



# ATOC COLLOQUIUM

## Welcome!

Please join us for the colloquium on **September 21, 2018** from **11:00am-noon** in **SEEC N125** featuring ATOC graduate students **Ariel Morrison, Jason West and Steffen Mauceri**. Come early for coffee starting at 10:45am, and lunch will be served after!

### Ariel Morrison: Observed and Simulated Cloud Response to Arctic Sea Ice Loss from CALIPSO and CESM1

We investigate present-day and future Arctic cloud-sea ice relationships in a fully-coupled global climate model. Model evaluation using a lidar simulator and lidar satellite observations shows agreement between present-day observed and modeled cloud-sea ice relationships. Summer clouds are unaffected by sea ice variability, but more fall clouds occur over open water than over sea ice in CALIPSO and in the CESM1. With future sea ice loss, modeled summer cloud fraction, vertical structure, and optical depth barely change. Future sea ice loss does not influence summer clouds, but summer sea ice loss does drive fall cloud changes by increasing the amount of sunlight absorbed by the summertime ocean and the latent and sensible heat released into the atmosphere. During fall, the simulated boundary layer deepens and clouds become more opaque over newly open water. We find no evidence for a summer cloud-sea ice feedback but strong evidence for a positive cloud-sea ice feedback that emerges during non-summer months as the Arctic warms and sea ice disappears.

### Jason West: The Role of Oceanic Processes in the Initiation of Indian Summer Monsoon Intraseasonal Oscillations (MISOs) over the Indian Ocean

Observational analyses and ocean general circulation model (OGCM) experiments were performed to understand the influence of oceanic processes on the warm sea surface temperature anomalies (SSTAs) prior to the convection initiation of MISOs in the equatorial Indian Ocean. Satellite observations revealed 41 strong MISO events that initiated during the May–October season of the 2001–2012 period. Eight of those events were preceded by SSTAs that were strongly influenced by wind stress-driven oceanic processes. Case studies of two strong MISO events associated with ocean-dynamically-induced SSTAs showed unmistakable evidence for the pre-convection SSTAs and sea surface height anomalies (SSHAs) associated with eastern boundary-reflected (in June/July 2004) and directly forced (in June 2006) intraseasonal oceanic Rossby waves. A mixed layer heat budget analysis of the OGCM results showed that advection played a much larger role than entrainment in elevating SSTAs. Further analysis showed that intraseasonal currents associated with the Rossby waves advected high seasonal mean SSTs into the initiation region.

### Steffen Mauceri: Aerosol Retrieval from Hyperspectral Imagery over India

A model for the retrieval of aerosol optical thickness (AOT) from hyperspectral image data is presented. The model, a deep neural network, is trained on atmospheric radiative transfer calculations from MODTRAN with varying aerosol and surface types. No ‘a priori’ information of the surface albedo or atmospheric state is necessary. Our model is able to retrieve AOT from MODTRAN calculations with a standard error of 0.04. We apply our model to AVIRIS-NG hyperspectral imagery over India with AOT ranging from 0 to 0.8, for validation. Comparisons to MODIS retrieved AOT shows a correlation of 0.76 and root mean square error (RMSE) of 0.1.

## About the ATOC Colloquium

The Department of Atmospheric and Oceanic Sciences Colloquium will be held **every other Friday** from **11:00am-noon** in **SEEC N125**. 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](mailto:jan.lenaerts@colorado.edu)). Please visit [www.colorado.edu/atoc/colloquium](http://www.colorado.edu/atoc/colloquium) for further details and the upcoming schedule.