NESDIS Program Update

Dr. Stephen Volz, Assistant Administrator for Satellite and Information Services

CESAS Meeting

Oct 4, 2016

Outline

- NOAA's observing system status
- NESDIS Strategic Plan
- Architecture of the future
- Refresher: NOAA priorities for the Decadal Survey
- NESDIS data challenges in the coming decade
- Overarching challenges and priorities

NOAA's role in civilian space-based Earth Observation

"The Budget supports NOAA's broad environmental mission and redefines NASA and NOAA Earth-observing satellite responsibilities whereby NOAA will be responsible only for satellite missions which contribute directly to NOAA's ability to issue weather and space weather forecasts and warnings to protect life and property."

-FY16 President's Budget Request

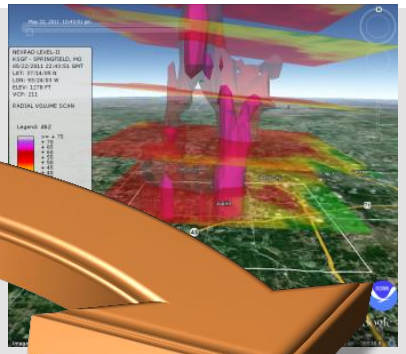
NOAA is committed to meeting the observational requirements of its Line Offices – the National Weather Service (NWS), the Marine Fisheries Service (NMFS), and the Ocean Service (NOS) – with systems developed, deployed, and leveraged by NESDIS and the Office of Marine and Aviation Operations (OMAO). The NOAA Observing Systems Council (NOSC) serves as the coordinating body for trades and discussions.

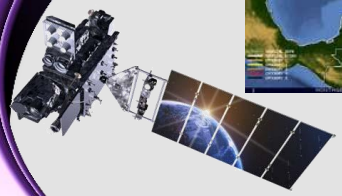
NOAA Strategic Priorities

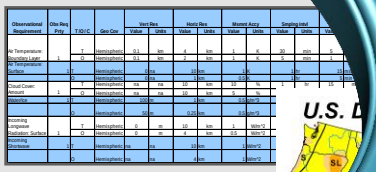
NOAA's Top Priorities

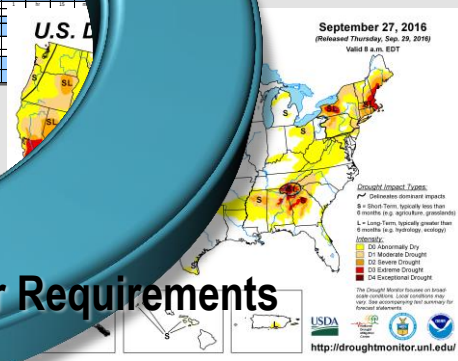
1. Provide Information & Services to Make Communities More Resilient
2. Evolve the National Weather Service
3. *Invest in Observational Infrastructure*
   - ***Observations account for $2.7B of NOAA's $5.45B budget***
4. Achieve Organizational Excellence

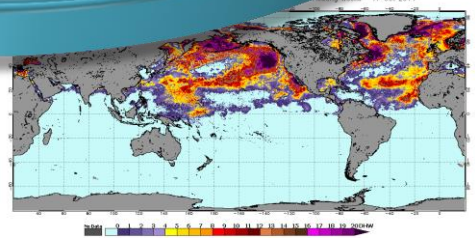
NOAA Observing System Council (NOSC) Portfolio Management











