

Preface

Few other scientific achievements in meteorology have caused such significant response in the world as the *Polar Front Meteorology* by the *Bergen School of Meteorology*. Today, weather prediction all over the world is performed according to the principles worked out in Bergen 75 years ago. Professor *Vilhelm Bjerknes* and his students, in particular *Jacob Bjerknes*, *Halvor Solberg* and *Tor Bergeron*, have attained a position as pioneers of modern meteorology and weather forecasting. Their discoveries and theories on extratropical cyclones changed the methods of weather forecasting and gave birth to the modern research of the dynamics of the atmosphere. The subjects brought forward by the Bergen School are more relevant than ever, and continuous research is vital to attain a better understanding and a better prediction of the weather, in particular vigorous weather.

An *International Symposium on the Life Cycles of Extratropical Cyclones* was held in Bergen, Norway, 27 June–1 July 1994. The Symposium was arranged by the Geophysical Institute at the University of Bergen in conjunction with the 75th anniversary of the Bergen School frontal-cyclone model. The organizers were *Sigbjørn Grønås*, Geophysical Institute and *Melvyn A. Shapiro*, NOAA, Boulder, USA. The Symposium was sponsored by many Norwegian and American institutions, organizations and corporations. Close to 300 scientists and students from all over the world participated. Altogether, 207 papers were presented; of these 17 were invited papers. Three volumes of Proceedings, containing about 1500 pages with extended abstracts, were ready for the Symposium. The Proceedings are available from the Geophysical Institute, University of Bergen. The papers of a historical nature and the invited papers will be published in a book by the American Meteorological Society.

Altogether 27 papers are being published in this issue of *Tellus*. Normal reviewing procedures have been followed. The papers are grouped according to the following sessions of the Symposium: Planetary-Scale Influences, Cyclone Life Cycles, Fronts, Jet Streams and the Tropopause, Mesoscale Substructures within Extratropical Cyclones. First, there are 5 papers on planetary-scale influences. They cover low-frequency variability of the atmosphere, in particular blocking events. One paper is a theoretical study on generalized Charney-Stern stability theorems. Then come 7 papers connected with cyclone life cycles. The spread in themes is large: downstream baroclinic developments, baroclinic instability, cold-air blocking in connection with orographic cyclogenesis, the early stages of cyclogenesis, a case study on rapid cyclogenesis, and climatology on troughs and cyclone tracks. Five papers are devoted to fronts, jet streams and the tropopause. Two of them are related to the seclusion process taking place in some strong cyclones, and 3 are connected with the tropopause and upper-level troughs. The last 10 papers are related to substructures within extratropical cyclones. Most are numerical simulations of mesoscale disturbances over the ocean, such as polar lows. A few of the papers show the need to extend the mesoscale numerical models to include non-hydrostatic effects and direct air/sea interaction.

The papers demonstrate that numerical simulation has become a common tool to produce data for the study of extratropical cyclones. Further, PV thinking has become popular for dynamical diagnosis. Modelling studies on mesoscale disturbances indicate an increasing need for mesoscale three-dimensional observations. International observation campaigns should be promoted.

The understanding of extratropical cyclones has increased tremendously since the Bergen School cyclone model was first introduced. We know that the complexity of extratropical cyclones is far beyond the descriptions of the Bergen School meteorologists. Despite the increased knowledge, it is interesting to note that the title of the Symposium and session names could have been proposed by Bergen School meteorologists. Some of the basic ideas introduced by them are still valid.

Sigbjørn Grønås
Geophysical Institute,
University of Bergen
Allégaten 70
5007 Bergen
Norway