The Administration's Cancellation of High-Tech Climate Satellites and Programs Put our Nations Security, Infrastructure, and Global Interests at Risk

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Summary: The Administration's proposed cancellation of climate satellites and research programs must be restored. By signing EO 13783 the White House is directing all agencies to exclude consideration of climate change in making agency policy decisions. Reduction in funding these satellites and programs will result in major impacts to planning and impediments for Earth Science research for many sectors of the Federal, State and local Governments, and Commerce. In particular, DoD requirements must be met as DoD sees changes in the Earth's weather and sea parameters a security threat to our military bases and in preparing near term and long-range plans. NOAA and NASA provide essential data sets, long-term global climate projections, weather forecasts, and other services to commerce and all federal agencies within the United States – including DoD. Cancelling NOAA and NASA climate satellites and programs and the signing of EO 13783, would place our Nations Security, Infrastructure, and Global Interests at Risk.

DoD considers climate change as a threat multiplier [1]. Our military strength depends on forecasting future climate and sea level conditions – The continual funding of NOAA and NASA satellites and programs are essential to achieving that goal.

- The signing of EO13783 (Promoting Energy Independence and Economic Growth) and the rescinding of EO 13653 (Preparing the United States for the Impacts of Climate Change) and the Presidential Memorandum of September 21, 2016 (Climate Change and National Security) is in direct conflict with DoD's policy on climate change. [2] [3] [4]

- The Department of Defense sees changes in Earth's dynamics as a present security threat, and a long-term risk. We are already observing the impacts of unprecedented weather patterns in shocks and stressors to vulnerable nations and communities, including in the United States, and in the Arctic, Middle East, Africa, Asia, and South America. [1]

- Unprecedented weather patterns and sea level rise causes global disruption of resources resulting in political instability, social tensions, and refugees —conditions that enable and encourage terrorist activity and other forms of violence and the need for US military responses [1] [5].

- Sea Level Rise (SLR) threatens our Naval Bases, and the measures needed to respond to SLR involve projecting the degree of rise that can be expected in the coming decades and centuries. There is a need for precise data to develop models to determine placement of Naval bases for 50 years and remain above sea level. A 10+ year lead-time is required. As seen in the included graph it is critical to know the rate in which sea levels will change. Such information can only be acquired by funding these programs.[6] [7]

- It is essential to continue or expanded Earth climate measurements and programs by satellites, sea sensors, and ground-level sensors to enable precise forecasts needed for military planning.

NOAA climate satellites (Budget Reduced) and climate change programs (Terminated)

- **NOAA / NASA Joint Polar Satellite System Program (JPSS)**
  - Replaces current 3 satellites in operation that are beyond design life
  - JPSS-1 launched 2017 – **Funded**
  - JPSS-2 launch 2022 – **Funded**
  - **Polar Follow On program - JPSS-3 & 4. Funding Reduced (-$394M)**
    JPSS-3 scheduled launch 2026
    JPSS-4 scheduled launch 2031

Program specifics: [8] [9] [10]

- Polar orbit making 7 passes around Earth per 24 hrs
- High Resolution instrumentation
- Launch at ~ 5 year intervals for continuity of Earth monitoring
- Provides continuous critical global Earth observations through 2038.
- Gather global measurements of atmospheric, terrestrial and oceanic conditions, including sea and land surface temperatures, vegetation, clouds, rainfall, snow and ice cover, fire locations / smoke plumes, atmospheric temperature, water vapor and ozone.
- Supports National Weather Service (NWS):
  - JPSS data are critical to the NWS ice operations, which uses imagery to monitor ice extent as well as potential hazards throughout the region. Forecasters produce graphic analyses of SST, sea ice and five-day sea ice forecasts year-round as a public service to public and private maritime operations. This ice forecast assists fishing and commercial vessels in determining the safest and most efficient route
  - Data is invaluable to NWS operations because in the arctic winter, it provides Day/Night Band imagery at night using the light of the moon. This type of high-resolution satellite imagery is not available from any other satellite. Imagery from the Day/Night Band on VIIRS instrument enables Weather Forecasting Offices in Alaska to clearly see high-resolution features throughout the year without sunlight.
  - Imagery for ship navigation in sea ice.
  - Alaskan lives and livelihoods dependent upon accurate forecasting oceanic conditions.
  - JPSS uses global ocean data for near-term critical weather forecasting (hurricanes, monsoons, tornadoes blizzards) days in advance and be used for medium and long-term modeling of weather forecasting [11]
  - Data to assess environmental hazards (droughts, forest fires, poor air quality, harmful coastal waters).

