

safe inferences there. The element of magnetic dip, though less important practically than that of declination, is of value in navigation in certain latitudes, and from its connection, through Gauss' investigations, with the declination and intensity, assumes a high degree of importance. While the declination observations on this coast go back to the seventeenth century, the dip has only been accurately observed for 23 years; for the earliest observations made in 1782 were, from the imperfection of the instruments, of little value. During this period the dip has decreased, reached a minimum, and begun again to increase, so that it has been a highly interesting period for observation. The lines of equal dip have been deduced by Professor Loomis, from the observations which he had accumulated before the date of his paper. The present memoir includes additional results, and discusses 161 observations made at the different stations between Toronto on the north, and Baltimore on the south. The average probable error of the result at any one station is about one minute and six-tenths of dip, and the time of minimum dip is ascertained to be about two years and seven-tenths. This time was the year 1843, or rather the close of 1842 (1842-7). Mr. Schott points out why these results do not agree with Professor Hansteen's, who had not observations enough to determine the epoch of minimum dip with accuracy. Observations on the Western coast confirm these results for the Eastern.

ON THE CAUSE OF THE INCREASE OF SANDY HOOK. BY PROF. BACHE.

It is well known, as one of the developments of the Survey, that the Hook is gradually increasing, growing to the northward into the main ship channel. At a spot north of the Hook, where there were forty feet of water when Captain GENNEY made his survey, in less than ten years it was nearly bare. The importance of determining the cause of this increase, as leading to the means of controlling it cannot be over estimated. The Commissioners on Harbor Encroachments had early attended to the matter and requested that the necessary observations for its investigation should be made. These were under the immediate direction of Prof. BACHE, the observations having been made by HENRY MITCHELL, one of the sub-assistants in the Coast Survey, with all desirable zeal and ability.

Various causes had been assigned for this growth from the action of the waves and the winds, sometimes on the outer side and sometimes on the inside of the Hook. The effect of the opening and closing of Shrewsbury inlet had also been insisted upon.

To examine these and other probable causes laborious observations of tides and currents had been made in the vicinity of stations which Prof. BACHE showed upon the map. Careful measurements of the low water line had also been made in connection with these observations, and with others of the force and direction of the winds. Objects easily distinguished from the sand, and of various specific gravities, and shapes, had been deposited near the shore of the Hook to determine the power and direction of transportation of matter along the shores of the Hook. The results of these observations have not yet been worked out in all their detail, but the conclusions from them are perfectly safe, and are of the highest importance. It turns out that this growth of the Hook is not an accidental phenomenon, but goes on regularly and according to determinable laws. The amount of increase depends upon variable causes, but the general fact is that it increases year by year, and the cause of this is a remarkable northwardly current, the amount and duration of which these observations assign along both shores of the Hook, the outer one extending across the whole breadth of False Hook channel, with varying velocity, and the one