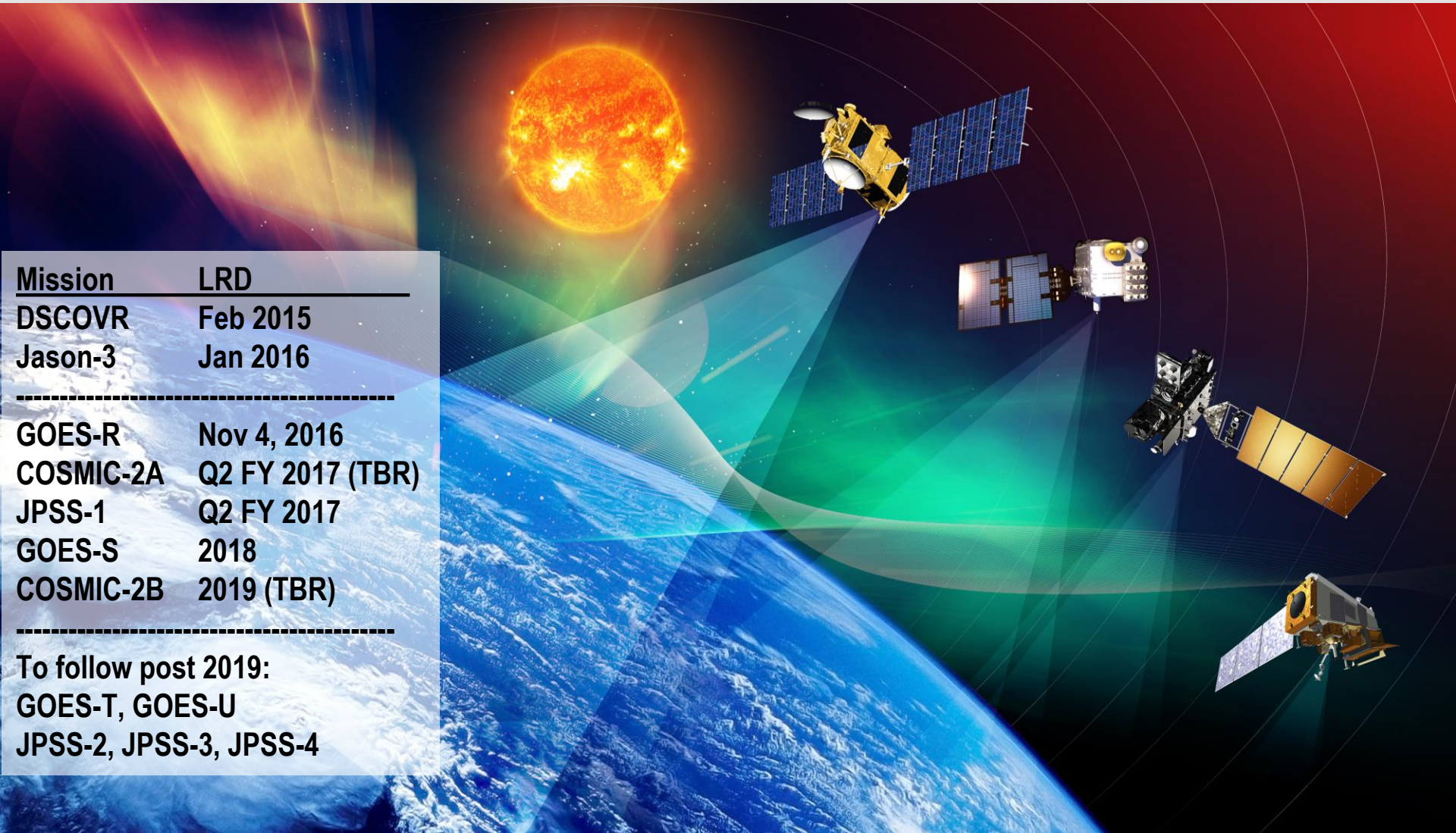
Observing System Deliverables

Efficient & Cost Effective Architecture

Observing System Capabilities

Observation User Requirements

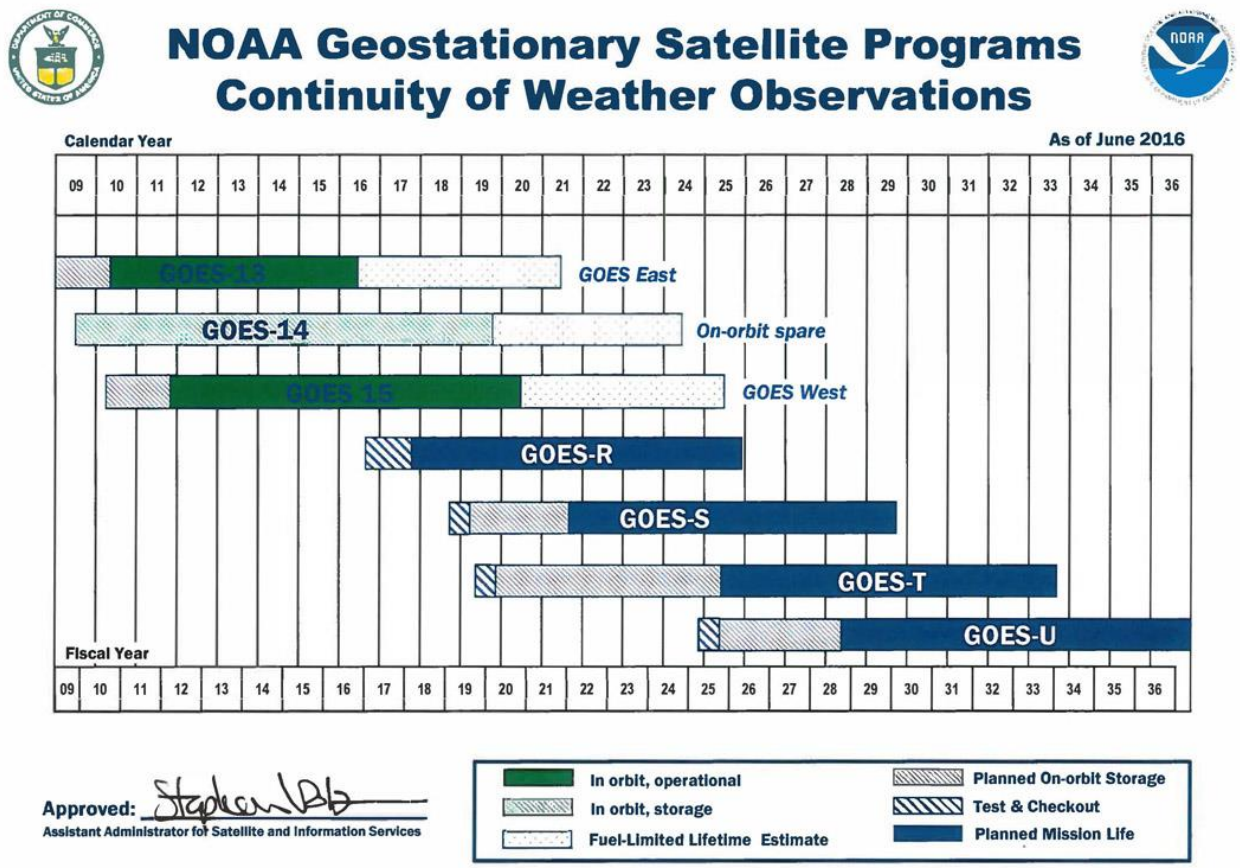
Recent and Upcoming Launches



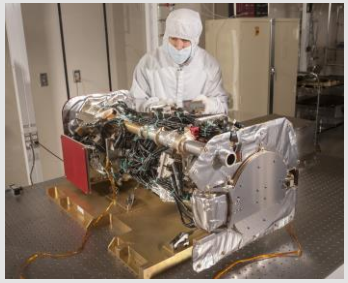
Mission	LRD
DSCOVR	Feb 2015
Jason-3	Jan 2016
GOES-R	Nov 4, 2016
COSMIC-2A	Q2 FY 2017 (TBR)
JPSS-1	Q2 FY 2017
GOES-S	2018
COSMIC-2B	2019 (TBR)

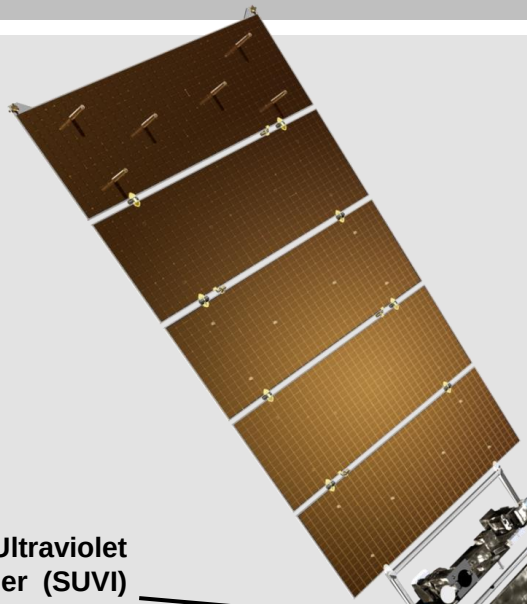
To follow post 2019:
GOES-T, GOES-U
JPSS-2, JPSS-3, JPSS-4

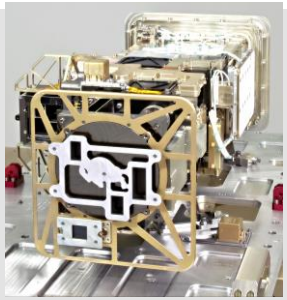
GOES Flyout Chart



GOES-R Series Spacecraft & Instruments







Extreme Ultraviolet and X-Ray Irradiance Sensor (EXIS)

Space Environment In Situ Suite (SEISS)

