The Stor Fjord.

(Hydrographical notice).

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In 1924 whilst the exploring expedition of the Marine Scientific Institute remained in the waters near Svalbard (Spitsbergen), some hydrographical observations were made in the Stor Fjord. In July, at the time they were carried on there was still so much ice in the Stor-Fjord that the investigations could only go as far as 78°N. Thus the further-most northern part of the bay, for a space of about 40 miles could not be explored, though it would have been most interesting to trace the influence of the open sea upon the Stor Fjord througt the Freemen and the Heley straits, especially in the northern part of the bay.

Altogether 14 stations were made in the Stor Fjord (fig. 1) distributed along one longitudinae from 77°12′N to 77°58′N and two transversal sections along the 78°N from the Inglefield Glacier on the western shore, not far from Agardh Bay, to Cape Blank on the eastern shore. and a southern one from Mont Schönrock, near Whales Bay to fhe Cape Whales Point. Considering the line of the southern section as the limit of the bay on the south, the station thus cover on the whole 2/3 of the Stor Fjord. We adhere to this limit only because of its geographical character, as representing the beginning of the narrow part of the bay. On the schematic section of the StorFjord along the line AB (fig. 2) between the stations 358 and 356 an elevation of the bottom can be seen quite distinctly, but this is not the sill, peculiar to the fjords, as it does not take up the entire breadth of the entrance to the bay.

From the greatest depths in the region of our stations 353, 356 and 358, wich attains 163 *m* the bottom rises somewhat abruptly to 78 *m* at st. 352 (77°39′N), It becomes shallower towards the north and at the entrance of the north Ginevra bay, the depfh is only of 16$^1/_2$ *m*. The bottom relief of the StorFjord presentssa peculiarity manifest in all the depth curveo on (fig. 2). It is slightly raised along the axis of the bay, whilst towards the shore, both western and eastern, especially near the former there is a very noticeable steep descent. Near the shore likewise the bottom slopes very much, thus corresponding to the character of the shore, which rises abruptly out of the sea.

There are, comparatively speaking, but few indications as to the nature of the bottom soil in the StorFjord. Most of the existing observations deal with the region of the real open sea at the latitude of the South Cape. Mud, mud with stones and clay are mostly found here. Upon the Stor-Fjord itself, on the meridian of Whales Bay we posses, a series of observations going from fhe western to the eastern shore; on the English map mud is shown along the whole strethch across the fjord. According to the observations at all our stations stones of different sizes were dredged as well as a greenish grey mud. There were stones in the ground samples obtained of by means of different instruments: Eckman's tube, dredges, bottom-sampler of Petersen. Larger stones were found occasionally, at some of the northern stations in the explored central part of the fjord. At the southermost starion 358 stones were scarce. In the southern section at the two extreme stations nearer to the shore (354 and 357) the upper ground layer had a yellowish tint.

As far back as the beginning of this century N. M. Knipovitch pointed out the possibility of there existing a branch of the warm Spitzbergen current in the depth of the Stor Fjord. This supposition he based on the some what scanty hydrographical materials of the Russian Expedition for the measurement of the degrees. such a supposition appears self evident considering the direction of the northern branch of the Atlantic current, which, meeting the Island group of Svalbard on its way, must partially deviate eastward and fill with its waters at least the deeper hollows at the entrance of the Stor Fjord; being forced to go on also by the shallowness of Bear Island and of ihe so called Spitsbergen Banks. How far does this part of the Atlantic current penetrate into the interior of the fjord, and in what measure is the regimen of the latter under the influence of these waters, is another question.

On the whole the geographical conditions here are all conduciv to the influence of the open sea. This can be equally applied to the north-eastern current, which, as it is supposed, bathes the shores of Svalbard flowing from east to west as a coastal current, then rounds the South Cape and goes on further, along the western shores of the archipelago, gradually losing itself in the north. The waters of this current cover a narrow, shallow belt along the coast. This polar current formes the upper water layer; the warm, but heavier water flows at a certaiu depth below it. Near the western coast these two currents first spread parallelly to one another (according to N a n s e n [1915] the Atlantic current being furthest from the shore), and then, in the north western part of Svalbard, the polar current gradually disappears, mixing with the Atlantic one.

