

Climate Capabilities of NPOESS

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Joint NASA-NOAA Study on the Climate Impacts of
the Nunn-McCurdy NPOESS Certification



Executive Summary

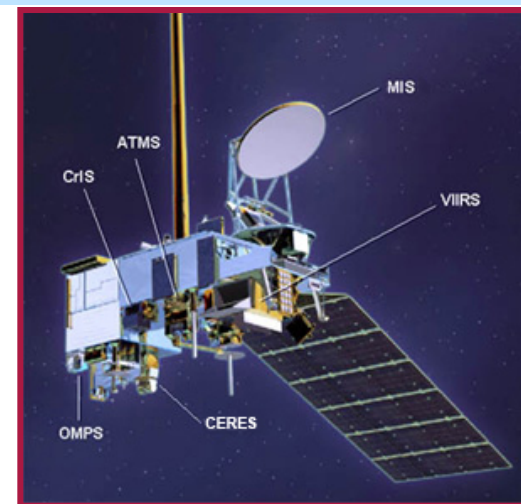
- **The White House Science Office requested NOAA and NASA to provide:**
 - An analysis of possible mitigation options of the climate impacts of the NPOESS Nunn-McCurdy Certification through 2026
 - An assessment of the potential costs of these options
 - All options are contingent on getting new funding
- **Primary goal: Ensure continuity of long-term climate records**
- **NOAA and NASA analyzed the following options:**
 - Remanifesting the climate sensors on NPOESS spacecraft
 - Placing sensors on currently planned non-NPOESS spacecraft
 - Developing new gap-filling climate satellite missions
 - Partnering opportunities
- **Key results:**
 - Work in progress: still assessing options
 - Multiple options exist to mitigate the loss of sensors from NPOESS – primary focus on use of a climate free-flyer
 - Production costs for CDR ground processing have been identified

Development of Mitigation Options



- **Multiple options exist to mitigate the loss of sensors from NPOESS**

- **Developed options using following criteria:**
 - Minimize risk to measurement continuity
 - First priority for existing climate data records
 - Minimize risk to existing programs
 - Cost effectiveness
 - Economies of scale
 - Leverage planned missions and sensors **including partnerships with other space agencies**

