movements beyond the period of application of the causative stress are probably normal features of glaciers. Glaciers may have an inherent periodicity independent of climatic factors. On the basis of such complications, it is probably true to say that departure from a condition of being in equilibrium with environment is the general rule among glaciers.

A discussion of recent systematic studies by Wallén on the Kårsa Glacier and Schytt and Woxnerud on the Stor Glacier in Swedish Lapland leads to a general appraisal of the recent glacier recession in Scandinavia, Iceland, Spitsbergen and Greenland. Typical of the author's penetrating approach to glacier fluctuation is his comment on the remarkable 60-mile recession in Glacier Bay, Alaska, since the eighteenth century. He would put the stress on the great advance which took place in the eighteenth century and its cause, as the major problem, and suggests that the retreat should not be taken as evidence of the importance of the present climatic fluctuation.

A brief summary of some recent data on the present climatic fluctuation, with its complicated reversals of seasonal trends in the past decade, is followed by a consideration of the causes of the recent glacier recession and the present climatic fluctuation. The author critically reviews current theories of increased zonal circulation as a major factor, on the whole favourably, and notes the growing tendency to accept the "solar variation" origin for both short- and long-range fluctuations. He stresses the significant fact that of all the endless series of climatic fluctuations since the beginning of history, "the present one is the first that we can measure, investigate and, possibly, explain."

Turning to the field of bio-geography attention is drawn to the great economic significance of the present climatic fluctuation in the northern sea routes and fishery fields and, on land, in its influence on forestry, agriculture and hunting. This is especially the case in the marginal countries, as is shown, for example, by a recent symposium on this subject published by the Finnish Geographical Society.

Finally, the author visualizes the recent changes, in the broader setting, in the fluctuations of the past few thousand years and looks forward to a bright future for glaciological research.

Many of Dr. Ahlmann's friends and admirers will recall the inspiring foreword he wrote to the first issue of the *Journal of Glaciology* and rejoice that, in spite of heavy prior claims on his time, he is able to continue actively in the field where, as elsewhere, his influence is pre-eminent.

S. E. HOLLINGWORTH

ANTARCTICA: INTELLIGENCE; REGIONAL PHOTO INTERPRETATION SERIES.

Air Force Manual 200–30. U.S. Air Force (Department of the Air Force), 1953. v+171 pages, 343 plates, 2 maps.

THIS is a fascinating picture-book for anyone interested in Antarctic glaciology. The author, Mr. John H. Roscoe, has chosen air photographs to illustrate almost every kind of ice-surface feature likely to be seen from an aircraft. His material is up to date, consisting mainly of photographs taken during U.S. Navy operations in the 1946–47 and 1947–48 Antarctic summers, although he makes use of both ground and air photographs of earlier expeditions. The purpose of the book is to provide Air Force intelligence and operations units with a key for the rapid and accurate reading and interpretation of air photographs of areas inundated by continental glaciers. There is every reason to believe that it will succeed in this purpose.

The first two chapters give an introduction to the Antarctic as a whole and discuss the application of photo reconnaissance and photo interpretation to the area. There are sections on discovery and exploration, on the main geographical features of the continent, on accessibility and on methods of transport. The limitations of photo reconnaissance and photo interpretation are dealt with clearly and objectively. Navigation seems to be the bugbear, and it is a brave man who will take to the air after reading: "In short, it is difficult for the pilot to get to where he wants to go, to know when he is there and to know where he has been, if and when he can manage to return to his base."

After the brief, though in part superfluous, introductions, the author launches into his subject. Some of the photographs appear flat, especially in the early part of the book. But anyone familiar with the difficulties of photographing whiteness—a snow landscape without the contrast of rock—will appreciate the largely successful reproduction of the delicate shadow-contrast provided by even the smallest surface features—skavler, snow dunes and sledge trucks. Each feature on a photograph is labelled, *e.g.* crevasses, iceberg, cloud, nunatak, melt water, moraine, valley glacier, stone polygons, etc. Beneath the photograph is a one-paragraph description in electrotype of the features appearing on it. This is well worth reading, in spite of the fact that few glaciologists will need even the labels to help them in understanding what the photographs portray. There are encouragingly few mistakes in the actual interpretation, and Mr. Roscoe has an eye for the origin of ice features, being widely read in the subject. He goes into a short discussion of things like differential ablation caused by rock-dust and moraine, and of the origin and occurrence of melt water.

There is much one could say about terminology, but the author has been faced with the problem of labelling many features which have not yet been described by expeditions on the ground. The path has many pitfalls, and he has not done badly. One wonders why crevasses must be labelled "tension crevasses" in the majority of cases, the converse—compression crevasses—occurring, of course, nowhere. "Slick ice" sounds slippery, but the term is not explained. "Hard glacier ice" is apparently "slick" on some occasions, though not always.

The photographs are classified under group headings, *e.g.* Major ice formations, Glaciers, Ice tongues, Shelf ice, Icebergs, Mountains, Coastlines, Islands, etc. As a result, reference to a particular feature is quite straightforward. "Major ice formations" are subdivided into Continental glaciers, Island ice, Highland ice, Cirque ice, Avalanche ice and Snowdrift ice. In many cases the photographs are printed in stereo-pairs, a great help to those unfamiliar with the features shown.

For the glaciologist, there is much that is superfluous. On p. 141 there are six almost identical photographs taken to convince the unbelieving reader of the occurrence of "white day"—the absence of shadows in overcast weather. But the valuable material in the book is not hard to sort out from the rest, and it will be a useful reference work. A word of caution is perhaps necessary in using the folding map entitled "Antarctica—Aerial photographic coverage." This is a useful attempt to show the flight tracks of aircraft from which photographs have been taken, but in many cases the tracks certainly do not represent photographic *coverage*. The author concludes his introductory chapters as follows: "Airphoto interpretation is no substitute for research in the field. It is a fact, however, that approximately 100,000 airphotos have been taken of areas of Antarctica on which man has never set foot, and of many areas which man is not likely to explore personally for many years to come, if ever. Photo interpreters can provide military or regional analyses of these areas by use of photo interpretation keys developed on the basis of their experience or the experience of other photo interpreters and explorers in similar regions elsewhere in the Antarctic."

CHARLES SWITHINBANK

A FUNCTIONAL GLOSSARY OF ICE TERMINOLOGY. U.S. Navy Hydrographic Office, Washington D.C. H.O. Publication No. 609, 1952. xv+88 pages, 110 plates. $0.80.

THIS is an amplification and revision of the previous glossary with the same title (H.O. Study 103, 1948) dealing with Arctic sea ice. It is not wholly different in aim from *Antarctica*, reviewed above, although the chief distinction is that here the main emphasis lies upon definition rather than upon recognition in the field. Its avowed purposes are (1) to standardize terminology, (2) to provide means of classifying and describing ice forms and (3) to develop a better understanding of ice properties in general.

It deals with ice wherever ice is found. Snow and snow surfaces are not included and reference is made to the reviewer's book *Snow Structures and Ski Fields* for this purpose. This book, however,