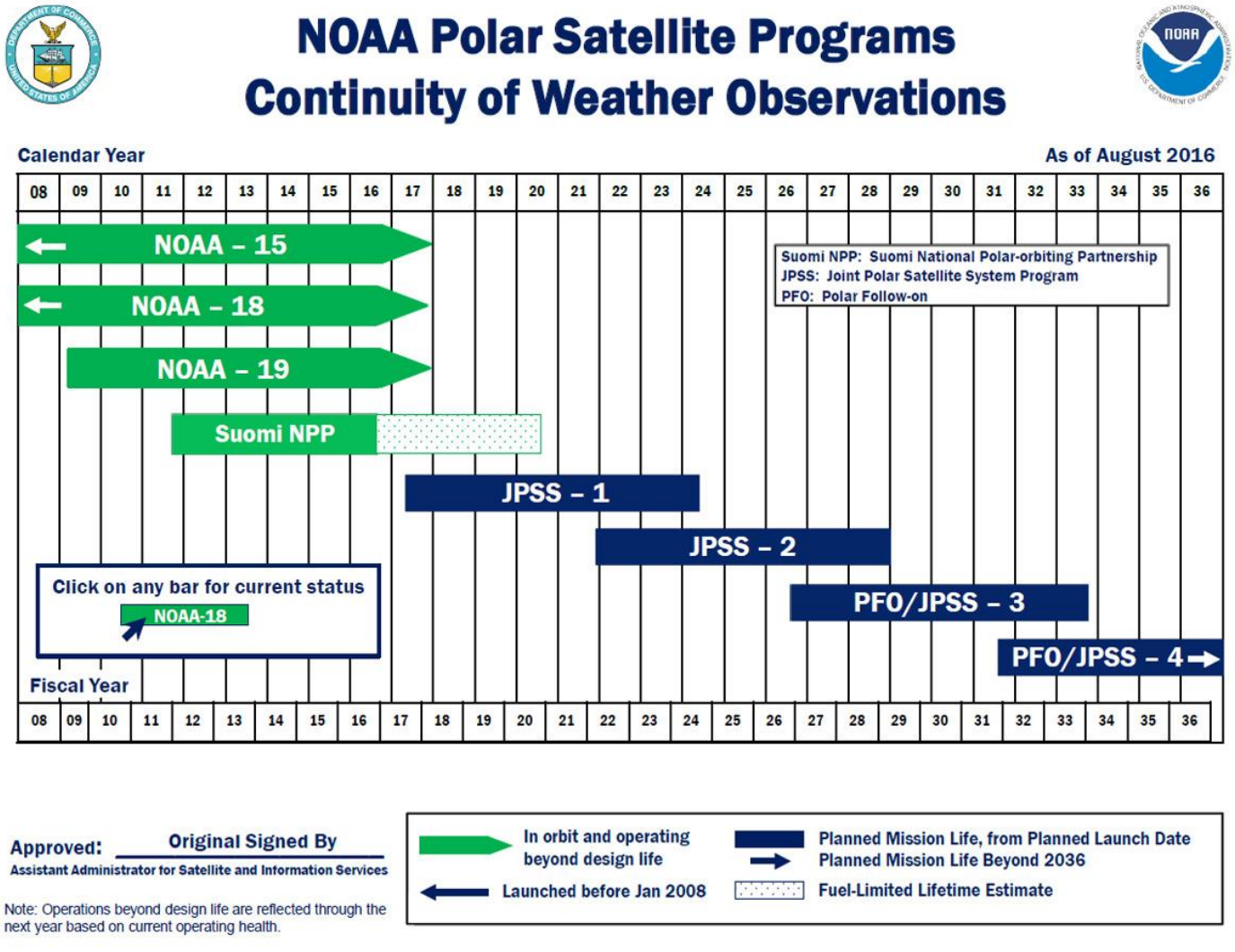
Solar Ultraviolet Imager (SUVI)

Magnetometer

Advanced Baseline Imager (ABI)

Geostationary Lightning Mapper (GLM)

Polar Flyout Chart



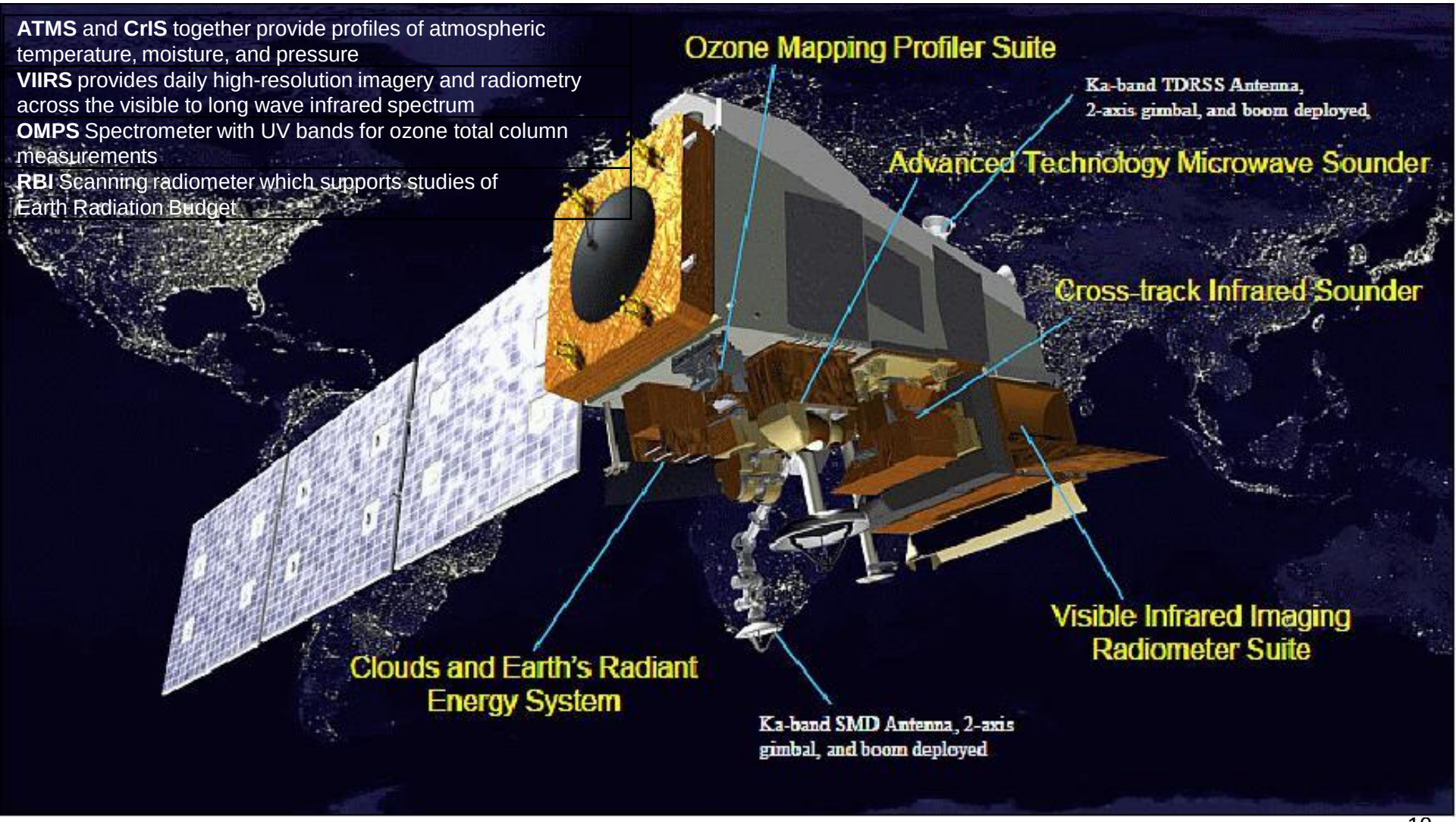
JPSS Spacecraft & Instruments

ATMS and **CrIS** together provide profiles of atmospheric temperature, moisture, and pressure

