Reviews

FRANZ JOSEF LAND. Susan Barr (Editor). 1995. Oslo: Norsk Polarinstitutt. 175 p, illustrated, hard cover. ISBN 82-7666-095-9.

In 1926 the Soviet Union declared that, according to the sector principle that Canada had used in its arguments to claim the Canadian archipelago, Franz Josef Land (Zemlya Frantsa Iosifa) and all other lands lying in the areas between the mainland of the USSR and the North Pole were to be considered Soviet territory. During the next five years, a number of Norwegian interests attempted to retain their traditional economic rights to Franz Josef Land, but, by the early 1930s, the Soviet annexation was a *fait accompli*. As Anthony Fiala, the American Arctic explorer of the first decade of the twentieth century, wrote when offering Camp Ziegler and the other buildings he had left behind on Franz Josef Land to the Norwegian government: 'I suppose it would be like presenting something that was already in the pocket of a burglar' (quoted on page 100).

The effective closure of Franz Josef Land to the non-Soviet world continued until 1990, when a joint Soviet–Norwegian expedition spent three weeks locating and examining the remains of Fridtjof Nansen's and Hjalmar Johansen's wintering quarters of 1895–1896 and a number of other historical sites, including Cape Flora, Eira Harbour, and Camp Ziegler. During the intervening 60 years, very little information from this archipelago had been made available to the west, and this excellent little volume, edited by Susan Barr, the ethnologist and historian for the Norsk Polarinstitutt and the historical consultant for the Norwegian part of the 1990 expedition, has now made the first step in alleviating this gap in knowledge.

As the foreword to the book indicates, it is not a scientific compendium. Rather it presents an overview of the history and physical geography of the archipelago in a way both accessible to the public and useful for the scientist intending to conduct research in the area.

The book has 12 chapters, including general characteristics, climate, glaciers, geology, freshwater systems, soil, vegetation, marine environment and wildlife, and human impact. Each is written by an expert in that particular field, with scholars from Russia, Poland, and Austria accompanying five contributors from the Norsk Polarinstitutt. The entire work is illustrated with approximately 80 photographs, maps, or drawings, as well as tables of information. *Franz Josef Land* thus gives an excellent survey of what is the northernmost archipelago in the world, lying between 79° 46' and 81° 52'N, with its closest parts reaching approximately 900 km from the North Pole. Current information and available literature about the islands is brought together in an integrated whole, although, despite the fact that 85% of the total land of its 191 islands is glaciated and 95% of the sea surface around and between the islands is covered with ice at its annual maximum, Franz Josef Land is still the home to an impressive array of differing geological, climatic, and life systems, including 150 species of bryophytes, more than 100 species of lichens, 57 species of vascular plants, at least 500 species of sea-bottom macrofauna, and 43 species of birds.

More than half of the book, however (in the remaining three chapters), is devoted to the history of Franz Josef Land. The archipelago was one of the last explored areas of the northern hemisphere, arguably being first sighted from the sealer *Spidsbergen* in 1865, when it was named Rønnbeck Land after the ship's captain (Horn 1930: 11). However, it was not until the Austro-Hungarian exploring expedition of 1872–1874, led by Karl Weyprecht and Julius Payer, that the existence of this northern island group was proved beyond doubt. After being caught in the ice for a year, drifting slowly northwest from the northern end of Novaya Zemlya, on 30 August 1873 the crew of *Tegetthof* first saw new land, which was named Kaiser Franz-Josef's Land (Payer 1876: I, 279). The headland first sighted was named Cap Tegetthof, although the land to which the ship was closest was Wilczek Island, named after one of the major sponsors of the expedition. The first landing was made on that island on 1 November, and the next spring Payer led a series of sledge journeys. On the first, he explored Hall Island (on which Cap Tegetthof is located); on the second, he went through Austrian Strait and all the way to the northernmost part of the archipelago, at Cape Fligely on Rudolf Island; and on the third, he visited McClintock Island to the southeast. On 20 May 1874, *Tegetthof* was abandoned and the crew made its way in four boats to the west coast of Novaya Zemlya.

Later in the nineteenth century, and into the twentieth, Franz Josef Land became a popular base for attempts on the North Pole. Among these were the Jackson–Harmsworth Expedition (1894–97), on which Frederick Jackson had his famous, and fortunate, meeting with Fridtjof Nansen at Cape Flora, Northbrook Island; the American journalist Walter Wellman's expedition (1898–1899); the Duke of Abruzzi's expedition (1899–1900), on which Umberto Cagni and three others attained a farthest north of 86° 34'; and two expeditions funded by the American industrialist William Ziegler, the first under Evelyn B. Baldwin (1901–1902) and the second under Fiala (1903–1905). Meanwhile, the first Russian expedition to Franz Josef Land, in 1901, was the second trial journey of the icebreaker *Yermak*.

