



# Report on NOAA SEB Studies

Presented to CGMS-51 Working Group III session, agenda item 6  
CGMS-51-NOAA-WP-12

## Executive summary of the WP

NOAA is presenting two relevant studies: 1. GeoXO Benefit Analysis and 2. Economic Benefit Analysis of NOAA's Space Weather Products and Services to the Electric Power Industry

**GeoXO Benefit Analysis:** The purpose of this study is to conduct an economic benefit analysis of NOAA's future Geostationary Extended Observations (GeoXO) satellite constellation and the manner in which those benefits are produced. The report also provides estimates of the magnitude of a subset of the anticipated societal benefits for comparison with the anticipated cost of the constellation during its development and throughout its operational life. GeoXO includes five distinct instruments but is designed as a system. Although each instrument provides unique and economically valuable observations, realizing the full value of GeoXO depends on multiple instruments working in combination. Even where benefits can be traced primarily to a single instrument, the magnitude of benefits is frequently increased by information provided by other instruments on GeoXO. The five instruments included in recommended GeoXO constellation are:

- Vis/IR Imager (imager)
- Geostationary Lightning Mapper (lightning mapper)
- Ocean Color
- Atmospheric Composition
- IR Sounder (sounder)

**Economic Benefit Analysis of NOAA's Space Weather Products and Services to the Electric Power Industry:** This study looks at potential economic impact of a solar storm. More specifically it addresses the economic loss from a space weather induced electricity blackout.

## GeoXO Value Summary

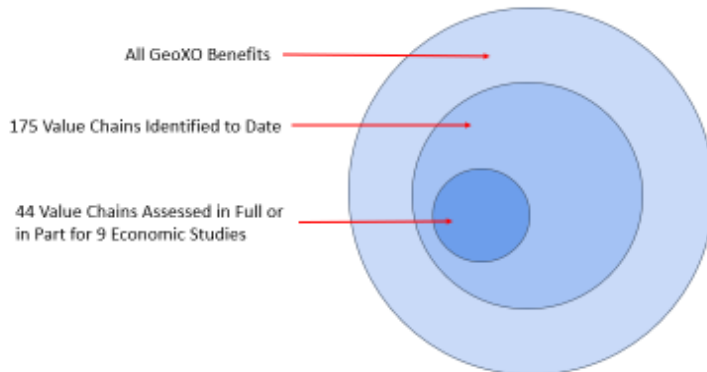
### Highlights

- 175 value chains identified
- 9 economic studies
- 44 with quantified benefits (most of the 44 are only partial assessments)
- **Considering only 25% of identified value chains, GeoXO benefits estimated to be ~\$4B/year with ROI >4X**
- This estimate excludes value provided to international users, which would make calculated benefit greater

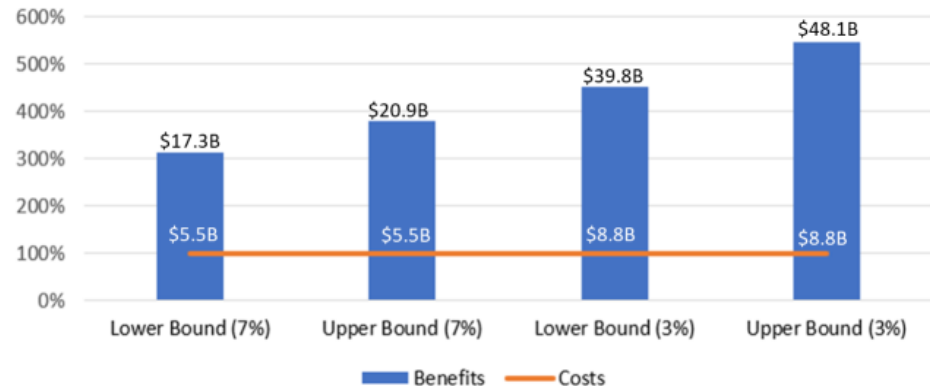
### GeoXO observations will be used to:

- reduce impacts of natural hazards
- reduce cost of response to warnings
- increase human health and safety
- increase economic productivity
- improve NOAA's ability to meet observational mandates and international agreements