VIIRS provides daily high-resolution imagery and radiometry across the visible to long wave infrared spectrum

OMPS Spectrometer with UV bands for ozone total column measurements

RBI Scanning radiometer which supports studies of Earth Radiation Budget



NESDIS Strategic Approach

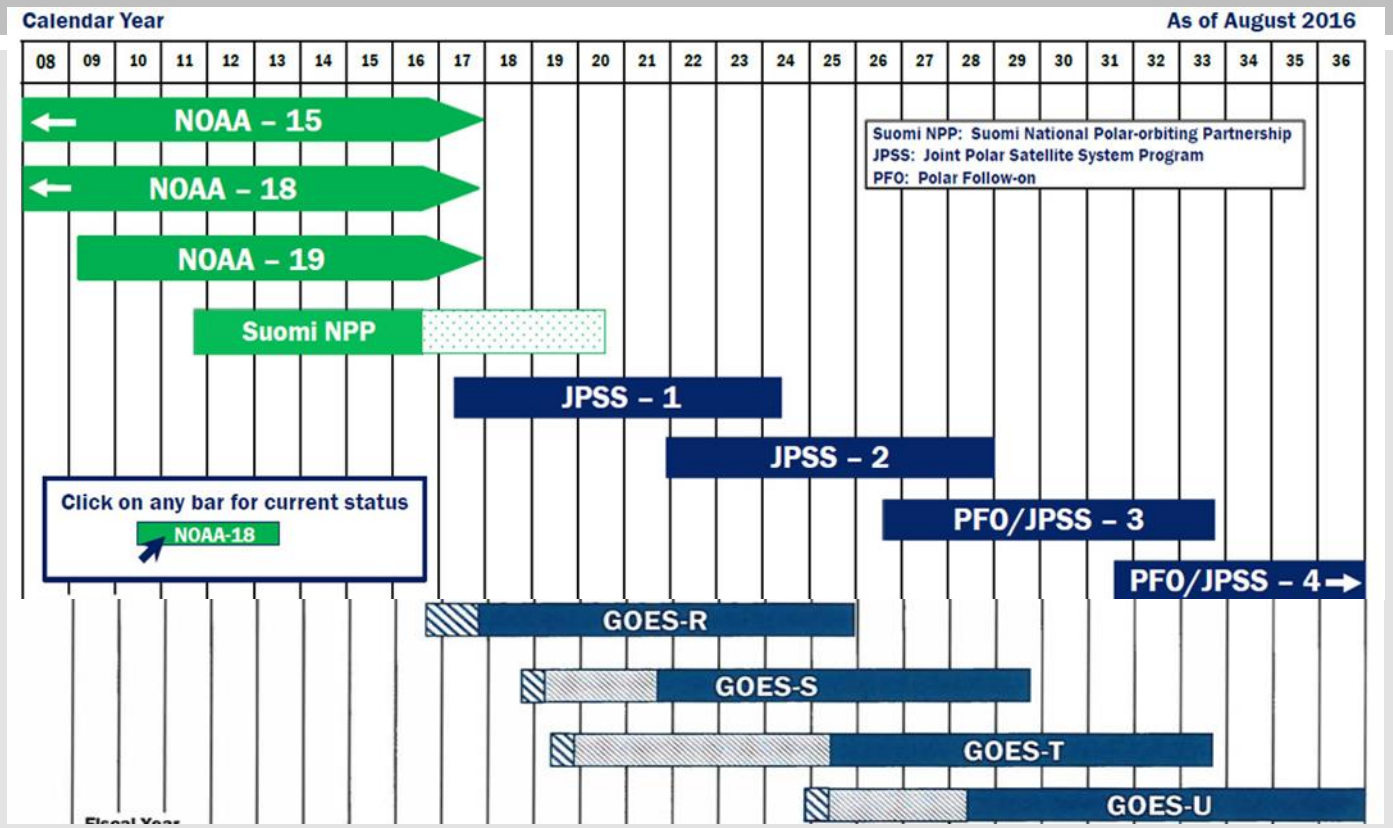
NESDIS Strategic Approach

Commitments

- **Continuity**
  - NESDIS must continue to ensure the continuity of our observations over time and anticipate future risks to mission success with the reliability and robustness that have come to define the organization.

- **Data & Information**
  - NESDIS must not only deliver single-source informational products, but also broad-based data-acquisition and distribution products that utilize and integrate multiple sources of data, allowing a broader spectrum of use.

Baseline NOAA Polar and Geostationary Platforms



- JPSS and GOES platforms will provide high performance baseline observations through the mid 2030s
- To this we will add DSCOVR and follow-on space weather observations, and
- We will be incorporating partner and potentially commercial observations

Community

- **Partnerships**
  - Successful partnerships allow us to meet our mission cost-effectively and to be more responsive to the needs of our users and stakeholders. Under this strategic plan, our international and interagency partnerships will remain a priority for NESDIS.
- **People**
  - As the scope, breadth and level of expertise of services and information provided by NESDIS expands in the years to come, we will continue to rely on a workforce that is engaged, diverse, dedicated and nationally and internationally recognized as authorities in their fields.

Partners in the Global Space-Based Observing System

Capabilities

- **Architecture**
  - NESDIS will work to evolve its ground and space architecture and move away from stand-alone systems in order to improve observational capabilities, resiliency and efficiency.
- **Use-Inspired Science**
  - NESDIS has an opportunity to help better inform future environmental assessments through innovative science and meaningful engagements with stakeholders and decision makers. These engagements will also help develop the next generation of science-based product and services.