The differing nationalities of these early expeditions was, as always, marked by the giving of place-names reflecting different countries or empires. Remarkably, the western place-names were not, in general, changed by the

https://doi.org/10.1017/S0032247400067607 Published online by Cambridge University Press

Soviet regime, and the islands still bear the names of Wilczek, Rudolph (the crown prince of Austria during the Austro-Hungarian expedition), Northbrook (the First Lord of the Admiralty during Benjamin Leigh Smith's expedition of 1880), Hooker (by Smith for Sir Joseph Hooker, former director of Kew and president of the Royal Society), Eva–Liv (for Nansen's wife and daughter), Jackson (by Nansen after their meeting), Graham Bell (first explored by Baldwin on Wellman's expedition), and Ziegler. This multi-national approach has been very positively carried on in this book, which has summaries of its findings in Norwegian, German, Polish, Russian, and French.

In April 1994 Russian Prime Minister Viktor Cernomyrdjn signed a declaration creating a nature reserve of Franz Josef Land and its surrounding areas; this was a major step in the nature conservation of the Eurasian Arctic. The authors of *Franz Josef Land* hope that this book, in addition to providing much-needed information about this archipelago, will reflect a similar interest and concern, and will lead to a greater understanding of the need to protect one of the least-known areas on Earth. (Beau Riffenburgh, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER.)

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DYNAMICS AND MODELLING OF OCEAN WAVES. G.J. Komen, L. Cavaleri, M. Donelan, K. Hasselmann, S. Hasselmann, and P.A.E.M. Janssen. 1994. Cambridge: Cambridge University Press. xxi + 532 p, illustrated, hard cover. ISBN 0-521-47047-1. £40.00; $US59.95.

Serious research on the theory of ocean waves began during World War II and was motivated by an urgent military need: the requirement for accurate prediction of wave conditions on beaches where amphibious landings were planned. In the United States, the challenge was taken up at Scripps Institution of Oceanography by Harald Sverdrup (a polar oceanographer by origin) and Walter Munk. They came up with empirical relationships tying wave height and period to the velocity, duration, and fetch of the wind (the upstream distance over which the wind is blowing), and they also calculated how waves and swell are refracted by bottom topography as they approach the beach. These relationships were good enough to provide successful forecasts for South Pacific landings, and, most famous of all, the critical forecast of rough but acceptable conditions that allowed D-Day to proceed almost on schedule and just before a major storm.

After the war, intensive research began on trying to understand the mechanism of wave generation by wind in the ocean. Much of the work was done by a brilliant group gathered by George Deacon at the National Institute of Oceanography, Wormley: such men as Burling, Longuet-Higgins, Darbyshire, and Barber. The concept of the wave spectrum was introduced in the early 1950s to describe the way in which wave energy is distributed among a continuous range of frequencies and directions, and enormous efforts went into investigating the physical mechanisms by which energy is transferred from the wind to the ocean surface, and then lost by dissipation. Explanations were sought for the shape of the spectrum of a 'fully developed sea,' the sea state that results from a given wind blowing over an infinite distance for an infinite length of time. By the late 1960s adequate and plausible physical mechanisms were in place to describe and predict the major features of the sea surface.

It was at this point that Klaus Hasselmann's group entered the scene. Hasselmann, a distinguished oceanographer and climate modeller, had already worked extensively on wave observation and theory, especially in the JONSWAP (Joint North Sea Wave Project) experiments, but in 1984 he began a new wave modelling project in Hamburg with a group called WAM (Wave Modelling Group). After several years of work, the group came up with a third-generation wave model that takes account of many subtle effects neglected in earlier models, and that has been extensively tested against the vast new data sets now available from satellite radar altimeters. WAM has now been adopted world-wide as the preferred model for generating wave predictions from global surface pressure fields. This book, despite its misleadingly inclusive title, is, in fact, primarily a description of the different aspects of WAM, as told by the various members of the group. The lead author acknowledges that it is the final report of the WAM/SCOR (Scientific Committee for Oceanic Research) Working Group 83.

So far, so good. However, in one vital respect of special interest to polar readers, the book fails dismally. The section on the propagation of waves in icefields is very short, acknowledges none of the major work done on the subject, and is also quite misleading. The reader will find on pages 171–174, section II.7, 'Interactions with ice,' by Diane Masson of the University of British Columbia, a member of the WAM group. This section simply discusses the situation where the wind is attempting to generate wave energy in an open icefield consisting primarily of open water dotted with ice floes. It considers the balance between wave generation in the open-water phase of the mixture and wave dissipation and refraction by the ice floes. The treatment of wave–floe interaction is incorrect and has been outdated for at least two decades, since it considers a disturbance potential under the ice floe that is a sum of diffraction of a wave incident on the floe as if it were a fixed body, and a scattering by a body forced to oscillate in still water. It has been shown by many authors that such a treatment seriously over-estimates the disturbance caused by a floe, since it is essentially treating the field of floes as a set of moored floating islands, each of which is oscillating up and down. The act of fixing a floe

https://doi.org/10.1017/S0032247400067607 Published online by Cambridge University Press