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OVERFLOW '73

THE DISTRIBUTION OF WATER MASSES ON THE GREENLAND-SCOTLAND RIDGE IN AUGUST/SEPTEMBER 1973 ⊕

a Data-Report

by

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⊕ ICES Expedition Overflow '73, Contribution No. 36

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Summary

In August/September 1973 the ICES Expedition Overflow '73 was carried out in the area of the Greenland-Iceland-Scotland ridge to study the arctic overflow. TS-profiles from both, hydrocasts and CTD's of twelve ships from seven countries are analysed for water masses of the area. The results are presented shipwise in terms of overall TS-diagrams and sections of water masses contributing to the deep overflow of arctic and subarctic waters across the ridge. These are Norwegian Sea Deep water (NS) for the whole area. A mixture of North Icelandic Winter water and Arctic Intermediate water (NI/AI) and East Icelandic Winter water (EIW) which origin from the East Icelandic current contribute as intermediate waters to the deep overflow between Iceland and Scotland. The corresponding intermediate waters on the Greenland-Iceland ridge are Arctic Intermediate (AI) and Polar Intermediate water (PI).

Zusammenfassung

Im August/September 1973 wurde im Seegebiet des Grönland-Island-Schottland Rückens die Expedition Overflow '73 des ICES durchgeführt. Vertikale TS-Profile von zwölf Schiffen aus sieben Nationen sind einer Analyse auf Wassermassen unterzogen worden. Die Ergebnisse sind für jedes Schiff in Form von TS-Übersichtsdiagrammen der benutzten Profile sowie Vertikalschnitten derjenigen arktischen und subarktischen Wassermassen dargestellt, die zum tiefen Overflow über das Rückensystem beitragen. Dies ist für den gesamten Bereich das Norwegische See Tiefenwasser (NS). Im Bereich des Island-Faroer-Schottland Rückens trägt ferner als Zwischenwasser eine Mischung aus Nordisländischem Winter- und Arktischem Zwischenwasser (NI/AI) und Ostisländisches Winterwasser (EIW) mit Ursprung im Ostislandstrom zum Overflow bei. Arktisches Zwischenwasser (AI) und Polares Zwischenwasser (PI) sind die entsprechenden Wassermassen im Bereich des Grönland-Island Rückens.

1. Introduction

In August/September the ICES Expedition Overflow '73 was carried out in the area of the Greenland-Iceland-Scotland ridge, the main topographic rise between the arctic seas and the North Atlantic. It's main aims were to study the overflow of cold arctic and subarctic waters across the ridge-system which compensates the inflow of Atlantic water, precipitation and run off into the northern seas. This overflow partly occurs in the cold surface currents along the east coast of Greenland and Iceland and a branch of recirculated North Atlantic water which enters the Faroe Shetland channel from the north on the Faroe side. These basic surface currents flowing southwards can already be seen on the early current chart of this area by Helland-Hansen and Nansen (1909).

The existence of a deep overflow of Norwegian Sea Deep water was first recognized by Knudsen (1899). Helland-Hansen and Nansen (1909) also showed the existence of low saline water with temperature ranging from 0^{o} C. to 3^{o} C. which sinks to depths of 200 m to 500 m south of the polar front. The importance of these intermediate water masses for the deep overflow across the Iceland-Faroe ridge has been pointed out by Stefansson(1962) and Meincke (1972). For the Greenland-Iceland ridge Gade et al. (1965)reported intermediate waters contributing to the deep overflow.

This data report has been initiated by the ICES Working Group on Oceanic Hydrography in order to get a basis knowledge about the distribution of water masses contributing to the deep overflow across the Greenland-Scotland ridge during the ICES expedition Overflow '73. On the basis of hydrographic stations of twelve ships from seven countries (table 1) a TS-diagram analysis for these water masses has been conducted. The results are presented shipwise in terms of watermass-sections and overall TS-diagrams for each section.

A study using the water mass distribution together with results of current measurements during Overflow '73 for the calculation of transport rates of deep overflow across the ridges is in preparation by one of the authors (Meincke, 1979).

2. Observed water masses and their TS-relation

A short review of the origin and characteristics of the water masses observed in the area of Overflow '73 will now be given and summarized in table 2. For further information about origin and formation of water masses see Stefansson (1962).

(i) Iceland-Faroe-Scotland ridge:

Well southwest of the ridge those undisturbed water masses maybe defined which are involved from the Atlantic side in the intensive mixing over the Iceland-Faroe ridge and in the channel system between the Faroes and Shetlands.

First as deep water the Irminger Sea water (IS, $\sim 4^{\circ}$ C., $\sim 34.97^{\circ}/oo$) is found at depths of 800 m and more. It has been described extensively by Dietrich (1957) and is shown in the TS-diagrams of the southwest stations of SHACKLETON (p. 64, 65, stat 220-226). This deep water does not reach the sill depth and thus does not cross the ridge northwards.

The inflow from the Atlantic towards the Norwegian Sea is completely given by North Atlantic water with core below the surface layer in $\sim$ 250 m in it's pure (NA, $\geq 9.0^{\circ}$, $\geq 35.32\ ^{\circ}/oo$) or modified form (MNA, $> 8.5^{\circ}$, $\sim 34.24\ ^{\circ}/oo$). NA is found in the southeastern part of the area at all stations of CHALLENGER (p. 50 ff) as well as at the Shetland side of the Faroe-Shetland channel (EXPLORER, p. 23). MNA is observed on the Faroe side of the Faroe-Shetland channel and at all stations of SHACKLETON (p. 65 ff). This supports the idea of a recirculation of North Atlantic water round the Faroes (Meincke, 1978). MNA occurs also on the whole central Iceland-Faroe ridge, but the reason for this is not yet clear. The main part of the south flowing cold Overflow water is given by the well known Norwegian Sea

Deep water (NS, $\leq$ 0.5° C , ~ 34.92 °/oo). It occurs at all stations north of the ridge in undisturbed form at least from the sill depth on.

Two intermediate water masses also contribute: North Icelandic Winter water is formed in winter on the North Icelandic shelf, mixes with Arctic Intermediate water and flows southeast (Stefansson, 1962). Along the polar front it sinks below the Atlantic water. It's characteristics (NI/AI, 2.5° C - 3° C 34.88 °/oo) are found over the whole area just south and north of the sill depths. To the overflow it contributes less than NS.

The second intermediate water occurs in the region from the southeastern shelf of Iceland towards the central part of the ridge. (W. HERWIG, p. 107, METEOR, p. 81, stat. 39, 41). It can hardly be traced south of the ridge. Due to it's low temperature and salinity, according to Meincke (1978), it is speculated to be formed in winter from waters of the East Icelandic current (EIW, -0.5° C - 1° C , ~ 34.72 °/oo). Low salinity intermediate waters have been shown in sections earlier, e.g. by Dietrich (1956).

Also southeast of Iceland the surface waters of the south going East Icelandic current are defined (EIC, 6.0° C - 6.5° C, 34.45 °/oo - 34.65 °/oo) with temperatures of the summer season.

All over the ridge the surface waters (SW) of various origins have not been taken into account.

(ii) Greenland-Iceland ridge

Looking first at the Atlantic components one finds from the southern stations of HUDSON (p. 127, stat. 31 - 37) two deep waters. Irminger Sea water (IS, ~ 4° C, ~ 34.97 °/oo) is observed in a thick layer below Labrador Sea water (LS, ~ 3.8° C, ~ 34.88 °/oo) and North Atlantic water (NA, > 7° C, > 35.10 °/oo). IS, LS and NA procede towards the sill of the ridge northwards on the Icelandic side, but

IS and LS seem not to cross the sill whereas NA contributes nearly completely to the northerly inflow. Note that NA in this region is less warm and saline as further southeast. There are four water masses flowing southwards across the ridge (HUDSON, p. 130, stat. 111 - 120). At the surface on the Greenland side it is the East Greenland current with very low saline Polar water with admixtures of low saline Greenland shelf waters. In the upper most meters this water is summer heated. Since the analysis is mainly concerned with the deep overflow, a definition close to the one of Stefansson (1962)for Polar water has been used (P, $\leqslant -1.0^{\circ}$ C, $\leqslant$ 34.00 $^{\circ}/oo$).

The most dense water is the Norwegian Sea Deep water (NS, $\leqslant -0.5^{\circ}$ C , $\sim$ 34.92 $^{\circ}/oo$) which fills the basin north of the sill and is also observed at most stations south of the sill.

Two intermediate water masses contribute also to the overflow. Arctic Intermediate water (AI, $\sim 1^{\circ}$ C., $\sim$ 35.00 $^{\circ}/oo$) is formed by cooling of Atlantic water and mixing with Polar water and bottom water far north of Iceland (Stefansson, 1962) and probably originates from the Spitzbergen Atlantic current (Helland-Hansen and Nansen, 1909). It's high salinity supports this idea, since it cannot be formed by mixing of NA from the western part (7° C , 35.10 $^{\circ}/oo$) with NS and the waters of the Spitzbergen Atlantic currents originally come from the more saline inflow from the North East Atlantic.
When reaching the sill region it's density is very close to that of NS. Thus due to probable mixing, AI and NS cannot be distinguished far south of the sill, and NS has been taken as the only reference at these stations. The second intermediate water shows not so clear a signal in the TS-diagram but seems to be present at all stations on the Greenland side north of the ridge in about 100 - 200 m depth. According to Gade et al. (1965) this water with low temperature and salinity ($\leqslant -1.0^{\circ}$ C., $\sim$ 34.50 $^{\circ}/oo$) is formed further north. Because of it's polar constitutents, Malmberg (1972) called it Polar Intermediate water

(PI, $\leq -1^{\circ}$ C, 34.50 $\pm$ 0.1 $^{\circ}/oo$). Far south of the ridge it is found on the Greenland side of the continental break in a thin and deep intermediate layer above NS, probably mixed with P.

3. Methods of analysis

Both, hydrocasts and CTD's have been used on the different ships for sampling. In a first step, all data have been validated by the responsible national institutes and after delivery to the IfM have been checked once more. Obvious errors as indicated by statical instability or single TS-points falling outside the 'normal' TS-relation have been removed. In some cases the salinities of whole profiles have been corrected with respect to a non mixed water mass at that station, mainly Norwegian Sea Deep Water (NS).

Next, fractions of water masses have been calculated analogue to a procedure described by Hermann (1967). Assuming linear mixing of three water masses with (conservative) TS-relations (T_i, S_i), i = 1, 2, 3, the fractions m_i of these water masses in a volume of unit 1 with relation (T, S) are derived from the set of equations

$$(1)\quad \begin{aligned} T &= \sum_i m_i T_i \\ S &= \sum_i m_i S_i \\ 1 &= \sum_i m_i . \end{aligned}$$

The m_i are all non-negative (and thus physically relevant) if and only if the point (T, S) falls within the mixing-triangle with corner points (T_i, S_i) in the TS-diagram.

Due to errors in the measurements, nonlinear effects in mixing processes of the existence of small fractions of a fourth water mass, TS-points often lie slightly outside the relevant mixing triangle. In such cases the TS-value has been projected onto the neighbouring side of the mixing triangle, thus assuming mixing only between those two water masses, connected by this line.

At many stations the form of the TS-curves below the surface layer shows clearly the existence of four water masses, that take part in the mixing. If, starting below the surface layer, at least one of the intermediate layers occur non-mixed, it is possible to calculate the fractions m_i, i = 1, 2, 3, 4 in two different mixing triangles where the relation of the non mixed layer connects both triangles and thus assures continuity. The procedure is similar for more than four water masses. The decision for the triangles to use has been made after inspection of the TS curves of each station separately.

For each ship the used mixing triangles are listed in tables. Overall TS-diagrams give some impression about the quality of the data. Both precede the sections of fractions of water masses contributing to the overflow, expressed in percentages of the unit volume. Their absolute errors are estimated to ± 10 %. Positions, depths and times of measurements have been compared with or taken from the Overflow '73 Inventory (1976).

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5. Tables

Table 1 List of origin of data

Ship	Institute/Organisation
Explorer	DAFS, Marine Laboratory, Aberdeen
Helland-Hansen	Geophysical Institute, Bergen
J.C. Svabo	Institute for Physical Oceanography, Copenhagen
Challenger	SMBA, Oban, ICES
Cirolana	Fish. Lab. Lowestoft
Shackleton	IOS-Wormley
B. Davydov	ICES
Meteor	Institut für Meereskunde, Kiel
Bj. Saemundsson	Marine Research Institute, Reykjavik,ICES
W. Herwig	Deutsches Hydrographisches Institut, Hamburg
Hudson	Bedford Institute of Oceanography, Dartmouth
Prof. Viese	ICES

Table 2: Water mass characteristics

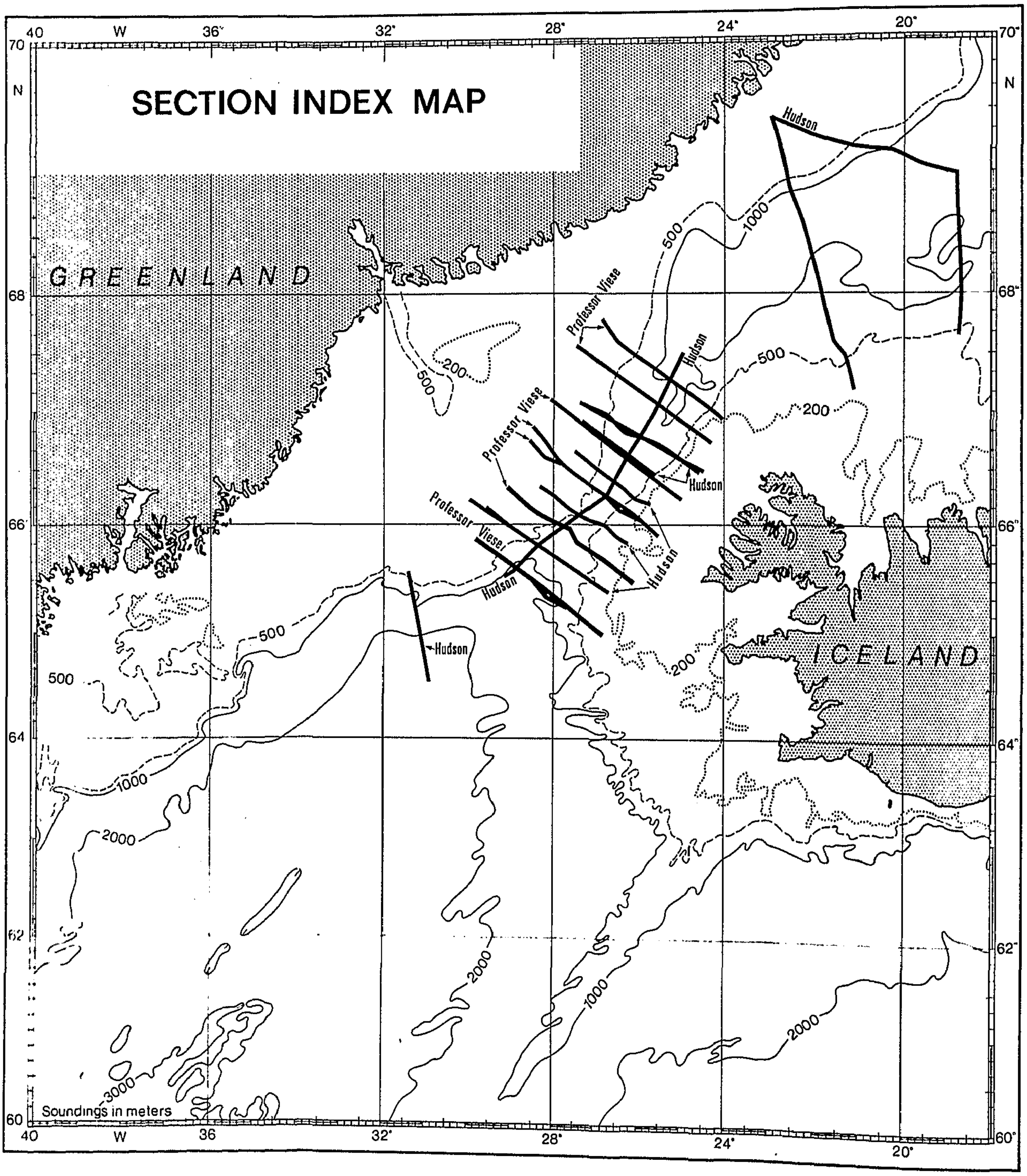
Area	Name	Symbol	TS-characteristics
Greenland-Scotland	Norwegian Sea Deep water	NS	$\leq -0.5^\circ$ C, $\sim 34.92^\circ$/oo
	Irminger Sea water	IS	$\sim 4^\circ$ C, $\sim 34.97^\circ$/oo
Iceland-Scotland	North Atlantic water	NA	$> 9.0^\circ$ C, $> 35.32^\circ$/oo
	Modified North Atlantic water	MNA	$\geq 8.5^\circ$ C, $\sim 35.24^\circ$/oo
	East Icelandic Current water	EIC	6.0° C - 6.5° C, 34.45°/oo - 34.65°/oo
	North Icelandic Winter/Arctic Intermediate water	NI/AI	2.5° - 3.0° C, 34.88°/oo
South east Iceland	East Icelandic Winter water	EIW	-0.5° C - 1° C, $\sim 34.72^\circ$/oo
Greenland-Iceland	North Atlantic water	NA	$\geq 7^\circ$ C, $> 35.10^\circ$/oo
	Labrador Sea water	LS	$\sim 3.8^\circ$ C, $\sim 34.88^\circ$/oo
	Polar water	P	$\leq -1.0^\circ$ C, $\leq 34.00^\circ$/oo
	Polar Intermediate water	PI	$\leq -1.0^\circ$ C, $\sim 34.50^\circ$/oo
	Arctic Intermediate water	AI	$\sim 1^\circ$ C, $\sim 35.00^\circ$/oo
General	Surface waters of various types	SW	relative high T, relative low S

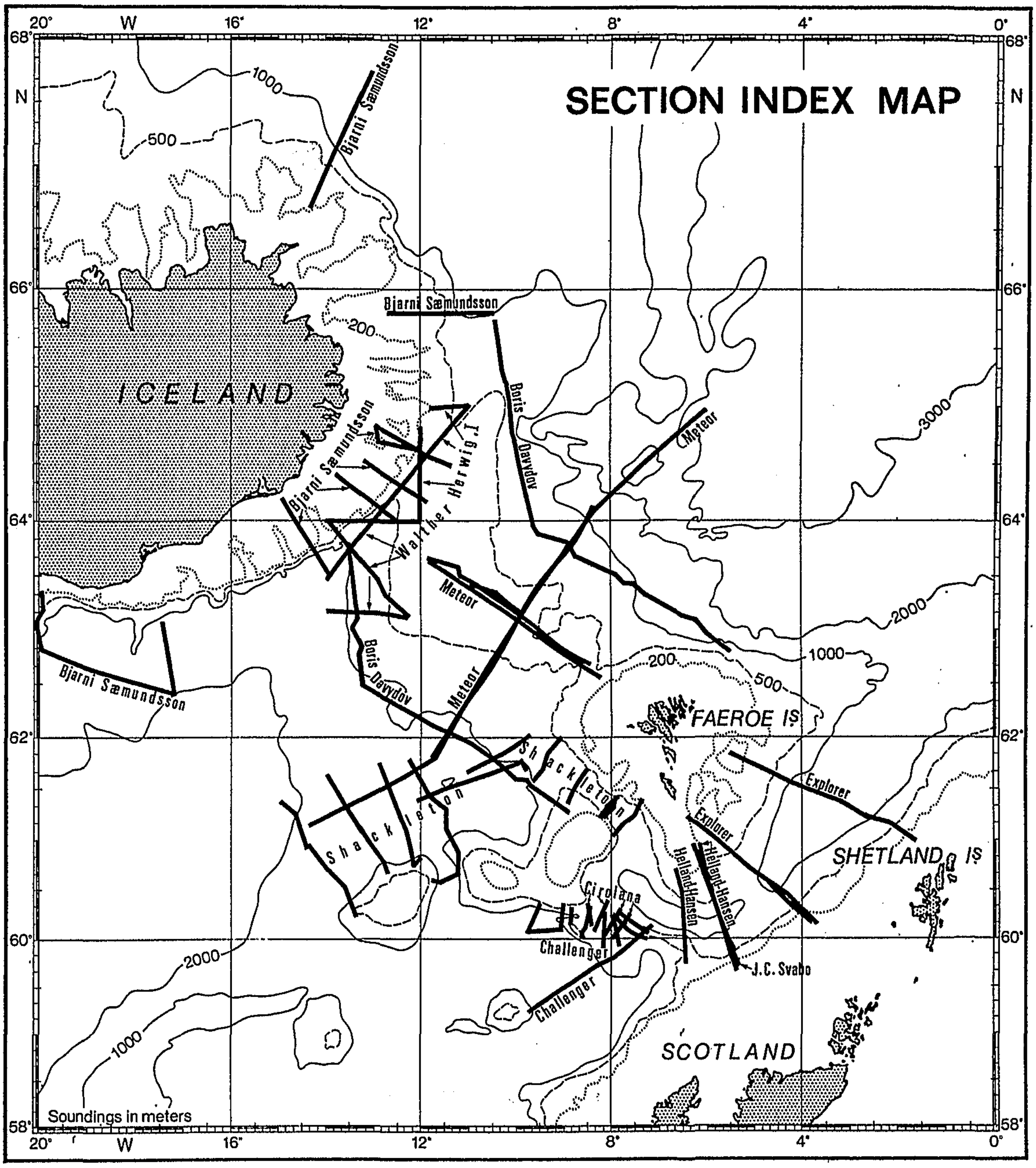
Table 3: Mixing triangles used for calculation of fractions of water masses (characteristics see table 2).

Triangle No	Water masses	Area
1	NA, IS, NS	Iceland-Scotland
2	MNA, IS, NS	" "
3	NA, NI/AI, NS	" "
4	MNA, NI/AI, NS	" "
5	MNA, EIC, NI/AI	South East Iceland
6	EIC, EIW, NS	" " "
7	EIC, EIW, NI/AI	" " "
8	NI/AI, EIW, NS	" " "
9	NA, LS, IS	Greenland-Iceland
10	IS, PI, NS	" "
11	P, NA, PI	" "
12	NA, PI, AI	" "
13	PI, AI, NS	" "
14	NA, PI, NS	" "
15	P, NA, NS	" "

Table 4: List of water masses and mixing triangles analysed

Ship	Observed water masses (table 2)	Mixing triangles (table 3)
Explorer	NA, MNA, NI/AI, NS	3, 4
Helland-Hansen	NA, MNA, NI/AI, NS	3, 4
J.C. Svabo	NA, MNA, NI/AI, NS	3, 4
Challenger	NA, IS, NI/AI, NS	1, 3
Cirolana	NA, NI/AI, NS	3
Shackleton	MNA, IS, NI/AI, NS	2, 4
Boris Davydov	MNA, EIC, IS, NI/AI, EIW, NS	2, 4, 5, 7, 8
Meteor	NA, MNA, EIC, IS, NI/AI, EIW, NS	1, 2, 4, 5, 8
Bj.Saemundsson	MNA, EIC, IS, NI/AI, EIW, NS	2, 4, 5, 6, 7, 8
Walter Herwig	MNA, EIC, NI/AI, EIW, NS	4, 5, 7, 8
Hudson	NA, P, LS, IS, AI, PI, NS	9, 10, 11, 12, 13, 14, 15
Professor Viese	NA, P, LS, IS, AI, PI, NS	9, 11, 12, 13, 14, 15


SECTION INDEX MAP
GREENLAND
ICELAND
Hudson
Professor Viese
Soundings in meters
200
500
1000
2000
3000
40
W
36°
32°
28°
24°
20°
70°
N
68°
66°
64°
62°
60°


SECTION INDEX MAP
ICELAND
FAEROE IS
SHETLAND IS
SCOTLAND
Bjarni Sæmundsson
Boris Davydov
Walther Herwig I
Meteor
Shackleton
Explorer
Helland-Hansen
J.C. Svabo
Cirolana
Challenger
Soundings in meters
20°
16°
12°
8°
4°
0°
68°
66°
64°
62°
60°
58°
W
N
200
500
1000
2000
3000

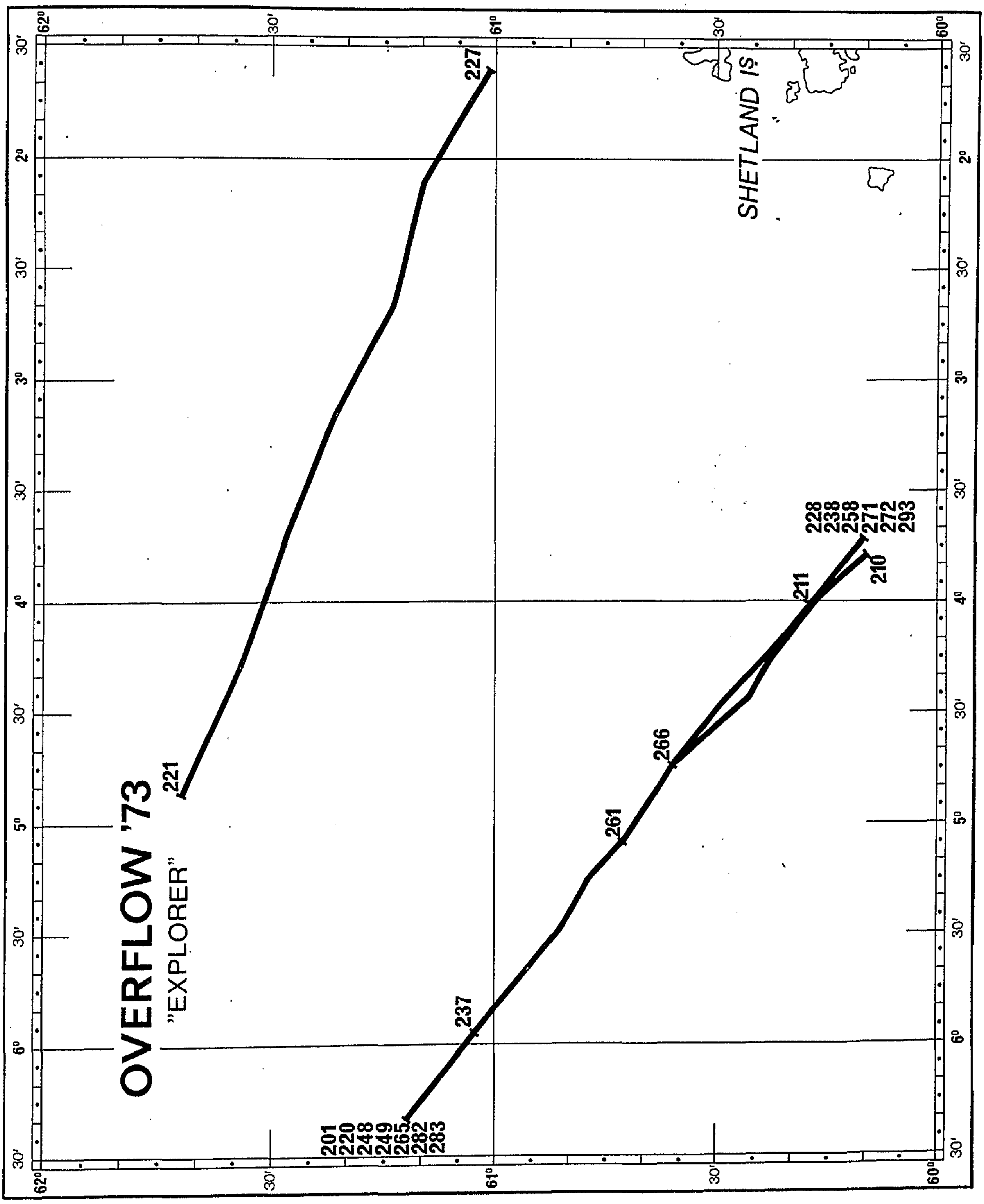
6. Water mass analysis

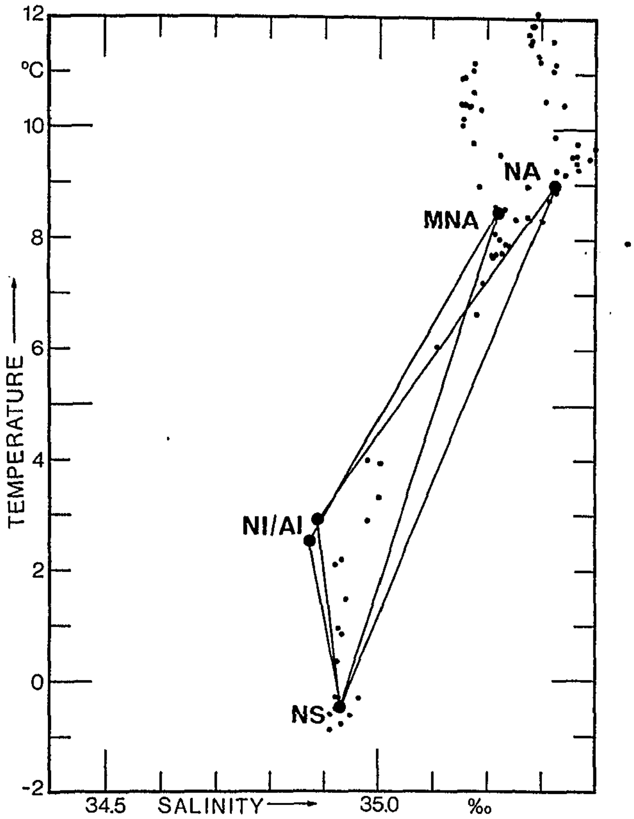
In this chapter the results of the water mass analysis are presented in form of sections. For each ship these sections are preceded by special remarks, a station map and overall TS-diagrams.

6.1 Explorer

The working area was the Faroe-Shetland region. The TS-diagrams clearly show two water masses of the North Atlantic type below surface waters with lower salinities. Overflow waters occur in amounts of NI/AI and NS.

Section	Stat.No.	Mixing triangles (see table 3)
201 - 210	201 - 205	4
	206 - 210	3
211 - 220	211 - 215	3
	216 - 220	4
221 - 227	221 - 224	4
	225 - 227	3
228 - 237	228 - 231	3
	232 - 237	4
238 - 248	238 - 240	3
	241 - 248	4
249 - 258	249 - 254	4
	255 - 258	3
261 - 271	261 - 267	4
	268 - 271	3
272 - 282	272 - 275	3
	276 - 282	4
283 - 293	283 - 287	4
	288 - 293	3


OVERFLOW '73
"EXPLORER"
SHETLAND IS.
221
227
201
220
248
249
265
282
283
237
261
266
211
210
228
238
258
271
272
293
62°
61°
60°
30'
2°
3°
4°
5°
6°



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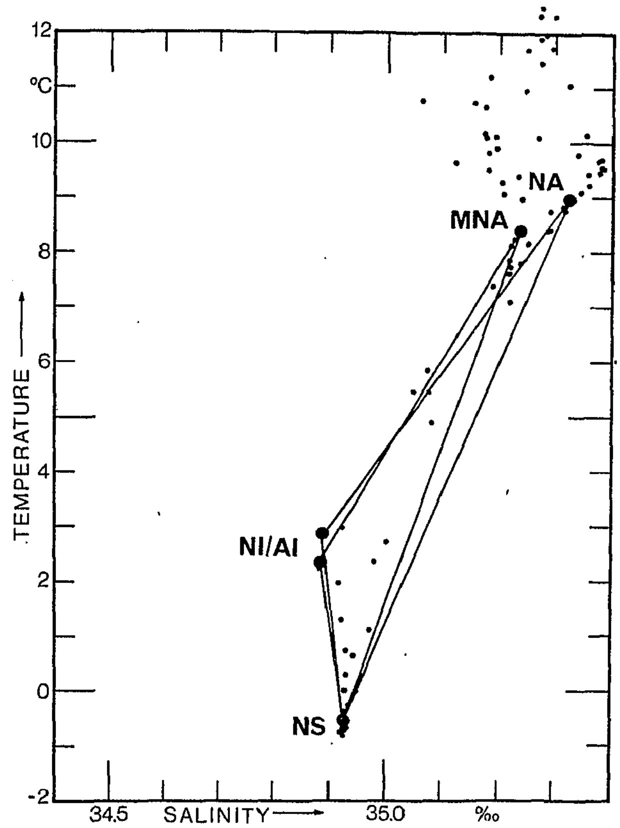

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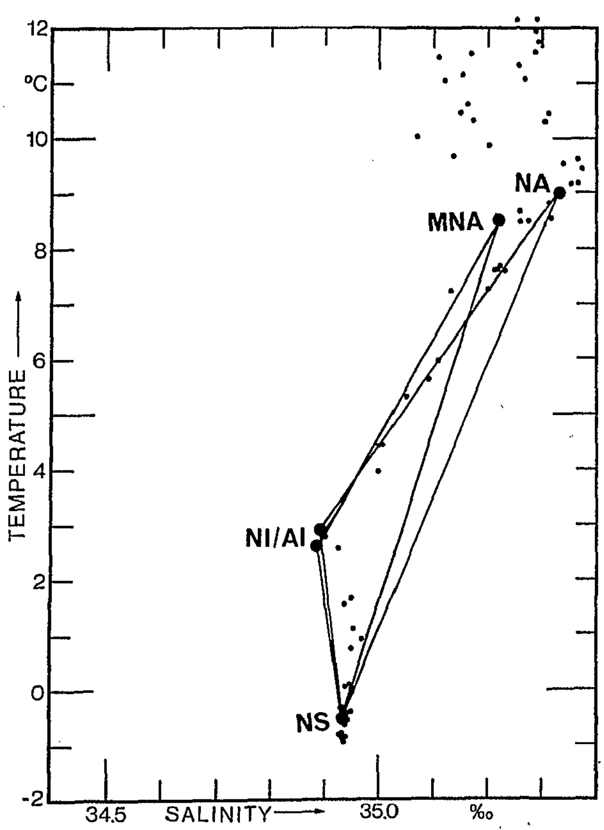

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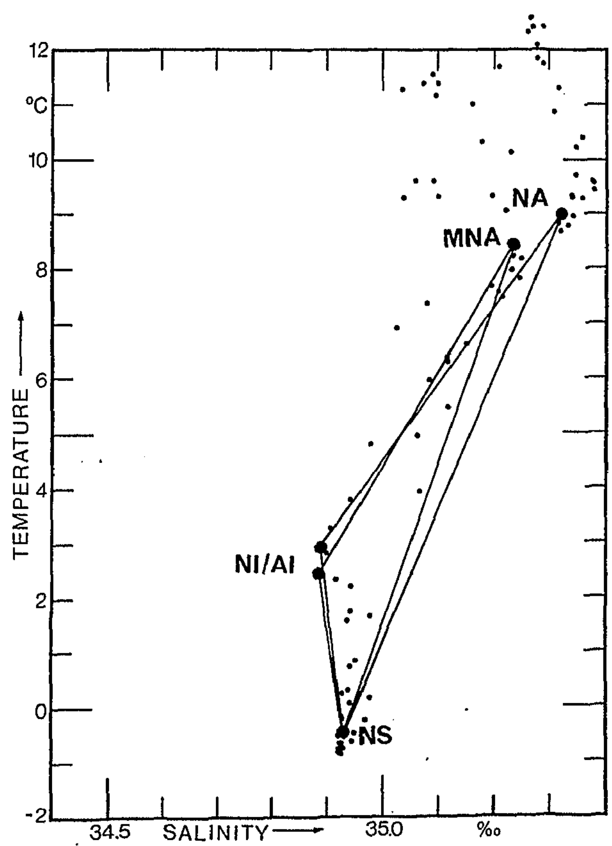
STAT.NO.221-227



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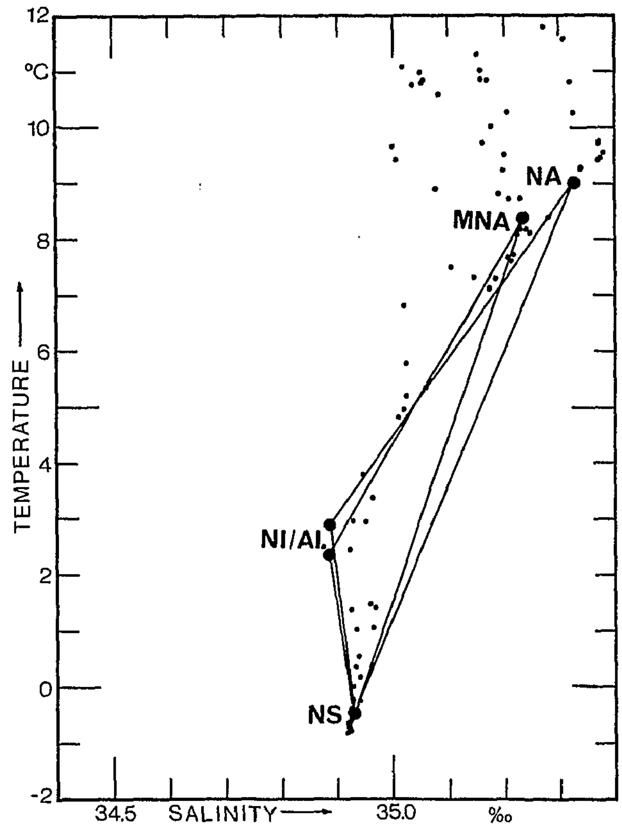

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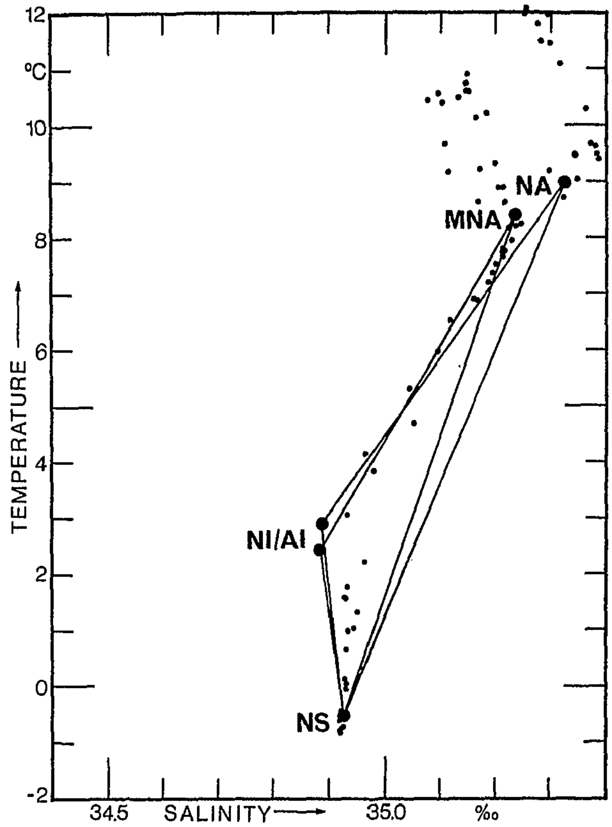

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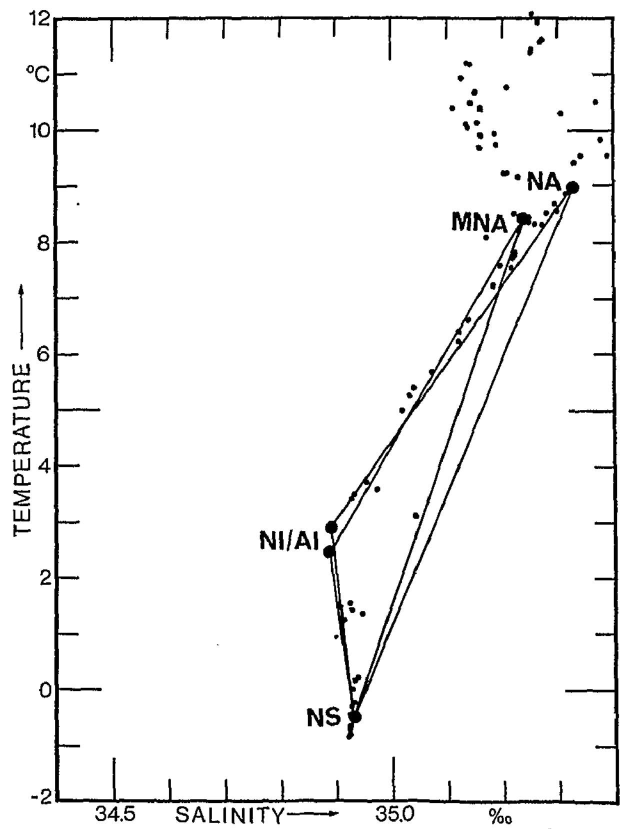

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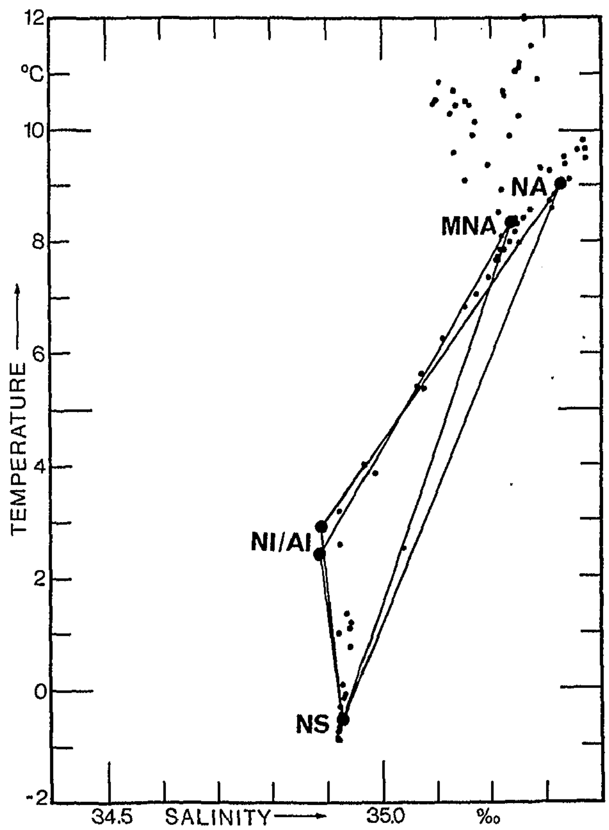

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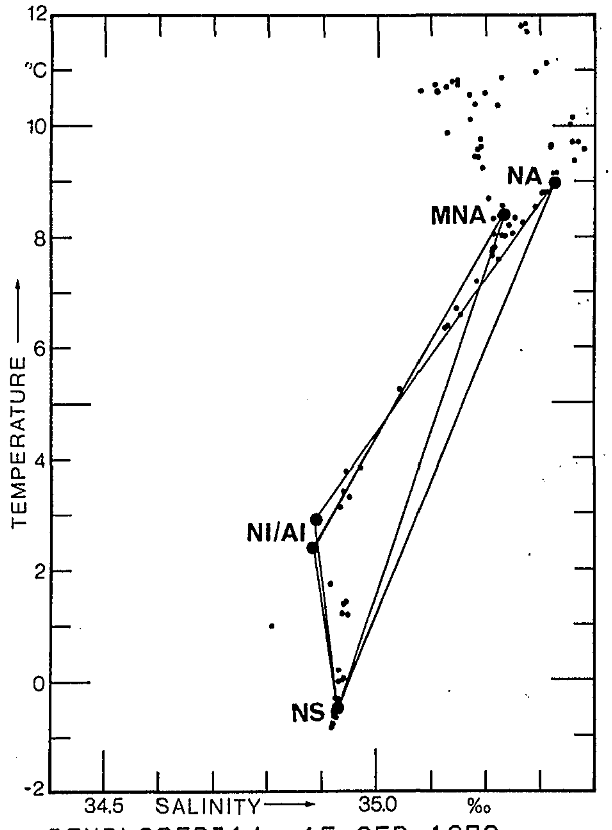

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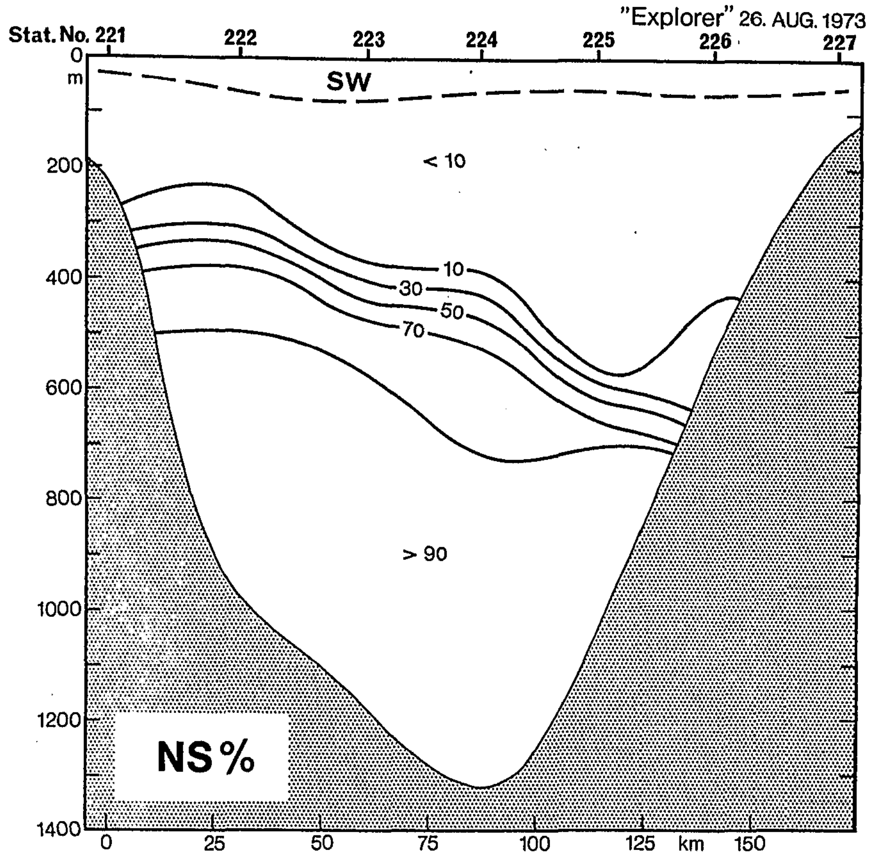
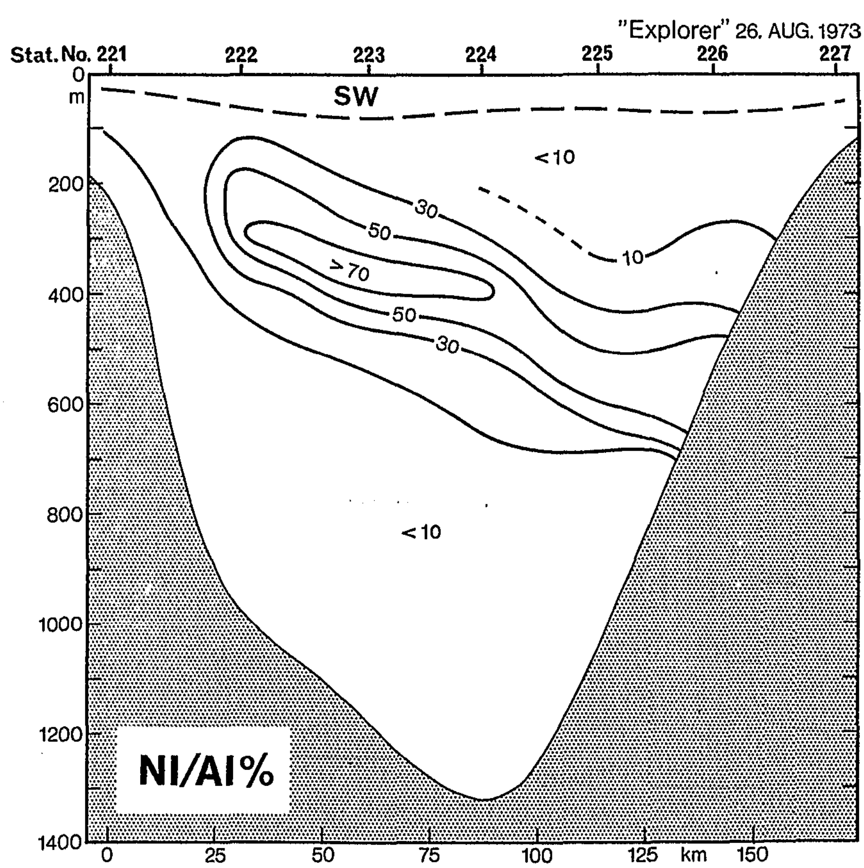
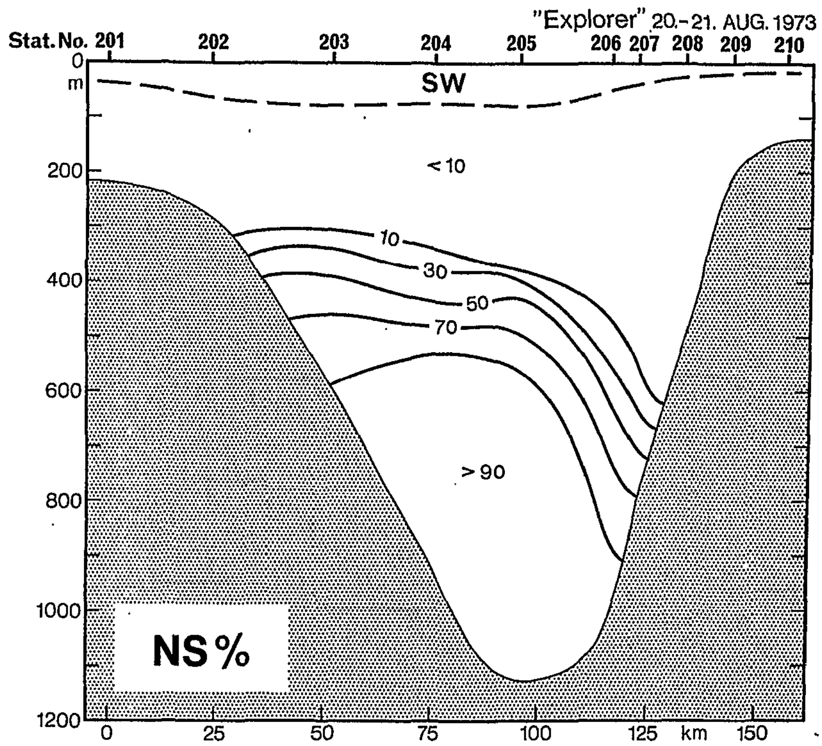
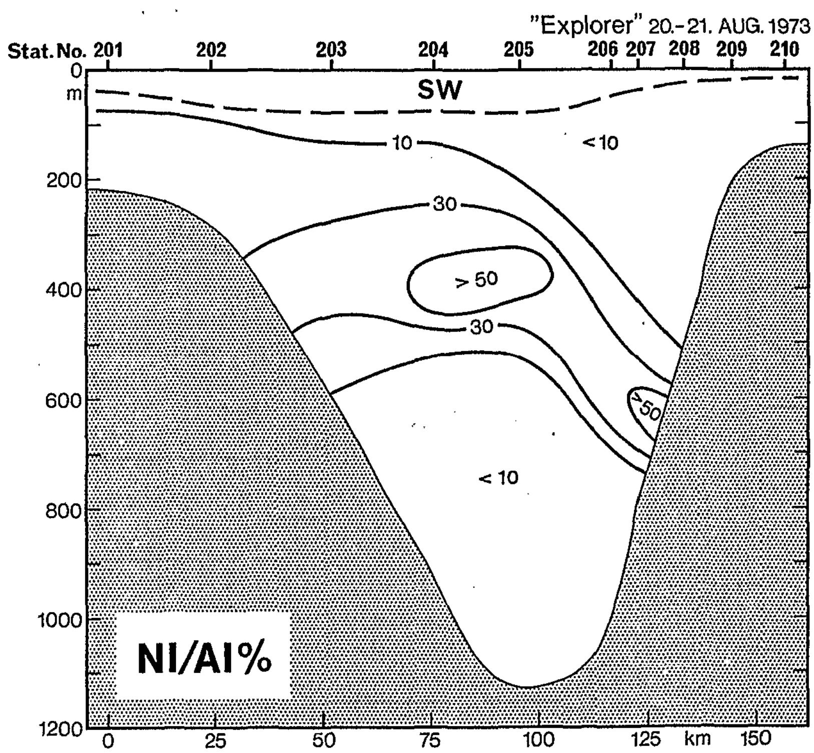
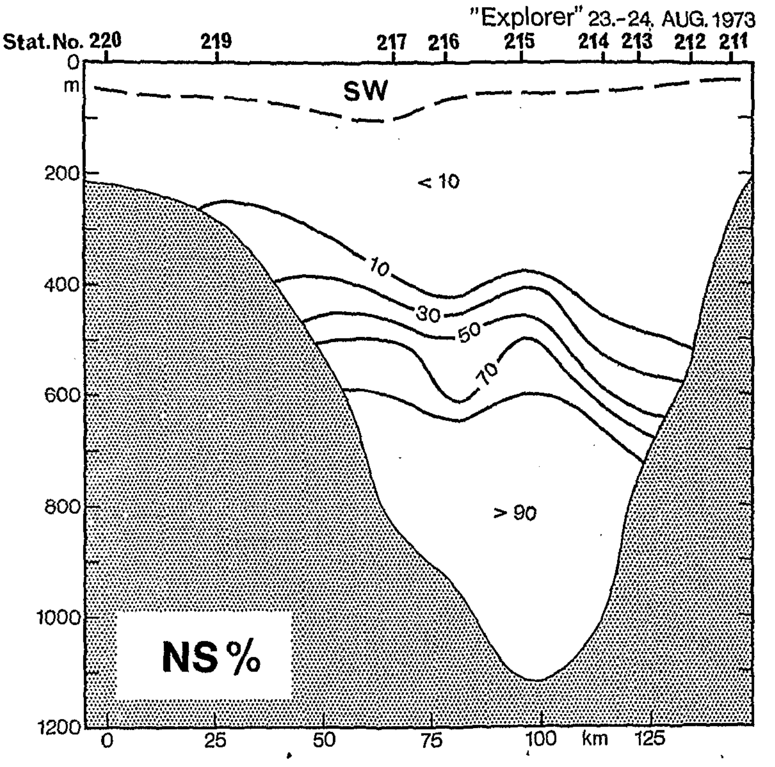
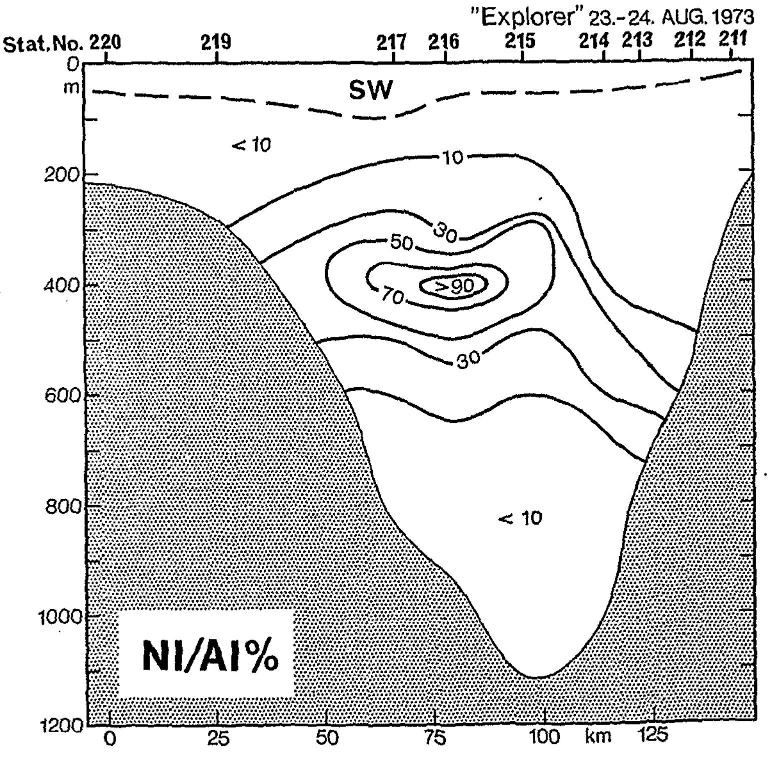

"Explorer" 26. AUG. 1973
Stat. No. 221
222
223
224
225
226
227
0
m
SW
< 10
200
400
600
800
1000
1200
1400
10
30
50
70
> 90
NS %
0
25
50
75
100
125
km
150

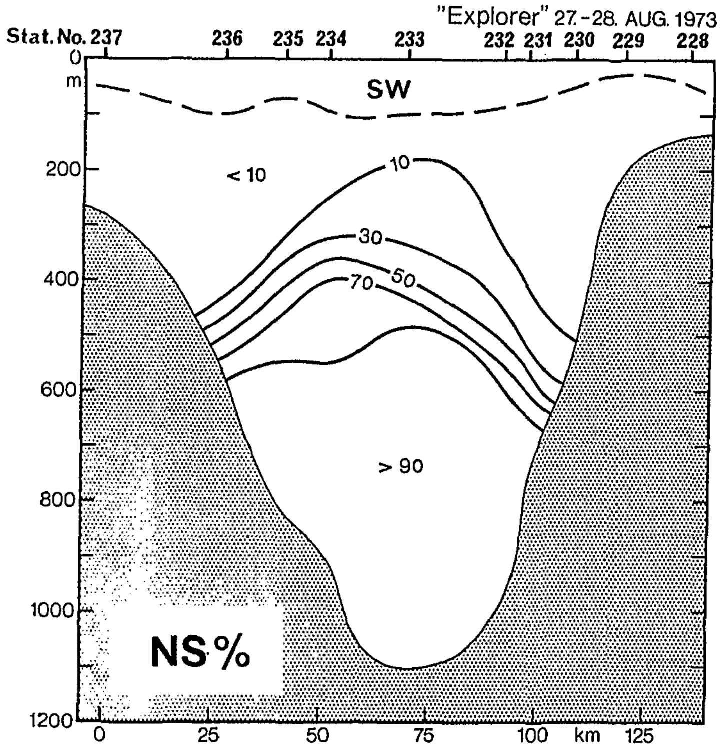

"Explorer" 26. AUG. 1973
Stat. No. 221
222
223
224
225
226
227
0
m
SW
<10
30
50
>70
10
50
30
< 10
200
400
600
800
1000
1200
1400
NI/AI %
0
25
50
75
100
125
km
150

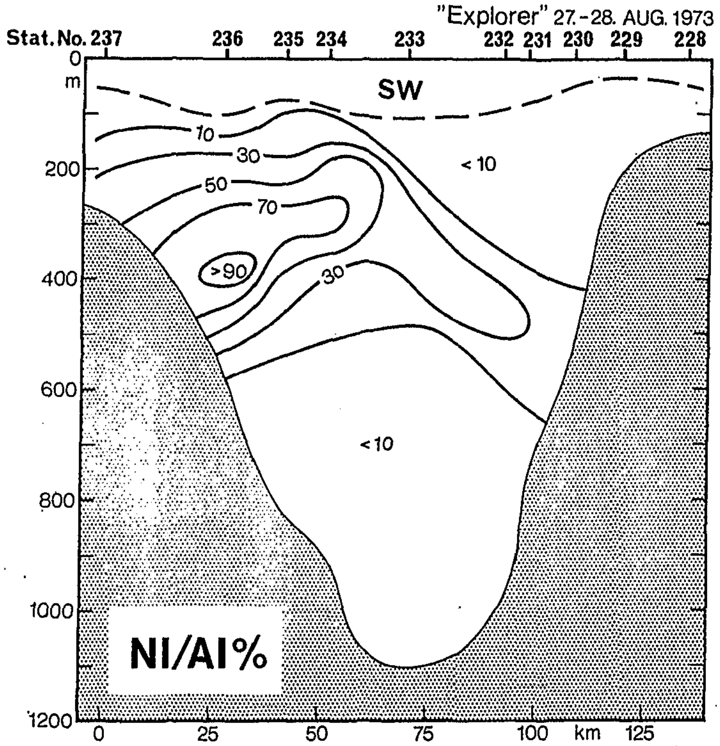

"Explorer" 20.-21. AUG. 1973
Stat. No. 201 202 203 204 205 206 207 208 209 210
0
m
SW
200
400
600
800
1000
1200
< 10
10
30
50
70
> 90
NS %
0 25 50 75 100 125 km 150

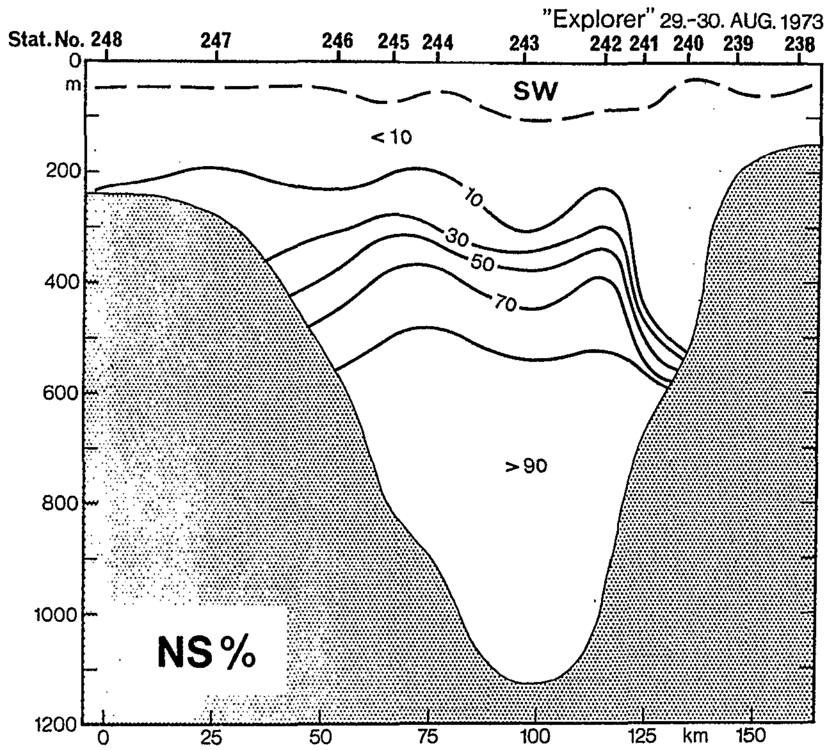

"Explorer" 20.-21. AUG. 1973
Stat. No. 201 202 203 204 205 206 207 208 209 210
0
m
SW
200
400
600
800
1000
1200
10
< 10
30
> 50
30
> 50
< 10
NI/AI %
0 25 50 75 100 125 km 150

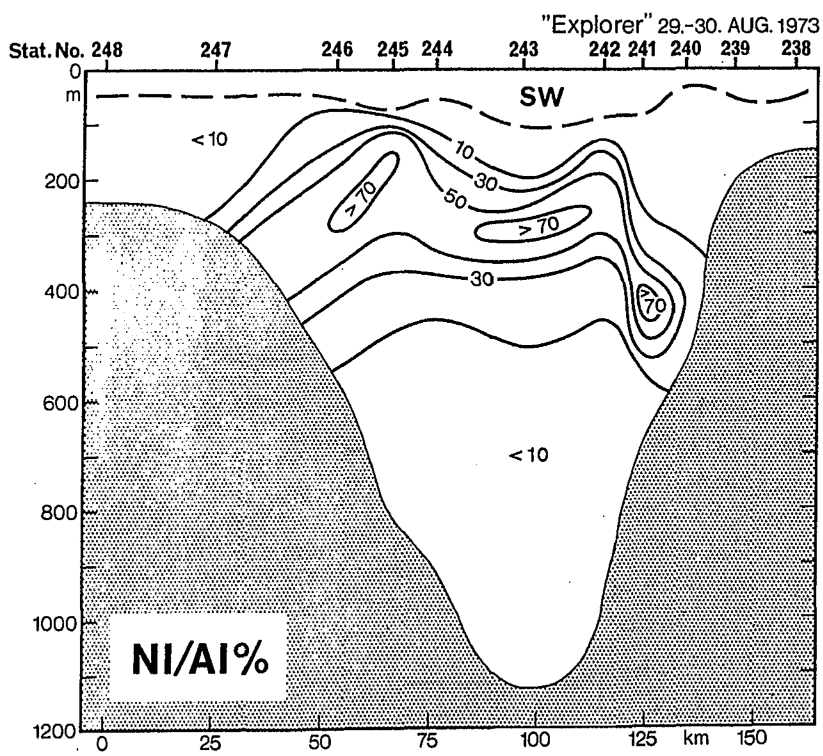

"Explorer" 23.-24. AUG. 1973
Stat. No. 220
219
217
216
215
214
213
212
211
0
m
SW
200
< 10
10
400
30
50
70
600
800
> 90
1000
NS %
1200
0
25
50
75
100
km
125

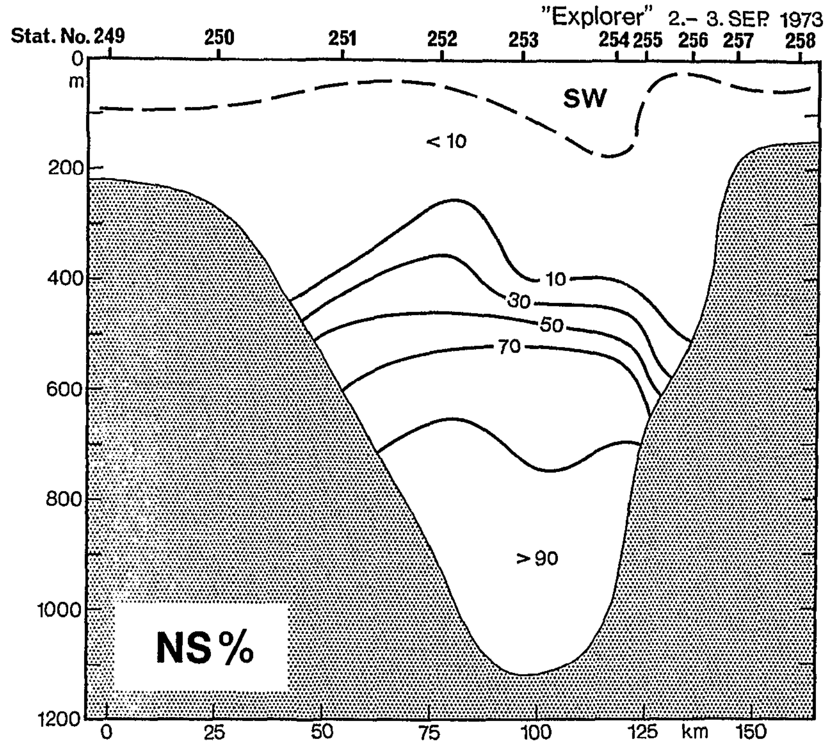

"Explorer" 23.-24. AUG. 1973
Stat. No. 220
219
217
216
215
214
213
212
211
0
m
SW
< 10
10
200
30
50
400
>90
70
30
600
800
< 10
1000
NI/AI%
1200
0
25
50
75
100
km
125

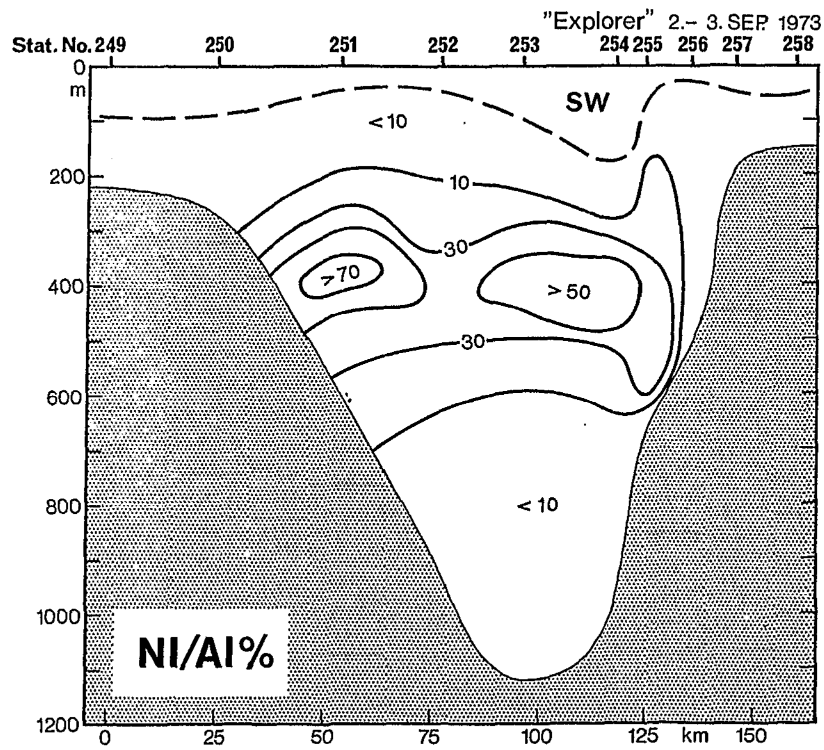

"Explorer" 27.-28. AUG. 1973
Stat. No. 237
236
235
234
233
232
231
230
229
228
0
m
200
400
600
800
1000
1200
SW
< 10
10
30
50
70
> 90
NS %
0
25
50
75
100
km
125

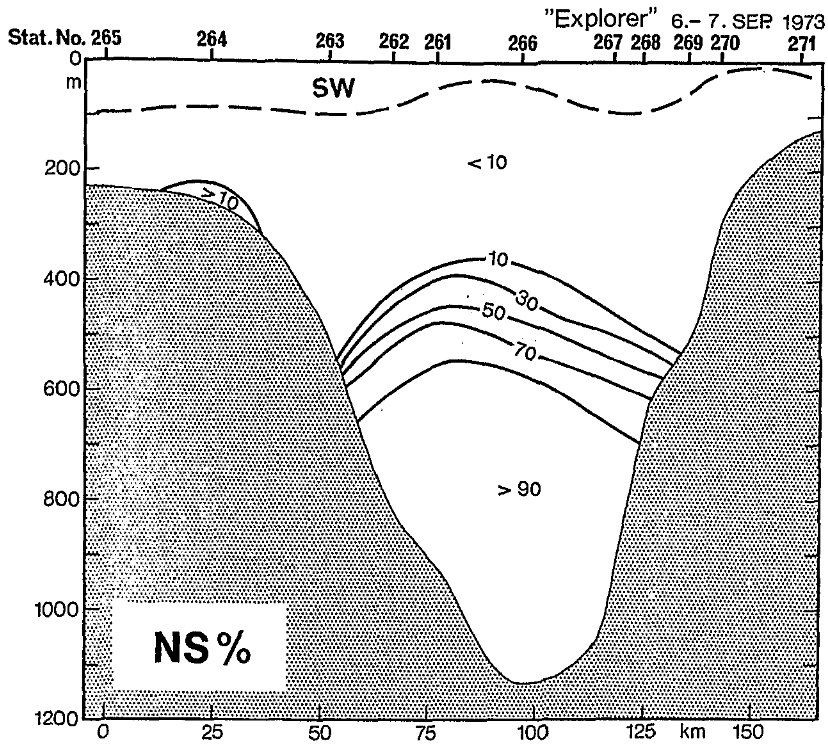

"Explorer" 27.-28. AUG. 1973
Stat. No. 237
236
235
234
233
232
231
230
229
228
0
m
200
400
600
800
1000
1200
SW
10
30
50
70
>90
30
< 10
< 10
NI/AI %
0
25
50
75
100
km
125

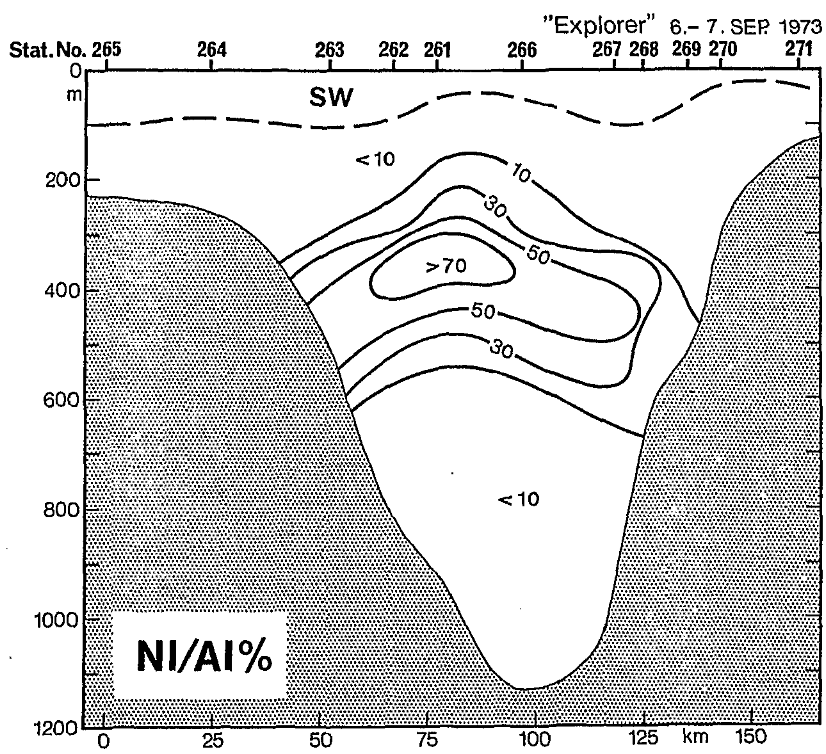

"Explorer" 29.-30. AUG. 1973
Stat. No. 248 247 246 245 244 243 242 241 240 239 238
0
m
SW
< 10
10
30
50
70
> 90
200
400
600
800
1000
1200
0 25 50 75 100 125 km 150
NS %

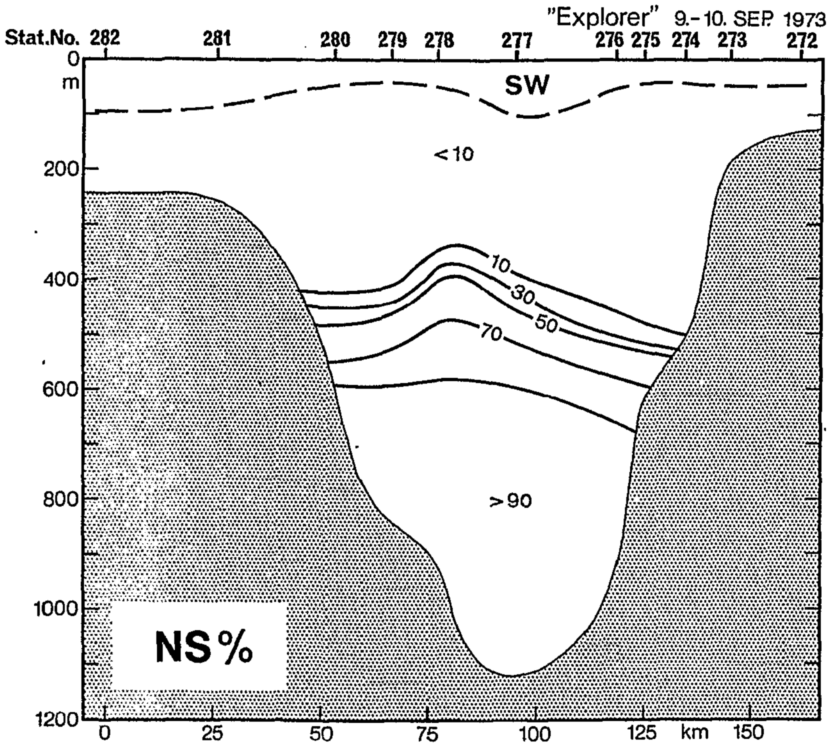

"Explorer" 29.-30. AUG. 1973
Stat. No. 248 247 246 245 244 243 242 241 240 239 238
0
m
SW
< 10
10
30
50
> 70
> 70
30
70
< 10
200
400
600
800
1000
1200
0 25 50 75 100 125 km 150
NI/AI %

