Climate Observations and Monitoring and CPO's Risk Areas

The COM program has funded research that supports the areas of coastal inundation, marine ecosystems, water resources and extreme heat. These four climate risk areas are part of a new CPO initiative.

Communities across the country are faced with multiple impacts of a changing climate, such as increased flooding and drought variability, warmer and more-variable ocean temperatures, altered precipitation patterns and more-frequent heat waves.

The Climate Program Office (CPO) in 2019 identified four areas of climate risks around which CPO's research and communications divisions could collectively focus. CPO is piloting this strategic effort to address America's most pressing climate challenges by applying science to improve capabilities and support user-driven needs.

COM plays a vital role in connecting NOAA's observational data collected from the atmosphere and oceans to societal challenges created by climate variability, change, and impacts relevant to the CPO risk areas.

COM invests in research to develop and analyze observational datasets that advance our ability to monitor and detect changes in the climate system. COM's investments target research that improves the integration of existing observations into NOAA's climate monitoring and modeling efforts, and advances stakeholder community applications.

Working with NOAA partners, **COM-funded projects have targeted issues such as drought, extreme heat, flooding, and coastal hazards**. COM observation-based datasets continue to lay groundwork for R&D supporting these risk areas.

How does COM science support the CPO climate risk areas?

Datasets developed and analyzed by COM provide support to All Risk Areas

Analysis of long observational time-series enable detection of changes to the Ocean and Atmosphere - the understanding of which is essential to all four risk areas.

(FY14,17,18 Ocean Climate Indices, Indicators for Assessments)

Datasets, utilizing multiple platforms and innovative methods, improve process-level understanding and predictions with potential to advance all four risk areas.

(FY20/FY21 Atmospheric Boundary Layer; Ocean Datasets)

New Capabilities to explain extremes in a climate context, co-supported by CPO's Climate Variability and Predictability; Modeling Analysis, Predictions, and Projections; and Assessments Programs benefit all risk areas
(FY20 Explaining Extremes)

COM-funded Research in Climate Risk Areas

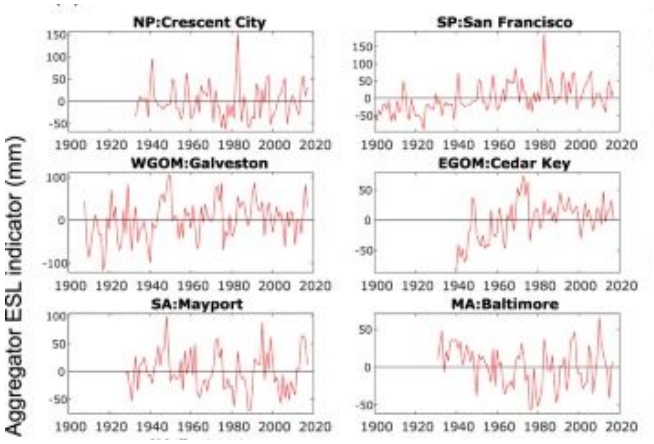


Figure adapted from Wahl et al. 2019 displays an extreme sea level indicator (ESL), a combination of sea level rise and storm surge.

1. Coastal Hazards: Extreme Sea Level Rise, Hurricanes

COM-funded research, in partnership with NCEI and NOS, resulted in an **Extreme Sea Level Rise Indicator** capturing the compound effects of Sea Level Rise and Storm Surge, and improved understanding of drivers of sea level rise through analysis of NOAA's paleoclimate data records.

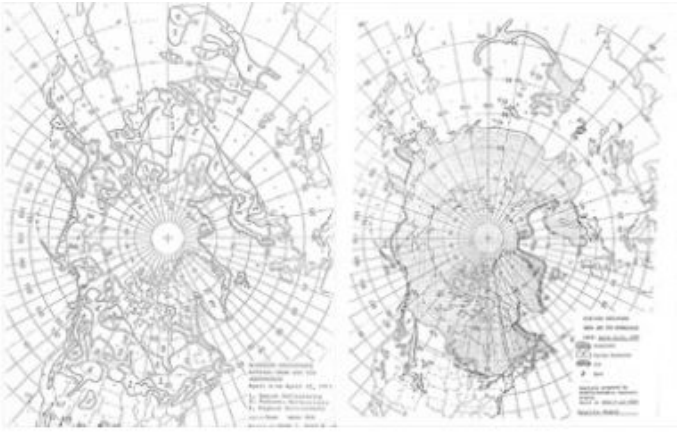
COM-funded research, in partnership with AOML and NESDIS, has extended the observed record of **hurricane intensity**. Analysis of long-term ocean data has also improved understanding of the **rapid intensification** of hurricanes. Continued work will transition these results into improving hurricane forecasts.

2. Water Resources

COM-funded research, in partnership with NCEI,

- **Improved monitoring of snow conditions** - extending the climate data record of snow extent, and developing new methods to detect changes in the seasonal melt cycle.
- **Developed hydroclimate datasets (flooding & drought)** to highlight hotspots of risk and help decision-makers put hazards into long-term context using paleoclimate data, in-situ, satellite, and/or modeled data.

In partnership with NCEI and NWS, COM funding accelerated improvements to NOAA's **observation-based precipitation datasets for climate monitoring**, as well as **extreme precipitation** methods development over the last 5 years (GHCN, CMORPH2).



NOAA weekly snow maps are being digitized and merged with the modern satellite record to extend climate records back in time to better understand changes to the hydrological cycle.

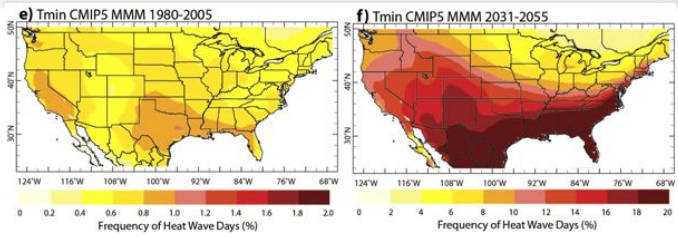


Figure adapted from Lyon et al. showing increase in projected change in frequency of heat wave days between 1980-2005 and 2031-2055 periods. This study is supported by an observational analysis.

3. Extreme Heat

COM-funded research, in partnership with NESDIS:

- Developed/improved key NOAA observation-based temperature datasets that underpin studies on extreme heat (e.g. GHCN; upper atmosphere temperature; 12,000 year record) and support climate assessments
- Characterized future heatwaves and developed indicators of human thermal comfort and impacts

4. Marine Ecosystems

Ongoing COM-funded research is developing ecological indicators for the West Coast region; and improving observation-based ocean condition datasets (e.g. Temperature, pCO_2) that can serve as a basis for studies on climate impacts to marine ecosystems.

COM is engaging in CPO's Marine Ecosystem Risk Team which is expanding CPO's connection to NOAA's stewardship mission through building partnerships with the National Ocean Service/Office of National Marine Sanctuaries.