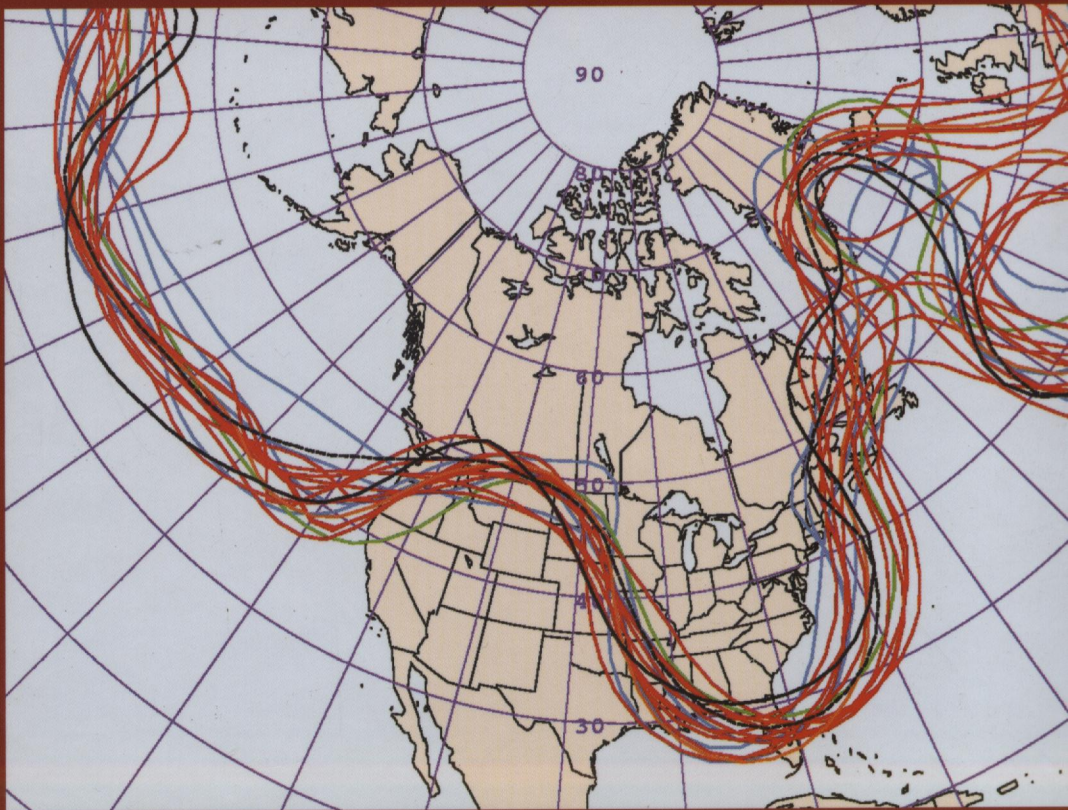


Eugenia Kalnay

Atmospheric Modeling, Data Assimilation and Predictability



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During the 50 years of numerical weather prediction the number of textbooks dealing with the subject has been very small, the latest being the 1980 book by Halpern and Wilczak. As you will soon realize, the intervening years have seen impressive development and success. Eugenia Kalnay has contributed significantly to this expansion, and the meteorological community is fortunate that she has applied her knowledge and insight to writing this book.

Eugenia was born in Argentina, where she had exceptionally good teachers. She had planned to study physics, but was introduced to meteorology by a stroke of fate; her mother simply entered her in a competition for a scholarship from the Argentine National Weather Service. But a military coup took place in Argentina in 1966 when Eugenia was a student, and the College of Sciences was invaded by military forces. Rafaelo Garcia, then Dean of the College of Sciences, was able to obtain for her an assistantship with Jule Charney at the Massachusetts Institute of Technology. She was the first female doctoral candidate in the Department and an outstanding student. In 1971, under Charney's supervision, she finished an excellent thesis on the circulation of Venus. She recalls that an important lesson she learned from Charney at that time was that if her numerical results did not agree with accepted theory it might be because the theory was wrong.

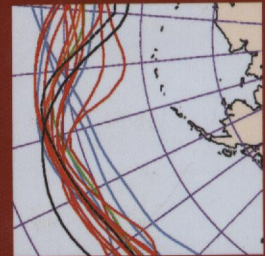
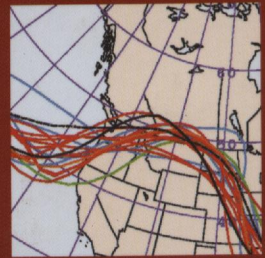
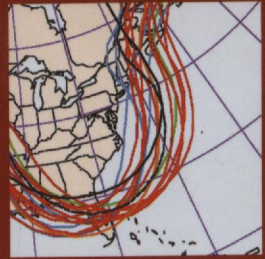
What has she written in this book? She covers many aspects of numerical weather prediction and related areas in considerable detail, on which her own experience enables her to write with relish and authority. The first chapter is an overview that introduces all the major concepts discussed later in the book. Chapter 2 is a presentation of the standard equations used in atmospheric modeling, with a concise

Atmospheric Modeling, Data Assimilation and Predictability

This comprehensive text and reference work on numerical weather prediction covers for the first time, not only methods for numerical modeling, but also the important related areas of data assimilation and predictability.

It incorporates all aspects of environmental computer modeling including an historical overview of the subject, equations of motion and their approximations, a modern and clear description of numerical methods, and the determination of initial conditions using weather observations (an important new science known as data assimilation). Finally, this book provides a clear discussion of the problems of predictability and chaos in dynamical systems and how they can be applied to atmospheric and oceanic systems. This includes discussions of ensemble forecasting, El Niño events, and how various methods contribute to improved weather and climate prediction. In each of these areas the emphasis is on clear and intuitive explanations of all the fundamental concepts, followed by a complete and sound development of the theory and applications.

Professors and students of meteorology, atmospheric science, oceanography, hydrology and environmental science will find much to interest them in this book which can also form the basis of one or more graduate-level courses. It will appeal to professionals modeling the atmosphere, weather and climate, and to researchers working on chaos, dynamical systems, ensemble forecasting and problems of predictability.



Eugenia Kalnay holds the Chair of the Department of Meteorology at the University of Maryland. She is a member of the US National Academy of Engineering, is the recipient of two gold medals from the US Department of Commerce and the NASA Medal for Exceptional Scientific Achievement, and has received the Jule Charney Award from the American Meteorological Society. The author of more than 100 peer reviewed papers on numerical weather prediction, data assimilation and predictability, Professor Kalnay is a key figure in this field and has pioneered many of the essential techniques.

Cover illustration: represents 17 members of a 6-day ensemble forecast valid on November 15, 1995. The forecast agreement led to the first official prediction of an East Coast blizzard issued 5 days in advance. Courtesy of

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