

ATS/CIRA Colloquium

Matti Morzfeld

from Scripps Institution of Oceanography

Hosted by Peter Jan Van Leeuwen

3 p.m. Thursday, February 9th

ATS 101 and Zoom

Predator prey dynamics and stratocumulus clouds

Earth's energy budget is a key quantity for our climate and how it changes. The reason is that stratocumulus clouds have a great effect on Earth's energy budget because they cover vast amounts of our planet and reflect sunlight. It is thus important to understand and model stratocumulus clouds. In this talk, I will make connections between two very different models. The first model is a large eddy simulation (LES), which is a cloud resolving three-dimensional atmospheric simulation that is computationally expensive to run. The second model is a scalar delay differential equation, which is trivial to run and that interprets the interactions of precipitation and cloud as a predator (rain) and prey (cloud). Put simply, the idea of the predator prey model is that "rain eats clouds". We connect these two models and present a computational framework that connects the predator prey dynamics to stratocumulus clouds by estimating the parameters of the predator prey model from an LES. This is a non-trivial task and I will explain how a feature-based approach to parameter estimation can help build bridges between models of different types. I will also present ongoing work in which we process a whole suite of LES with the goal of mapping meteorological conditions to the parameters of the predator prey model. This is joint work with Rebecca Gjini (Scripps Institution of Oceanography), Franziska Glassmeier (TU Delft) and Graham Feingold (NOAA).

Colloquia page: atmos.colostate.edu/colloquia