



ATOC COLLOQUIUM

Welcome!

Please join us for the next ATOC Colloquium on **Friday, October 18** from **11:00am–Noon** in **SEEL 303**. This week's colloquium features ATOC graduate students **Nick Luchetti, Tessa Gorte, and Abigail Smith**. Come early for coffee starting at 10:45am, and lunch will be served after!

Nick Luchetti ▶ **Evaluating Gust Front Characteristics Near Complex Terrain**

Fire safety, aviation, wind energy, and structural engineering operations are impacted by thunderstorm outflow boundaries or gust fronts (GFs) in particular when they occur in mountainous terrain. While most examinations of GF characteristics have focused on well-organized convection in areas such as the Great Plains, here the investigation is broadened to explore GF characteristics that evolve near the complex terrain of the Colorado Rocky Mountains. Using in-situ observations from meteorological towers, as well as data from wind-profiling lidars and a microwave radiometer, 24 GF events are assessed to quantify changes in wind, temperature, humidity, and turbulence in the lowest 300 m AGL as these GFs passed over the instruments. Most events from this study experience an increase in wind speed from 1 to 8 m s⁻¹, relative humidity from 1 to 8 %, and weak vertical motion from 0.3 to 2.0 m s⁻¹ during GF passage, while temperature drops by 0.2 to 3°C and turbulent kinetic energy peaks at > 4 m² s². Vertical profiles reveal that these changes vary little with height in the lowest 300 m, and the changes in magnitude for all variables are on average weaker in the Colorado Front Range than that typically observed from organized, severe storms in flatter regions.

Tessa Gorte ▶ **Scoring Antarctic Surface Mass Balance in Climate Models to Refine Future Projections**

An increase of Antarctic Ice Sheet (AIS) surface mass balance (SMB) has the potential to mitigate future sea level rise that is driven by enhanced solid ice discharge from the ice sheet. In this work, we use a reconstructed data set of AIS snow accumulation as "true" observational data, to evaluate the ability of the CMIP5 and CMIP6 suites of models in capturing the mean, trends, temporal variability and spatial variability in SMB over the historical period (1850–2000). Using a scoring system based on these metrics, we created a subset of the top 10th percentile of models to refine 21st century (2000–2100) AIS SMB projections.

Abigail Smith ▶ **Seasonal Transitions of Arctic Sea Ice over the Satellite Era**

Model projections of Arctic sea ice show a large spread between models, on the order of millions of square kilometers. Causes of the model spread are not well understood, and because of this the spread has remained large through CMIP3, CMIP5 and early results from CMIP6. Using CMIP6 models, the CESM Large Ensemble and a newly available satellite dataset, we assess the timing of seasonal sea ice transitions and their relationships to sea ice extent, volume and sensitivity to global warming. By including numerous metrics of seasonal sea ice transitions, we are able to evaluate seasonal ice loss and gain processes that may contribute to the large spread in model projections of Arctic sea ice.

About the ATOC Colloquium

The Department of Atmospheric and Oceanic Sciences Colloquium is held **every other Friday** from **11:00 AM-Noon** usually in **SEEL 303**. Colloquia will alternate between the following formats: (A) Full-length talk by a faculty member or invited speaker, (B) Three conference-length talks by graduate students. If you would like to nominate a speaker (including self), please email the ATOC Colloquium Committee Chair, Prof. Jan Lenaerts (jan.lenaerts@colorado.edu). Please visit www.colorado.edu/atoc/colloquium for further details and the upcoming schedule.