As regards the cold north westerly polar current it can be definitely affirmed that this current certainly exists as our observations, made in 1924 (fig 4), in the region of R. A m u n d s e n's stations 24 and 25 and the st. F of H a m b e r g confirm N a n s e n's supposition. Our stations 191 and 193 (see table 2) situated to the east and to the west of Swedish Foreland are likewise typical: temperature = —1.35°, salinity=34.49°/oo at a depth of 100 *m* (stat. 191), and ftemperature = —1.60° with salinity = 34.49°/oo at a depth of 100 *m* (stat. 193). Among the other stations along the eastern coast (stats 195 and especiall 196) are also characteristic, with, a temperature of—1.48° and—1.43° at a depth of 50 and 100 *m* and a salinity = 34.49°/oo at a depth of 50 *m* [1]. However, it is not in this series of Stations alone, that we have polar water. We have also found such water in a more distant region from Svalbard. The same table gives data on a series of stations (190—186), where the upper layer of 100 *m* is cooled down to—1.5° with a salinity up to 34 1/2°/oo, in other termes, presenting the evident characteristics of the elements of polar water. Then station 198′ and the next, more southern ones 199 and 200 are already within the sphere of influence of the warm eastern Spitsbergen current, and are distinguiched by a higher temperature. A positive temperature appears first of all at stat. 198, at a depth of 10 *m* at the two next stations we found a positive temperature from the surface down to the very bottom. Thus, these stations differ completely from H a m b e r g's F station, which is evidently situated further east, beyond the limit of the warm current. Unhappily we do not dispose of any hydrographical data for the coastal belt along Edge Island, where in all probability, we could have encountered the polar current pressed to the shore and would have been able to trace it further, near to the mouth of the Stor Fjord. To the south of the Stor Fiord we have the group of stations of the 7-n expedition of the Maritime Scientific Institute, situated in the region of the Spitsbergen shallow waters.

At the shallow stations 319, 338 and 335 (tabl. 3) typical for these banks, one can ascertain the similiraty of the hydrographical elements of temperature and salinity (compare N a n s e n 1915). In our opinion this similarity is due to an intense intermixting of the waters, produced by the agitation and by the horizontal displacement of great masses of water owing to the currents of high and low tide. The mixing of the waters. at so small a depth as 40—50 *m* can be almost complete.

The study of the data concerning temperature and salinity furnishes a basis for supposing that some of these stations (321, 341) are situated within the sweep of the eastern ramification of the Spitsbergen current, which is felt most strongly in the north—western region of the banks. It is probable that a certain part of the Atlantic water rises, under the pressure of the principal stream of the warm current, up to a level above 40—50 *m* and covers partially the shallows of the Spitsbergen bank from the north west whilst colder waters advance from the south east. The layers intermix into a heterogeneous mass, and owing to local conditions, a uniform water result, characteristic for the banks.

At our southern stations in the Stor Fjord, on the contrary, we find polar water at the 358, 357 and 353 stations with a typical low temperature at a debth of 50 *m* which went down to—1.78° with a salinity up to 34.74°/oo [2]. This is the cold intermediate layer which is found in the western fjords, and which is to be explained, either by the penetration over the sill of the waters belonging to the cold polar coastal current (N a n s e n), or else by the cooling down, in the fjord itself, of the Atlantic water which has entered it (N. v o n H o f s t e n and S. B o c k. 1910).

Our, point of view is, that in this open part of the sea, which is at it were, the entrance to the fjord, this phenomenon of dichotermy partly shows the general character of the temperature distribution of the polar sea. However an important part in this process belongs to the mass of the Atlantic waters in the immediate neighbourhood, which moves into the bay. These waters, somewhat cooling, go down into the bottom, keeping their salinity, or losing it but sligthly.