- The President's Budget Blueprint for FY2018 dated March 2017 **)** [12] : Un-clear at the time on amount of funding cuts. We interpreted as the **Polar Follow On program** terminated but with the submission of the FY 2018 NOAA Budget Summary dated May 2017 we have a better understanding of the FY 2018 funding and basic scope of the **Polar Follow On program**.

- FY 2018 NOAA Budget Summary dated May 2017: [13]

> Reduction from out-year request for FY 2018 in NASA's FY 2017 budget [14] of $586K to FY 2018 NOAA Budget Summary of $180K in (-$394K)

Summary of Budget for Polar Follow On program: funded but at a lower level. The purpose of the budget cut is for NOAA to initiate a re-plan of the Polar Follow On program and work to improve its constellation strategy considering all the polar satellite assets to ensure polar weather satellite continuity while seeking cost efficiencies, managing and balancing system technical risks, and leveraging partnerships. Congress needs to ensure that any budget cuts are consistent with the viability of the US polar satellite system.

- **NOAA climate change grants and programs - cancelled ($250M)** [13]
  - Terminates NOAA grants and programs for coastal and marine management, research, and education including Sea Grant.
  - Programs help U.S. coastal communities prepare themselves for rising sea levels. [15]
  - Industry, states, and communities are on their own.

NASA Earth science satellite missions to provide climate data - cancelled ($102M) [13]

- **PACE (Plankton, Aerosol, Cloud, and Ocean Environment Mission), a spacecraft that's planned to orbit Earth and study global ocean color, in order to better understand ocean health.** [16] [17] [18] **Funding Terminated.**
  - Provides data to:
    - Avoid catastrophic risk of airplane engine failure by monitoring ash clouds from volcanic eruptions to recalculate aircraft flight plan.
    - Monitor phytoplankton growth (bottom of food chain) in support of commercial fisheries industry that provides 1.4M jobs and valued at $153B in sales.
    - Support oil spill monitoring and response
    - Improve forecasting air quality
    - Determine health of our coastal waters
- **CLARREO Pathfinder (Climate Absolute Radiance and Refractivity Observatory), a proposed spacecraft that will produce highly accurate climate records.** [16] [19] **Funding Terminated.**
  - Provides data for climate projections to make informed decisions in responding to rising sea levels, rising global temperatures, and declining air quality.
  - Provides data for coastal communities and DoD for planning Naval Bases

- **DSCOVR (Deep Space Climate Observatory).** [16] [20] **Funding Terminated**.
  - Joint NASA, NOAA, and the US Air Force satellite operational since 2015.
  - Orbiting the neutral-gravity point (Lagrange-1 (L1)) and monitors both the sun and Earth (about 930,000 miles from Earth and 94,000,000 miles from the sun).
  - The sun view enables instruments to monitor the solar wind and forecasting space weather at Earth -- effects from the material and energy from the sun that can impact satellites and technological infrastructure on Earth. Provides 15-60 min advanced warning for solar events such as geomagnetic storms. **These instruments are not affected by the budget cut**
  - Earth view: Monitors Earth ozone, vegetation, atmospheric aerosols, cloud heights, for climate research. **Funding for the operation of this instrument is terminated**.

- **OCO-3 (Orbiting Carbon Observatory 3).** [16] [21] [22] [23] **Funding Terminated**
  - Investigates and provides data to more reliably forecast future changes in the abundance and distribution of CO2 on Earth as it relates to growing urban populations and changing patterns of fossil fuel combustion. To be installed on Space Station. Funding Terminated.
  - Current OCO-2 (Orbiting Carbon Observatory 2) mission ended early 2016 but still collects data. Funding for continued mission support in question.

