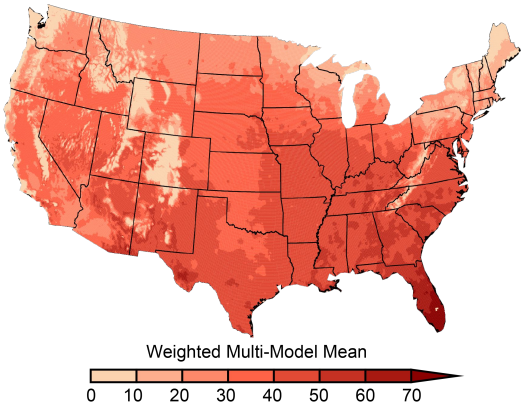
EXTREME HEAT: AN ESSM WORKSHOP

Climate Research to Enhance Resilience to Extreme Heat| CPO.NOAA.GOV/ESSM

U.S. summers are hot and getting hotter.

According to the National Centers for Environmental Information, summer 2019 was the hottest on record in the Northern Hemisphere, continuing a trend of record-breaking years. The 4th National Climate Assessment (NCA 2018) projects that the trend will continue — heat waves will intensify, last longer, and span larger areas, damaging human health, agriculture and managed lands, fisheries and the blue economy, energy, and transportation.



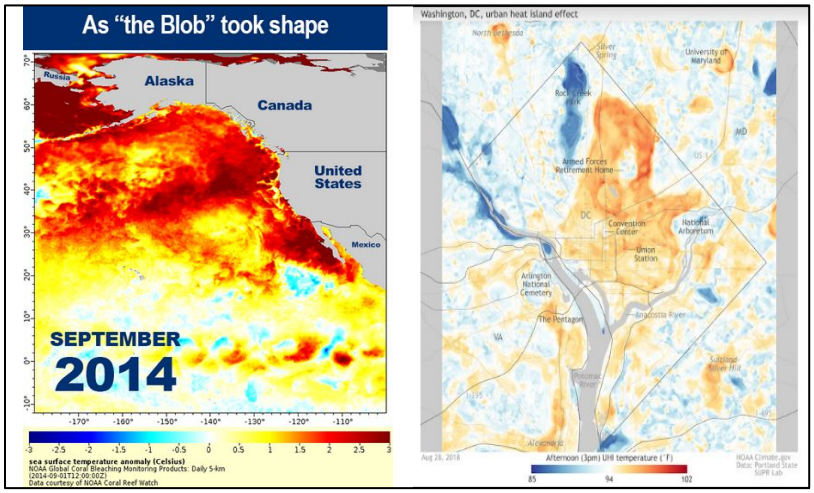
Projected change in number of days above 90°F by 2050. Source: NCA 2018

The CPO Earth System Science and Modeling Division (ESSM) convened science and user communities to address Extreme Heat Risks

Location Silver Spring, Maryland **Date** 11/18-19, 2019
Participants 90 participants from NOAA (OAR, NWS, NMFS), other federal agencies, university scientists, U.S. CLIVAR, and USGCRP.

Participants discussed climate information needed to build resilience to extreme heat across societal sectors. They also identified research priorities to address user-demanded climate information. ESSM Council and programs had follow-on discussions to synthesize workshop findings.

Participants discussed critical problems decision-makers face in response to extreme heat events in key impact areas: Arctic, urban, health, agriculture, forest and range working land, and fisheries.



(Left) Sea surface temperature anomaly maps show temperatures above normal in orange and red. Source: NOAA Coral Reef Watch. (Right) Urban Heat Island Map of Washington D.C. showing elevated temperatures in red. Source: NOAA Climate.gov

User community identified key information needs.

- Predicting extreme heat events to enable effective preparedness, response, mitigation, and adaptation
- Understanding risks of compound extremes and their multivariate or cascading impacts
- Improving communication and use of existing climate information (forecast products, tools, and data) with users.

Acknowledgements

Workshop Organizing Committee: Ana Barros, Tom Delworth, Jin Huang, Jim Hurrell, Annarita Mariotti, Virginia Selz, and Eric Williams.

Science community discussed existing capabilities and identified Extreme Heat research gaps.

Scientists identified research gaps and priorities to address use needs for extreme heat resilience in small group breakout sessions: Applications and Products; Observations and Datasets; Modeling; Predictions and Projections; and Process Understanding and Predictability.

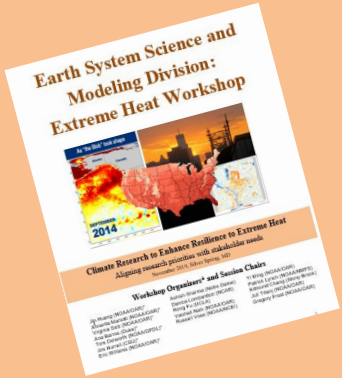
Modeling

- Resolutions are too coarse to meet user needs.
- Certain features are not incorporated in, or coupled to, the appropriate model to provide needed information.
- Information needed by stakeholders often has low predictive skill.

Observations

- More observations are needed: physical and biogeochemical, land-ocean-atmosphere and fluxes.
- Coupled multidisciplinary observations are needed on similar scales under different conditions to improve process understanding and modeling.
- Emerging observation challenges need to be considered. Continuity and consistency with other historical long-term observational records, in many cases, have not yet been established.

Participants made recommendations for ESSM Extreme Heat research.



Enhance understanding of short-term and long-term temperature increases (marine and terrestrial) through modeling, analysis, and field campaigns.

- Predictability of extremes
- Regional responses to global forcing
- Compound extremes, multivariate, or cascading impacts and feedbacks

Improve models and predictive skill, especially at regional scales, through observational and modeling research

- Couple climate models to chemical models on scales relevant to stakeholders for urban applications
- Increase model resolution for local applications

Participants recommended ESSM work with OAR partners to achieve more.

- Foster transdisciplinary partnerships and facilitate sustained collaborative dialogue to increase resilience to extreme heat across societal sectors with CPO/Climate Society Interactions Division
- Explore the intersection between the climate and weather timescale with the Weather Program Office
- Maintain and expand observations for process-level understanding with OAR labs and other agencies

Workshop findings and recommendations will inform ESSM's future research directions and funding priorities. Source: CC License: Chris Goldberg