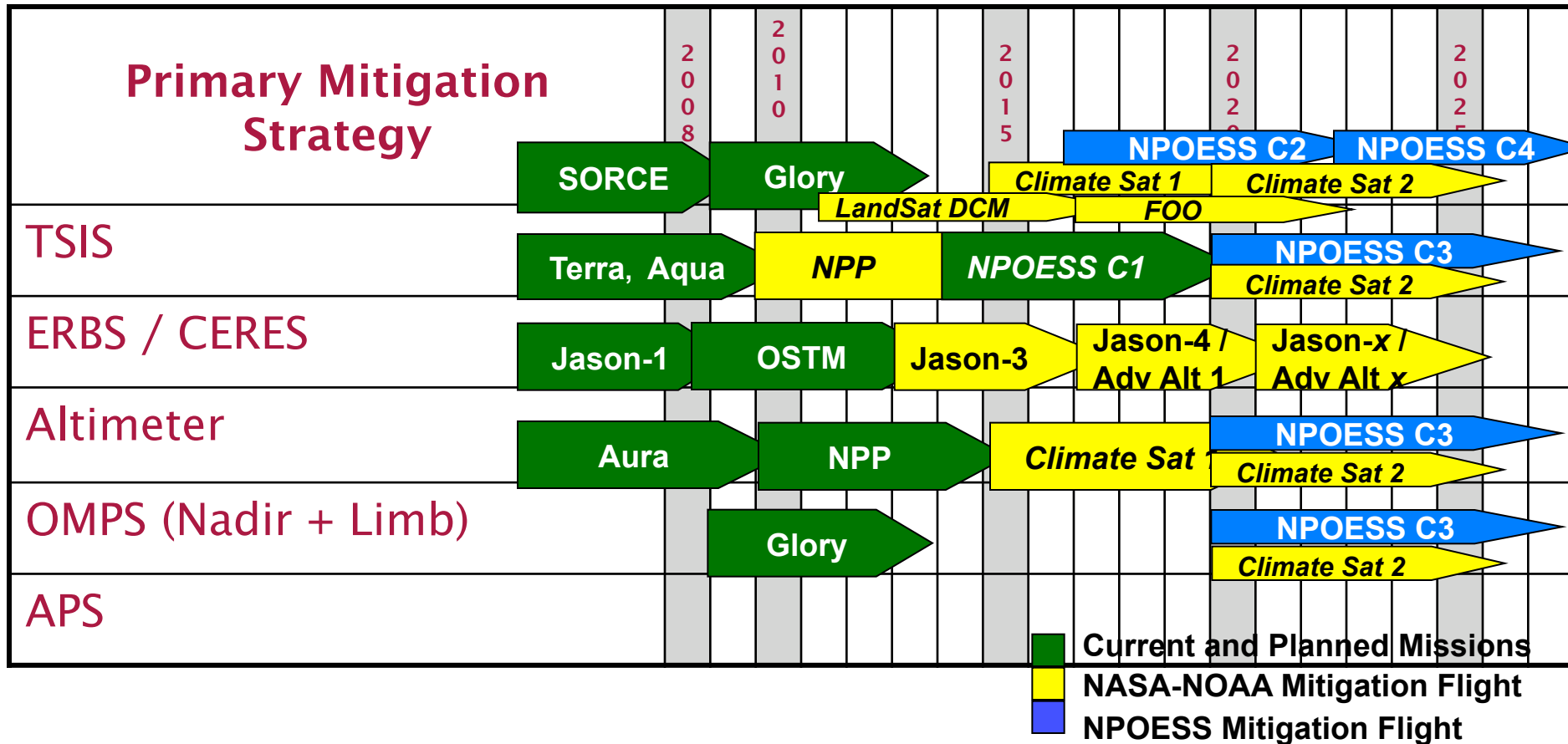




Current Studies - Hardware

- **Work in progress: still exploring options**
- **NPOESS remanifestation**
 - Assessed 2 options for earliest return to NPOESS flights (C2-C4)
 - NASA procures and delivers sensors to NPOESS as Government Furnished Equipment (GFE)
 - The Integrated Program Office (IPO) procures sensors via current prime contractor overseeing subcontracted instrument vendors
- **Altimetry**
 - Altimetry capability explored as free-flying Jason follow-on and as advanced altimeter missions
- **Climate satellite missions**
 - Examined 2 research-grade missions
 - Additionally explored TSIS (total and spectral) on Landsat Data Continuity Mission (LDCM) and International Space Station (ISS)
 - Currently assessing CERES on NPP
 - Examined 2 operational-grade missions
 - Used sensor analysis from NASA plus spacecraft development analysis from NOAA Polar Extended Mission study (2006)