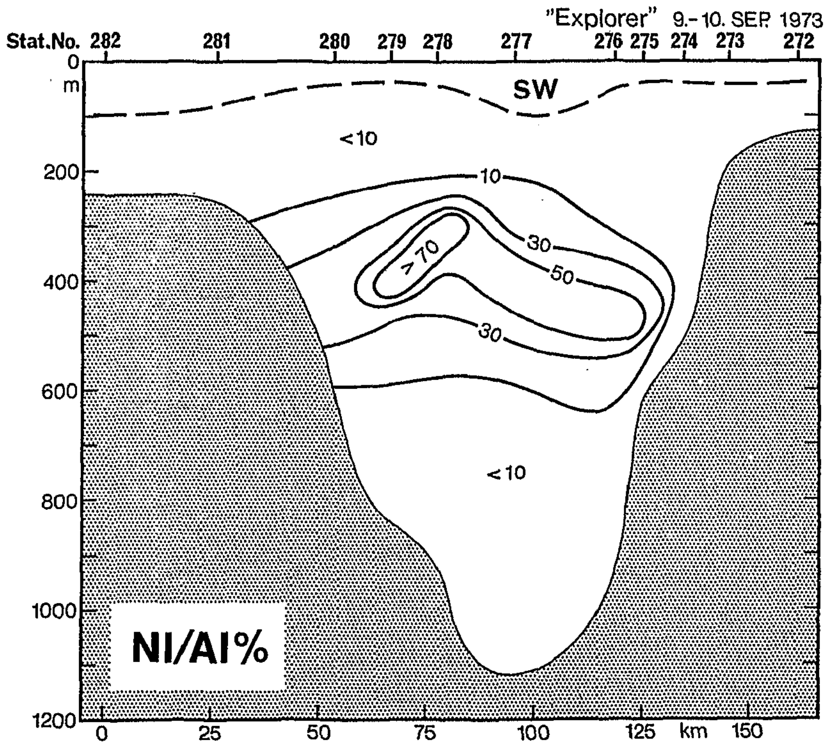

"Explorer" 2.– 3. SEP. 1973
Stat. No. 249
250
251
252
253
254 255
256
257
258
0
m
200
400
600
800
1000
1200
SW
< 10
10
30
50
70
> 90
NS %
0
25
50
75
100
125
km
150

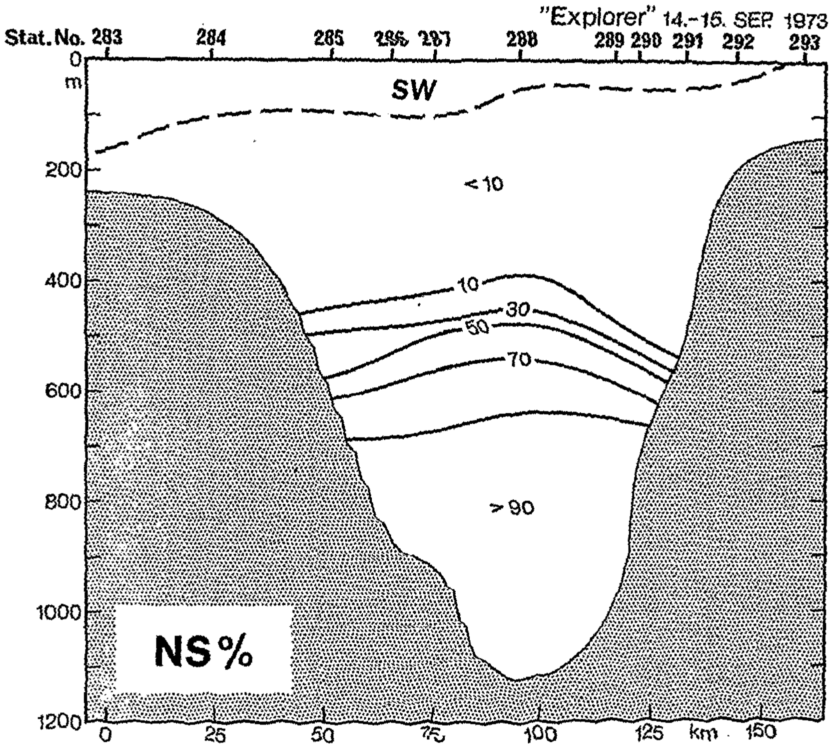

"Explorer" 2.– 3. SEP. 1973
Stat. No. 249
250
251
252
253
254 255
256
257
258
0
m
200
400
600
800
1000
1200
SW
< 10
10
30
> 70
> 50
30
< 10
NI/AI %
0
25
50
75
100
125
km
150

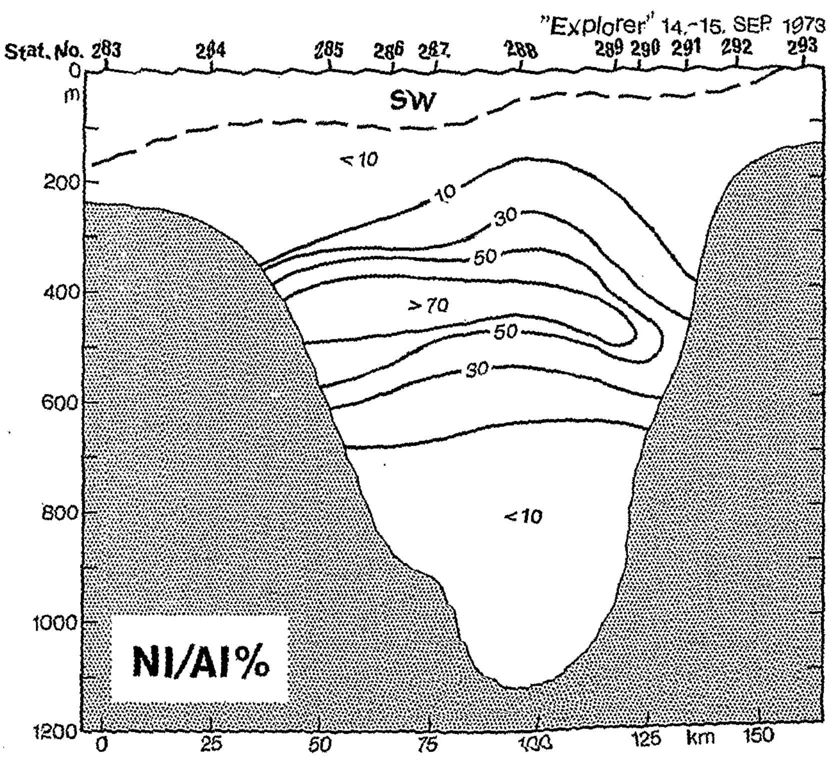

"Explorer" 6.– 7. SEP. 1973
Stat. No. 265 264 263 262 261 266 267 268 269 270 271
0 m 200 400 600 800 1000 1200
SW
< 10
> 10
10
30
50
70
> 90
NS %
0 25 50 75 100 125 km 150


"Explorer" 6.– 7. SEP. 1973
Stat. No. 265 264 263 262 261 266 267 268 269 270 271
0 m 200 400 600 800 1000 1200
SW
< 10
10
30
50
> 70
50
30
< 10
NI/AI %
0 25 50 75 100 125 km 150


"Explorer" 9.-10. SEP. 1973
Stat.No. 282 281 280 279 278 277 276 275 274 273 272
0 m 200 400 600 800 1000 1200
SW
<10
10
30
50
70
>90
NS%
0 25 50 75 100 125 km 150


"Explorer" 9.-10. SEP. 1973
Stat.No. 282 281 280 279 278 277 276 275 274 273 272
0 m 200 400 600 800 1000 1200
SW
<10
10
30
50
>70
30
<10
NI/AI%
0 25 50 75 100 125 km 150

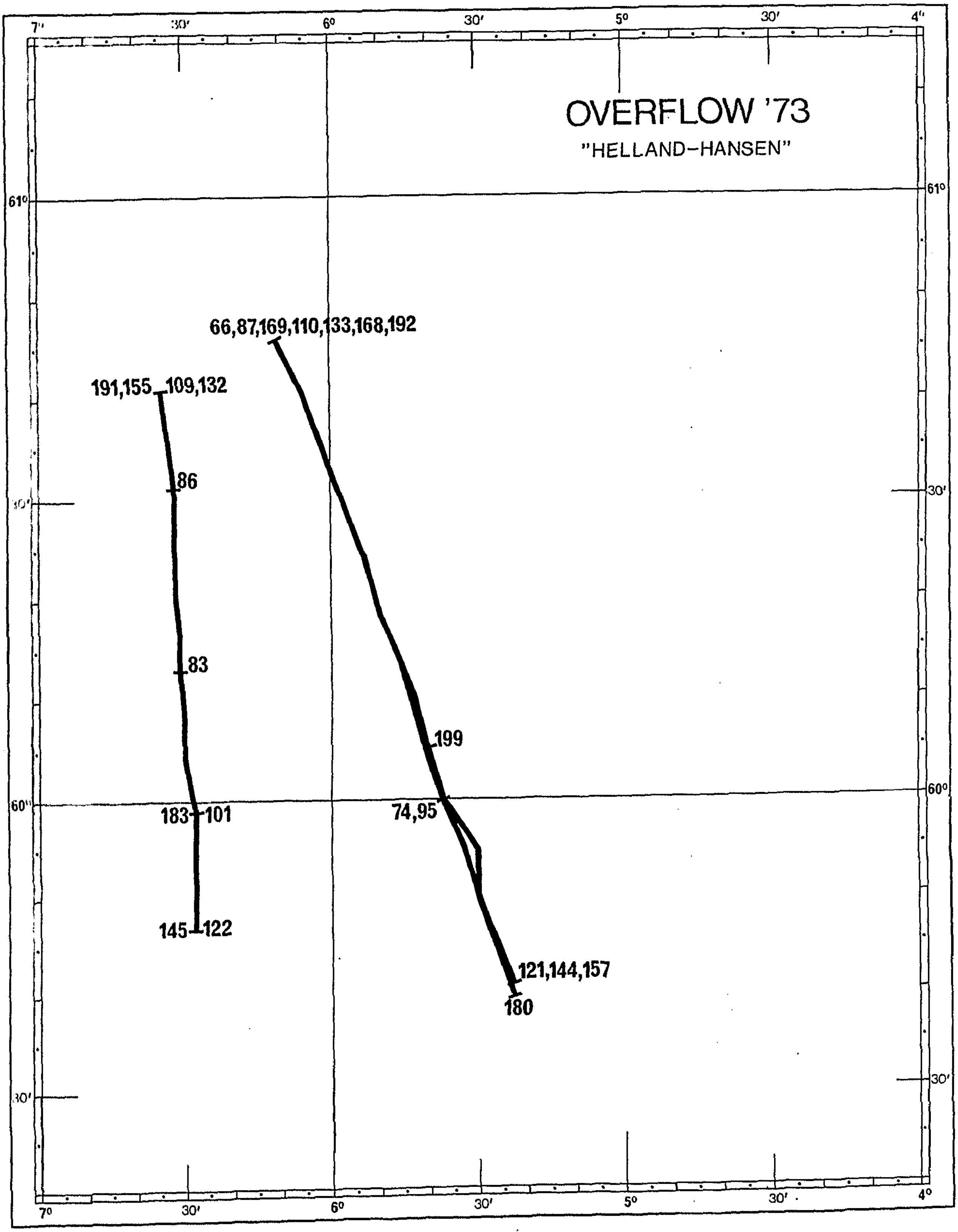

"Explorer" 14.-15. SEP. 1973
Stat. No. 283 284 285 286 287 288 289 290 291 292 293
0 m 200 400 600 800 1000 1200
SW
<10
10
30
50
70
>90
NS%
0 25 50 75 100 125 km 150

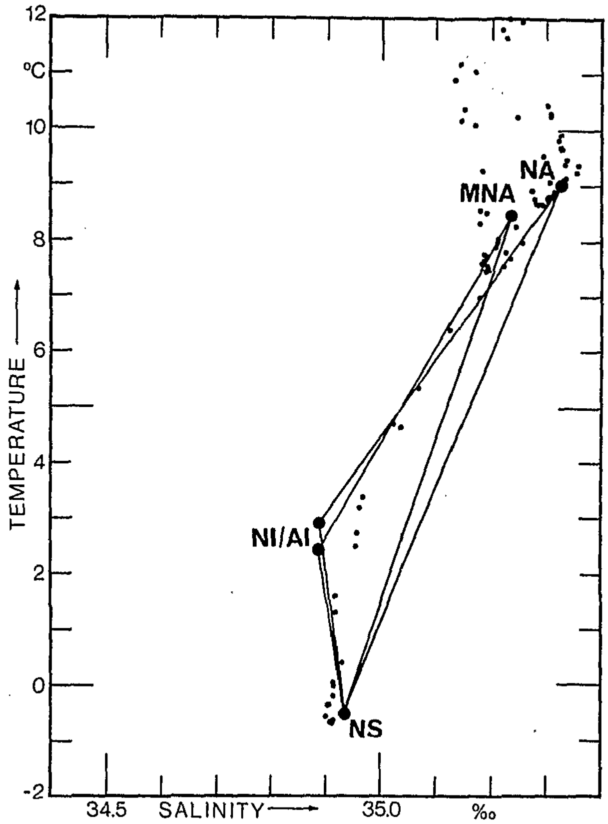

"Explorer" 14.-15. SEP. 1973
Stat. No. 283 284 285 286 287 288 289 290 291 292 293
0 m 200 400 600 800 1000 1200
SW
<10
10
30
50
>70
50
30
<10
NI/AI%
0 25 50 75 100 125 km 150

6.2 Helland-Hansen

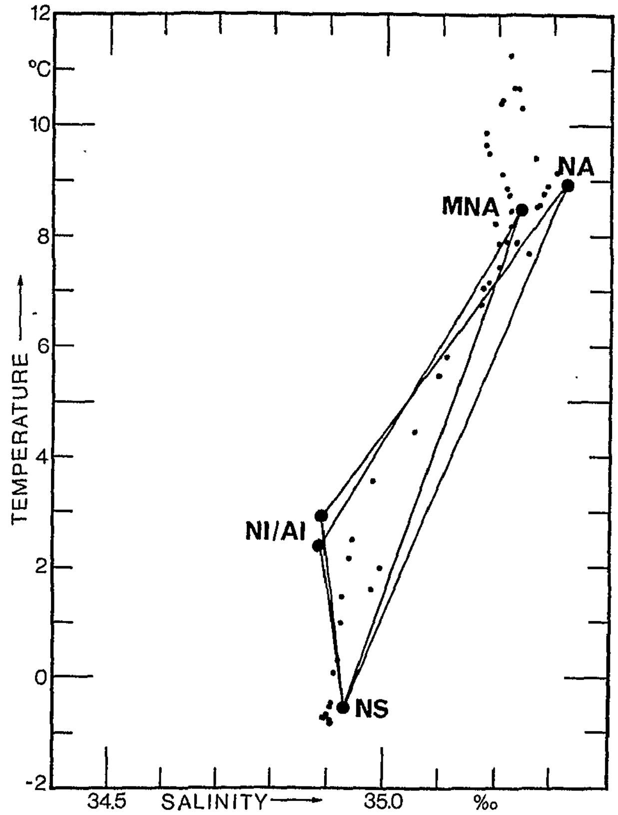
The working area was the Faroe-Shetland channel, slightly south of EXPLORER. As for EXPLORER two waters of Atlantic type and NI/AI and NS were observed.

Section	Stat.No.	Mixing triangle (see table 3)
66 - 74	66 - 68	4
	69 - 74	3
83 - 86	83, 84	3
	85, 86	4
87 - 95	87	4
	88 - 95	3
101 - 109	101 - 106	3
	107 - 109	4
110 - 121	110 - 113	4
	114 - 121	3
122 - 132	122 - 131	3
	132	4
133 - 144	133 - 138	4
	139 - 144	3
144 - 155	145 - 152	3
	153 - 155	4
157 - 168	157	4
	158 - 161	3
	162 - 168	4
169 - 180	169, 170	4
	171	3
	172	4
	173 - 180	3
183 - 191	183 - 188	3
	189 - 191	4
192 - 199		3

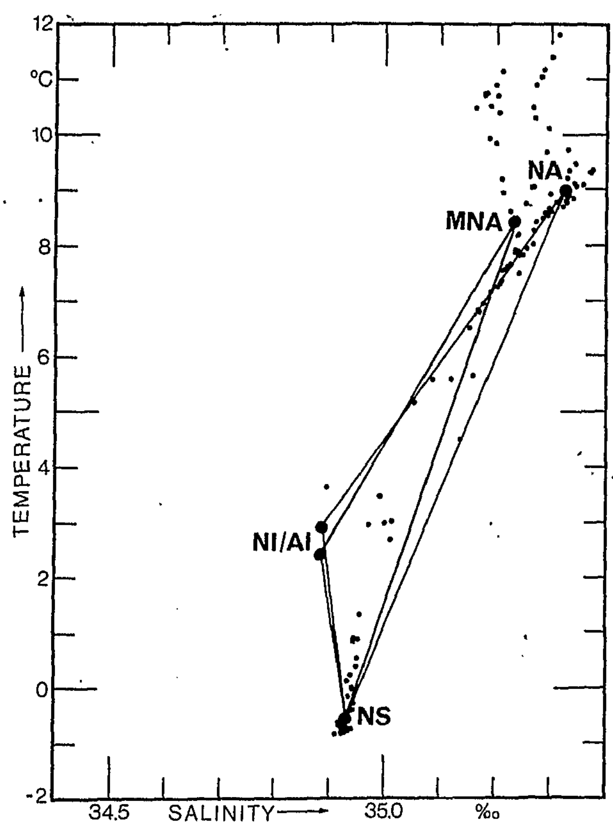

OVERFLOW '73
"HELLAND-HANSEN"
7°
30'
6°
30'
5°
30'
4°
61°
30'
60°
30'
66,87,169,110,133,168,192
191,155
109,132
86
83
199
183
101
74,95
145
122
121,144,157
180



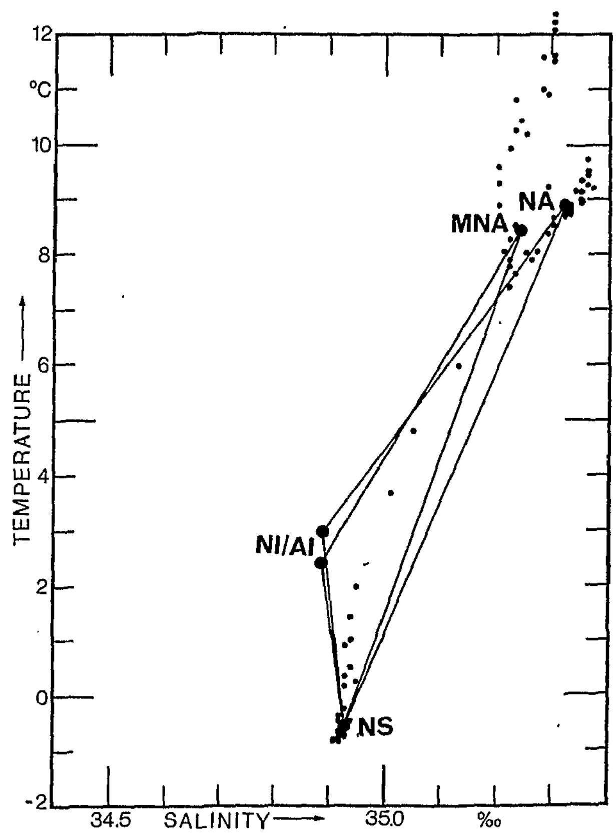
"HELLAND-HANSEN"
15.-16.AUG.1973
STAT.NO.66-74



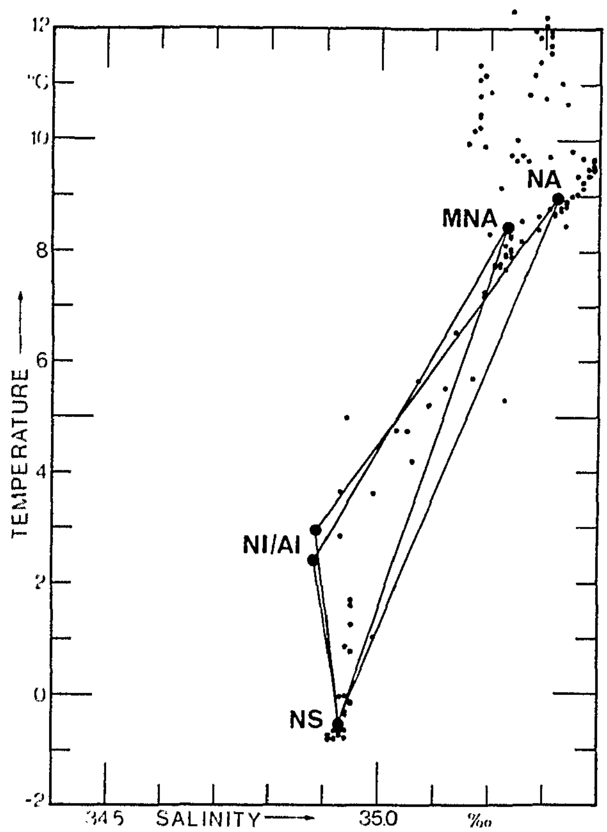
"HELLAND-HANSEN"
16.-17.AUG.1973
STAT.NO.83-86



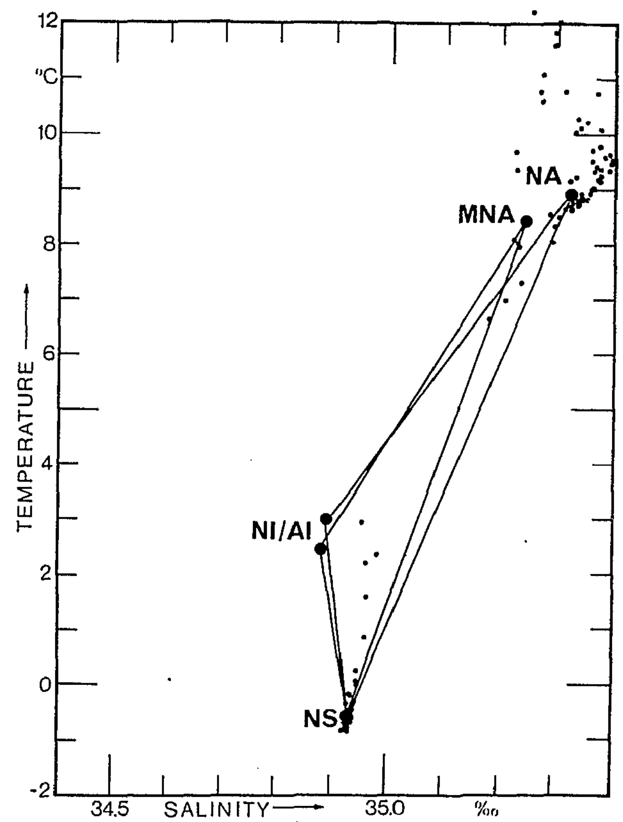
"HELLAND-HANSEN"
20.-21.AUG.1973
STAT.NO.87-95



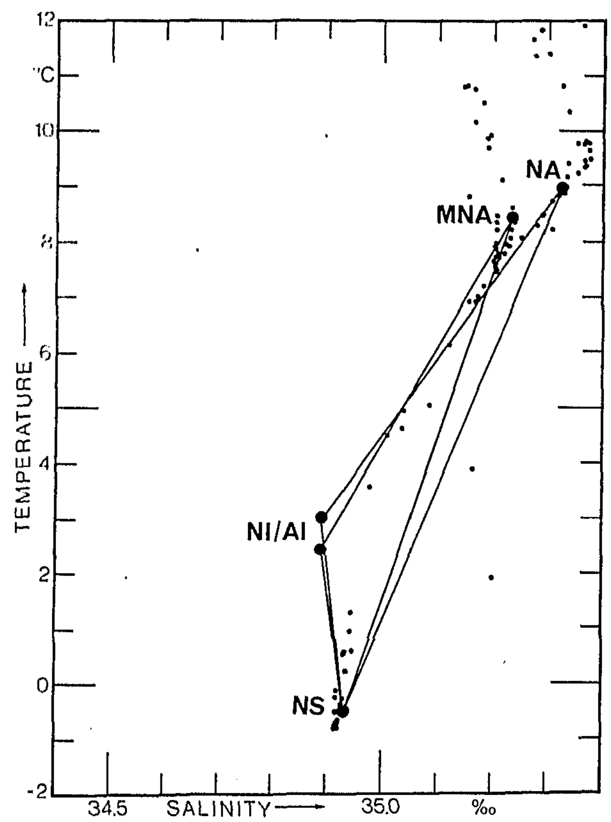
"HELLAND-HANSEN"
21.-22.AUG.1973
STAT.NO.101-109



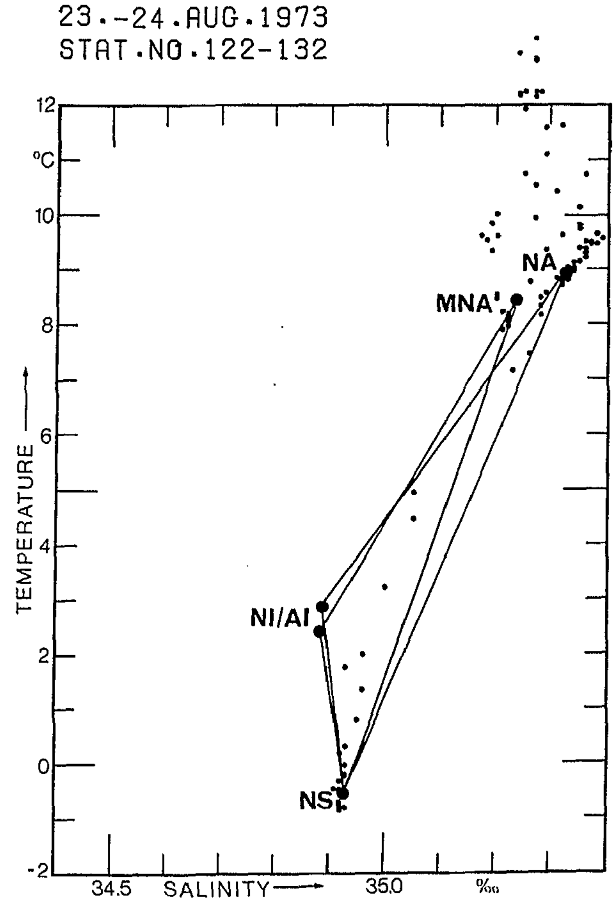
"HELLAND-HANSEN"
22.-23.AUG.1973
STAT.NO.110-121



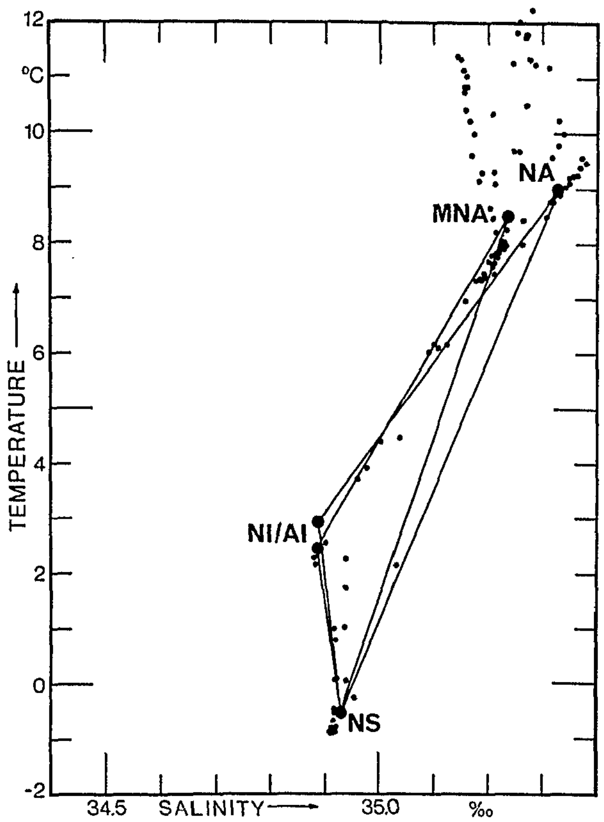
"HELLAND-HANSEN"
23.-24.AUG.1973
STAT.NO.122-132



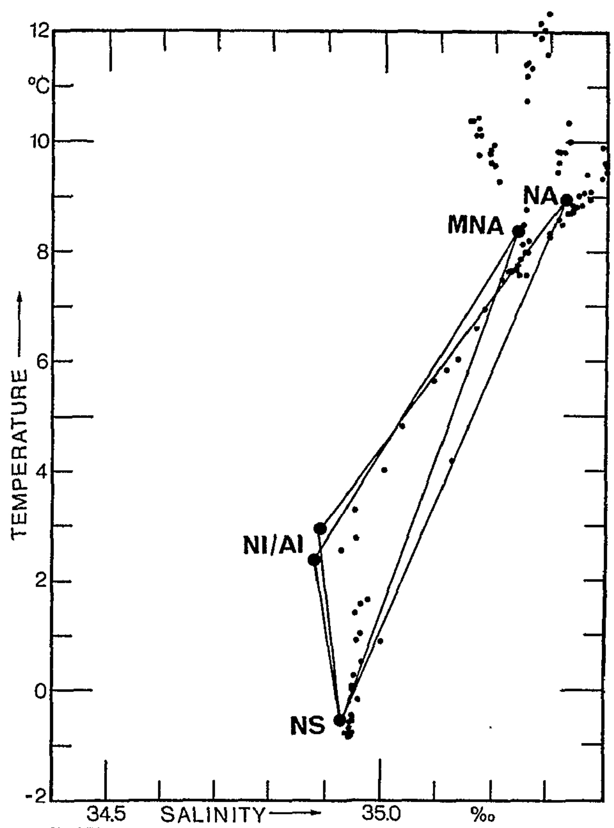
"HELLAND-HANSEN"
24.-25.AUG.1973
STAT.NO.133-144



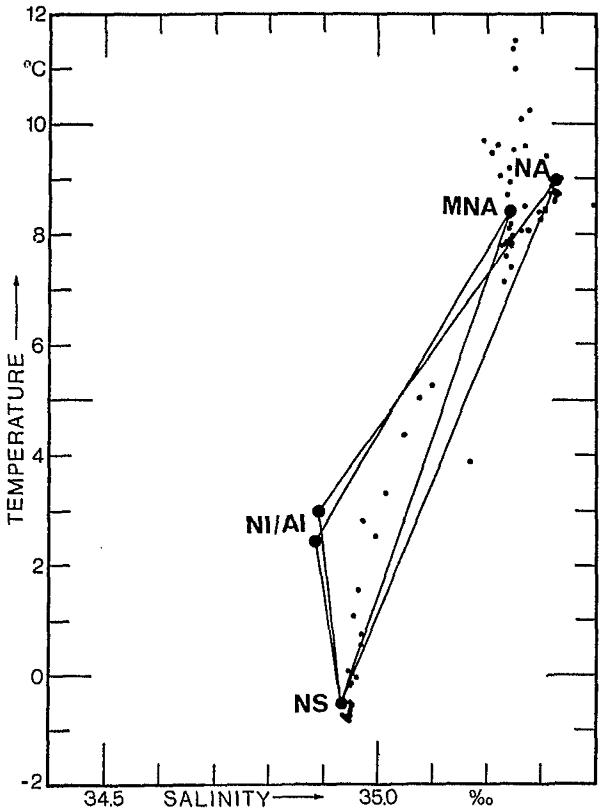
"HELLAND-HANSEN"
25.-26.AUG.1973
STAT.NO.145-155



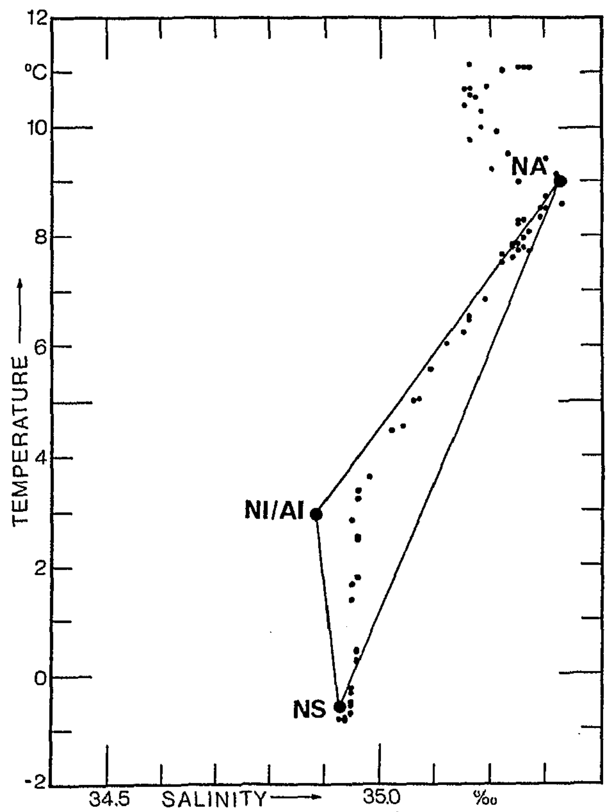
"HELLAND-HANSEN"
27.AUG.1973
STAT.NO.157-168



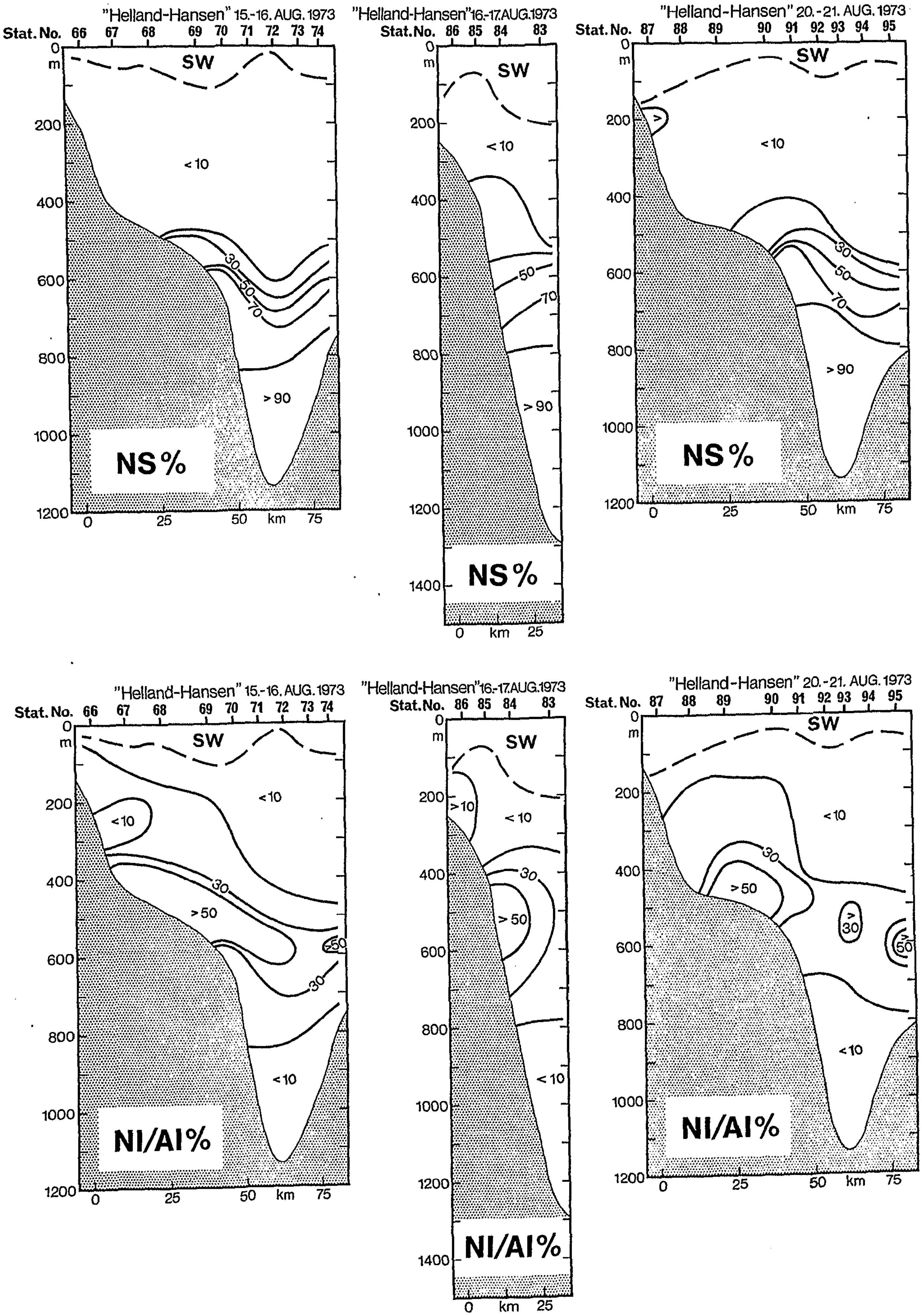
"HELLAND-HANSEN"
3.-4.SEP.1973
STAT.NO.169-180

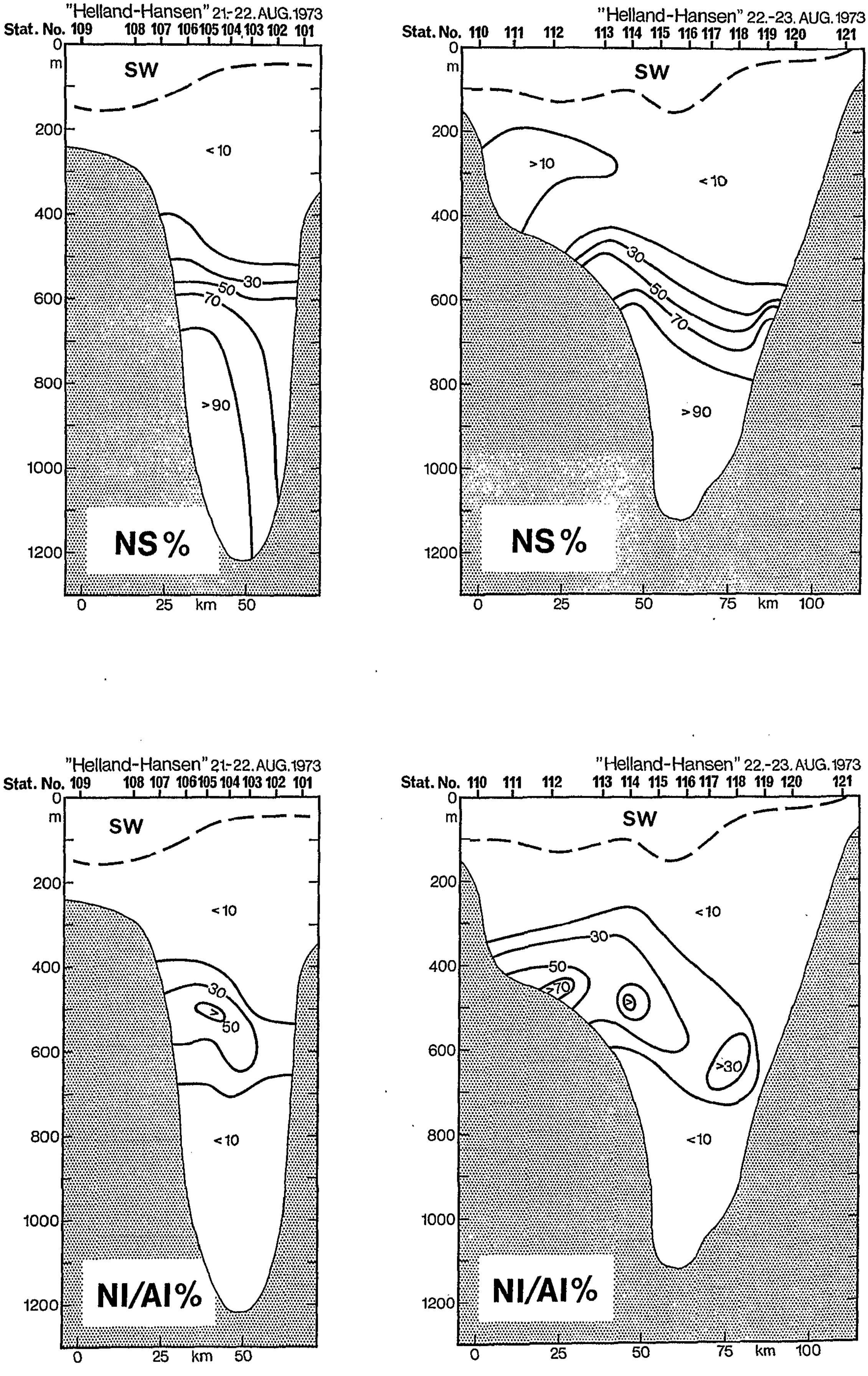


"HELLAND-HANSEN"
4.-5.SEP.1973
STAT.NO.183-191

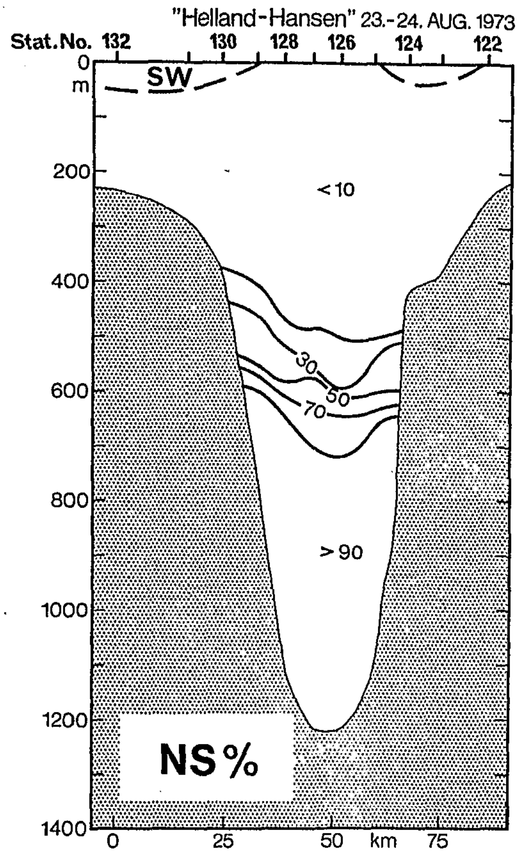


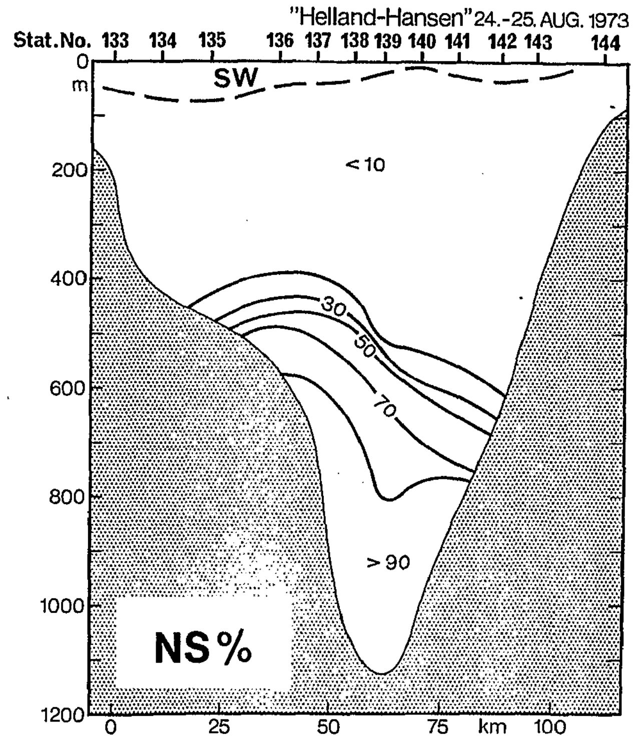
"HELLAND-HANSEN"
5.SEP.1973
STAT.NO.192-199

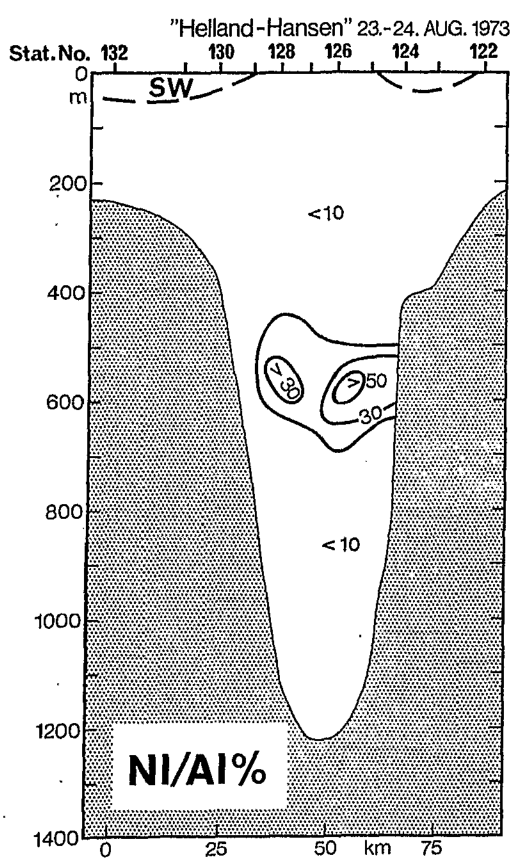

"Helland-Hansen" 15.-16. AUG. 1973
Stat. No. 66 67 68 69 70 71 72 73 74
SW
< 10
30
50
70
> 90
NS %
0 25 50 km 75
"Helland-Hansen" 16.-17. AUG. 1973
Stat. No. 86 85 84 83
SW
< 10
50
70
> 90
NS %
0 km 25
"Helland-Hansen" 20.-21. AUG. 1973
Stat. No. 87 88 89 90 91 92 93 94 95
SW
< 10
30
50
70
> 90
NS %
0 25 50 km 75
"Helland-Hansen" 15.-16. AUG. 1973
Stat. No. 66 67 68 69 70 71 72 73 74
SW
< 10
30
> 50
< 10
NI/AI %
"Helland-Hansen" 16.-17. AUG. 1973
Stat. No. 86 85 84 83
SW
> 10
< 10
30
> 50
< 10
NI/AI %
"Helland-Hansen" 20.-21. AUG. 1973
Stat. No. 87 88 89 90 91 92 93 94 95
SW
< 10
30
> 50
> 30
> 50
< 10
NI/AI %
m
0 200 400 600 800 1000 1200 1400

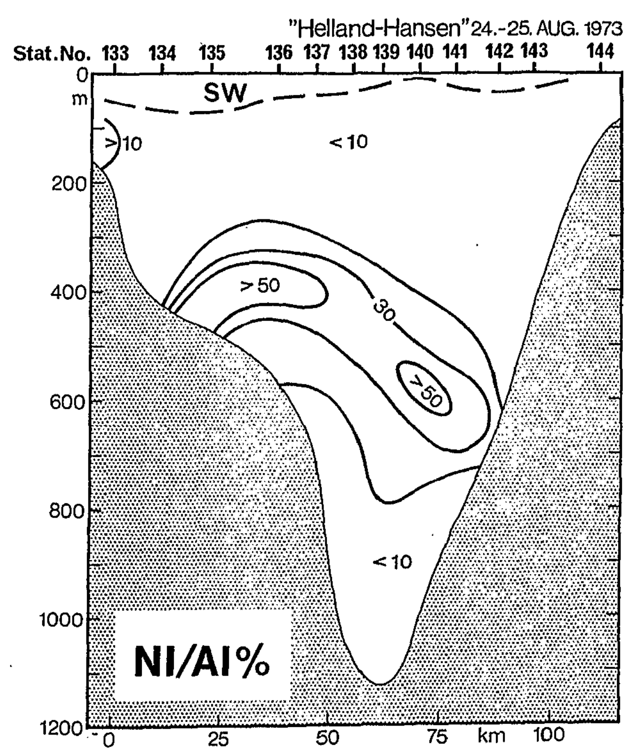


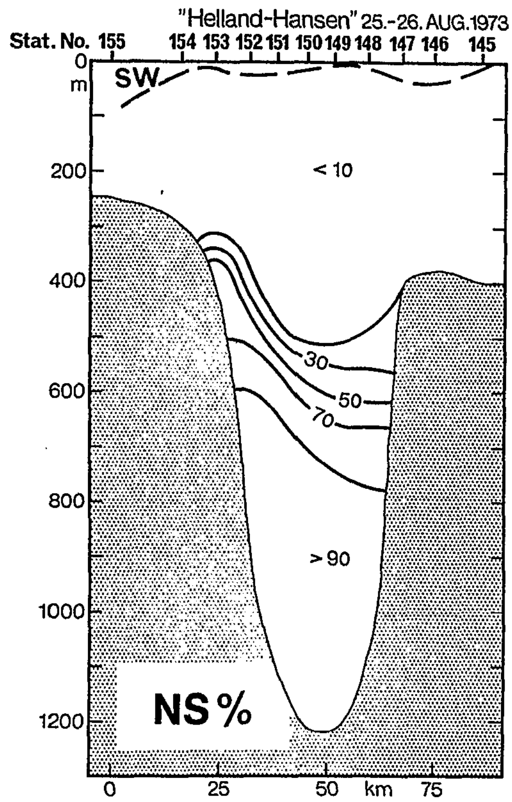
"Helland-Hansen" 21.-22. AUG. 1973
Stat. No. 109 108 107 106 105 104 103 102 101
SW
<10
30
50
70
>90
NS %
0 25 km 50
"Helland-Hansen" 22.-23. AUG. 1973
Stat. No. 110 111 112 113 114 115 116 117 118 119 120 121
SW
>10
<10
30
50
70
>90
NS %
0 25 50 75 km 100
"Helland-Hansen" 21.-22. AUG. 1973
Stat. No. 109 108 107 106 105 104 103 102 101
SW
<10
30
50
<10
NI/AI %
0 25 km 50
"Helland-Hansen" 22.-23. AUG. 1973
Stat. No. 110 111 112 113 114 115 116 117 118 119 120 121
SW
<10
30
50
70
>30
<10
NI/AI %
0 25 50 75 km 100

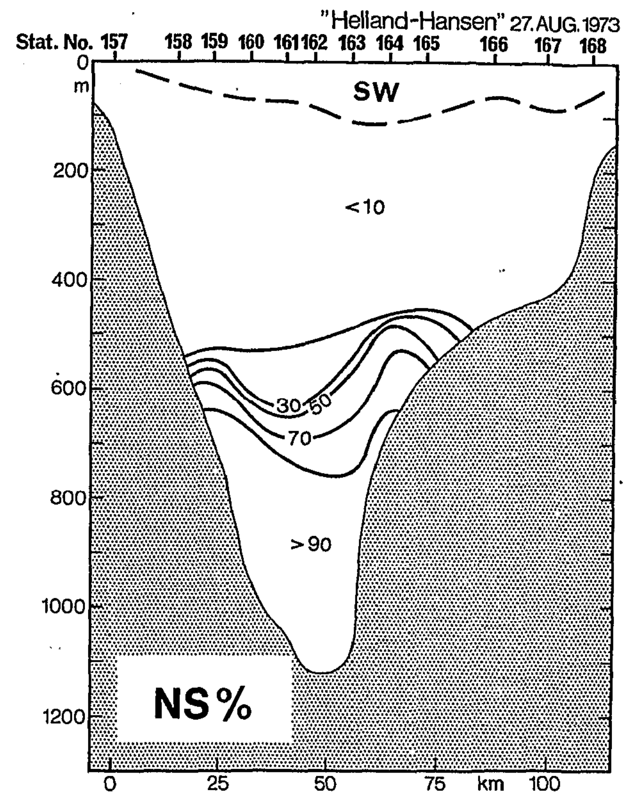

"Helland-Hansen" 23.-24. AUG. 1973
Stat.No. 132 130 128 126 124 122
0
m
SW
<10
30
50
70
>90
NS%
200
400
600
800
1000
1200
1400
0 25 50 km 75

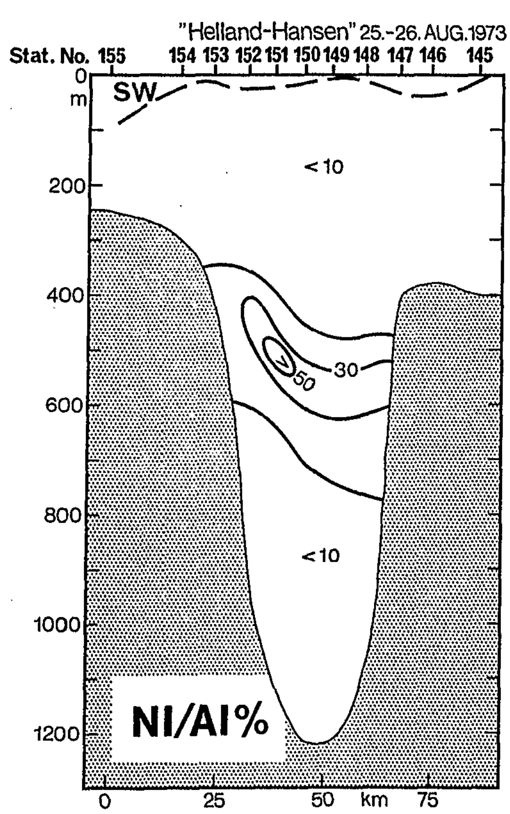

"Helland-Hansen" 24.-25. AUG. 1973
Stat.No. 133 134 135 136 137 138 139 140 141 142 143 144
0
m
SW
<10
30
50
70
>90
NS%
200
400
600
800
1000
1200
0 25 50 75 km 100

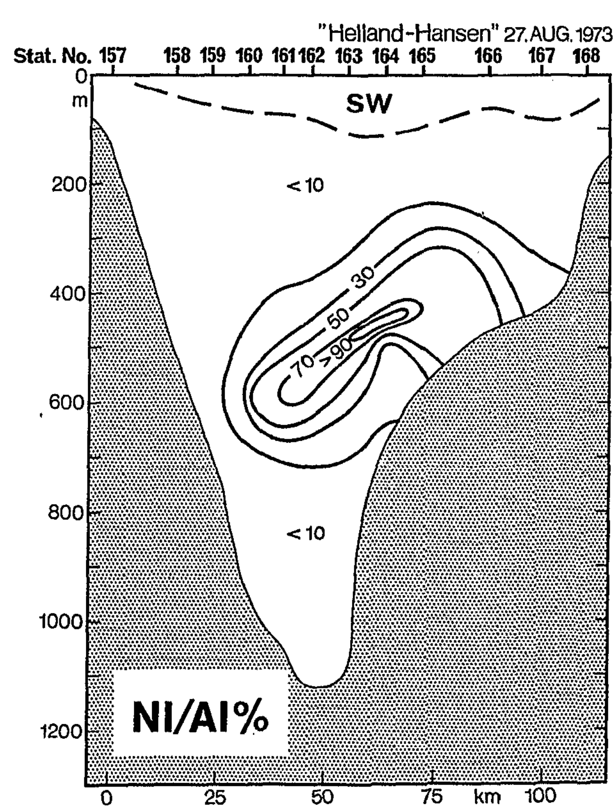

"Helland-Hansen" 23.-24. AUG. 1973
Stat.No. 132 130 128 126 124 122
0
m
SW
<10
>30
>50
30
<10
NI/AI%
200
400
600
800
1000
1200
1400
0 25 50 km 75

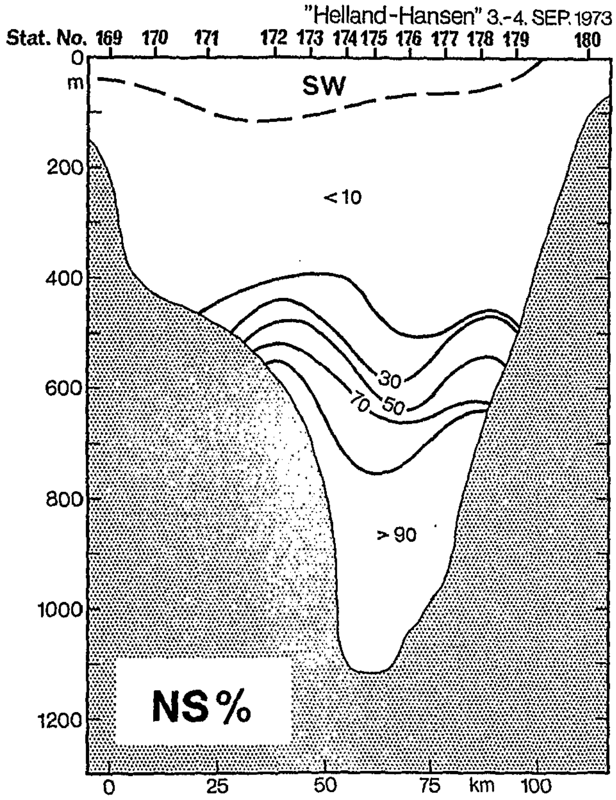

"Helland-Hansen" 24.-25. AUG. 1973
Stat.No. 133 134 135 136 137 138 139 140 141 142 143 144
0
m
SW
>10
<10
>50
30
>50
<10
NI/AI%
200
400
600
800
1000
1200
0 25 50 75 km 100

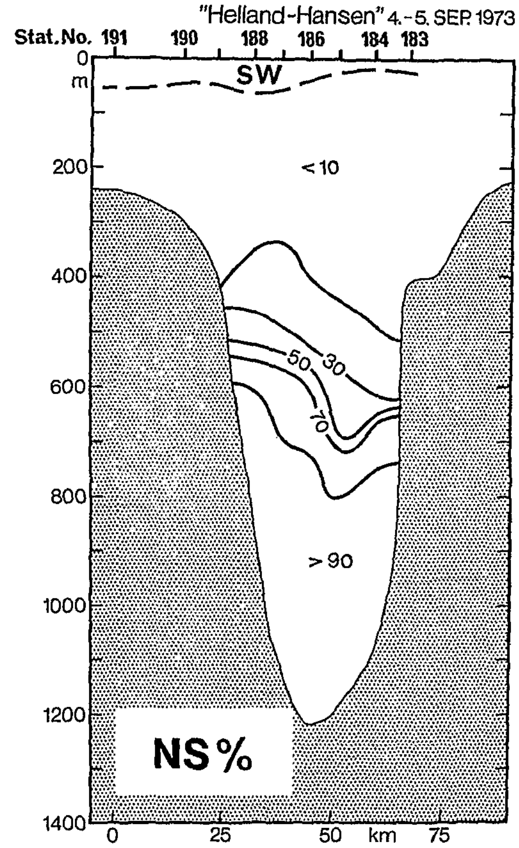

"Helland-Hansen" 25.-26. AUG.1973
Stat. No. 155 154 153 152 151 150 149 148 147 146 145
0 m
200
400
600
800
1000
1200
SW
< 10
30
50
70
> 90
NS %
0 25 50 km 75


"Helland-Hansen" 27. AUG. 1973
Stat. No. 157 158 159 160 161 162 163 164 165 166 167 168
0 m
200
400
600
800
1000
1200
SW
< 10
30
50
70
> 90
NS %
0 25 50 75 km 100


"Helland-Hansen" 25.-26. AUG.1973
Stat. No. 155 154 153 152 151 150 149 148 147 146 145
0 m
200
400
600
800
1000
1200
SW
< 10
30
50
< 10
NI/AI %
0 25 50 km 75


"Helland-Hansen" 27. AUG. 1973
Stat. No. 157 158 159 160 161 162 163 164 165 166 167 168
0 m
200
400
600
800
1000
1200
SW
< 10
30
50
70
> 90
< 10
NI/AI %
0 25 50 75 km 100


"Helland-Hansen" 3.-4. SEP. 1973
Stat. No. 169 170 171 172 173 174 175 176 177 178 179 180
0
m
SW
200
400
600
800
1000
1200
<10
30
50
70
>90
NS%
0 25 50 75 km 100


"Helland-Hansen" 4.-5. SEP. 1973
Stat. No. 191 190 188 186 184 183
0
m
SW
200
400
600
800
1000
1200
1400
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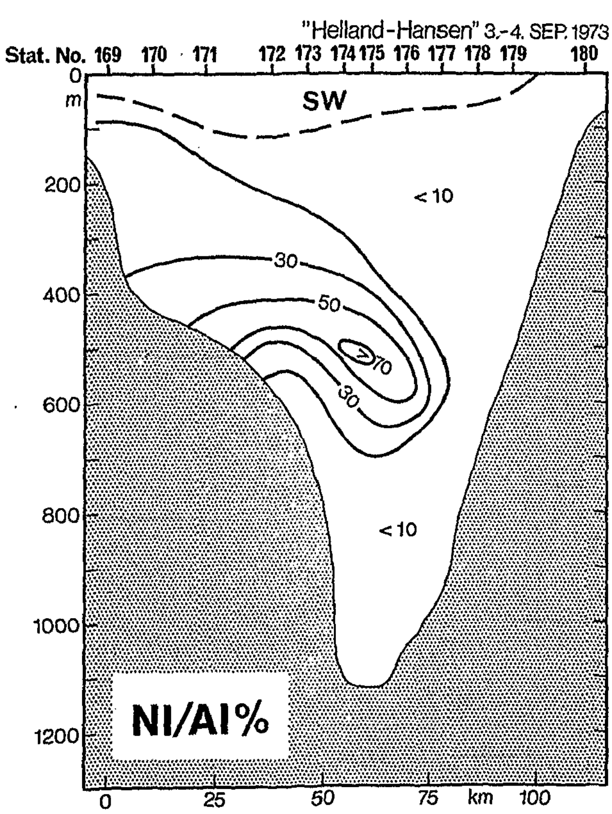
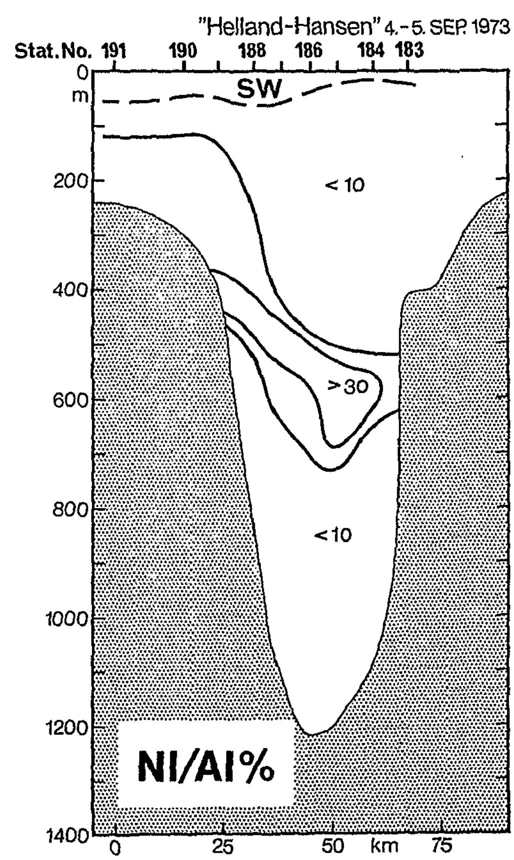
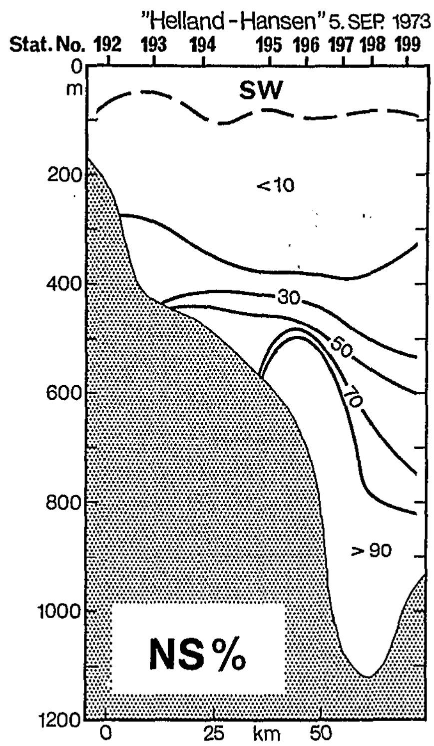
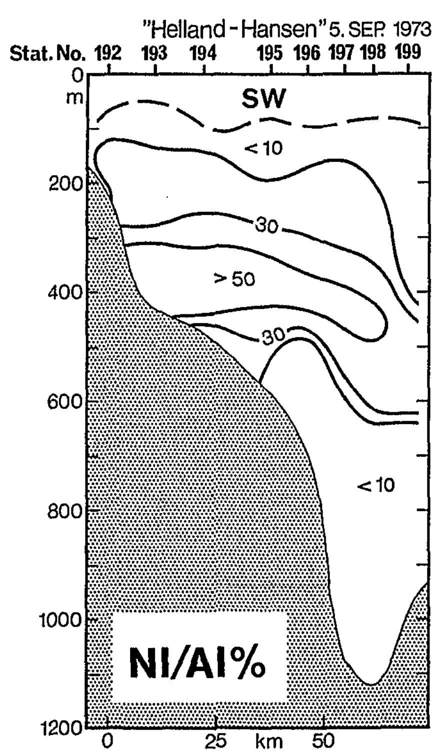
50
30
70
>90
NS%
0 25 50 km 75


"Helland-Hansen" 3.-4. SEP. 1973
Stat. No. 169 170 171 172 173 174 175 176 177 178 179 180
0
m
SW
200
400
600
800
1000
1200
<10
30
50
>70
30
<10
NI/Al%
0 25 50 75 km 100


"Helland-Hansen" 4.-5. SEP. 1973
Stat. No. 191 190 188 186 184 183
0
m
SW
200
400
600
800
1000
1200
1400
<10
>30
<10
NI/Al%
0 25 50 km 75

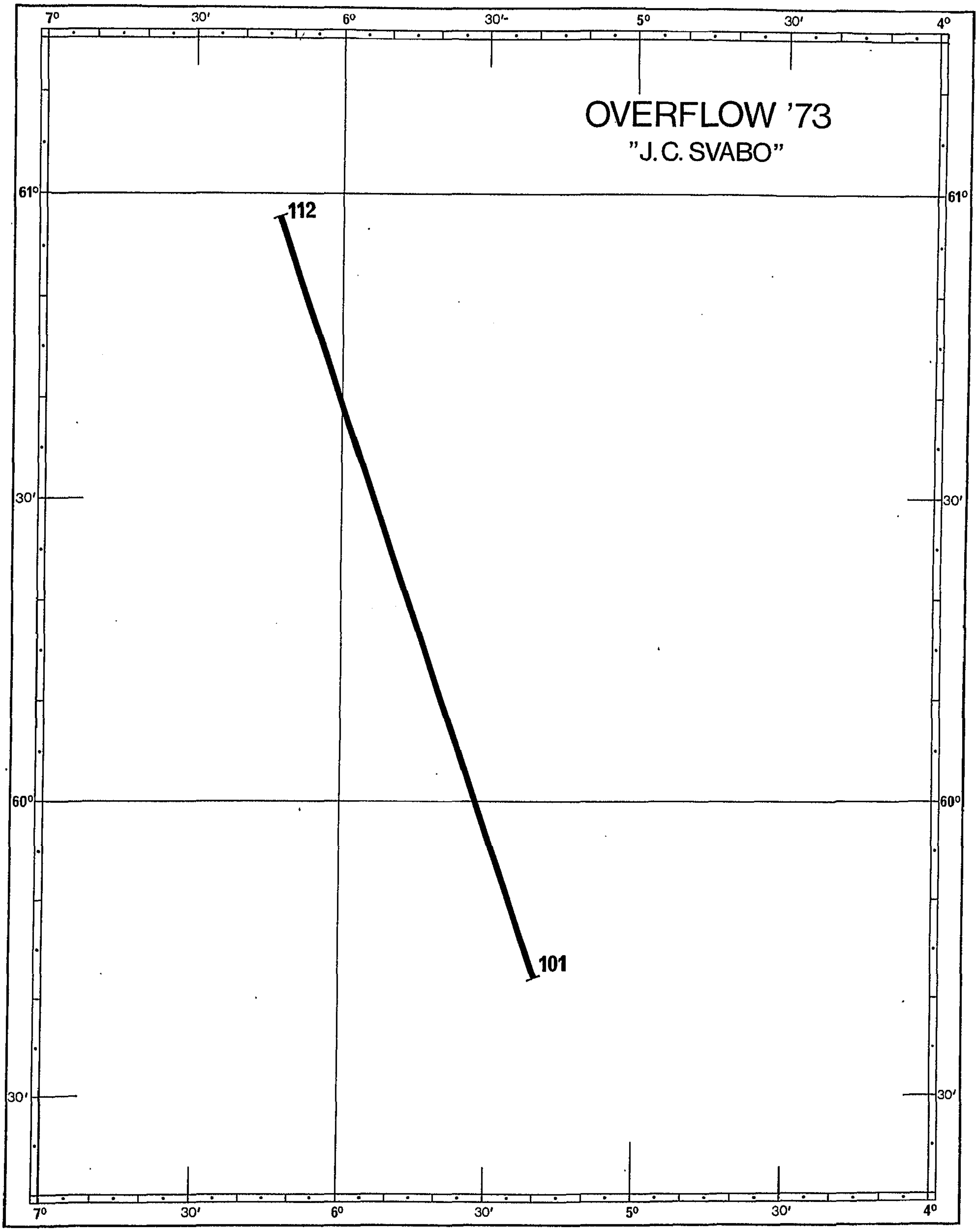

"Helland-Hansen" 5. SEP. 1973
Stat. No. 192 193 194 195 196 197 198 199
0
m
SW
<10
30
50
70
>90
200
400
600
800
1000
1200
NS%
0
25
km
50


"Helland-Hansen" 5. SEP. 1973
Stat. No. 192 193 194 195 196 197 198 199
0
m
SW
<10
30
>50
30
<10
200
400
600
800
1000
1200
NI/AI%
0
25
km
50

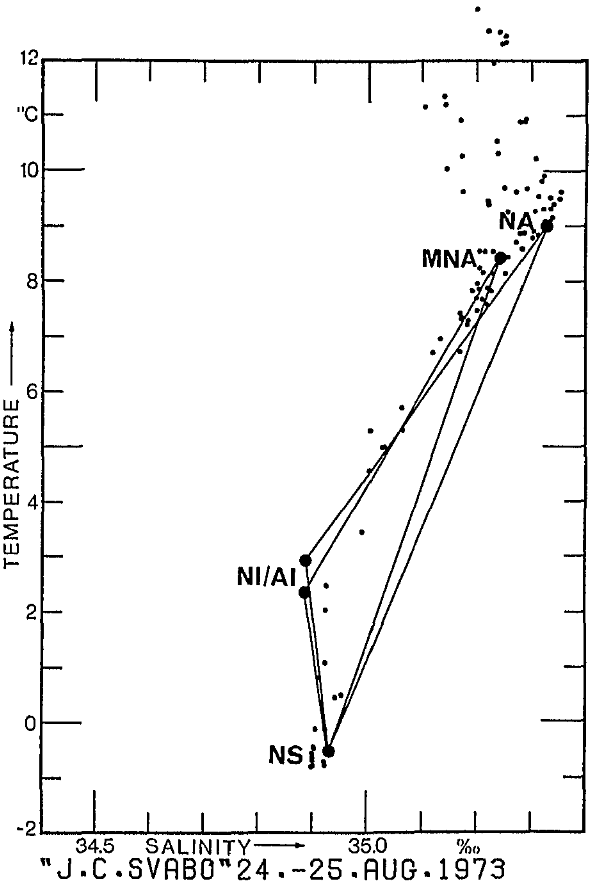
6.3 J.C. Svabo

In this area NI/AI and NS occur in smaller amounts.

