

THE GREAT LAKES AS A SENSITIVE BAROMETER.

BY F. NAPIER DENISON, METEOROLOGICAL SERVICE OF CANADA.

Concluded from last issue.

From a careful study of the subject, with the assistance of the foregoing tabulations and records, the following points have been deduced:

(1) That when the lake record is least disturbed, so is the barometric trace.

(2) When the lake undulations become large and rapid, so do the atmospheric waves as recorded upon the barograph.

(3) There is a marked correspondence between the time intervals of these undulations as recorded by both instruments, the larger waves averaging 20 minutes, and the smaller ones 10 minutes.

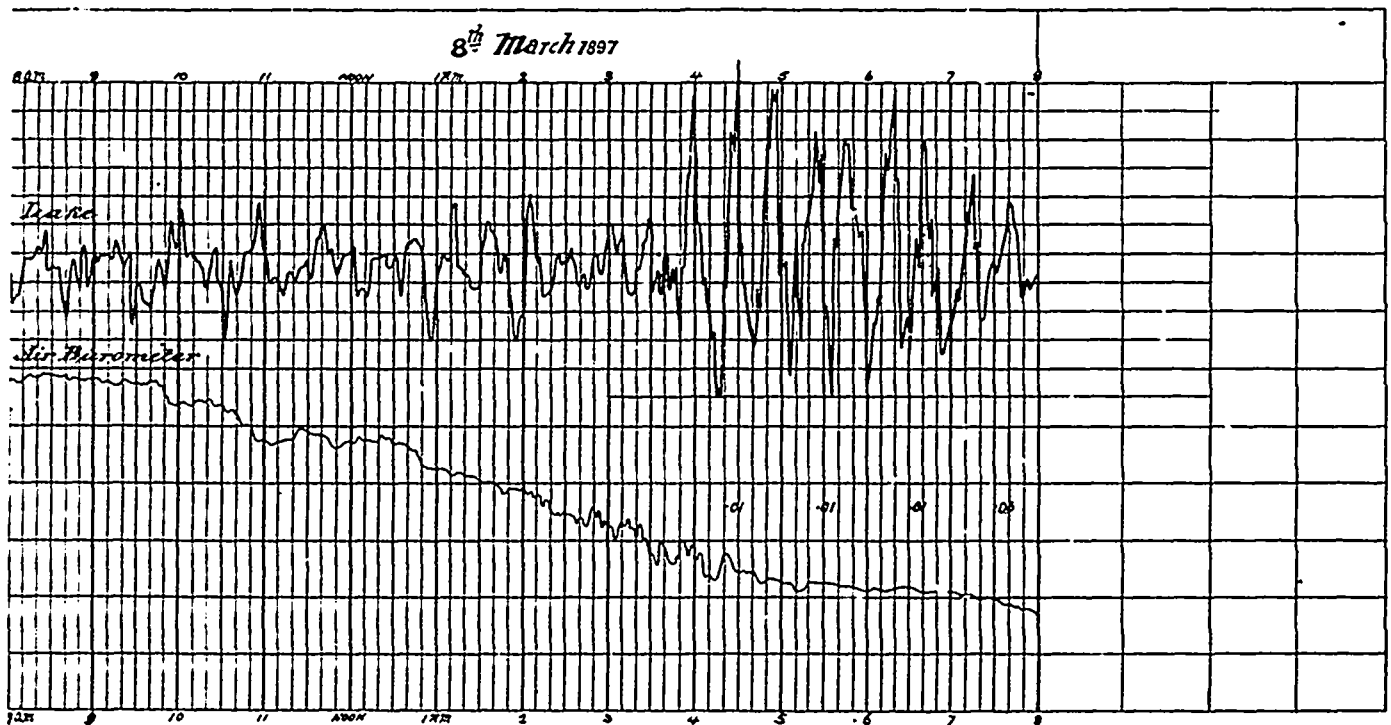
(4) That the lake level is never stationary; the smallest movements recorded for twelve consecutive hours was $\frac{1}{2}$ to 1 inch, when the barograph trace was also very quiet.

(5) That the longitudinal and transverse "seiches" are due to great differences of atmospheric pressure be-

sanitary benefit, particularly to the fish, cause much inconvenience and often loss of property to the fishermen; for after such disturbances, their nets, if set at right angles to the length of the lake, often drag their anchors some distance, and when brought to the surface are found to be filled with debris from the bottom of the lake. Such rapid changes of water level are invariably followed by the "seiches" or movements of oscillation of the whole lake's surface.

(7) That the smaller undulations are due to the direct action of the atmospheric waves or billows as they move over the surface of the lake, tending to form minute undulations upon the surface, corresponding in length to these billows, and as they move further into the bay, becoming magnified as they reach narrower and shallower portions, until finally they assume the proportions recorded upon the instrument.

(8) That these lake undulations become rapid and of great amplitude during fine weather, and a rising or stationary barometer when an important anti-cyclone is central over the lake region, and a pronounced cyclonic area is developing over the Southern States. This clearly



tween the extremities of the lake, which are doubtless augmented when the gale strikes the water's surface. These "seiches" consequently appear shortly before, during, and for several days after the passage of some severe storms. The lake trace before us clearly shows this movement, and the following chart the position of the barometric gradient at the time of this record. From a limited number of observations the time interval of these "seiches" appears to be four hours and 49 minutes, and 45 minutes respectively. Should the isobars lie parallel with the length of the lake during the passage of a storm, the "seiche" movements become almost imperceptible. (The quiet traces of both barograph and lake instrument for the 27th February last, bear this out). This may explain why little or no undulations were remarked by Professor Forel, upon the Swiss Lakes, on certain days, although the wind was strong.

(6) The rapid heaping up of the water at one end of the lake, which is also due to great differences of atmospheric pressure between its extremities, in conjunction with the action of the wind, sets up powerful currents at both top and bottom of our lakes, which although of great

demonstrates the existence of great atmospheric waves, set up along the boundary surfaces of the upper and lower strata, caused by the upper portion of the lower air stratum, not being retarded by friction from contact with the earth, and of greater specific gravity than that to the south of it, beginning to move towards the region of lighter air, viz., in a southerly direction. The barometric gradient being small, the movement is slow, but in an opposite direction to the upper stratum, which is less dense and rapidly moving polewards.

(9) The falsely termed "tidal waves" encountered upon the lakes, especially upon Lake Erie, are due to large and rapid atmospheric changes, so often noticeable upon the barograph preceding or during thunderstorm conditions. The above is a fair illustration of the smaller "waves" as shown upon the Humber instrument for the 8th of March last. Here you will observe that both barometric and lake traces are decidedly disturbed until 2.45 p.m., when several abnormal undulations appear upon the barograph, followed shortly afterwards by correspondingly large lake undulations, greatest amplitude $11\frac{1}{2}$ inches in 15 minutes. You will also notice the marked 10 minute intervals be-