In this way we find here a water layer of high salinity and wifh a low femperature, as for instance at stat. 356; u here the temperature of the bottom layer fallo to—1.83°

[1] The sample of the water from the depth of 100 m perished but there is reason to suppose that its salinity idffered but little from that of the preceding layer.

[2] We observed traces of such a low temperature at a depth of 50 m at the end of summer at our stat. 203, 77°21′30 N 18° 22′ O situated not far from stat. 357 of this year.

Depth	0	5	10	25	50	85	91 (bottom).
Temperature	0.18°	0.50°	0.49°	0.45°	0.18°	0.83°	—

the salinity being 31.16°/oo, a degree of salinity the polar water does not possess. Our observations confirm what the Swedish expedition of De Geer had also noticed (1910), that in these regions the salinity can go up to 35°/oo and more. N a n s e n formerly doubted its being so, and supposed that ihy high numbers of the degree of salinity, which he had obtained by the aerometrical method were not correct. At the stat. 353, situated somewhat to the north of Stat. 356, the same high salinity is found = 35.14°/oo.

The general schema of the formation of this heavy cold layer can be represented thus: The water of the Atlantic, with a high salinity, penetrates into the fjiord. In cooling it acquires a greater density and descends in consequence to a certain depth, where its density corresponds to that of the contiguous water layers. In holes and deep hollows this water remains, and can still be round in autumn as well as in the ice thawing period. It can be added that the process of ice fomation must in a great measure to the formation of denser heavy water. What is the cause that makes the waters penetrate into the depth of the Stor Fjord? Is it a sucking in, resulting from a circular movement in the interior of the fjord, along ths shore, or is there besides a direct pressure of the warm Atlantic current or some other cause, it is difficult to say. We cannot but think that there exist other causes, as for instance the tidal wave, which can influence the incoming of the outside water into the Stor Fjord open towards the south. The polar water, flowing along the coast of Svalbard from the south east over the shallows, past the South Cape and then northwards along the western shore, likewise penetrates into the fjord. This water must inevitably enter the Stor Fjord from the east, drawing in with it the Atlantic water of the north east branch of the Spitsbergen current. In the fjord these waters mix more or less and the cooled down, heavy water wich thus results fill the hollows. The excess ot water flows out into the open ocean along the western shore of the fjord. In its cyclonic movement in the interior of the fjord, the current partially draws away the waters of the eastern part of the ocean as well, through the narrow straits of Helis and Thymen. One can judge how mighty is the water exchange in then straits from the fact that in 1924 the E S. „Persey" of the Marius Scientific Institute could not enter the Stor Fjord through the Thymen strait because of the force of the current. Sometimes the incoming water provoques the formation of the characteristic intermediate layer, noticed already by other explorers (N a n s e n, N. v. H o f s t e n, etc.), which we found at our northern 349 Station, where it apparently did not undergo any mixing with the contiguous layers and kept its place between two warmer ones. The mass of the warmer Atlantic water, which enters the fjord, moves northward along the eastern side of the bay. In their cours these waters reach that region of our northern section in its eastern part, where, couled down by the influt of polar water through the north—west straits, they form a cold and heavy waterlayer. In the middle of the fjord there is a water centre, warmed and by comparison with the shallon part of the fjord, of a greater salinity all through.

It seems to me that it is just here that the stream of Atlantic water, encountring more shallow places, turns westward, forms the centre of an eddying movement and creates conditions favorable for a higher temperature and salinity. Further north the Atlantic water can scarcely penetrate in any considerable quantity into the depth of the fjord. However, as there have been no direct observations made in this part of the fjord, this may be considered as an open question.