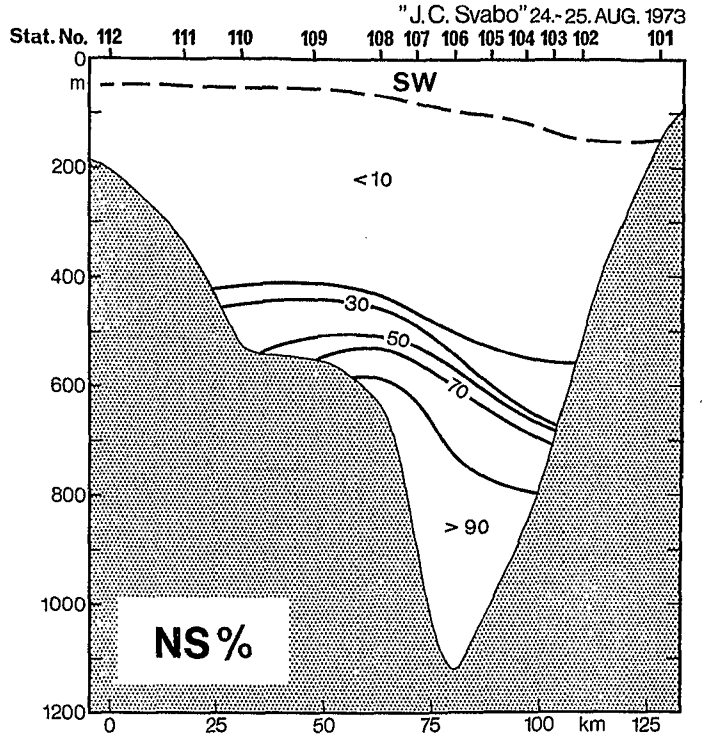
Section	Stat.No.	Mixing triangle (see table 3)
101 - 112	101 - 105	3
	106 - 112	4

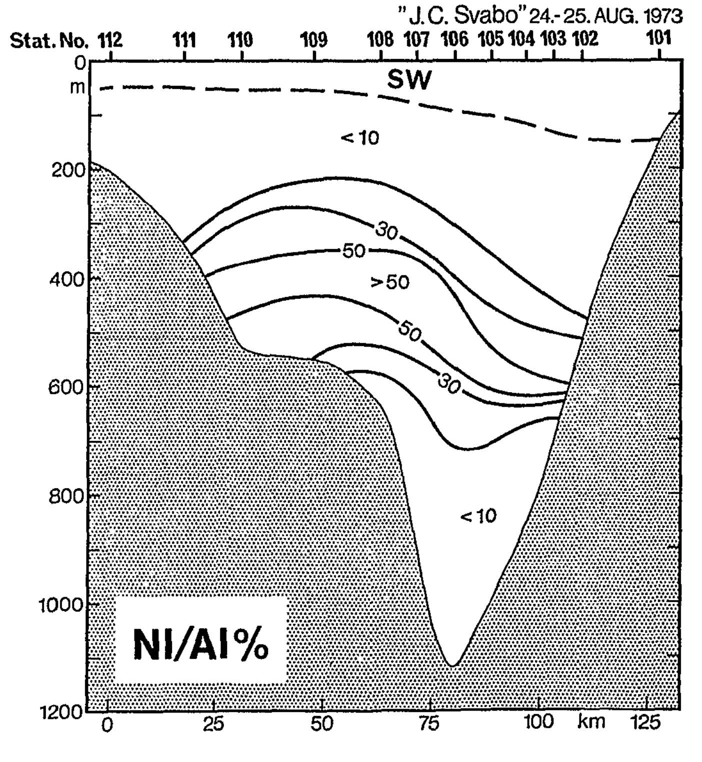


OVERFLOW '73
"J.C. SVABO"
7°
30'
6°
30'
5°
30'
4°
61°
60°
30'
112
101



"J.C.SVABO"24.-25.AUG.1973
STAT.NO.101-112

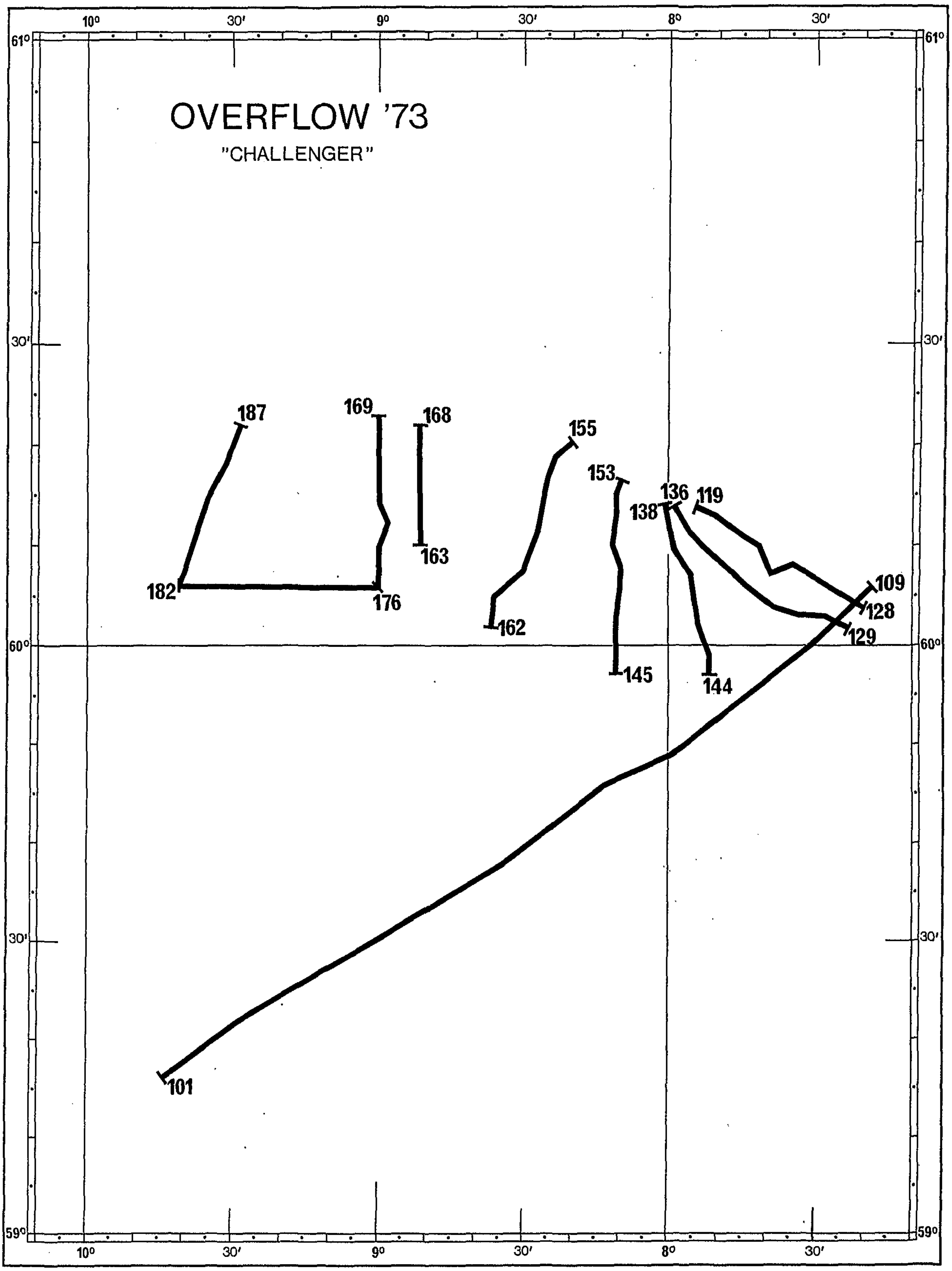

"J.C. Svabo" 24.-25. AUG. 1973
Stat. No. 112 111 110 109 108 107 106 105 104 103 102 101
m
0
200
400
600
800
1000
1200
SW
<10
30
50
70
>90
NS %
0 25 50 75 100 km 125

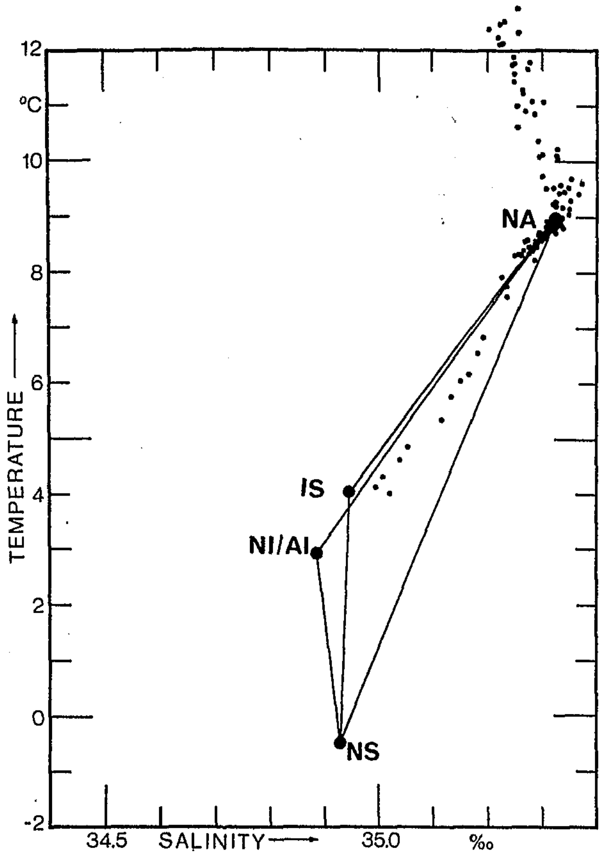

"J.C. Svabo" 24.-25. AUG. 1973
Stat. No. 112 111 110 109 108 107 106 105 104 103 102 101
m
0
200
400
600
800
1000
1200
SW
<10
30
50
>50
50
30
<10
NI/AI%
0 25 50 75 100 km 125

6.4 Challenger

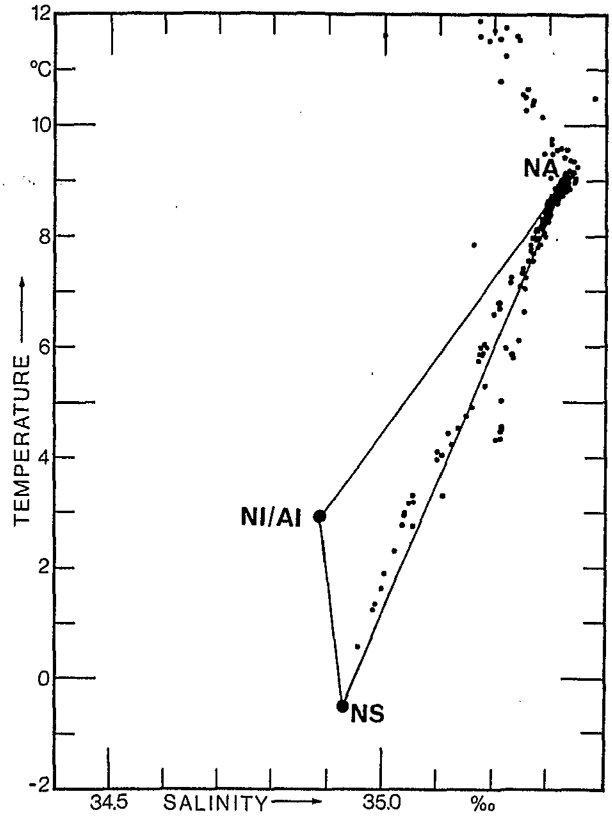
In the area of the Wyville-Thomson Ridge NA is the dominant Atlantic Water type. NI/AI and NS are observed. IS is found in the deeper parts of the Atlantic basin. From station 106 to 109 the amount of NI/AI is less 10 %.

Section	Stat.No.	Mixing triangle (see table 3)
101 - 109	101 - 105	1
	106 - 109	3
119 - 128		3
129 - 136		3
138 - 144		3
145 - 153		3
155 - 162		3
163 - 168		3
169 - 176	169 - 175	3
	176	1
176 - 182		1
182 - 187		1

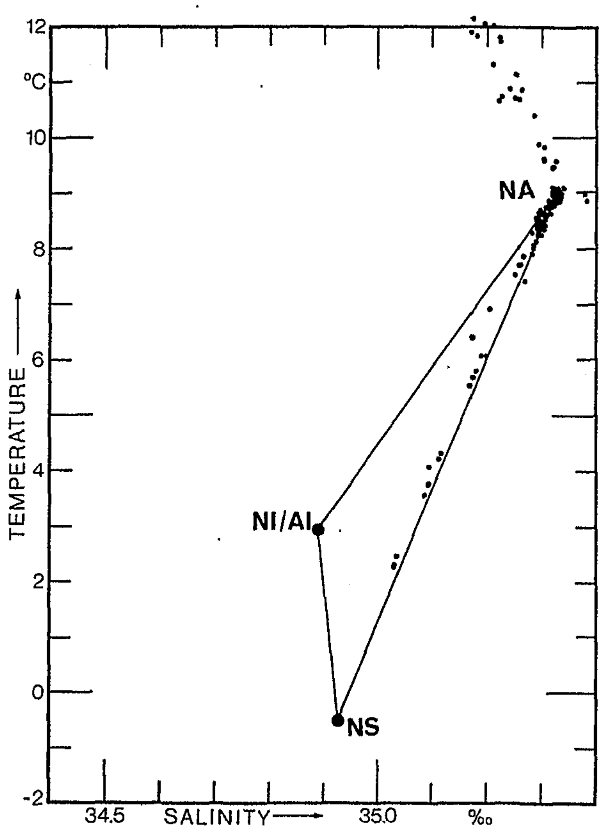

OVERFLOW '73
"CHALLENGER"
10°
30'
9°
30'
8°
30'
61°
30'
60°
30'
59°
187
169
168
155
153
136
119
138
163
182
176
162
109
128
129
145
144
101



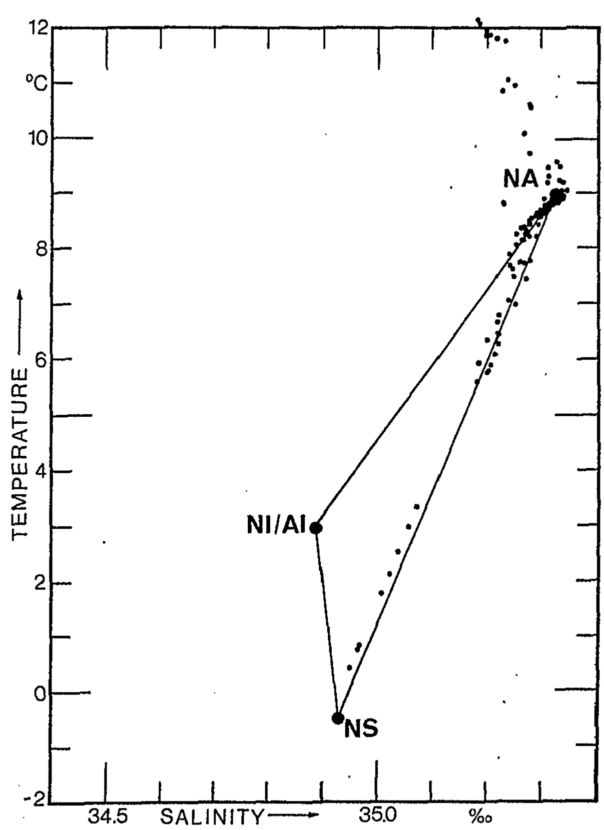
"CHALLENGER" 23.-24.AUG.1973
STAT.NO.101-109



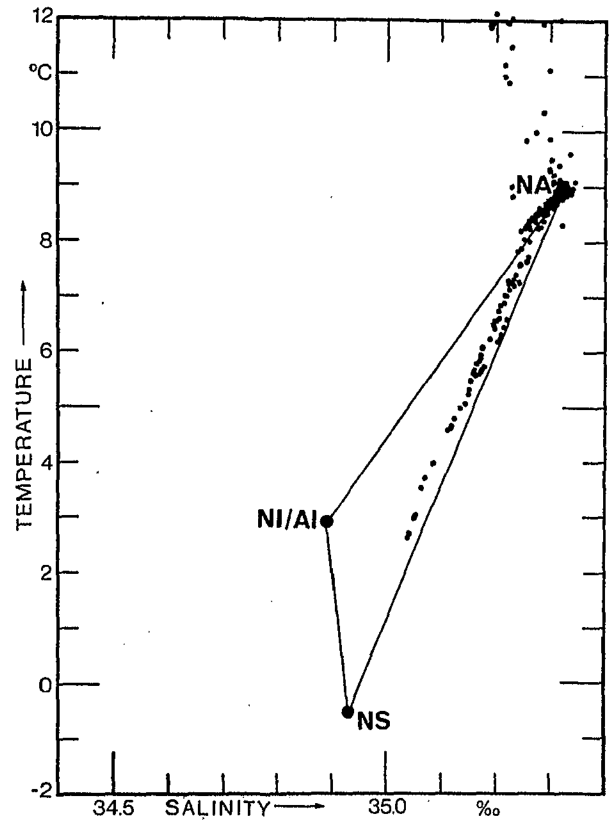
"CHALLENGER" 24.-25.AUG.1973
STAT.NO.119-128



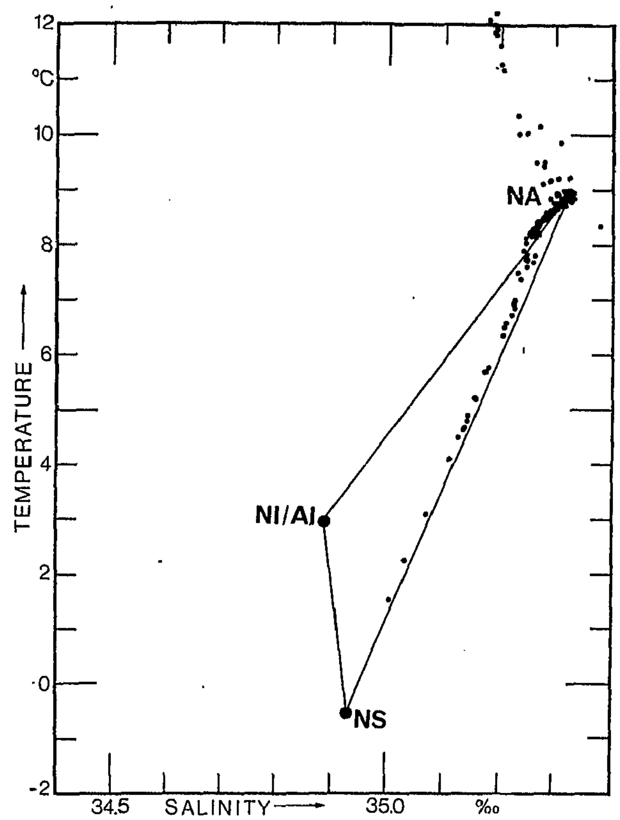
"CHALLENGER" 25.AUG.1973
STAT.NO.129-136



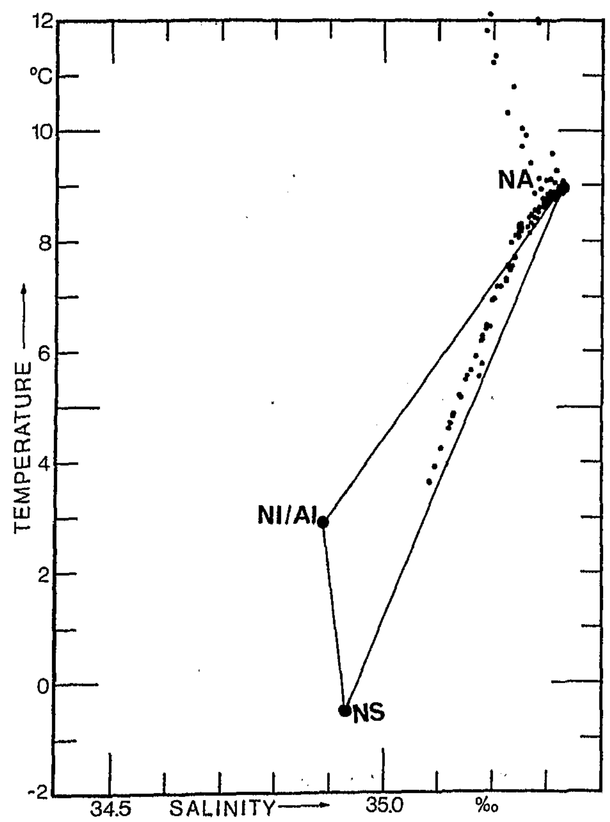
"CHALLENGER" 26.AUG.1973
STAT.NO.138-144



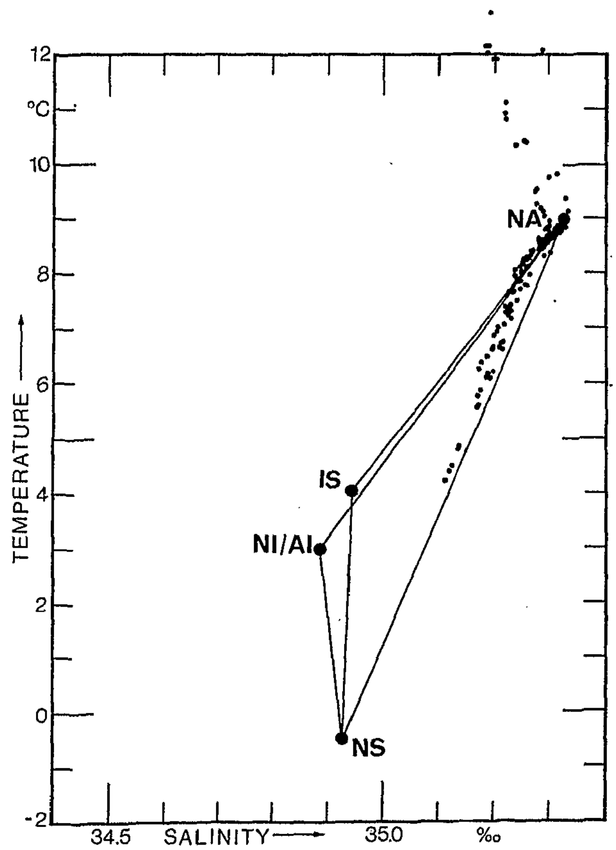
"CHALLENGER"26.-27.AUG.1973
STAT.NO.145-153



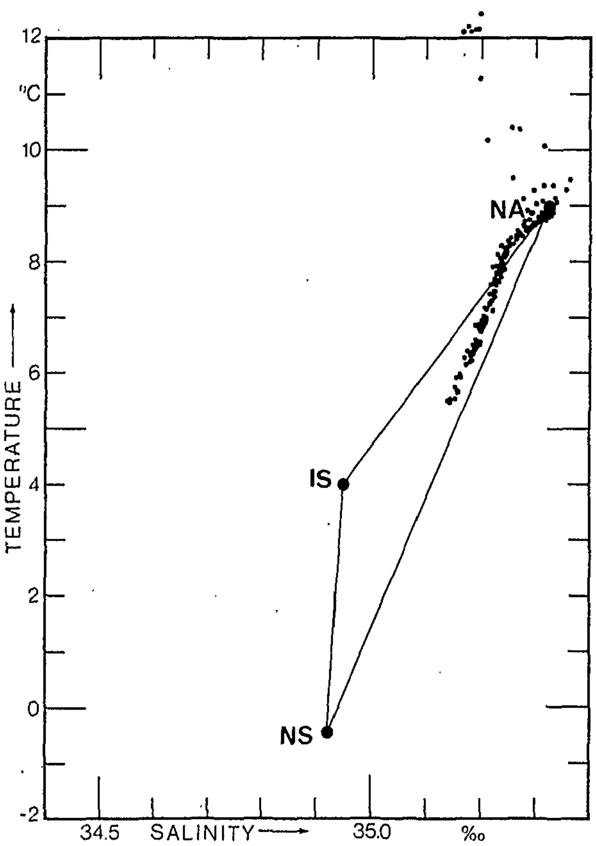
"CHALLENGER"27.AUG.1973
STAT.NO.155-162



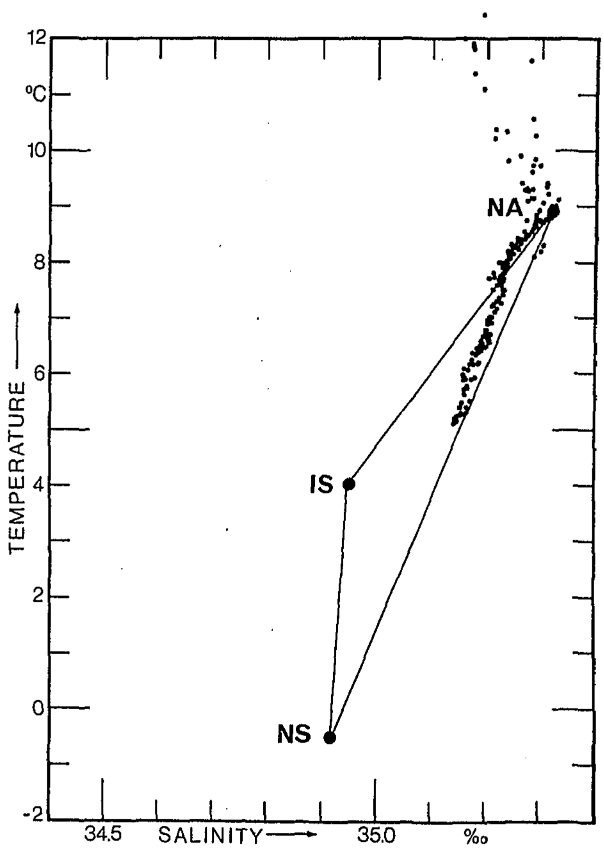
"CHALLENGER"28.AUG.1973
STAT.NO.163,164,166-168



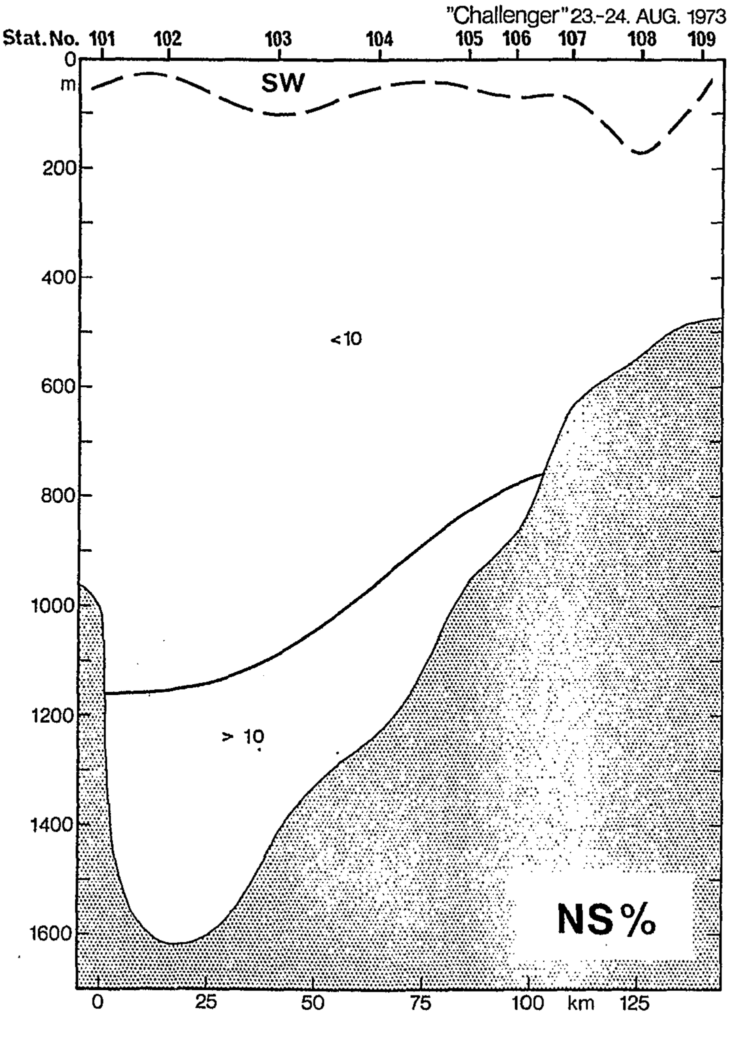
"CHALLENGER"28.AUG.1973
STAT.NO.169-176



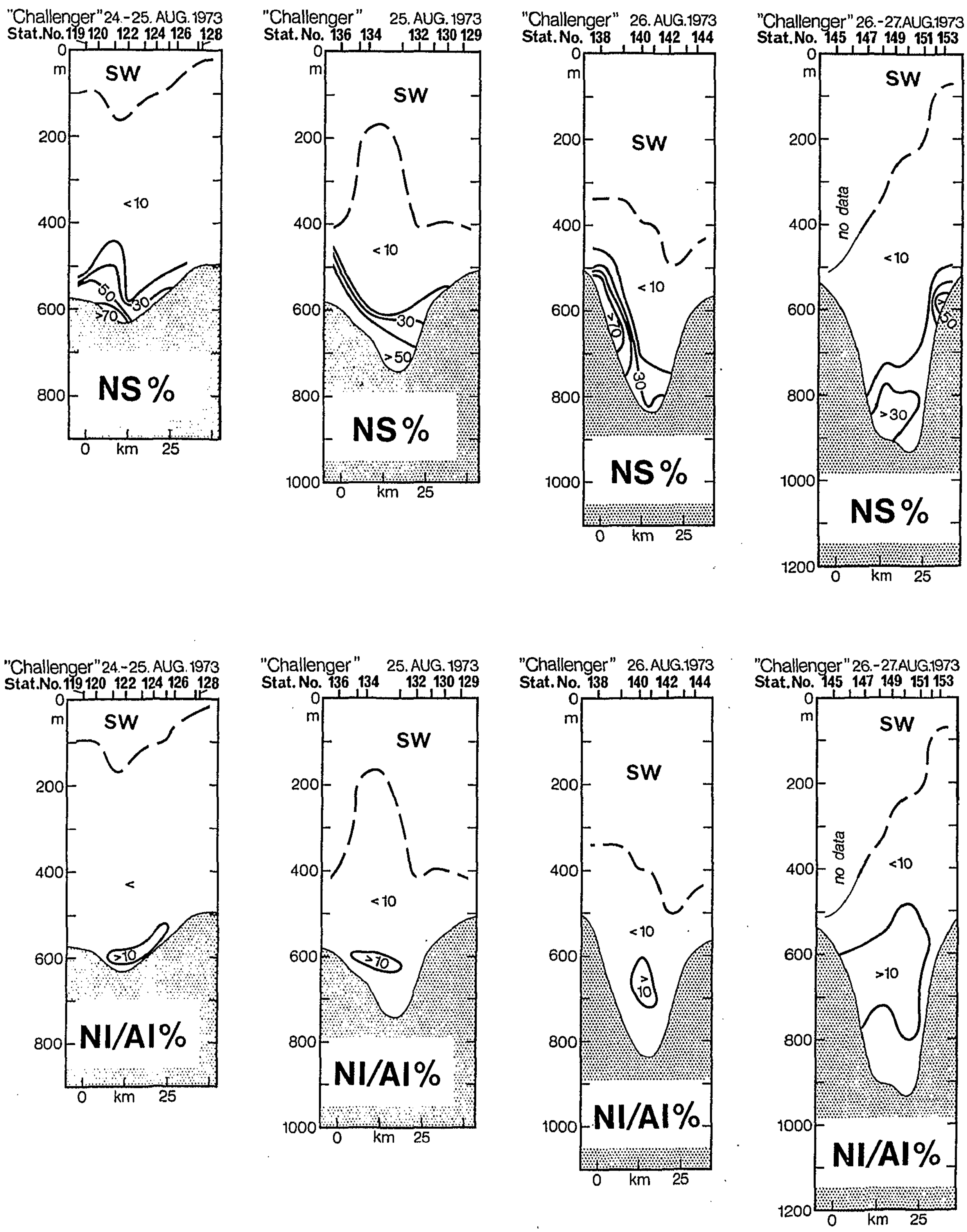
"CHALLENGER" 28.-29.AUG.1973
STAT.NO.176-182

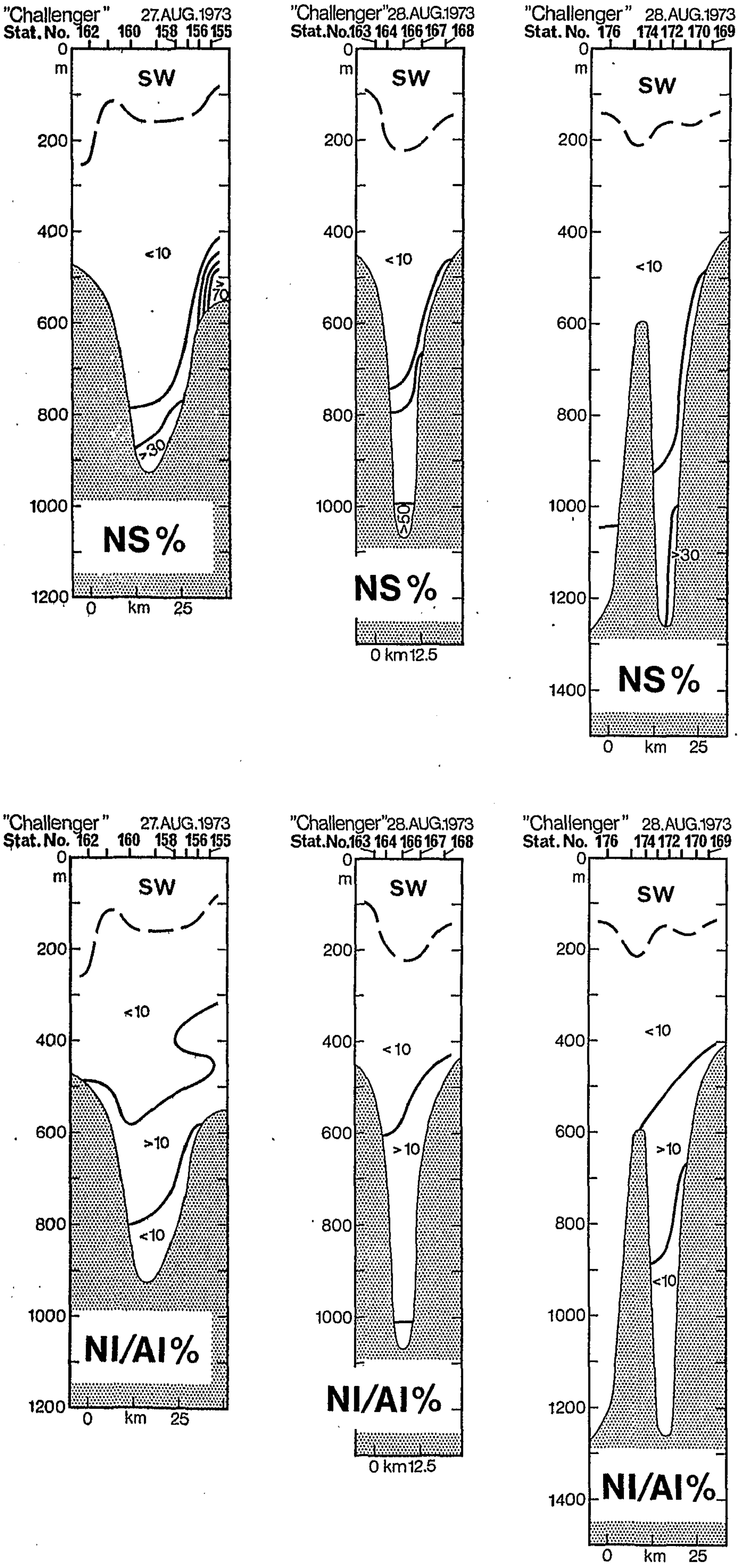


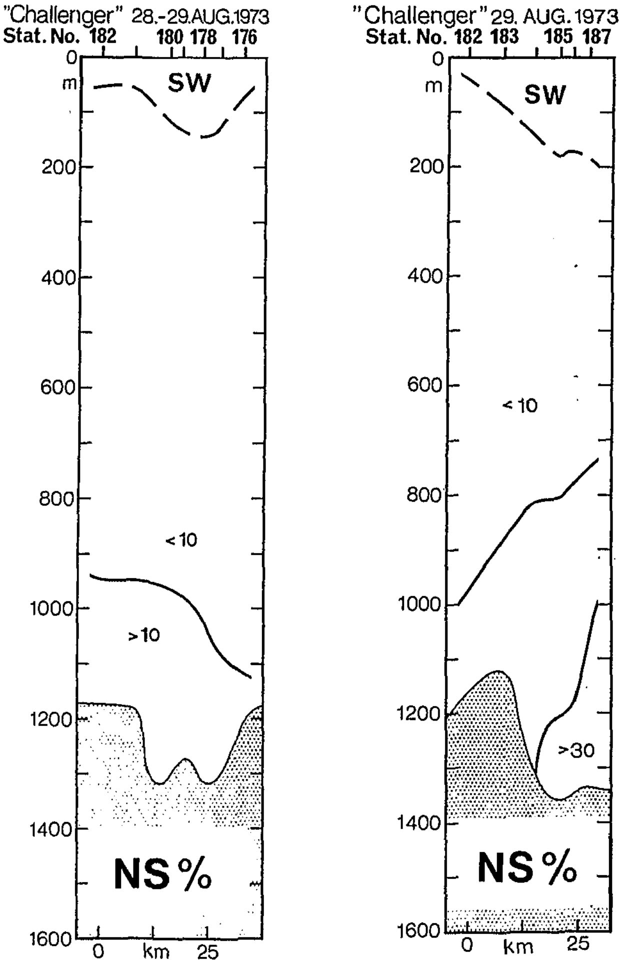
"CHALLENGER" 29.AUG.1973
STAT.NO.182-187



"Challenger" 23.-24. AUG. 1973
Stat. No. 101 102 103 104 105 106 107 108 109
0
m
SW
200
400
<10
600
800
1000
1200
> 10
1400
1600
NS%
0 25 50 75 100 km 125


"Challenger" 24.-25. AUG. 1973
Stat.No. 119 120 122 124 126 128
SW
<10
50
30
>70
NS %
0 km 25
"Challenger" 25. AUG. 1973
Stat. No. 136 134 132 130 129
SW
<10
30
>50
NS %
0 km 25
"Challenger" 26. AUG. 1973
Stat. No. 138 140 142 144
SW
<10
>10
30
NS %
0 km 25
"Challenger" 26.-27. AUG. 1973
Stat. No. 145 147 149 151 153
SW
no data
<10
>50
>30
NS %
0 km 25
"Challenger" 24.-25. AUG. 1973
Stat.No. 119 120 122 124 126 128
SW
<
>10
NI/Al %
0 km 25
"Challenger" 25. AUG. 1973
Stat. No. 136 134 132 130 129
SW
<10
>10
NI/Al %
0 km 25
"Challenger" 26. AUG. 1973
Stat. No. 138 140 142 144
SW
<10
>10
NI/Al %
0 km 25
"Challenger" 26.-27. AUG. 1973
Stat. No. 145 147 149 151 153
SW
no data
<10
>10
NI/Al %
0 km 25

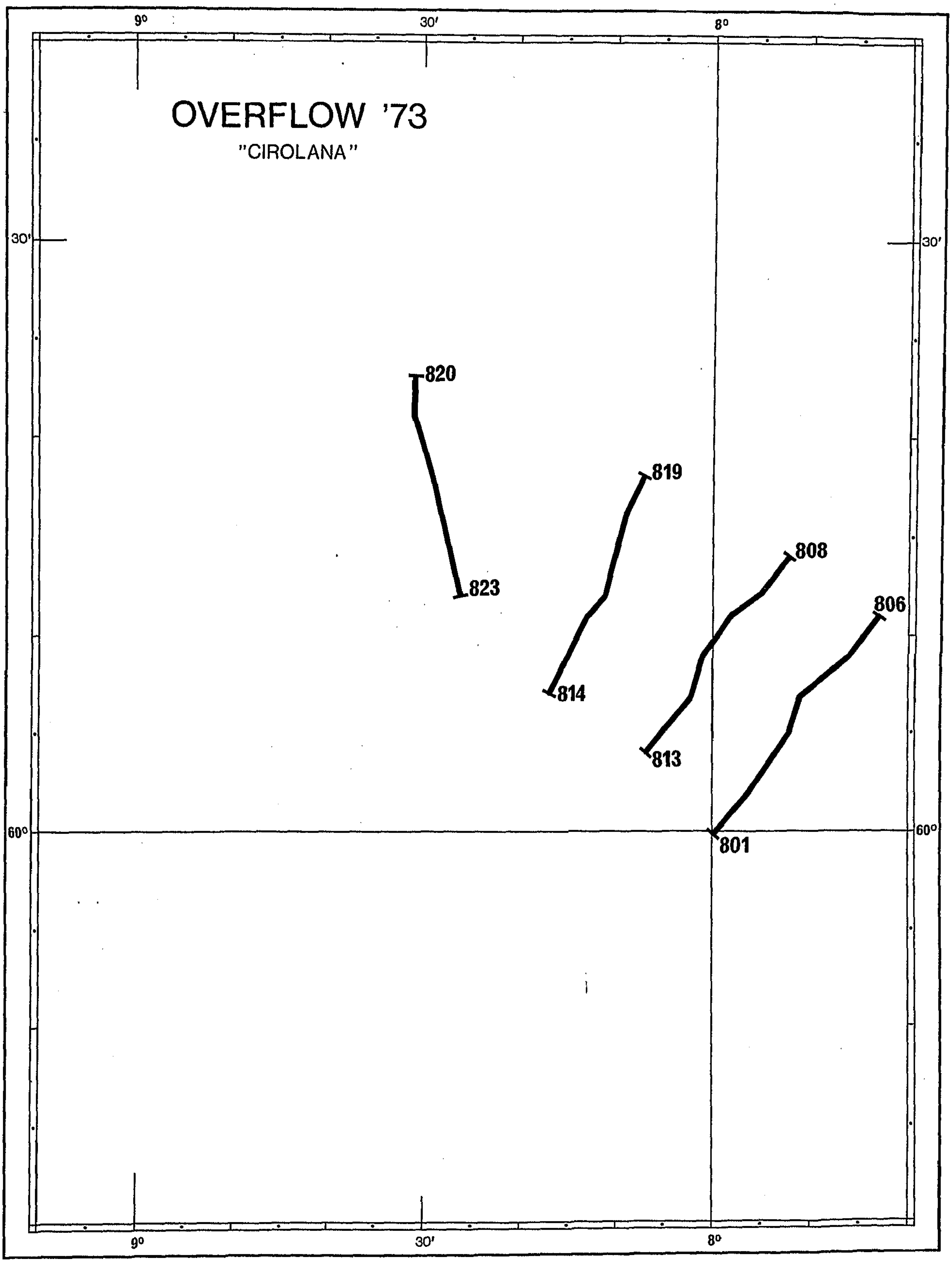

"Challenger" 27.AUG.1973
Stat.No. 162 160 158 156 155
SW
<10
>70
>30
NS %
0 km 25
"Challenger" 28.AUG.1973
Stat.No. 163 164 166 167 168
SW
<10
<50
NS %
0 km 12.5
"Challenger" 28.AUG.1973
Stat.No. 176 174 172 170 169
SW
<10
>30
NS %
0 km 25
"Challenger" 27.AUG.1973
Stat.No. 162 160 158 156 155
SW
<10
>10
<10
NI/AI%
0 km 25
"Challenger" 28.AUG.1973
Stat.No. 163 164 166 167 168
SW
<10
>10
NI/AI%
0 km 12.5
"Challenger" 28.AUG.1973
Stat.No. 176 174 172 170 169
SW
<10
>10
<10
NI/AI%
0 km 25
0 m
200
400
600
800
1000
1200
1400


"Challenger" 28.-29.AUG.1973
Stat. No. 182 180 178 176
SW
<10
>10
NS %
0 km 25
m
0
200
400
600
800
1000
1200
1400
1600
"Challenger" 29. AUG. 1973
Stat. No. 182 183 185 187
SW
<10
>30
NS %
0 km 25
m
0
200
400
600
800
1000
1200
1400
1600

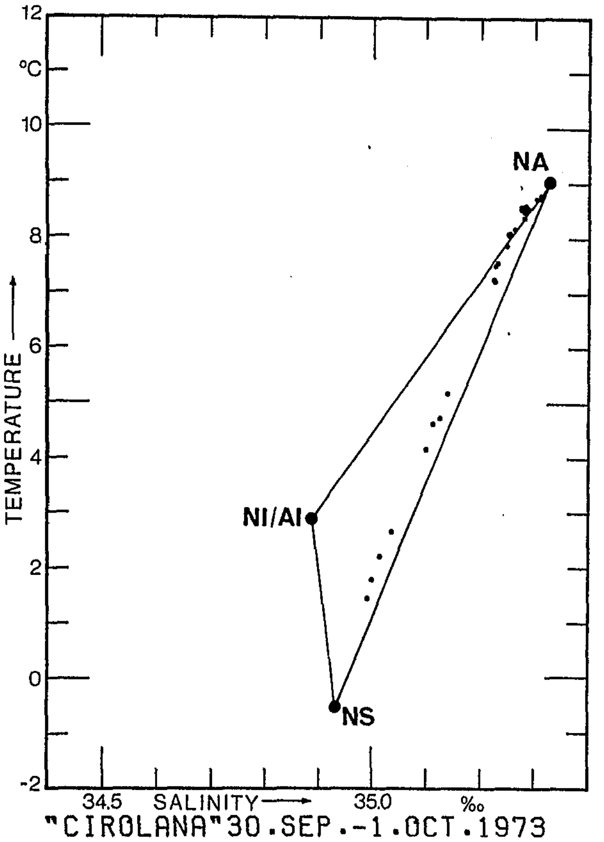
6.5 Cirolana

NA is the dominant Atlantic water, NI/AI and 143 are observed in small amounts.

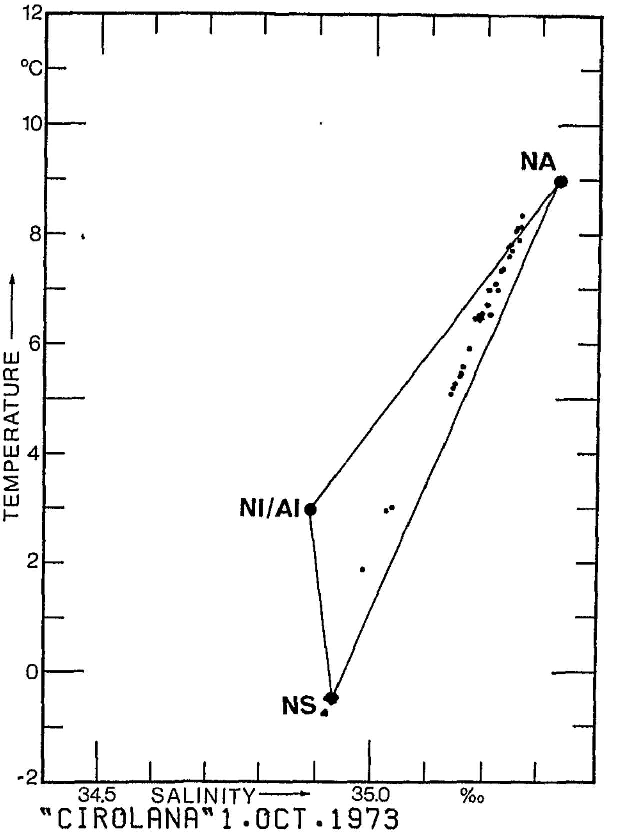
Section	Stat.No.	Mixing triangle (see table 3)
all	all	3



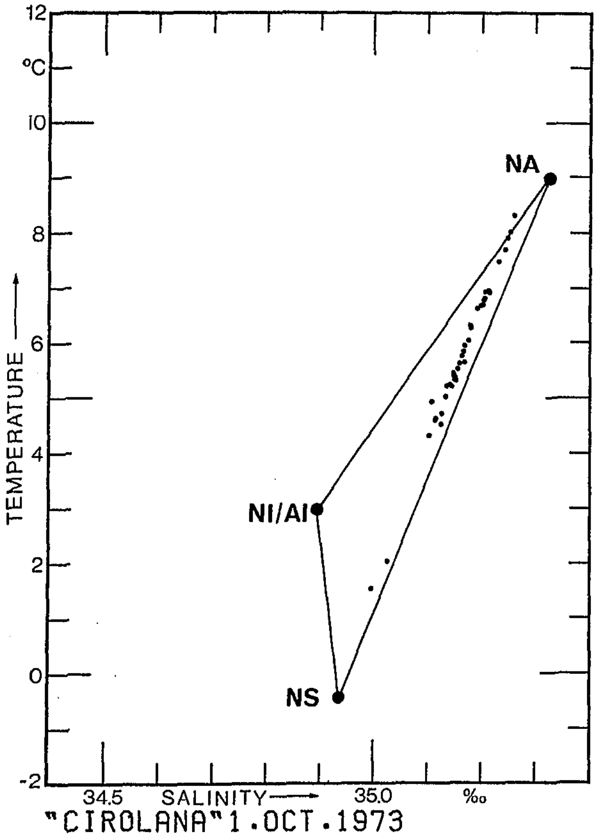
OVERFLOW '73
"CIROLANA"
9°
30'
8°
30'
30'
820
823
819
814
808
813
806
801
60°
60°
9°
30'
8°



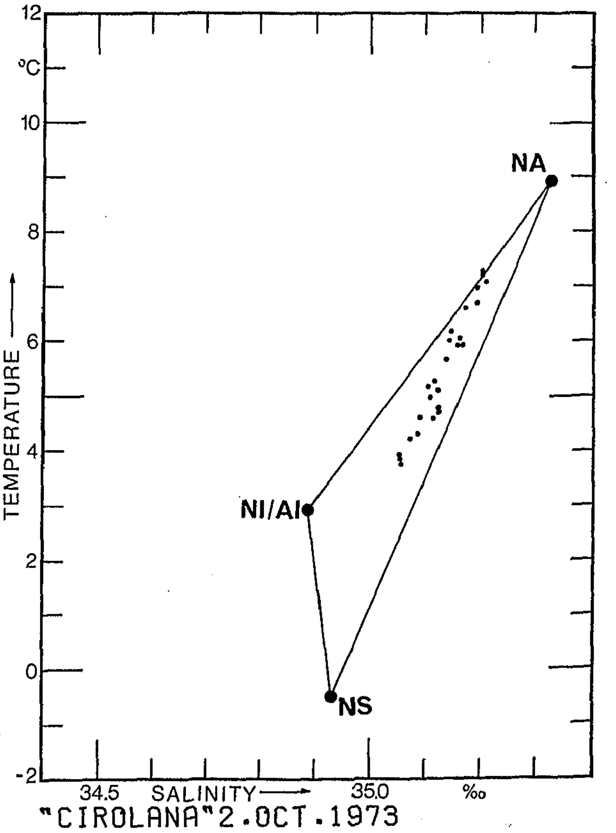
"CIROLANA"30.SEP.-1.OCT.1973
STAT.NO.801-806



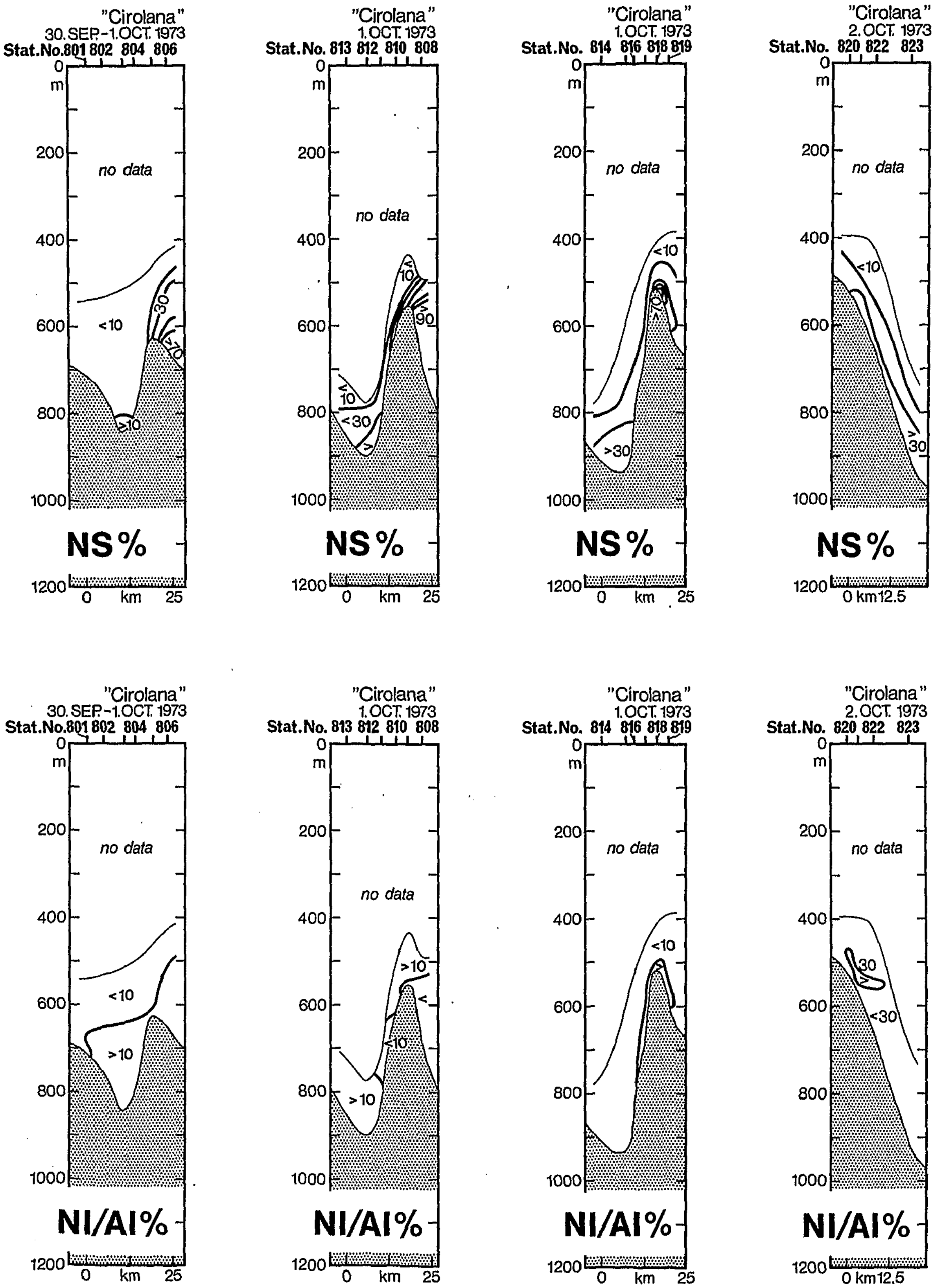
"CIROLANA"1.OCT.1973
STAT.NO.808-813



"CIROLANA"1.OCT.1973
STAT.NO.814-819



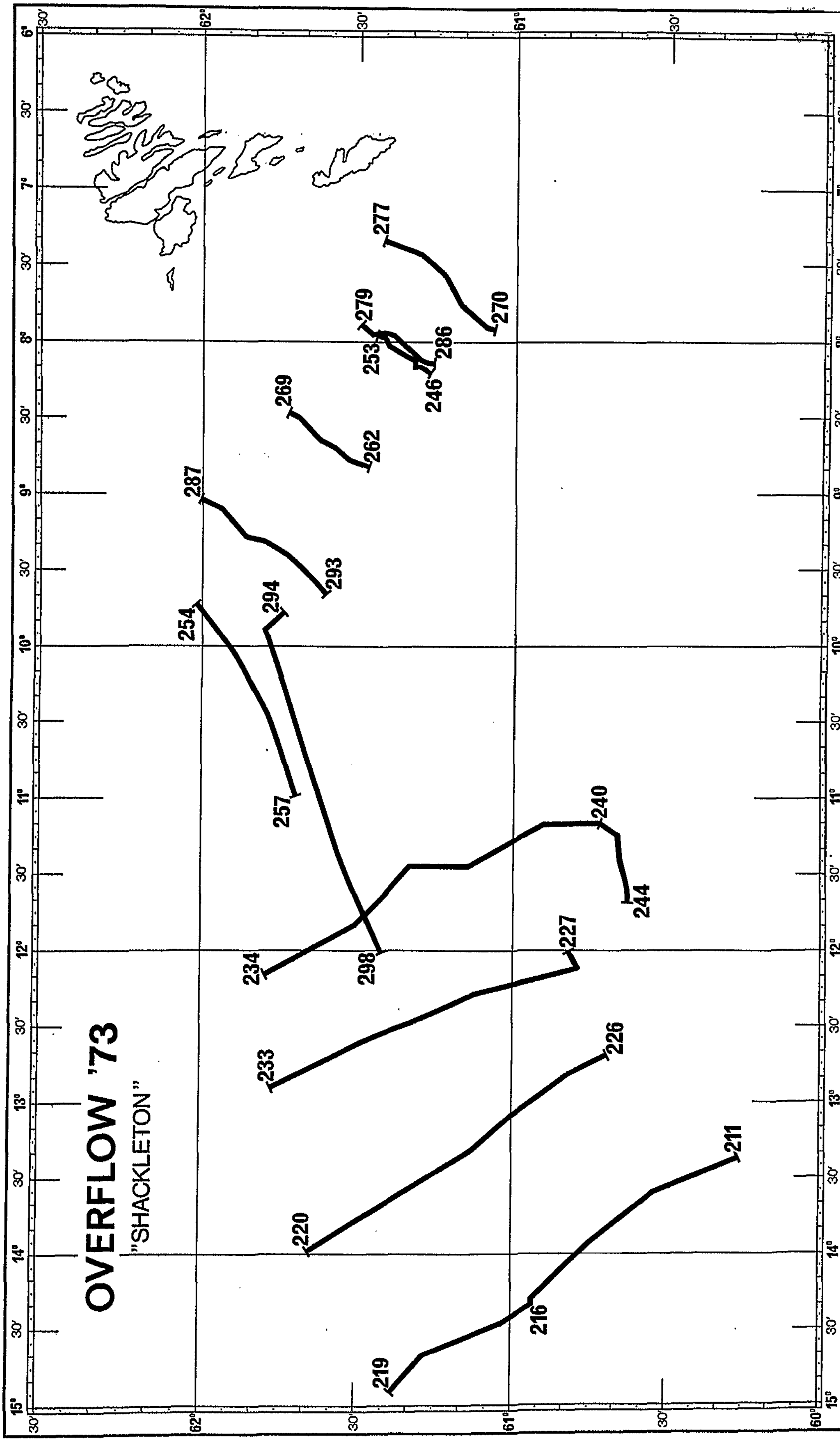
"CIROLANA"2.OCT.1973
STAT.NO.820-823

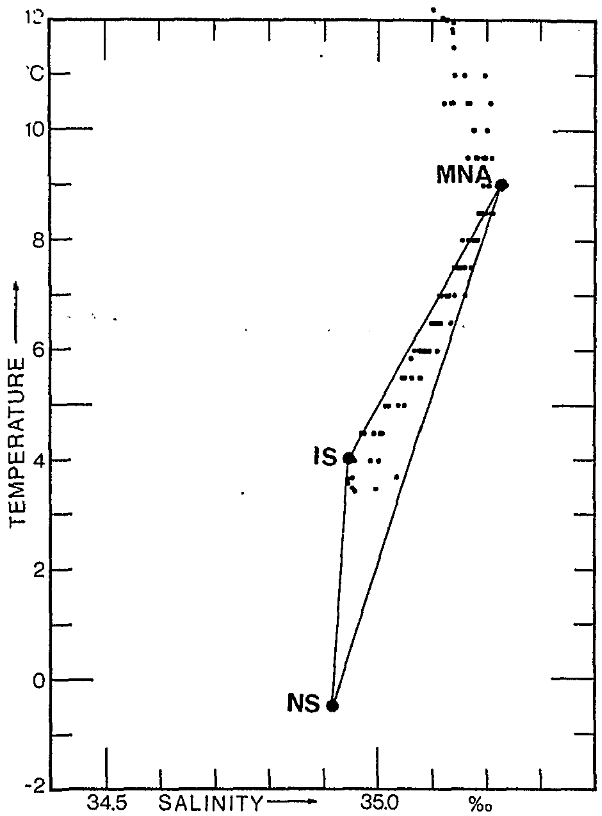

"Cirolana"
30. SEP.-1. OCT. 1973
Stat.No. 801 802 804 806
"Cirolana"
1. OCT. 1973
Stat.No. 813 812 810 808
"Cirolana"
1. OCT. 1973
Stat.No. 814 816 818 819
"Cirolana"
2. OCT. 1973
Stat.No. 820 822 823
0
m
200
400
600
800
1000
1200
no data
<10
>10
<30
>30
30
>70
90
NS%
0 km 25
0 km12.5
NI/AI%

6.6 Shackleton

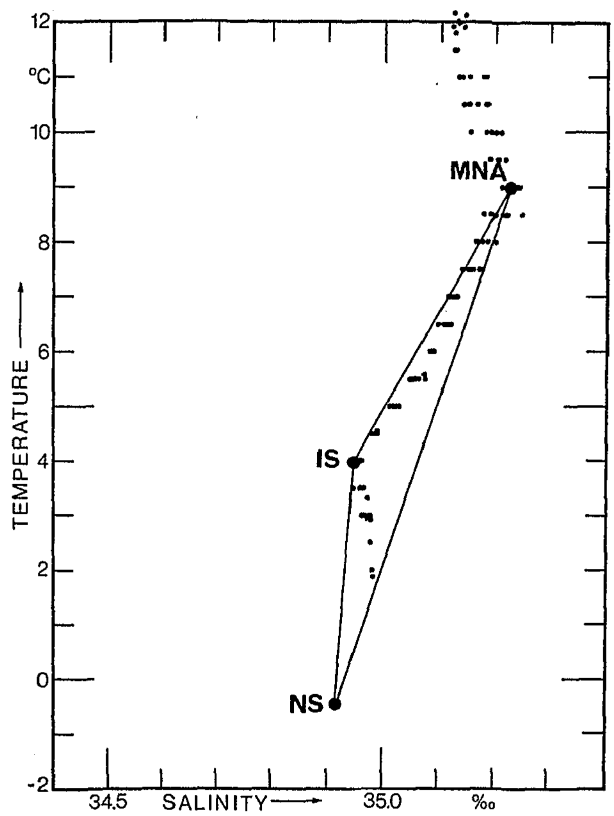
For the region of the Faroe-Bank Channel the Atlantic water is dominated by MNA. NI/AI and NS are observed. IS is found in the deep Atlantic basin.

Section	Stat.No.	Mixing triangle (see table 3)
211 - 219		2
220 - 226		2
227 - 233		2
234 - 240		2
240 - 244		2
246 - 253		4
254 - 257	254 - 256	4
	257	2
262 - 269		4
270 - 277		4
278 - 286		4
287 - 293		4
294 - 298		2

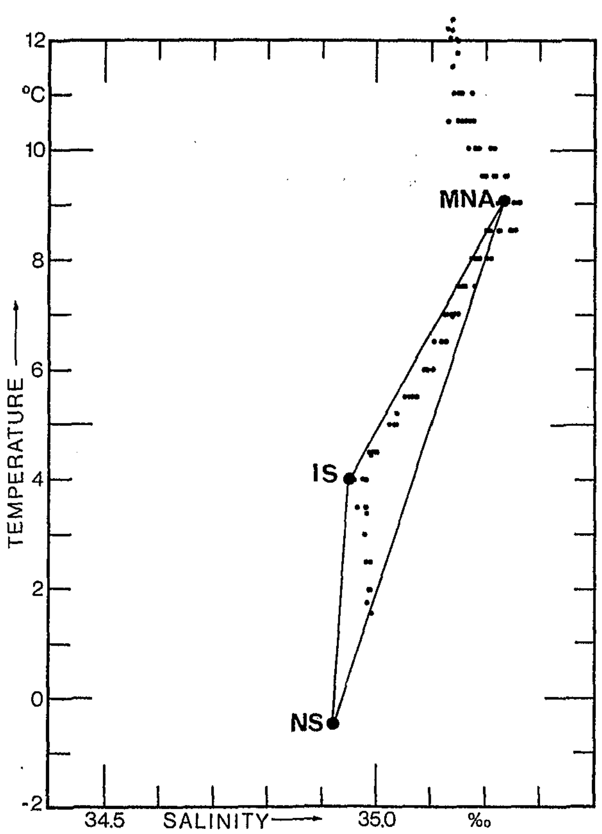

OVERFLOW '73
"SHACKLETON"
277
270
279
253
286
246
269
262
287
293
294
254
257
240
244
227
234
298
233
226
211
220
216
219
6°
7°
8°
9°
10°
11°
12°
13°
14°
15°
62°
61°
60°
30'



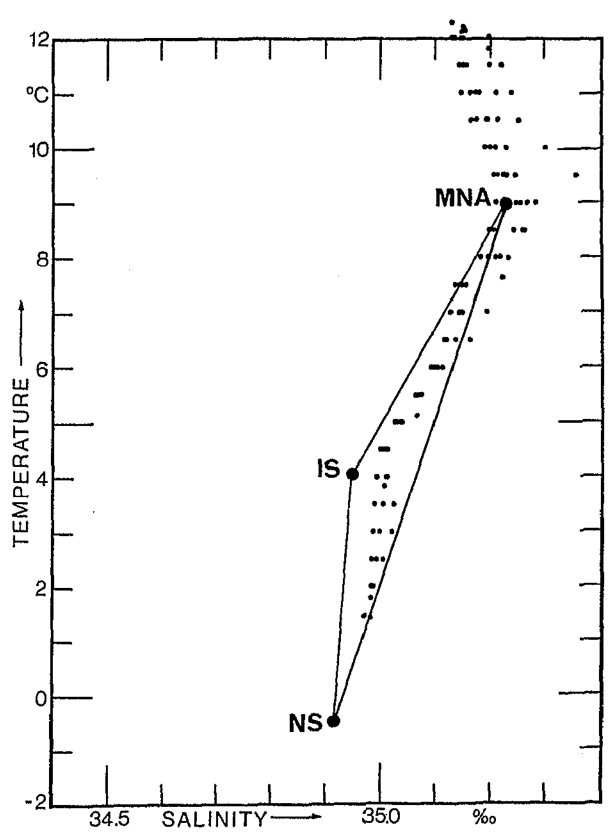
"SHACKLETON" 19.-20.AUG.1973
STAT.NO.211-214,216-219



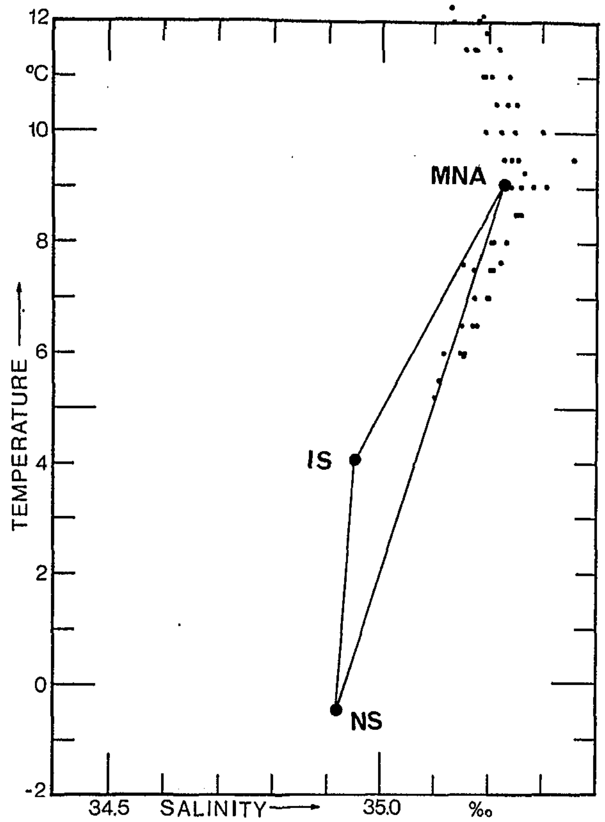
"SHACKLETON" 21.-22.AUG.1973
STAT.NO.220-226



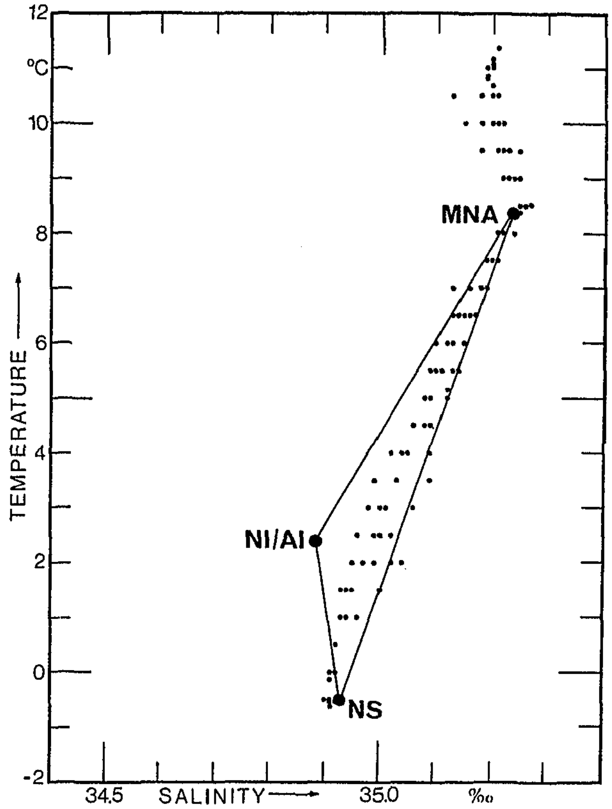
"SHACKLETON" 22.AUG.1973
STAT.NO.227-233



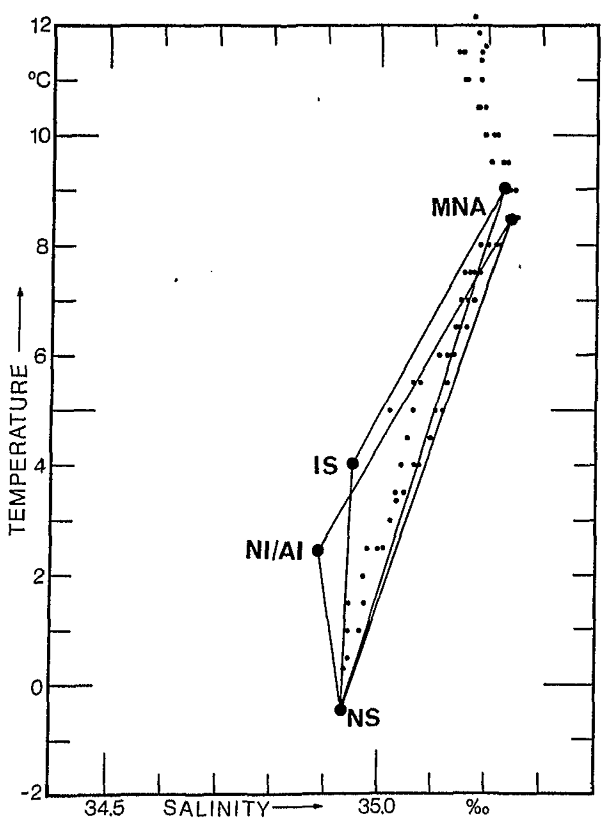
"SHACKLETON" 23.AUG.1973
STAT.NO.234-240



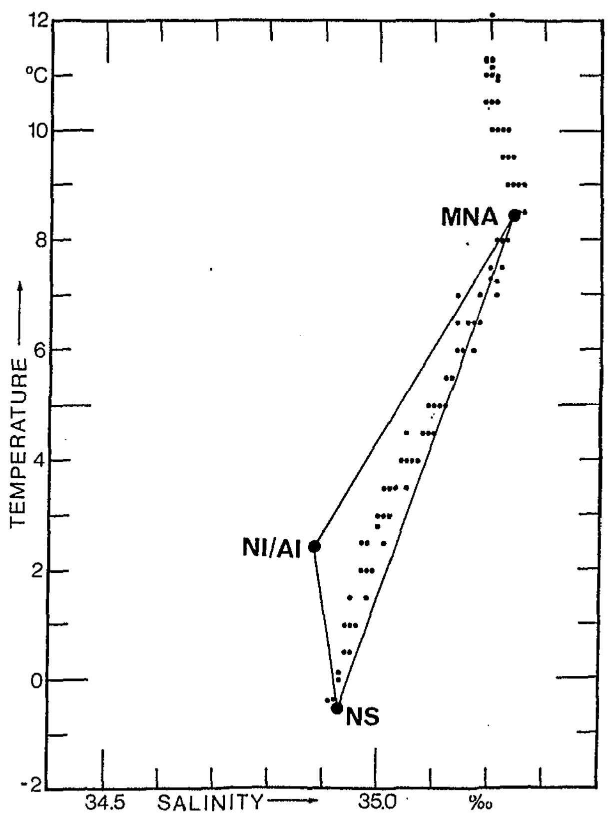
"SHACKLETON"23.-24.AUG.1973
STAT.NO.240-244



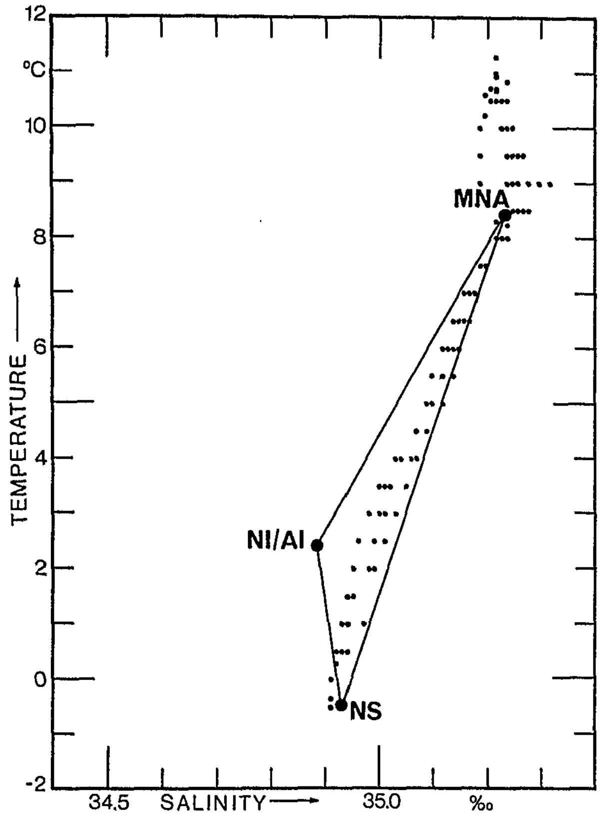
"SHACKLETON"24.-25.AUG.1973
STAT.NO.246-253



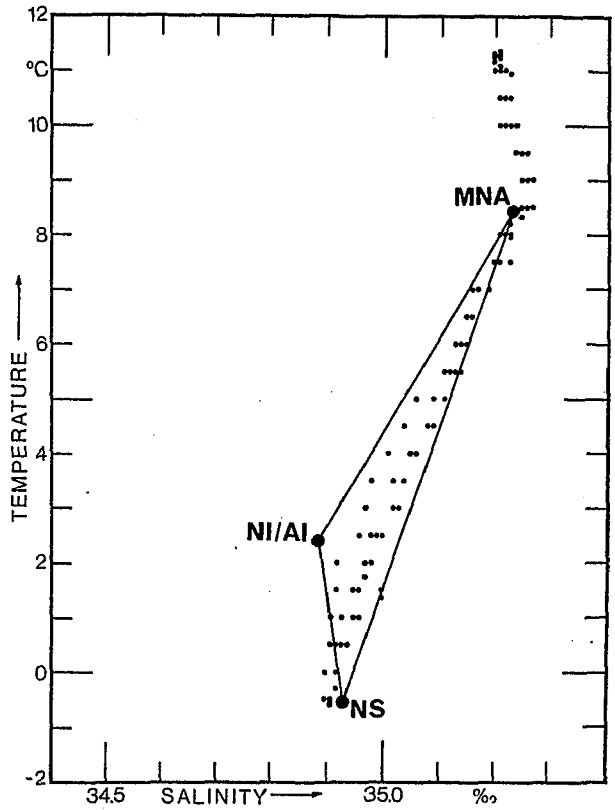
"SHACKLETON"25.-26.AUG.1973
STAT.NO.254-257



