

gradually from N. W. to N. E. and back again to N. W. The regularity of this change in direction makes it probable that it is tidal in its nature; but the observations were not continued long enough to establish any definite relation between the two. On August 31st the station was again occupied for a few hours, and the direction and velocity were found in correspondence with the previous observations. The average direction is thus as nearly as possible from the north (magnetic) with an average velocity of very little more than one knot per hour.

While the current ran from the N. E. the undercurrent was stronger than the surface current as far down as 50 fathoms. Two measurements at 30 and 40 fathoms (made August 14th and 31st) showed the velocity at that depth to be 38 to 40 per cent stronger than at the surface.

On the other hand, while the current ran from directions west of north, two measurements of the undercurrent at 40 fathoms (made August 15th) showed the velocity to be only 50 per cent of the surface current, and its direction to be 20° more westerly.

The total thickness of the current at this station was not ascertained. This thickness might have been ascertained here and at the other stations much more definitely, if the meter which was intended for the purpose, had not failed to work electrically.

Station M, on the east side of the strait was occupied on August 22nd and again from August 27th to 29th when a continuous record of the current for 41 hours was obtained. The velocity of the surface current varied from 0.50 to 1.40 knots per hour; and the direction veered from E. to S. (mag.) the dominant direction being from the S. E. The change in direction was much less regular than at station L, and no relation can be seen between the variations in direction and velocity and the tides as recorded by the gauge on St. Paul Island.

On August 27th, at a time when the surface current had an average velocity and its usual direction from the S. E., the indication of the deep fan showed that the undercurrent extended to a depth of 50 fathoms and possibly to 100 fathoms; and that it ran from S. by E., or from a direction about 30° more southerly than the surface current. The velocity of the undercurrent at 30 and 40 fathoms ranged from 44 per cent of the surface velocity, to an equality with it; but was never greater.

On the western side of the strait, between Cape North and St. Paul Island, one station was selected at N, in 60 fathoms on the edge of the shallow water extending from Cape North. This station was occupied from August 23rd to 25th; and the current was found to run from the N. W. During the period of 48 hours immediately previous to the occupation of this station on the 23rd, the wind had ranged from N. to N. W., with an average velocity of 24 miles per hour, making a total of 1,122 miles of wind in that time. It is therefore probable that the velocity of the current as then found, was as great as it ever is. A continuous record of the current for 46 hours was obtained; and the velocity ranged from 1.39 to 2.25 knots per hour, the average being nearly 1.80 knots. In direction, the extreme variation was from N. to N.W. (mag.) the dominant direction being nearly from the N.W. There is no relation discernable between the variation in direction and the tide; but the greater velocity of the current seems to occur during the fall of the tide.

The undercurrent at 40 fathoms has only about one-third the strength of the surface current; but it appears probable that the water was in motion throughout the whole depth of 60 fathoms.

Temperatures.—The water was found to be a little warmer between Cape North and St. Paul Island than across the main opening of the Strait between that island and Cape Ray. The surface temperature there ranged from 55° to 60°; and from the surface, the temperature fell gradually with the depth till it reached 32° at about 50 fathoms. At greater depths, from 100 to 200 fathoms, the temperature was again higher, and averaged about 40°. This result appeared so anomalous that the matter was carefully investigated, and every precaution taken to insure accuracy.

The temperatures, so long as they fell regularly with the depth, were taken with registering thermometers of the Miller-Casella pattern. But where there are layers of

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