

Field, William O. 1964. *Observations of glacier variations in Glacier Bay, Southeastern Alaska, 1958-1961*. Glacier Bay National Monument. Preliminary Report. Department of Exploration and Field Research, American Geographical Society, Broadway at 156th St., New York 32, N.Y., 35 pages, multilith.

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conception belonging to a society in which man is the supreme geographical agent. Nor is there a stable economic state for all time, or even a short time, but rather constant fluctuation on the local as on the international level. As always, in this paper on « balance », Baker works out his theories with copious references and even quotations from other authors including Milton. The article draws attention to some of the difficulties facing planners and notes some of the past failures : beyond question, it comes from a writer possessing a strong social conscience.

Books of presentation essays to retiring geographers are becoming more frequent year by year in Britain. Some consist of essays by the organisers and their friends ; this one is entirely by J. N. L. Baker apart from a brief, perhaps excessively brief, tribute. A few of the essays given here have not been previously published and the rest form only a fraction of the author's output over forty years. Curiously enough, Baker published only one book, *A History of Geographical Discovery and Exploration*, 1937, subsequently translated into French and Polish. As one reads these essays, one wishes that Baker had followed the clearly marked though stony road of book production rather than the inviting avenues through forests of learning that the writing of papers provides. But there are writers who prefer the long rugged road of endeavour that leads to a book and others who like to clear a small patch of jungle, and Baker belong to the second group. He has gone forward, armed with a passion for accuracy, the will to search rigidly, and a deep understanding of the English literature like many other son of the English Church he has absorbed some of its powers of saying things simply and directly. His essays show a gravity of mind, a penetration of comment not far short of asperity and an unerring sharpness of judgment. It was said of one living British geographer that one could not conceive that he was ever young : of Baker it could be said that one cannot conceive that he ever could be old. Rarely is he humorous but a certain brightness shines through his pages which suggests that he has enjoyed the adventure of writing through the years, and no doubt will continue to do so.

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GLACIERS DE L'ALASKA

FIELD, William O. 1964. **Observations of glacier variations in Glacier Bay, South-eastern Alaska, 1958-1961.** Glacier Bay National Monument. Preliminary Report. Department of Exploration and Field Research, American Geographical Society, Broadway at 156th St., New York 32, N. Y., 35 pages, multilith.

Glacier Bay comprises a body of water about 100 km (62 mi) long, and up to 15 km (9 mi) wide, centered at latitude 58°40'N and longitude 136°05'W ; the sea water in the inlets and fiords ranges to depths of 1,000 to over 2,000 feet. At the time of these investigations ten glaciers in five different inlets had termini resting in tidewater and actively discharging icebergs ; five other valley glaciers terminated on outwash plains within 30 m (100 ft.) of sea level.

But in the middle of the XVIIIth century this whole bay region was completely filled with glaciers to its very mouth. Catastrophic glacier wastage followed, with water now 1,000 feet deep where ice had stood 3,000 feet above sea level 200 years ago. Rate of glacier recession here has been 15 times more rapid than in any other known region of the world. Unpetrified fossil forests of 12 to 14 radiocarbon ages ranging from less than 300 to more than 7,000 years have been exposed by the intense erosion by meltwater streams and wave action.

Cooper in 1937 explained the extreme sensitivity of this region to climatic change as due to the palmate arrangement of the valleys draining mountains on three sides toward a single outlet like the veins of a maple leaf coalescing toward the supporting petiole at the base. Another feature of importance is the large area of rather low altitude snow collecting surface which could change suddenly from a glacial asset to a glacial liability with climatic warming and rising of

the altitude of the snow-rain interface. Still another aspect is the orientation of the whole basin with its mouth directed southward opening into the prevailing storm winds. To whatever causes the extreme sensitivity to climatic changes may ultimately be attributed, Doctor Field will be a major contributor to their understanding. He has been actively engaged in surveying and resurveying the ice margins in Glacier Bay for the past 40 years.

The observations emphasized in the present report, those made in 1958 and 1961, are of special interest at this time for two reasons in that they provide an opportunity to test the influences on glacier regimen of both earthquakes and climatic changes.

Earthquake-advance theory. — A strong earthquake of 8 July 1958 with Richter magnitude of $7\frac{3}{4}$ to 8 occurred along the Fairweather Fault, with its epicenter only 26 to 100 km (16-62 mi) to the west of Glacier Bay. This provided an opportunity to test the earthquake-advance theory proposed by Tarr and Martin in 1910 and 1914 following a series of strong earthquakes at nearby Yakutat Bay in 1898 after which nine glaciers made short-lived rapid advances (surges) which they attributed to the earthquakes. Extensive calving of Glacier Bay glaciers in 1899 choked the whole of Glacier Bay with icebergs and brought to an end the regular visits of tourists boats to Glacier Bay. This heavy discharge of bergs had also been attributed to the earthquakes. The present report reveals no excessive calving of glaciers into Glacier Bay itself, nor any evidence of delayed response which can be specifically attributed to the earthquake. These observations are confirmed by an article published in *Science*, April 16, 1965, by Austin S. Post, entitled « Alaska Glaciers: Recent observations in respect to the earthquake-advance theory. » He has made a study in relation to the earthquake of 27 March 1964 which had its epicenter in the heavily glaciated Chugach Mountains. The observations of Post suggest that the 1964 earthquake induced little significant snow and ice avalanching. Five months after the earthquake he found only one glacier which showed some evidence of the beginning of a surge.

Climatic advance theory. — About 1942 after several decades of accelerated recession, glaciers began to grow in Washington State and by 1955 Hubley had found enlargement of 50 glaciers in the mountains of that state. This occurred in response to reduced temperatures and increased precipitation. Philips and the present reviewer have shown that closed basin lakes of northern California, Oregon, Washington, and British Columbia grew in size at this same time. In 1960 Post reported that well over 100 small steep gradient glaciers in the coast range between Vancouver, B.C., and Juneau, Alaska either were advancing or casting ice down cliffs where older ice was no longer present. Maynard Miller similarly reported the strong downward shift of the zone of maximum snowfall in the Juneau icefield during the late 1950s.

Doctor Field's report reviewed here indicates that most of the glaciers of Glacier Bay were still receding at their terminal faces in recent years, but many of these had been cut off from active sources of supply years ago. However, there are a few exceptions. a) The Grand Pacific Glacier at the head of Tarr Inlet began a slow advance between 1941 and 1947 that was still in progress in 1961; b) Margery Glacier advanced after 1950; c) Most of eight glaciers in Johns Hopkins Inlet advanced from 1929 to 1935 and from 1946 to 1952. The termini of several other glaciers have maintained their positions with little change in the latest two decades.

Doctor Field has pointed out that much more detailed regimen studies in the upper parts of the glaciers are needed for an adequate comprehension of the glacio-climatic relationships and the history of climatic change in the Glacier Bay Area. Nevertheless, the photographic record has now been continued for seven decades and although there are many gaps in the coverage and its continuity cannot compare with the observations of glaciers in populated areas such as the Alps, the record nevertheless is unusual for an area which is not on regular routes of transportation. As the author has indicated in his subtitle, this is a preliminary report of glacier variations issued pending completion of a final report which will include illustrations, maps, and additional analysis of the data. Meanwhile the reviewer and many others will be looking forward with keen anticipation to the publication of a more complete study of glacier variation in this most interesting natural glaciological laboratory.

D. B. LAWRENCE