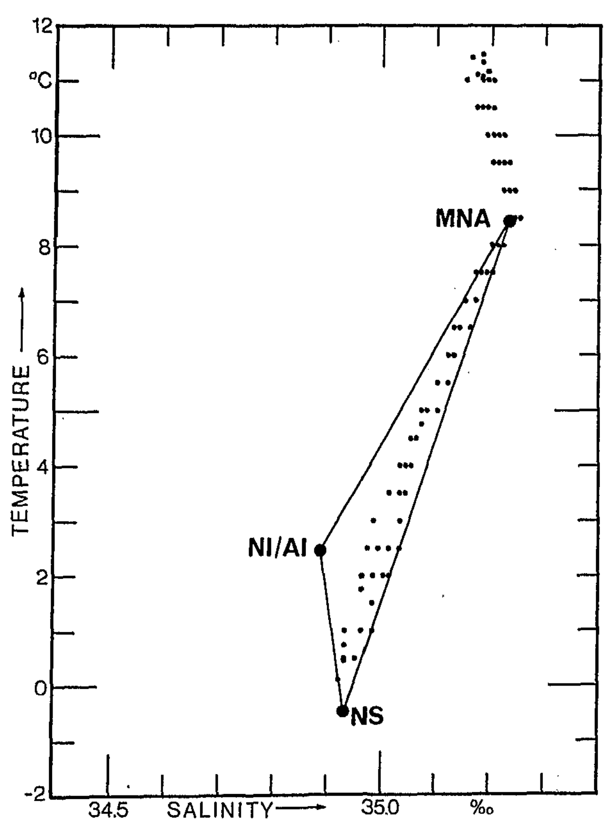
"SHACKLETON"27.AUG.1973
STAT.NO.262-269



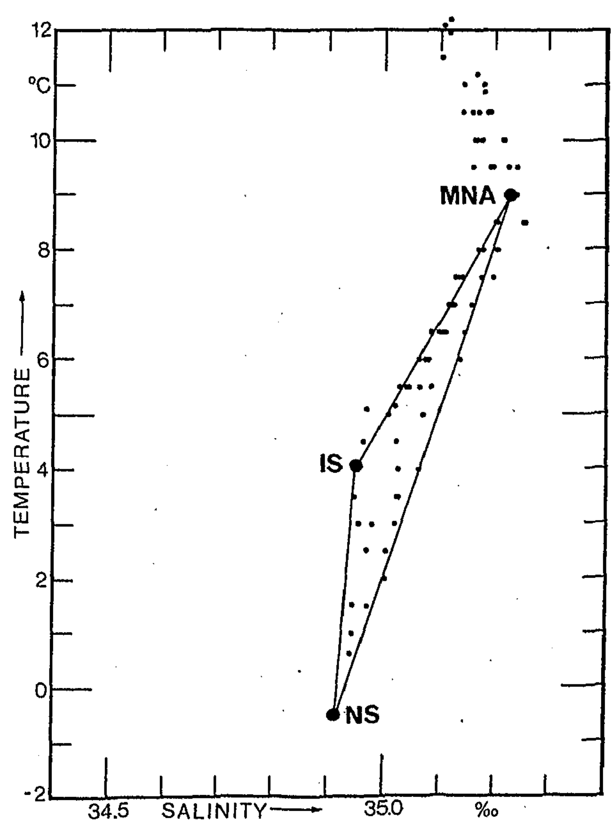
"SHACKLETON"28.AUG.1973
STAT.NO.270-277



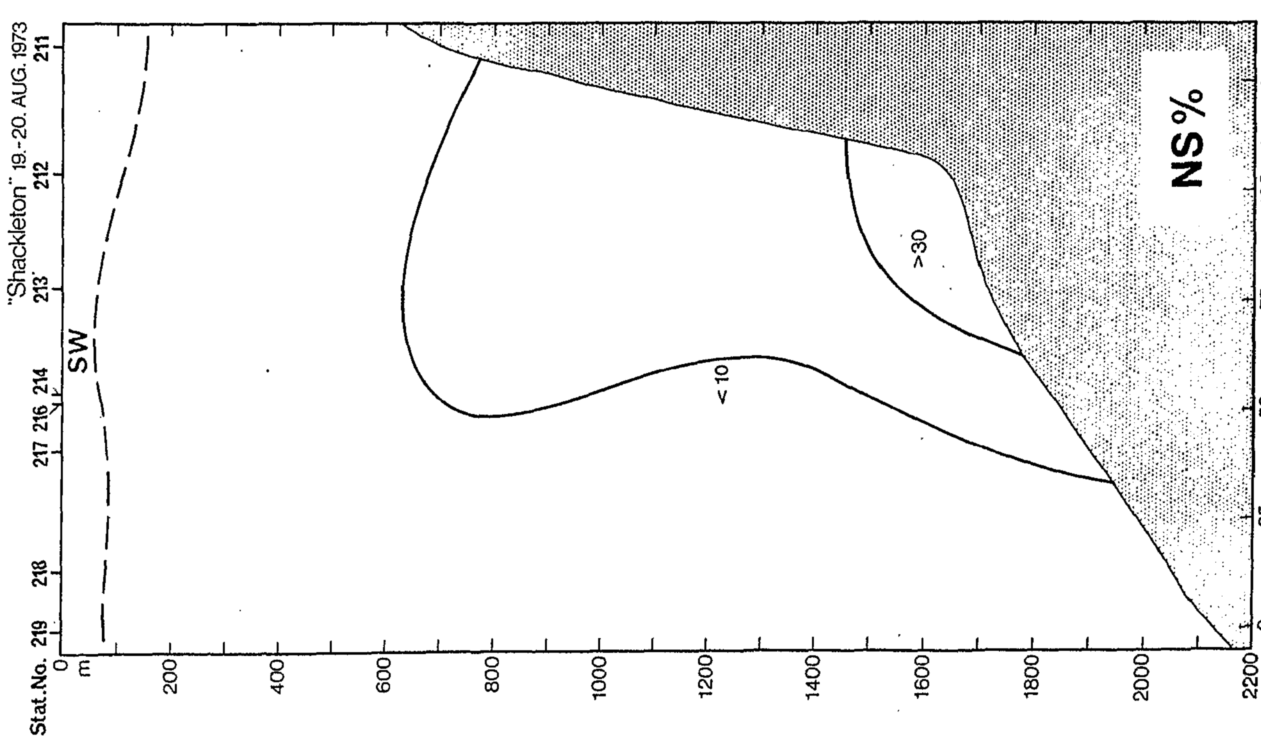
"SHACKLETON"28.-29.AUG.1973
STAT.NO.278-286

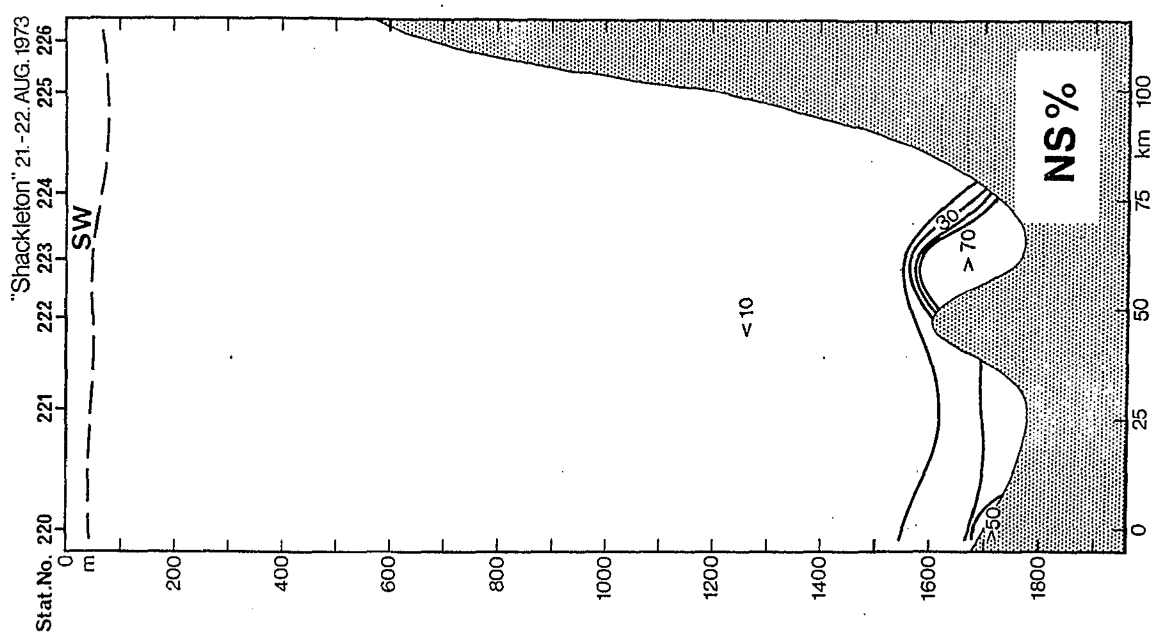


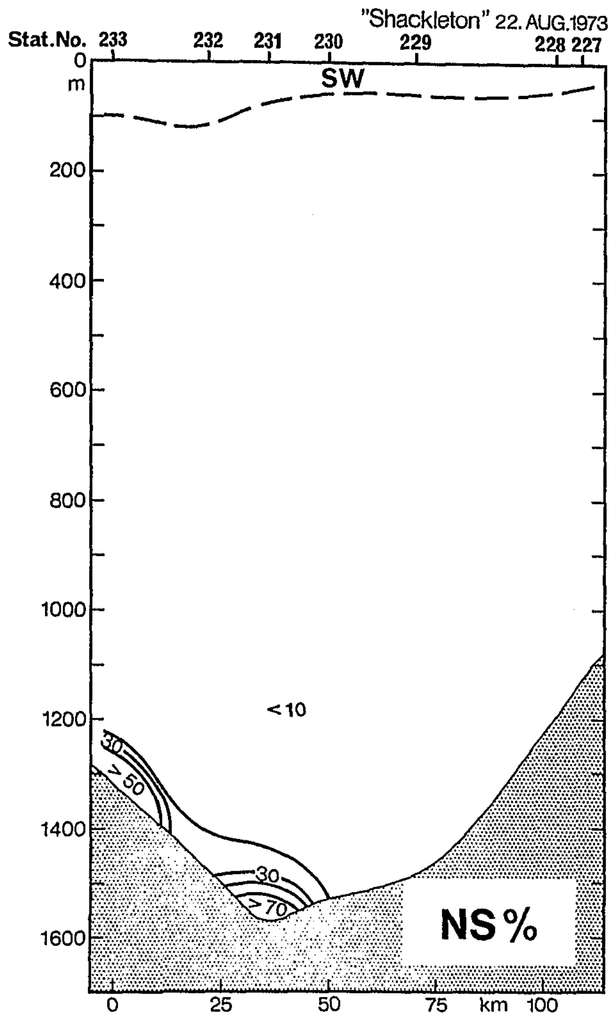
"SHACKLETON"2.-3.SEP.1973
STAT.NO.287-293

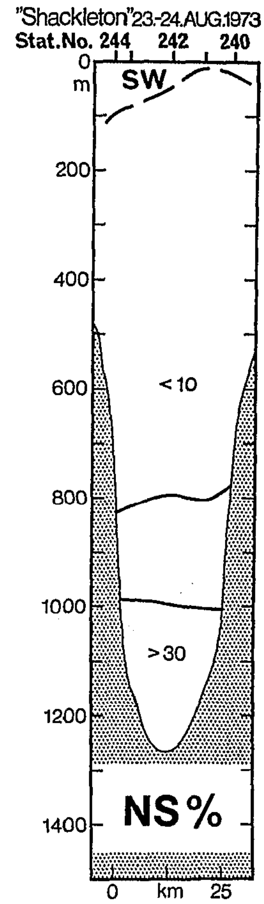


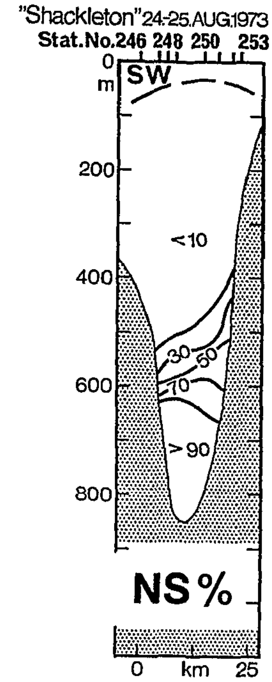
"SHACKLETON"3.-4.SEP.1973
STAT.NO.294-296 .298

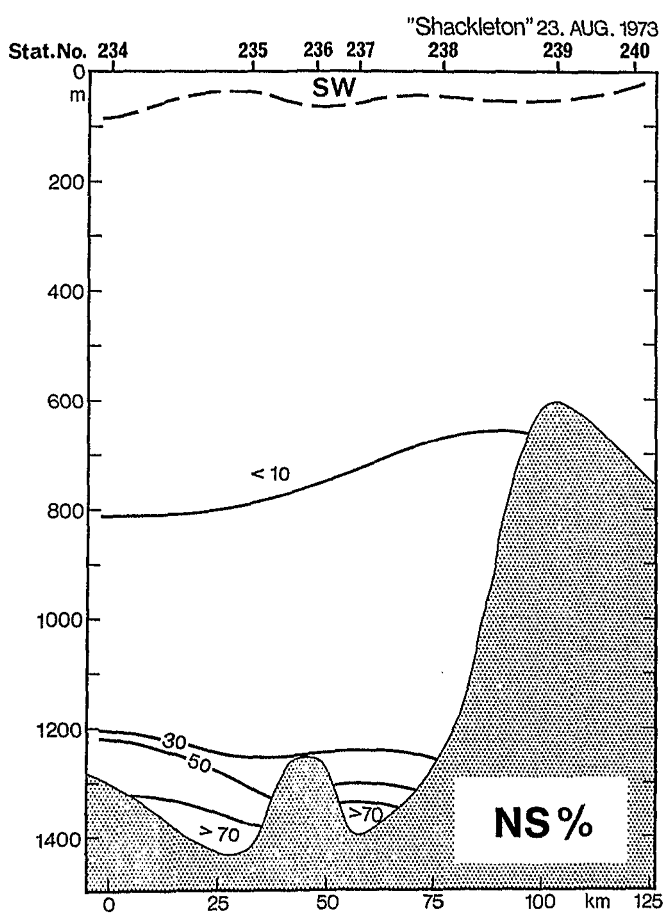

"Shackleton" 19.-20. AUG. 1973
Stat.No. 219 218 217 216 214 213 212 211
SW
< 10
>30
NS%
0 m 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
0 25 50 75 100 km 125

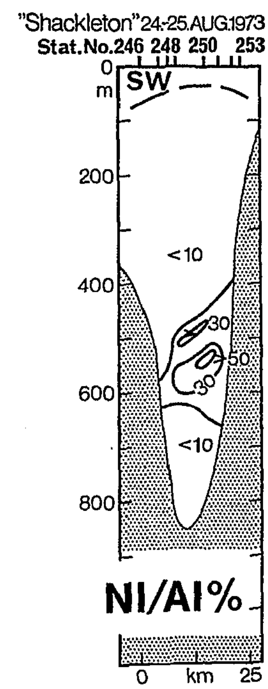

"Shackleton" 21.-22. AUG. 1973
Stat.No. 220 221 222 223 224 225 226
SW
< 10
30
> 70
50
NS%
0 m 200 400 600 800 1000 1200 1400 1600 1800
0 25 50 75 km 100

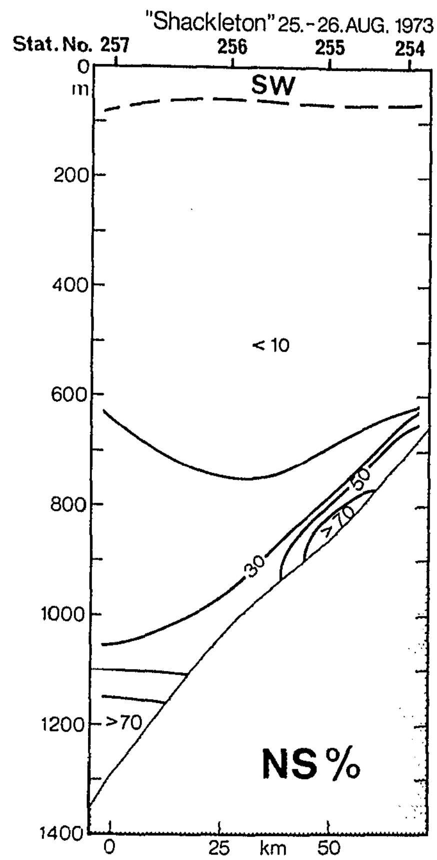

"Shackleton" 22. AUG.1973
Stat.No. 233 232 231 230 229 228 227
0
m
SW
200
400
600
800
1000
1200
1400
1600
<10
30
>50
30
>70
NS %
0 25 50 75 km 100

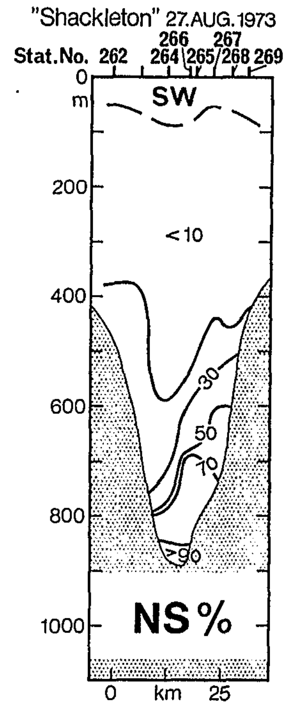

"Shackleton"23.-24.AUG.1973
Stat.No. 244 242 240
0
m
SW
200
400
600
800
1000
1200
1400
<10
>30
NS %
0 km 25

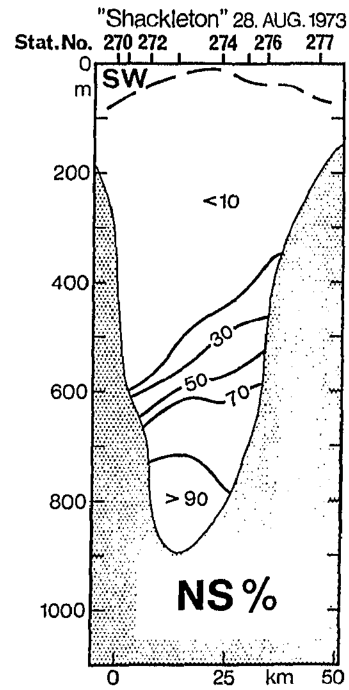

"Shackleton"24.-25.AUG.1973
Stat.No.246 248 250 253
0
m
SW
200
400
600
800
<10
30
50
70
>90
NS %
0 km 25

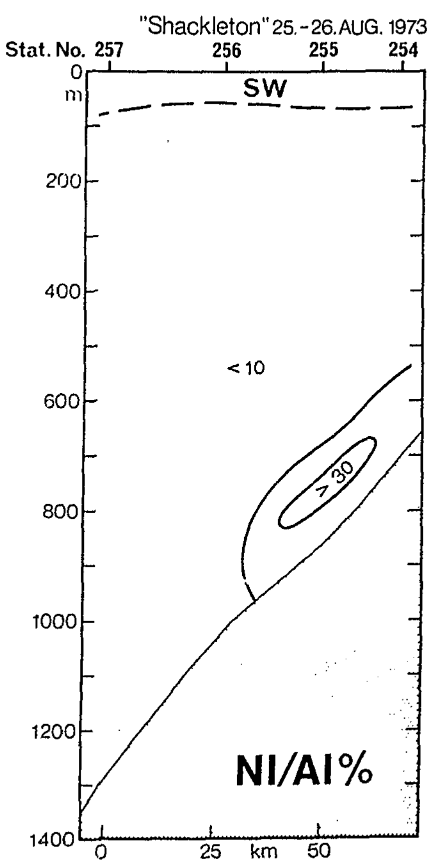

"Shackleton" 23. AUG. 1973
Stat.No. 234 235 236 237 238 239 240
0
m
SW
200
400
600
800
1000
1200
1400
<10
30
50
>70
>70
NS %
0 25 50 75 100 km 125

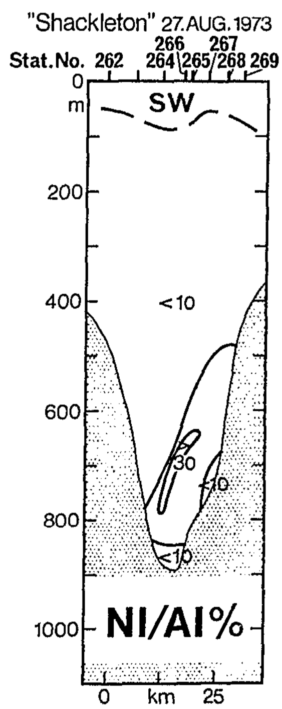

"Shackleton"24.-25.AUG.1973
Stat.No.246 248 250 253
0
m
SW
200
400
600
800
<10
30
50
30
<10
NI/AI %
0 km 25

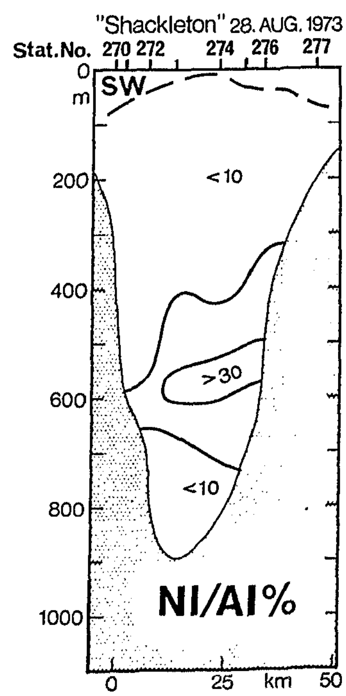

"Shackleton" 25.-26. AUG. 1973
Stat. No. 257 256 255 254
0 m
SW
200
400
600
800
1000
1200
1400
< 10
30
50
>70
>70
NS %
0 25 km 50

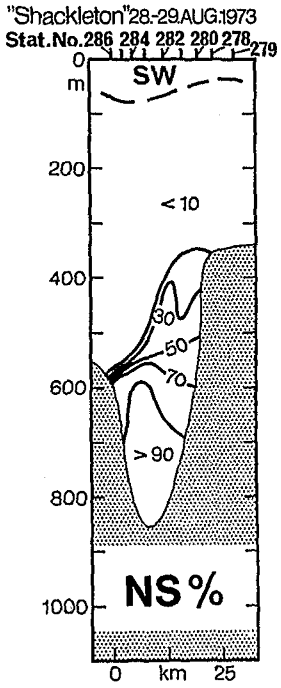

"Shackleton" 27. AUG. 1973
Stat. No. 262 264 266 265 267 268 269
0 m
SW
200
400
600
800
1000
< 10
30
50
70
>90
NS %
0 km 25

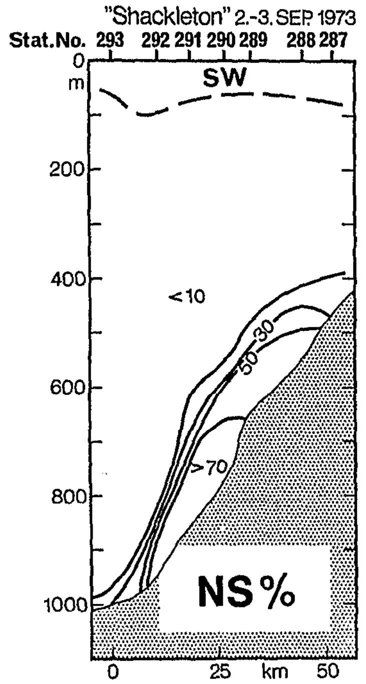

"Shackleton" 28. AUG. 1973
Stat. No. 270 272 274 276 277
0 m
SW
200
400
600
800
1000
<10
30
50
70
> 90
NS %
0 25 km 50

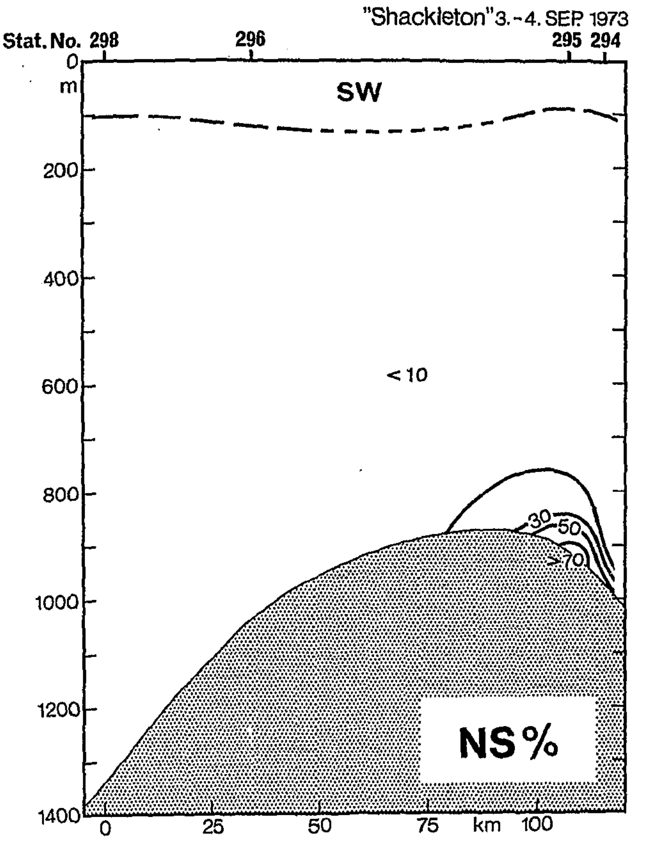

"Shackleton" 25.-26. AUG. 1973
Stat. No. 257 256 255 254
0 m
SW
200
400
600
800
1000
1200
1400
< 10
> 30
NI/AI %
0 25 km 50

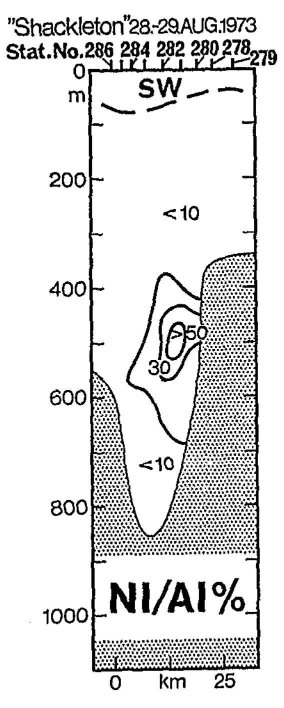

"Shackleton" 27. AUG. 1973
Stat. No. 262 264 266 265 267 268 269
0 m
SW
200
400
600
800
1000
< 10
30
<10
<10
NI/AI %
0 km 25

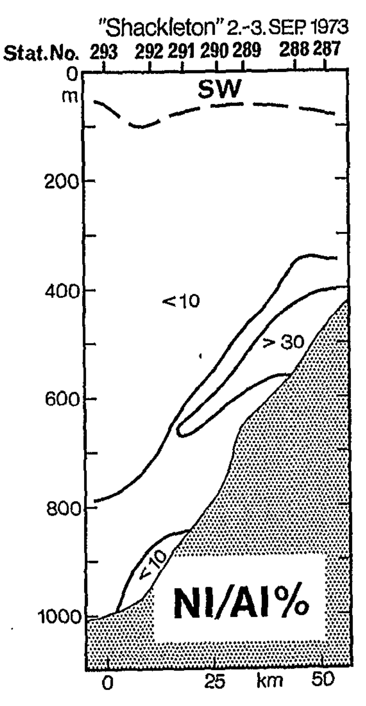

"Shackleton" 28. AUG. 1973
Stat. No. 270 272 274 276 277
0 m
SW
200
400
600
800
1000
< 10
>30
<10
NI/AI %
0 25 km 50


"Shackleton" 28.-29. AUG. 1973
Stat.No. 286 284 282 280 278 279
SW
<10
30
50
70
>90
NS %
0
m
200
400
600
800
1000
0 km 25


"Shackleton" 2.-3. SEP. 1973
Stat.No. 293 292 291 290 289 288 287
SW
<10
30
50
>70
NS %
0
m
200
400
600
800
1000
0 25 km 50


"Shackleton" 3.-4. SEP. 1973
Stat.No. 298 296 295 294
SW
<10
30
50
>70
NS %
0
m
200
400
600
800
1000
1200
1400
0 25 50 75 km 100


"Shackleton" 28.-29. AUG. 1973
Stat.No. 286 284 282 280 278 279
SW
<10
>50
30
<10
NI/AI %
0
m
200
400
600
800
1000
0 km 25

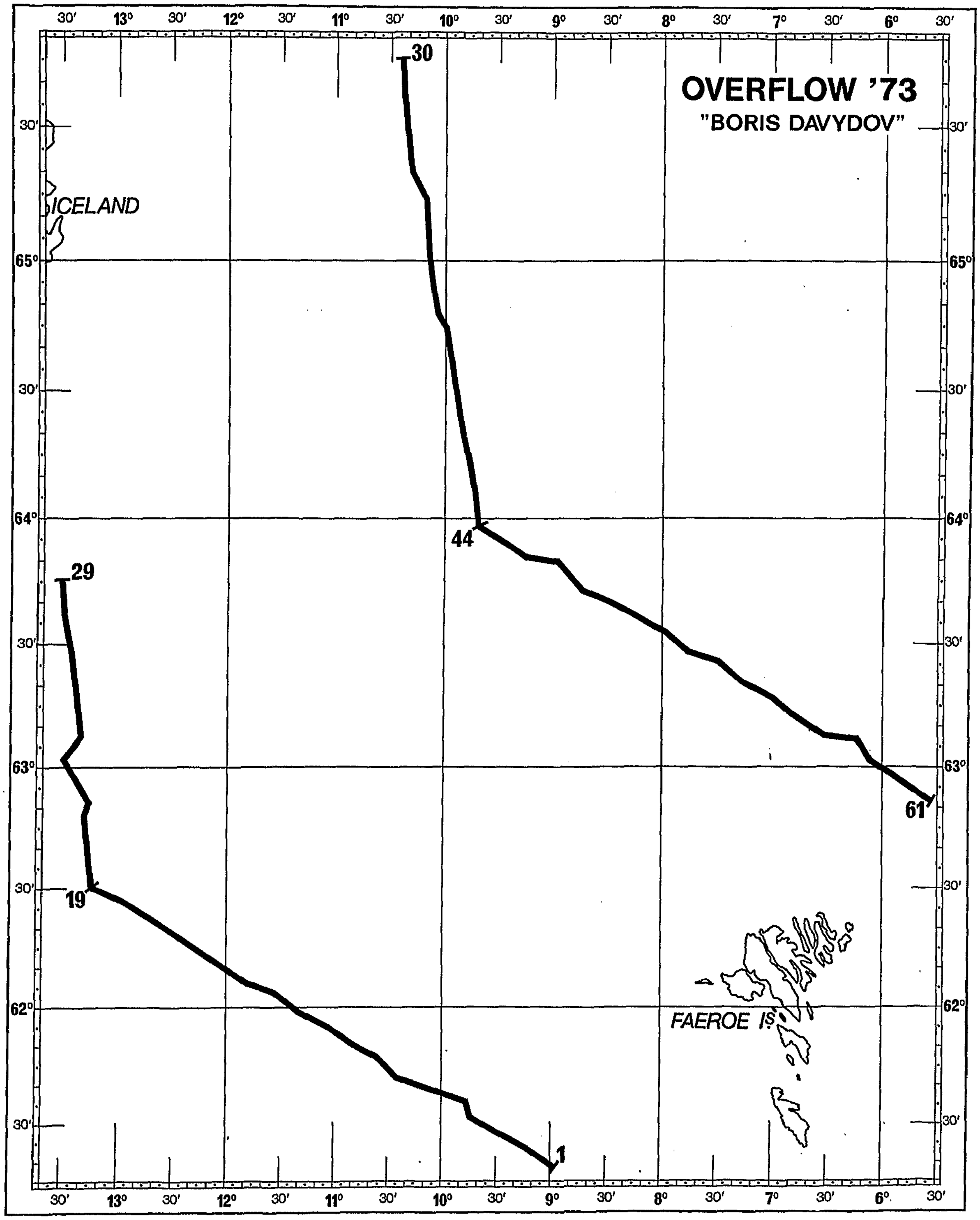

"Shackleton" 2.-3. SEP. 1973
Stat.No. 293 292 291 290 289 288 287
SW
<10
> 30
<10
NI/AI %
0
m
200
400
600
800
1000
0 25 km 50

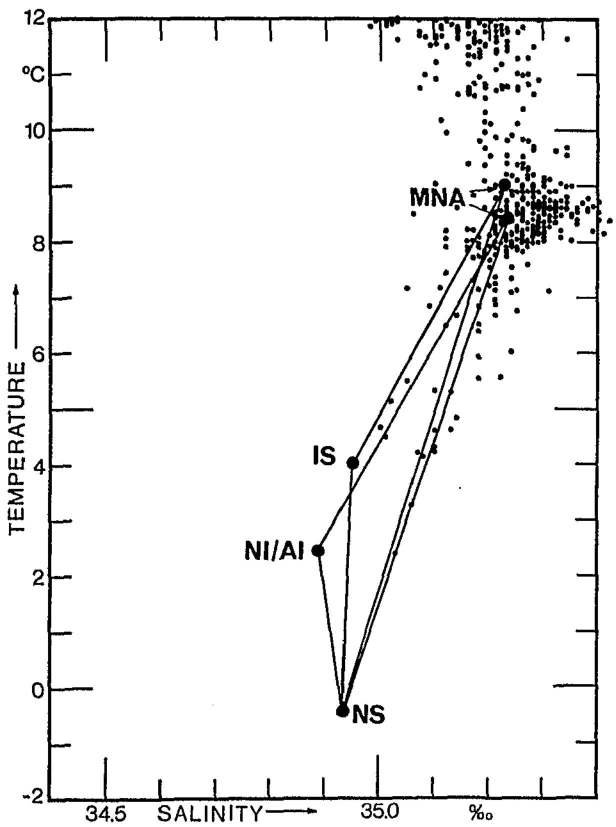
6.7 Boris Davydov

Both sections run parallel to the crest of the Iceland-Faroe ridge. Southwest of the ridge (Stat. 1 - 29) MNA, NI/AI and NS were analysed. IS is found in the Atlantic basin. In the eastern part of the northern section (Stat. 30 - 61) EIW and EIC were also observed.

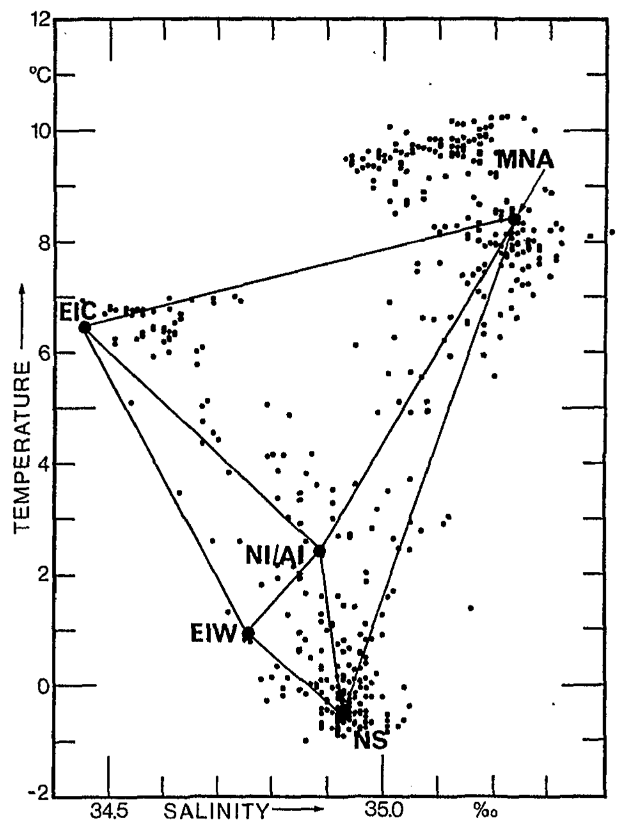
Remark: Many stations have been calibrated for salinity using NS as reference.

Section	Stat.No.	Mixing triangle (see table 3)
1 - 29	1 - 3	4
	4 - 9	2
	10 - 16	4
	17 - 19	2
	20 - 29	4
30 - 61	30 - 32	7, 8
	33	4, 5, 8
	34	7, 8
	35	5, 8
	36	4, 5
	37	7, 8
	38	4, 5, 8
	39	5, 8
	40, 41	5, 8
	42	4, 5, 8
	43, 44	4, 5
	45 - 61	4

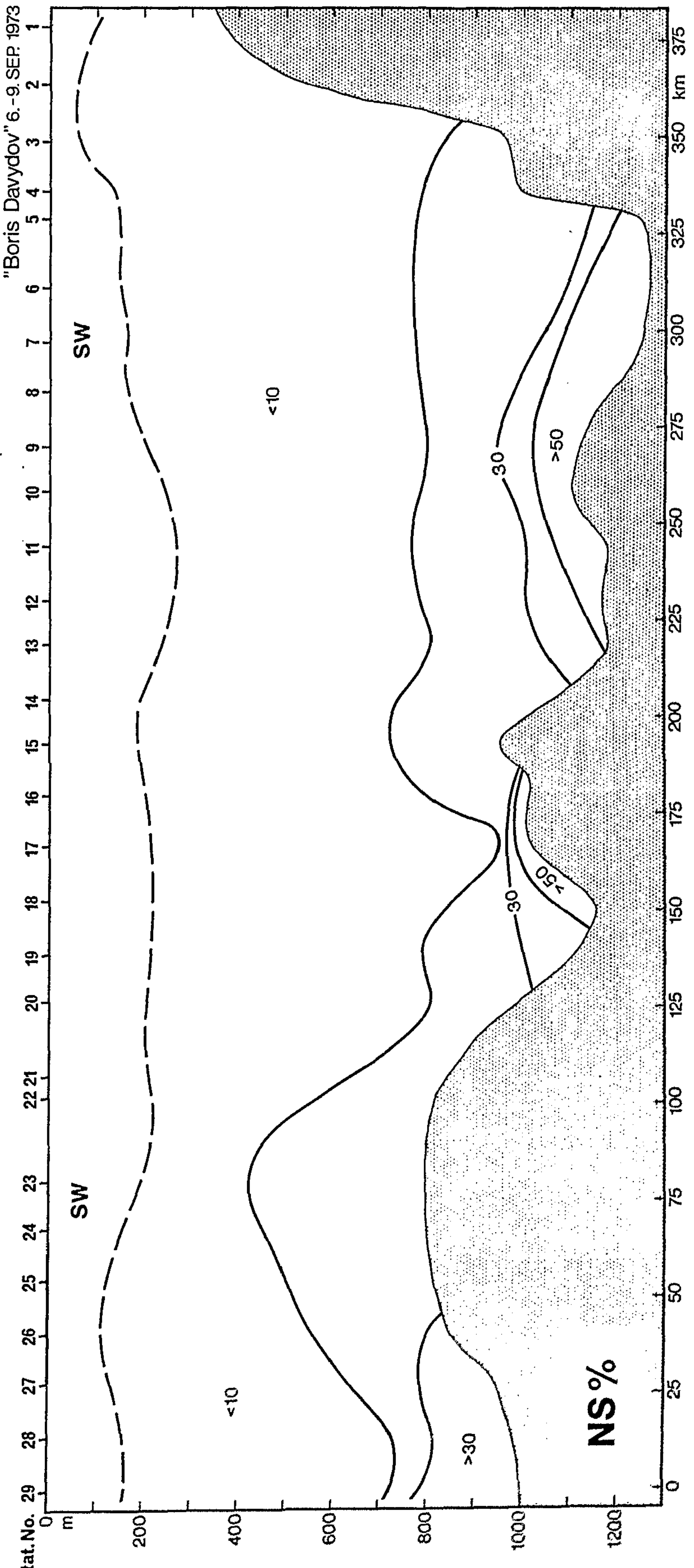

OVERFLOW '73
"BORIS DAVYDOV"
ICELAND
FAEROE IS.
30
44
61
29
19
1
30'
13°
12°
11°
10°
9°
8°
7°
6°
65°
64°
63°
62°

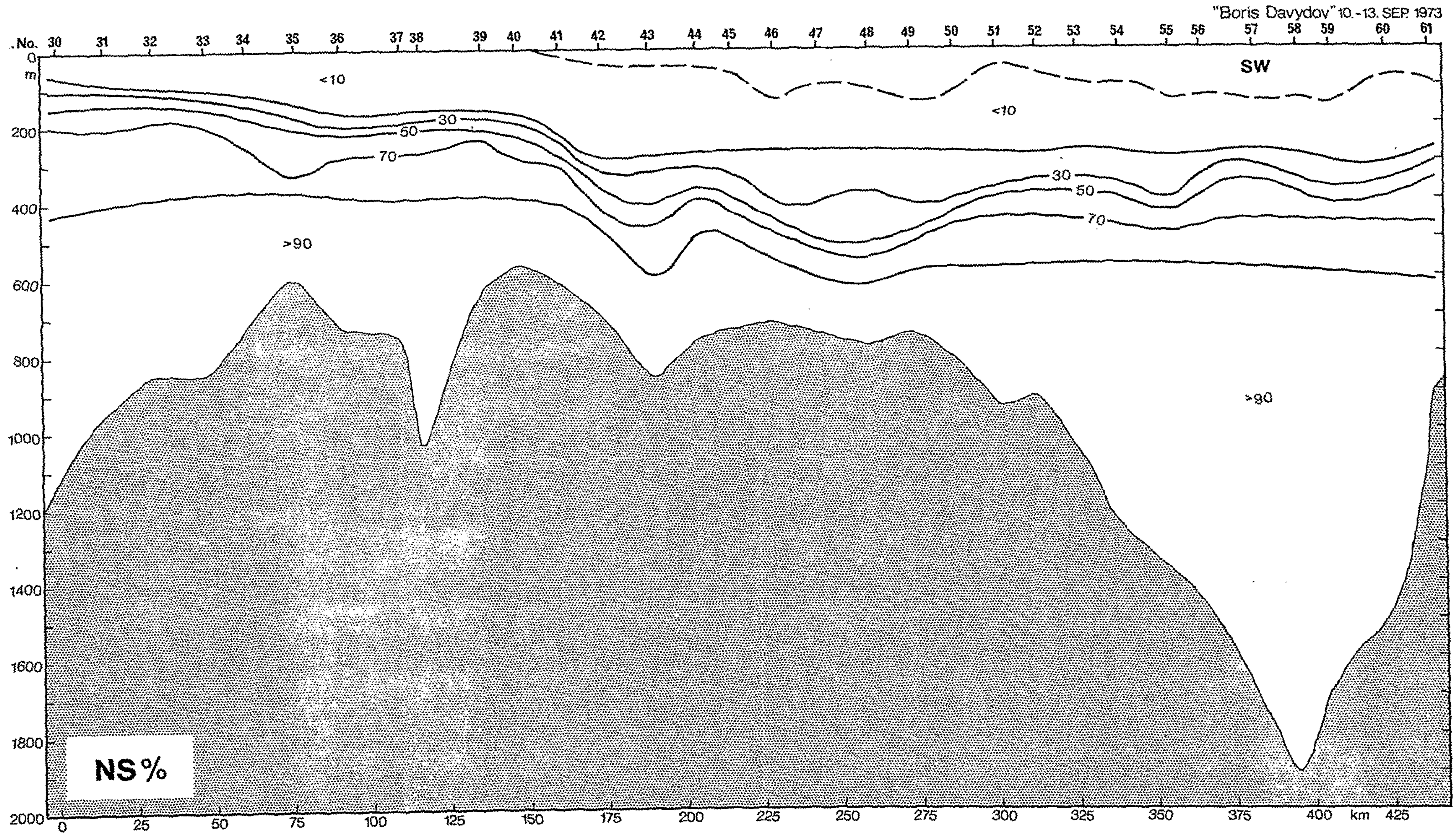


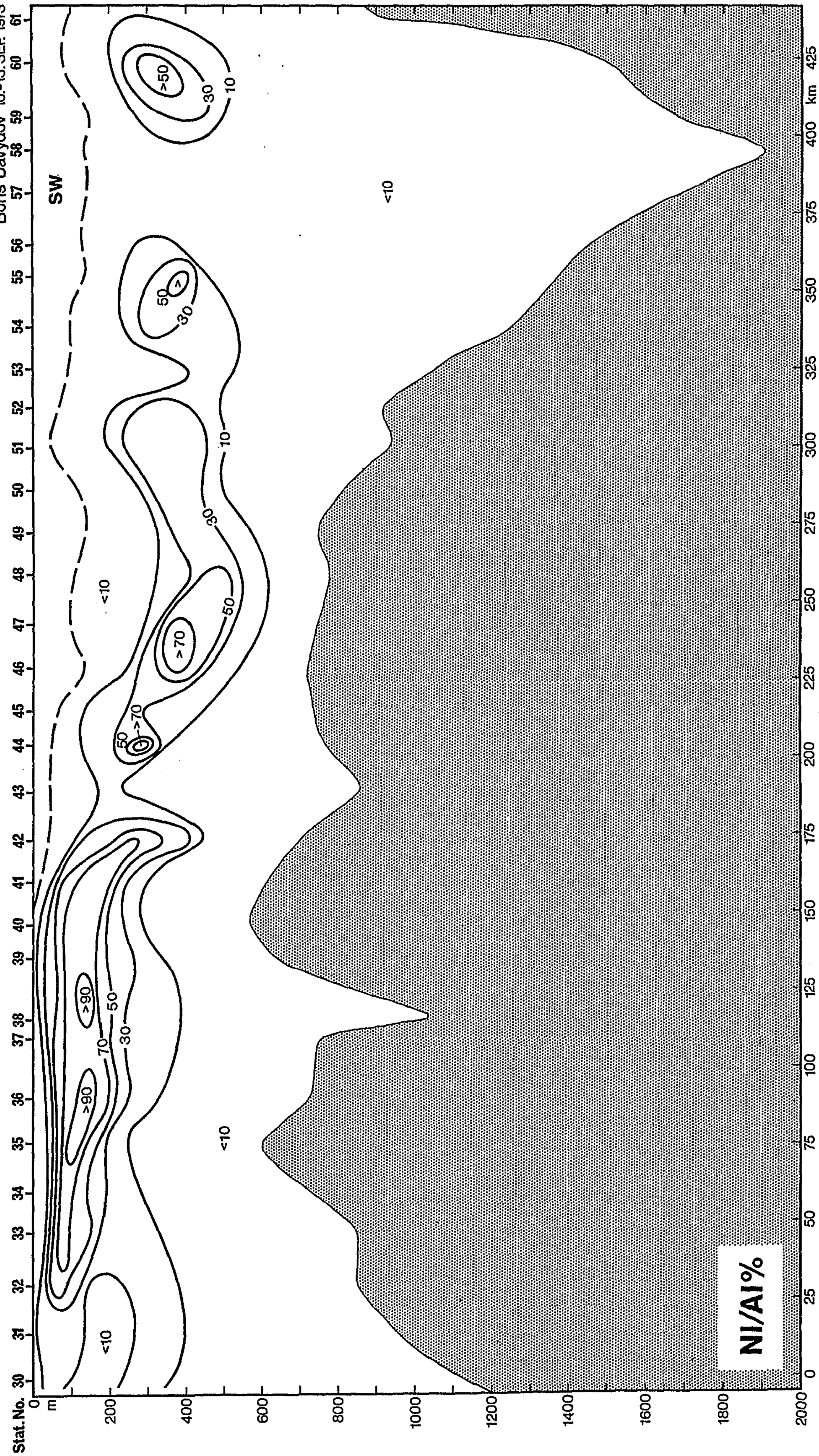
"BORIS DAVYDOV"6.-9.SEP.1973
STAT.NO.1-29

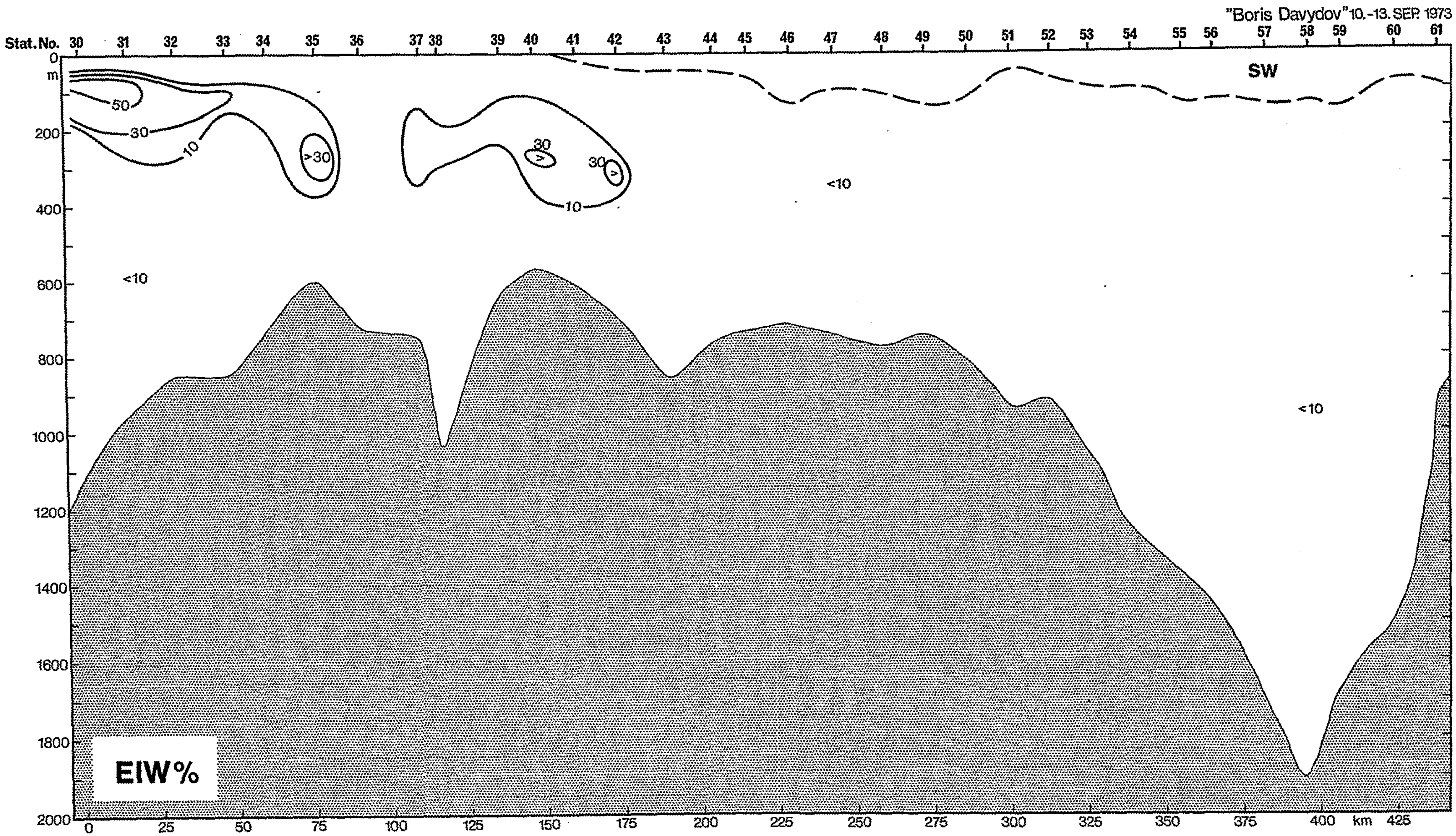


"BORIS DAVYDOV"10.-13.SEP.1973
STAT.NO.30-61


"Boris Davydov" 6.-9.SEP. 1973
Stat. No.
m
0
200
400
600
800
1000
1200
km
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
SW
SW
<10
<10
>30
30
30
>50
>50
NS %


"Boris Davydov" 10.-13. SEP. 1973
No.
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61
SW
m
0 200 400 600 800 1000 1200 1400 1600 1800 2000
<10
30
50
70
>90
0 25 50 75 100 125 150 175 200 225 250 275 300 325 350 375 400 km 425
NS%

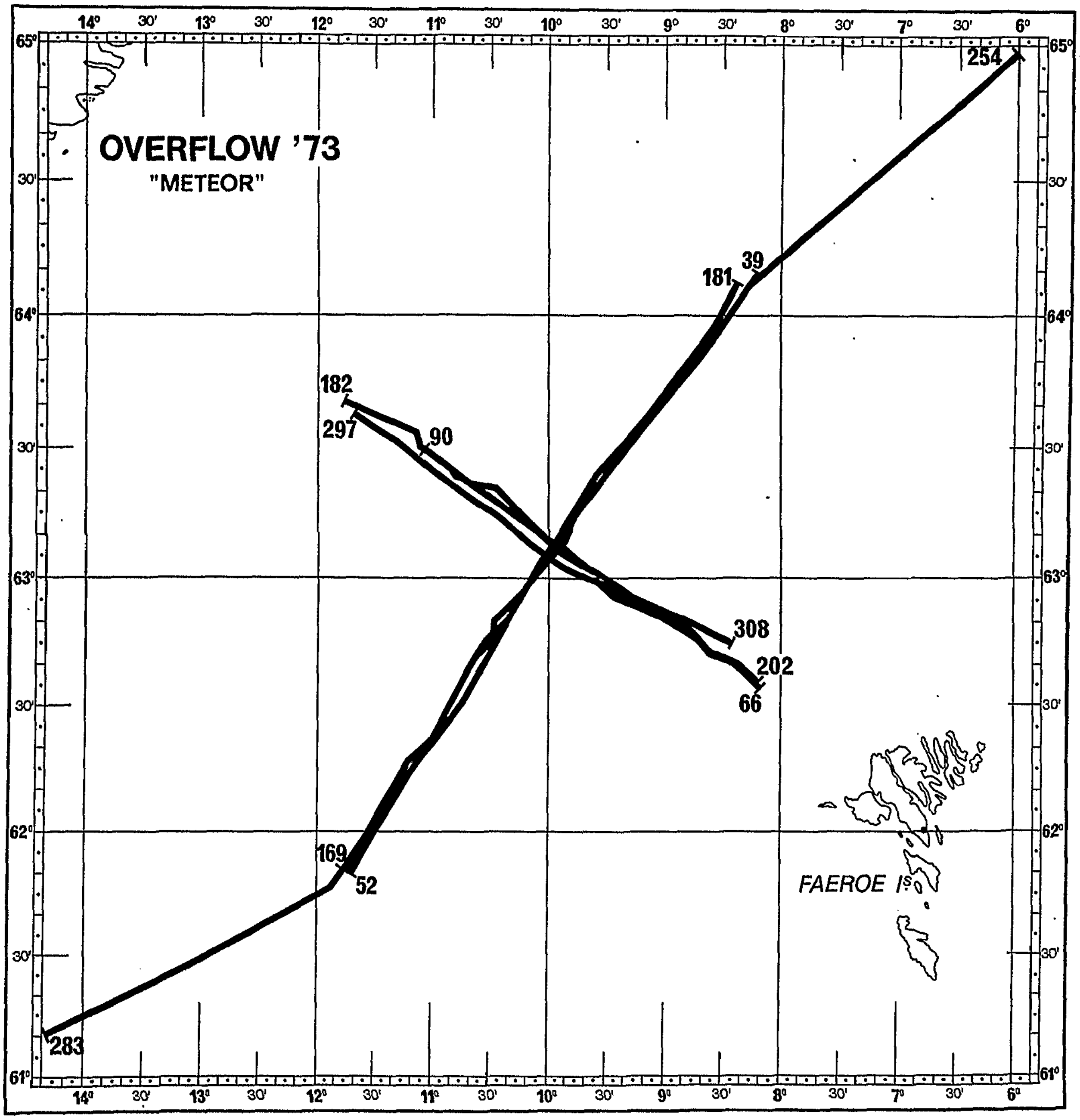

"Boris Davydov" 10.-13. SEP. 1973
SW
NI/Al%
Stat. No.
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61
m
0 200 400 600 800 1000 1200 1400 1600 1800 2000
0 25 50 75 100 125 150 175 200 225 250 275 300 325 350 375 400 425 km
<10
10
30
50
70
>90
>70
>50

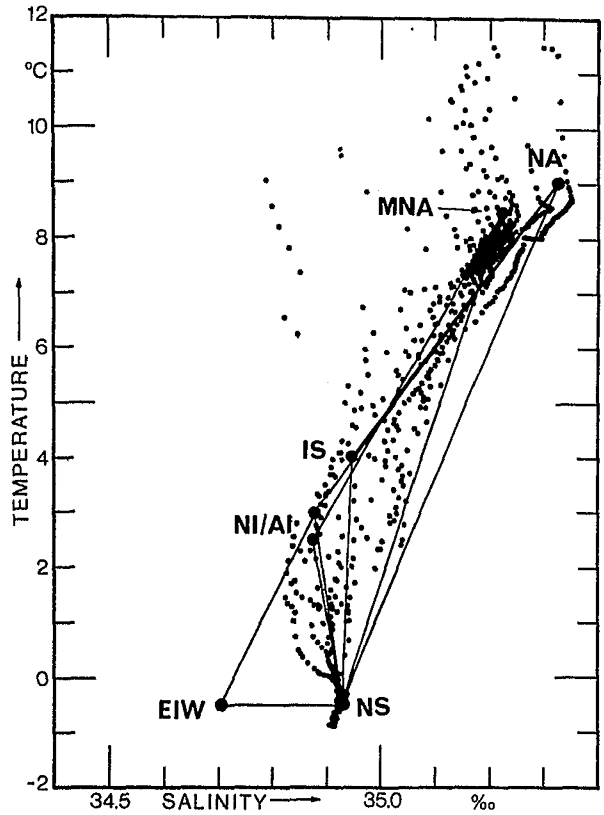

"Boris Davydov" 10.-13. SEP. 1973
Stat. No.
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61
m
0
200
400
600
800
1000
1200
1400
1600
1800
2000
0 25 50 75 100 125 150 175 200 225 250 275 300 325 350 375 400 km 425
SW
50
30
10
>30
30
>
30
>
10
<10
<10
<10
EIW%

6.8 Meteor

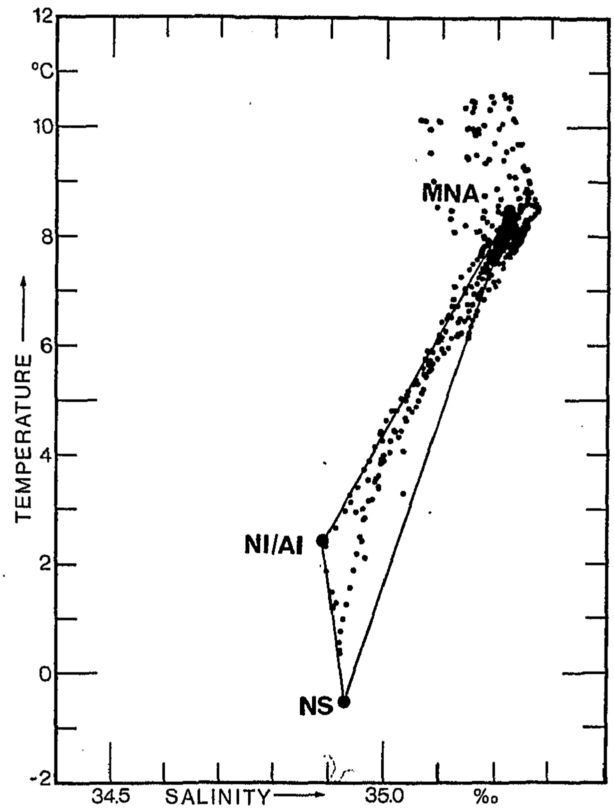
Sections were run across the central part of the Iceland-Faroe-Ridge and parallel to it's crest. Thus all water masses of this area have been observed. They show a rather complicated horizontal structure of overflow waters. Besides NI/AI and NS, isolated amounts of EIW and EIC were found at single stations.

Section	Stat.No.	Mixing triangle (see table 3)
39 - 52	39, 41	4, 8
	42 - 50	4
	51, 52	1
66 - 90		4
169 - 181	169, 170	2
	171 - 176	4
	177 - 179	4, 5
	180	4, 5, 8
	181	5, 8
182 - 202	182	4, 5
	183 - 188	4
	189	4, 5
	190, 191	4
	192, 193	4, 5
	194 - 202	4
254 - 283	254	4, 5
	260	4, 5, 8
	262	5, 8
	264 - 274	4, 5
	277, 280, 283	2
297 - 308	297 - 299	4, 5
	300	4, 5, 8
	301	4, 5
	302 - 308	4

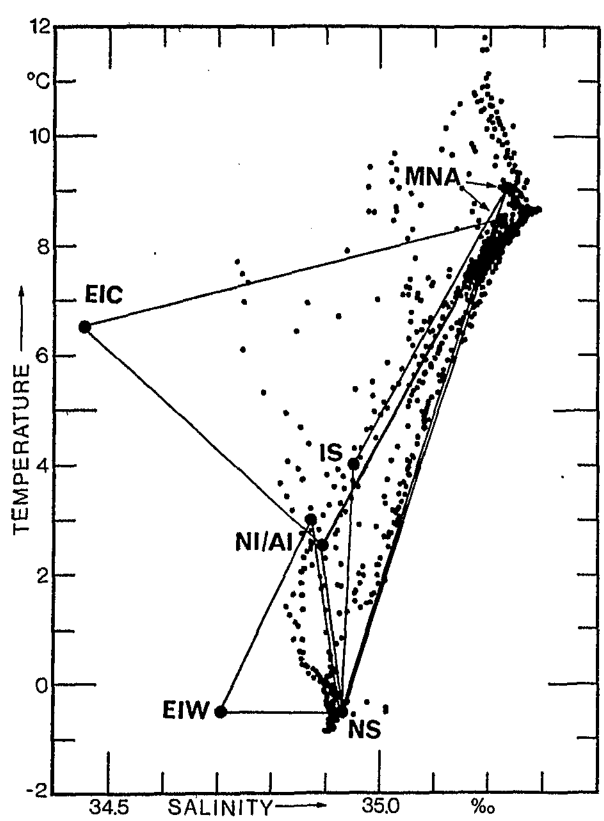

OVERFLOW '73
"METEOR"
14°
30'
13°
12°
11°
10°
9°
8°
7°
6°
65°
64°
63°
62°
61°
254
39
181
182
297
90
308
202
66
169
52
283
FAEROE Is



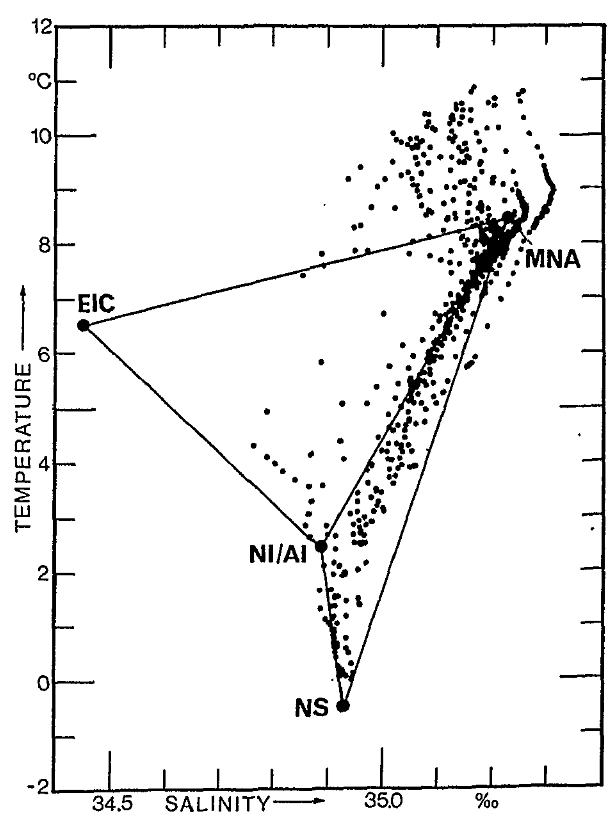
"METEOR"16.-17.AUG.1973
STAT.NO.39,41 -52



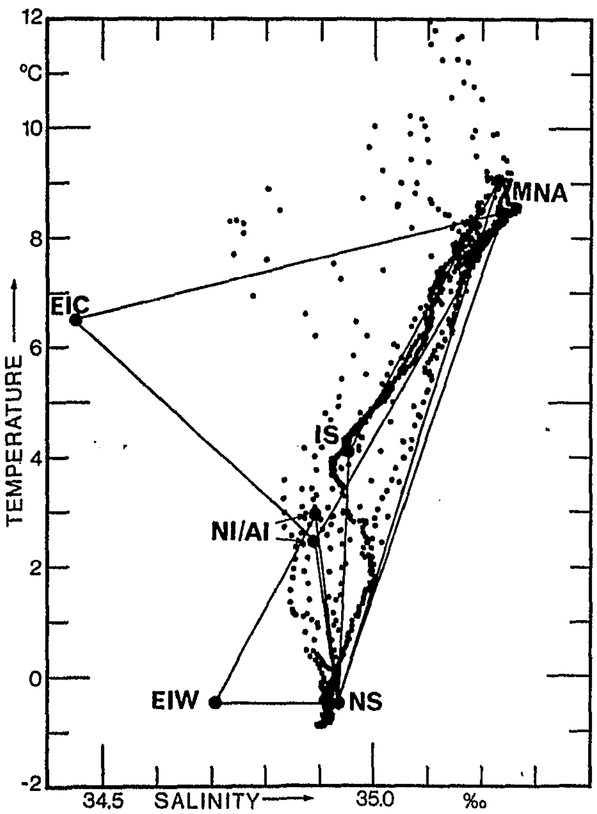
"METEOR"18.-19.AUG.1973
STAT.NO.66,68,70,72,74,75,77,79,
86,88,90



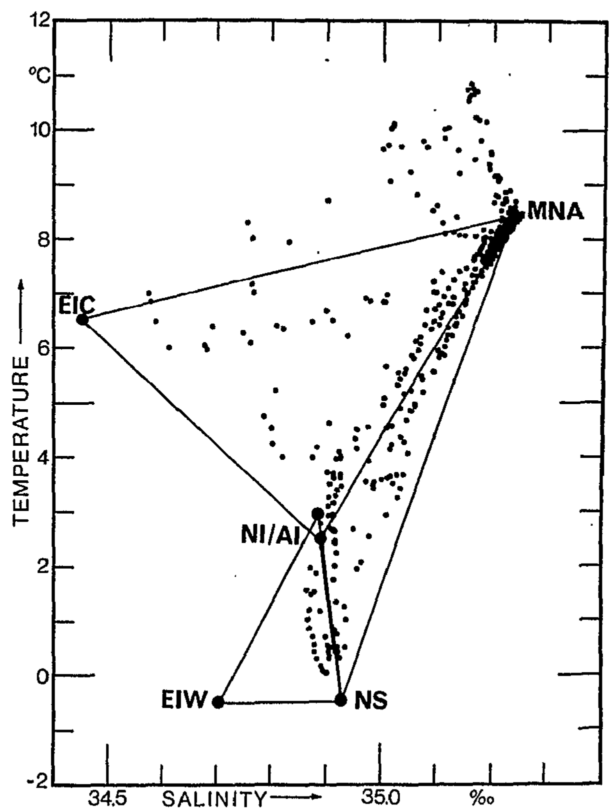
"METEOR"24.-26.AUG.1973
STAT.NO.169-181



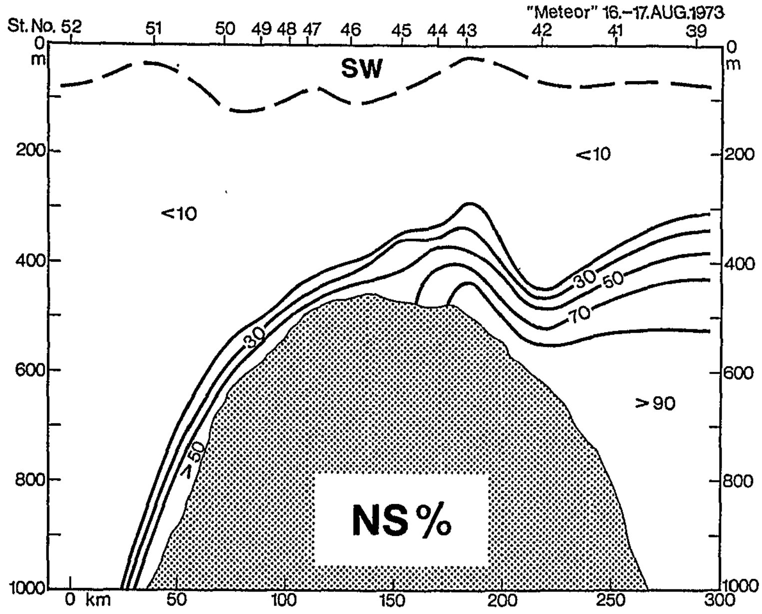
"METEOR"26.-28.AUG.1973
STAT.NO.182-202,184a,189a

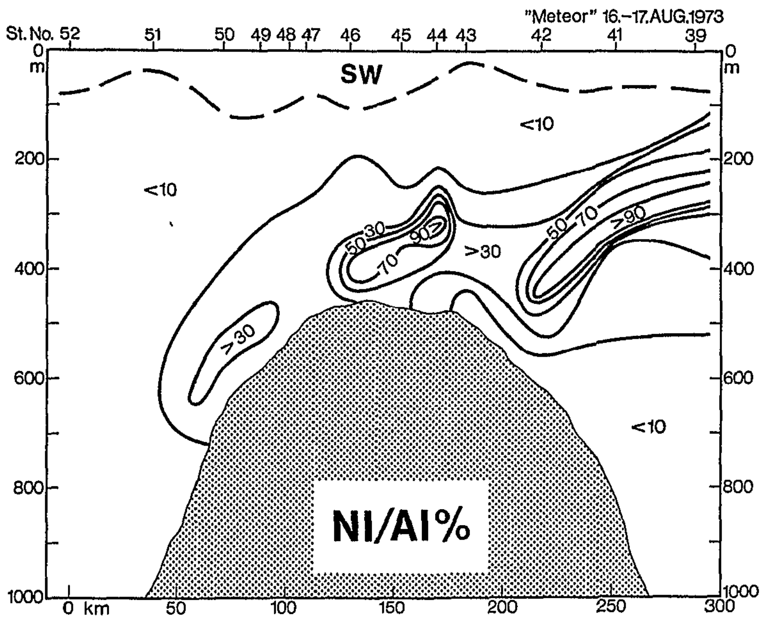


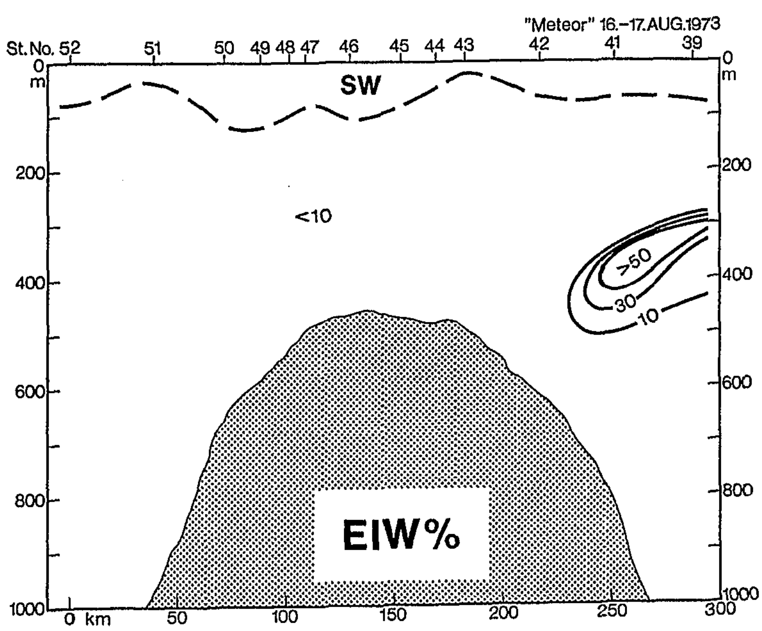
"METEOR" 4.-8.SEP.1973
STAT.NO.254,260,262,264,268,270,
272,274,277,280,283

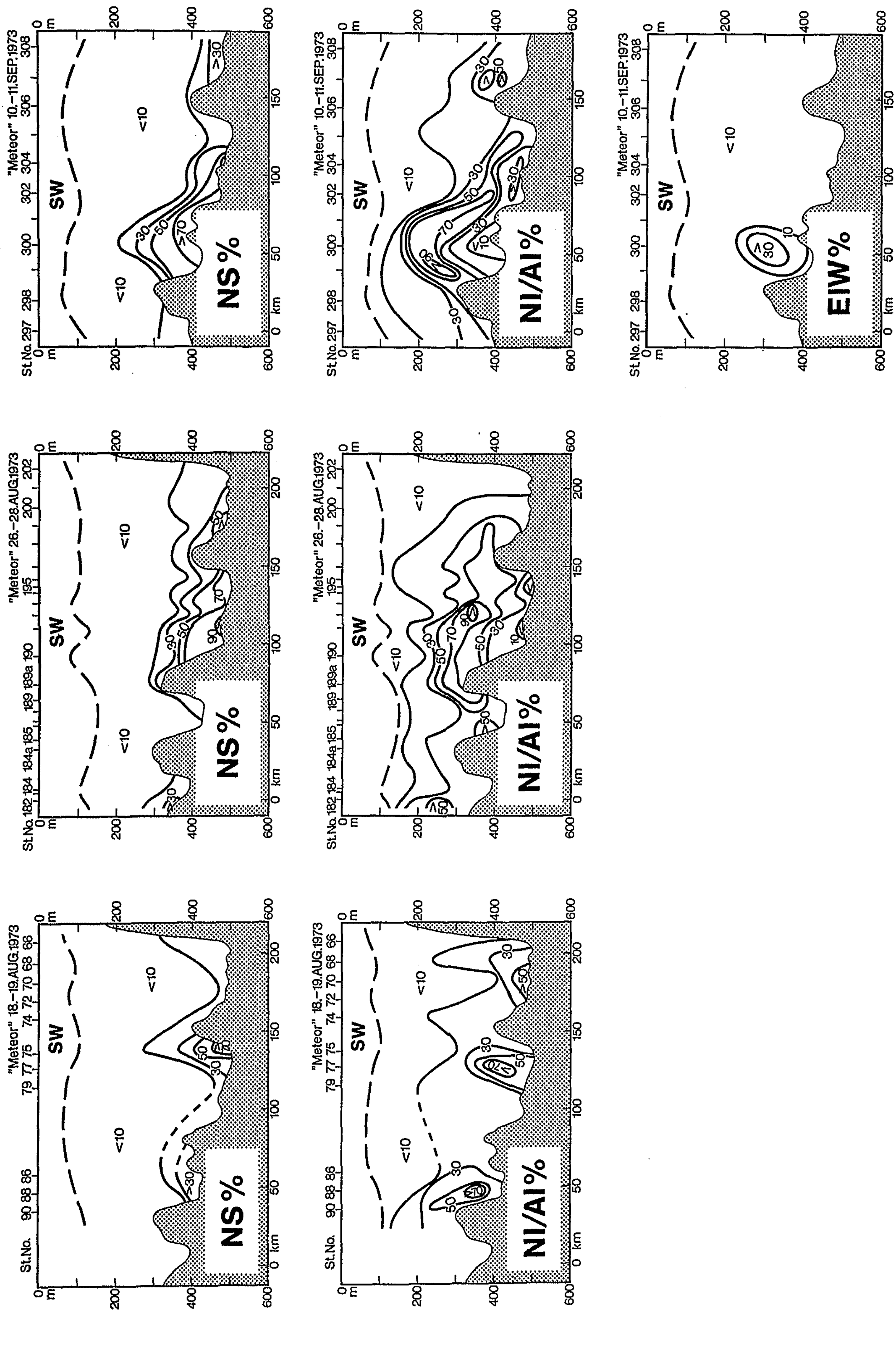


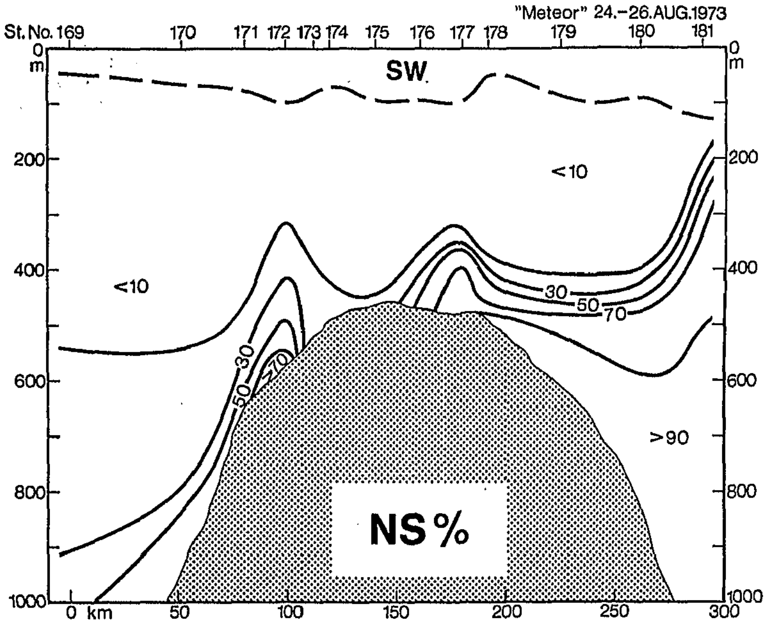
"METEOR" 10.-11.SEP.1973
STAT.NO.297-302,304-308

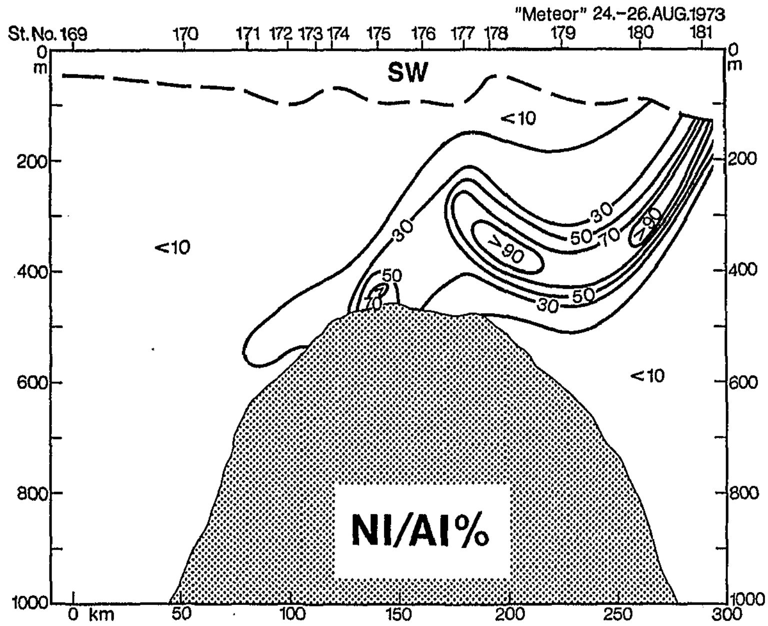

"Meteor" 16.–17.AUG.1973
St.No. 52 51 50 49 48 47 46 45 44 43 42 41 39
SW
<10
<10
30
50
70
30
>50
>90
NS %
0 km 50 100 150 200 250 300
0 m 200 400 600 800 1000