Such a distribution of the Atlantic water in the interior of the fjord is also proved by the transparency and the colour of the water. Along the axis of the fjord, beginning from the southern stat. 358, the transparency decreases gradually towards the north, whilst the colour passes from a dark blue to a greenish one.

Stat.	358	356	353	352	351	349
Transparency in m	33	30	24	18	14.5	12.5
Colour	III-IV	III-IV	III-IV	V-VI	V-VI	VI

At the station situated nearer to the coasts the transparency is lower and the colour greener, partly owing to the minutes suspended particles in the littoral region brought from the land by the thawing water. In the central part of the fjord the water is of an intenser dark blue and more transparent because the stream of Atlantic water from outside has not yet had time to mix with the waters of the fjord. On the southern section the influence of the shores is very apparent.

Stat.	357	356	355	354
Transparency	8	30	29	17
Colour	VI	III-IV	III-IV	IV-V

The existence of a constant movement of the water cyclonic in character is also shown indirectly by the movement of the ice floes (observed by us as well as by other explorers) in the direction indicated, and by the iccbeing carried out of the fjord round the South Cape westwards.

O x y g e n (fig. 5). By its tenor in oxygen the Stor Fjord at the time of our observations presented a picture characteristic not only for the polar basin, but also for the Svalbard fjord in general. What is characteristic first of all, is that the upper water layer from the surface down to 25, and sometimes to 50 *m* deep, is sursaturated with oxygen. In four out of 14 stations (Stat. 348, 350, 351 and 354), sursaturation was observed down to a depth of 50 *m*. All these stations are situated in the eastern part of the fjord. The sursaturation is rather strong and at the southern station 358 it reaches as much as 25%. Beginning from 25 and sometims 50 *m* deep, the content of oxygen steadily decreases towards the bottom. However in 3 cases (stats 354, 356 and 358) at a depth of 100 *m* certain deviations were noticed. At the stats 354 and 356 the oxygen minimum is not at this depth, but in the bottom water layer. On the contrary, at stat. 358 the oxygen content was found to by higher. This phenomenon can be perhaps attributed to the presence, in this region where the streams of the Atlantic current meet with those of the Polar one, of an interposition of water layers with a different oxygen content auswering to temperature of a given layer.

The upper layer, sursatureted with oxygen presents a peculiarity which repeats itself at all the stations—viz. that there is, absolutely, as well as relatively, less oxygen on the surface than in the layers situated lower. This phenomenon which at first sight seems strange, becomes comprehensible, if we take into consideration that an equilibrum must be established between the oxygen contained in the water, and that of the atmosphere, an equilibrum, which has been destroyed by the altered condition of the gaseous equilibrum. It is indifferent whether the cause of sursaturation has been an excessive developement of the phytoplankton, or a change in the temperature conditions; it must disappear in the cours of time and the zone contiguous to the atmosphere presents for thus perfectly appropriate condition (wave motion etc.). In all likelihood, more than one factor parcitipates in the formation of a layer of sursaturated oxygen, precisely in the upper water layers. On one hand the development of the phytoplankton can lead to an abundant emission of the oxygen, on the other the changing temperature conditions when layers with different tenor of oxygen are mixing, can also have an influence. Moreover, besides this I consider that in the period of ice thawing, the upper water layers can be enriched in oxygen, at the expence of the air included in the mass of icefloes and in their snow covering.

According to our observations the % minimum of saturation does not always coincide with the temperature minimum, as has been observed in the western Svalbard fjords. Out of five cases where a cold intermediate layer was observed, in three the oxygen minimum was at a great depth.

It is quite possible that, at a given moment san energetic developement of organismus takes place in the layer situated somewhat lower than the intermediate cold one, and in this way the factor which has the most active influence on the decrease of the oxygen tenor may provoke such a lack of coincidance in this or that layer.

