

These several data are combined in the following table:

Computation of the height of the bench mark at Charlotte, New York, above the bench mark at Sacketts Harbor, New York, in 1874 and 1896.

	1874.	1896.
	<i>Feet.</i>	<i>Feet.</i>
Charlotte bench mark above Charlotte gage zero.....	+33.003	+38.950
Charlotte gage zero above Sacketts Harbor gage zero.....	- 2.217	- 0.055
Sacketts Harbor gage zero above Sacketts Harbor bench mark.....	-12.225	-20.125
Sum of above = Charlotte bench mark above Sacketts Harbor bench mark.....	+18.561	+18.770
Difference.....		-0.061

The results of the computations indicate that the height of the Charlotte bench mark above the Sacketts Harbor bench mark has diminished in twenty-two years to the extent of 0.061 foot. This quantity is the algebraic sum of six other quantities, two measurements through water leveling and four measurements by the engineer's level. The probable errors of the water levelings are ± 0.008 and ± 0.014 foot; the probable errors of my own instrumental levelings were each ± 0.01 foot. Assigning the same precision to the earlier levelings, we obtain for the resulting quantity (0.061 foot) a probable error of about $\pm .03$ foot.

This probable error attempts to express only such deviations from accuracy as are exhibited by the discordance of observations; it does not include errors of the class called constant. The result may be vitiated by the instability of either bench or by river freshets in 1874, and there are qualifications related to tides and cyclonic gradient.

The data at Sacketts Harbor are not subject to errors from stream floods. The gages at Charlotte were on the bank of the Genesee River near its mouth. The channel is deep, and at ordinary river stages the current is so gentle that river level and lake level are the same, but in time of river flood the river level is somewhat higher. In 1896 no flood periods were included, but the records for 1874 are not full enough to insure freedom from flood influences. If the Charlotte data include errors due to that cause, their correction would increase the computed change of relative height.

The tides of the Great Lakes are so small as to be masked by the seiches, but they are nevertheless of sufficient magnitude to affect an investigation of this sort. Lieut. Col. J. D. Graham determined a lunar tide of Lake Michigan at Chicago amounting to $1\frac{3}{4}$ inches and a spring tide amounting to $3\frac{1}{2}$ inches.¹ Gen. C. B. Comstock determined a lunar

¹ Ann. Rept. Chief of Engineers, U. S. A., for 1860, p. 290.