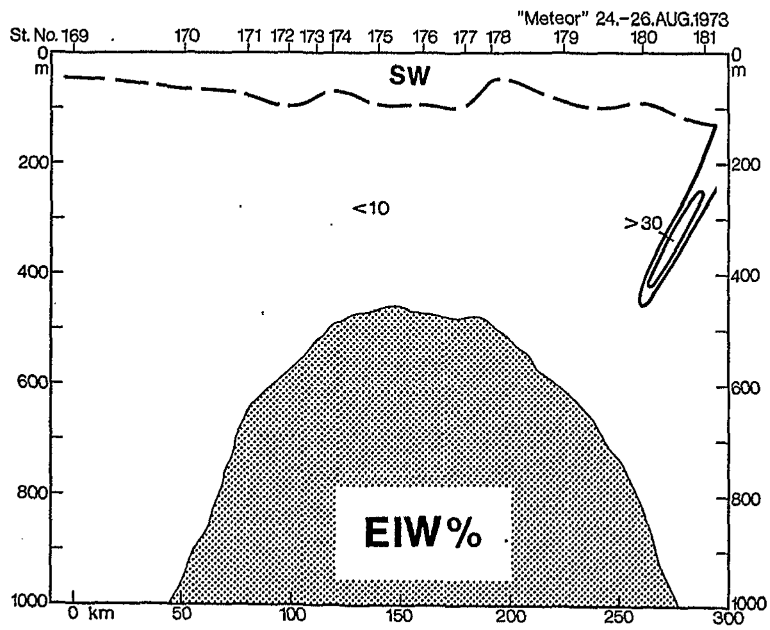

"Meteor" 16.–17.AUG.1973
St.No. 52 51 50 49 48 47 46 45 44 43 42 41 39
SW
<10
<10
50 30
90
70
>30
50 70 >90
>30
<10
NI/AI %
0 km 50 100 150 200 250 300
0 m 200 400 600 800 1000

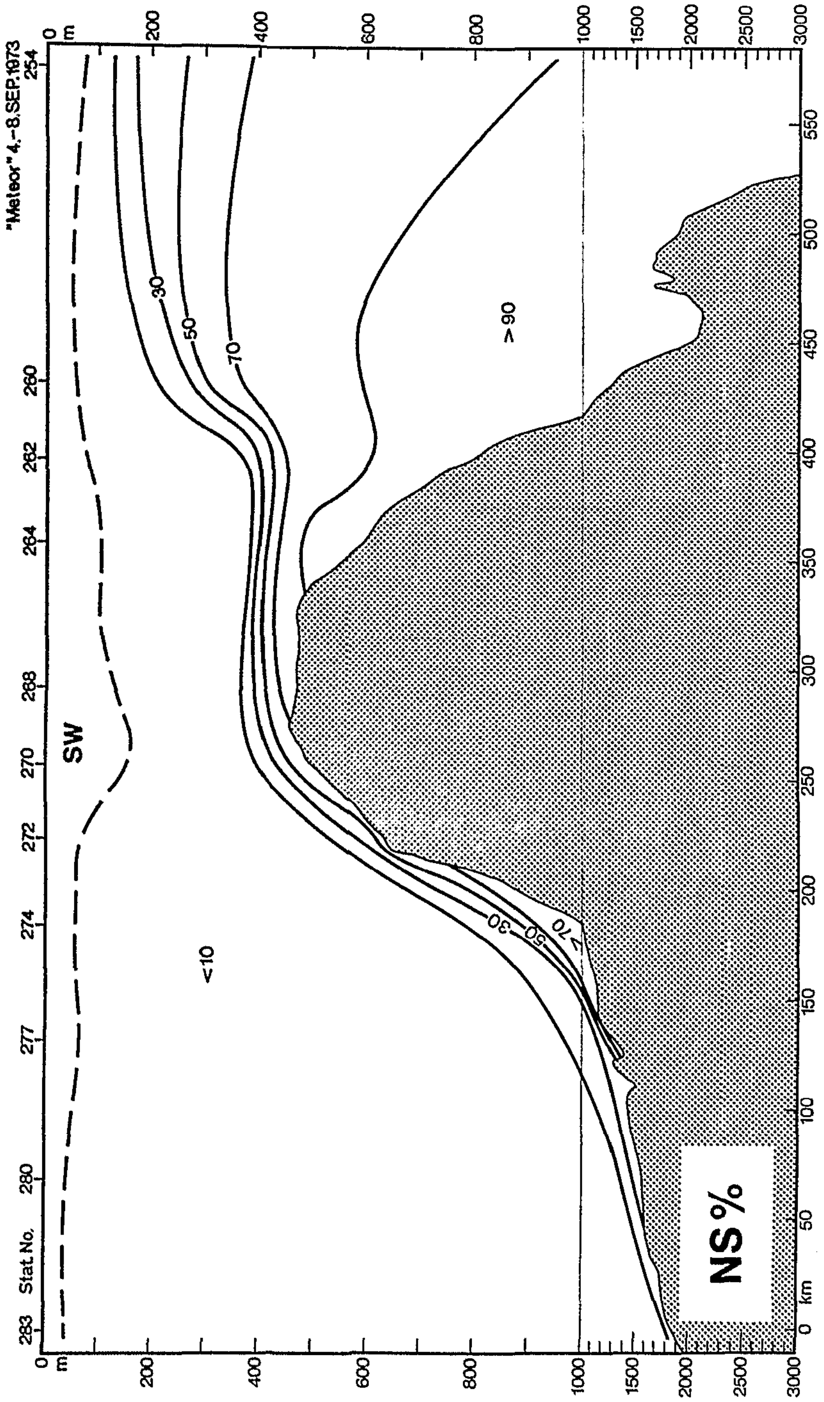

"Meteor" 16.–17.AUG.1973
St.No. 52 51 50 49 48 47 46 45 44 43 42 41 39
SW
<10
>50
30
10
EIW %
0 km 50 100 150 200 250 300
0 m 200 400 600 800 1000

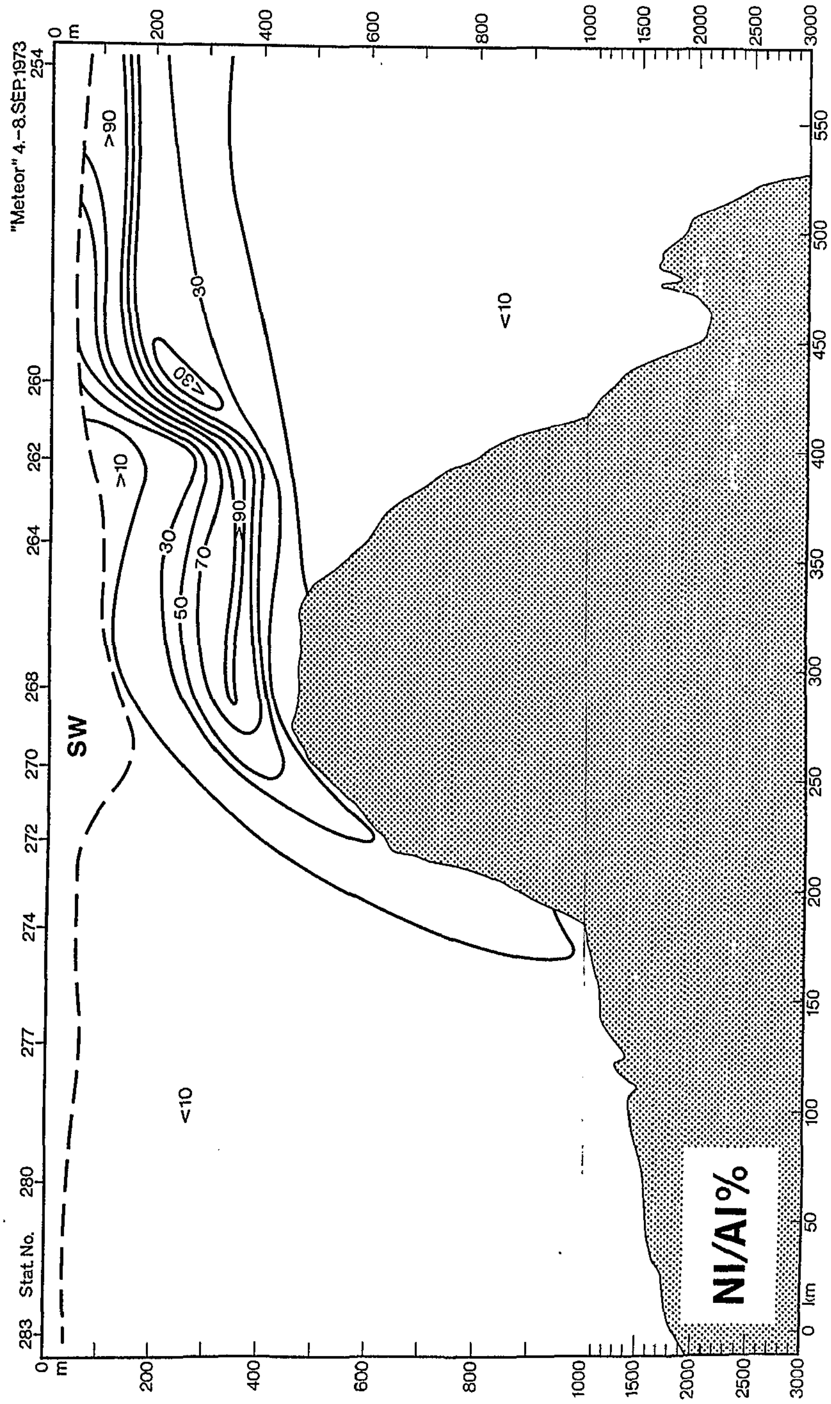

"Meteor" 18.–19.AUG.1973
St.No. 90 88 86 79 77 75 74 72 70 68 66
NS %
NI/AI %
"Meteor" 26.–28.AUG.1973
St.No. 182 184 184a 185 189 189a 190 195 200 202
NS %
NI/AI %
"Meteor" 10.–11.SEP.1973
St.No. 297 298 300 302 304 306 308
NS %
NI/AI %
EIW %
SW
<10
km
m

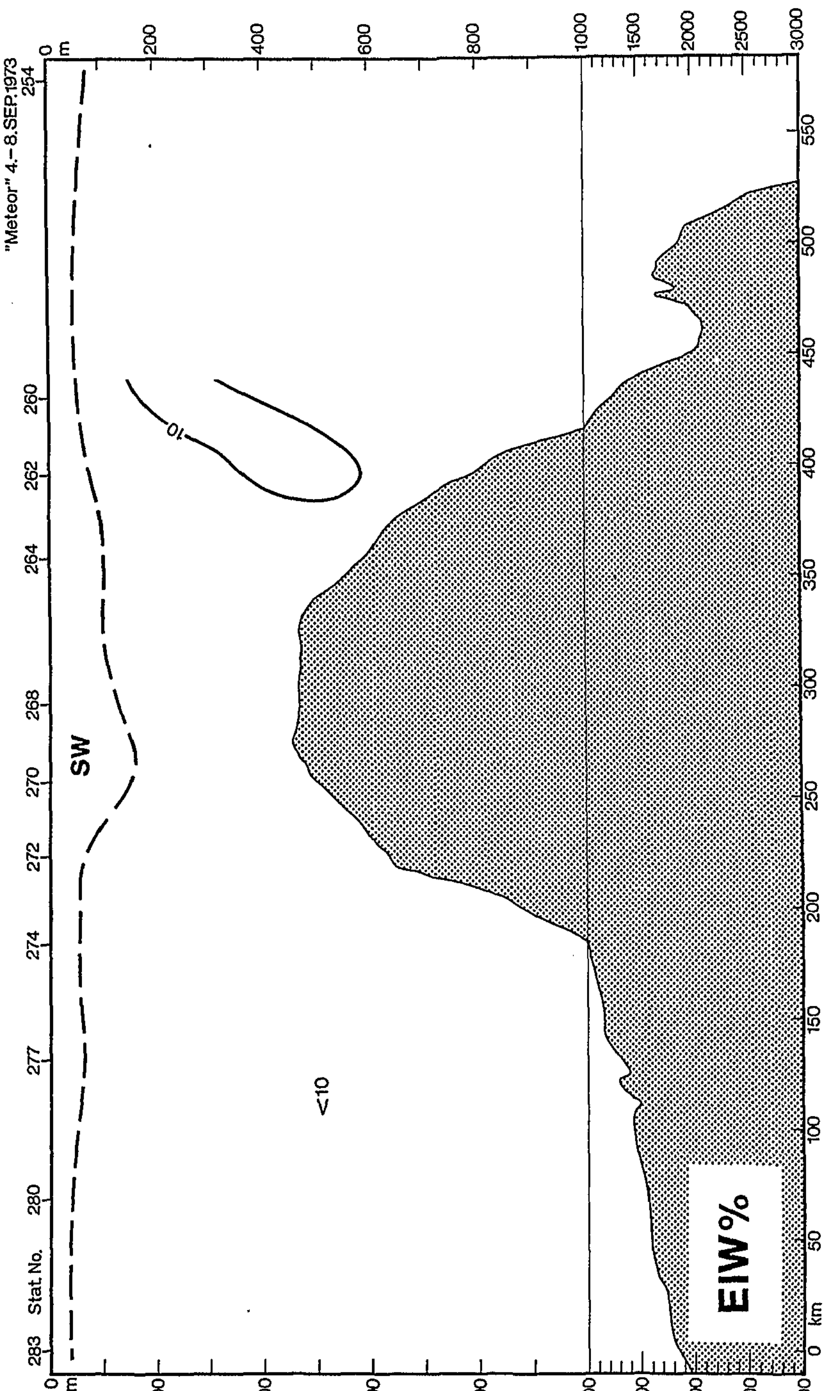

"Meteor" 24.-26.AUG.1973
St.No. 169
170
171 172 173 174 175 176 177 178
179
180
181
SW
<10
<10
30
50
70
>90
NS%
0 km
50
100
150
200
250
300
m
200
400
600
800
1000


"Meteor" 24.-26.AUG.1973
St.No. 169
170
171 172 173 174 175 176 177 178
179
180
181
SW
<10
<10
<10
30
50
70
>90
NI/AI%
0 km
50
100
150
200
250
300
m
200
400
600
800
1000


"Meteor" 24.-26.AUG.1973
St.No. 169
170
171 172 173 174 175 176 177 178
179
180
181
SW
<10
>30
EIW%
0 km
50
100
150
200
250
300
m
200
400
600
800
1000


"Meteor" 4.-8.SEP.1973
Stat. No.
283
280
277
274
272
270
268
264
262
260
254
SW
<10
>90
30
50
70
NS%
km
m


"Meteor" 4.-8.SEP.1973
Stat. No.
283
280
277
274
272
270
268
264
262
260
254
SW
>90
>10
<10
<10
<30
30
50
70
>90
NI/AI%
km
0
50
100
150
200
250
300
350
400
450
500
550
0
m
200
400
600
800
1000
1500
2000
2500
3000


"Meteor" 4.–8.SEP.1973
Stat. No.
283
280
277
274
272
270
268
264
262
260
254
SW
10
<10
EIW%
0 m
200
400
600
800
1000
1500
2000
2500
3000
km
0
50
100
150
200
250
300
350
400
450
500
550

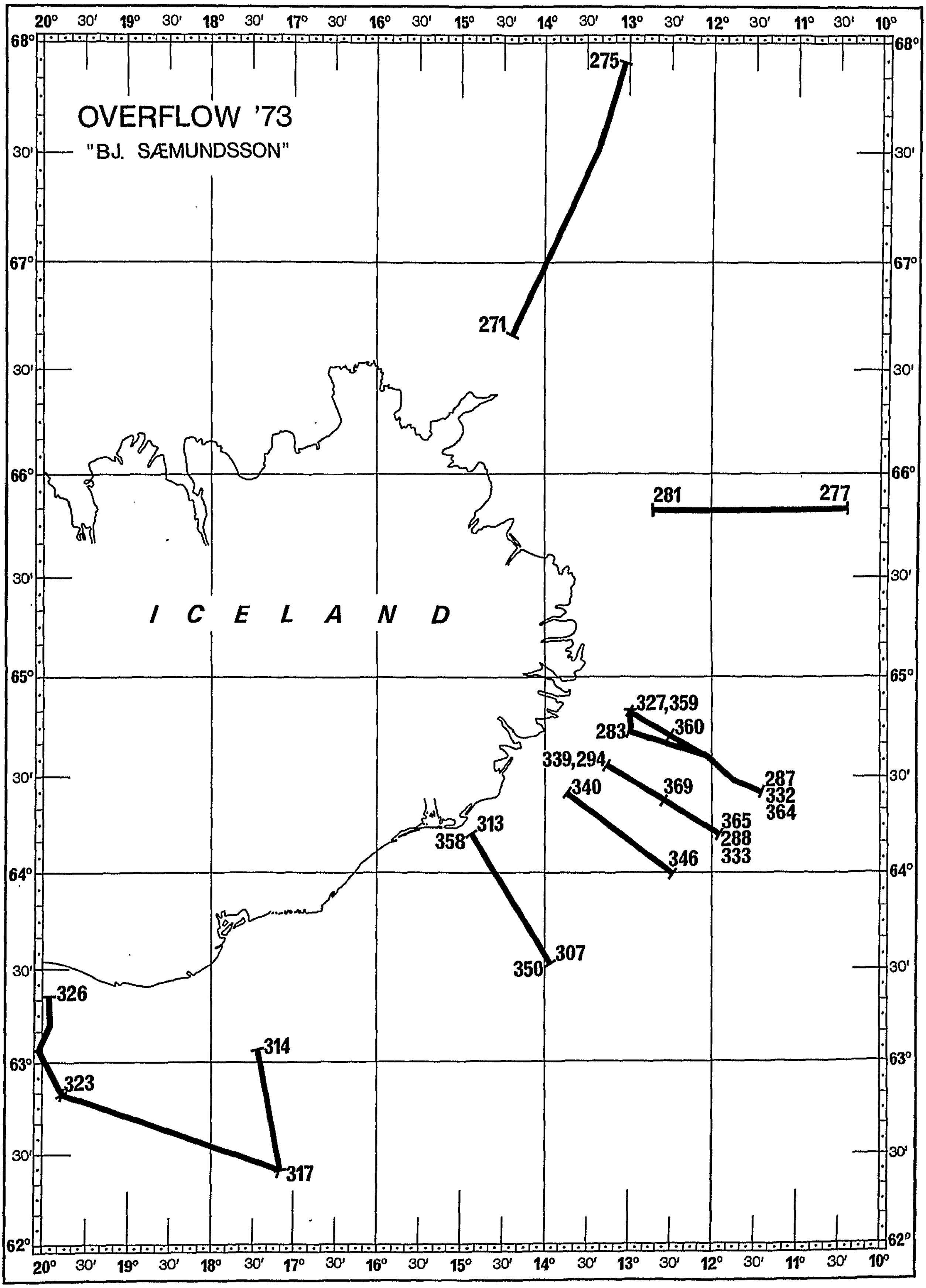
6.9 Bj. Saemundsson

The boundary between the North Atlantic water and the East-Icelandic Current is often crossed by the sections. Thus MNA,EIC, NS, NI/AI and EIW are found.From stations 354 to 358 the amount of NI/AI is less 10 %.

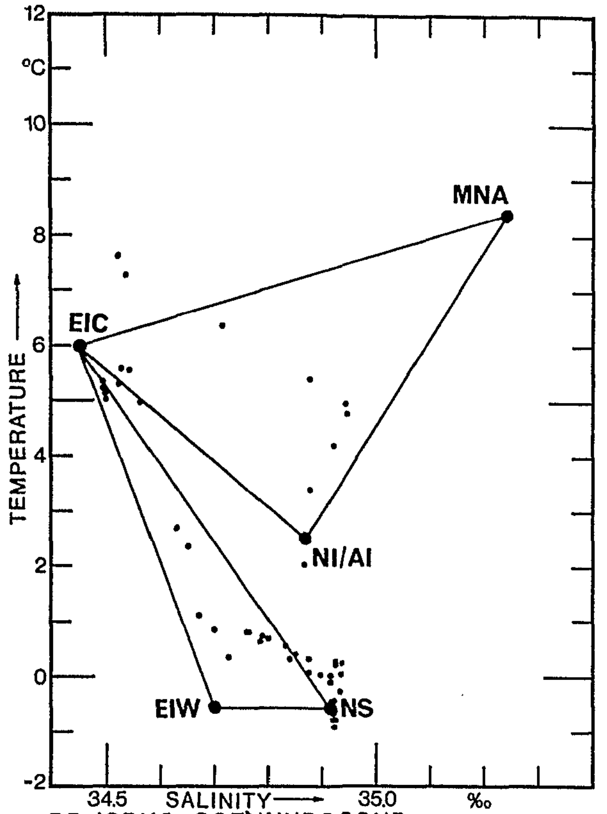
Section	Stat.No.	Mixing triangle (see table 3)
271 - 275	271 - 272	5
	273 - 275	6
277 - 281	277 - 280	6
	281	5
283 - 287	283, 284	5
	285 - 287	5, 7, 8
288 - 294	288, 289	5
	290, 291	5, 7
	292, 293	7
	294	5
307 - 313	307 - 309	2
	310 - 313	5
314 - 317		2
317 - 323		2
323 - 326		2
327 - 332	327 - 329	5, 7
	330 - 332	7, 8
333 - 339	333 - 335	4, 5
	336	5, 8
	337 - 339	5
340 - 346	340 - 343	5
	344 - 346	4
350 - 358	350 - 353	2
	354 - 358	5

6.9 (cont'd)

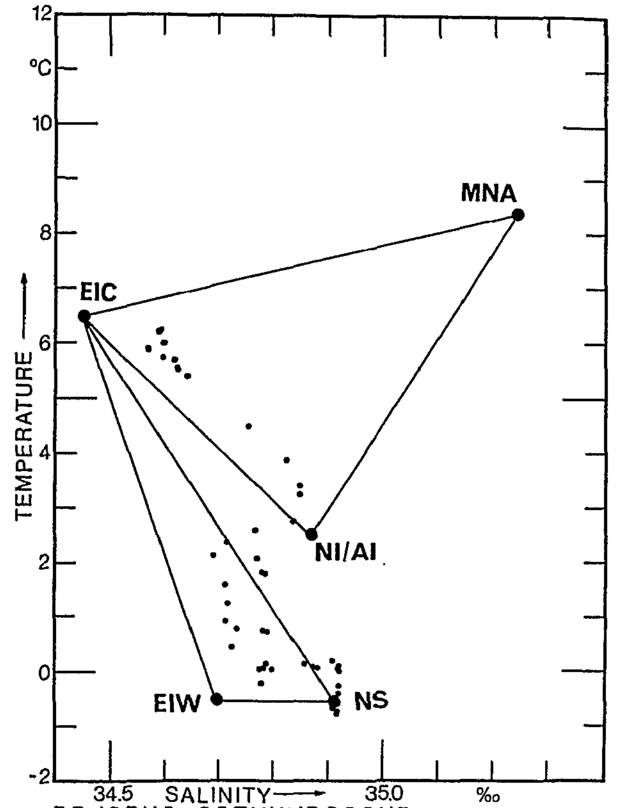
Section	Stat.No.	Mixing triangle (see table 3)
359 - 364	359	7
	360	5
	361	7
	362 - 364	4, 8
365 - 369		4



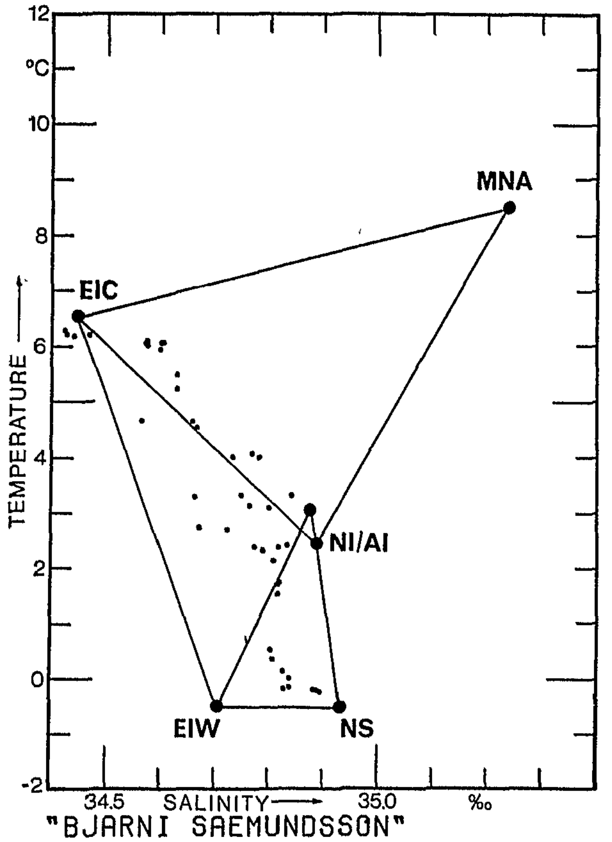
OVERFLOW '73
"BJ. SÆMUNDSSON"
I C E L A N D
20° 30' 19° 30' 18° 30' 17° 30' 16° 30' 15° 30' 14° 30' 13° 30' 12° 30' 11° 30' 10°
68° 30' 67° 30' 66° 30' 65° 30' 64° 30' 63° 30' 62°
275
271
281
277
327,359
283
360
339,294
287
332
364
340
369
365
288
333
346
313
358
307
350
326
314
323
317



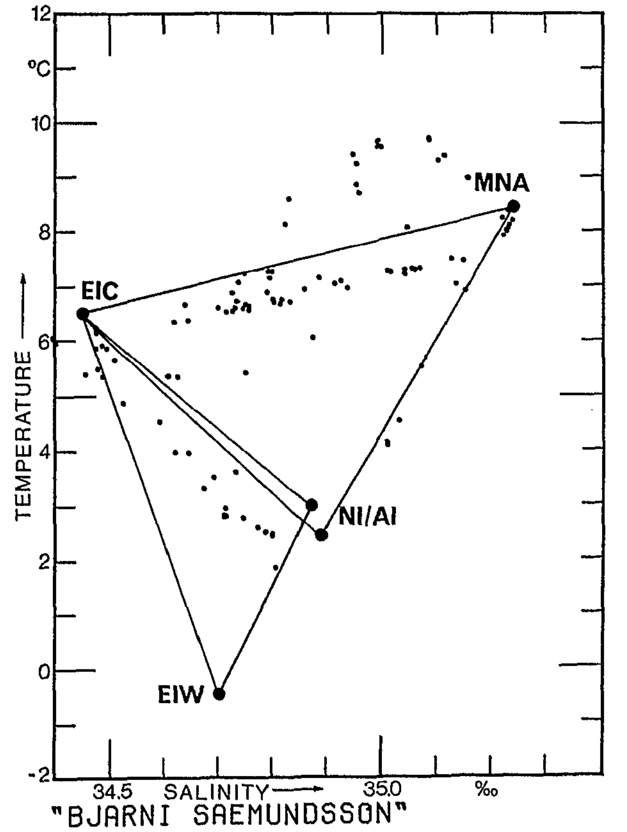
"BJARNI SAEMUNDSSON"
16.AUG.1973
STAT.NO.271-275



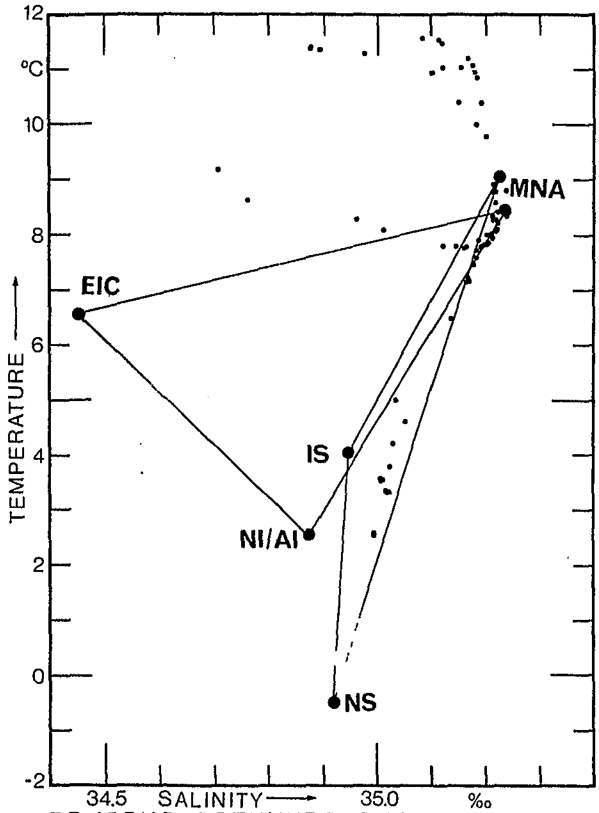
"BJARNI SAEMUNDSSON"
17.-18.AUG.1973
STAT.NO.277-281



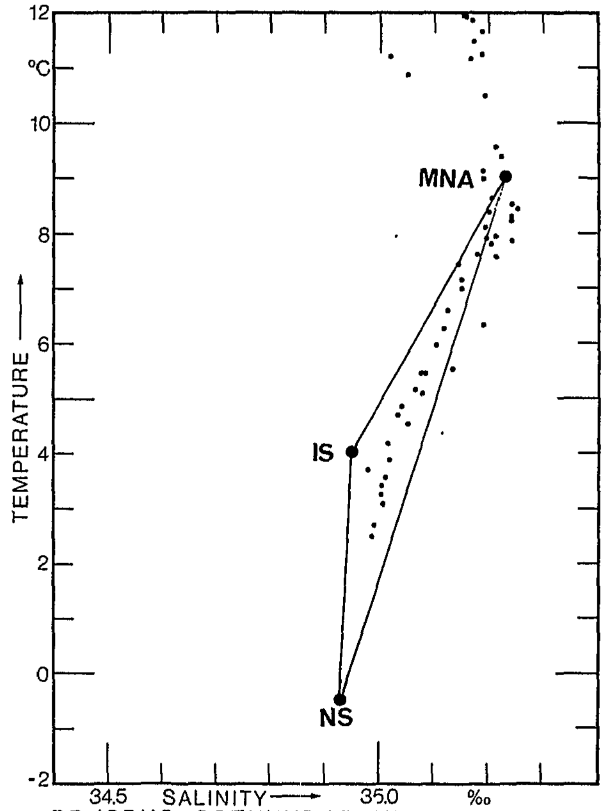
"BJARNI SAEMUNDSSON"
19.-20.AUG.1973
STAT.NO.283-287



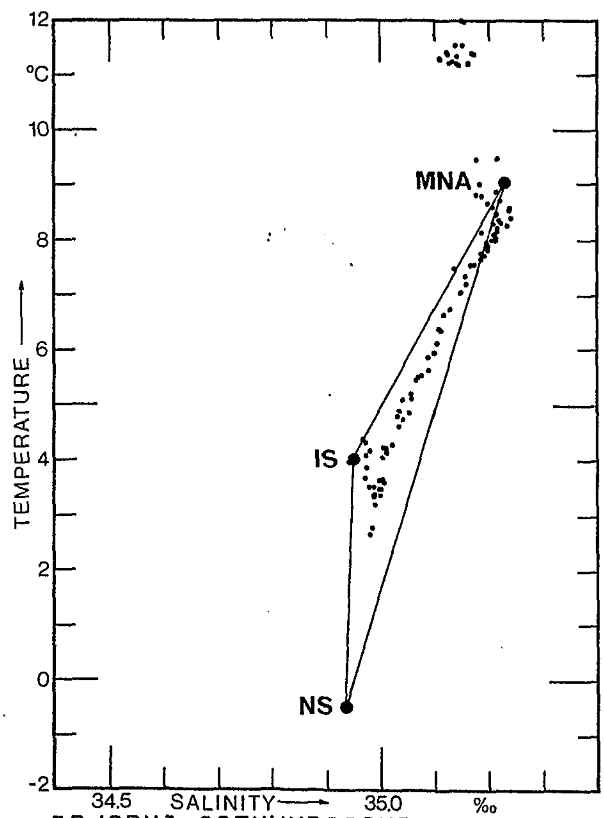
"BJARNI SAEMUNDSSON"
20.AUG.1973
STAT.NO.288-294



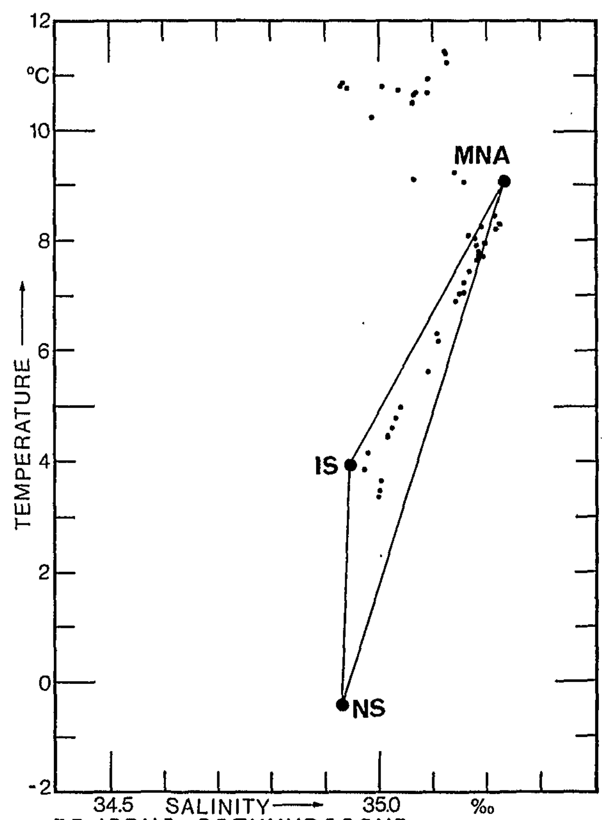
"BJARNI SAEMUNDSSON"
23.AUG.1973
STAT.NO.307-313



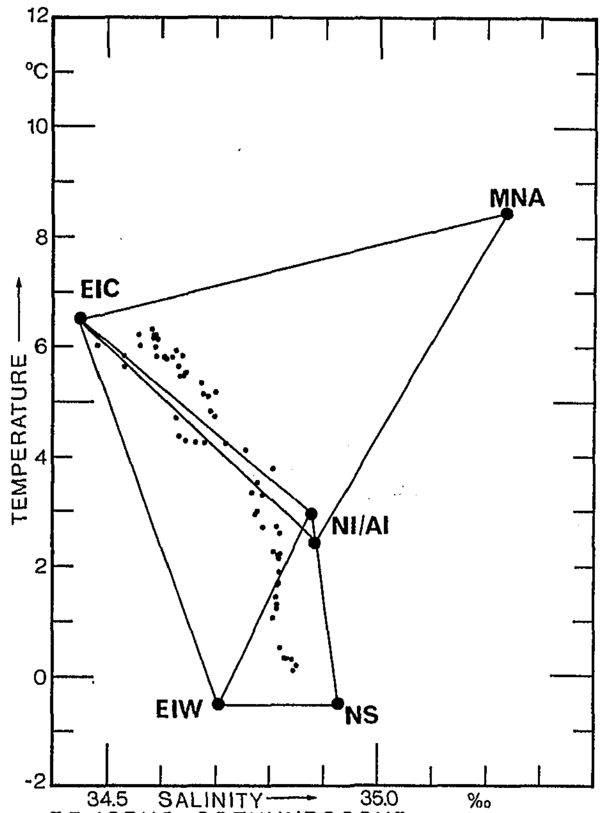
"BJARNI SAEMUNDSSON"
24.AUG.1973
STAT.NO.314-317



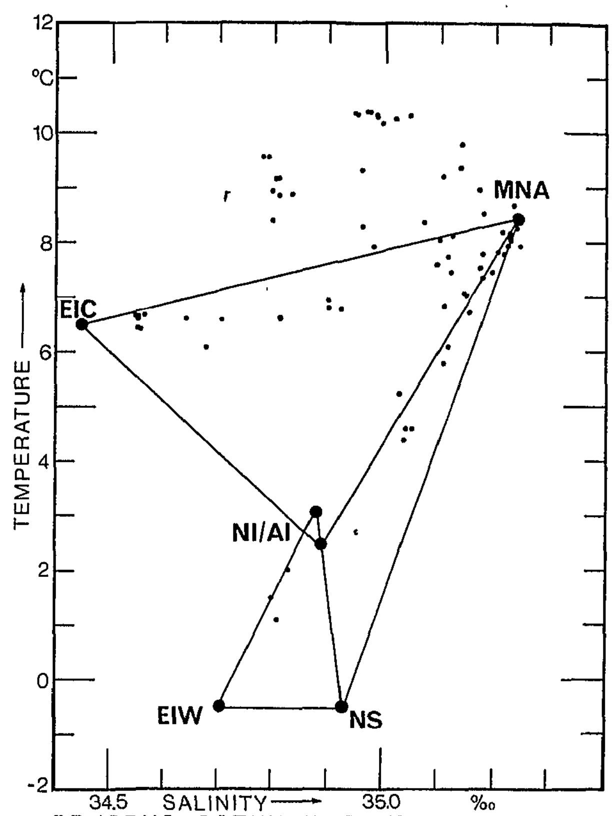
"BJARNI SAEMUNDSSON"
24.-25.AUG.1973
STAT.NO.317-323



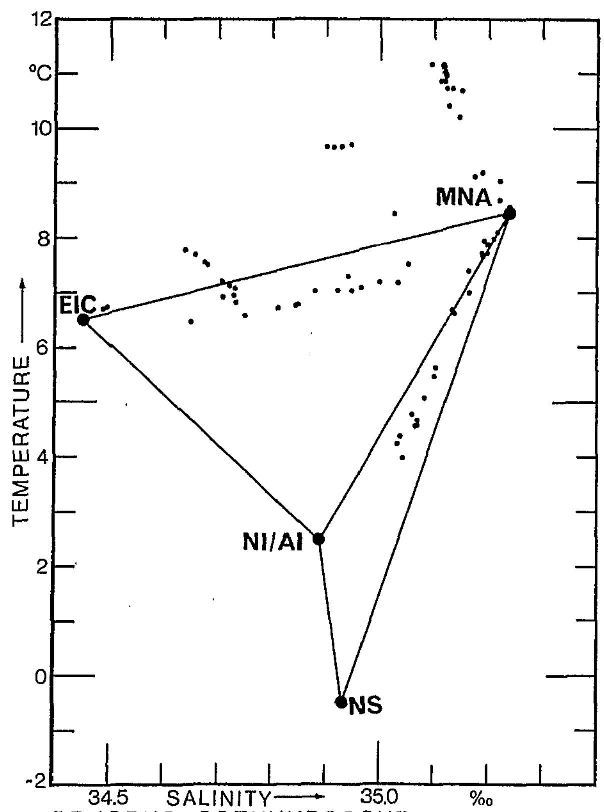
"BJARNI SAEMUNDSSON"
25.AUG.1973
STAT.NO.323-326



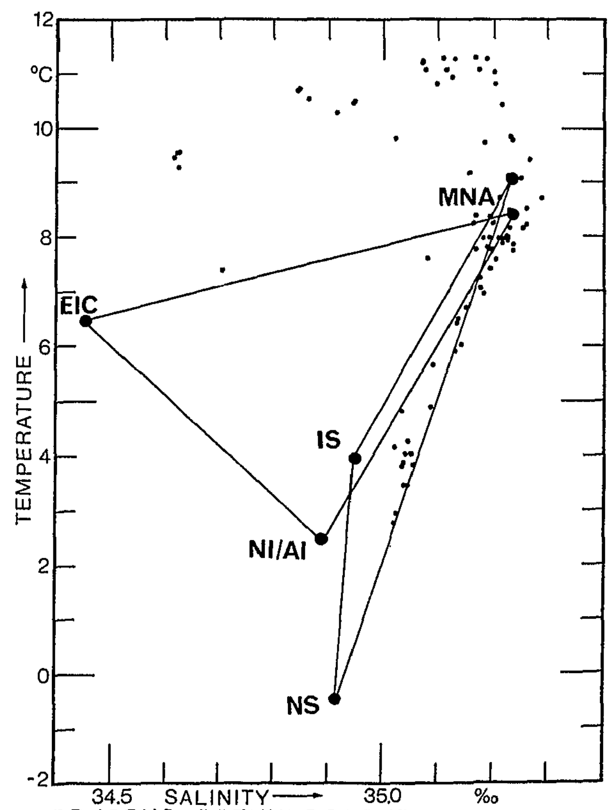
"BJARNI SAEMUNDSSON"
30.-31.AUG.1973
STAT.NO.327-332



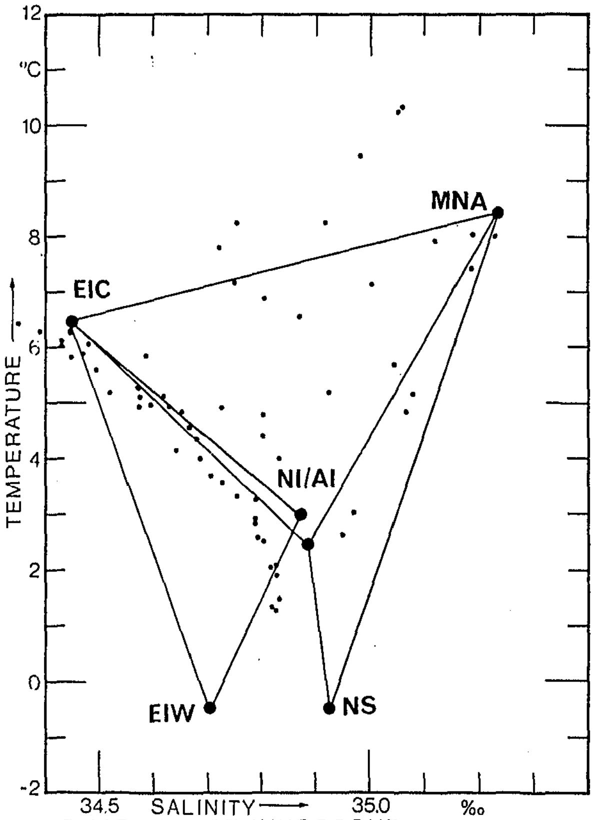
"BJARNI SAEMUNDSSON"
31.AUG.-1.SEP.1973
STAT.NO.333-339



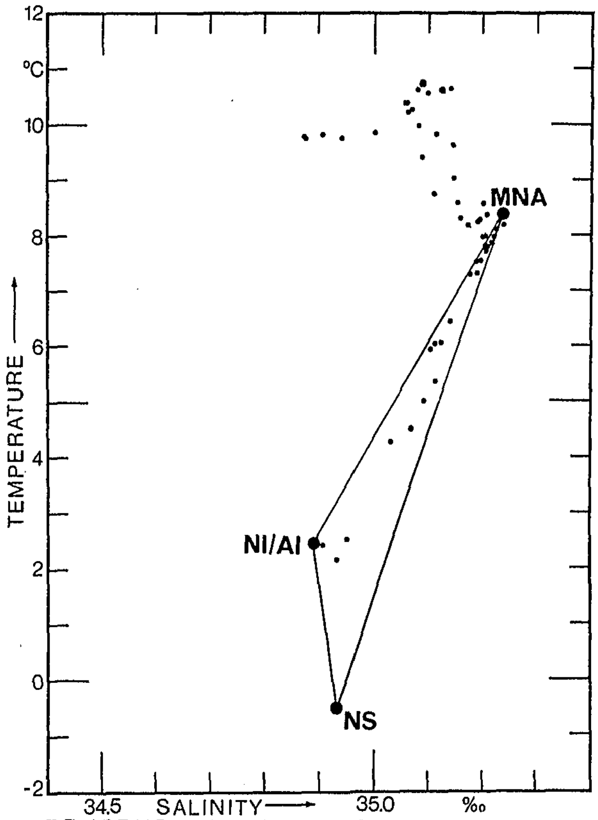
"BJARNI SAEMUNDSSON"
1.SEP.1973
STAT.NO.340-346



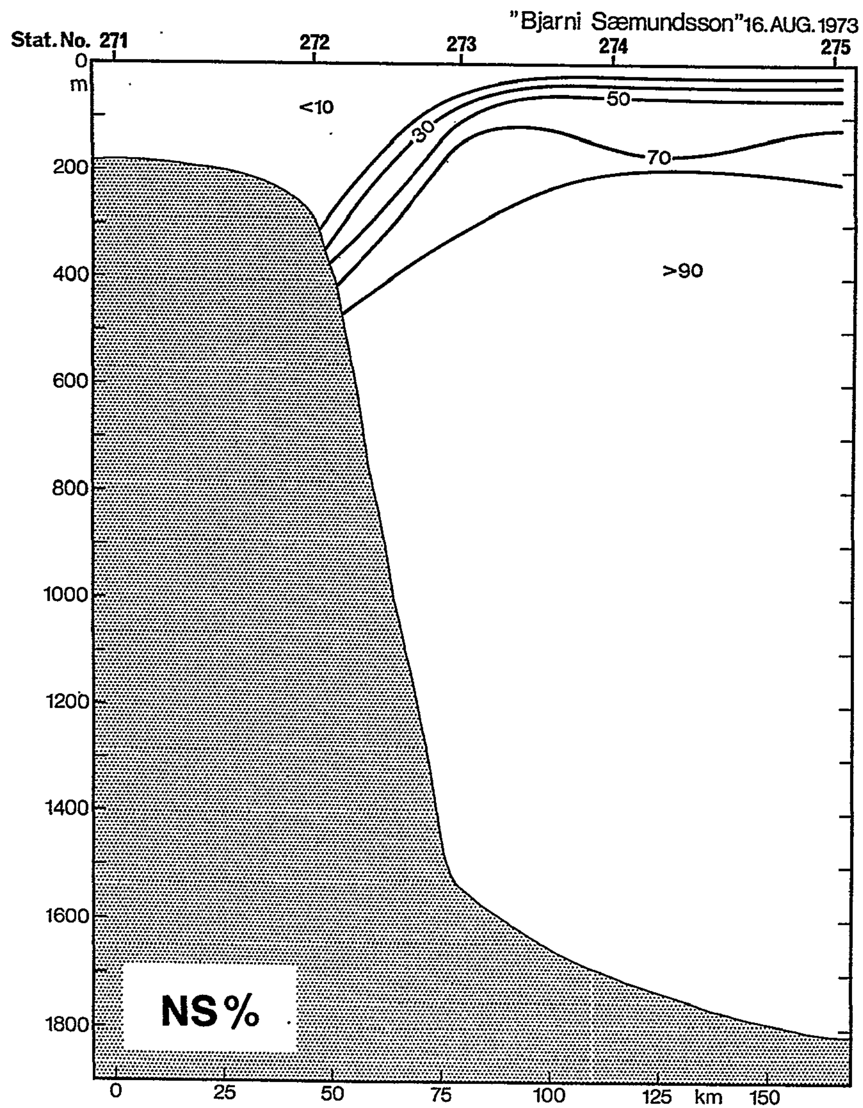
"BJARNI SAEMUNDSSON"
2.-3.SEP.1973
STAT.NO.350-358

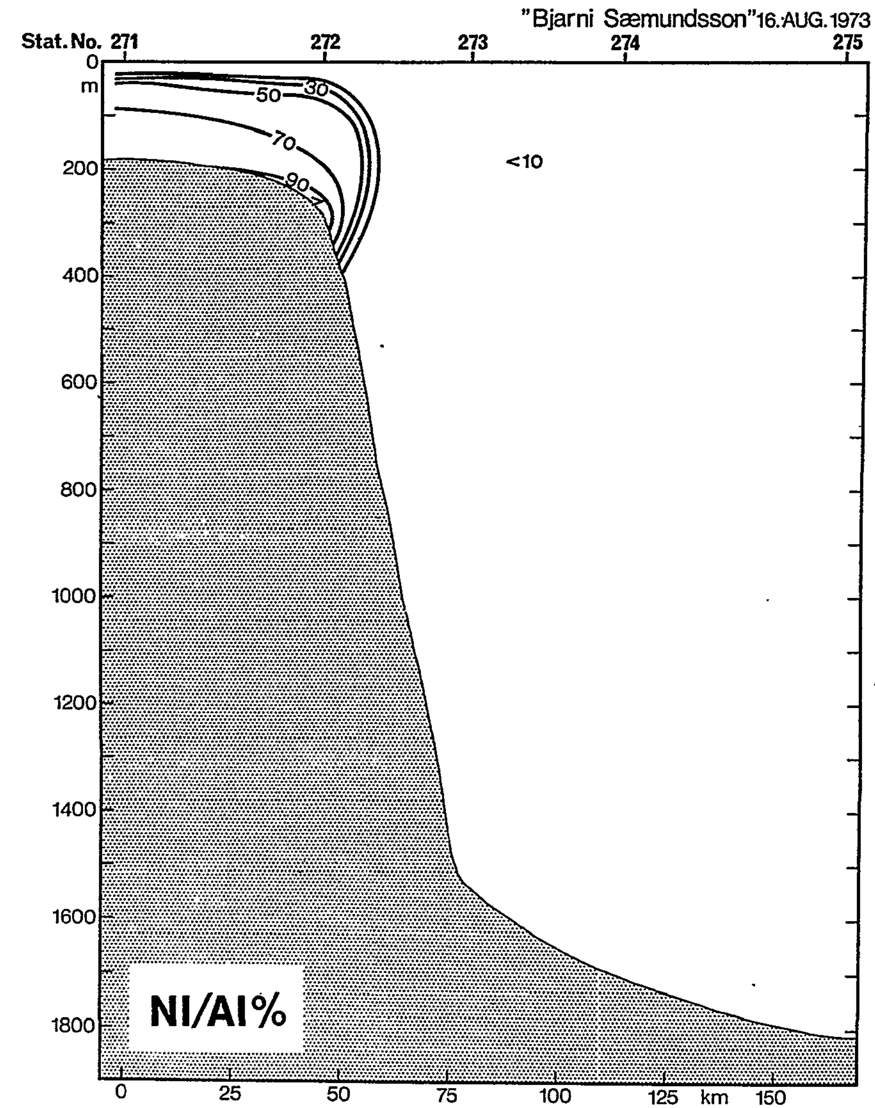


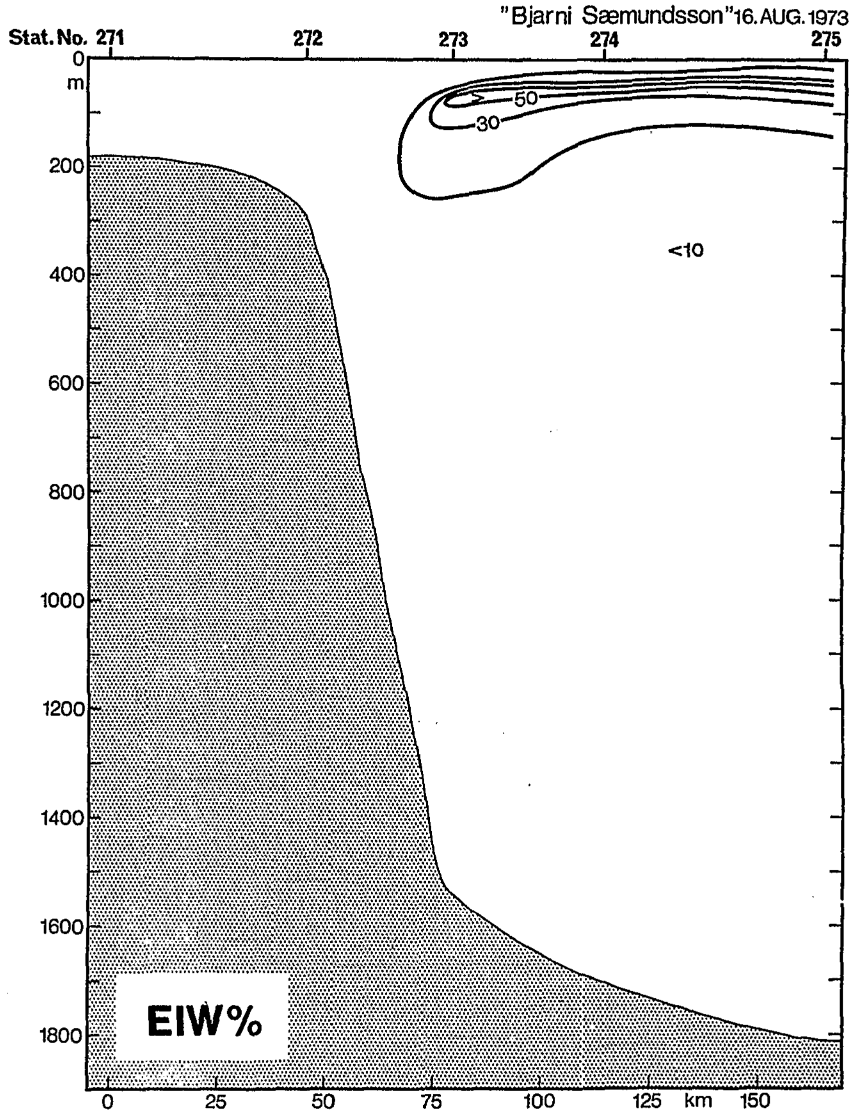
"BJARNI SAEMUNDSSON"
4.SEP.1973
STAT.NO.359-364

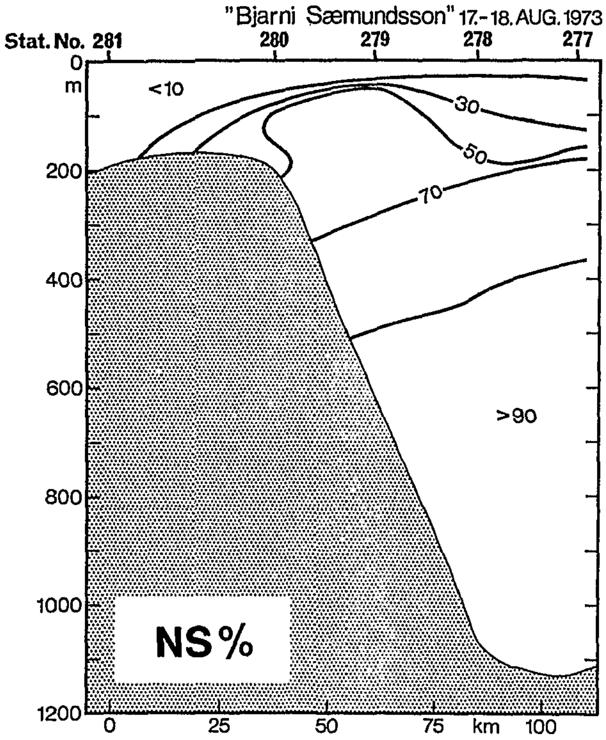


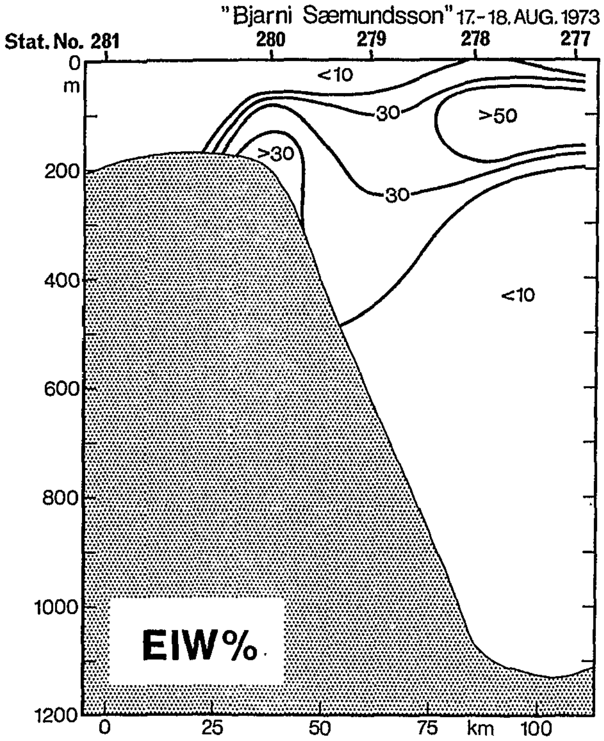
"BJARNI SAEMUNDSSON"
4.-5.SEP.1973
STAT.NO.365-369

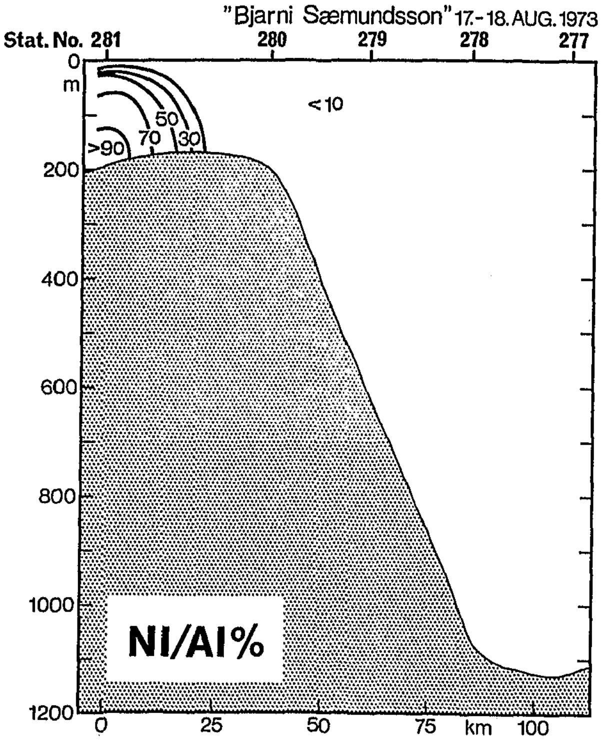

"Bjarni Sæmundsson"16.AUG.1973
Stat. No. 271
272
273
274
275
0
m
200
400
600
800
1000
1200
1400
1600
1800
<10
30
50
70
>90
0
25
50
75
100
125
km
150
NS%

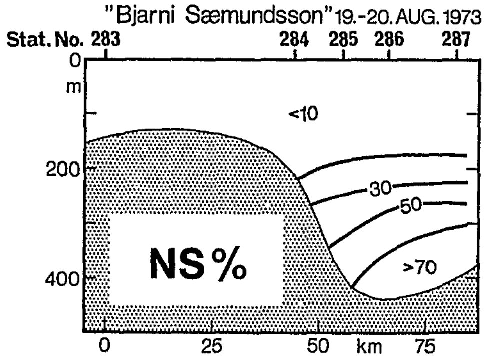

"Bjarni Sæmundsson"16.AUG.1973
Stat. No. 271
272
273
274
275
0
m
200
400
600
800
1000
1200
1400
1600
1800
30
50
70
90
<10
0
25
50
75
100
125
km
150
NI/AI%

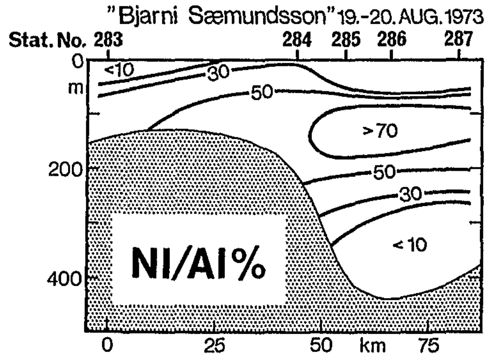

"Bjarni Sæmundsson"16.AUG.1973
Stat.No. 271
272
273
274
275
0
m
200
400
600
800
1000
1200
1400
1600
1800
50
30
<10
EIW%
0
25
50
75
100
125
km
150

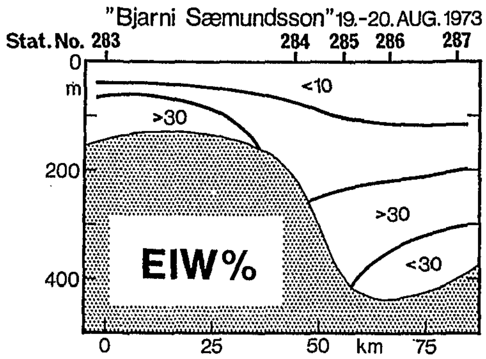

"Bjarni Sæmundsson" 17.-18. AUG. 1973
Stat. No. 281 280 279 278 277
0 m 200 400 600 800 1000 1200
<10
30
50
70
>90
NS%
0 25 50 75 km 100

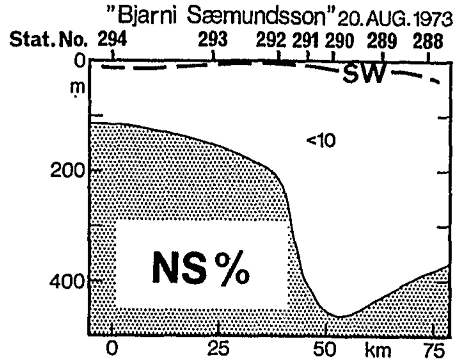

"Bjarni Sæmundsson" 17.-18. AUG. 1973
Stat. No. 281 280 279 278 277
0 m 200 400 600 800 1000 1200
<10
30
>50
>30
30
<10
EIW%
0 25 50 75 km 100

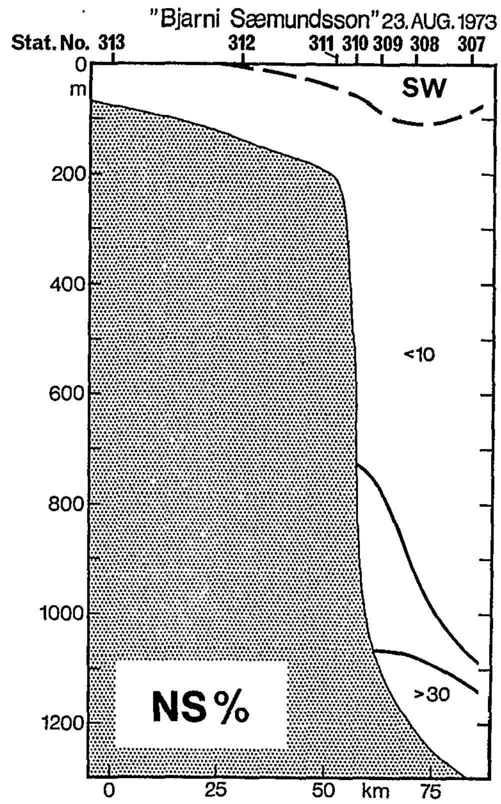

"Bjarni Sæmundsson" 17.-18. AUG. 1973
Stat. No. 281 280 279 278 277
0 m 200 400 600 800 1000 1200
<10
50
>90
70
30
NI/AI%
0 25 50 75 km 100

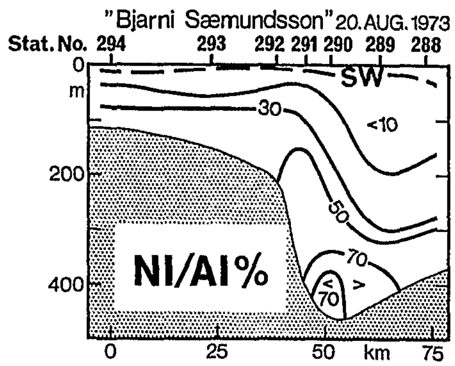

"Bjarni Sæmundsson" 19.-20. AUG. 1973
Stat. No. 283 284 285 286 287
0 m 200 400
<10
30
50
>70
NS%
0 25 50 km 75

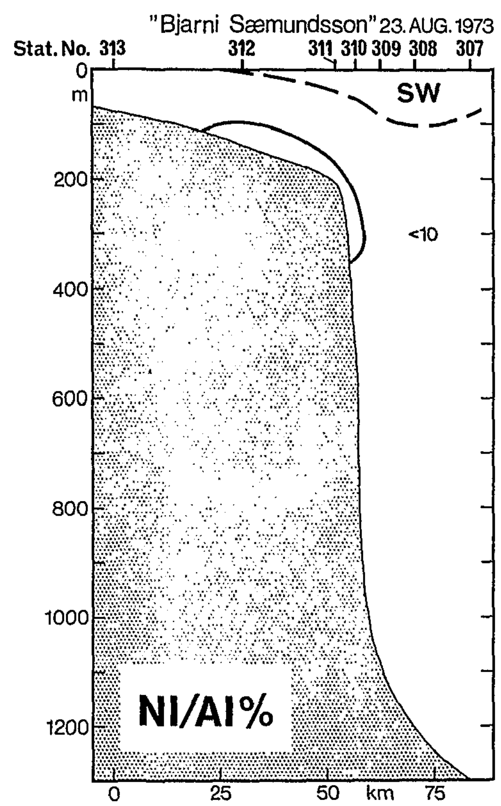

"Bjarni Sæmundsson" 19.-20. AUG. 1973
Stat. No. 283 284 285 286 287
0 m 200 400
<10
30
50
>70
50
30
<10
NI/AI%
0 25 50 km 75

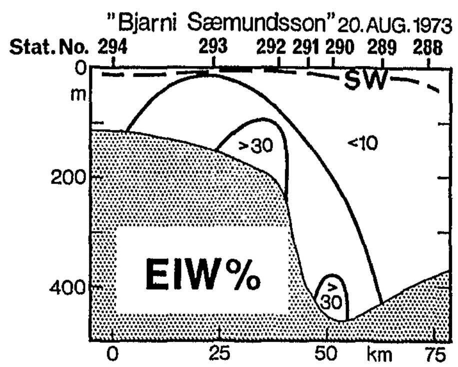

"Bjarni Sæmundsson" 19.-20. AUG. 1973
Stat. No. 283 284 285 286 287
0 m 200 400
<10
>30
>30
<30
EIW%
0 25 50 km 75

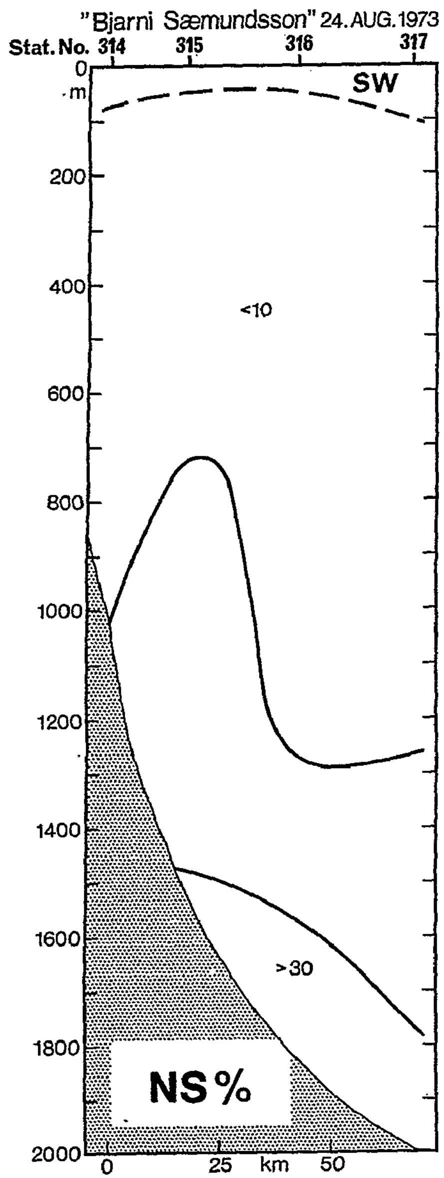

"Bjarni Sæmundsson" 20. AUG. 1973
Stat. No. 294 293 292 291 290 289 288
SW
<10
NS%
0
m
200
400
0 25 50 km 75

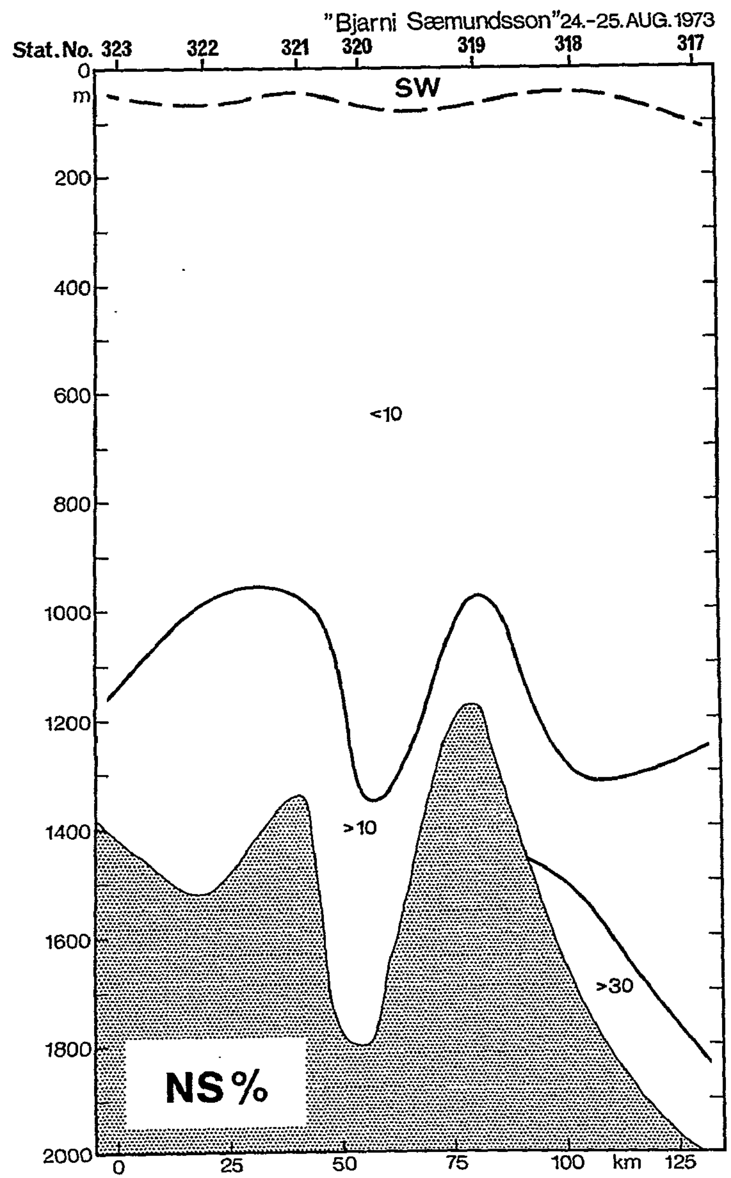

"Bjarni Sæmundsson" 23. AUG. 1973
Stat. No. 313 312 311 310 309 308 307
SW
<10
>30
NS%
0
m
200
400
600
800
1000
1200
0 25 50 km 75

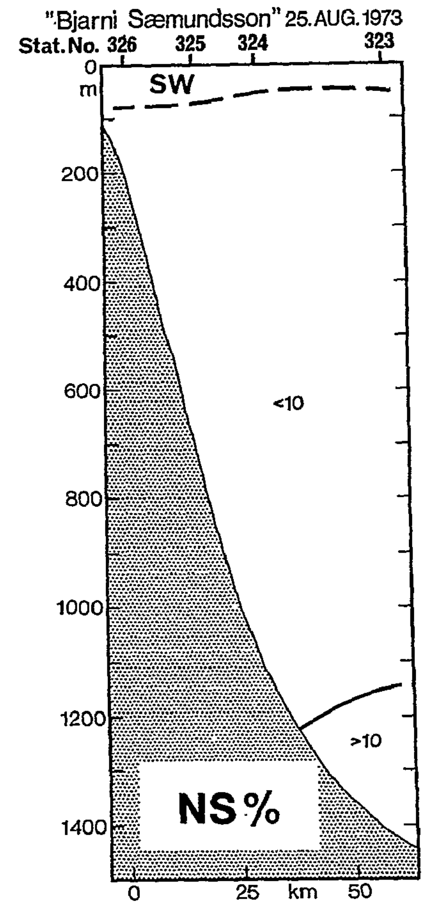

"Bjarni Sæmundsson" 20. AUG. 1973
Stat. No. 294 293 292 291 290 289 288
SW
30
<10
50
70
< 70
>
NI/AI%
0
m
200
400
0 25 50 km 75

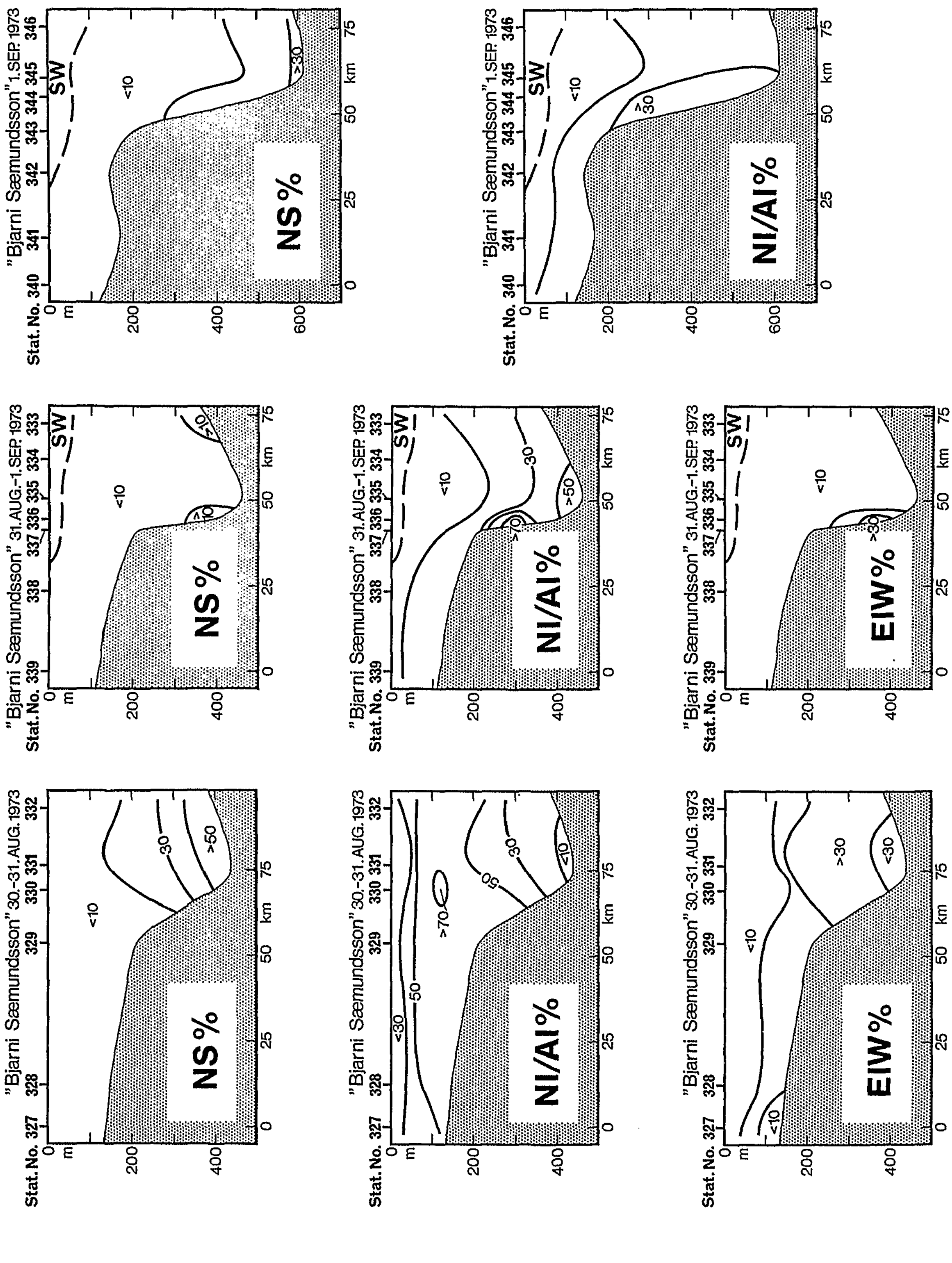

"Bjarni Sæmundsson" 23. AUG. 1973
Stat. No. 313 312 311 310 309 308 307
SW
<10
NI/AI%
0
m
200
400
600
800
1000
1200
0 25 50 km 75