Architecture of the Future

Develop a space-based observing enterprise that is flexible, responsive to evolving technologies, and economically sustainable.
--FY15 NOAA Annual Guidance

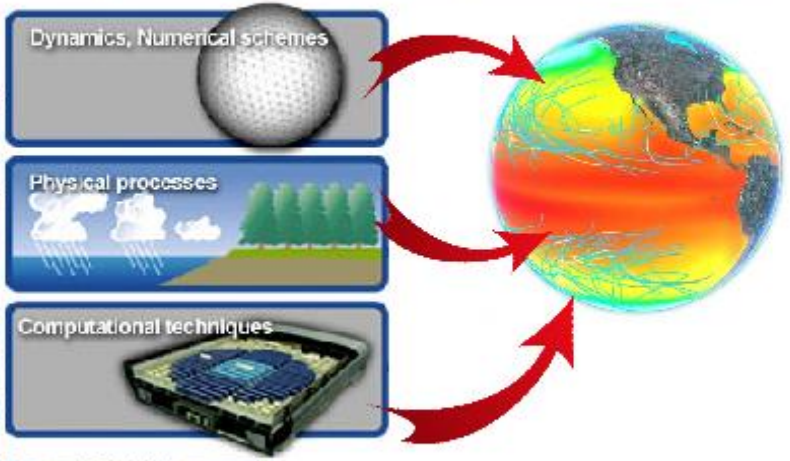
Global Earth Observing Satellite System

NESDIS & Satellite Partners

Next Generation Integrated & Adap Operations

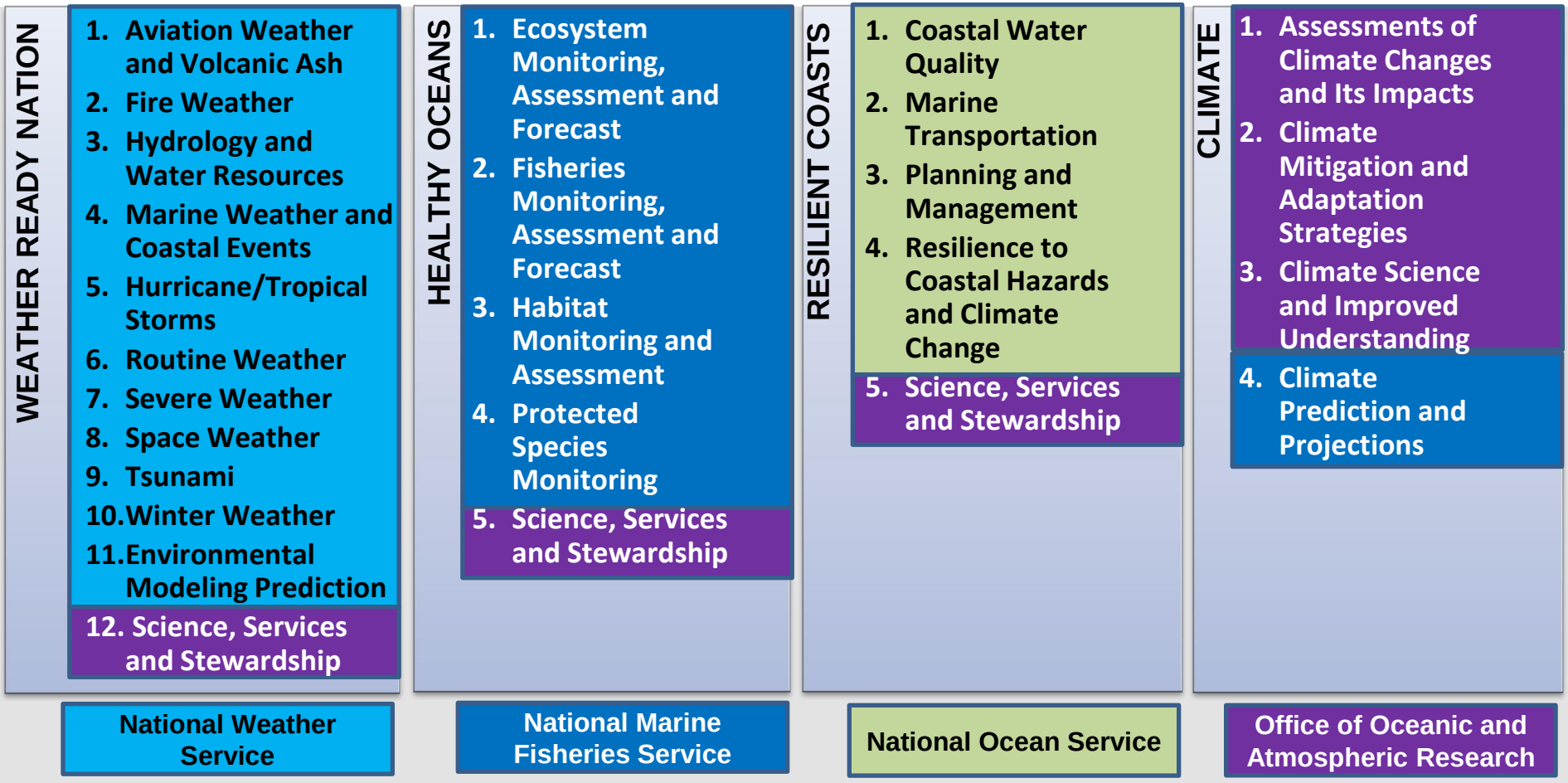
NESDIS

Integrated & Assimilated Operational Data Flow



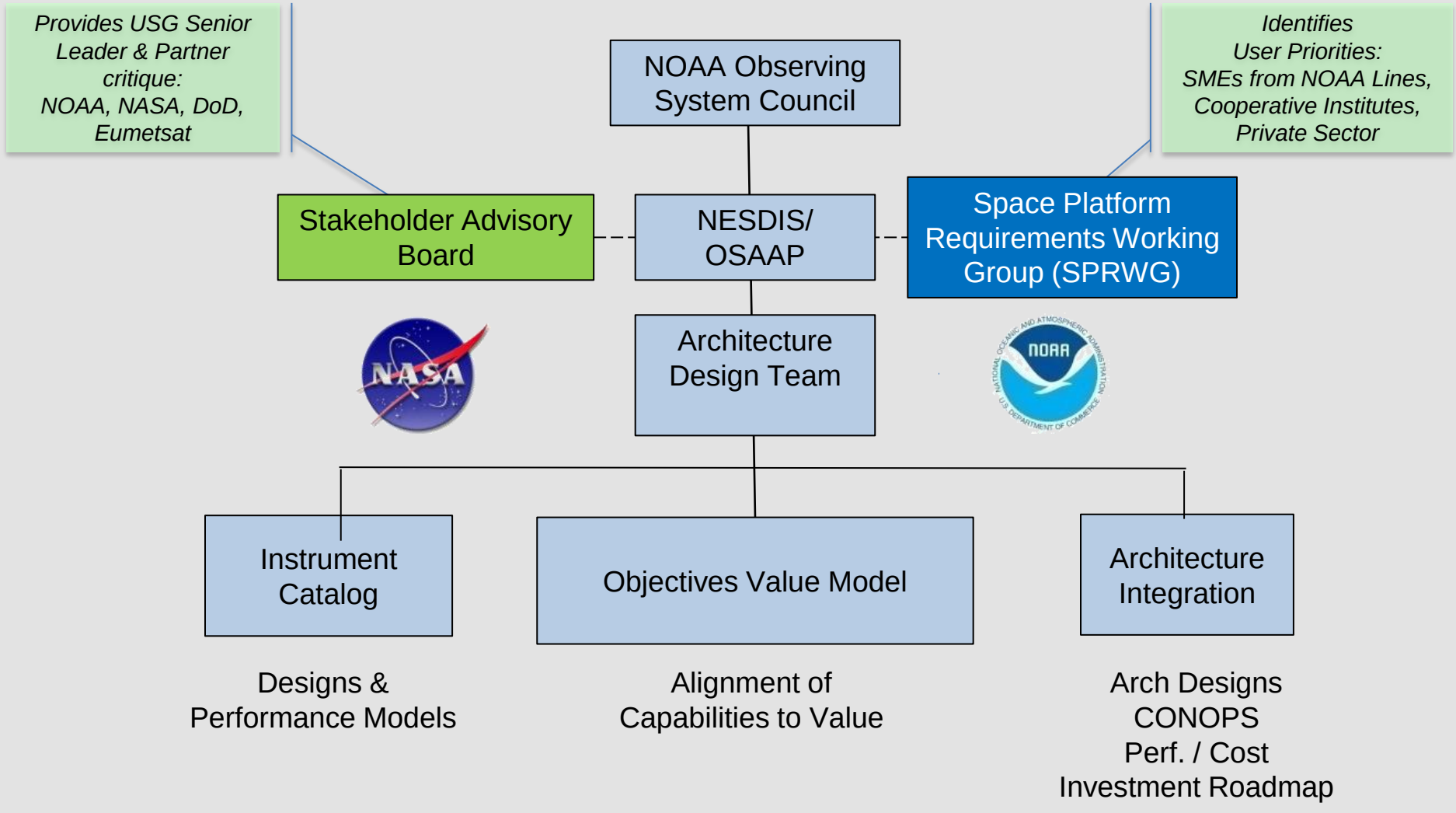
NOAA NWS/OAR & NESDIS

We Are Addressing Needs Across NOAA



NOAA Mission Service Areas by Line Office

NOAA Space Architecture Study Approach



Advisory Groups to NESDIS on Architecture

- Space Platform Requirements Working Group (SPRWG)
  - Assesses new or existing user needs & provides relative priorities for observational needs in context of future architecture
  - Functions as interface between stakeholders (widely represented on the SPRWG) and NSOSA Study team
  - SPRWG results will serve as input to process for new foundational (Level 0 & Level 1) requirements for next generation of NOAA satellites that follow GOES-R, JPSS, DSCOVR, Jason-3, & COSMIC-2 missions

- Stakeholder Advisory Group
  - Provides USG Senior Leader & Partner critique of interim study results
  - Ensures coordination between NOAA and external space agency partners

Advisory Group Membership

SPRWG

1. **Rich Anthes, Chair (UCAR)**
2. Steve Ackerman (U Wisconsin, CIMSS)
3. Bob Atlas (NOAA, AOML)
4. Dan Baker (CU, LASP)
5. Lisa Callahan (NASA GSFC)
6. Jerry Dittberner (Consultant)
7. Rich Edwing (NOAA, NOS)
8. Pam Emch (Northrop Grumman)
9. Michael Ford (NOAA, NMFS)
10. Bill Gail (Global Weather Corp)
11. Mitch Goldberg (NOAA Liaison)
12. Steve Goodman (NOAA liaison)
13. Chris Kummerow (CSU)
14. Terry Onsager (SWPC)
15. Kevin Schrab (NOAA, NWS)
