A Welcome Book on Computer Forecasting...

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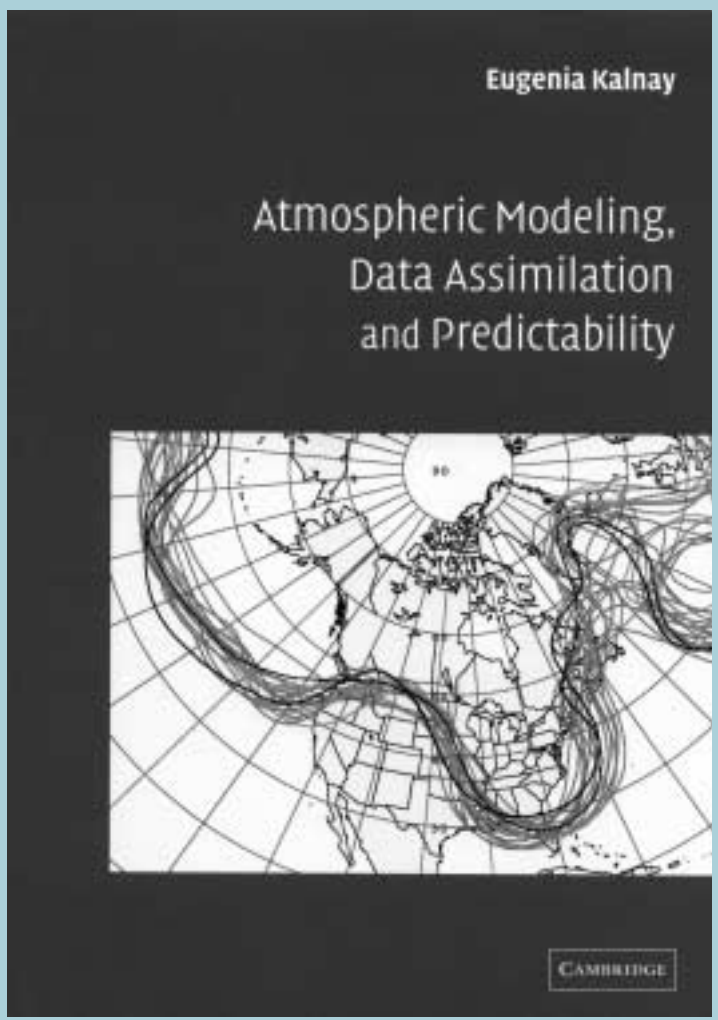
Computer modelling is now the primary means of forecasting the weather. The accuracy of Numerical Weather Prediction models has improved steadily over the half-century since the first tentative experiments. There are a huge number of technical papers and reports devoted to NWP, but very few books. So, a frisson of excitement accompanied the rumour that Eugenia Kalnay was writing a new book. Expectations were high, since she is a renowned expert in the field. She has not disappointed us.

Eugenia Kalnay got a PhD in MIT in 1971. Her advisor was Jule Charney (Ray Bates, a former Met Éireann Assistant Director, was another of his doctoral students). She was Director of the Environmental Modeling Center, U.S. National Weather Service, for ten years to 1997, so she knows a thing or two about NWP. Her book is called Atmospheric Modeling, Data Assimilation and Predictability, and covers all three topics in the title. It is a mathematical book, but don't stop reading, because it has a considerable amount of expository material, accessible to all. I am reviewing it here in the hope of persuading mathophobes (pace Mr. Gates) to look through the book. They will gain much by perusing the discursive sections even if they skip the sums.

The first of the six chapters is a historical survey, tracing the development of NWP from the ENIAC integrations up to the present, and ending with a peek into the future. It is almost completely non-mathematical and is eminently readable. The next two chapters deal with the equations of motion and the numerical methods of solving them. These are tough going, but are worth scanning, as there are some descriptive sections. In chapter 3.5, on regional models, Eugenia refers to a report by Aidan McDonald as `an excellent review of the lateral boundary conditions used in operational regional NWP'. Chapter 4 is an admirably succinct (i.e., mercifully short) introduction to the huge area of subgrid-scale physical processes. Again, much of it is accessible to the general reader.

Chapter 5, the longest in the book, is also the toughest, dealing with the vital subject of data assimilation. The material here is inherently difficult. However, a superficial scan will give you an overview of the subject, and many buzz-words to amaze your friends. The final chapter is on predictability and ensemble forecasting.



Forecasters should find this particularly useful and relevant. We have emerged from denial (or was it the Amazon?), and recognise the limitations on our predictive abilities. The chaotic nature of the atmosphere is unavoidable. We can forecast with probability but never with certainty, particularly at longer lead-times. Operational ensemble forecasting is reviewed in this chapter. The concluding sections are on the role of the oceans in long-range forecasting and on climate change.

The bibliography is comprehensive, running to 44 pages. More that a dozen references are to work of current or former Met Éireann scientists. This is gratifying, indicating that a small, dedicated team can have an international impact. Some of the numerical techniques developed in Dublin, and now in widespread use, are described in this excellent book.