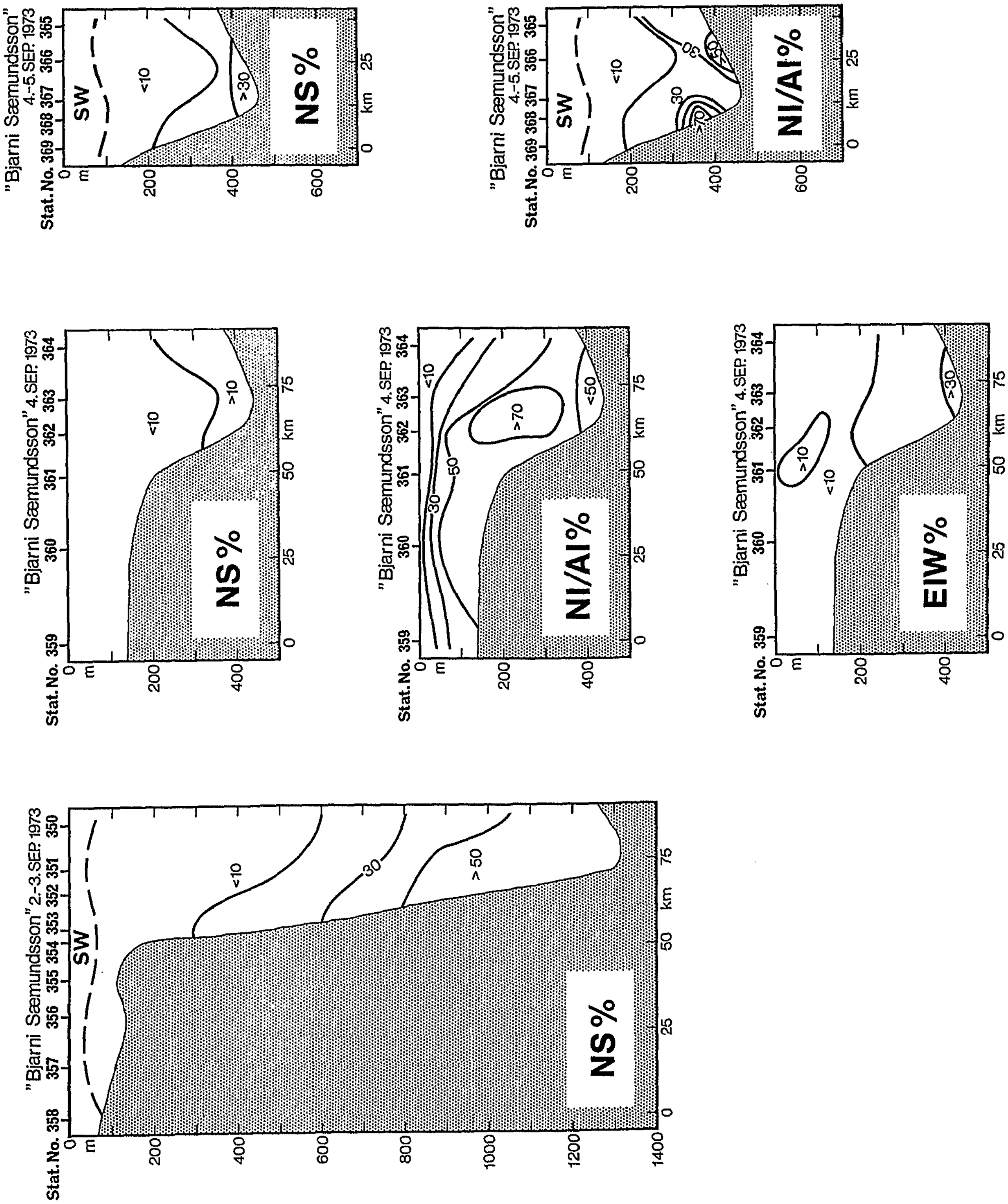

"Bjarni Sæmundsson" 20. AUG. 1973
Stat. No. 294 293 292 291 290 289 288
SW
>30
<10
> 30
EIW%
0
m
200
400
0 25 50 km 75


"Bjarni Sæmundsson" 24. AUG. 1973
Stat. No. 314 315 316 317
0
m
200
400
600
800
1000
1200
1400
1600
1800
2000
SW
<10
>30
NS %
0 25 km 50


"Bjarni Sæmundsson" 24.-25. AUG. 1973
Stat. No. 323 322 321 320 319 318 317
0
m
200
400
600
800
1000
1200
1400
1600
1800
2000
SW
<10
>10
>30
NS %
0 25 50 75 100 km 125


"Bjarni Sæmundsson" 25. AUG. 1973
Stat. No. 326 325 324 323
0
m
200
400
600
800
1000
1200
1400
SW
<10
>10
NS %
0 25 km 50


"Bjarni Sæmundsson" 30.-31. AUG. 1973
Stat. No. 327 328 329 330 331 332
NS%
NI/AI%
EIW%
"Bjarni Sæmundsson" 31. AUG.-1. SEP. 1973
Stat. No. 339 338 337 336 335 334 333
SW
NS%
NI/AI%
EIW%
"Bjarni Sæmundsson" 1. SEP. 1973
Stat. No. 340 341 342 343 344 345 346
SW
NS%
NI/AI%
0 m 200 400 600
0 25 50 km 75
<10
>30
>50
>70


"Bjarni Sæmundsson" 4.-5. SEP. 1973
Stat. No. 369 368 367 366 365
SW
<10
>30
NS %
"Bjarni Sæmundsson" 4.-5. SEP. 1973
Stat. No. 369 368 367 366 365
SW
<10
30
50
>70
NI/AI %
"Bjarni Sæmundsson" 4. SEP. 1973
Stat. No. 359 360 361 362 363 364
<10
>10
NS %
"Bjarni Sæmundsson" 4. SEP. 1973
Stat. No. 359 360 361 362 363 364
<10
30
50
>70
<50
NI/AI %
"Bjarni Sæmundsson" 4. SEP. 1973
Stat. No. 359 360 361 362 363 364
>10
<10
>30
EIW %
"Bjarni Sæmundsson" 2.-3. SEP. 1973
Stat. No. 358 357 356 355 354 353 352 351 350
SW
<10
30
> 50
NS %
km
m

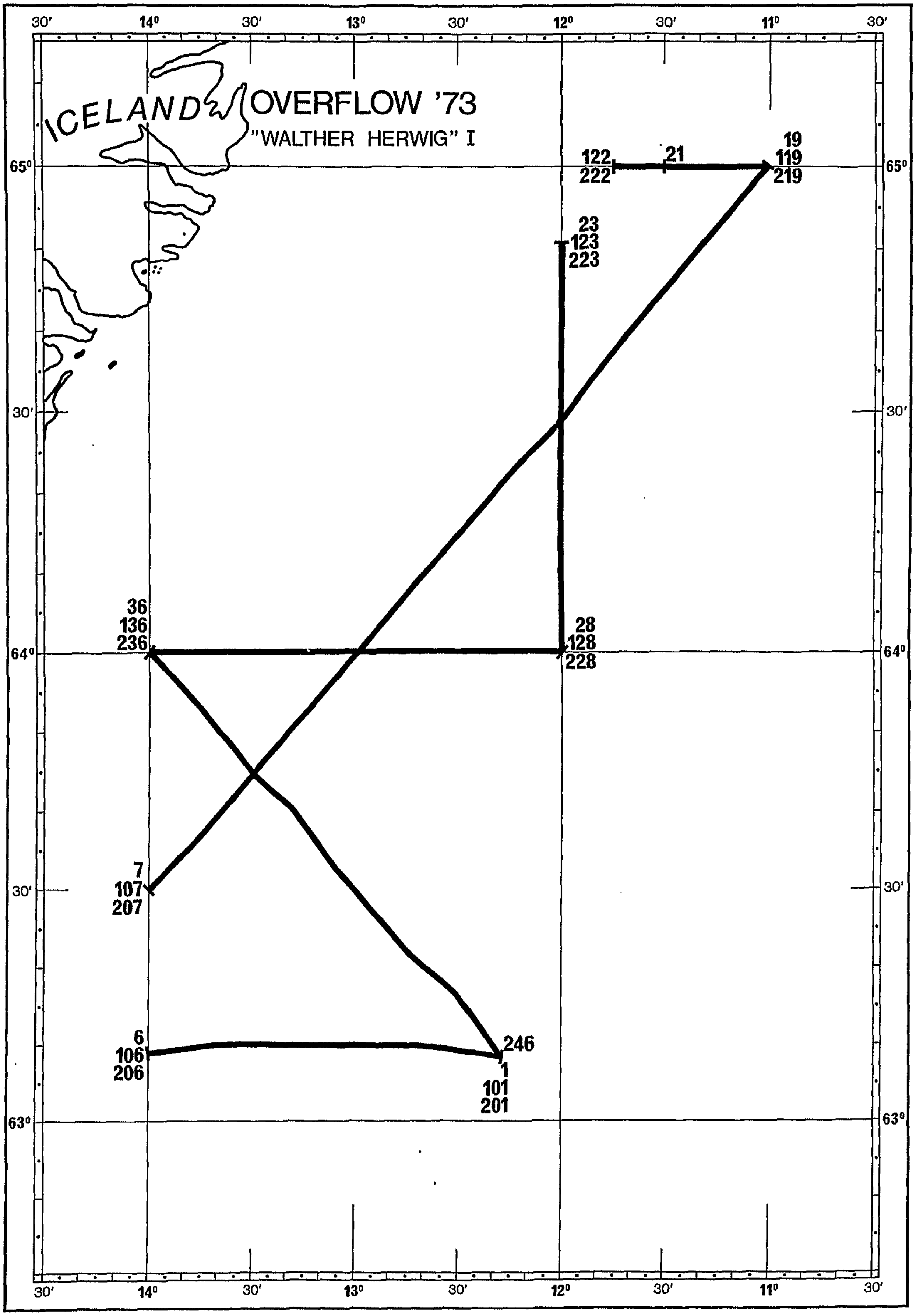
6.10 W. Herwig

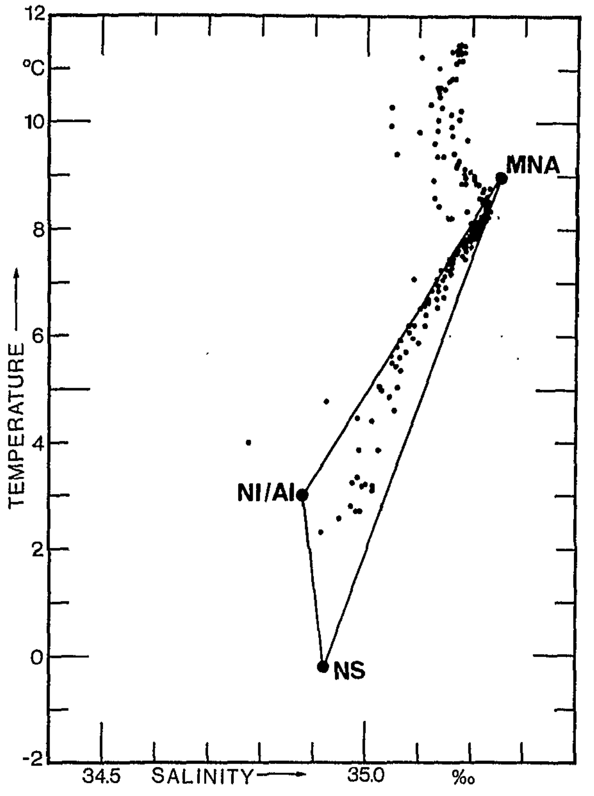
Atlantic water is dominated by MNA. NS, NI/AI and EIW occur as deep overflow, and EIC at the surface. IS has not been analysed, but is found from below 800 m on the south west flank of the ridge:

Station	Stat.No.	Mixing triangle (see table 3)
1 - 6		4
101 - 106		4
201 - 206		4
7- 19	7 - 13	4, 5
	14 - 16	4, 8
	17 - 19	7, 8
107 - 119	107 - 112	4, 5
	113 - 116	4, 8
	117, 118	8
	119	4, 7, 8
207 - 219	207 - 212	4, 5
	213 - 217	4, 8
	218	7, 8
19 - 21		7, 8
119 - 122		7, 8
219 - 222		7, 8
23 - 28	23 - 25	7, 8
	26 - 28	4, 5
123 - 128	123	4, 5
	124	7, 8
	125	8
	126 - 128	4, 5
223 - 228	223, 224	4, 5
	225	8
	226	7, 8
	227, 228	4, 5

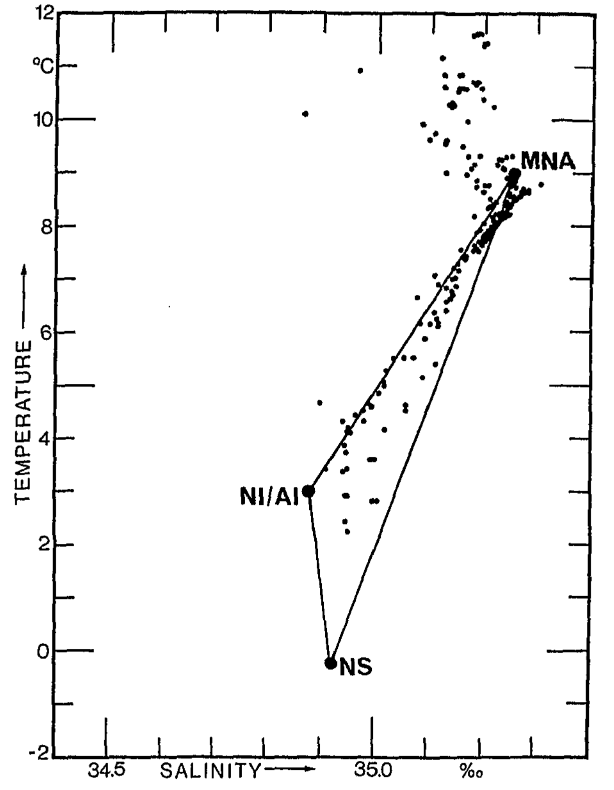
W. Herwig (cont'd)

Section	Stat.No.	Mixing triangle (see table 3)
28 - 36		4
128 - 136		4
228 - 236		4
36 - 101		4
136 - 201		4
236 - 246		4

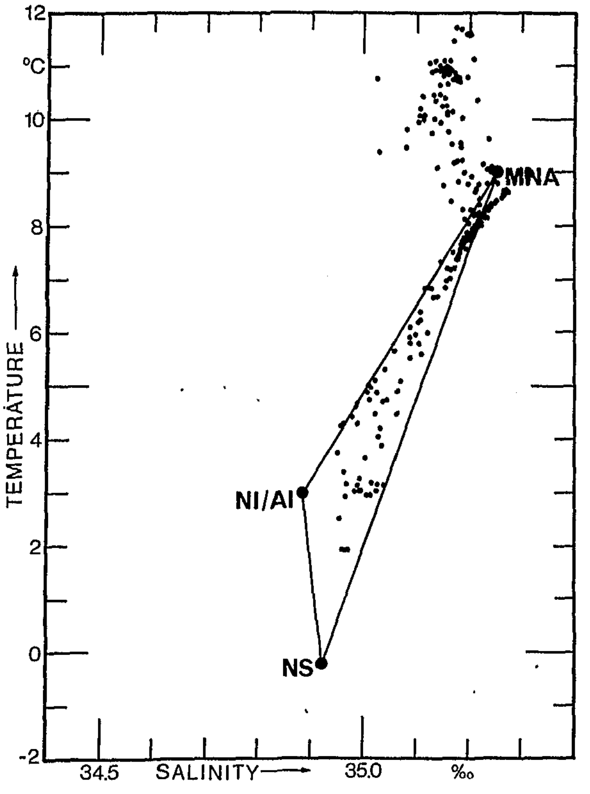

ICELAND
OVERFLOW '73
"WALTHER HERWIG" I
30'
14°
30'
13°
30'
12°
30'
11°
30'
65°
64°
63°
122
222
21
19
119
219
23
123
223
36
136
236
28
128
228
7
107
207
6
106
206
246
1
101
201



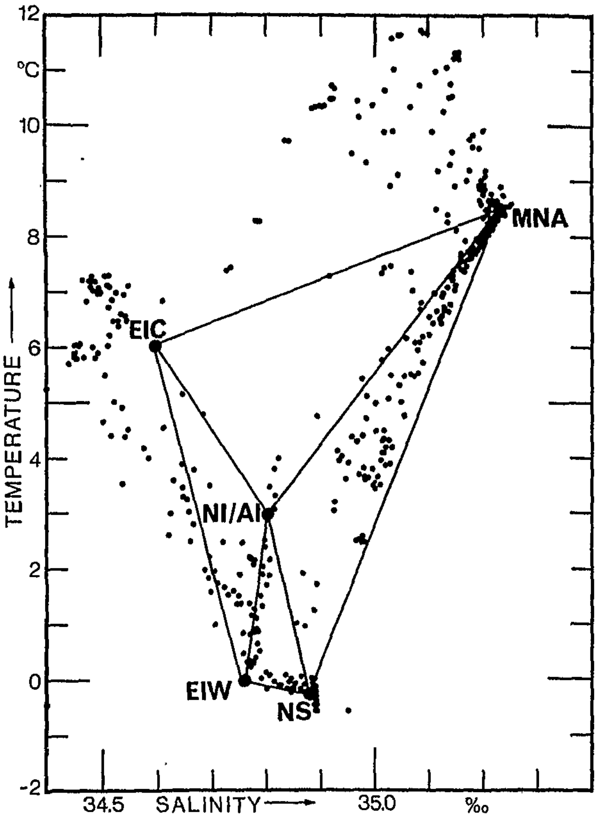
"WALTHER HERWIG", I
13.-14.AUG.1973
STAT.NO.1-6



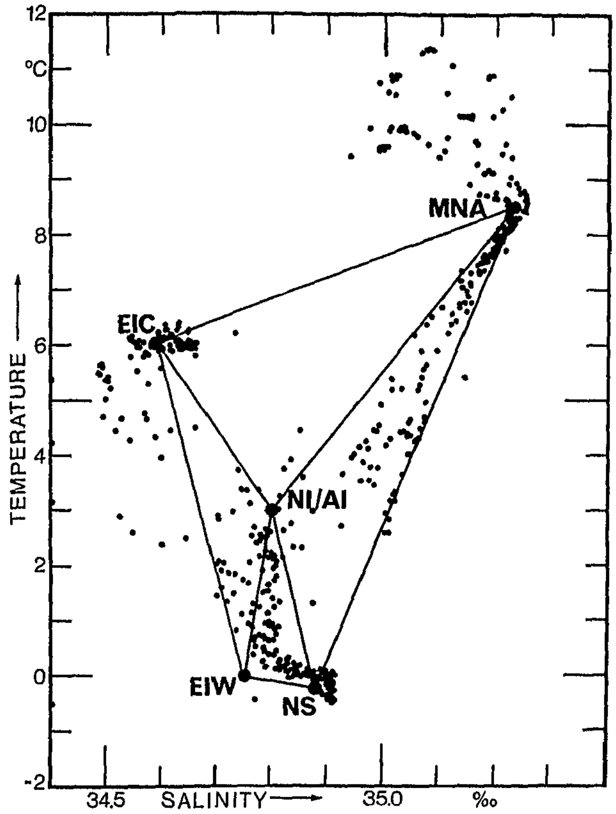
"WALTHER HERWIG", I
18.AUG.1973
STAT.NO.101-106



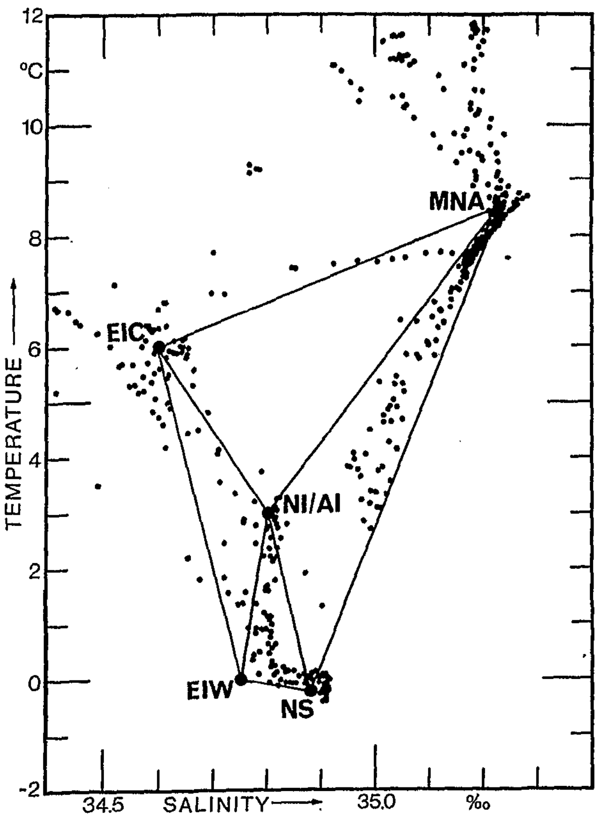
"WALTHER HERWIG", I
25.-26.AUG.1973
STAT.NO.201-206



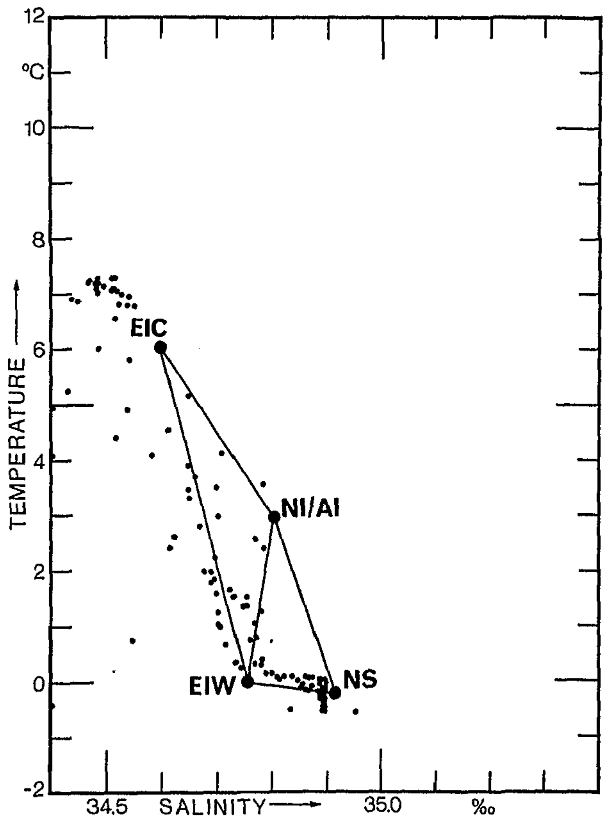
"WALTHER HERWIG", I
14.-16.AUG.1973
STAT.NO.7-19



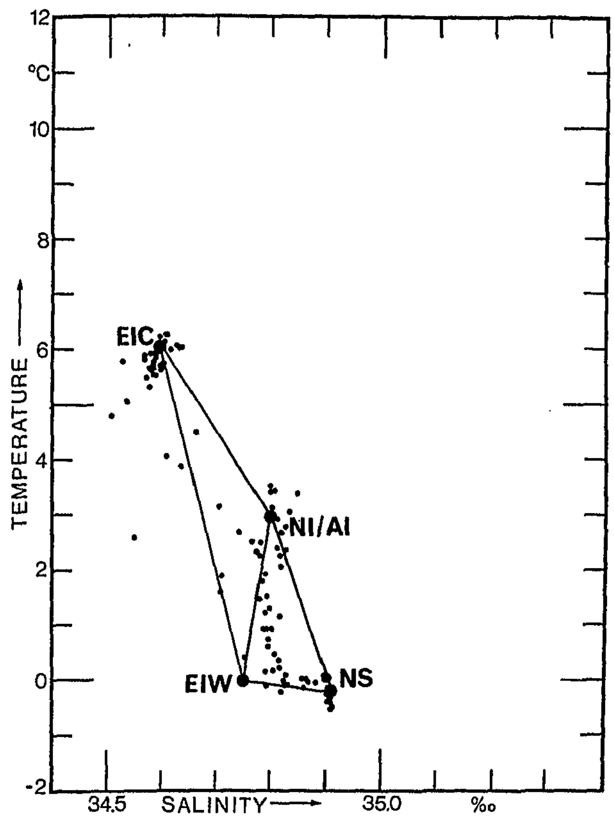
"WALTHER HERWIG", I
19.-20.AUG.1973
STAT.NO.107-119



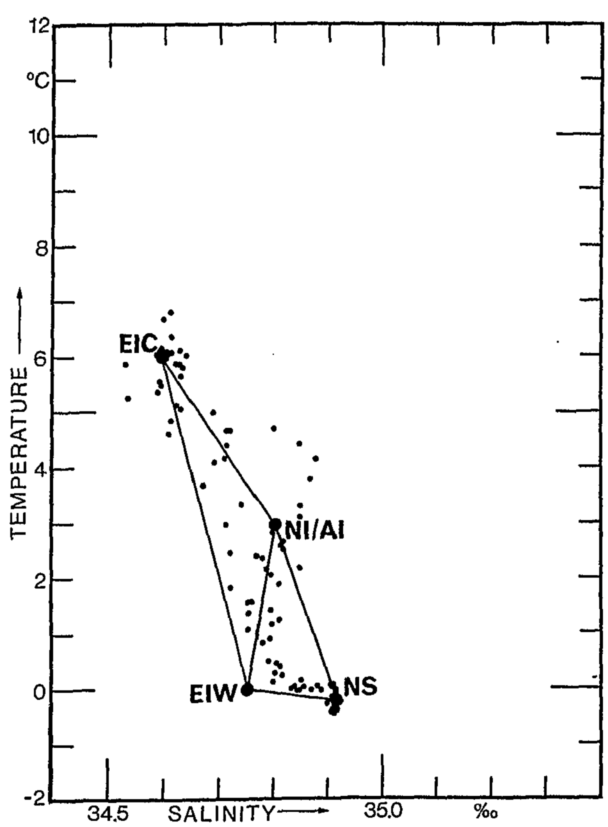
"WALTHER HERWIG", I
26.-27.AUG.1973
STAT.NO.207-219



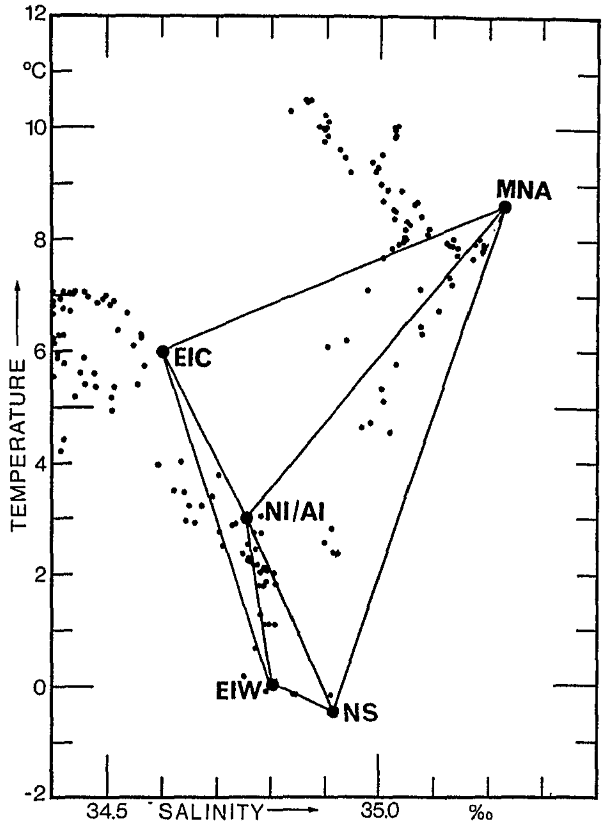
"WALTHER HERWIG", I
16.AUG.1973
STAT.NO.19-21



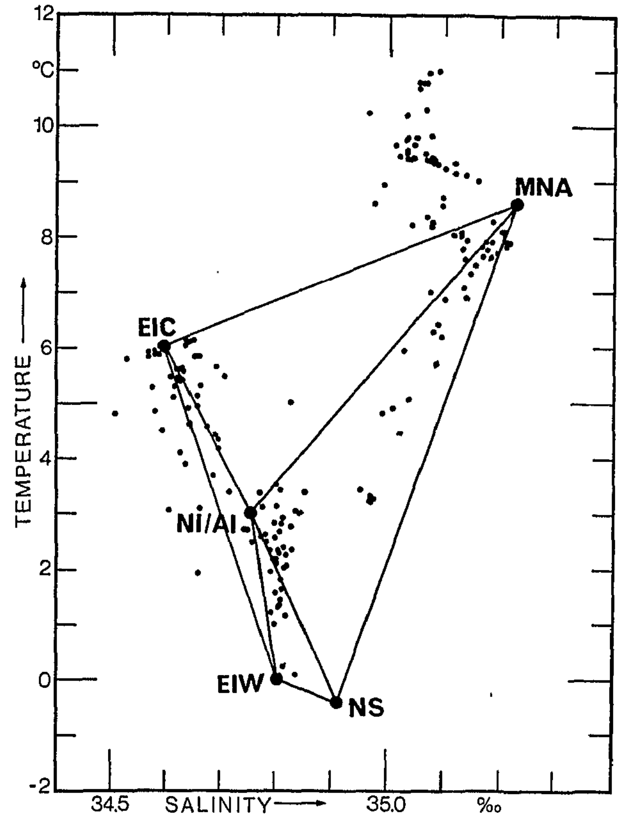
"WALTHER HERWIG", I
20.-22.AUG.1973
STAT.NO.119-122



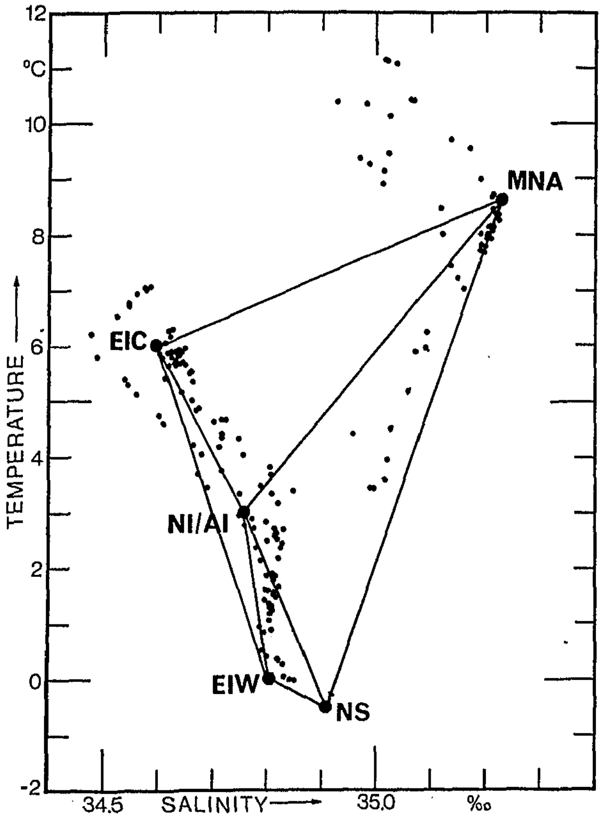
"WALTHER HERWIG", I
27.-28.AUG.1973
STAT.NO.219-222



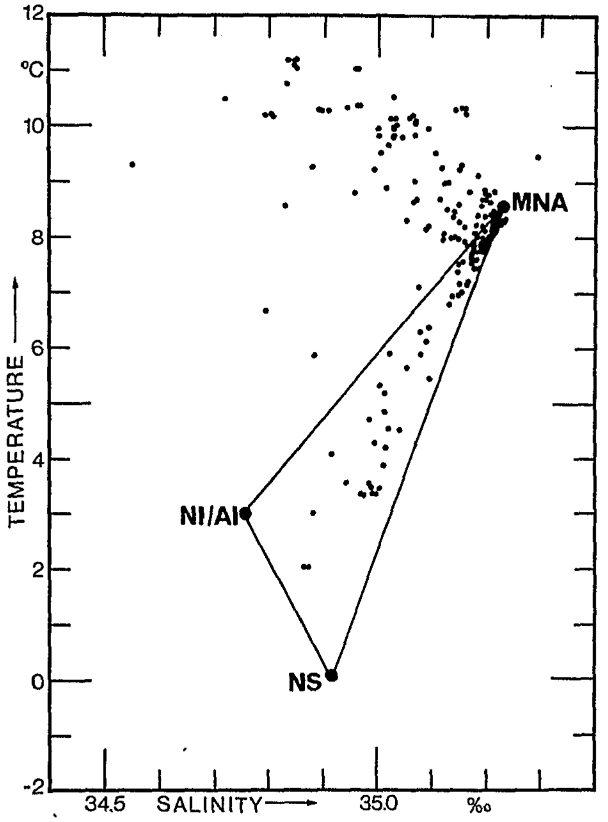
"WALTHER HERWIG", I
16.-17.AUG.1973
STAT.NO.23-28



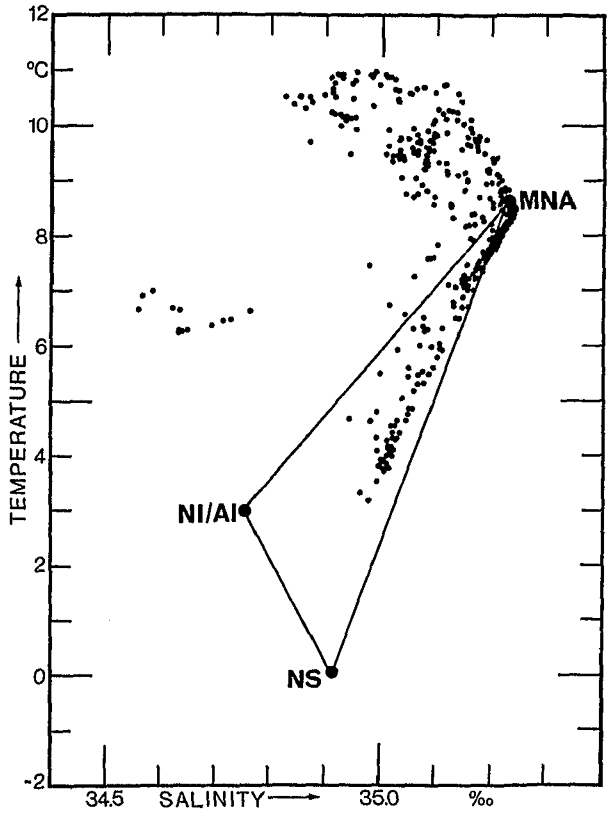
"WALTHER HERWIG", I
22.AUG.1973
STAT.NO.123-128



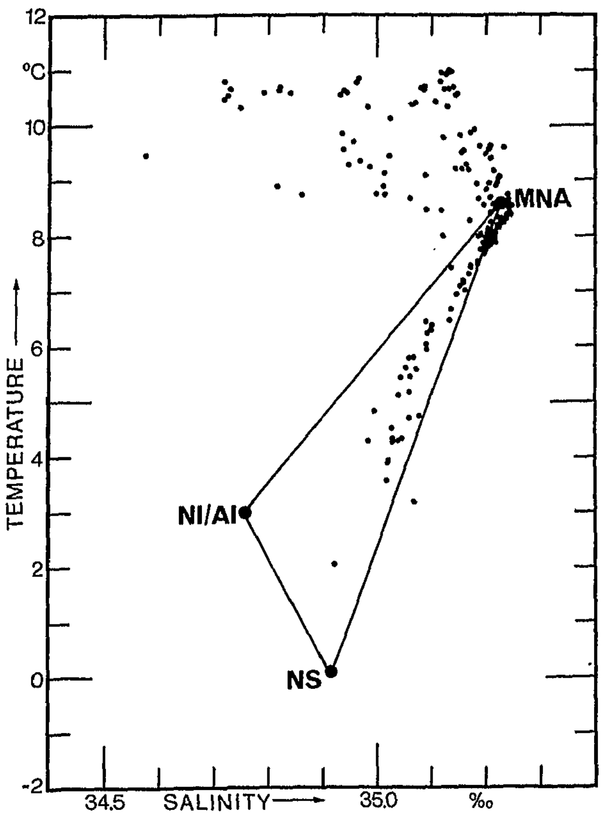
"WALTHER HERWIG", I
28.AUG.1973
STAT.NO.223-228



"WALTHER HERWIG", I
17.AUG.1973
STAT.NO.28,29,31-33,35,36



"WALTHER HERWIG", I
22.-24.AUG.1973
STAT.NO.128-133,135,136



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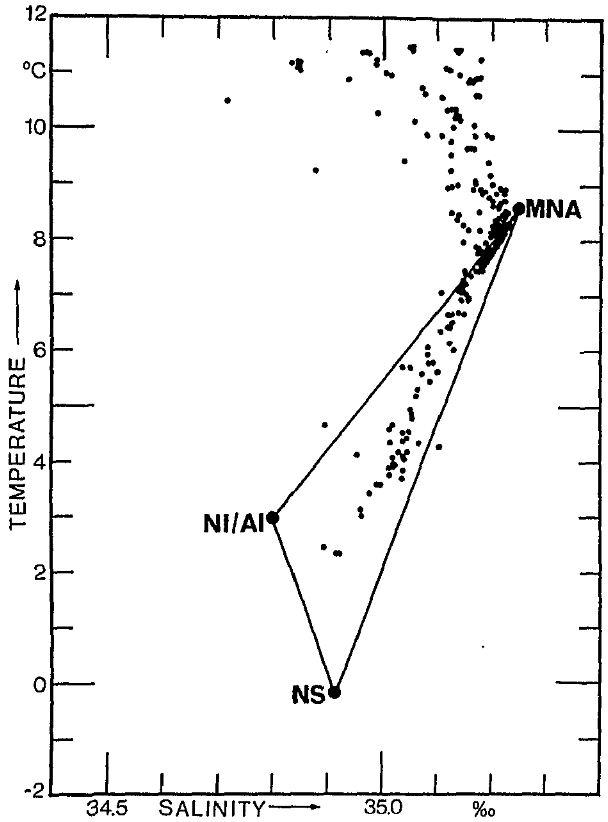
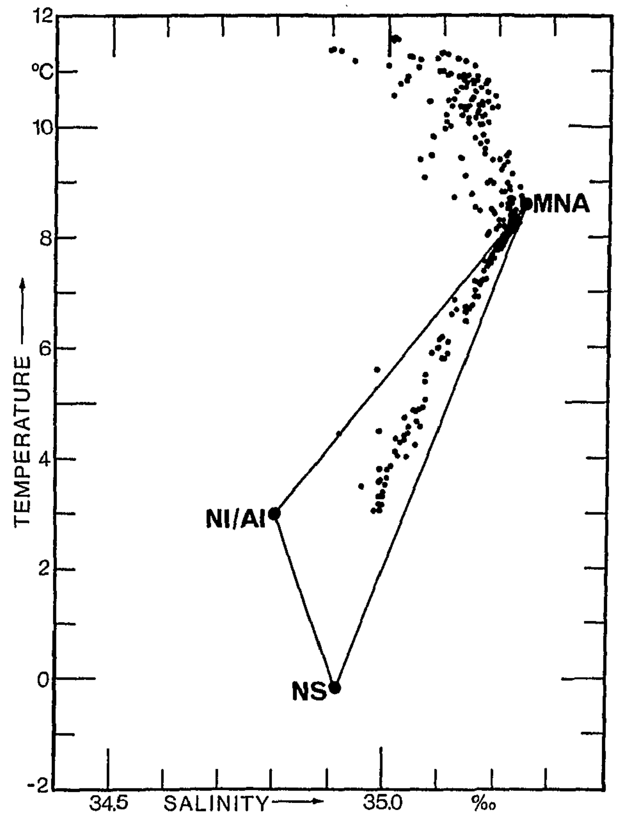
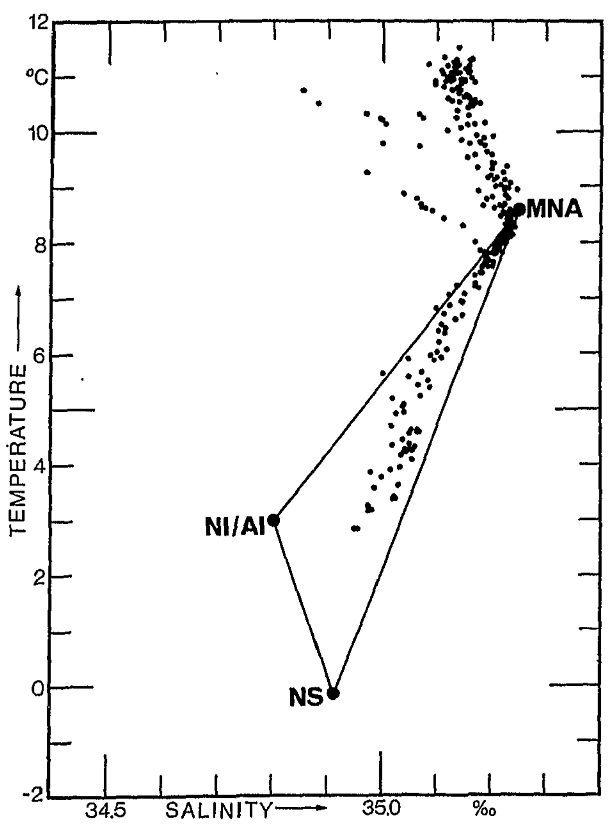
STAT.NO.228,230-233,235,236



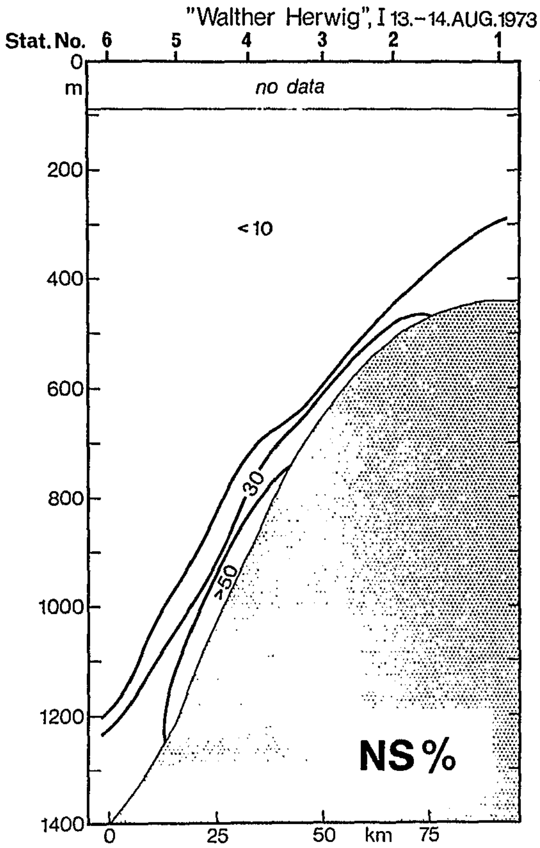
"WALTHER HERWIG", I
17.-18.AUG.1973
STAT.NO.36,37,39-45,101



"WALTHER HERWIG", I
24.-25.AUG.1973
STAT.NO.136,137,139-145,201



"WALTHER HERWIG", I
29.-30.AUG.1973
STAT.NO.236,237,239-246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no data
200
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600
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1400
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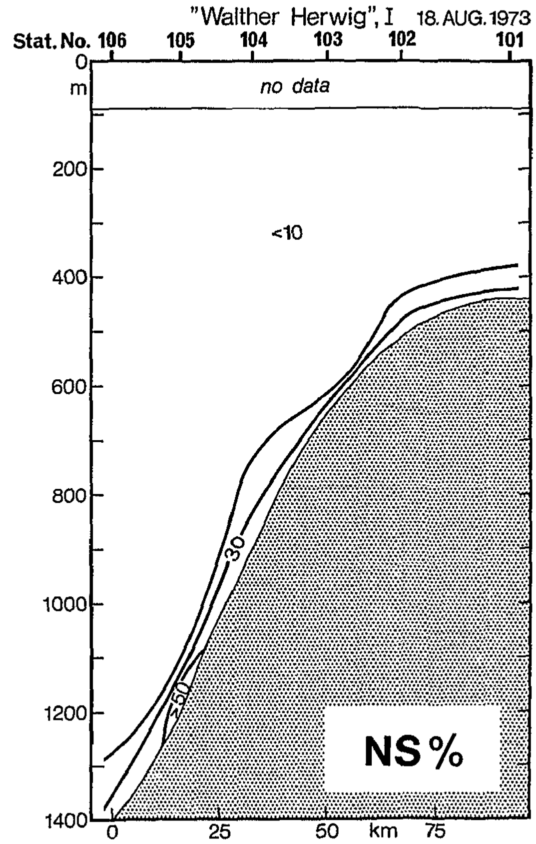
NS%
0 25 50 km 75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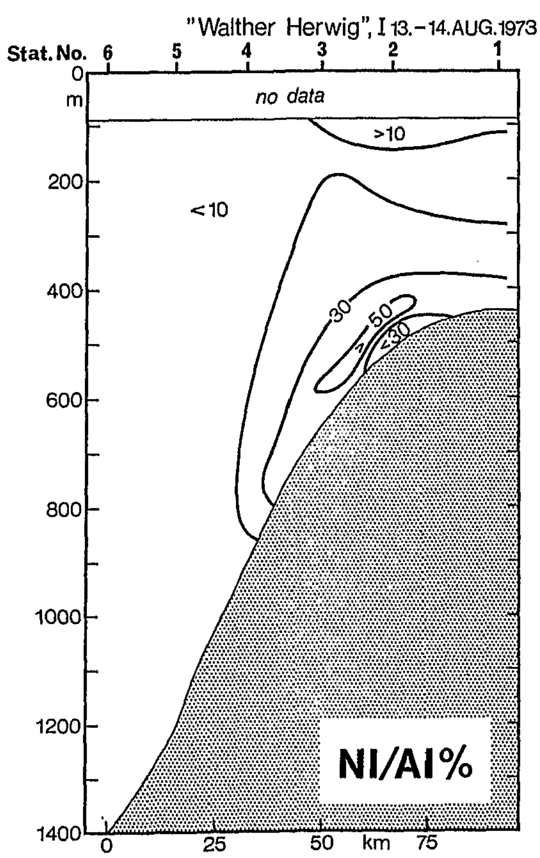
NS%
0 25 50 km 75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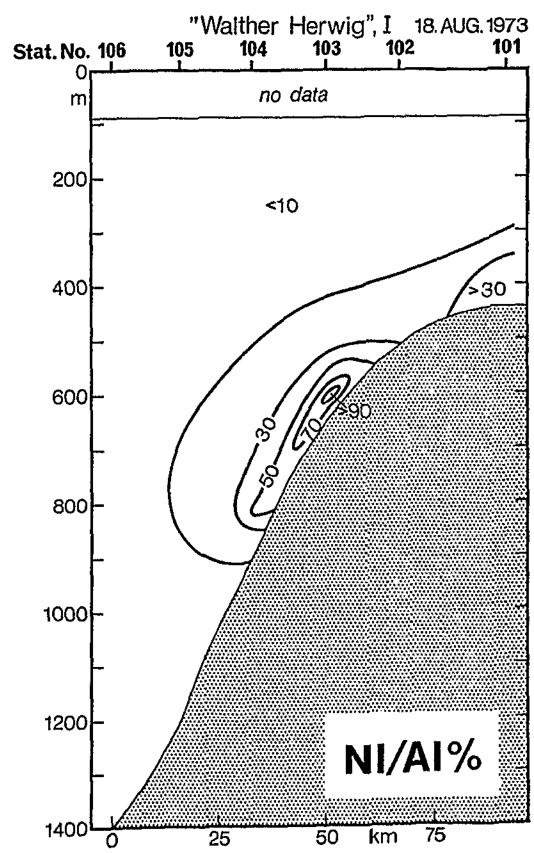
NI/AI%
0 25 50 km 75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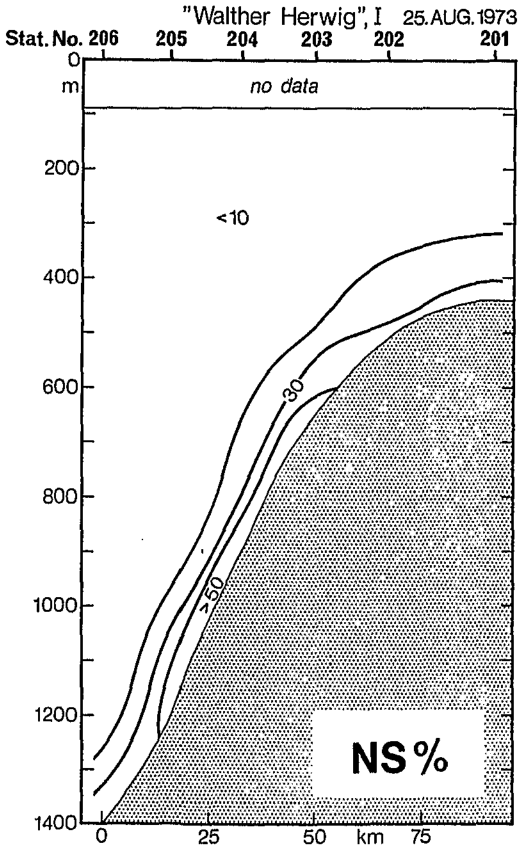
NI/AI%
0 25 50 km 75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NS %
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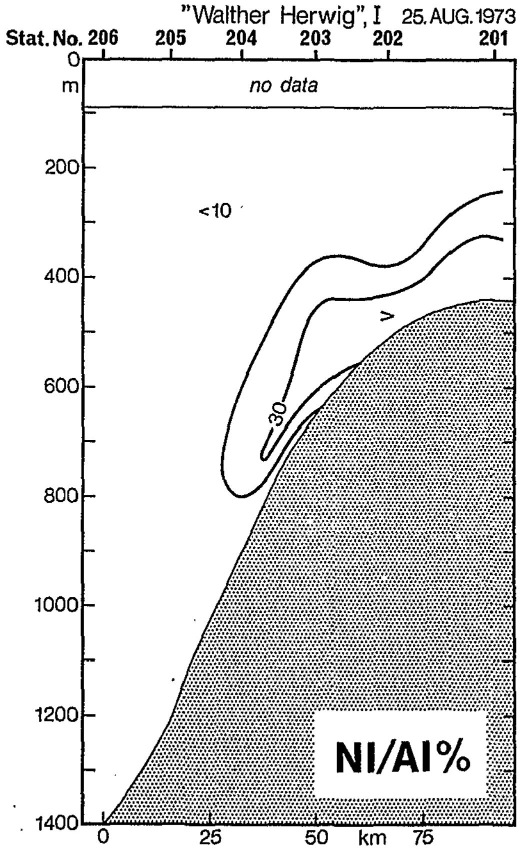
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NI/AI%
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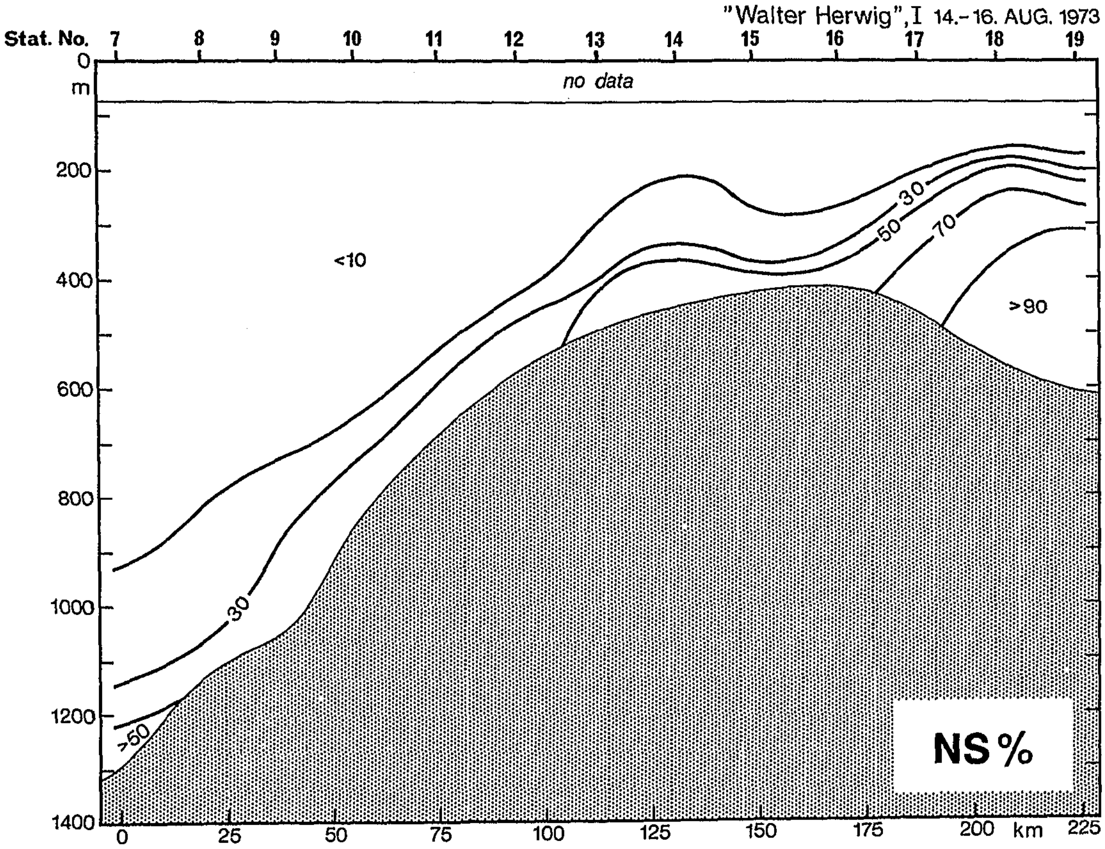
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19
no data
m
<10
30
50
70
>90
>50
NS %
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600
800
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1200
1400
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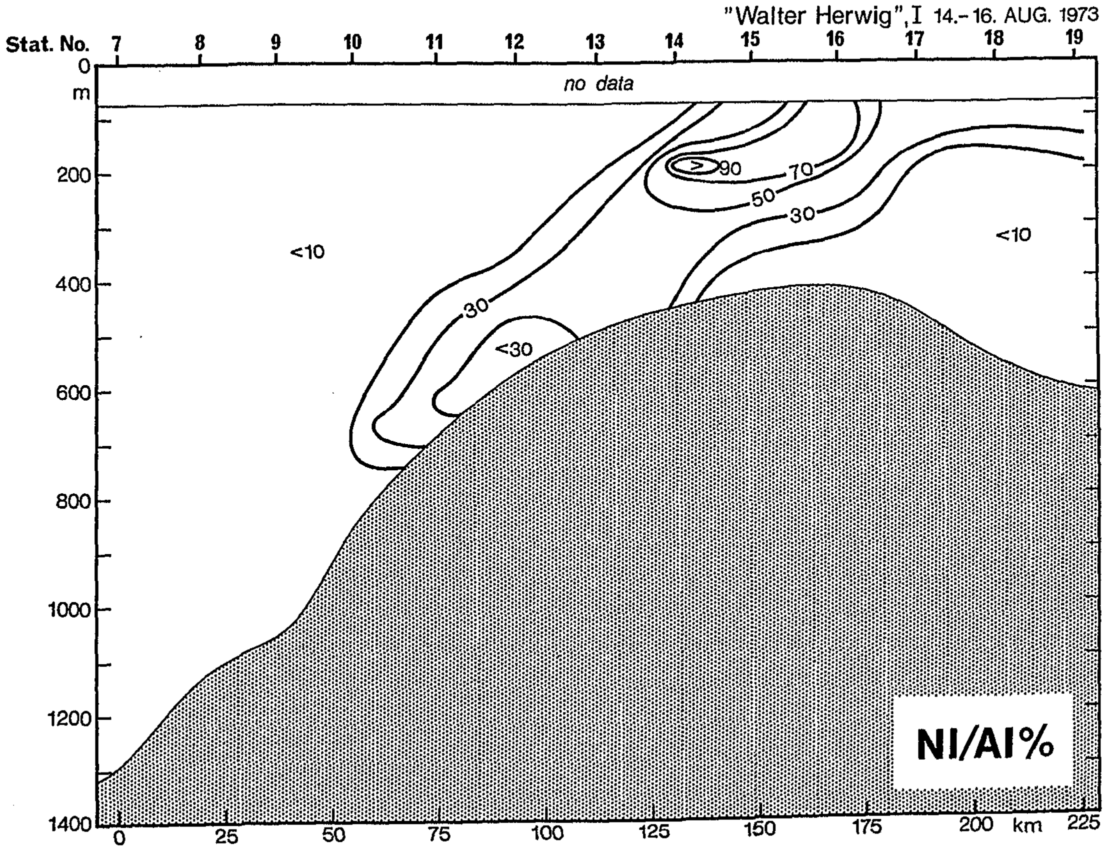
25
50
75
100
125
150
175
200 km
225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18
19
no data
m
<10
>90
70
50
30
<30
<10
NI/AI%
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200
400
600
800
1000
1200
1400
0
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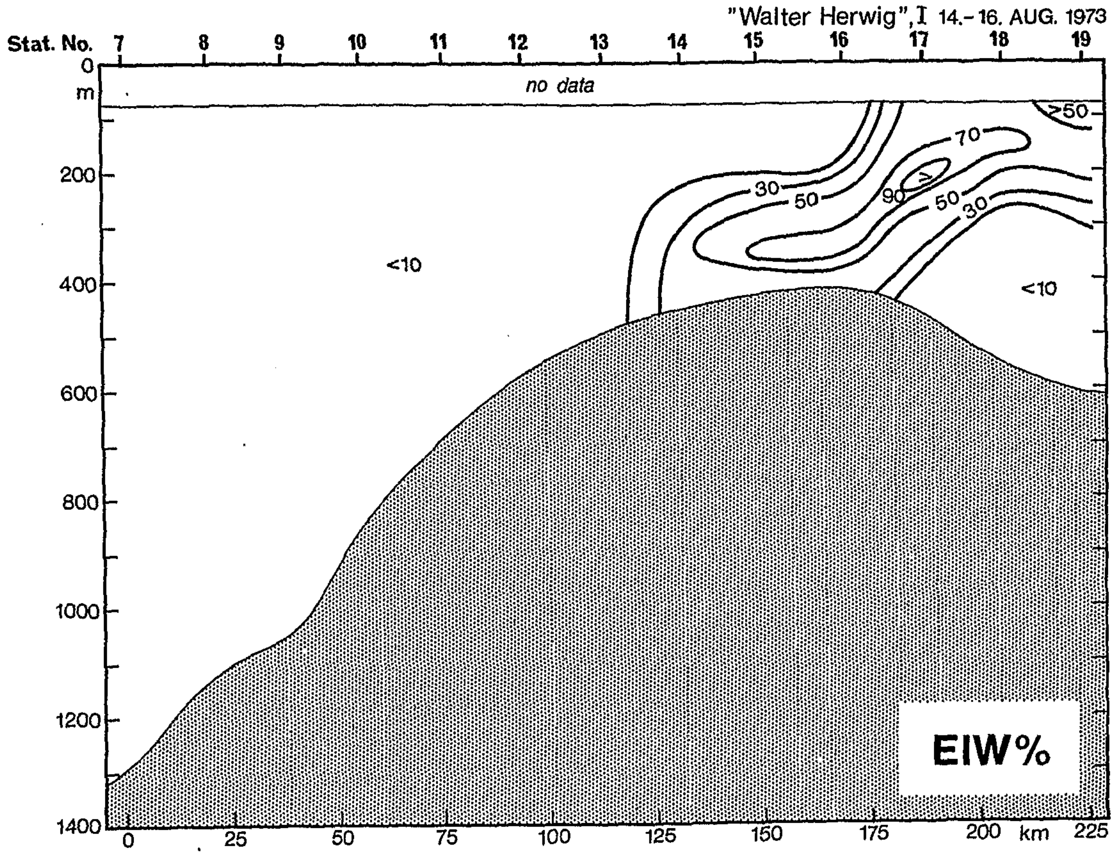
50
75
100
125
150
175
200 km
225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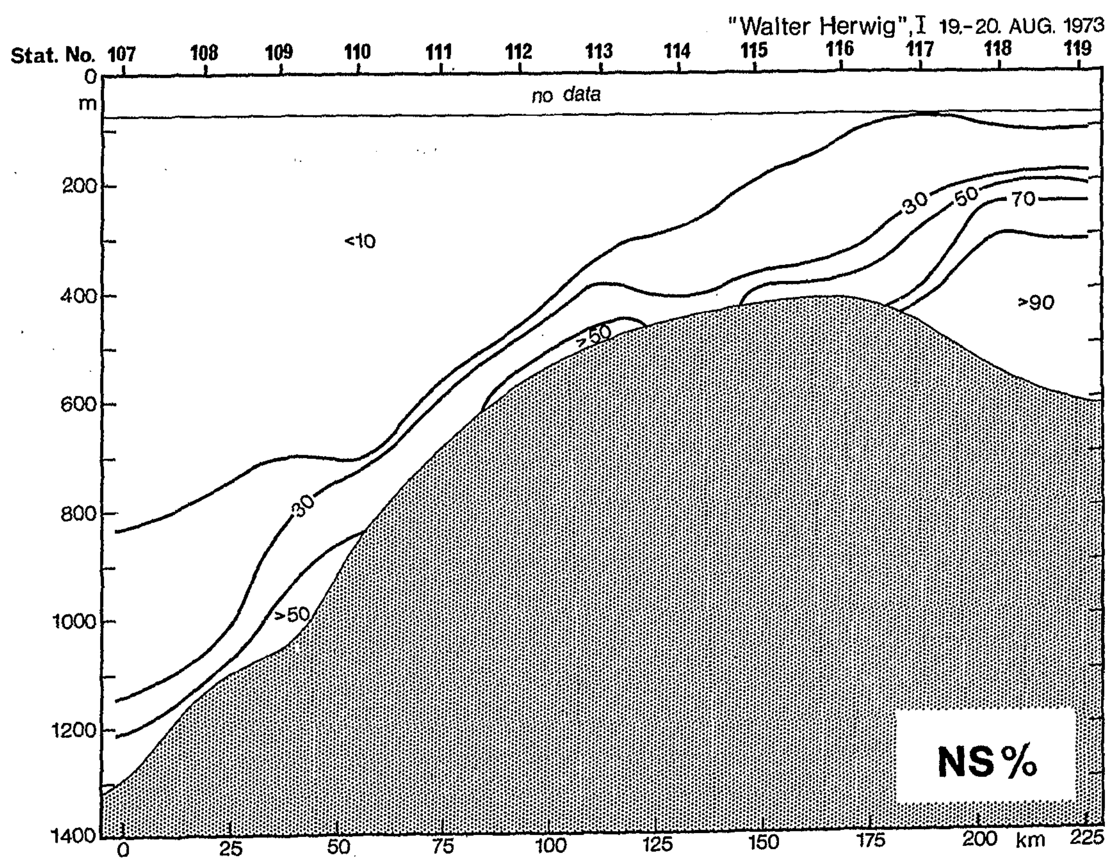
EIW%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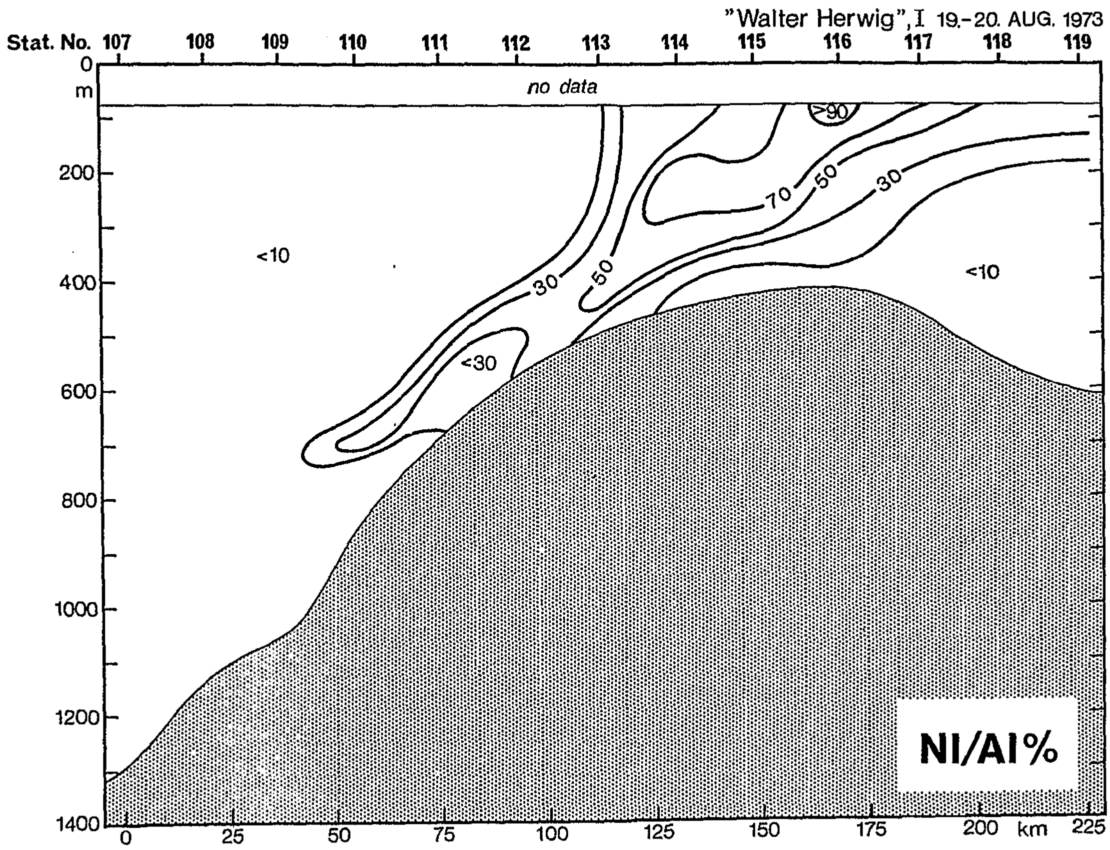
>90
>50
30
>50
0 25 50 75 100 125 150 175 200 km 225
NS%


