



ATOC COLLOQUIUM

Welcome!

Please join us for the next ATOC Colloquium on **Friday, September 15** from **11:00 AM–12:00 PM**, which will be held in **SEEC S228 and simulcast over Zoom**. This week's colloquium features **Ulla Heede (ATOC/CIRES)**, **Michelle Maclennan (ATOC)**, and **Kara Hartig (Harvard)**.

Ulla Heede ▶ Tropical Pacific Warming Patterns Influence Future Hydroclimate Extremes in the Americas

The tropical Pacific has an uncertain future. The issue of how the tropical Pacific will respond to global warming is vigorously debated, yet, unfortunately, we still have no clear answer whether the eastern Pacific will experience enhanced warming in the 21st century as global climate models predict, or whether current trends will continue or perhaps plateau. In this talk, I present a study in which my co-authors and I address this issue head on by designing a novel set of A-GCM experiments where everything is held constant *except* the pattern of warming in the tropical Pacific. This way, we can isolate the effects of the eastern Pacific warming on the terrestrial hydroclimate. We find that the eastern Pacific warming has a very pronounced effect in several regions across the Americas manifesting as both modulation of long-term trends, and changes in ENSO-related extreme events. These findings have wide reached implications for adaptation and climate risk assessment.

Michelle Maclennan ▶ Fieldwork on Thwaites Eastern Ice Shelf, Antarctica

West Antarctica's Thwaites Glacier is approximately the size of the state of Florida and currently contributes 4% of all global sea-level rise. In recent decades, the flow of ice from Thwaites Glacier into the ocean has accelerated, and it could contribute several centimeters of sea level rise by the end of the century. Thwaites Eastern Ice Shelf, the floating ice at the terminus of Thwaites Glacier, is the fastest-changing part of the glacier. Warm circumpolar deep water has melted the ice shelf from below and large rifts are causing the ice shelf to crack apart from the side, and as a result it is expected that Thwaites Eastern Ice Shelf will collapse in the next 1-4 years. In December 2022, a team of 7 researchers traveled down to Thwaites Eastern Ice Shelf to download oceanographic data on basal melt, perform glaciological measurements of the ice shelf thickness and rifts, and collect water samples and snow density profiles at the surface. This was the third and final field season on the ice shelf, and the last major opportunity to study this unique and rapidly changing region before its imminent collapse. Here, we present a summary of the fieldwork conducted and early results on the current conditions of Thwaites Eastern Ice Shelf, along with pictures and stories from the field.

Kara Hartig ▶ How Warmer Climates Prevent Continental Interiors from Dropping Below Freezing

In spite of the mean warming trend over the last few decades and its amplification in the Arctic, some studies have found no robust decline or even a slight increase in wintertime cold air outbreaks over North America. But fossil evidence from warmer paleoclimate periods indicates that the interior of North America never dropped below freezing even in the depths of winter, which implies that the maintenance of cold air outbreaks is unlikely to continue indefinitely with future warming. To identify key mechanisms affecting cold air outbreaks and understand how and why they will change in a warmer climate, we examine the development of North American cold air outbreaks in both a pre-industrial and a roughly 8xCO₂ scenario with the Community Earth System Model, CESM2. Using a combination of model climatology and air parcel trajectory analysis, we demonstrate how the loss of the surface temperature inversion, increased heat and moisture fluxes over the Arctic Ocean, and subsequent changes to diabatic heating terms prevent North American temperatures from ever dropping below freezing in the warmer climate.

Zoom: <https://cuboulder.zoom.us/j/98582201579>

Passcode: ATOC

About the ATOC Colloquium

The Department of Atmospheric and Oceanic Sciences (ATOC) Colloquium is typically held **every other Friday** from **11:00 AM–12:00 PM**. Colloquia alternate between the following formats: (A) Full-length talk by a faculty member or invited speaker, (B) Three conference-length talks by graduate students or postdocs. If you would like to nominate a speaker (including self), please email the ATOC Colloquium Committee Chair, Prof. Andrew Winters (andrew.c.winters@colorado.edu). Please visit www.colorado.edu/atoc/colloquium for further details.