



Climate Program Opening Workshop August 21-25, 2017

Lecture: *A Cloud of Numbers: Representing Physical Processes in the Earth System with Mathematics*

Speaker: Andrew Gettelman

Abstract:

Physical processes in the earth system are modeled with mathematical representations called parameterizations. This talk will describe some of the conceptual approaches and mathematics used to describe physical parameterizations focusing on cloud parameterizations. This includes tracing physical laws to discrete representations in coarse scale models. Clouds illustrate several of the complexities and techniques common to many physical parameterizations. This includes the problem of different scales, sub-grid scale variability. Discussions of mathematical methods for dealing with the sub-grid scale will be discussed. Inexactness or indeterminate problems for both weather and climate will be discussed, including the problems of indeterminate parameterizations, and inexact initial conditions. Different mathematical methods, including the use of stochastic methods, will be described and discussed, with examples from contemporary earth system models.