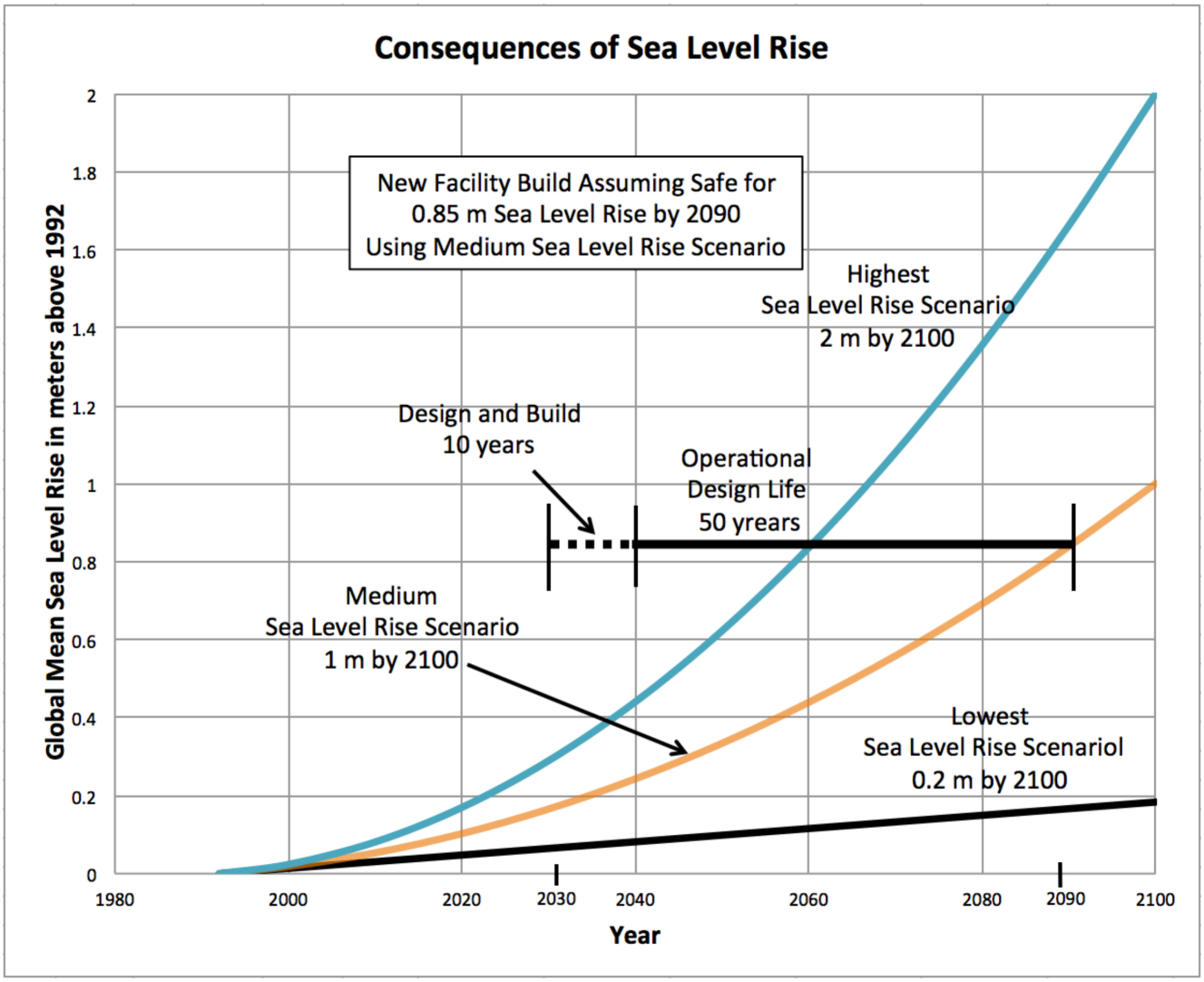
Note: DoD Defense Meteorological Satellite Program (DMSP) [24] [25] [26]

- Active Air Force Program
- Polar orbit
- 5 are operational in latest series
- Provides weather data and imagery for DoD
- HOWEVER
  - Sea ice instrumentation not working in some.
  - 1990's technology
  - Because of duplicate program with NOAA, funds to continue DMSP have been denied by Congress.
  - DoD relies on data and imagery from NOAA / NASA satellites.

Without the continual funding of these climate satellites and climate change programs, planning and mitigation for climate change for many sectors of the Federal, State, and local Governments and Commerce will not be able to continue to protect lives and properties.

- Weather forecasts
- Environmental change
- Forestry
- Energy
- Transportation
- National Security
- Public Health & Safety
- Coastal Communities
- Agriculture
- Water

Rising Sea Level are Threatening to Submerge 128 Military Bases



Rising sea level are threatening to submerge 128 military bases. [6] This chart represents the importance of our ability to predict sea level rise to ensure that our Naval Basis are fully operational. The colored curves are taken from a DoD Environmental Research Program report on sea level scenarios for costal risk management. [7]

Scenario used for this current paper:

- Naval Base could remain operational with the Lowest Scenario curve at 0.2-meter sea level rise by 2010 and no action would be necessary
- The intermediate Medium Scenario curve at 1.0 meter sea level rise by 2010 requires action soon. Operations would be in jeopardy in several decades.
- Assuming that the reconstruction of a new base would have an operational lifetime of at least 50 years (many Naval Basis have been in operation for centuries), the design would need to safely accommodate a 0.85-meter sea level rise by 2090.

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