"Walter Herwig", I 19.-20. AUG. 1973
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no data
m
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200
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>90
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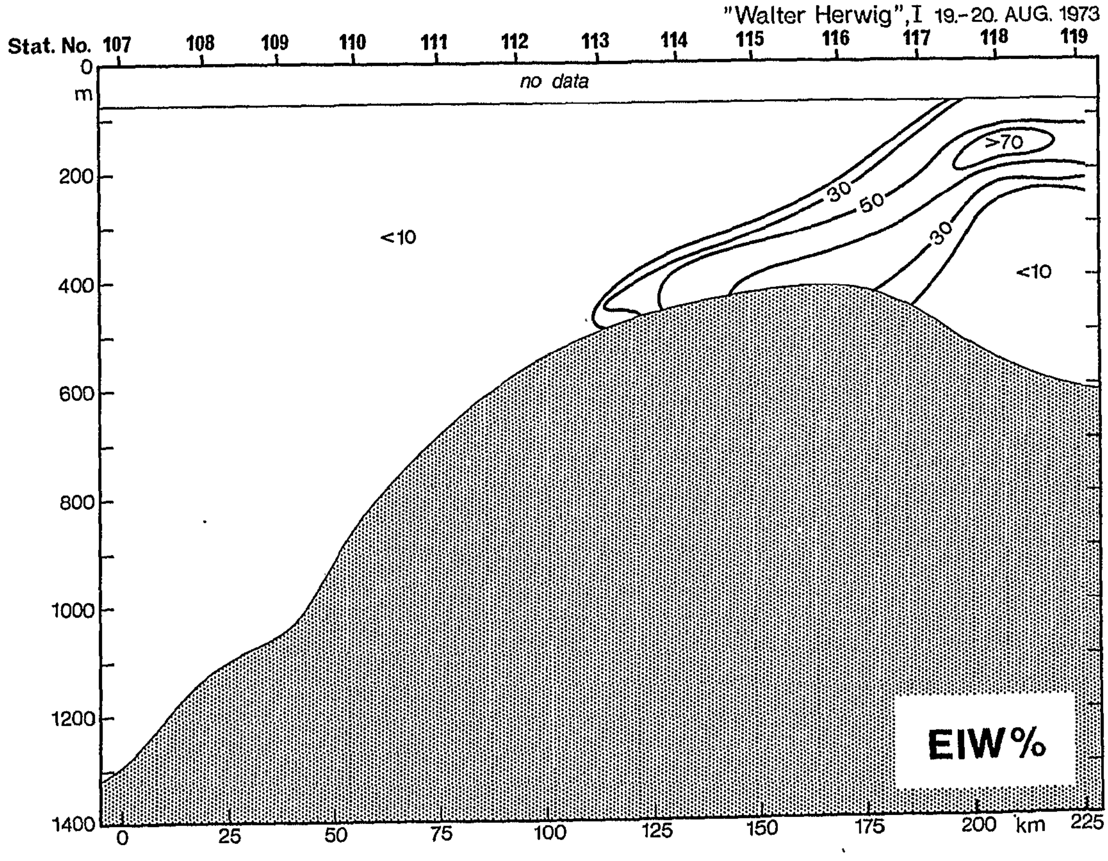
NI/AI%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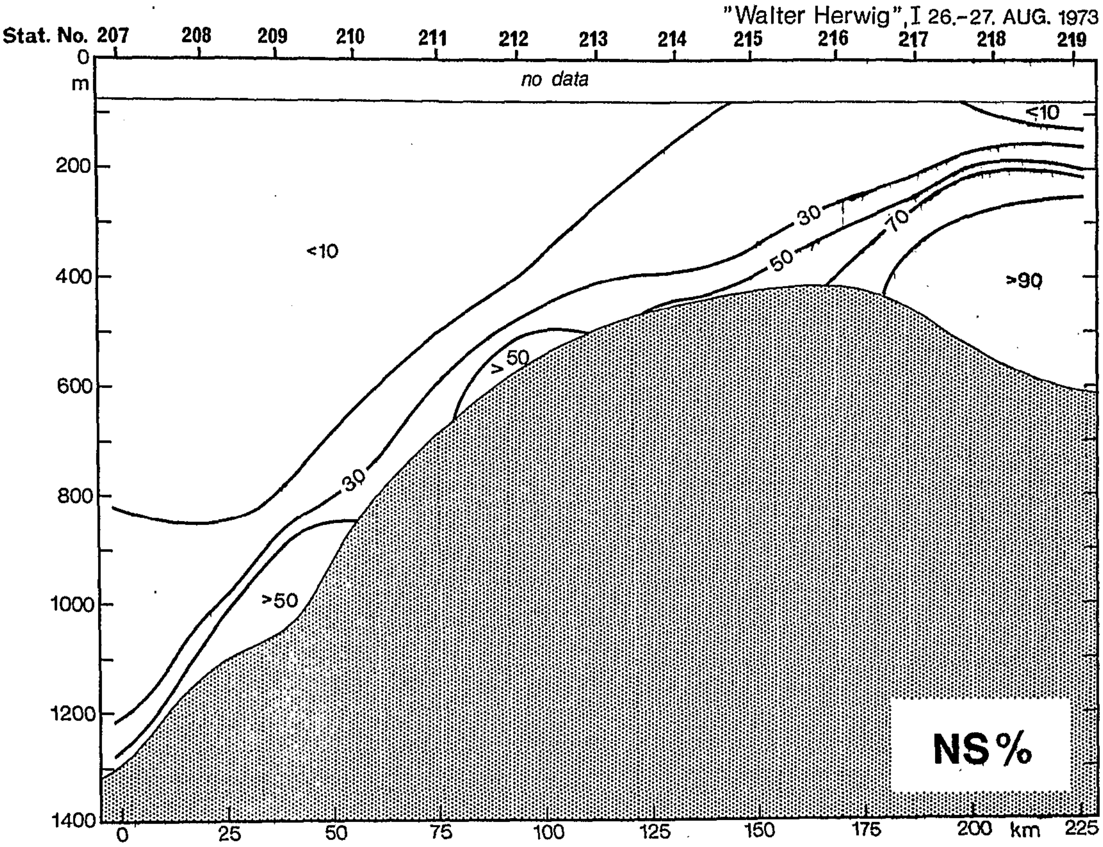
EIW%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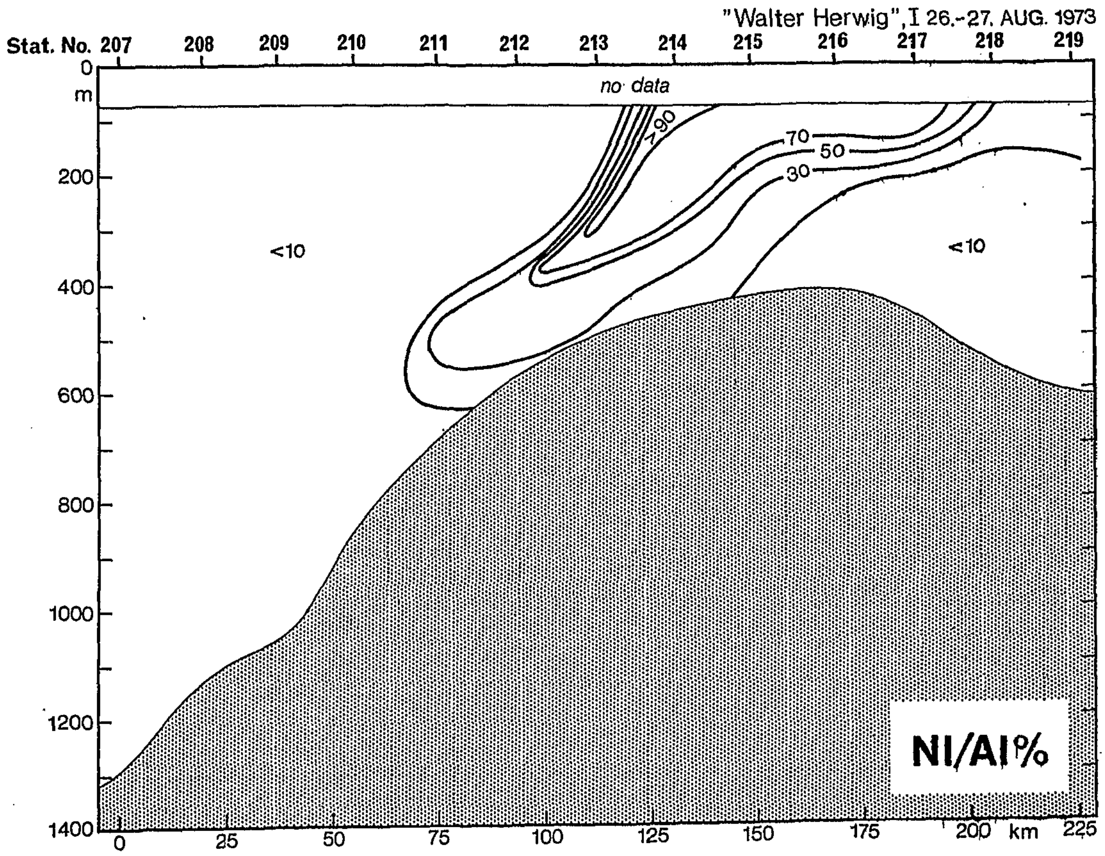
NS%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m
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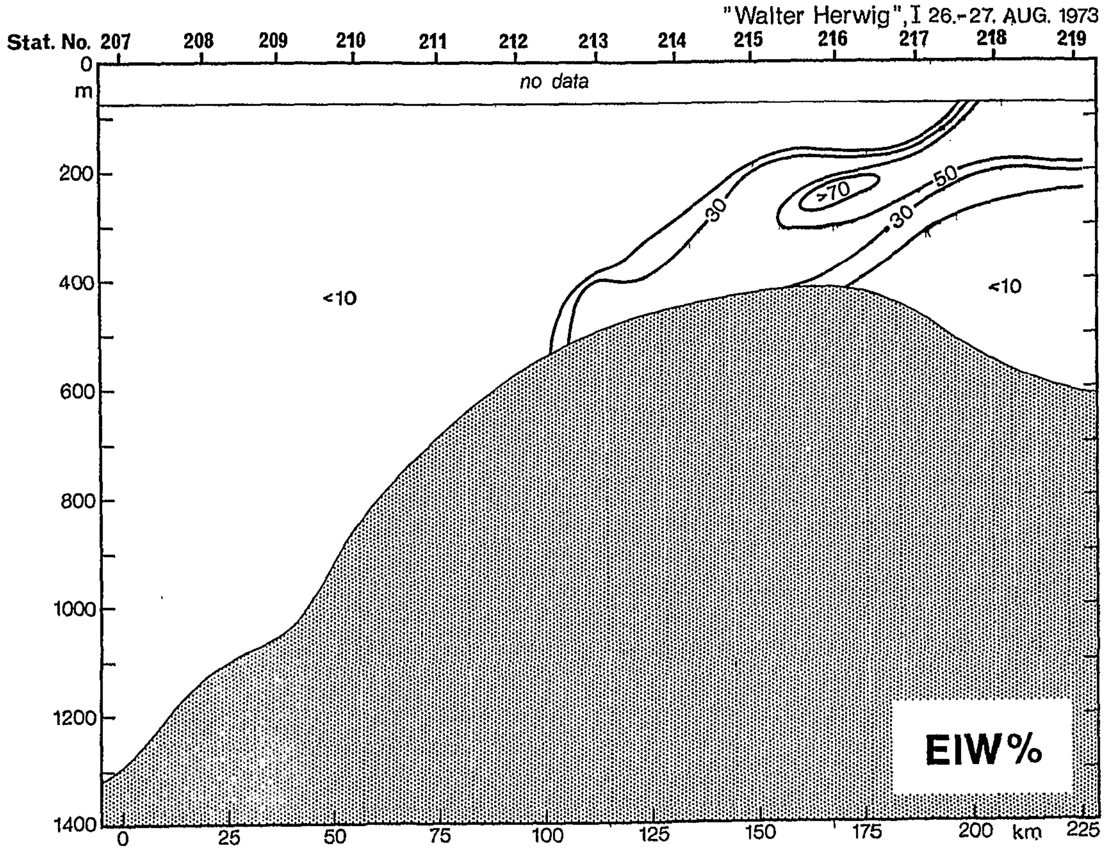
NI/AI%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m
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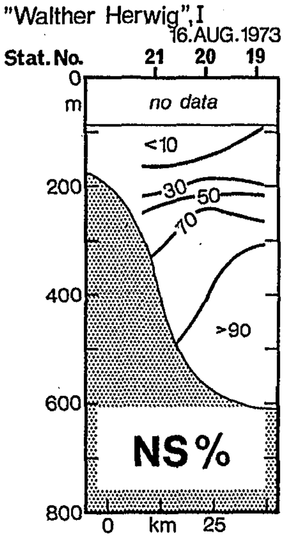
0 25 50 75 100 125 150 175 200 km 225
EIW%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NS%
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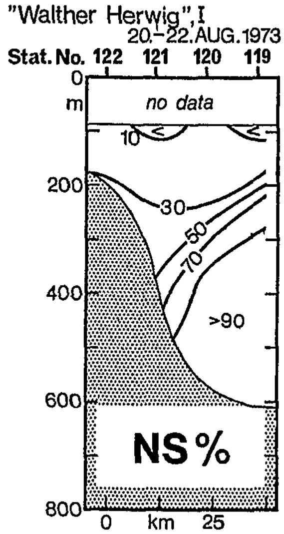
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20.-22.AUG.1973
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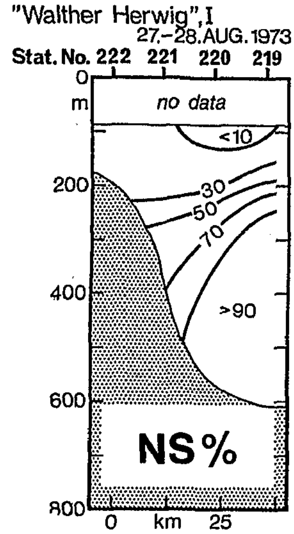
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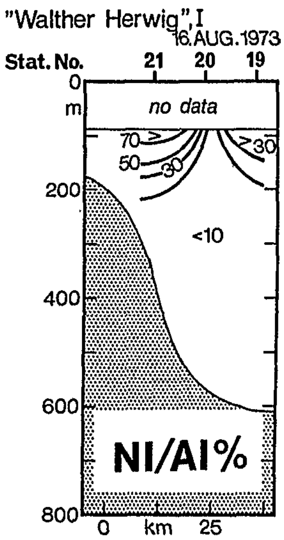
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NI/AI%
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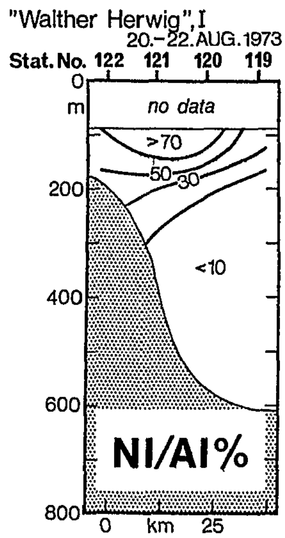
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20.-22.AUG.1973
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NI/AI%
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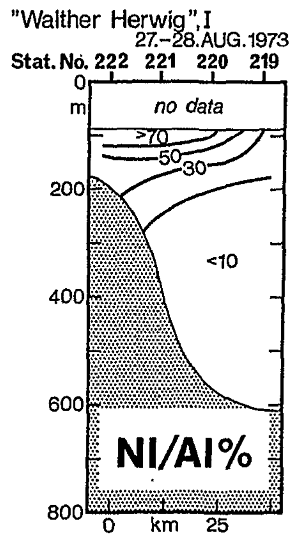
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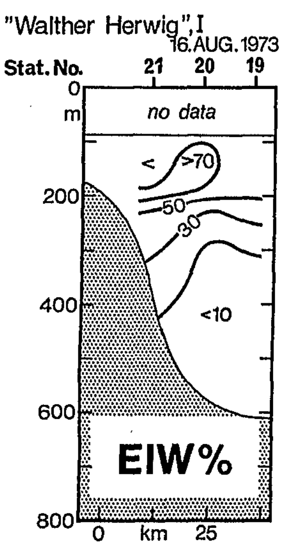
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EIW%
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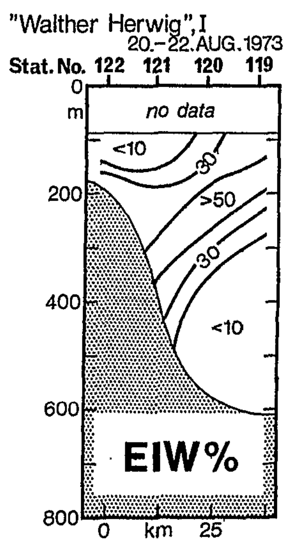
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20.-22.AUG.1973
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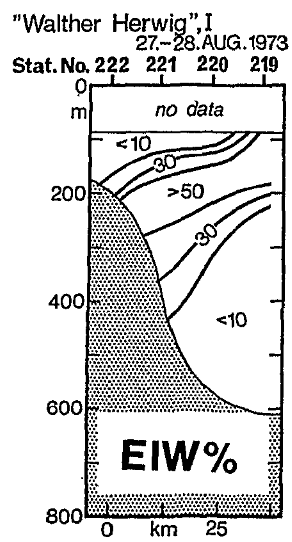
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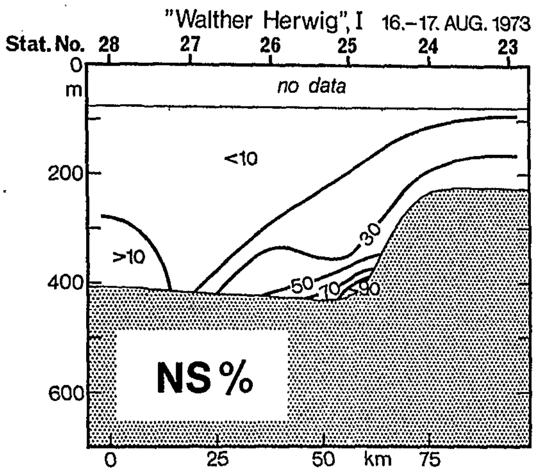
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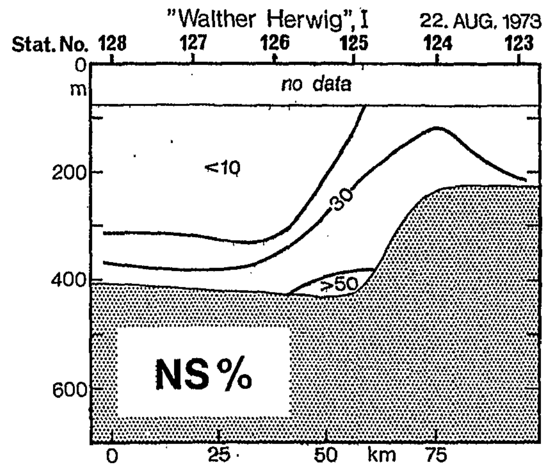
NS %
0 25 50 km 75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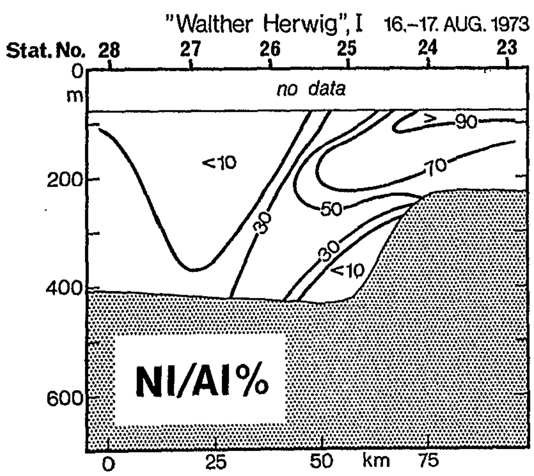
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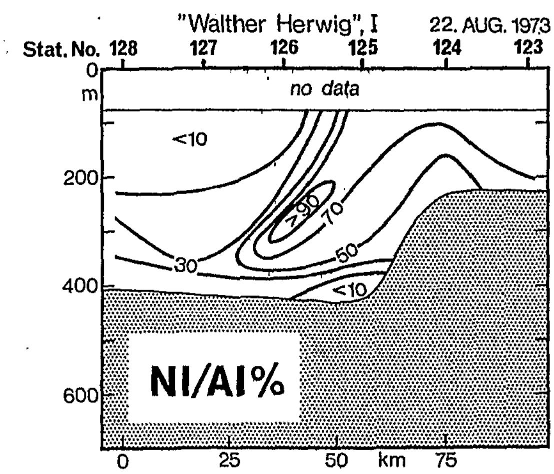
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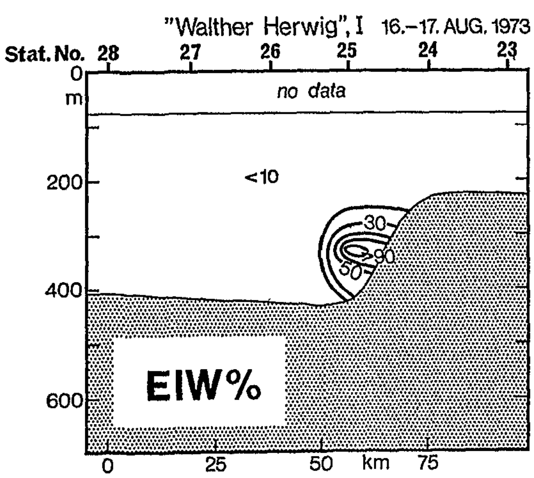
NI/AI%
0 25 50 km 75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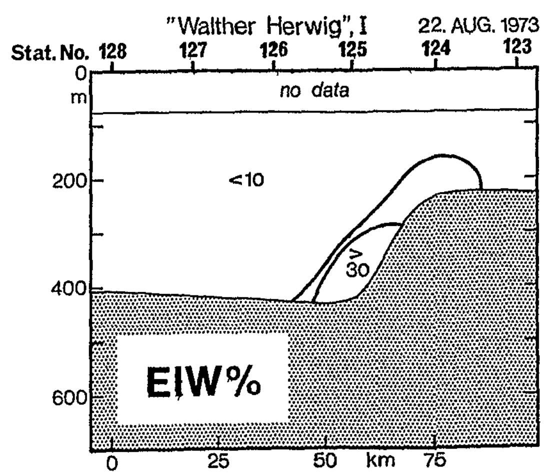
EIW%
0 25 50 km 75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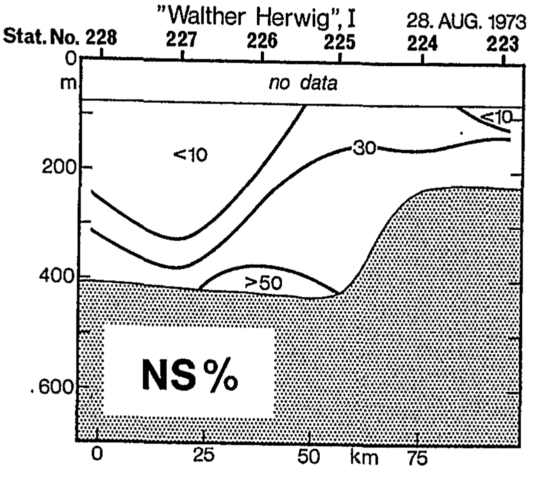
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km
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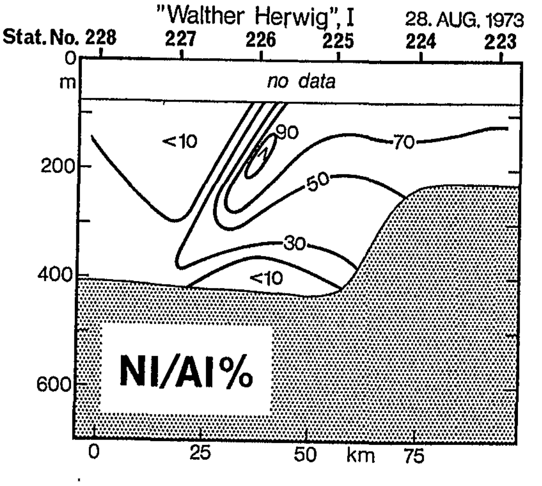
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600
NI/AI%
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50
km
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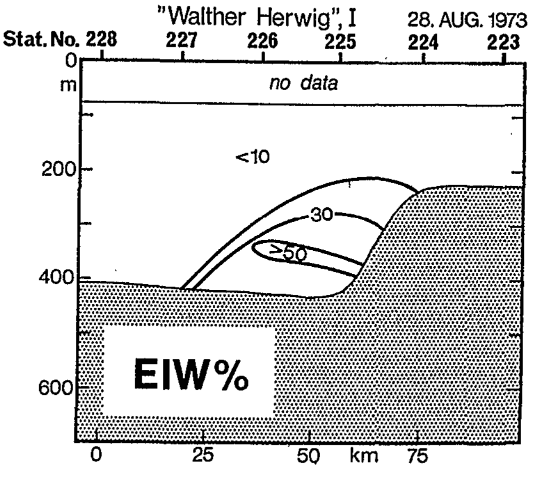
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28. AUG. 1973
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600
EIW%
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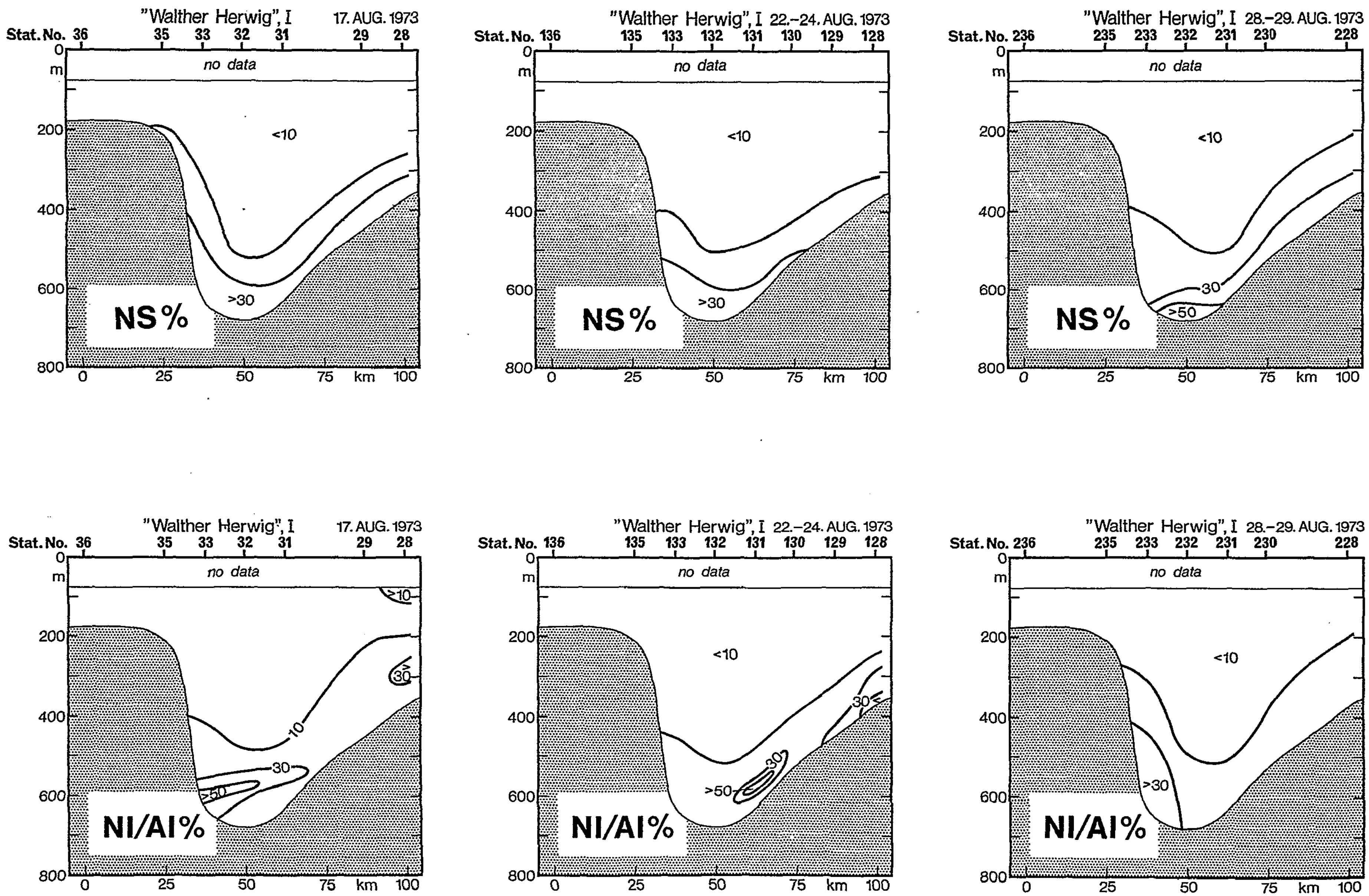
25
50
km
75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Stat. No. 236 235 233 232 231 230 228
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"Walther Herwig", I 22.-24. AUG. 1973
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"Walther Herwig", I 28.-29. AUG. 1973
Stat. No. 236 235 233 232 231 230 228
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800
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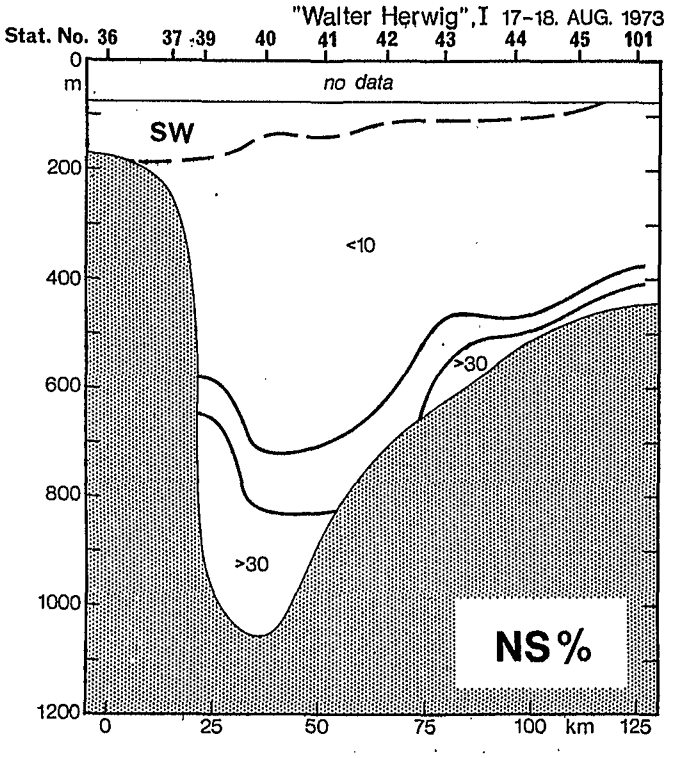
50
75
km
100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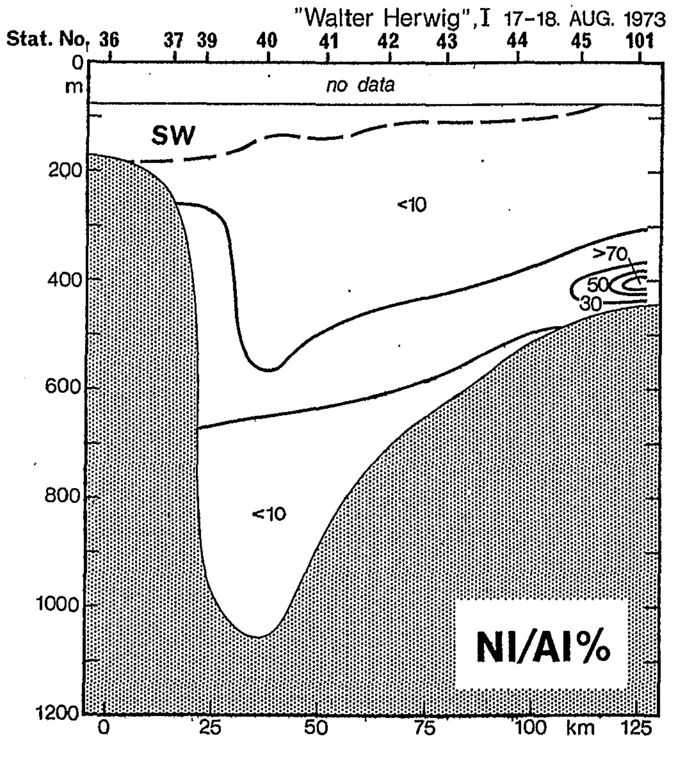
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NI/AI%
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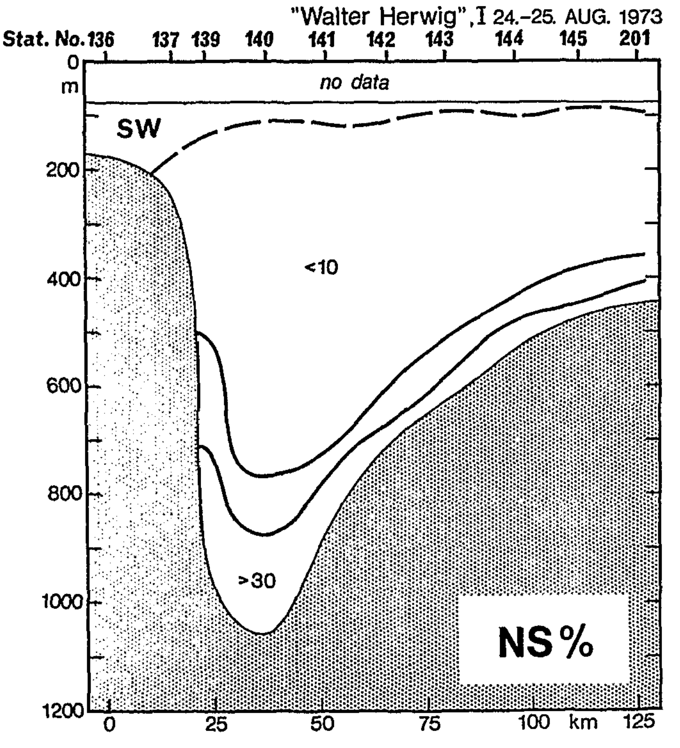
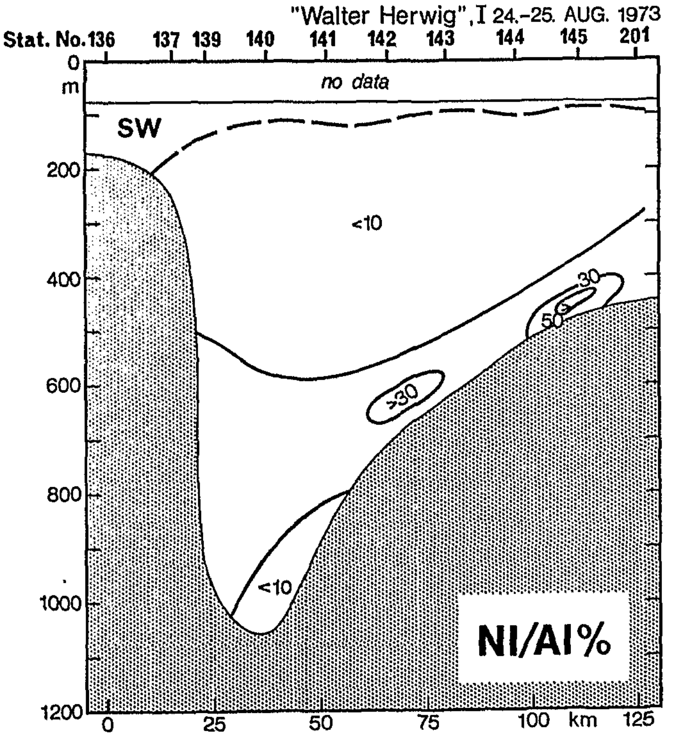
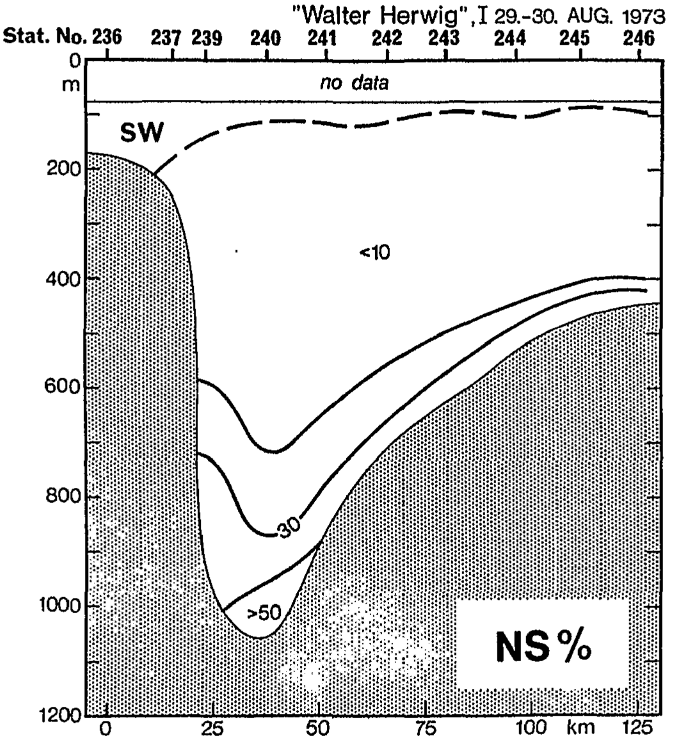
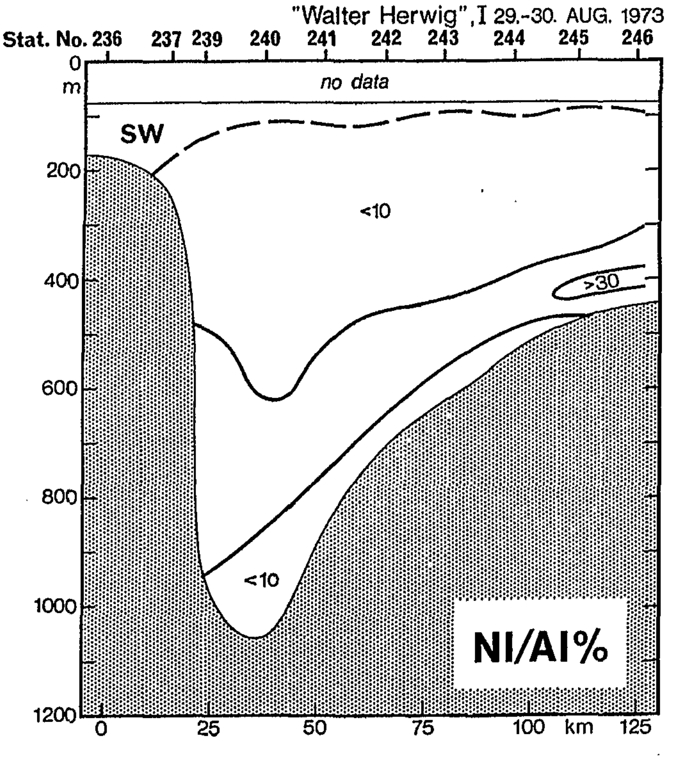
0 25 50 75 100 km 125


"Walter Herwig", I 24.-25. AUG. 1973
Stat. No. 136 137 139 140 141 142 143 144 145 201
no data
SW
<10
>30
NS %
0 m 200 400 600 800 1000 1200
0 25 50 75 100 km 125


"Walter Herwig", I 24.-25. AUG. 1973
Stat. No. 136 137 139 140 141 142 143 144 145 201
no data
SW
<10
30
50
>30
<10
NI/AI %
0 m 200 400 600 800 1000 1200
0 25 50 75 100 km 125


"Walter Herwig",I 29.-30. AUG. 1973
Stat. No. 236 237 239 240 241 242 243 244 245 246
0
m
no data
SW
200
400
600
800
1000
1200
<10
30
>50
NS %
0 25 50 75 100 km 125


"Walter Herwig",I 29.-30. AUG. 1973
Stat. No. 236 237 239 240 241 242 243 244 245 246
0
m
no data
SW
200
400
600
800
1000
1200
<10
>30
<10
NI/AI%
0 25 50 75 100 km 125

6.11 Hudson

NA is the dominant Atlantic inflow water. IS and LS are observed in the Atlantic basin. As cold overflow P was analysed for the surface at the Greenland side of the ridge, in intermediate layers AI and PI and as deep overflow NS were found. At the southern most section NS and AI could not be seperated, and NS has been taken as reference.

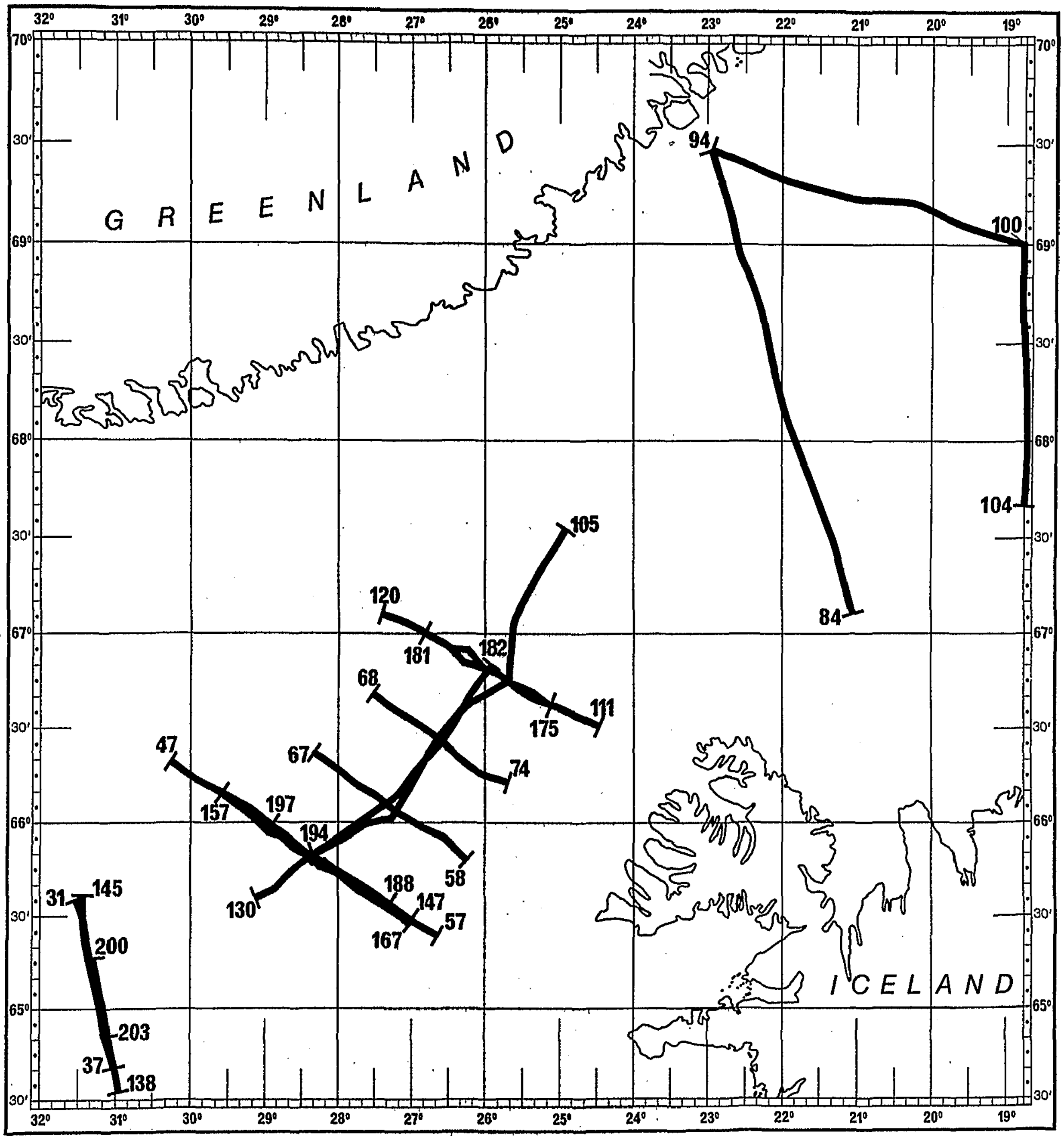
Section	Stat.No.	Mixing triangle (see table 3)
31 - 37	31, 32	14
	33 - 37	9, 10
46 - 57	46 - 50	11, 12
	51, 52	11, 12, 13
	54.- 57	9
58 - 67	58 - 60	9
	61	12, 13
	62 - 65	11, 12, 13
	66, 67	11, 12
68 - 74	68 - 71	11, 12
	72, 73	11, 12, 13
	74	14
84 - 94	84	12
	85, 86	11, 12, 13
	87 - 93	11, 13
	94	11
94 - 104	94	11
	96 - 98	11, 13
	99 - 103	11, 13
	104	12
111 - 120	111, 112	12, 13
	113	11, 12, 13
	114 - 120	11, 13
105 - 130	105	11, 13
	109, 110, 114	11, 12, 13
	122 - 124, 127, 128,130	11, 12, 13

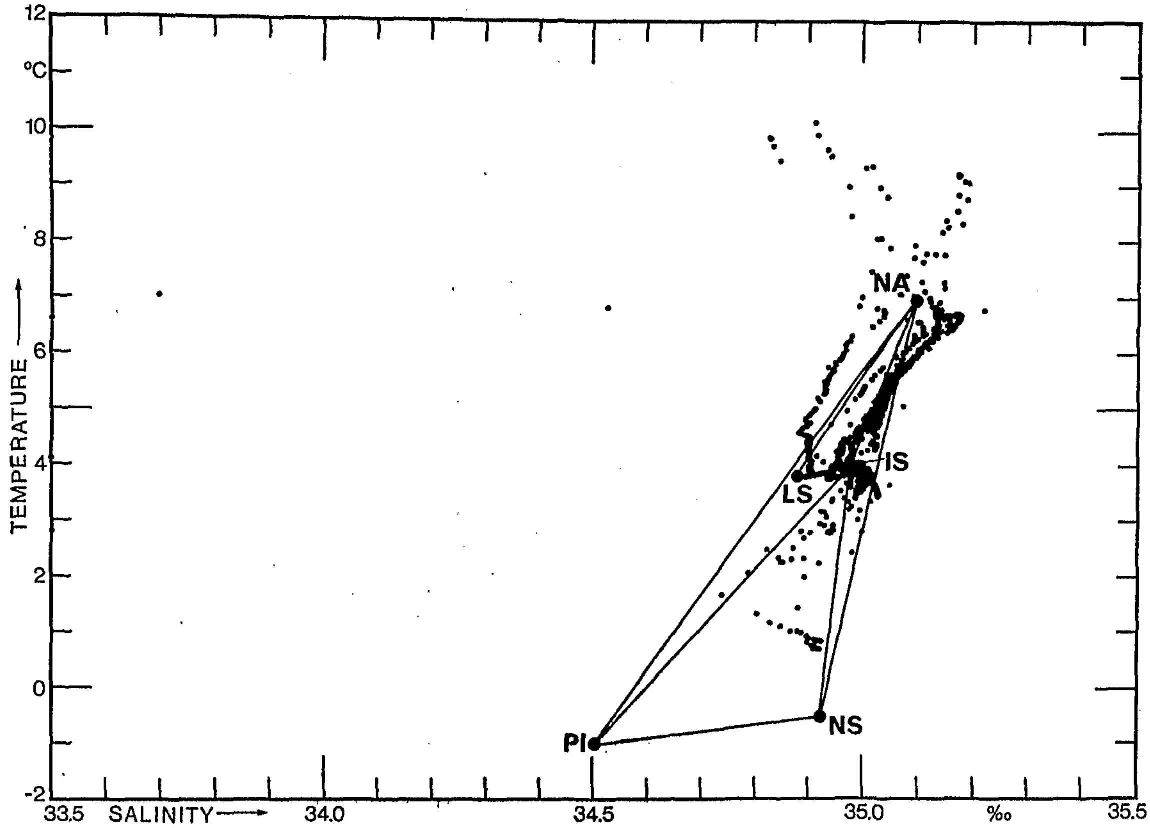
Hudson (cont'd)

Section	Stat.No.	Mixing triangles (see table 3)
138 - 145	138 - 142	9, 10
	144, 145	9
147 - 157	147, 148	9
	149 - 153	14
	154, 155	11, 12, 13
	156, 157	11, 12
157 - 167	157 - 160	11, 12
	161 - 164	11, 12, 13
	165 - 167	12
175 - 181	175	11, 12
	176 - 181	11, 13
188 - 197	188	9
	189, 190	9, 10
	191 - 195	14
	196	11, 12, 13
	197	11, 12
200 - 203		9, 10
182 - 194	182, 183	12, 13
	184	11, 12, 13
	194	11, 12

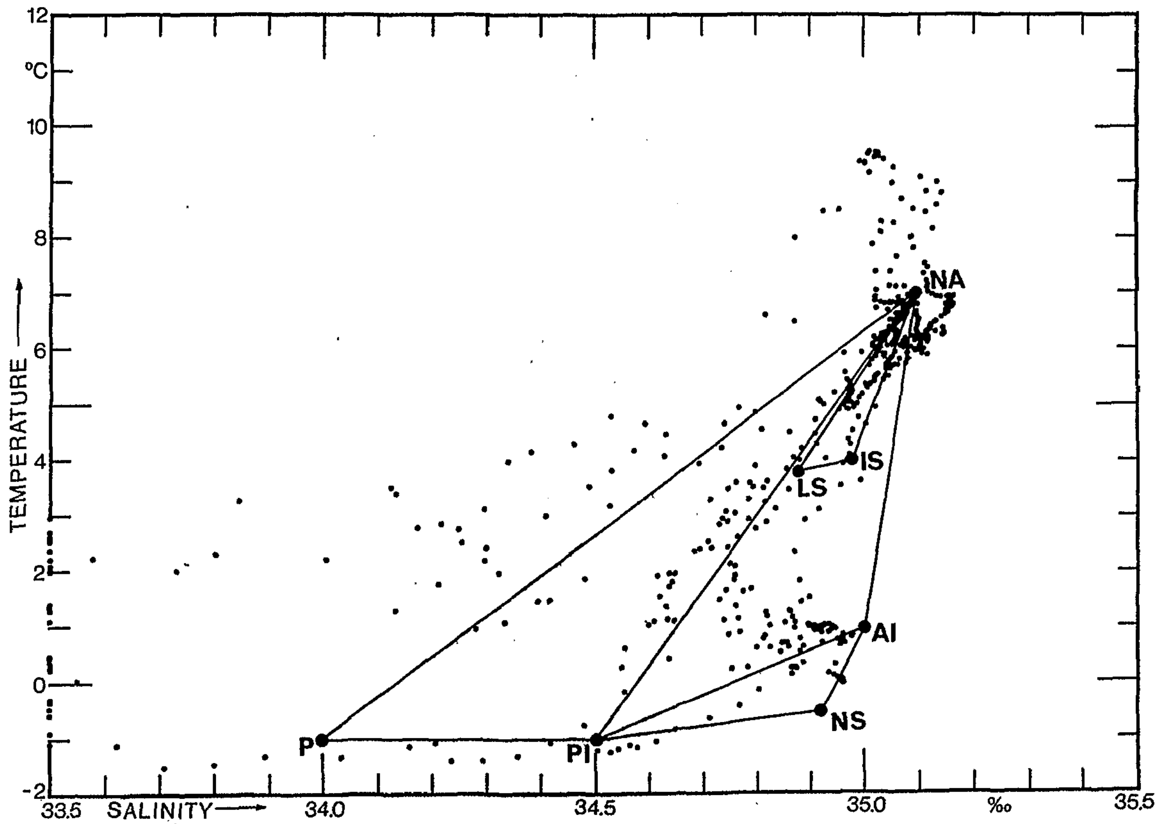
OVERFLOW '73

"HUDSON"

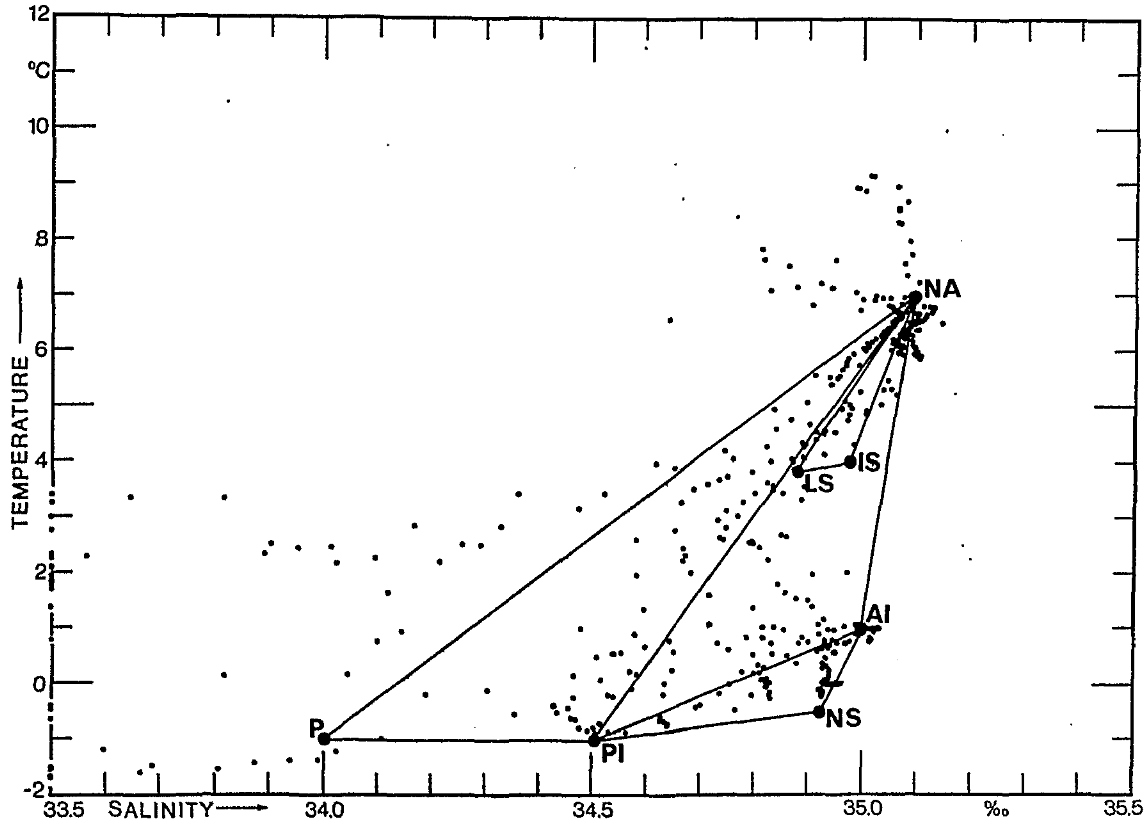




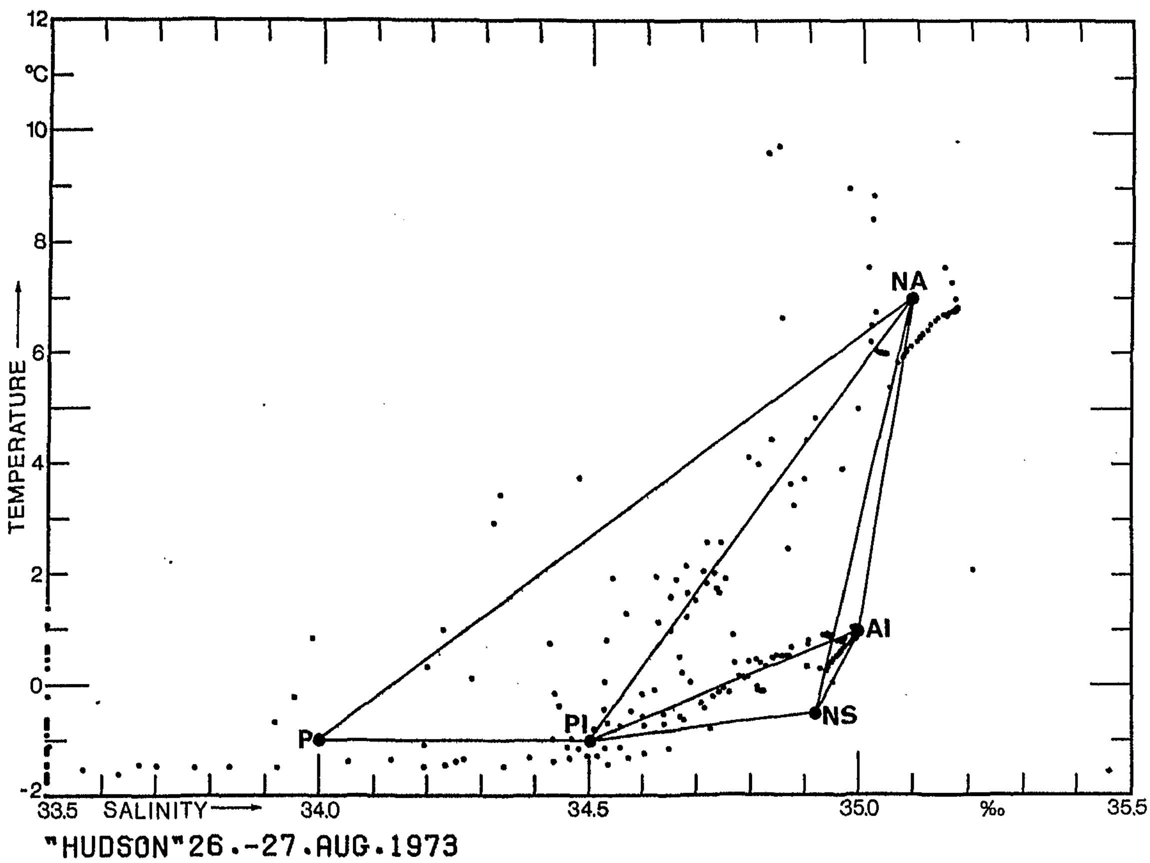
"HUDSON"22.AUG.1973
STAT.NO.31-37



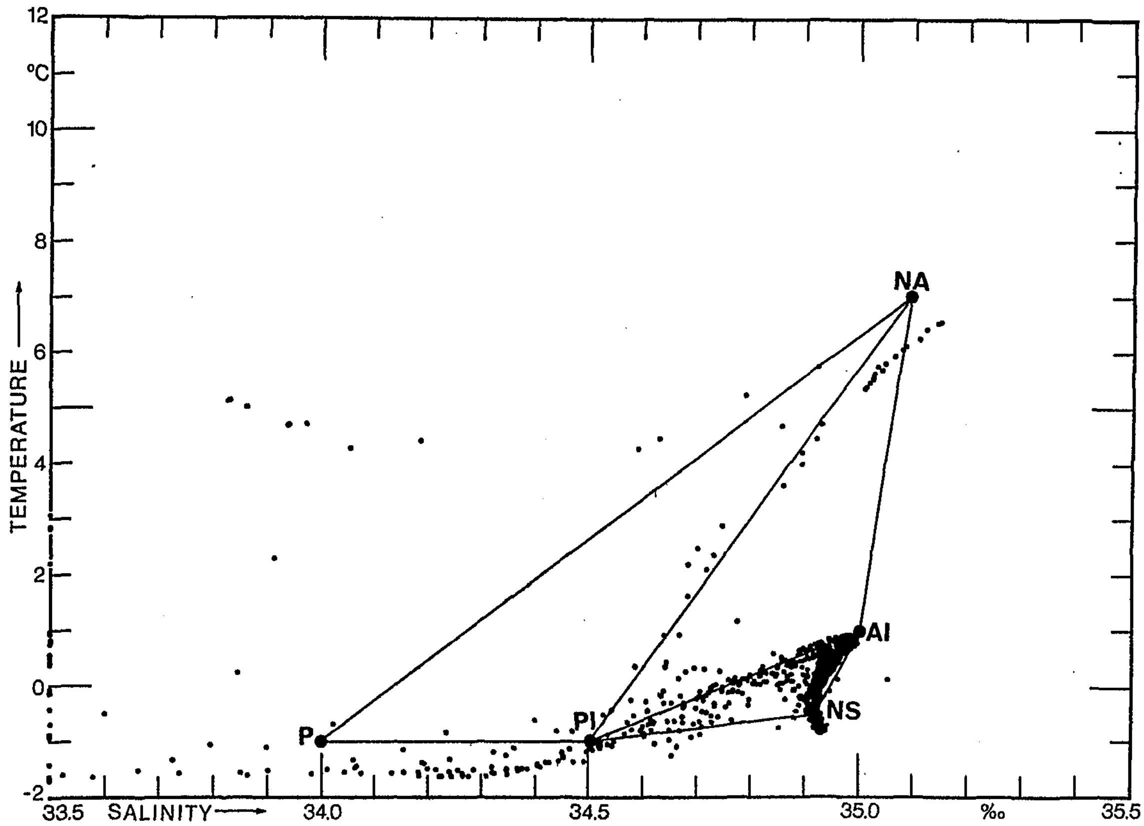
"HUDSON"24.-25.AUG.1973
STAT.NO.46-52,54-57



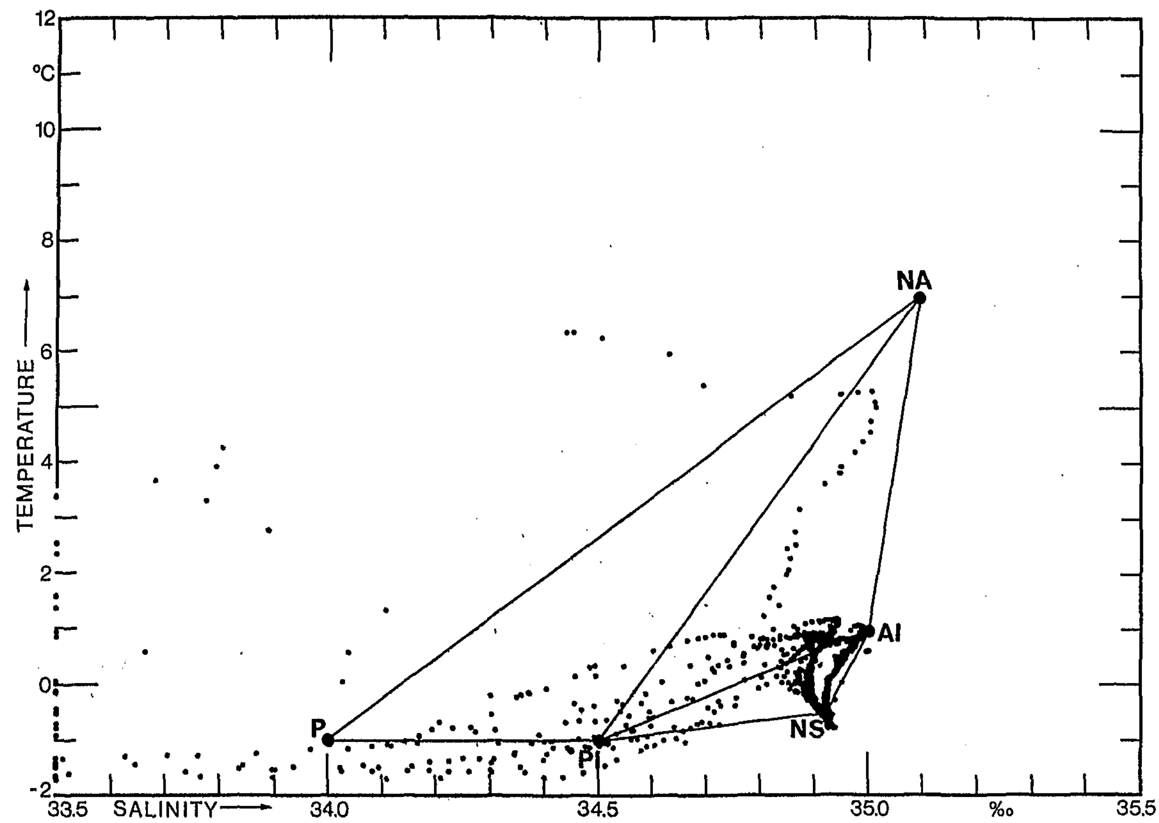
"HUDSON"25.-26.AUG.1973
STAT.NO.58-62,64 - 67



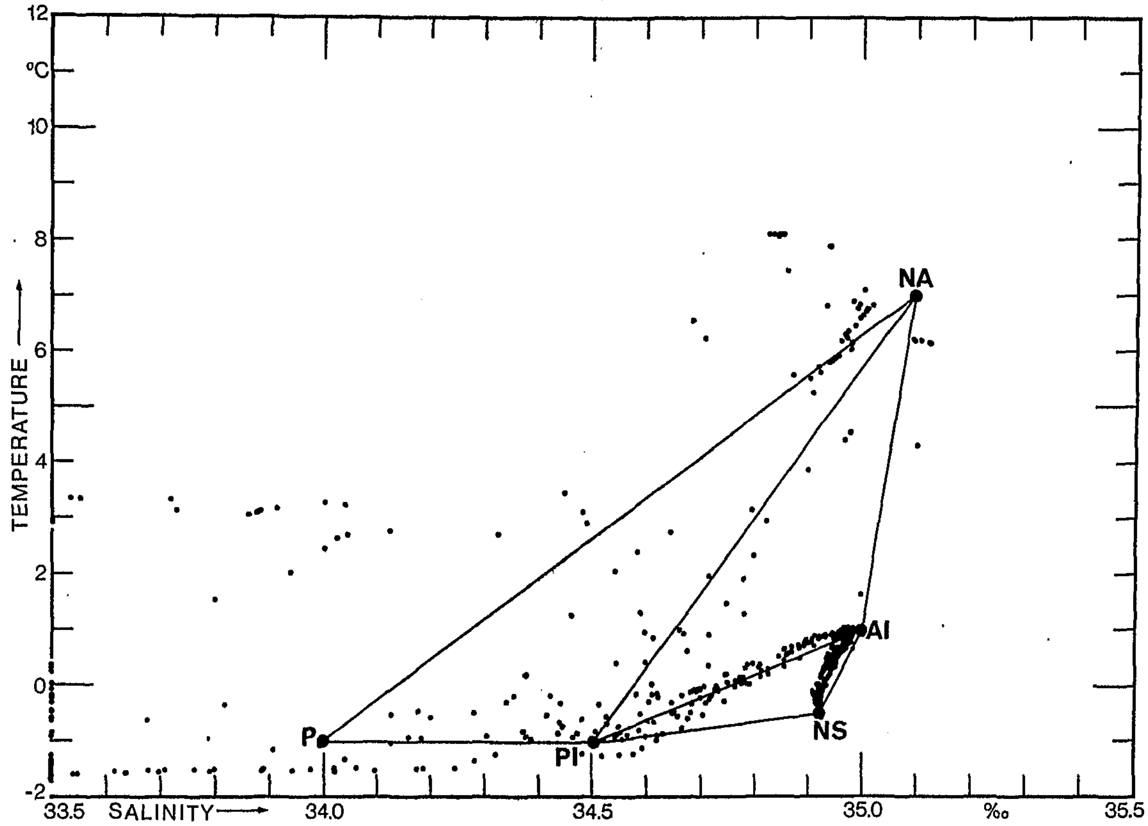
"HUDSON"26.-27.AUG.1973
STAT.NO.68-74



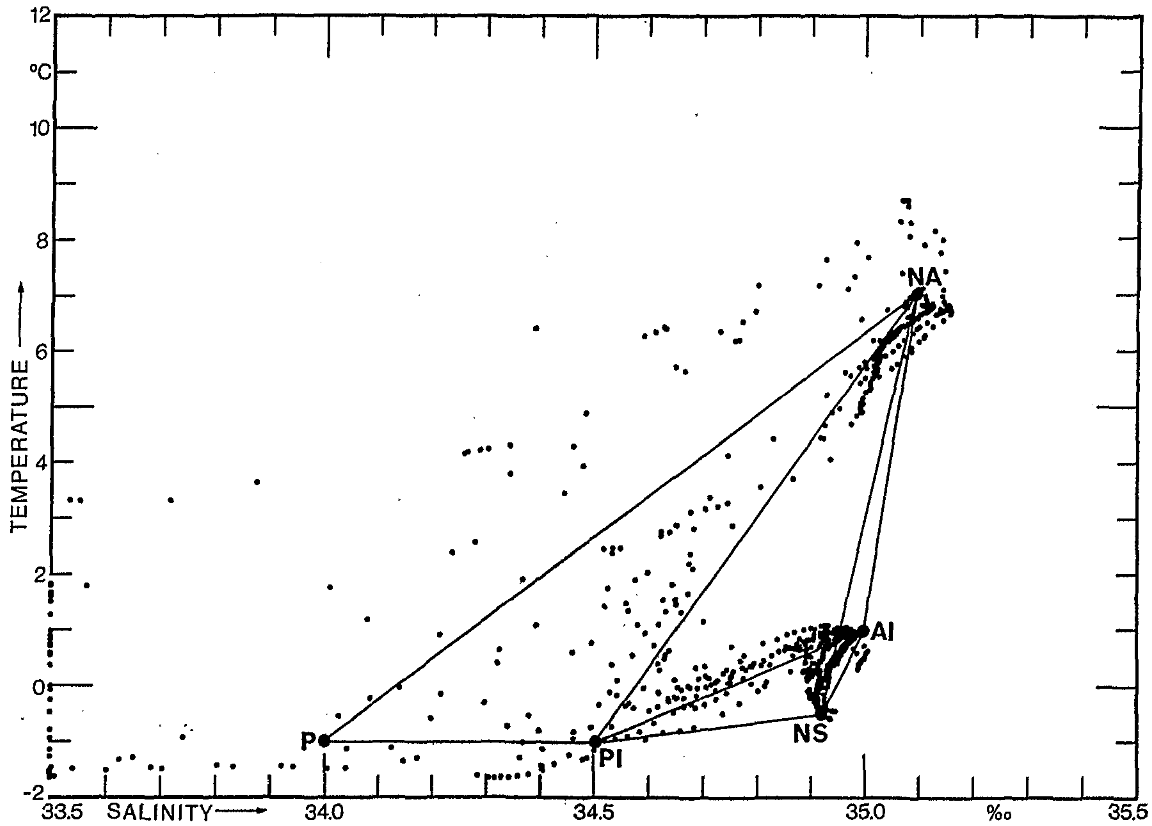
"HUDSON"29.-31.AUG.1973
STAT.NO.84-94



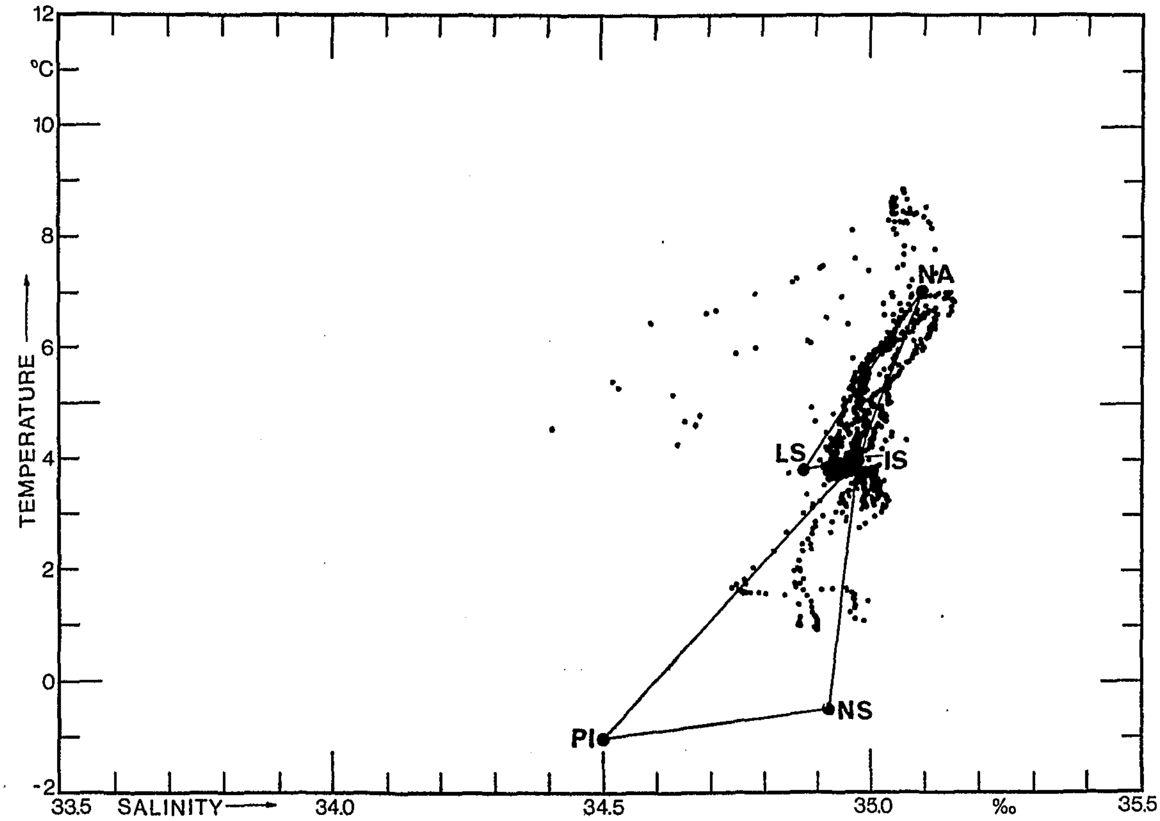
"HUDSON"31.AUG.-1.SEP.1973
STAT.NO.94,96-104



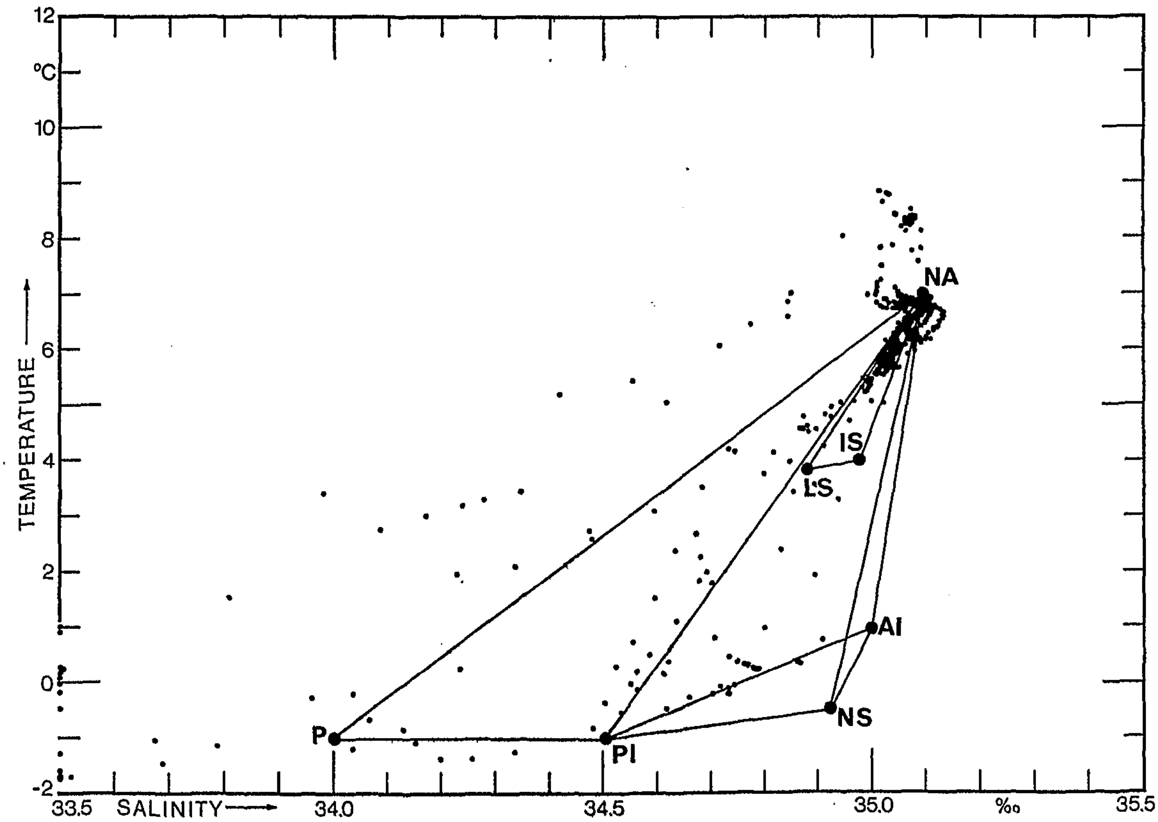
"HUDSON"3.-4.SEP.1973
STAT.NO.111-120



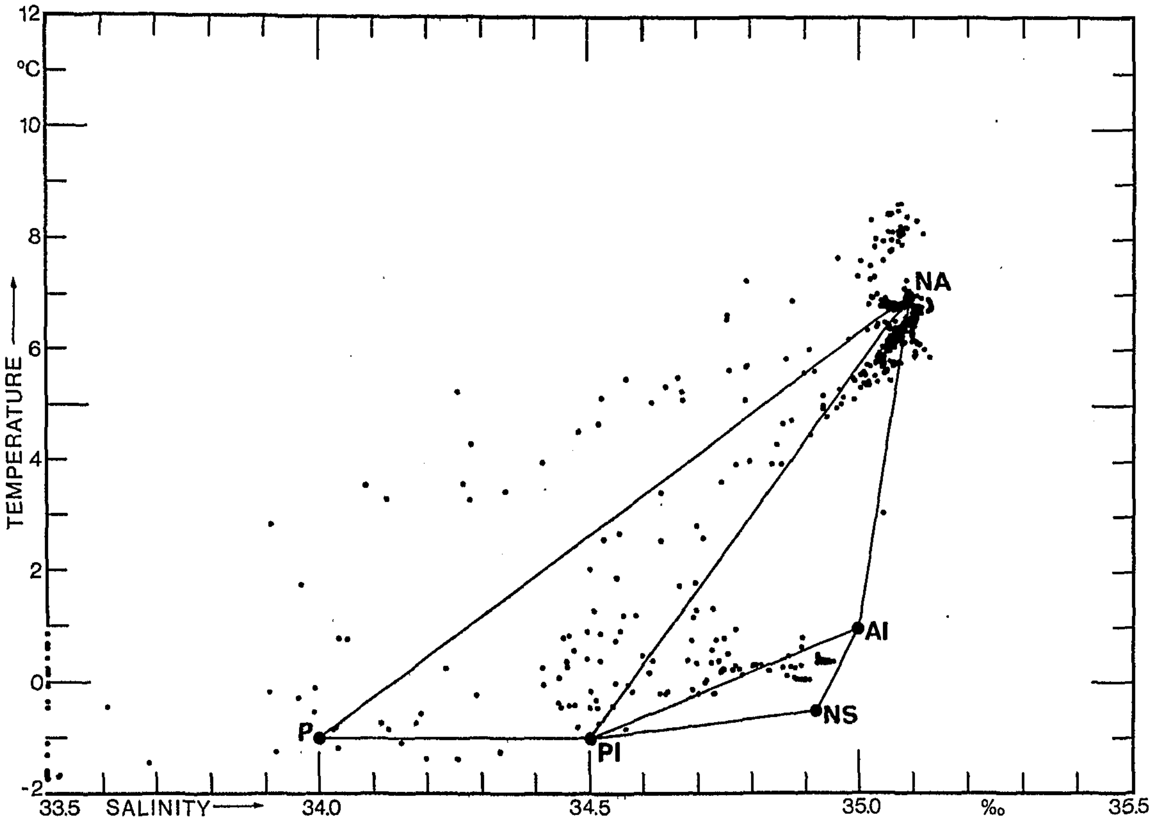
"HUDSON"2.-5.SEP.1973
STAT.NO.105,109,110,114,
122-124,127,128,130



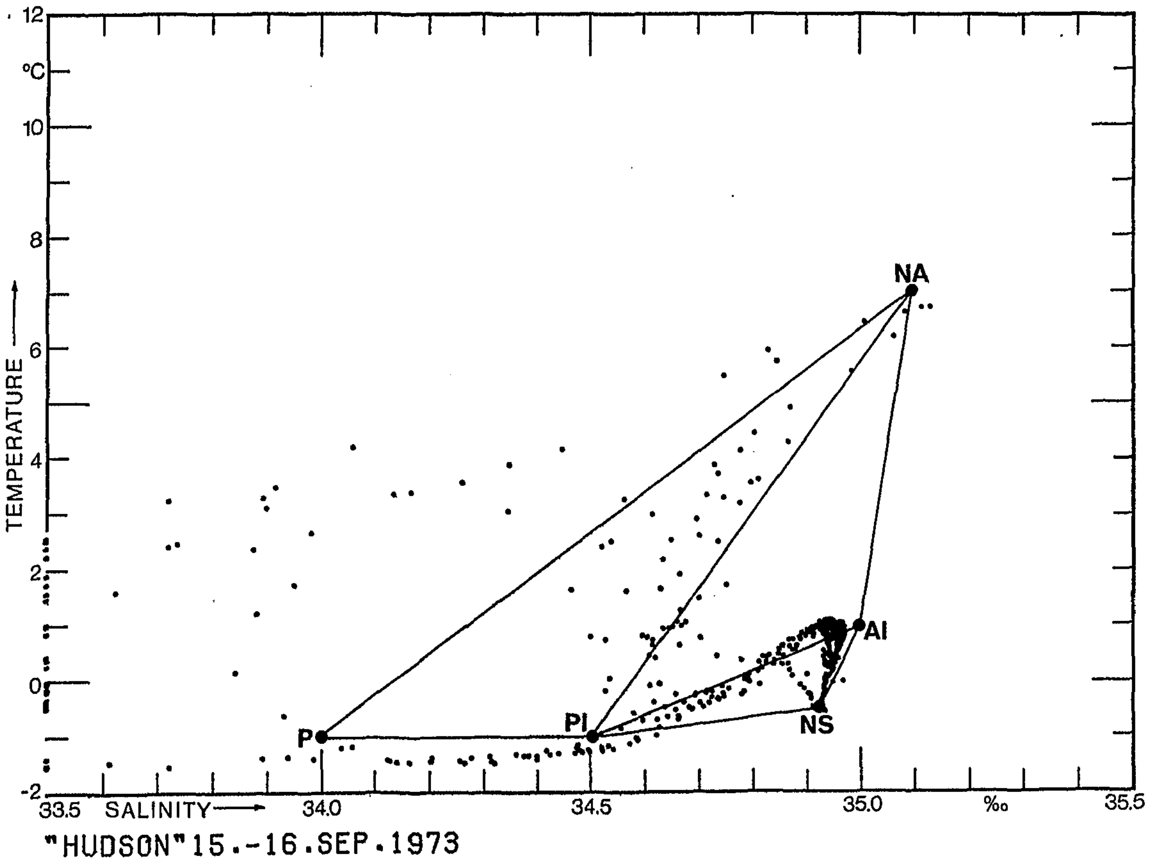
"HUDSON"5.-6.SEP.1973
STAT.NO.138-142,144,145