On the whole, at the majoritis of stations the mode of distribution of the oxygen in the deeps appears to be the same, with a division into two layers: an upper sursaturated one, and a lower one beginning from a depth of 50 *m* with an incomplete tenor of oxygen. Only the 4-th station, in the shallowest northern region of the fjord, with depth scarcely above 50 *m* differs from the others inasmuch as a sursaturation through the whole mass of water, from the surface to the bottom was found there. Considering that the saime phenomenon is observed in the entire fjord down to a depth of 50 *m* it can be with certainly be that this layer with an excess of oxygen is situated more or less on the same depth throughout thewhole extent of the fiord. The remaining mass of water, the lower layers contains a sufficient amount of oxygen, and only in the deep hollows in the southern part of the fjord, with depths of about 150 *m*, does the tenor of oxygen fall below 7 cm^3. The minimal content of oxygen was found at a depth of 100 *m* stat. 356; it was of 6.32 cm^3. (The number of 6.12 cm^3 at a 100 *m* depth at stat. 353 must be considered as erroneous).

It must be admitted that, on the whole, the water of Stor Fjord is well wentilated even in its comparatively deep parts. As to the northern, shallow ledge. We have explored, the water here allmost all through contains oxygen even in excess. The good ventilation and the absence of stagnation phenomena even in the deeper parts of the fjord is a consequence of its having a completely open entrance, of its being directly united to the contiguous regions of the open sea, where an energetic horizontal circulation takes place (Polar and Atlantic currents), and to its having no sill characteristic for the fjords, to prevent the penetration from outside of waters saturated with oxygen. The observations of Gaarder [1915—1916] in the norvegian fjords, have shown that the oxygen dissolved, decreases more or less regularly owing to an insufficient exchange with the open sea. In the Stor Fjord, as we have seen there is a free exchange with the open sea, and therefore, if the water there is saturated by oxygen it is natural that ever new quantities of oxygen should penetrate into the fjord together with the stream of water from the open sea. At inconsiderable depths in the fjord, even with an insignificant convection, the water through its entire thickness can be easily enriched by oxygen, penetrating from outside.

The hydrogen ion concentration (fig. 5). For determination of hydrogen ion concentration we made use of α-naphtolphtalein. The determination was made by dispersed day light. At this time of year we had the possibility of working during the entire 24 hours. We consider that the question as to the temperature at which the determination ought to be made demands to be experimentally verified. If the determination be made immediately after the samples has been taken, the temperature of the samples may become somewhat altered. At the same time the temperature of the standard solutions alters visibly (especially in the region of the North), as compared to the temperature at which they have been electrometrically established. In order to introduce corrections to the temperature of Kolthoff [1922], one must also determine it every time, which technically is most inconvenient. We applied the usual correction for the „salt error" of Palitzsch to our material of the Stor Fjord. As to the so called „protein error" it was of no significance in our case. The correction for the „salt error" was taken for α-naphtolphtalein. The data, we have obtained as to the hydrogen ion concentration are distinguished by a great. regularity. This is shown first of all by the fall of pH in accordence with depth, only presenting a certain rise depth of 10 *m*. (With a few exceptions, when the rise was found at other depths). The extreme limits for pH are 8.12 near the surface and 7.90 near the bottom. The oscillation amplitude for the fjords of Svalbard, according to the observations of Nansen [1915] is somewhat larger, 8.25—7.92. (The time of observation in the year the same as ours). This, somewhat greater amplitude is owing to his having found in Green Harbour, on the surface pH = 8.25, whilst usually in the upper iayers of other fjords, and in Stor Fjord, according to our observations, pH = ∽8.10. In more southern latitudes in the upper layers of the North Atlantic (55° to 60° N. Lat. Gaarder, 1927) pH was found on an average = 8.22 though in other places, according to the observations of the same authors numbers of aléower significance are met with (up to 8.13). In the open sea to the north of Svalbard Nansen found near the surface also a higher pH.

Stat.	19	80° 18'N,	10°45' O	— pH = 8.24
Stat.	39	80° 5'N,	15°33' O	— pH = 8.19

These last numbers, seem to contradict the rule, according to wihch pH falls as the latitude increases.

