Air Quality in a Changing Climate: NOAA's Role

Enhancing the role of the National Oceanic and Atmospheric Administration in earth system prediction by improving observing, understanding, and predicting the impacts and interactions of air quality with the Earth's changing climate

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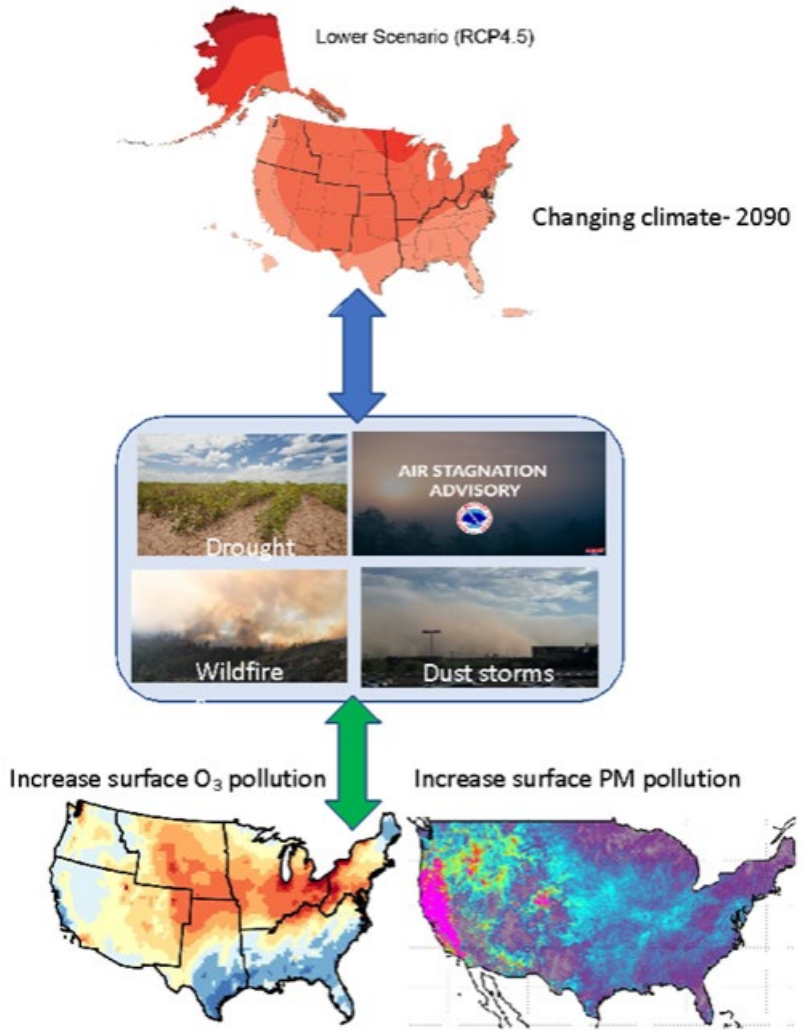
Imperative

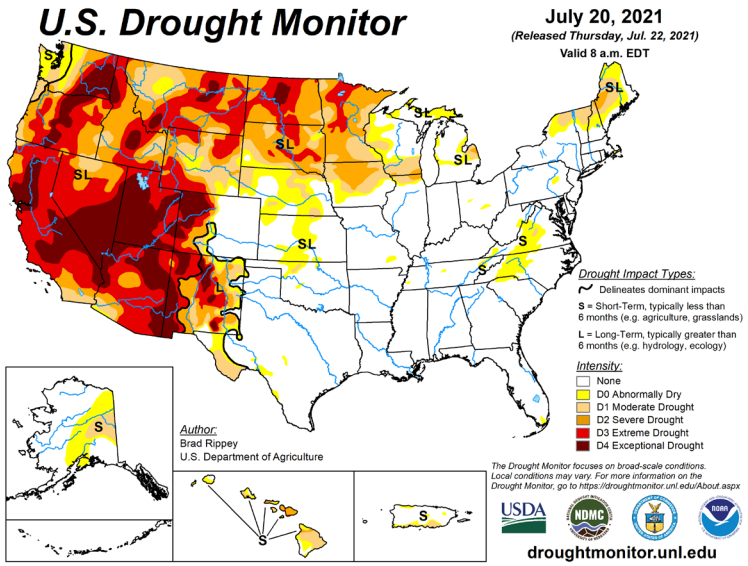
- Air quality can be a central portfolio of NOAA (like it is water).

  Atmospheric Composition/Air Quality is a key component of Earth System Science and Modeling. Essential for Understanding and Predicting changes in & impacts of Climate and Weather.

- NOAA can enable the Nation to effectively cope with impacts of climate extremes and change on air quality

  NOAA has a significant opportunity to champion, lead, and coordinate amongst federal agencies the research needed to predict the impacts of climate extreme and change on air quality, through its mandate for earth system prediction.

