

“ [October, 1885.]

“ 1st. The pack has drifted back again, and is to-day nearer the shore to the northward than yesterday.

“ 3rd. The ice is now tight and compact in every direction; from the top of a hill some distance inland, a little open water shows near the horizon between south and east; elsewhere no water to be seen. The bay to the north of the station is frozen so that the seals can lie on it.

“ 4th, 5th, 6th, 7th. Ice in every direction, slackening and tightening with the tide; at times large lakes of open water show.”

I pass over the winter and come to the summer again.

“ [July, 1886.]

“ 9th, 10th, 11th. No open water in sight.

“ 12th. S.W. wind has blown the ice off shore.

“ 13th. Ice to the northward and between here and Salisbury seems compact, but the Straits to the south must be nearly clear as we could hear the sea breaking on the outer edge of the ice near the shore to the south.

“ 15th, 16th. Ice tightly packed on the shore; no open water.

“ 17th. Ice loosened out a little and some open water shows in places.

“ 18th, 22nd. Ice remains loose; much open water.

“ 23rd, 24th. Open water along shore, but ice visible on the horizon.

“ 25th, 26th. Ice swings in a little occasionally, but it is always loose and much broken up.

“ 28th, 8 p.m. Ice packed tightly in all directions.

“ 29th, 30th. Not a particle of open water to be seen. Ice packed tightly to the horizon.”

“ NOTES ON THE ICE IN HUDSON STRAITS AND BAY.

“ In considering the question of the quantity and movements of the ice in Hudson Straits, the first point that arises is whether the only ice to be met with there is that formed in the immediate locality, or whether there are sources of supply beyond.

“ We have now had voyages on three years to Hudson Straits, and it is certainly legitimate to assume that we have not met with all the kinds of ice which are at any time to be found in these regions. I consider that they may be divided into three types or classes: First, there are in Hudson Straits at all times of the year, icebergs; second, up to the end of July or beginning of August there is much young floe ice, by this is meant the ice which has been formed during the winter immediately preceding. Its thickness is variously reported from 7 feet 6 inches at the harbour on Marble Island to 3 feet 10 inches at Port Burwell, in the eastern entrance of the Straits. A mean between these two measures would be, I consider, a fair average for the thickness of this class of ice, when met with in Hudson Straits, say somewhere about 5 feet of solid blue ice; covering this ice is a sheet of snow packed solid and as hard as the ice itself, and, like the ice, of varying depth. In the month of July 2 feet would probably be the average depth of this cap or crust of snow, thus making the total depth of ice and snow together from 7 to 9 feet.

“ The third type of ice is what I called in my first year's report the 'heavy Arctic ice.' This ice is of every thickness, from 10 to 40 feet; it is the product of many winters in which it has been growing in thickness, both below by freezing, and above by the accumulation of the successive winters' snows.

“ Port Laperrière and Nottingham Island. During the season of 1884, the field ice never left the Nottingham Island, but remained there, swinging to and fro with the tide, all summer. On 2nd October, at Nottingham Island, the Straits are reported full of ice as far as can be seen, and the date of the final closing fixed by the observer there was 26th October. At Port Laperrière, first ice 19th October. Straits closed, apparently full of ice, 22nd October.

“ The general direction of Hudson Straits at the eastern end, is about N.W. and S.E. (true), and across the mouth of the Straits, flows persistently the great Arctic current, carrying with it, not only giant bergs from the Humboldt and other glaciers, but field ice from the Arctic Sea coming down the East Greenland coast, together with all that comes down Davis' Straits and from out of its many bays and fjords. The quantity of this ice which passes down across the mouth of Hudson Straits is enormous, nor does it all pass across; a great deal of it is carried right into Hudson Straits to the south of Resolution Island; more comes in through Gabriel Straits and thence flows westward along the north shore of Hudson Straits. This westerly set apparently terminates about the eastern side of Salisbury Island, because the bergs are seen to come in the Straits, and to