At present it must be considered, as established, that as salinity increases, so does the significance of pH. This is observed in the horizontal direction. In the vertical direction we notice usually, that beginning at from a certain depth, pH decreases whilst the salinity augments. This apparent contradiction is due to the fact that the influence of the increasing pressure of CO_2 and of depth is stronger than the influence of salinity (K. Buch, 1917; Gaarder, 1927) The comparatively low significance of pH in the upper layers of the Stor Fjord proves that the vertical circulation is sufficiently energetic to draw in as well the deeper, more acid water layers.

The Stor Fjord represents an open bay with a completely free influx of outside waters, of the litteral superficial Polar current on one side and of the Atlantic current on the other. In the fjord itself these waters in mixing give waters of a mean, mixed composition in which the reaction of deeper layers, brought from the open sea, may find its reflection.

Nevertheless, in spite of this general, somewhat heightened acidulation one cannot, in any case speak of any stagnation phenomena. The limits of the value of pH in the bottom layers are not above those found by other explorers. The minimum, we found in the Stor Fjord, was at stat. 346, at a depth of 85 *m* (bottom 90 *m*) and the same at stat. 353, at a depth of 155 *m* (bottom 160 *m*) — 7.90. This minimum differs from the mean for the bottom layer of all the stations only by 0.08. The amplitude of the values pH in the same layers is 0.15.

We likewise observed in the Stor Fjord the coincidence of the maximum content of oxygen with the highest value of pH. The falling of the oxygen tenor and in the value of pH, on the lines they have in common (independently from several exceptions), in the thickness below this maximum, viz the region where the role of the vegetable plankton is but a secondary one, can be seen by a comparison of both series of oxygen and pH values.

In these layers the hydrogen ion concentration curves and those of oxygen have a contrary course with the decrease of oxygen the value of pH falls likewise. With the comparatively small depths of the Stor-Fjord this phenomenon is not so strongly expressed as for instance in the Atlantic ocean (H. Wattenberg. The Atlantic expedition on the „Meteor", 1927).

The materials we have collected on the hydrography and hydrochemies of the Stor Fjord, make it quite evident that it cannot be considered a fjord in the real sense of this term. Too wide an entrance into the bay, regions of open sea closely adjoining it as well as the presence of two mighty currents place it under the dependance of the hydrographical conditions, governing the neighbouring surrounding seas.

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Станции	Время	Положение	Глубина m	t°	S°/oo	O_2	$\frac{100+O_2}{O_2'}$	pH
345	8 VIII	77°59'N	0	2.00	18.33	8.23	95.03	8.06
		18°50'O	10	—1.22	31.98	9.12	107.29	8.06
			30	—1.40	33.22	9.29	109.81	8.02
			36					
346	9 VIII	77°5"30"N	0	1.80	—	—	—	8.02
		18°41'O	10	1.24	—	8.95	—	8.06
			25	1.09	33.73	9.06	91.10	8.03
			50	-1.50	34.29	6.99	83.12	7.94
			85	—1.75	34.47	6.88	81.42	7.90
			90					
347	9 VIII	77°5,30'N	0	2.50	30.57	8.48	107.20	8.02
		19°14'O	10	0.78	33.77	9.15	114.95	8.03
			25	0.20	33.37	8.97	110.74	8.02
			45	—0.97	34.11	9.35	112.52	8.00
			51					
348	9 VIII	77°58'H	0	2.50	29.47	8.73	110.60	8.05
		19°47'O	10	0.28	32.79	9.02	110.95	8.07
			25	0.00	33.62	8.94	102.96	8.03
			50	—1.10	34.09	8.87	106.35	8.00
			57	—1.69	34.13	8.17	96.46	8.00
			62					
349	9 VIII	77°59'N	0	2.40	32.97	8.68	113.20	8.02
		20°14'O	10	—0.63	32 97	9.47	113.96	8.06
			25	—1.71	34.00	9.84	116.04	8.03
			50	—1.74	34.22	8.02	94.69	7.98
			83	—1.09	34.56	7.07	85.18	7.94
			88					
350	9 VIII	77°59'N	0	2.00	33.60	8.71	112.90	8.02
		20°36'O	10	2.11	33.58	8.71	112.97	8.05
			25	1.03	33.82	8.77	108.35	8.01
			50	0.66	33.93	8.81	110.54	8.03
			60	-1.69	34.00	8.99	105.41	8.05
			65					
351	10 VIII	77°49'N	0	3.60	33.33	8.51	113.60	8.06
		19°52'O	10	2.23	33.84	8.79	114.45	8.12
			25	3.87	32.92	8.43	113.46	8.06
			50	--0.32	34.20	8.56	104.90	8.00
			60	-0.63	34.23	8.36	101.70	8.03
			65					
352	10 VIII	77°39'N	0	3.60	30.30	8.06	105.60	8.04
		19°40'O	10	1.21	33.91	8.85	112.45	8.05
			25	0.19	34.05	8.73	108.31	8.02
			50	—0.26	34.25	8.38	102.95	7.98
			73	—1.35	34.38	7.88	94.14	8.01
			78					

