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A CLOSE PARALLEL BETWEEN TEMPERATURE FLUCTUATIONS IN EAST CANADA AND BRITAIN

By G. S. CALLENDAR

In his opening address to the panel on Climatic change at the 1953 Toronto Meteorological Conference, Professor G. Manley referred to the surprising similarity of the temperature fluctuations on both sides of the North Atlantic. This relationship is shown very clearly in Fig. 1, which compares the 10-year moving average of temperature at Kew with that shown by a group of five stations in southern Ontario. The latter is taken from the Canadian temperature series presented to the Toronto Conference by Dr. R. W. Longley (1954).

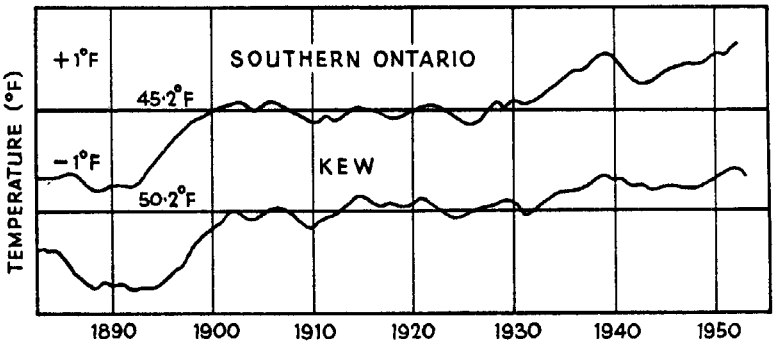

Figure 1. 10-year temperature averages in E. Canada and England, 1873-1952.

When the great distance and also the very considerable difference of climates between the two regions represented by these curves are taken into account, it is truly remarkable that the decadal temperature fluctuations should be so nearly concordant. The same may be said of the other districts in east Canada reported on by Longley, except in the case of northern Ontario where the few early readings may be unreliable. To the west of the great lakes the minor fluctuations are often the reverse of those in the east, especially so in the last few years when severe winters on the Prairies have caused a sharp drop in the Western curves.

The cause of the micro-agreement often shown by these fluctuations in east Canada and Britain would seem to be a matter for the meteorologists who study long-wave patterns in the zonal westerlies.

A further point of interest shown by these temperature observations is that the overall trend has been almost the same in Canada and Britain. The change of average temperature between the first and second half of the period is readily computed for each of the Canadian districts by taking out the decadal means from Longley's curves. This change, averaged for the several districts of east Canada, is here compared with representative British temperature differences between the same two 40-year periods, 1871 to 1910 and 1911 to 1950. For western Canada the district values are only available from about 1890 to cover the whole region, and here the 30-year half periods, 1891 to 1920 and 1921 to 1950, are used. The Canadian values are averages for about 30 stations in each case.

As the general trend of temperatures in northern latitudes of Asia was very similar to that in Canada and Britain between the 1880's and 1930's (Willett 1950), it probably would be safe to conclude that it has been characteristic of most of the north temperate zone in this century. Old British records, with good reliability through much longer periods (Manley 1946, 1953; Callendar 1952) indicate little overall trend during the 19th century, with averages about 0·7°F below that of the last 40 years. In view of these regional temperature trends, it is highly significant that the great majority of glaciers have been receding of late in all climates where they are sensitive to small temperature fluctuations, because this indicates that an upward trend is by no means confined to north temperate latitudes, although doubtless too small to be noticeable in many regions.

TABLE 1.

Area	Temperature change (°F)	Overall rate (°F/yr)
E. Canada	0·82	+ 0·02
W. Canada	0·87	+ 0·03
England (Manley 1953)	0·78	+ 0·02
Scotland (Aberdeen)	0·91	+ 0·023

In this connection it is also significant that recent calculations on the radiative thermal equilibrium by G. N. Plass (1953), indicate that temperatures should rise by about 1°F in certain climates for a 10 per cent increase of atmospheric carbon dioxide, because the latter is approximately the amount (25×10^{10} ton), added by combustion of coal and oil since the turn of the century, and moreover, as we have seen, the rate of rise in certain regions would give 1°F in 50 years. Plass, while noting the possible significance of his results, claims only that they are indicative. Hewson (1954) considers that an important effect of the extra CO_2 could be a fractional reduction of cloud cover, leading to smaller reflection loss from the solar beam, or to an upward displacement of the thermal equilibrium. This supports a recent suggestion by the writer (Callendar 1949).

References

Callendar, G. S.	1949	*Weather*, London, **4**, p. 310.
	1952	*Quart. J. R. Met. Soc.*, **78**, p. 265.
Hewson, E. W.	1954	*Proc. Toronto Met. Conf. 1953*, p. 240.
Longley, R. W.	1954	*Ibid.*, p. 207.
Manley, G.	1946	*Quart. J. R. Met. Soc.*, **72**, p. 1.
	1953	*Ibid.*, **79**, p. 242.
Plass, G. N.	1953	*Trans. Amer. Geophys. Un.*, **34**, p. 332.
Willett, H. C.	1950	*Cent. Proc. R. Met. Soc.*, p. 195.

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Three unusual depths of snowfall in Japan

By H. Arakawa

Many people, including the general public, railway and highway maintenance engineers, etc., are very much interested in the depth of snowfall; thus snowfalls of unusual depth receive a great deal of publicity in the press and in weather reports.

Recently a large-scale compilation of depths of snowfall throughout Japan has been made by the writer (*Sekisetsu Ruinen Kisho Hyo*, Central Meteorological Observatory, Tokyo, 198 pp., 1954). Three outstanding values will be described below.

TABLE 1. Details of stations including the record snowfall depths

Station	Elevation (m)	Location	Greatest depth of snowfall (m)	Date	Commencement of records
Ibukisan	1,318	35°25′N, 136°24′E	11·82	14 Feb. 1927	1923
Makawa	1,100	36°32′N, 137°31′E	7·50	26 Feb. 1945	1935
Tochiomata	293	37°11′N, 139°05′E	7·08	15 Feb. 1936	1923