

backscatter signal from SAR in the Bellingshausen Sea. The signature of first-year ice is similar to that in the Weddell Sea, but they note that flooding precludes distinction of thick first-year and multi-year ice. Relatively young and new ice types are identifiable, providing a basis for quantifying ice growth. Interestingly, short-term changes in backscatter values can be used to trace the passage of weather systems. The utility of combined satellite synthetic aperture radar and scatterometer data for deducing ice-drift regimes in the Weddell Sea is considered by Drinkwater.

In the fourth section, on ice–ocean–atmosphere interactions, Martinson and Iannuzzi derive spatial estimates of various sea-ice diagnostics, including *in situ* ice growth (pre- and post-summer pycnocline elimination), ice-growth/melt ratio, and ocean heat flux for the Weddell Sea. These fields are empirically deduced from basic observations of temperature and salinity gradients through the pycnocline, mixed-layer, and pycnocline thickness, etc. Their findings are discussed in relation to understanding ocean–sea-ice processes. Markus and others and Comiso and Gordon detail techniques for deriving sub-pixel scale information on Weddell Sea coastal polynya open-water (or low ice-concentration) areas from passive microwave data. The first paper obtains smaller estimated polynya areas, with sea-ice production suggested not to exceed 5% of the total Weddell Sea ice volume. The notion of coastal polynyas being ‘ice factories’ may thus need to be reviewed. The second paper finds that summer ice extents do not precondition those in the following winter but do relate to ice extent in the previous winter. The impact of the wind on ice and polynya areas is discussed, and potential links between the Antarctic Circumpolar Wave and deep-water production are proposed.

The penultimate section considers ice characteristics and processes in the marginal ice zone. Fukamachi and others describe mesoscale features in summer ice using satellite data. Ice tongues and wave-like features are found when surface winds are light, indicating their likely oceanographic origins, but progress in understanding processes depends on improved oceanographic measurements. Shen and Squire report on a new, entirely physics-based model to account for wave damping by the motion and interaction of floes. Model performance is assessed using Weddell Sea observations.

In the final section, on landfast and marine ice properties, Fedotov reviews the spatial and physical attributes of landfast ice in East Antarctica. The complexity of ice composition, and hence of the controlling processes, is emphasised here and in other comprehensive papers by Gow and others and Tison and others, looking at landfast ice in McMurdo Sound and marine ice near Terra Nova Bay. The utility of studying marine ice near the shelf-ice edge in understanding oceanographic processes and ice-shelf mass balance is emphasised in the last paper. (S. Harangozo, British Antarctic Survey, High Cross, Madingley Road, Cambridge CB3 0ET.)

**GLACIER HYDROLOGY AND HYDROCHEMISTRY.** M. Sharp, K.S. Richards, and M. Tranter (Editors). 1998. Chichester: John Wiley. vii + 342 p, illustrated, soft cover. ISBN 0-471-98168-0. £40.00.

Publisher John Wiley has developed a series of books on topical themes in hydrology. The volumes comprise papers formerly published in the journal *Hydrological Processes* and are edited by principal scientists in the particular field. This new book, the sixth volume in the series, represents a collection of recent research papers concerning hydrological aspects of glaciology.

To cover recent major advances in glacier hydrology, the editors have selected 18 papers on aspects of the subject. Glacier research in the Arctic, sub-Arctic, and Alpine environments is included. Moreover, the book includes several theoretical (modelling) contributions. Thus, the book represents a well-balanced collection of material highlighting important research in glacier hydrology.

The book has one major positive aspect. That is that all the papers (or chapters as they are known in the book) were formerly peer-reviewed and are therefore of a good quality. It therefore seems appropriate to collect the leading papers within a given field in a single volume such as this. The papers also were previously style-edited by John Wiley, and so figures are of a generally high standard.

However, there are numerous negative aspects to this book. First, these papers have been lifted verbatim from the original journals. There is absolutely no sign of ‘editing’ of any of the papers. In fact, the only job the editors appear to have done is a one-page preface and the opening introduction. Second, 10 of the 18 papers in the book already appeared in the same volume of *Hydrological Processes*. The book is thus not so much a collection of 18 papers as rather eight new papers supplementing an existing volume of the journal. Moreover, intentional or not, the original reference to these papers in *Hydrological Processes* is very difficult to find. It is not enough to mention simply that all of the papers have appeared before in *Hydrological Processes*; the original date, volume number, issue number, and page numbers for each paper should be given. If a student wished to cite a paper in this volume, they should by rights cite the original source, not this secondary level of publication.

Third, the academic affiliations given at the start of each chapter are not consistent across the volume. In order for readers (including students, presumably) to write to authors, the addresses should have been updated. Fourth, the index is woefully short. Fifth, the book will cost far too much for students to purchase. A simple calculation indicates that if a student were to send off 16 letters (the number of different first authors) asking for reprints (assuming they can find the original reference and correct address), it would cost £4.16. The book costs £40. The only difference between the book and a collection of papers is the preface (one page), the introduction, and the index (which in my opinion is poor anyway). Sixth, the

collection of papers is limited to those published in *Hydrological Processes*. It is therefore the case that any significant advance in the subject that has not been published previously in the journal cannot be included in this book.