pass up the north side going west beyond Ashe Inlet. The breadth of ice outside of Hudson Straits varies greatly from time to time. I have been told of its being 120 miles off in March, and this year in the end of May, Capt. Guy, of the *Arctic* says, 'We found the southwest ice extending off Resolution Island from 40 to 50 miles of tight ice, and outside from this 10 to 20 miles of slack ice;' showing up to the 25th of May, this year, an impenetrable barrier of 50 miles of tight ice between navigable water and the entrance of Hudson Straits. This mass of ice outside pens up the ice in Hudson Straits, and it is only after a westerly blow of some duration that it moves off to the eastward and permits of the ice moving out. About the end of June or beginning of July, the bulk of the northern ice has passed south of Cape Chidley, and the Hudson Straits is free to pass out, but at this season of the year the westerly winds form only about 30 per cent. of the total, hence the discharge is slow and vast quantities of this ice disappear in the Straits and Ungava Bay under the influence of the rising temperature of both air and sea.

“ It will be admitted that with the experience extending to centuries, which the Hudson Bay Company have, if it were possible for them to get their ships in earlier they would endeavour to do so; inasmuch as the detention of one of their ships over a winter in the bay, entails loss of markets, more or less undue wear and tear of vessel, and the additional expense of wages and maintenance of the crew. I have examined the records of 116 consecutive arrivals at York Factory, and find that the average date is September 4th. Of the 116, 48 arrived in August; earliest date, 6th August. The latest arrival was the 7th October, on which occasion the ship wintered in the bay.

“ There is no question but that the year in which the ship arrived, 6th August, must have been an exceptionally favourable one, because of all the August arrivals only 13 arrived prior to the 20th of the month, and in considering the question of the navigability of the Straits by steamships for the ordinary purposes of commerce, I am of the opinion that steam will not lengthen the season at the beginning more than a month to five weeks, so that our own experience, and that of the Hudson Bay ships, points to the first half of July as being the earliest date at which the Straits may be considered navigable for the purposes of commerce, by steamships fortified for ice navigation, and at the same time capable of being used profitably as freight carriers.

“ It has been held by some that the ice in Hudson Straits was so light and so much broken up that there was no risk of an ordinary vessel being crushed in it. I am informed that one of the American whaling vessels was crushed in 1885, and the Hudson Bay Company some years since lost a vessel by the ice in the Straits.

“ The Hakluyt Society have published a work entitled 'The Geography of Hudson Bay,' by Capt. Coats.

“ Capt. Coats was an officer in the Hudson Bay Company, who commanded vessels sailing into Hudson Bay from 1727 to 1751. During this time he was twice crushed in the ice, and in his geography he says: 'In the year 1727, when near the meridian off Cape Farewell, when running through the ice with small sail, two pieces of ice shut upon us and sunk our ship. Again in 1736, being entangled in the ice six leagues within Cape Resolution when the ice shut upon us by the tides only (for it was dead calm) and crushed our sides in and sunk her in 20 minutes.'

“ GENERAL REMARKS ON THE NAVIGATION OF HUDSON BAY AND STRAITS.

“ Having now made voyages on three years to Hudson Straits, and having carefully examined the reports by the observers as to the formation and movements of the ice in Hudson Straits, I have the honour to submit the following statement in regard to the navigation of these waters.

“ In discussing this question, I think it well to state that I am not required to report on the commercial aspect of the case, and whether Hudson Straits navigation can be made to pay, nor do I, in the seasonal limits given, mean to state that it is impossible for a ship occasionally to get in earlier or leave later; but having carefully considered the subject, I give the following as the season during which navigation may in ordinary years be regarded as practicable for the purposes of commerce; not, indeed, to the cheaply-built freight steamer, commonly known as the 'ocean tramp,' but to vessels of about 2,000 tons gross, fortified for meeting the ice, and of such construction as to enable them to be fair freight carriers. These vessels must be well strengthened forward; should have wooden sheathing, and be very full under the counter; the propeller should be of small diameter and be well down in the water. I place the limit of size at about 2,000 tons, because a larger ship would be somewhat unwieldy, could not make such good way through the loose ice; and being