Станции	Время	Положение	Глубина m	t°	S°/oo	O_2	$\frac{100+O_2}{O_2'}$	pH
353	10 VIII	77°28'30"N	0	2.30	25.07	8.24	100.70	8.06
		19°21'O	10	0.40	34.02	9.74	121.45	8.08
			25	—0.32	34.42	8.98	110.32	8.01
			50	-1.78	34.43	7.67	90.66	7.98
			100	—1.47	34.70	[6.12]	[73.03]	7.95
			155	—1.84	35.14	6.95	82.44	7.90
			160					
354	10 VIII	77°24'N	0	3.90	—	7.74	—	8.05
		20°14'O	10	2.81	33.71	8.13	107.23	8.03
			25	0.53	34.20	8.36	104.76	8.03
			50	0.15	34.31	8.35	103.73	8.01
			100	—1.13	34.74	7.17	86.39	7.94
			125	—0.96	34.51	7.16	86.47	7.98
			130					
355	10 VIII	77°23'N	0	5.10	30.62	7.29	100.70	8.06
		19°48'O	10	3.44	33.10	7.74	107.20	8.04
			25	0.17	34.18	9.33	115.76	8.08
			50	—0.79	34.45	8.20	99.16	8.00
			100	—1.26	34.74	7.23	86.79	7.96
			135	-1.77	34.97	6.91	82.07	7.98
			140					
356	10 VIII	77°21'30"N	0	4.00	29.60	7.88	103.70	8.05
		19°20'O	10	1.90	33.31	8.96	115.32	8.11
			25	—0.98	34.14	9.77	117.57	8.03
			50	—1.55	34.52	7.43	88.35	8.00
			100	—1.81	34.81	6.82	80.81	7.96
			140	—1.83	35.16	6.94	82.42	7.96
			147					
357	10 VIII	77°20'N	0	1.20	24.33	8.77	103.70	8.09
		18°37'O	10	1.61	31.41	8.89	111.97	8.10
			25	—0.88	34.00	9.64	116.15	8.05
			50	—1.68	34.36	7.64	90.41	7.94
			75	—1.20	34.49	7.34	88.12	7.92
			80					
358	11 VIII	77°12'N	0	4.50	29.02	7.84	106.40	8.05
		19°22'O	10	0.29	33.77	10.10	124.47	8.09
			25	—0.65	34.16	9.41	114.34	8.03
			50	—1.71	34.74	7.29	86.48	7.90
			100	—1.31	34,88	7.40	88.83	8.00
			158	—1.85	—	6.92	82.28	7.94
			163					