

PHYSICS & ENVIRONMENTAL STUDIES COLLOQUIUM

Precipitation formation and marine stratocumulus as a natural laboratory

Marine stratocumulus (MSc) are the most pervasive cloud type on earth, covering over a quarter of the planet's surface in the annual mean. These clouds typically occur in the lowest kilometer of the atmosphere near the semipermanent subtropical highs of the global oceans and exert a significant cooling effect, earning them the nickname “the climate refrigerator.” Despite their climatic importance, MSc are difficult to represent in numerical models of the atmosphere and are a major source of bias in the radiative budget of climate models.

This talk focuses on the physical process responsible for precipitation formation in MSc, collision-coalescence. In addition to being one of the primary moisture removal mechanisms in MSc, precipitation modulates cloud dynamics, lifetime and radiative properties thus an accurate description of collision-coalescence is crucial to adequately represent these clouds in models. Three aspects of collision-coalescence in numerical models are addressed using aircraft observations to constrain model responses: 1) the effect of varying the discretization of the cloud drop size distribution within a limited-domain model; 2) the effect of directly coupling collision-coalescence rates to background air turbulence and 3) an exploration of how stochastic small-scale variability in liquid water distribution can be incorporated into global-scale model cloud microphysical schemes.



Wednesday, March 8
3:10-4:10 p.m.
RNS 210

Cookies and Apple Cider Served!

Mikael Witte

Mikael Witte received his B.A. in Physics and Mathematics from St. Olaf College in 2008. After a brief stint as a professional musician, he left Minnesota to study cloud physics in the Earth and Planetary Sciences department at the University of California, Santa Cruz, where he completed his Ph.D. under the supervision of Dr. Patrick Chuang in 2016 on the topic of collision-coalescence in marine stratocumulus. Dr. Witte is now a postdoctoral fellow in the Advanced Study Program at the National Center for Atmospheric Research in Boulder, Colorado, where he works with aircraft observations to improve the representation of clouds in numerical models of the atmosphere using techniques such as multifractal analysis to characterize atmospheric variability.