL/OCEAN OBJECTIVES

- 3-D Winds
- Real Time (RT) regional weather imagery
- Global GNSS-RO soundings
- Global RT imagery
- Global Near RT microwave (MW) soundings
- Global Near RT infrared (IR) soundings
- Global ocean surface vector winds
- Non-RT global weather imagery
- Global ocean color/phytoplankton composition
- Microwave imagery
- Lightning
- Radar-based global precipitation rates
- Regional MW soundings
- Regional IR soundings
- Global sea surface height
- Global chemical concentration
- Ozone
- Outgoing Long Wave Radiation (NASA Mission)
- Incoming solar radiation (NASA Mission)

SPACE WEATHER OBJECTIVES

- Coronograph imagery: Off Sun-Earth line
- Coronograph imagery: Sun-Earth line
- Photospheric magnetogram imagery: Off Sun-Earth line
- Heliospheric images
- Aurroral imaging
- Thermospheric O/N2 ratio (height integrated)
- Upper thermospheric density
- Ionospheric electron density profiles
- Interplanetary Solar wind: Off Sun-Earth line
- Photospheric magnetogram imagery: Sun-Earth line
- Solar X-ray irradiance
- Solar EUV imaging
- Solar EUV irradiance
- Interplanetary Solar wind: Sun-Earth line
- Interplanetary energetic particles
- Geospace energetic Particles
- Geomagnetic field
- Interplanetary magnetic field

Evidence-Based Decision Making Tool



- Consider the value difference between C65 (legacy) and C86 (hybrid) at nearly the same cost

Example Hybrid Architecture

- GEO is mixed US Gov. satellites and hosted payloads
- LEO systems are partially disaggregated
- Mixed resolution payloads, update rates
- Commercial Services and GNSS-RO Data Buys