16. Chris Velden (U Wisconsin, CIMSS)
17. Tom Vonderhaar (CSU)
18. Jim Yoe (NOAA NWS, NCEP liaison)
19. Jeff Reaves (Executive Assistant)

Stakeholder Advisory Group

1. NASA
2. Department of Defense
3. Eumetsat
4. NOAA Line offices – NWS, OAR, NOS

NOAA's Key Challenges Going Forward

For the Space Architecture:

- Ensuring mission continuity (e.g., avoiding gaps) with efficient use of satellite resources
- Inserting new technology while delivering consistent products and information
- Projecting high impact user needs to 2030 and beyond
- Meeting expanding observing objectives (e.g. Space Weather and others) while continuing to deliver quality terrestrial weather observations

For Ground and User Architectures:

- Match the ground system evolution and upgrades
- Match the model and High Performance Computing (HPC) capabilities to the observing system and the data output

NOAA asks for the Decadal Survey

Given NOAA's context of a well-established portfolio for the next 10+ years that includes leverage of international partnerships, NOAA's priorities for the Survey are:

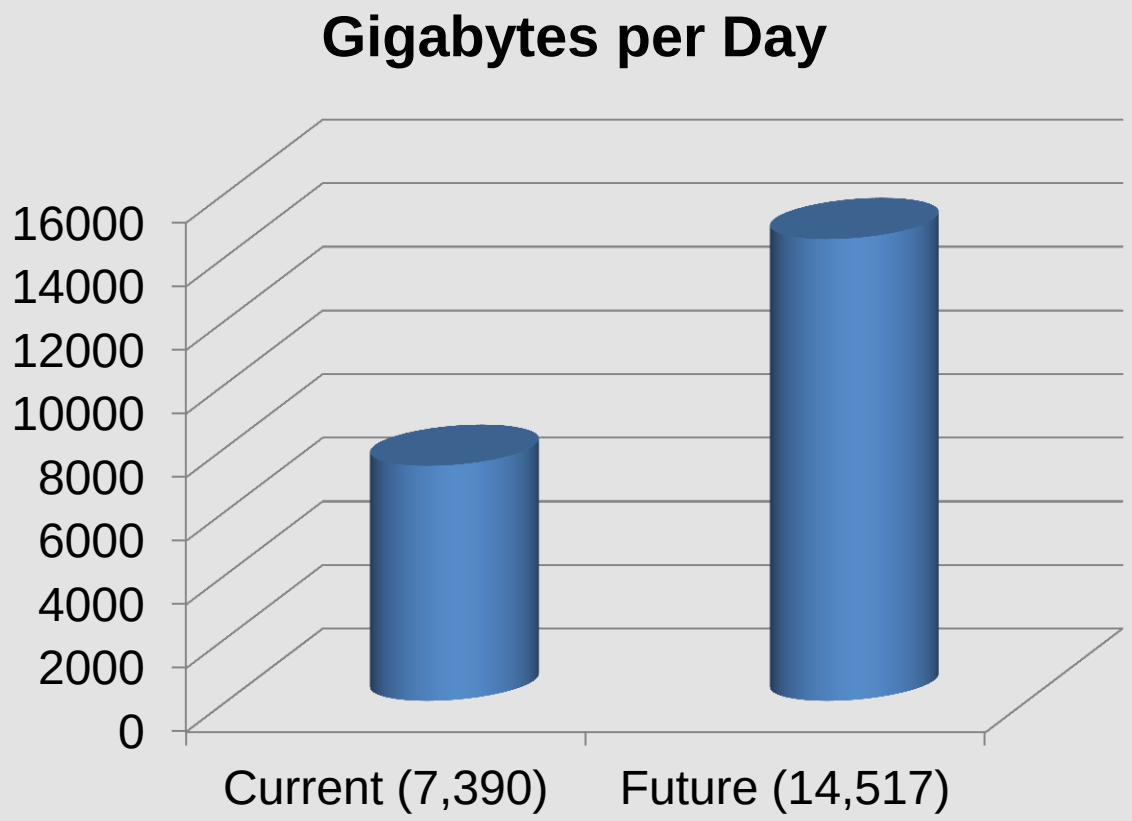
- New science that is needed to improve forecasting capability into and beyond the next decade
- Research missions and technology investments that would be beneficial to development of next-generation weather missions and complementary to weather measurements in the near term
- Evaluate best practices for making enhanced use of the extensive Earth observation data archives, and for bringing in new data sets
- Assess the value of non-traditional providers of Earth observation data in the international realm for potential operational use and whether they are being used effectively
- Consider the emergence of a commercial sector that may provide high quality Earth observations

