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Book reviews

Cloud identification (Computer Software. Version 1.3, Curriculum Development and Ongoing Education Group, Bureau of Meteorology, 1993). Requires IBM PC-compatible running Windows 3.1. $17 (direct from Bureau of Meteorology Publications Subsection); $20 (posted within Australia); $27 (posted overseas).

This software product is a foray into electronic book publishing by the curriculum development team led by Ian Bell at the Australian Bureau of Meteorology. It is essentially an electronic book where instead of turning pages the user 'clicks' on objects on the computer's screen. Its aim is to help in the training of observers and pilots to identify the ten basic cloud types.

This small and compact electronic book has sections including: Observing Clouds, Cloud Identification, Observing at Night and Clouds from the Air. There is also a glossary section and a testing module. All sections are simple in layout but are more than sufficient in information content to get the basics firmly across to the reader. There are typically six to eight photo images per cloud type in the cloud identification section and the images are generally of good quality and clear. It is disappointing that only a limited number of images are available for each type, however, the selected images are very good examples and highlight the unique features of each type. Of particular appeal to young users of the program is an interactive diagram in the Observing Cloud section, where cloud types are identified by pointing at the schematic cloud with the mouse cursor.

In general, the information contained in the program is useful and well founded, though I did disagree with the intent of a couple of sections. The Observing at Night section suggested one should note the types of clouds during the day and keep in mind the synoptic situation when observing at night: I suggest that true observations are what we see, not what we hoped to see. The other section that caused some concern was the testing section: it allowed two attempts before posting a result and then suggested that if you have scored less than 100 per cent on a cloud type you should review that section. Hence 50 successful identifications out of 100 could still give you an unblemished record. I hope that sort of scoring is not acceptable in the field!

The software is supplied on 3.5″ 1.44 MB floppy disks, and requires an IBM PC compatible computer capable of running MS-DOS Windows 3.1 with a 256 VGA colour display adapter. On a 386DX IBM PC computer running MS-DOS Windows it takes about 25 minutes to go through all the information screens for the cloud identification sections and very brief information units on night observations and observing clouds from the air. One run through the testing module takes about five minutes.

The layout is relatively simple as it uses the Asymmetrix ToolBook (C 1992) engine to manoeuvre through the information by bringing up different pages of information. Computer nerds may remember ToolBook as the utility supplied with Microsoft's Windows 3.0 that few people (I knew) used and could not be classified as a 'killer application'. The ToolBook interface works as expected, agriculturally and with little embellishment, but it is more than sufficient for an electronic book.

Installing the software from the disks supplied was easy despite there being only a video cover and disks supplied with the package. In fact, to test the ease of installation I gave it to a four year old who installed it on a 386DX IBM PC compatible with 4 MB of RAM running Windows 3.1 on MS DOS 6.0. The installation went without a problem as it simply copies files from the supplied disks with a prompt for each disk and then runs a test to see if the display configuration is adequate. The four year old had the package up and running and was in the testing module after about five minutes.

Having an adequate display and driver is essential for effective use of the program, and this is clearly spelt out on the video box used to distribute the program. The only problem I had when installing on another machine was due to my eccentric set up of Windows 3.1, which resulted in the keys to activate the glossary subunits being blank.

One annoying quirk of the program was the 'Start' button. All whom I introduced to the program were gullible enough to click on the big 'Start' button and expect the fun to start — wrong! All that happens is a reload of the program and a return to the point you were before the click. This annoying big button should be removed in future versions of the program.

At $20 (available from the Publications Subsection at the Bureau of Meteorology) the program is a worthwhile investment for primary and secondary schools having physical science (including geography) units, as well as the observers and pilots who were the original target groups. While simple in scope there is plenty of potential for developing the program further by using image compression technologies to speed up the display activity and allow a far greater number of images, or by moving to CD-ROM and multimedia. As a foray into distributed electronic book publishing I feel the curriculum group at the Bureau have produced a very useful educational tool.

Bruce W. Forgan

Bruce Forgan stares at computer screens in the Atmosphere Watch Section, Bureau of Meteorology.

Antarctic Meteorology and Climatology: Studies based on automatic weather stations edited by David H. Bromwich and Charles R. Stearns (Antarctic Research Series Vol. 61, American Geophysical Union, 1993) ISBN 0 87590 839 X, AGU code AR061839X. Hard cover, 208 pp. including floppy disc. US$70.00 (US$49.00 AGU member price).

The hostile Antarctic environment, with extremes of low temperature, high wind speeds and snow drift, presents a severe challenge to collect regular meteorological data over a large continent. This is a timely book to show the advances made with the use of automatic weather stations (AWSs) to obtain an extensive coverage of practically continuous meteorological data, received in near real time, over remote areas. The data are collected via satellite and distributed through the Global Telecommunications System (GTS) to analysis centres around the world. These AWSs supplement the existing network of synoptic meteorological stations and provide additional data from remote regions for a variety of basic research problems which cannot be adequately addressed with the information available from the conventional stations.