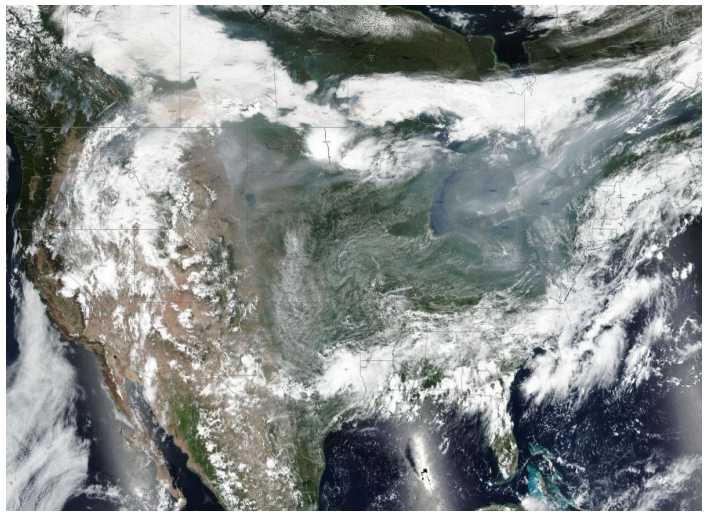




NOAA's Current Capabilities:

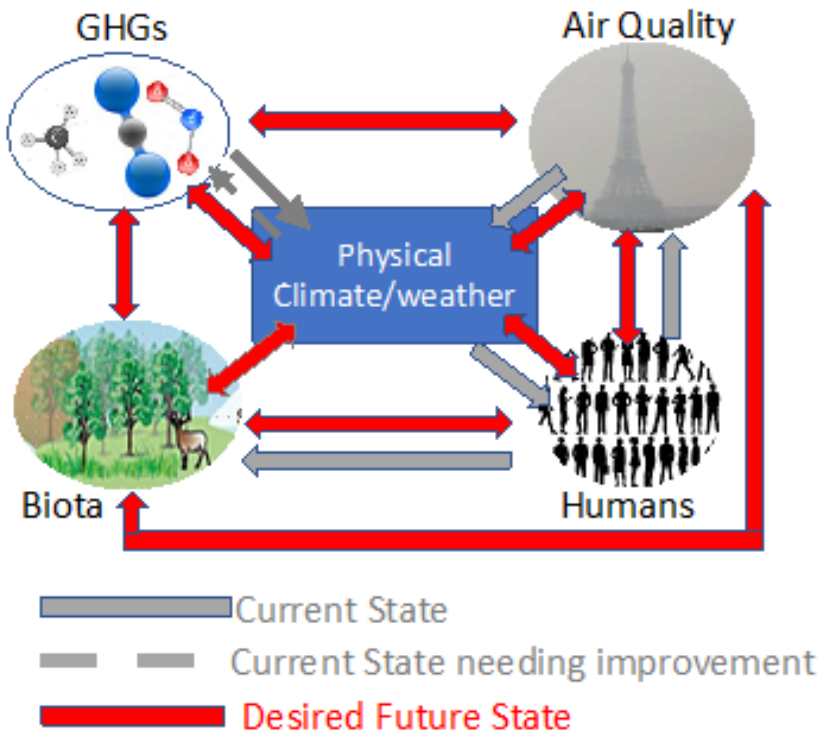
- NOAA research is essential for researching the composition of air pollution (as a function of time and space) and their transport.

Smoke generated by wildfires, July 20, 2021



- NOAA leads climate prediction, plays a crucial role in drought research and predictions with strong connection to wildfires, and in predictions of extreme precipitation/high humidity, which affect pollen events.

Gaps in NOAA's Portfolio



Adopted from Natalie Mahowald

(Other agencies involved: USDA (Forest Service), NASA, EPA, DoE, and NIST; shared goals is healthy.)

- Lack of integrated studies on how physical and biological climate-related processes affect air pollution. Many processes underpinning the impact of extreme climate events on air pollution are also not represented well in the most current climate and air quality models
- Gaps in emission predictions (probably best done in association with other agencies).
- Boundary layer- essential and is in NOAA's portfolio
- Numerous barriers exist among disciplines and between researchers and decision-makers in the study and risk management of the interconnected climate extremes and air quality.
- Importance of neighbors- transport.

Overarching recommendations

To enable NOAA to bring its scientific expertise to the table with the other agencies involved in this critical national issue.

- NOAA needs a coordination office to fully utilize its research and product portfolios. (Start with assessment of all the air quality related activities within NOAA, estimate the resources needed to meet NOAA's imperatives, and plan for future research.)

- NOAA can significantly advance its air quality mission and products via sustained funding for research on air quality in a changing climate.

Recommended Action:

NOAA convenes a workshop to take stock of its air quality related activities, prioritize, and work out ways to advance the research and products to enable the US to cope with the air quality in a changing climate.

Further recommendations

1. Support targeted early-career researchers to overcome current shortages in expertise in air quality-climate interactions (especially relative to drought, heat, and wildfire), develop vital long-term collaborations with drought and wildfire managers to sustain research programs that effectively address these societally impactful problems.

2. Enhance coordination with various state air quality agencies and private sector (stakeholders) and leverage their resources. (Use NOAA's extensive experience in weather, fisheries, and ocean services).

3. Develop a close working relationship with the epidemiology community (e.g., NIH, CDC, and EPA). Include concerns of traditionally marginalized communities in formulating the plans and communicating public health efforts are vital to enhancing environmental justice.

4. Establish a dedicated Societal Benefits Office to facilitate transitioning air quality research to applications and engage practitioners such as air quality managers, disaster response teams, and health professionals, via, for example, expand CPO's current Climate and Society Interaction (CSI) program.

5. Take up the mantle of predicting air quality in a changing climate and champion such research across other federal agencies, leverage and coordinate with other programs in Federal Agencies, such as the NASA Applied Sciences in Health and Air Quality.

Please see whitepaper for details and more granular recommendations.

Final thoughts

NOAA has the mandate and capability to contribute significantly to the nation's understanding of air quality and its impacts, particularly in a changing climate. The Climate Working Group believe implementing the report's recommendations will enable the agency to meet the needs of multiple stakeholders for air quality information as the country mitigates and adapts to changes in climate.

THANK YOU FOR YOUR ATTENTION

Considerations in this white paper

- Climate extremes and air quality
- Wildfire, dust, and pollen
- Boundary layer processes
- Observations and analysis
- Model development and evaluation
- Air quality forecasts
- Stakeholder engagement