Problem One: Data Volume

- Increasing amount of data into models and products

Current

GOES-13
GOES-15
NOAA-19
METOP-B
Jason-2
DMSP-F17
DMSP-F18
DMSP-F19
Suomi NPP
Other GEOs
Other LEOs

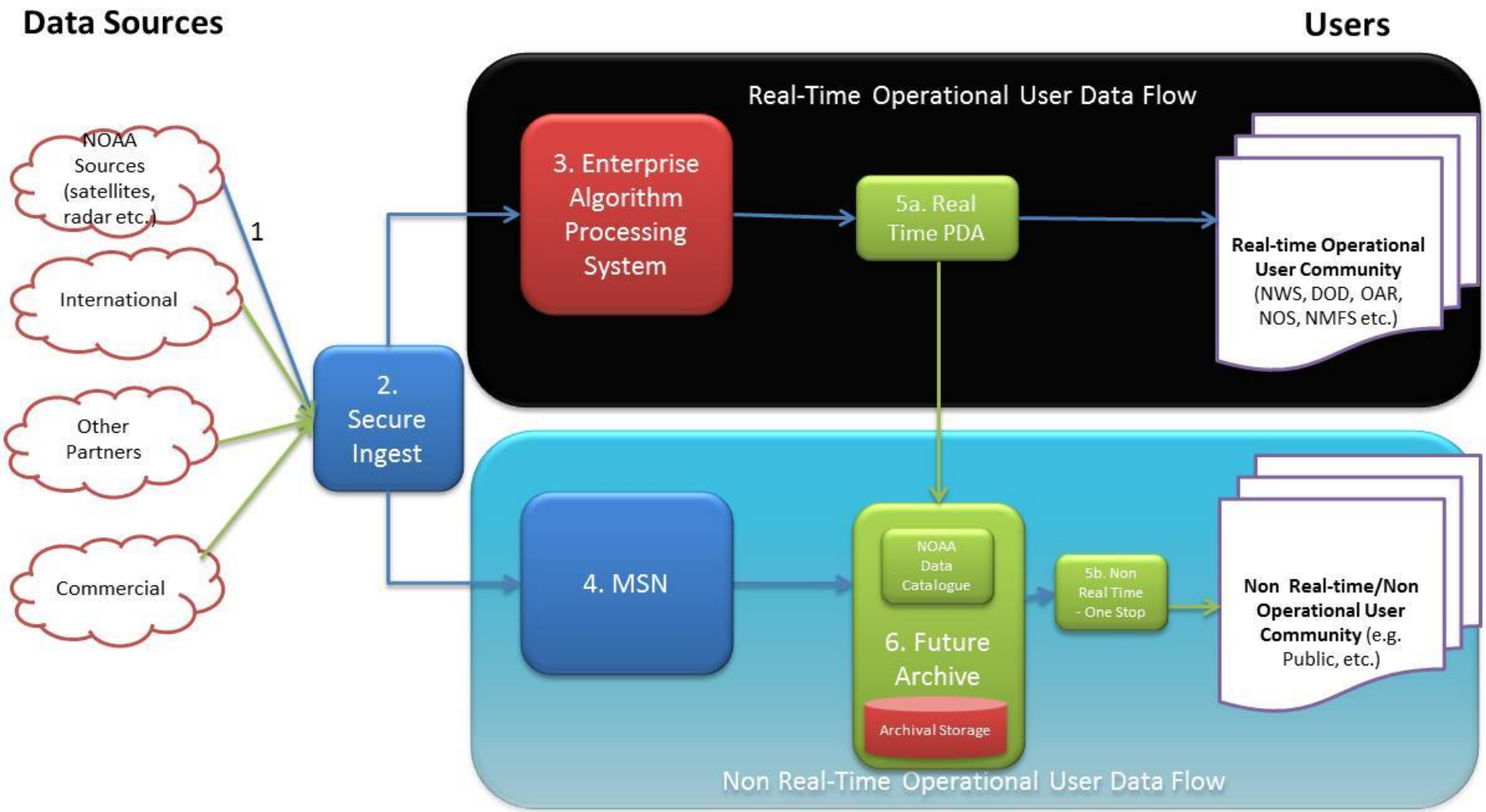


Future

GOES-R
GOES-S
METOP-C
METOP-D
Jason-3
DMSP-F20
JPSS-1
JPSS-2

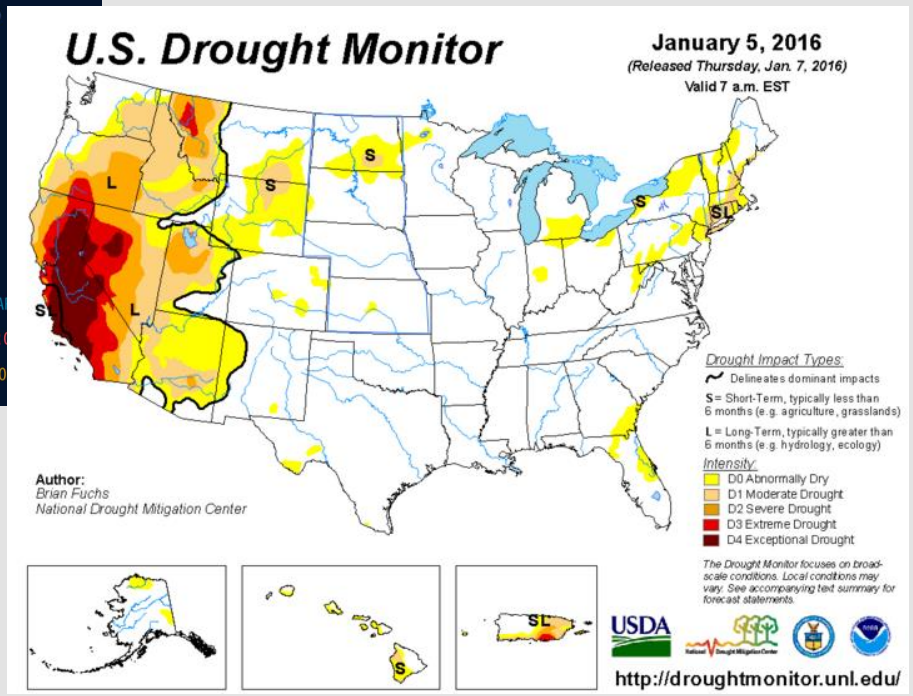
Then add in
Other GEOs
Other LEOs
Commercial

Future State:
All Sources Data Processing High-Level Architecture



NESDIS data challenges in the coming decade

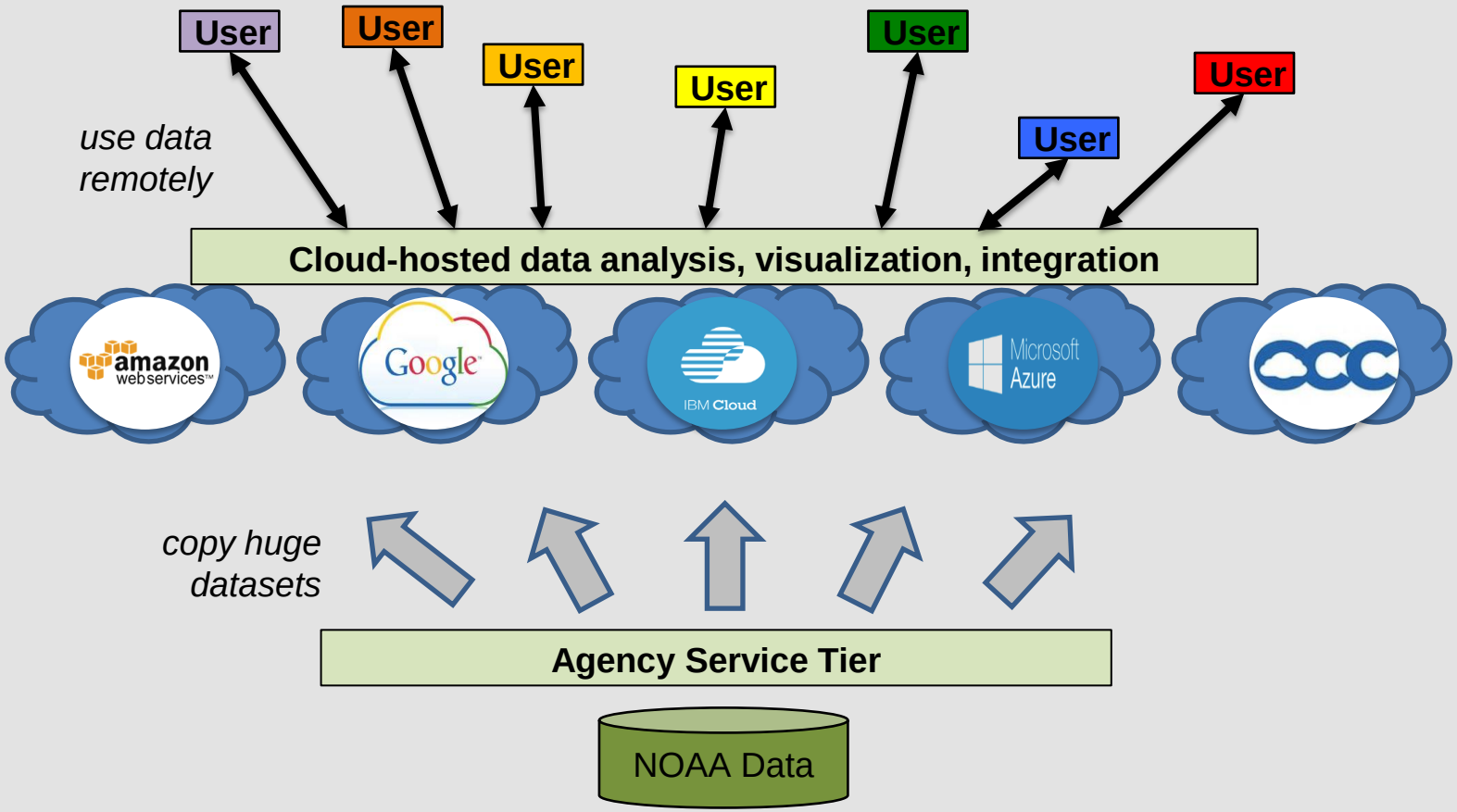
- Need to integrate and assimilate data from multiple sources



Problem Two: Provide Access to Archival Data

- Stewarding large amounts of data

NOAA Big Data CRADA Experiment



Commercial Data

- The existence of commercial companies preparing to or actually delivering quality satellite observations is an emerging factor in our future system architecture studies
- We have a number of challenges to be addressed as we add them into our assessments, including reconciling industry's development timeline with our deployment timelines
- Efforts this year have included:
  - Release of final NOAA Commercial Space Policy (January)
  - Release of draft NESDIS Commercial Space Activities Assessment Process (April)
  - Third Community Engagement event held as part of CWDP solicitation process (July)
  - Execution of Commercial Weather Data Pilot, including contract awards for commercial RO data for demonstration analyses (September)
    - *Spire and GeoOptics under contract to deliver Radio Occultation data to NOAA for evaluation purposes by April 30, 2017*

NESDIS overarching challenges and priorities

- Continue to deliver the complex and highly capable systems on time and on budget
  - *Challenge: Continued commitment to maintain the development pace of the GOES and JPSS satellites now underway*
- Augment the NESDIS and NOAA satellite observing system capabilities to incorporate efficiently data from multiple sources, including interagency, international, and commercial
  - *Challenge: Devise and implement operational approach to ingest data from all sources while meeting time latency, quality, validation, and IT security requirements*
- Define a new operating paradigm where the system is characterized as much by the product output as by the satellite input
  - *Challenge: Places significantly greater emphasis on the data processing and ground system hardware and data management, including increased funding*

Thank you!