

attributed to a gradual mixing with the salter water of the Gulf, in this distance. The Magdalen Islands lie across the path of this water as an obstruction in its course, and consequently the density contours are much disturbed by these islands. The way in which these contours are bent, seems also to accord with a flow of water of lower density against their north-western side.

On comparing the charts given in Plates VI and VII, which show the density contours at a depth of 10 fathoms in the region lying between the Magdalen Islands and the west coast of Cape Breton, it will be seen that the water in that region is unusually liable to disturbance from the wind. This appears to result from the interruption occasioned by the Magdalen Islands themselves; which makes it necessary for the water to find its way round the north or south ends of these islands on its way towards Cape North. The density sections in that region were taken in the early part of August, and the same lines were again run at the end of that month, as shown by the dates given. The actual direction and mileage of the wind, dating from a few days previous to the time of the observations in each case, is shown on the charts. In order to make the comparison clearer, the mileage of the wind is given for the same length of time; namely 16 days in each case.

Although there were three gales included in the latter period, it is noteworthy that the leading features indicated by the density contours remain the same. The density is least along the west coast of Cape Breton, and increases towards the Magdalen Islands; and in both cases the contours themselves lie east and west with the same general direction. The relative proportion of the water which may pass north or south of the Magdalen Islands on its way towards Cape North is not however clearly indicated by these charts alone; as the disturbance from the wind was so great as to make it difficult to say which of the features presented should be considered as the nearest to normal. For example, water of the same density may extend continuously from the Bird Rocks to St. Paul Island, while at another time this is intercepted by water of much higher density intervening. We may therefore leave the reply to this inquiry until we have examined the further evidence supplied by the direct observations of the set of the current throughout the regions under consideration.

The best measure of the actual amount of disturbance occasioned by the wind, was obtained from density sections between the Magdalen Islands and Cape Breton Island, which were run twice at different times along the same lines; and meanwhile, from August 12th to 15th there were 1650 miles of wind in 84 hours; thus averaging 20 miles an hour, and in direction chiefly from the S.S.W. and S. (magnetic). This amount of wind displaced the density contours to the northward about 19 miles at the surface, 15 miles at 10 fathoms, and 9 miles at 20 fathoms. The influence of this wind probably extended to the bottom; as the average depth there is little over 30 fathoms. It must not be assumed however that this displacement is entirely due to the local effect of the wind; as it may have resulted in part from a change in the direction of the set over wider areas. This instance serves also to show how well adapted these density methods are to such problems in the tracing of currents and their disturbance. Further examples of this will be given from the Gaspé region as illustrated by the density charts in Plates IV and V, when the Gaspé current itself is described.

*Direct observations of the currents in the open Gulf.*—We may first mention the results obtained at the night anchorages or stations occupied while the density work itself was in progress. These opportunities so far as obtained, furnish results based upon careful measurements of both velocity and direction, and serve to illustrate the nature of the currents in the open Gulf. The directions are those from which the current runs; as this gives the direction of the current in the same way that the direction of the wind is always defined. The directions are magnetic in all cases; and the velocities of the current were measured at the standard depth of 18 feet. The time is given on the 24 hour system. The observations obtained were as follows:—

Near the north end of the Orphan Bank, at a station 39 miles S.E. from Bonaventure Island. From 16.00 o'clock on Aug. 6th through the night to 6.30 on Aug. 7th. Weather very calm. Current ran from directions between N.W. and N. for 8 hours; then changed and ran from the S.E. and during the 6 hours following it veered