As a reading list for undergraduates, this volume is very good. However, I cannot believe that a new book is really necessary, given that it is essentially a compilation of previous papers. As a resource for those involved in the field, surely they will have *Hydrological Processes* at hand anyway? I cannot, therefore, imagine at whom the book is aimed and who will read it. Students will find it too costly, and all the papers are available elsewhere. Researchers will have all these papers at hand from the original journal. (Martin J. Siegert, Bristol Glaciology Centre, School of Geographical Sciences, University of Bristol, Bristol BS8 1SS.)

**SEARCHING FOR THE FRANKLIN EXPEDITION: THE ARCTIC JOURNAL OF ROBERT RANDOLPH CARTER.** Harold B. Gill Jr and Joanne Young (Editors). 1998. Annapolis: Naval Institute Press. 201p, illustrated, hard cover. ISBN 1-55750-321-4. \$US28.95.

New primary sources for the study of the Franklin search seem to surface with great regularity, nearly 150 years after its high point in the 1850s. Such is the continuing interest in the search that they find ready publication. This book is a welcome addition to these. It presents the journal of Robert Randolph Carter, who served as first officer of the brig *Rescue*, which was one of the two vessels of the US Grinnell expedition of 1850–1851. It is particularly valuable as no other day-to-day journal of that expedition has ever appeared. Carter's writing was only intended for his family and was in no sense official. Therefore, he was able to be totally candid in it, and he records, for example, his disagreements, of which there were several, with the decisions of higher ranking officers, and the general lack of organisation and planning that seems to have pervaded the expedition as a whole. In this respect, the journal is a valuable contrast to the main source for the expedition, Elisha Kent Kane's *The US Grinnell expedition in search of Sir John Franklin*, which presents a highly sanitised account.

The text as a whole is of interest, and, for the specialist, there are some real nuggets in it. The present reviewer has a particular interest in the two *Prince Albert* expeditions, which were roughly contemporary with the US expedition save for the fact that the vessel returned to Britain for the winter of 1850–1851, while the US expedition overwintered in the Arctic. An example of one of these nuggets is on page 66, where there is a statement to the effect that Captain H.T. Austin, commander of the main British official expedition then in the north, was 'trying' to induce Sir John Ross, commander of one of the smaller expeditions, to return to England so that news could be carried thither. This is a clear confirmation that Charles Forsyth, commander of *Prince Albert*, which had already sailed for home, had not informed the Americans of his intention.

This confirms the general impression, derived from study of the first *Prince Albert* expedition, of a certain deviousness in Forsyth's character. A further example is the note on page 145 to the effect that the account of the *Prince Albert* expedition by W.P. Snow, who had served on it, spoke 'so highly of our expedition as to turn every thing into ridicule we hear of with great indignation.' This is interesting as supporting the view of Snow's book held by some contemporary critics, but obviously Carter and his colleagues were not aware that Lady Franklin had been heavily involved in the preparation of Snow's account and might well have enhanced the praise of the Americans as a means of further ingratiating herself with Grinnell.

With regard to the search itself, the US Grinnell expedition contributed relatively little to it or to the exploration of the Canadian Arctic archipelago that was incidental to it. Indeed, considering the diminutive size of the vessels — *Rescue* was only 90 tons — and of their small crews, together with the absolute lack of equipment for, and experience in, land search techniques, it is unlikely that it could. However, the expedition contributed to the discovery of Franklin's wintering site on Beechey Island.

The journal is required reading for those with interests in the Franklin search. Such persons would, however, be well advised to skip the introduction altogether, refreshing their knowledge before starting on the text with a rereading of, for example, selections from Cyriax's classic account, which does not, surprisingly, appear in the references. The only parts of the introduction that merit attention are those relating to Carter's personal and family background. These are, however, incomplete. The account jumps from 1770 to the War of 1812, with no mention of the American Revolution. The section of the introduction relating to the background of the Franklin search is littered with errors and solecisms. For example, the theory of the open polar sea is certainly much older than William Scoresby the younger; to describe John Ross' vessel *Victory* as an 'appropriate ship for the North' flies in the face of informed opinion and indeed of sheer common sense, since of all vessels for the Arctic, a paddle steamer is surely the least appropriate, even if it were the first steam vessel used on a polar expedition; the use of the word 'above' for 'to the north of' is irritating; Forsyth's name is misspelt, and he was a commander, not a captain; the maiden name of Lady Franklin (not Lady Jane Franklin, nor for that matter was Lord Nelson, Lord Horatio Nelson) was not Griffith but Griffin; to describe Franklin's courage as 'pit bull' is insulting to both explorer and dog; and Franklin, himself, was not present, as is implied, at the Battle of New Orleans itself, which was, as the editors tell us, a significant British defeat, but at the preliminary action on Lac Borgne, which was a modest British victory.

There is also an epilogue, which is better than the introduction, but only because more of it relates to Carter's subsequent career. When the editors drift away from this and into other matters, they fall into error in the same depressing way. With regard to the search itself there are