Range of Options Examined for Climate Data Continuity



Current Studies - Climate Data Record (CDR) Science Support



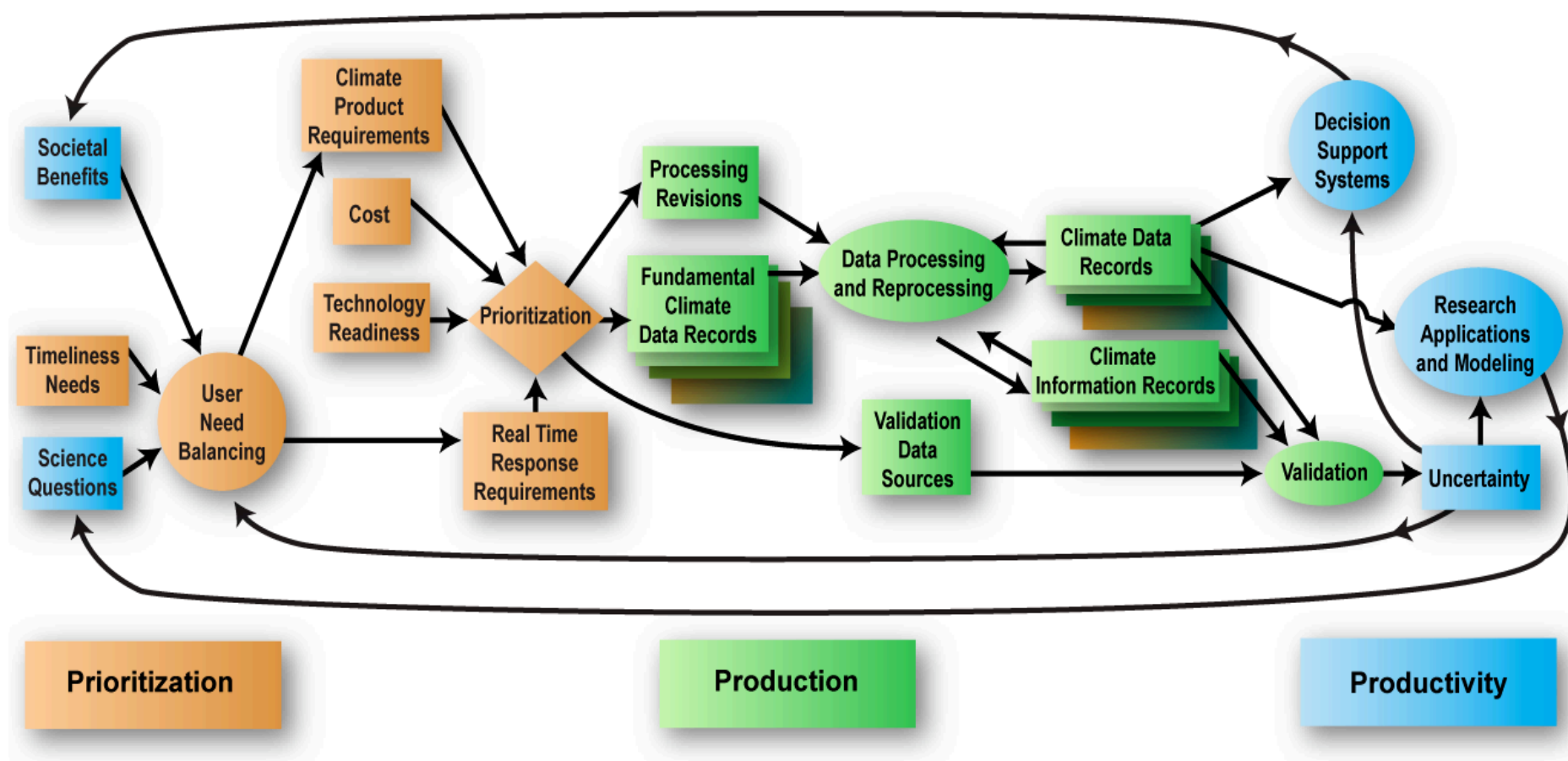
- Includes development, production, reprocessing, cal/val, stewardship, and distribution of CDRs *and* Climate Information Records (CIRs)
- Assumes data from all NPOESS certified sensors and mitigation sensors/ sources
- Potentially covers about 30 Climate Change Science Program Essential Climate Variables
- Options: Proof of Concept to full production adding all FCDRs, TCDRs, and CIRS
- Includes Research-to-Operations transitioning strategy, with sustained algorithm improvement plan



Improved Approach for Climate Data Sets

1. **Balance societal benefits, climate science questions, data quality, and timeliness in prioritizing data processing and reprocessing**
2. **Develop systematic approach to improving data quality**
 - a. Base error estimates on statistical and structural errors
 - b. Ensure systematic and open validation, combining satellite data with in-situ measurements
3. **Systematically provide feedback on data access and use**
 - a. Identify user communities and data use habits
 - b. Quantify data user activities & adapt data products to user needs
 - c. Feedback experience with data use into prioritization

Climate Data Records become a systematic & continual process for both research & operational satellite sensors





Conclusions

- The foundations of research and operational satellite CDRs has begun within NOAA and NASA
- Options for recovering NPOESS climate capabilities are focused on a climate free-flyer combined with Certified NPOESS Program
 - Near-term mitigation also use other missions
- CDR prioritization, production and productivity has been scoped & analogs begun using current data sets



Thank You

Joint Team Members

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