Department of Mathematics

Colloquium

João Teixeira

Jet Propulsion Laboratory
California Institute of Technology Pasadena, California

Turbulence, Convection and Clouds in Weather and Climate Models

Abstract: The parameterization of turbulent and convective mixing in weather and climate prediction models has been a major challenge in weather and climate research for several decades. In particular, different parameterizations are used, and patched together often artificially, for different types of convection: dry or moist, in the boundary layer or in the full troposphere. The Eddy-Diffusivity (ED) approach has been successful in representing some characteristics of neutral boundary layers and surface layers in general. The Mass-Flux (MF) approach, on the other hand, has been used for the parameterization of shallow and deep moist convection. In this presentation, an approach that relies on an optimal combination of the ED and MF parameterizations (EDMF) is discussed in detail as a possible solution for the full unification of the parameterizations of convective mixing in atmospheric models. In particular, we will present results from a new multi-plume stochastic EDMF parameterization that fully unifies the representation of convection in weather and climate models: One single parameterization that represents the effects of dry, shallow and deep moist convection in the atmosphere.

About the Speaker: Dr. Teixeira is the Atmospheric Infrared Sounder (AIRS) Science Team Leader and the Co-Director of the Center for Climate Sciences at NASA's Jet Propulsion Laboratory, California Institute of Technology. He is also a Visiting Associate and Lecturer at Caltech and a Visiting Scientist at UCLA. He received his Licentiate and Doctorate degrees in Physics from the University of Lisbon, in Portugal. Dr. Teixeira's research interests include the link between turbulence, clouds and climate, and the use of models and observations to better understand the interactions between the Earth's climate system and small-scale processes, such as turbulence, convection and clouds. He has developed new methods to model turbulence and clouds, and has played a key role in developing new approaches for evaluating climate models using satellite observations. He has served on a variety of international committees that address climate science.

Wednesday February 28, 2018

LO1117

2:30 PM – 3:30 PM