

EDITORIAL

Antarctic First Regional Observing Study of the Troposphere

The Antarctic First Regional Observing Study of the Troposphere (FROST) project, which was organized by the working group on Physics and Chemistry of the Atmosphere of the Scientific Committee on Antarctic Research, had the goals of studying the meteorology of the Antarctic, determining the strengths and weaknesses of operational analyses and forecasts over the continent and in the surrounding ocean areas, and assessing the value of new forms of satellite data. The project was based around three special observing periods (SOPs)—July 1994, 16 October–15 November 1994, and January 1995—for which comprehensive datasets were established of model fields and in situ and satellite observations. Assessments were also carried out for the Antarctic meteorological observations available on the Global Telecommunications System (GTS) and the extent to which late data could improve the analyses via the preparation of high quality manual surface and upper-air analyses. The archive of FROST observations also served as a valuable source of data for more fundamental research into the meteorology of the Antarctic since normally the data collected on the continent are scattered over a number of organizations and agencies.

This special issue of *Weather and Forecasting* presents a number of papers that have come out of the FROST project and describe different aspects of the work on analysis, assessment of model fields, and more basic research into the weather systems in the high-latitude areas of the Southern Hemisphere. Since access to Antarctic observations in a timely fashion for operational forecasting is a perennial problem, Colwell and Turner address the question of the availability of data on the GTS and the possible transmission problems that can arise. The quality of the operational analyses distributed over the GTS is considered in papers by Turner et al., Bromwich et al., and Hines et al. Although there have been great advances in the production of numerical analyses in recent years, there are still many problems with these fields in the Antarctic because of the incomplete or inaccurate representation of the governing physics, lack of data, and the extreme orography of the continent. To see if improvements could be made to the analyses through the use of data not available on the GTS as well as high-resolution satellite imagery, a number of fields from the FROST SOPs were reanalyzed and this work is described in a note by Hutchinson et al. Some of the new forms of satellite data have great promise for analysis over the data-sparse Southern Ocean. Marshall and Turner examined the potential of the surface wind vectors from the first European Remote Sensing Satellite (*ERS-1*) scatterometer to aid surface analysis of synoptic-scale weather systems over the ice-free ocean areas.

There are still many questions unanswered regarding the circulation of the high-latitude areas of the Southern Hemisphere and nature of the weather systems in the Antarctic, primarily because of the poor quality of the analyses over the continent and the enormous effort required to analyze extended series of charts and satellite images. However, the development of automatic depression tracking schemes has allowed the production of cyclone climatologies, at least over the ocean areas, and Simmonds and Murray apply such techniques to the FROST dataset. Weather systems over the continent have received far less attention than comparable oceanic systems, but they are extremely important for logistical activities within the interior, and in the understanding of the information held in ice cores. Pook and Cowled have completed a note, which is one of the very few papers to date on depression activity in the Antarctic interior, that illustrates the extent to which major frontal features can be found on the high plateau. The final article, by Lieder and Heinemann, examines the mesoscale weather systems

that are found around the continent, which can be very difficult to represent in operational analyses, but are of major importance for forecasters on the research stations.

John Turner
David H. Bromwich
Guest Editors

Gary M. Carter
Chief Editor