



Atmospheric and climatic variability: some generic dynamical and probabilistic features (Lewis Fry Richardson Medal Lecture)

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The variability of atmospheric and climatic fields over a wide range of space and time scales, and the difficulty to make long-term predictions on their future states are well-established facts. In this lecture an approach to these phenomena is outlined in the light of concepts and tools of present-day complexity research. We first summarize universal features of the evolution of initial errors, model errors and other representative prediction-related properties such as recurrences and extremes. Emphasis is placed on the intertwining between deterministic dynamics and randomness and thus to the need to adopt a probabilistic description. We subsequently address global properties such as transitions between states and response of the atmosphere and climate to external forcings. Finally, we explore the extent to which irreversible thermodynamics can provide some organizing principles underlying key features of their evolution.