Climate Dynamics: The Dichotomy of Stochastic Concepts and Deterministic Modeling

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Abstract

The quasi-realistic models of the dynamics of climate and of its subsystems atmosphere and ocean are in principle deterministic—but in practical terms they behave stochastically. In two introductory examples, the issue is explained, leading to the conclusion that given our inability to “understand” high-dimensional, multiple nonlinear systems, the stochastic Ansatz of Klaus Hasselmann, the “stochastic climate model,” is a suitable tool for conceptualizing and analysis. Randomness is an unavoidable component in such studies, independently if there is true randomness in the world or if it is mere a practical solution to something, which is intractable otherwise.