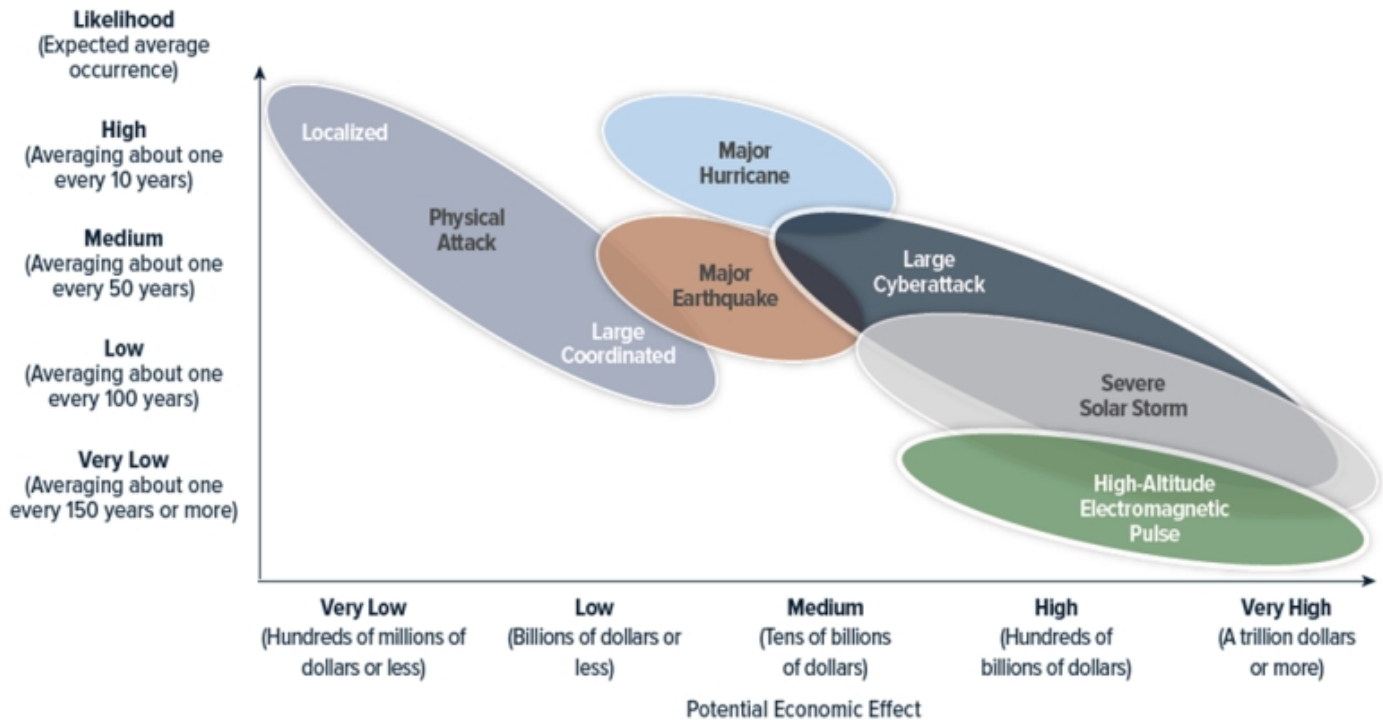
The Economic Value of GeoXO



GeoXO Constellation: Benefit / Cost Comparison  
Partial Benefits/Full Costs



# Space Weather is a National Priority



# Space Weather impacts infrastructure and activities vital to national security and the U.S. economy



**Space weather-induced electricity blackout:** *Daily* domestic economic loss in the U.S. equal to **\$41.5 billion**, plus an additional **\$7 billion** loss through the international supply chain.

## Key issues of relevance to CGMS:

- NOAA continues to pursue socioeconomic benefit analyses to better understand the value of our satellite programs and data. These analyses help us communicate effectively with funding agencies and to prioritize among potential program capabilities.

# Thank you

# Applicable Economic Benefit Analyses

- GeoXO Benefit Analysis, J. Adkins, 2022
  - Considering <25% of identified value chains (only 44 of 175 associated w/GeoXO observations), found program value exceeds costs 4X, with annual benefits of \$4B/yr (FY19\$)
- GOES-R Socioeconomic Benefits Study Phase 2, J. Lazo et al 2022
  - Benchmarking across all U.S economic sectors, study estimates GOES-R benefit >\$1.8B/yr (FY20\$)
- The Value of Surface-based Meteorological Observation Data, WMO/World Bank, 2021
  - Found global benefit of weather prediction \$162B/yr (w/ 76% due to satellites, 43% to US satellites)
  - <https://openknowledge.worldbank.org/handle/10986/35178>
- Economic and Safety-of-Life Benefits and Impact of Loss of GOES Broadcast, Alion, 2018
  - Estimates GOES DCS data relay value to USACE flood damage prevention ~\$1.27B/yr (FY16\$)
  - Estimates GOES EMWIN data broadcast damage and fatality prevention ~\$66M/yr (FY16\$)
- An Investigation of the Economic and Social Value of ... GOES, S. Bard et al, 2007
  - Considering only five benefit areas (cyclone forecast, aviation, energy demand, crop irrigation, recreational boating), study estimated GOES-R benefit to be >\$1.2B/yr (FY15\$)
  - <https://www.ssec.wisc.edu/geo-ir-sounder/wp-content/uploads/sites/36/2021/05/GOES-Economic-Value-Report-bard-1.pdf>