Of the 26 Physical Sciences volumes of the AGU Antarctic Research Series, this is only the third for Meteorology. The first, edited by M. Rubin (1966), provided a general coverage of the Antarctic weather and climate revealed by the comparatively large increase in coverage of conventional meteorological stations established over the International Geophysical Year (IGY, 1957–58). The second volume, edited by J.A. Businger (1975), was devoted entirely to the new information resulting from Plateau Station — the highest and coldest operational inland Antarctic site occupied by the US for three years from 1966–1969.

Since that time the greatest advances in meteorological data collection for Antarctica have come from the extensive deployment of automatic stations and the use of satellite remote sensing. This book focuses on these topics but in addition addresses a wide range of other Antarctic meteorology questions including: katabatic winds and boundary-layer dynamics, heat balances, numerical modelling, relations between Antarctic climate variations and ENSO (El Niño — Southern Oscillation), atmospheric aerosols, and microclimatologies in the Dry Valleys.

There are ten articles following a comprehensive summary in the form of a preface by the editors. The first, by Stearns et al., on the monthly mean climatic data from the Antarctic AWSs, plays a central role for the volume in summarising the mean climatic data for all the US AWSs spread over the continent. The 45 listed sites do not include a significant number of AWSs established by other nations, such as the dozen or so Australian AWSs established in Antarctica primarily by I.F. Allison of the Antarctic Division. Nevertheless, compared with only about 25 conventional stations which have been occupied long enough to provide data through an annual cycle, the AWSs now supply the dominant areal data coverage for Antarctic surface climatology, at least for the weather elements they record. The article summarises key aspects of the climatologies and refers to the complete datasets available in regular annual reports, or in electronic digital format including a floppy disc in a pocket with the present volume.

The katabatic wind is a prevailing theme for four of the articles. In Terre Adelie a series of AWSs from the high plateau to the coast shows the changes in the katabatic flow and the boundary layer from the cold and flatter interior to the steeper lower coastal regime where high-speed flow and blizzards occur (Wendler et al.). The intense katabatic drainage from the east Antarctic plateau into the Ross Sea is analysed by Bromwich et al. from a comprehensive array of AWSs. They show that the accelerated flow is associated with the strong density-current buoyancy effects, combined with confluent convergence, and the influence of the persistent local pressure gradient over the region. A similar effect is described by Breckenridge et al. for the katabatic flow through the Transantarctic Mountains and over the Ross Ice Shelf. They use infrared imagery from satellites to detect the thermal streaks associated with the katabatic flow and show from the AWS data how the air and snow surface temperatures are modified by the strong down-slope flow and mixing. Carrasco and Bromwich also use the thermal infrared imagery with the AWS data to study the flow onto the Ross Ice Shelf from west Antarctica. This combination of techniques provides a powerful means of detecting the strong katabatic surges associated with appropriate synoptic conditions.

Stearns and Weidner use the comprehensive set of AWS stations, along with the conventional stations, to derive the most comprehensive compilation of observations for sensible and latent surface fluxes yet available over the Antarctic continent. One striking result is that the net evaporation via sublimation averages about one-third of the precipitation or about half of the net surface accumulation. This provides added confirmation of results previously derived from general circulation models. The article of perhaps the widest interest to those outside the Antarctic meteorology community is the analysis of the Antarctic climatic anomalies and the SOI, by Smith and Stearns. They use data from 24 occupied stations since the IGY to examine the fields of atmospheric pressure and temperature over Antarctica in relation to the phases of the SOI. Significant statistical patterns are found with both leads and lags relative to the SOI minimum. One lead phenomenon identified appears to be a tropospheric thickness anomaly associated with blocking in the New Zealand sector of the South Pacific.

The classical Antarctic 'Kernlose Winter' (whereby the central winter period in the Antarctic interior is on average less extreme than the periods either side) is described in detail by Wendler for the Terre Adelie region. He shows that the feature results primarily from the balance between the radiation budget and the atmospheric advection, governed by the pressure gradients, which tend to be greater outside of the peak winter period.

For the clean Antarctic air the dominant aerosol constituent, in the interior and at the South Pole, is generally from sea salt. Hogan et al. show that the aerosol climatology for the South Pole is primarily related to the penetration of storm systems, mainly from the Ross and Weddell sea regions, to over the high central Antarctic plateau.

Perhaps the most intriguing article of all is the analysis of the extreme climatic conditions for the existence of life in the cold Dry Valleys of Antarctica. McKay et al. use AWSs with a variety of sensors in rock pores, as well as the atmosphere, to determine the 'nanoclimate' for the microbial ecosystems which survive there. In spite of air temperatures which only rarely reach above freezing in summer, the heating effects of solar radiation on the rocks create a significant period of above freezing temperatures for the tiny rock pores and fissures to trap moisture from snow in summer and revive from the winter freeze. This allows the organisms to colonise perhaps the most extreme conditions for life on the earth's surface.

In conclusion this AGU Volume on Antarctica offers some of the most fascinating insights into the features of the Antarctic climate and weather phenomena and also provides a valuable reference source for new Antarctic information and data.

W.F. Budd

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