

# Rapidly evolving aerosol emissions are a dangerous omission from near-term climate risk assessments

## Context and Objectives

- Anthropogenic aerosol (AA) emissions are expected to change rapidly over the coming decades, driven by a combination of industrialization, climate mitigation and air quality efforts.
- Unfortunately, standard framework evaluation of near-term climate risks (including the IPCC 6<sup>th</sup> Assessment Report) underrepresent the temporal and geographical complexity of the AA emissions and responses, reducing them to a cooling partially masking the greenhouse gas warming.
- The authors demonstrate how AA-driven complex responses constitute a major missing element in society's ability to prepare for future climate change, and discuss ways forward.

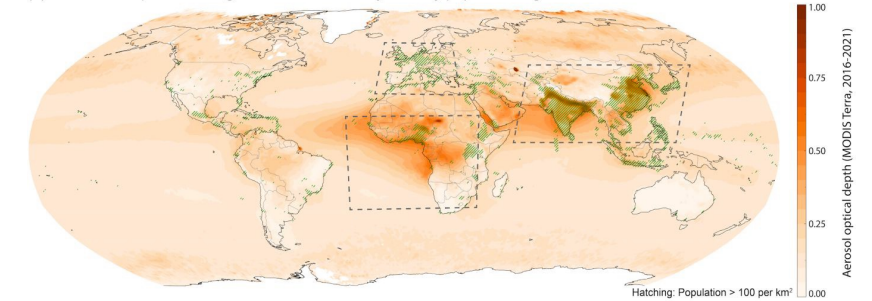
## Approaches

- The paper highlights how differences in regional aerosol emission pathways drive both near and far near-term climate changes; how Regional Climate Models often omit aerosol processes altogether, obscuring aerosols' impacts in local-scale climate planning; how emulators are often based on GHG-based pattern scaling, and how Impact models, damage functions, and social cost calculations produce inputs to risk assessments built around GHG-driven damages, neglecting aerosol-specific damages.

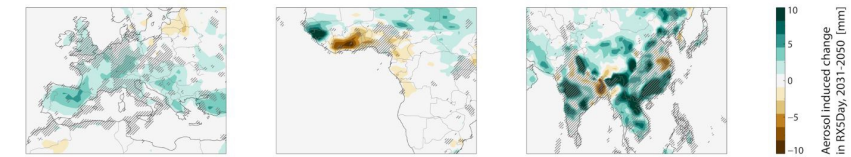
## Impact

- The authors outline a pathway towards progress and call for greater interaction between the aerosol research, impact modeling, scenario development, and risk assessment communities.

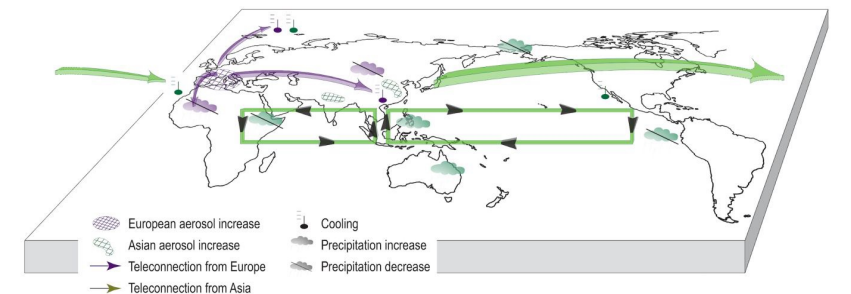
(a) Aerosols are present in high amounts over many densely populated regions



(b) Anthropogenic aerosols strongly influence extreme events, such as 5-day maximum precipitation, near emission sources



(c) Aerosol emissions also have strong remote influences, via a range of teleconnections



Aerosols are present in high amounts over many populated regions and currently influence weather and climate around the globe, both co-located with aerosol emissions and far afield.

Persad GG, BH Samset & LJ Wilcox, RJ Allen, MA Bollasina, BBB Booth, **C Bonfils**, T. Crocker, M Joshi, MT Lund, K Marvel, J Merikanto, K Nordling, S Undorf, D van Vuuren, DM Westervelt, A Zhao, 2023: Rapidly evolving aerosol emissions are a dangerous omission from near-term climate risk assessments *ERCL*, doi: 10.1088/2752-5295/acd6af



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