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Lothar Collatz Center
for Computing in Science

GRK 2583

SIAM Student Chapter Hamburg

CAM Nachwuchsgruppe Hamburg

Lothar-Collatz-Seminar

Wed, 10. September · **10:00** · Geom 241

Kamal Sharma (Universität Hamburg)

Numerical Simulation of a Structure-Preserving Idealized Stochastic Climate Model

Abstract:

Earth's oceans and atmosphere are characterized by a rich hierarchy of interacting processes that span a wide range of scales. The spatial scale of these processes typically ranges from a few millimeters to thousands of kilometers, while the temporal scale ranges from a few seconds to several decades. In both media, small-scale motions coexist and interact with large-scale circulations, and these interactions are essential for energy transfer, mixing, and the overall dynamics of the climate system. Due to limited computational resources, however, it is practically impossible to capture all spatial and temporal scales in numerical simulations. Processes that occur at scales smaller than the grid resolution of numerical models remain unaccounted for or unresolved. The effects of small scales on large scales are therefore not captured by these models, which can lead to errors in predictions. The representation of small scales is one of the most challenging aspects of numerical weather prediction and climate modeling. To account for the missing effects of unresolved/small scales, additional terms are added to the models. This process is known as parameterization or subgrid-scale modeling.

In this talk, I will present the use of a parameterization technique known as Stochastic Advection by Lie Transport (SALT) in modeling the effects of small/unresolved scales on the large/resolved scales in a coupled ocean–atmosphere climate model. This type of model can be used to study some of the fundamental processes that arise from the close interaction between the ocean and the atmosphere. I will discuss the governing model equations, their discretization procedure, and present the numerical simulation results.

For further information please contact

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www.c3s.uni-hamburg.de/news-events/seminar-c3s.html