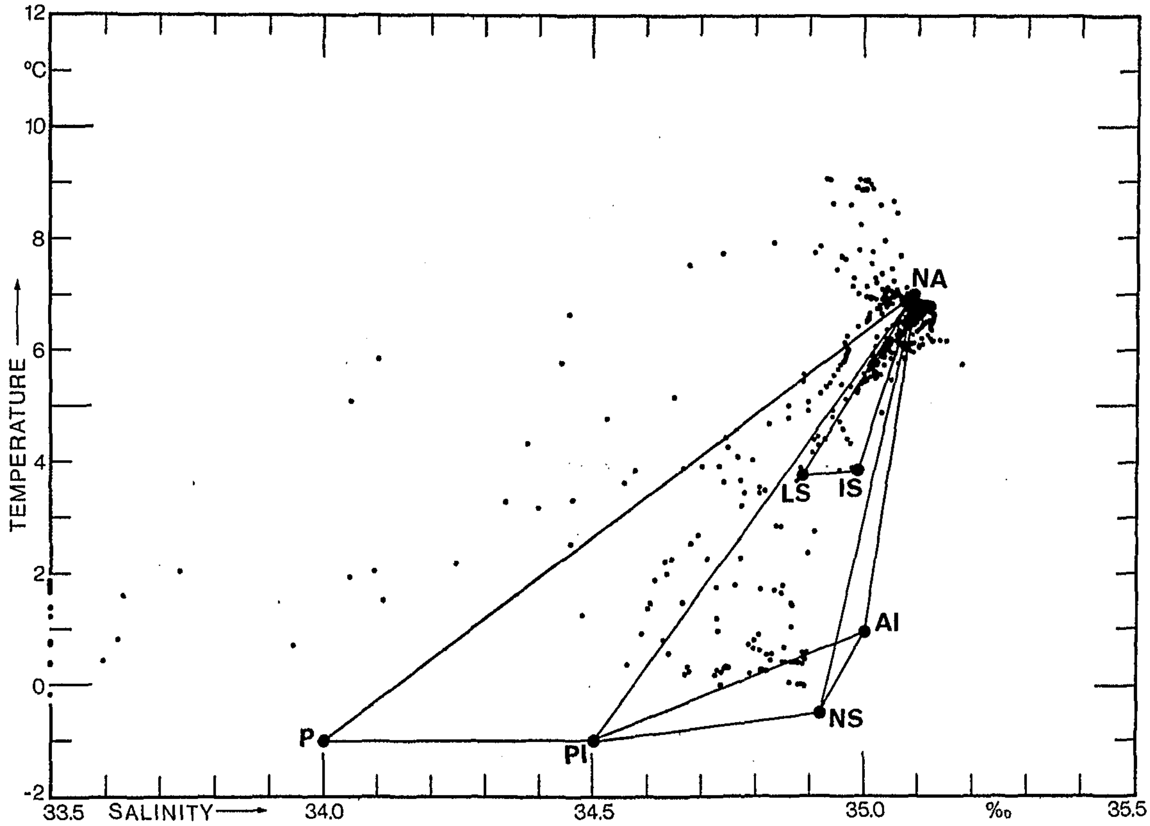
"HUDSON"7.-8.SEP.1973
STAT.NO.147-157



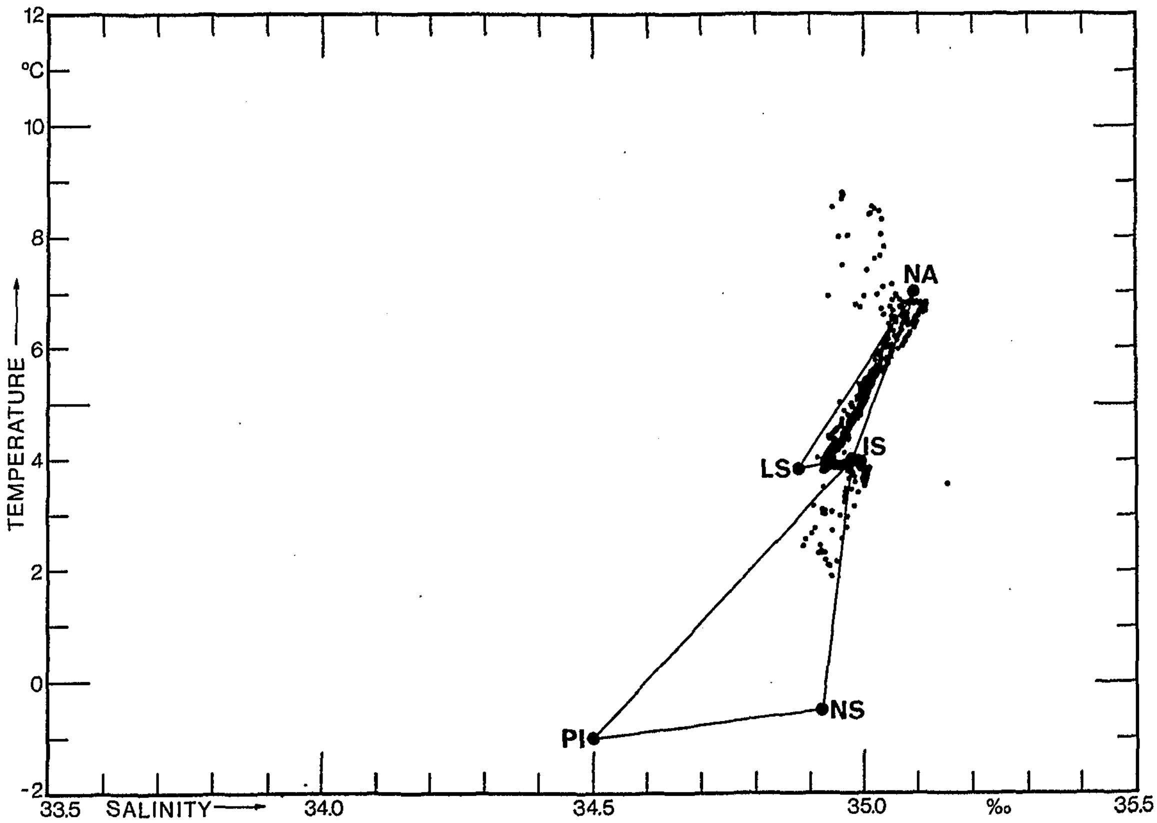
"HUDSON"8.-9.SEP.1973
STAT.NO.157-167



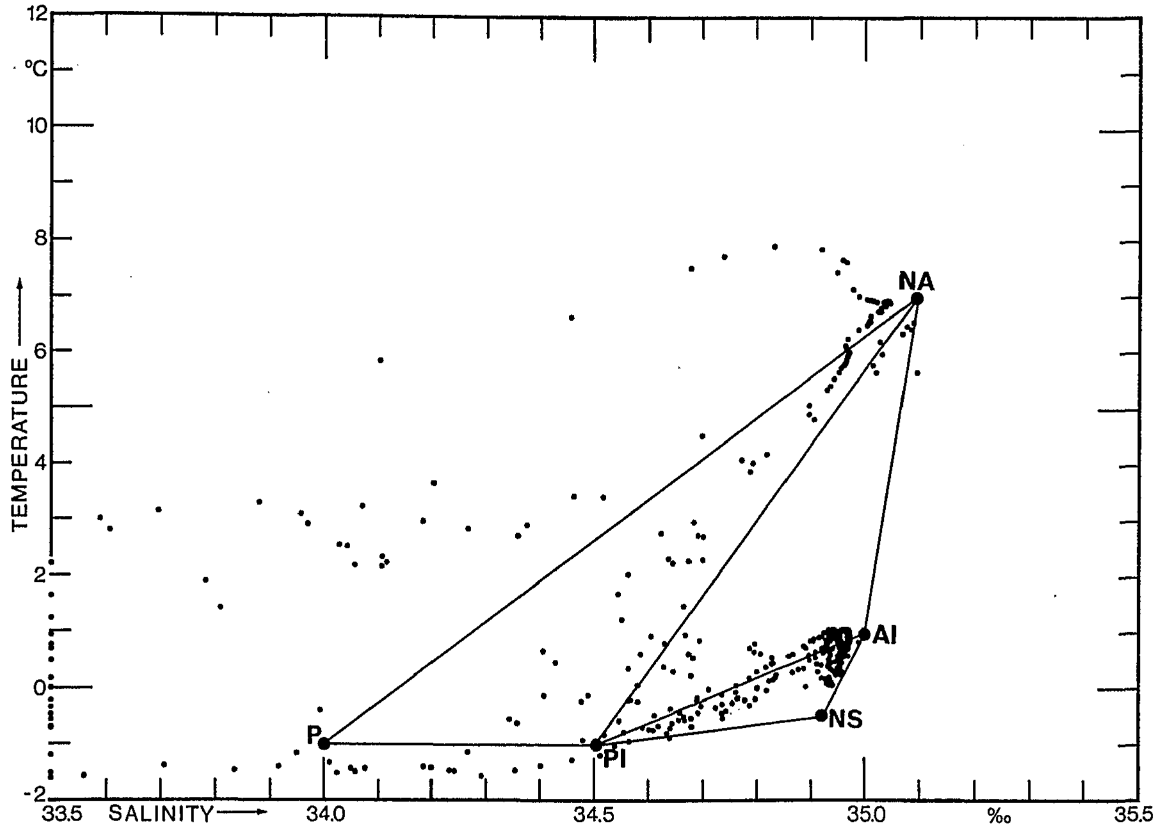
"HUDSON"15.-16.SEP.1973
STAT.NO.175-181



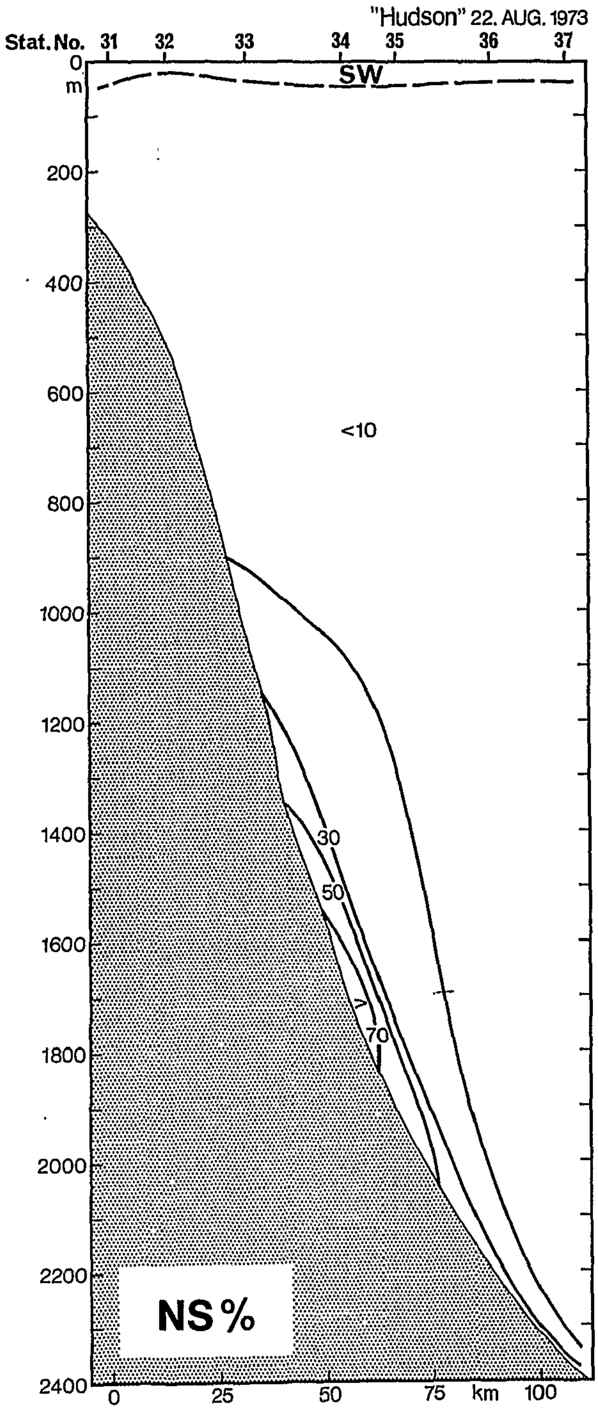
"HUDSON" 17.-18.SEP.1973
STAT.NO.188-197



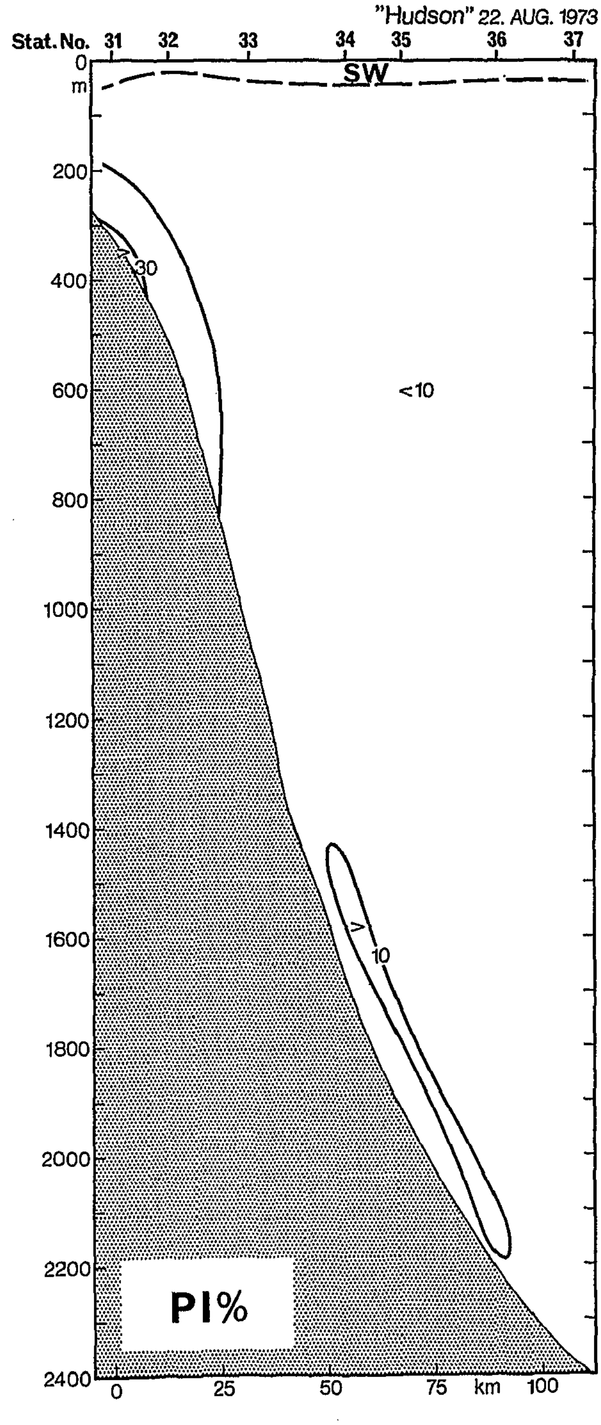
"HUDSON" 19.-20.SEP.1973
STAT.NO.200-203



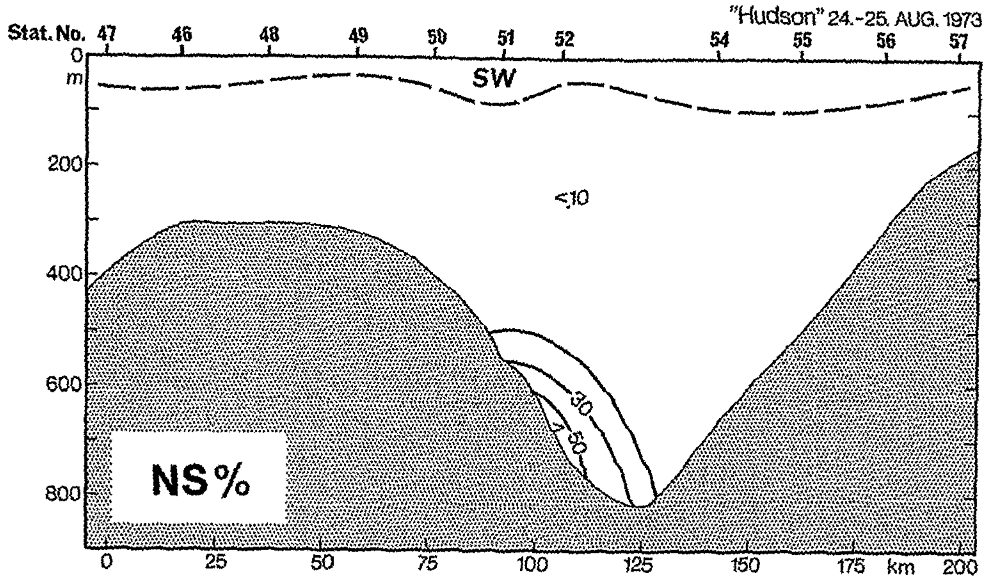
"HUDSON" 16.-18.SEP.1973
STAT.NO.182-187,194

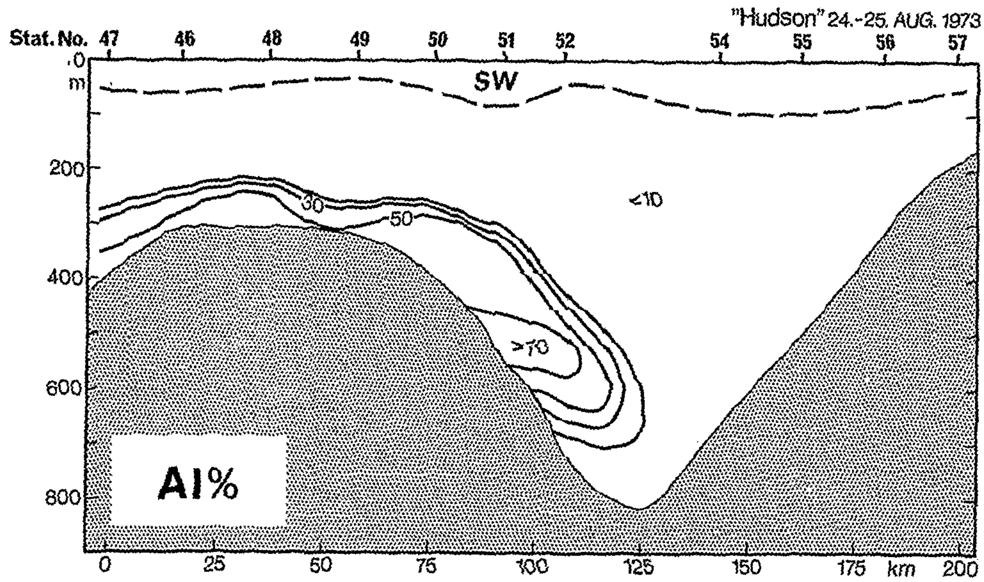


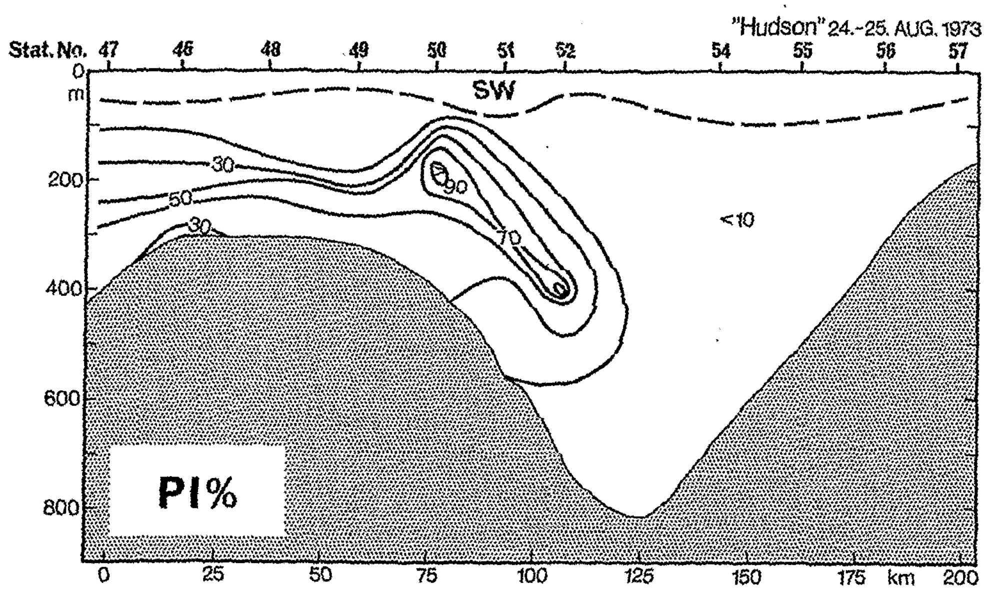
"Hudson" 22. AUG. 1973
Stat. No. 31 32 33 34 35 36 37
0 m
SW
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
<10
30
50
> 70
NS %
0 25 50 75 km 100



"Hudson" 22. AUG. 1973
Stat. No. 31 32 33 34 35 36 37
0 m
SW
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
> 30
<10
> 10
PI%
0 25 50 75 km 100


"Hudson" 24.-25. AUG. 1973
Stat. No. 47 46 48 49 50 51 52 54 55 56 57
0
m
SW
200
400
600
800
<10
30
50
NS%
0 25 50 75 100 125 150 175 km 200


"Hudson" 24.-25. AUG. 1973
Stat. No. 47 46 48 49 50 51 52 54 55 56 57
0
m
SW
200
400
600
800
<10
30
50
>70
AI%
0 25 50 75 100 125 150 175 km 200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Stat. No. 47 46 48 49 50 51 52 54 55 56 57
0
m
SW
200
400
600
800
30
50
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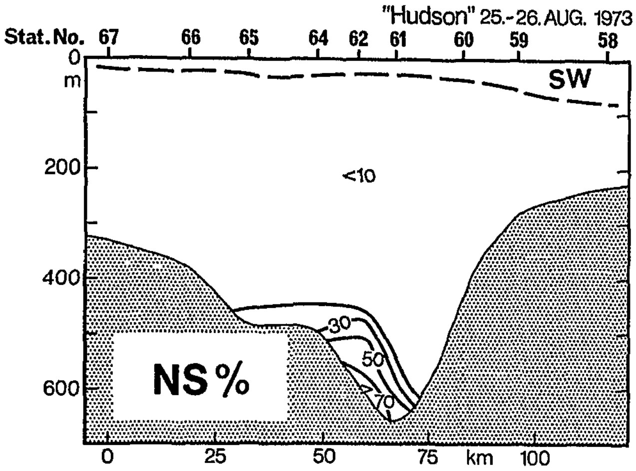
70
<10
PI%
0 25 50 75 100 125 150 175 km 200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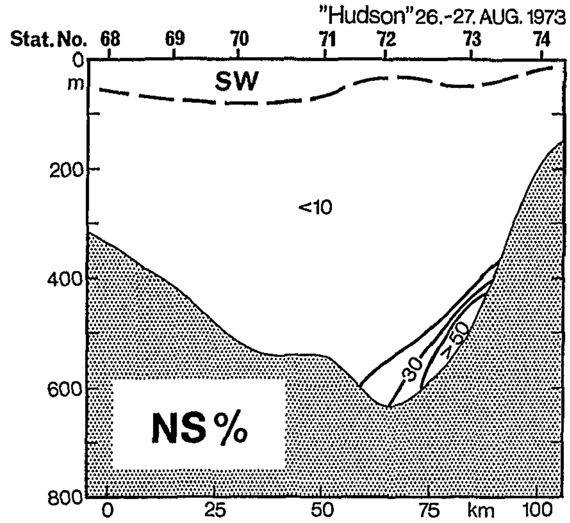
0 m 200 400 600
SW
<10
30
50
>70
NS%
0 25 50 75 km 100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Stat. No. 68 69 70 71 72 73 74
0 m 200 400 600 800
SW
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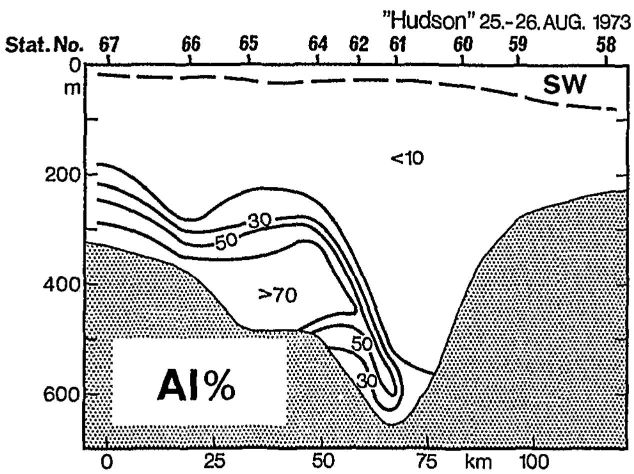
30
>50
NS%
0 25 50 75 km 100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Stat. No. 67 66 65 64 62 61 60 59 58
0 m 200 400 600
SW
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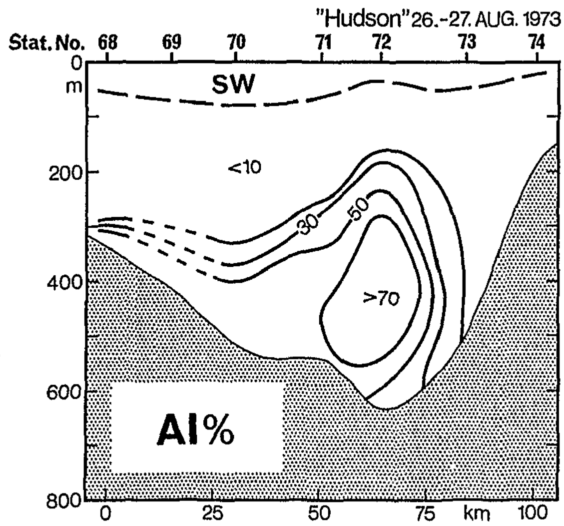
>70
AI%
0 25 50 75 km 100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SW
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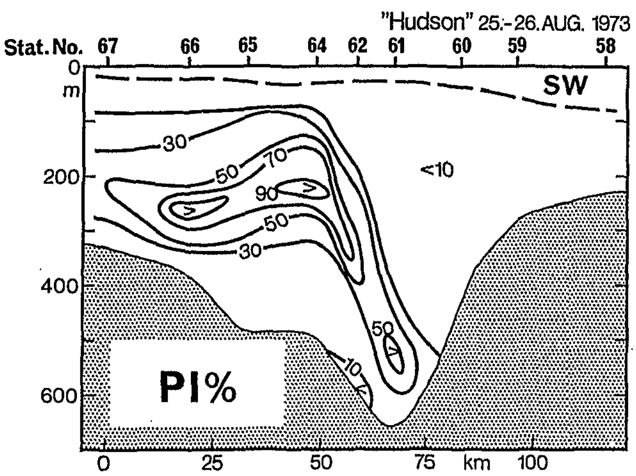
>70
AI%
0 25 50 75 km 100


"Hudson" 25.-26. AUG. 1973
Stat. No. 67 66 65 64 62 61 60 59 58
0 m 200 400 600
SW
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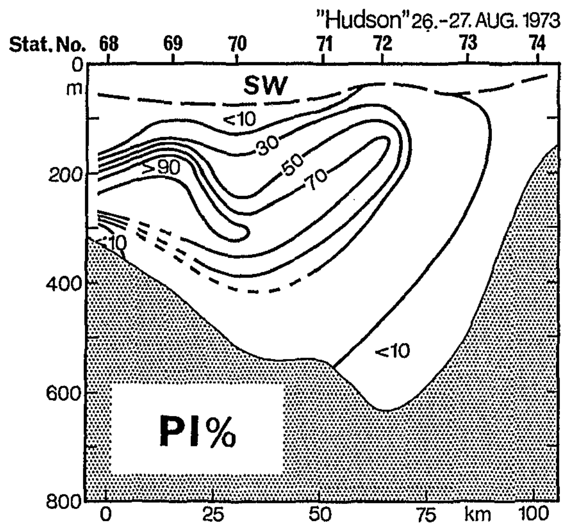
70
90
>
10
PI%
0 25 50 75 km 100


"Hudson" 26.-27. AUG. 1973
Stat. No. 68 69 70 71 72 73 74
0 m 200 400 600 800
SW
<10
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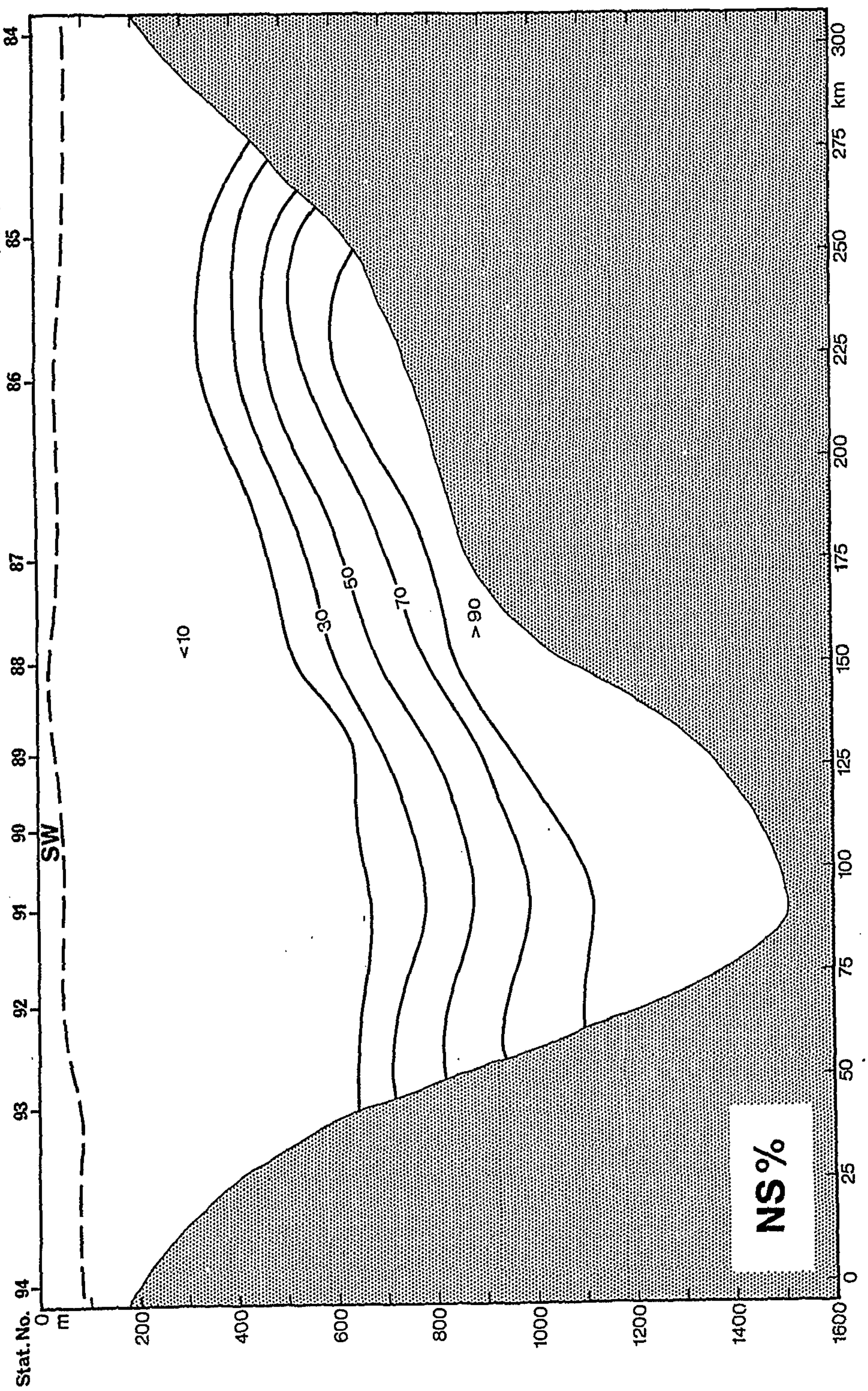
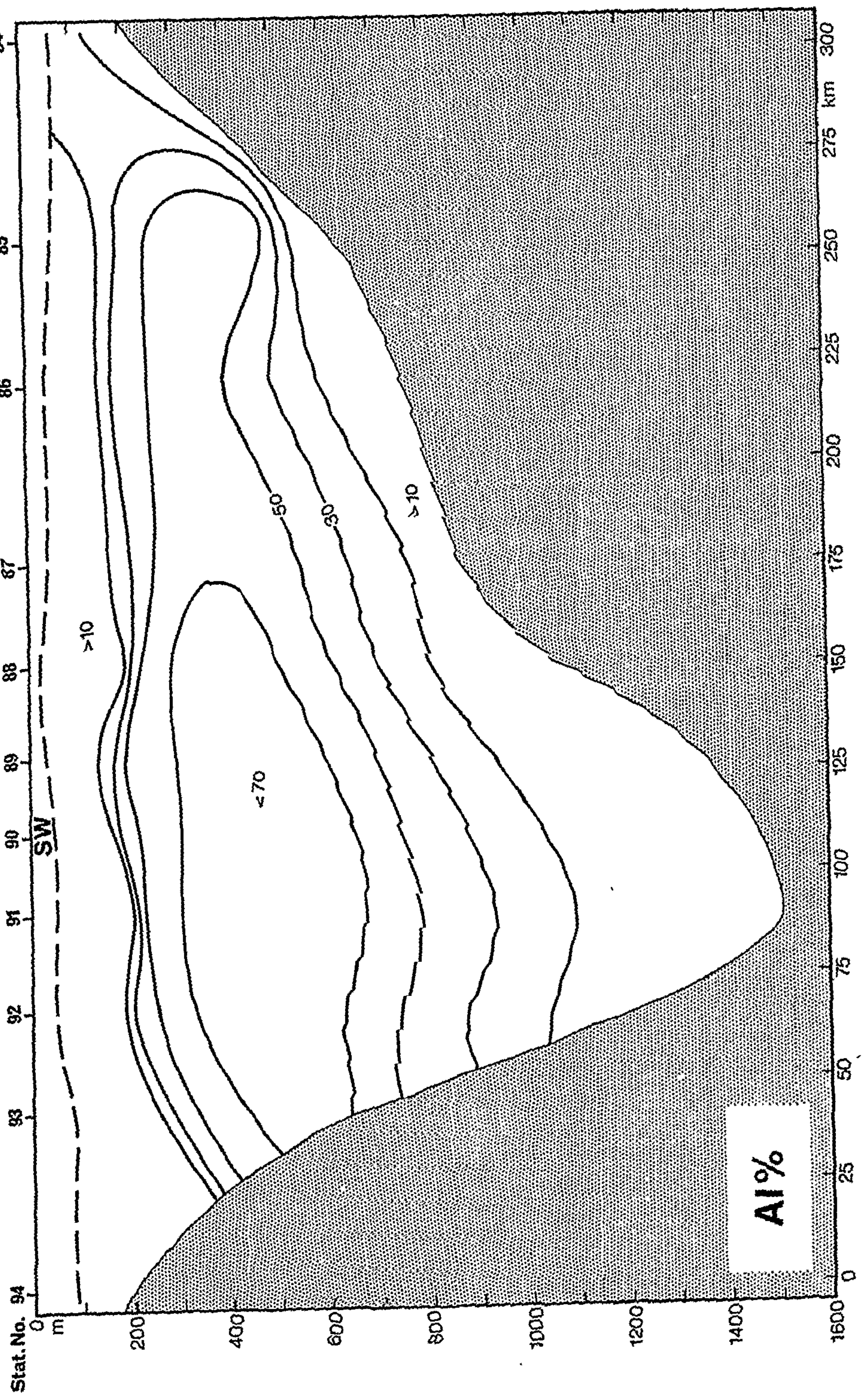
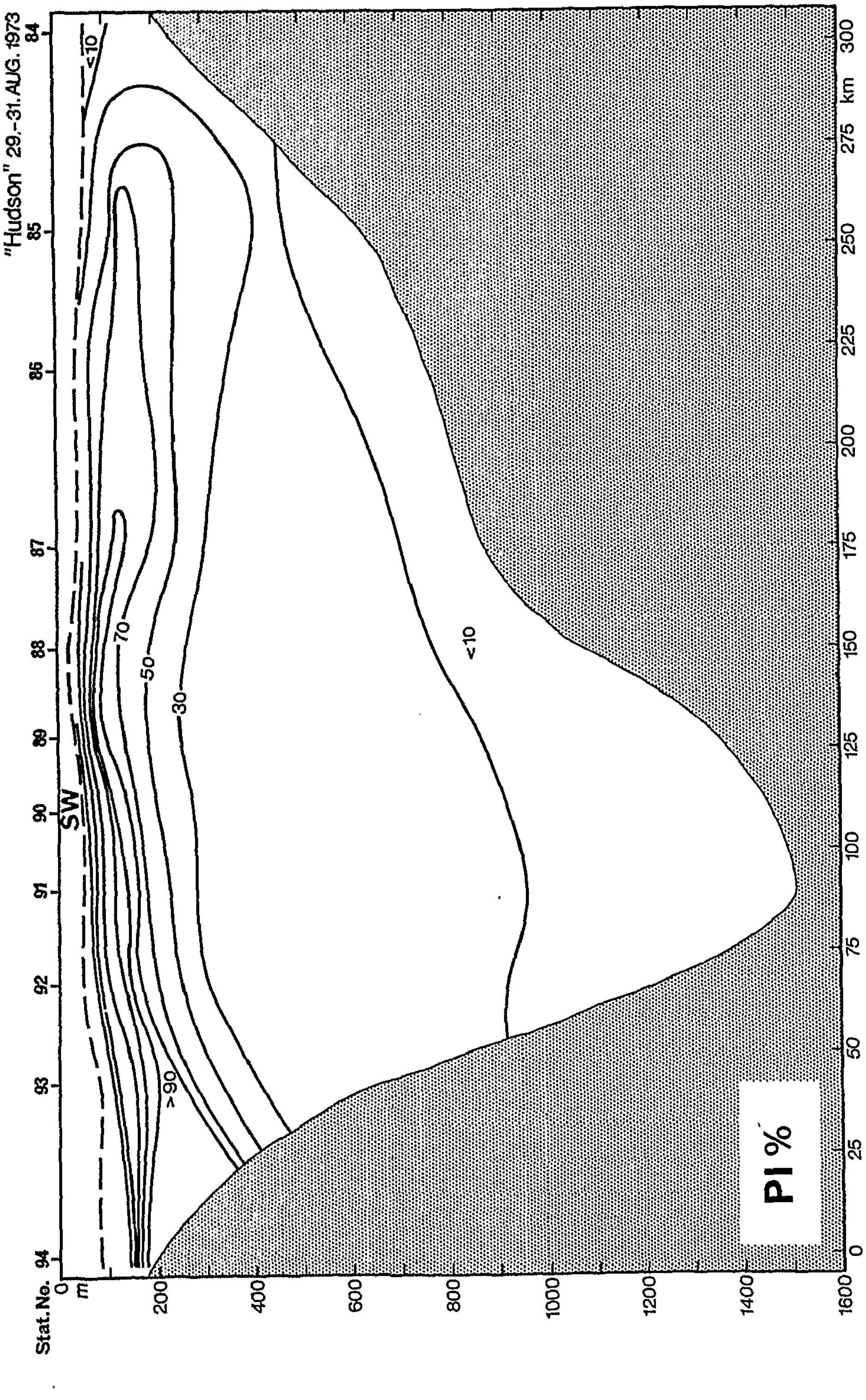
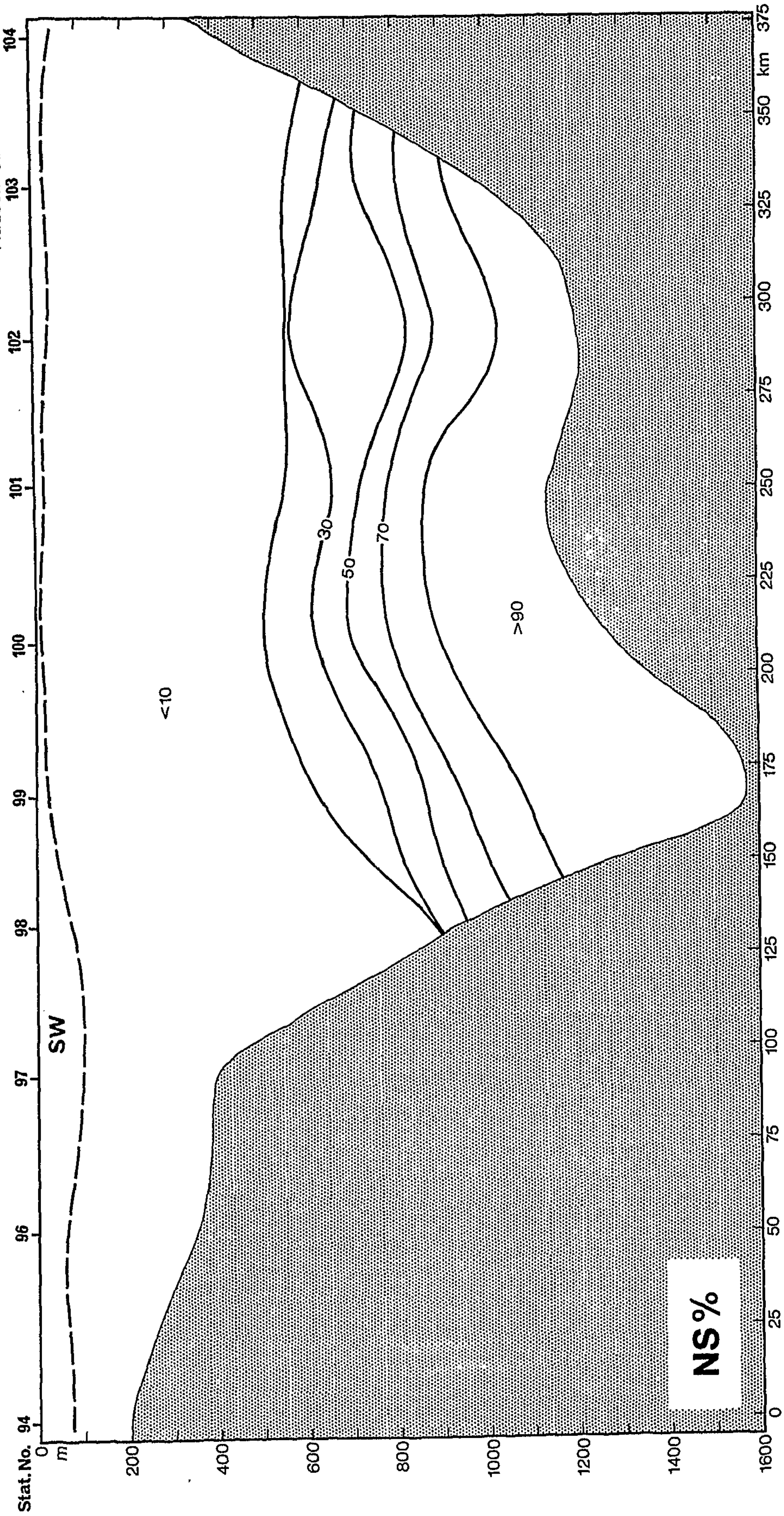
50
70
>90
PI%
0 25 50 75 km 100



"Hudson" 29.-31. AUG. 1973
Stat. No.
94
93
92
91
90
89
88
87
86
85
84
SW
m
0
200
400
600
800
1000
1200
1400
1600
0
25
50
75
100
125
150
175
200
225
250
275
300
km
<10
30
50
70
>90
NS%


"Hudson" 29.-31. AUG. 1973
Stat. No.
94
93
92
91
90
89
88
87
86
85
84
0
m
200
400
600
800
1000
1200
1400
1600
0
25
50
75
100
125
150
175
200
225
250
275
300
km
SW
>10
<70
50
30
>10
Al %


"Hudson" 29.-31. AUG. 1973
Stat. No.
94
93
92
91
90
89
88
87
86
85
84
m
0
200
400
600
800
1000
1200
1400
1600
0
25
50
75
100
125
150
175
200
225
250
275
300
km
SW
<10
70
50
30
>90
<10
PI %


"Hudson" 31.AUG.-1.SEP. 1973
Stat. No.
94
96
97
98
99
100
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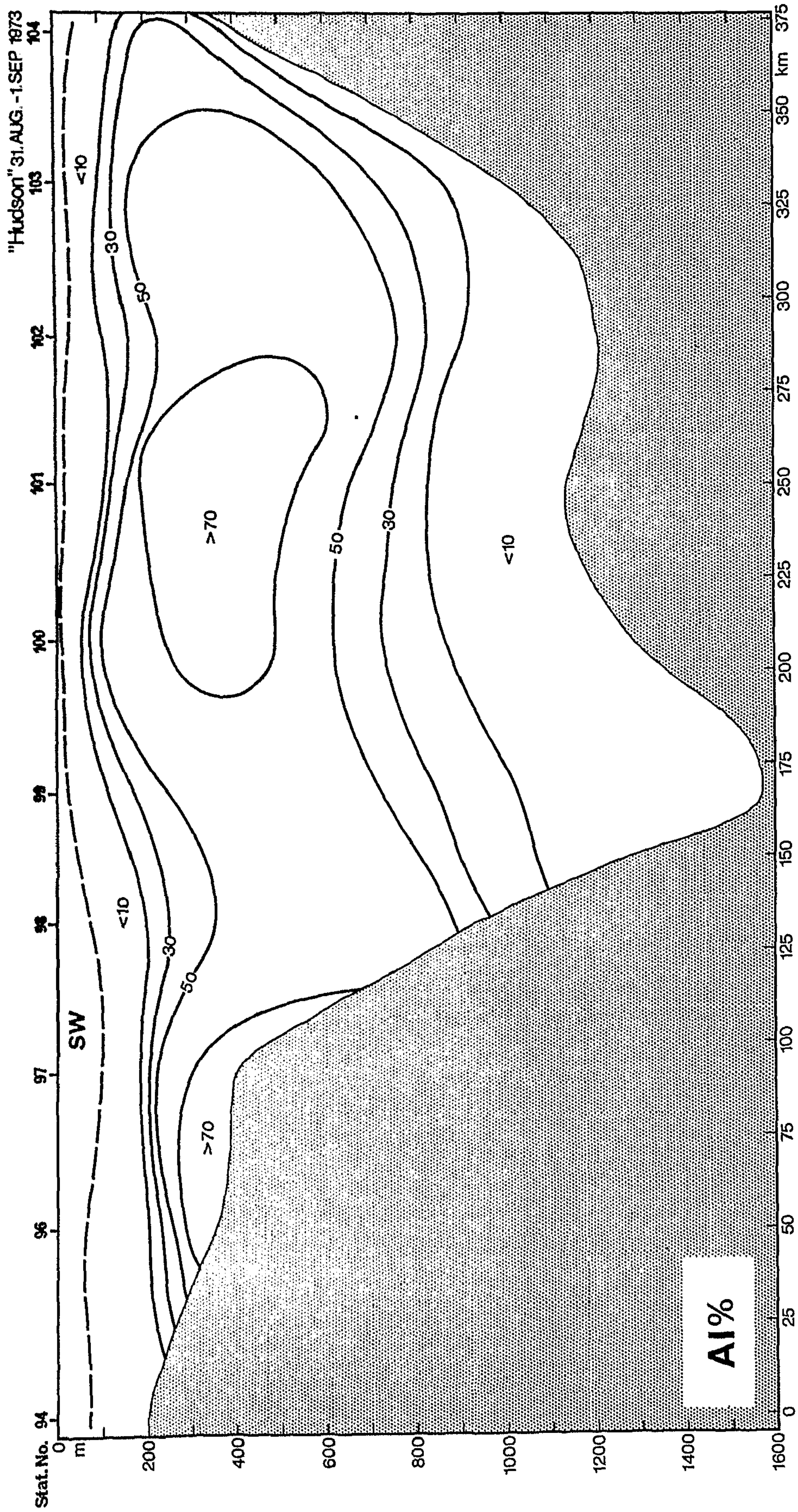
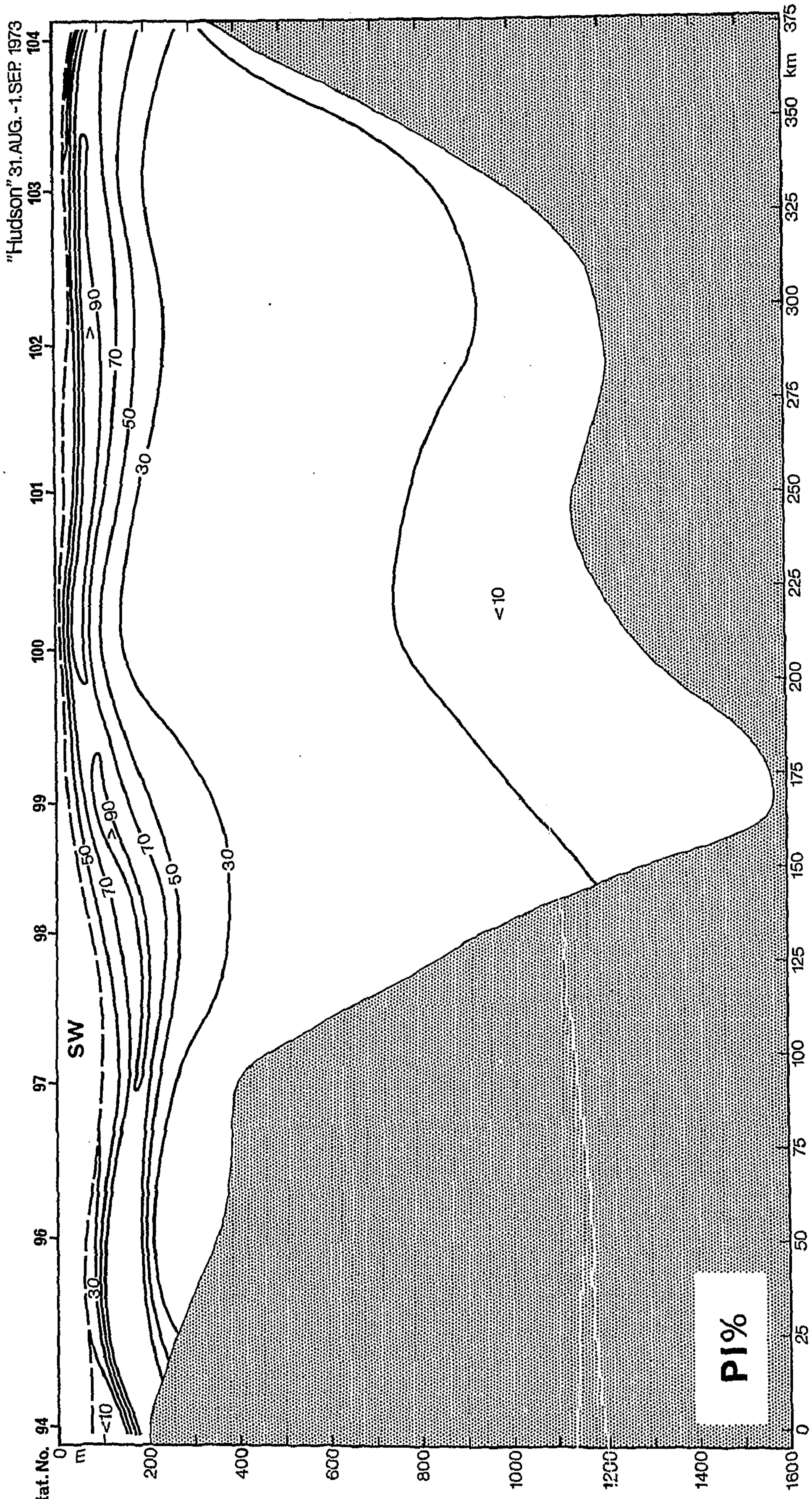
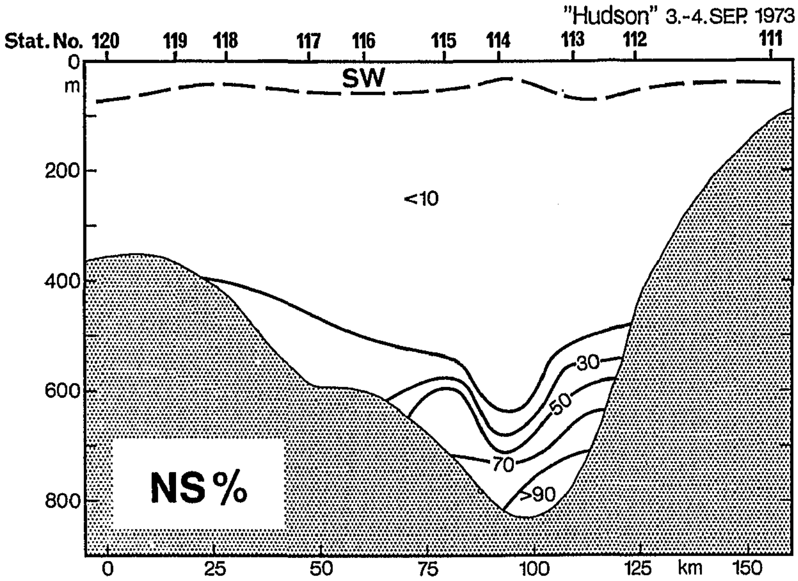
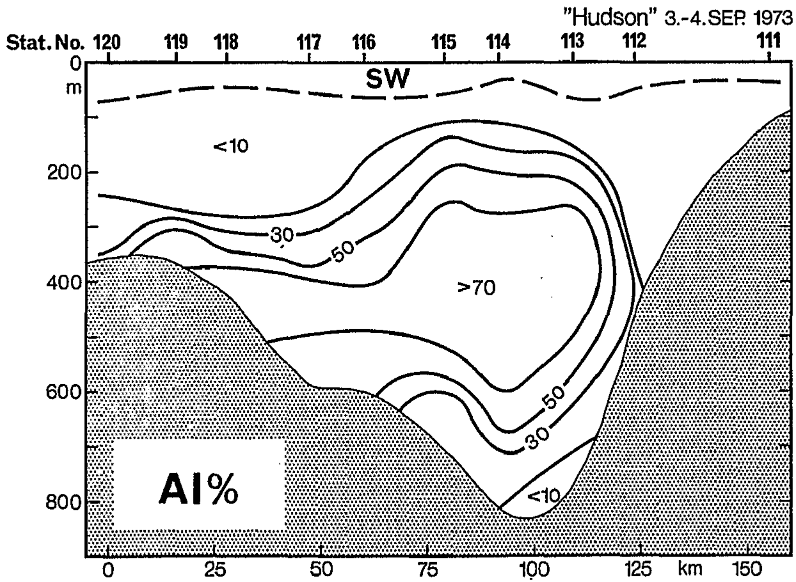
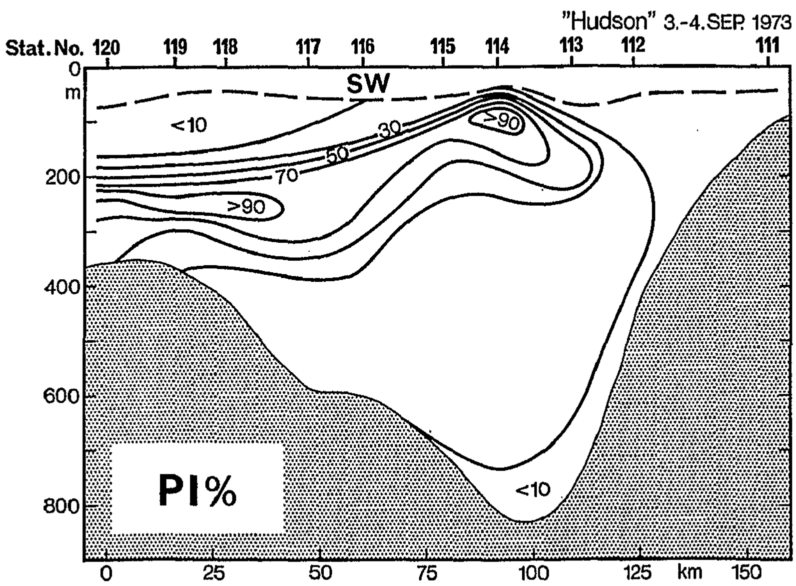
102
103
104
m
0
200
400
600
800
1000
1200
1400
1600
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
km
SW
<10
30
50
70
>90
NS %

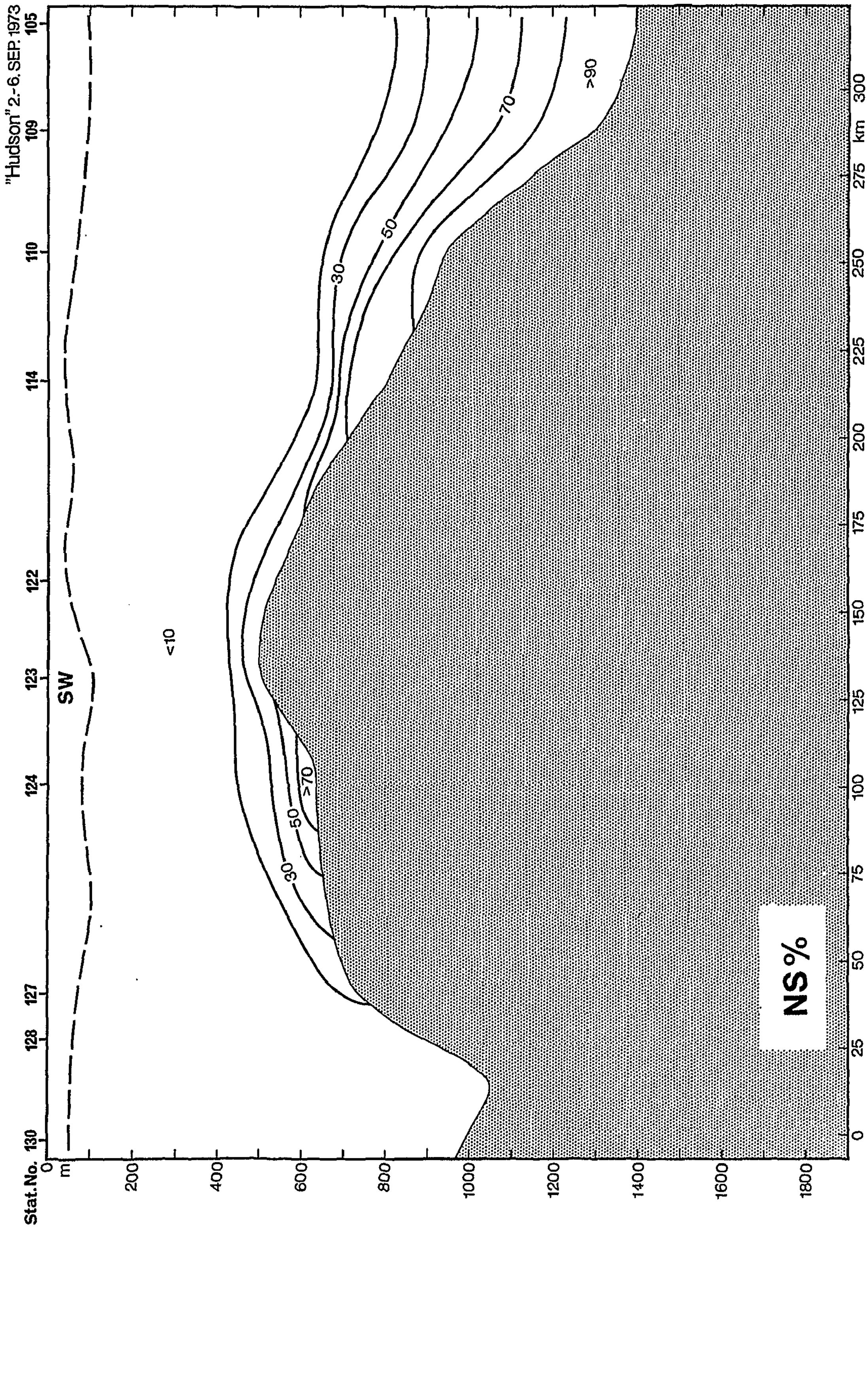

"Hudson" 31. AUG. - 1. SEP 1973
Stat. No.
94
96
97
98
99
100
101
102
103
104
0
m
200
400
600
800
1000
1200
1400
1600
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
km
SW
Al%
<10
30
50
>70


"Hudson" 31. AUG. - 1. SEP. 1973
Stat. No. 94 96 97 98 99 100 101 102 103 104
SW
0 m 200 400 600 800 1000 1200 1400 1600
0 25 50 75 100 125 150 175 200 225 250 275 300 325 350 375 km
<10
30
50
70
>90
<10
PI%

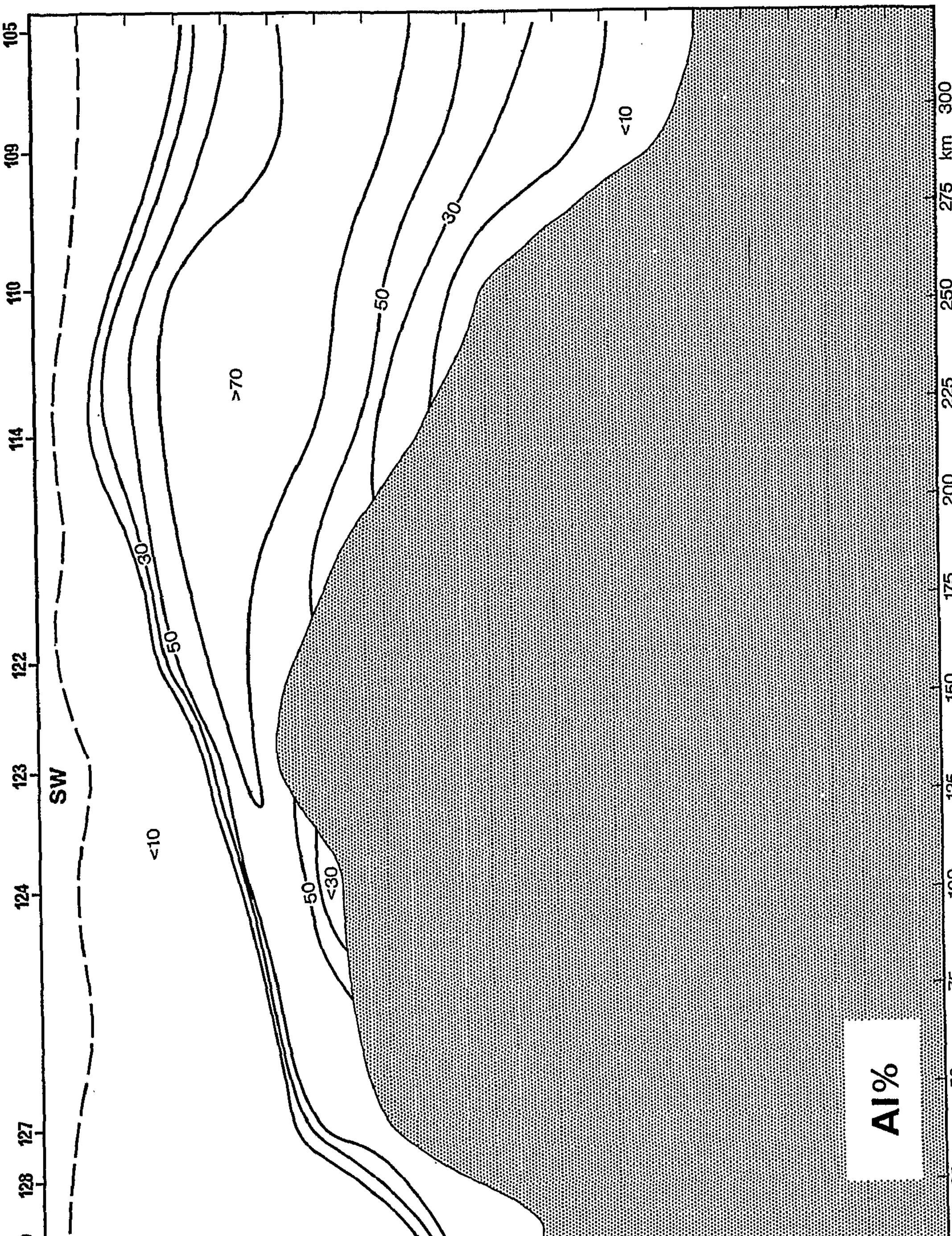

"Hudson" 3.-4.SEP. 1973
Stat. No. 120 119 118 117 116 115 114 113 112 111
0 m 200 400 600 800
SW
<10
30
50
70
>90
NS %
0 25 50 75 100 125 km 150

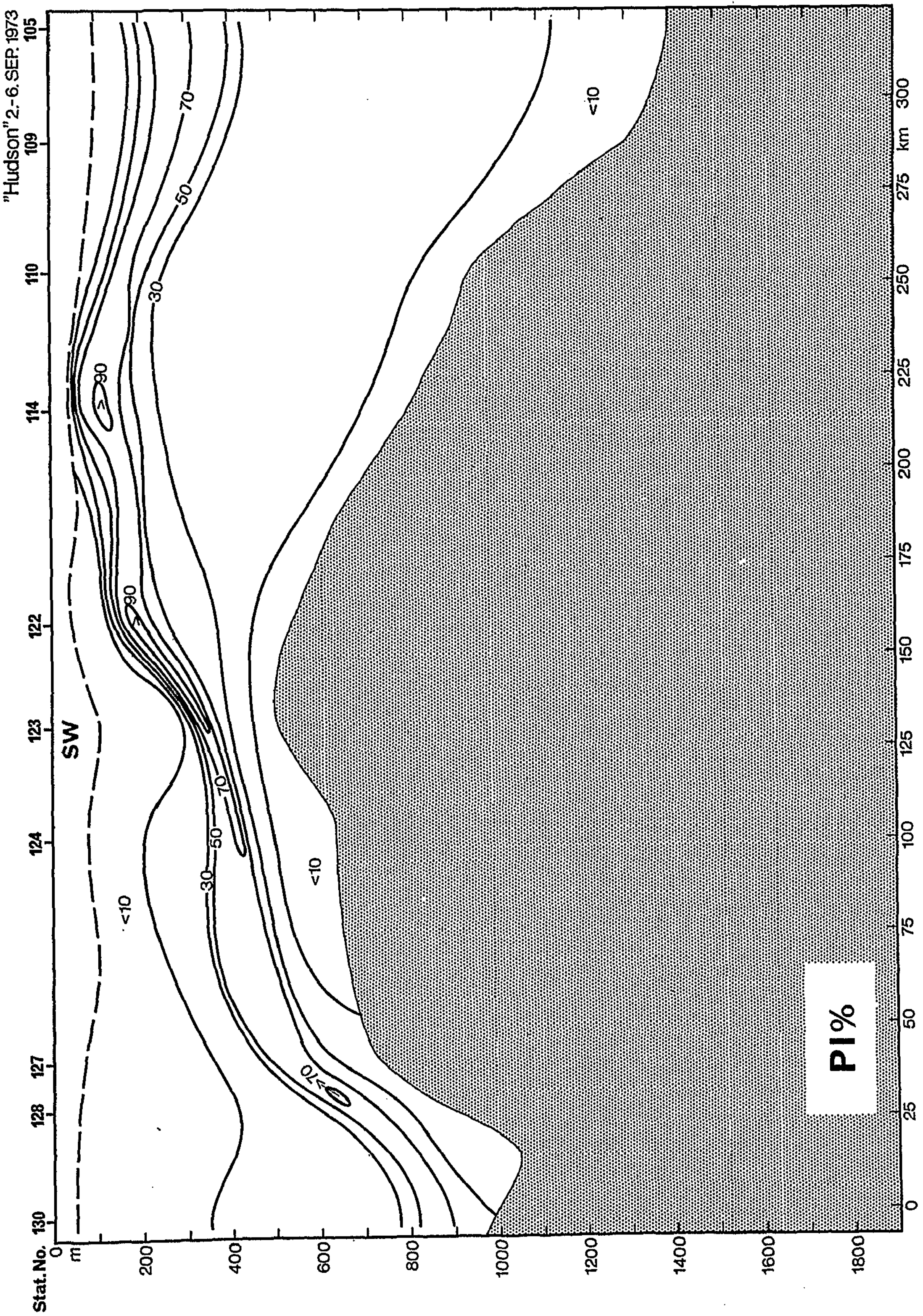

"Hudson" 3.-4.SEP. 1973
Stat. No. 120 119 118 117 116 115 114 113 112 111
0 m 200 400 600 800
SW
<10
30
50
>70
50
30
<10
AI%
0 25 50 75 100 125 km 150

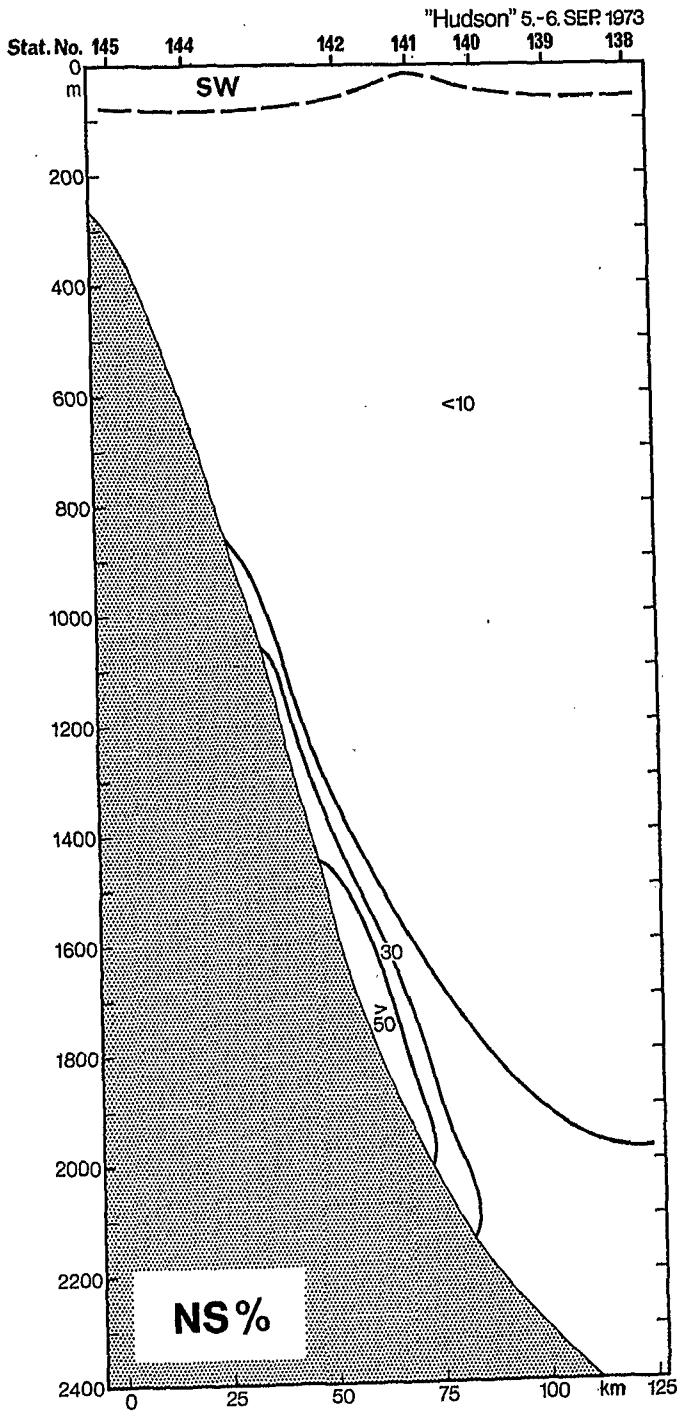

"Hudson" 3.-4.SEP. 1973
Stat. No. 120 119 118 117 116 115 114 113 112 111
0 m 200 400 600 800
SW
<10
30
50
70
>90
>90
<10
PI%
0 25 50 75 100 125 km 150

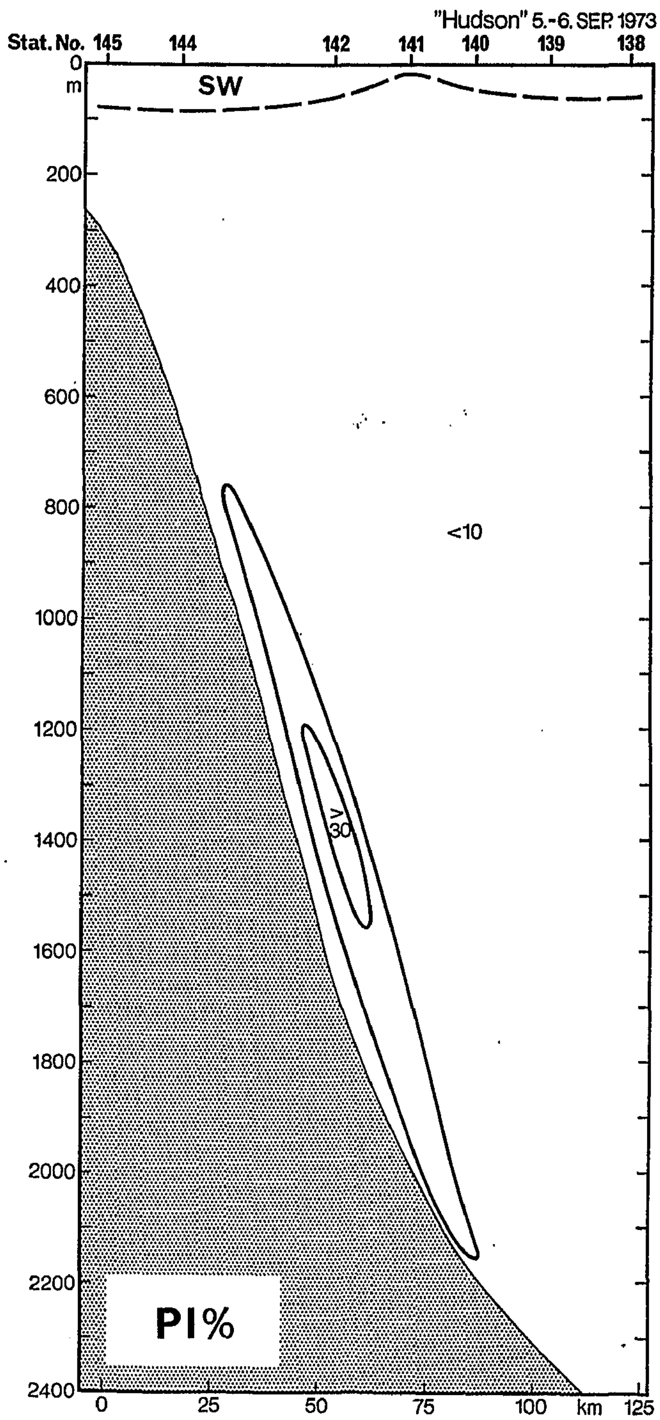


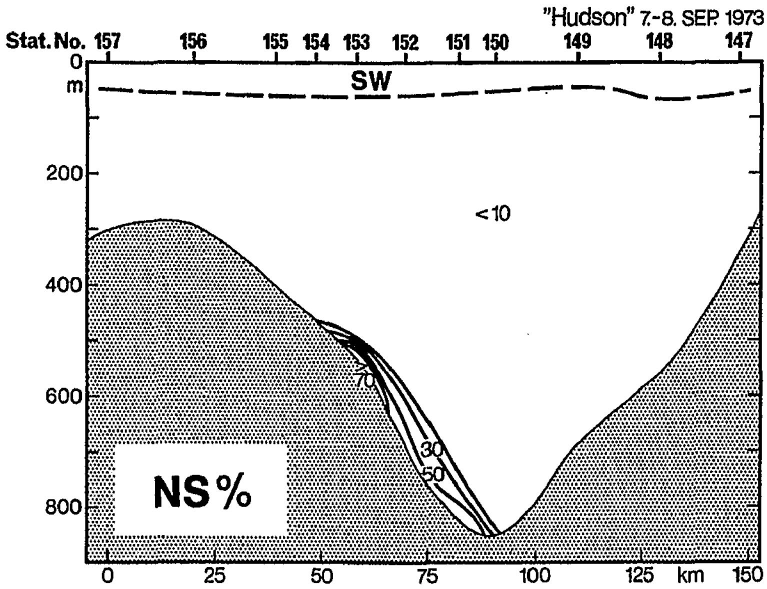
"Hudson" 2.-6. SEP. 1973
Stat. No.
130
128
127
124
123
122
114
110
109
105
0
m
200
400
600
800
1000
1200
1400
1600
1800
0
25
50
75
100
125
150
175
200
225
250
275
300
km
SW
<10
30
50
>70
70
>90
NS %

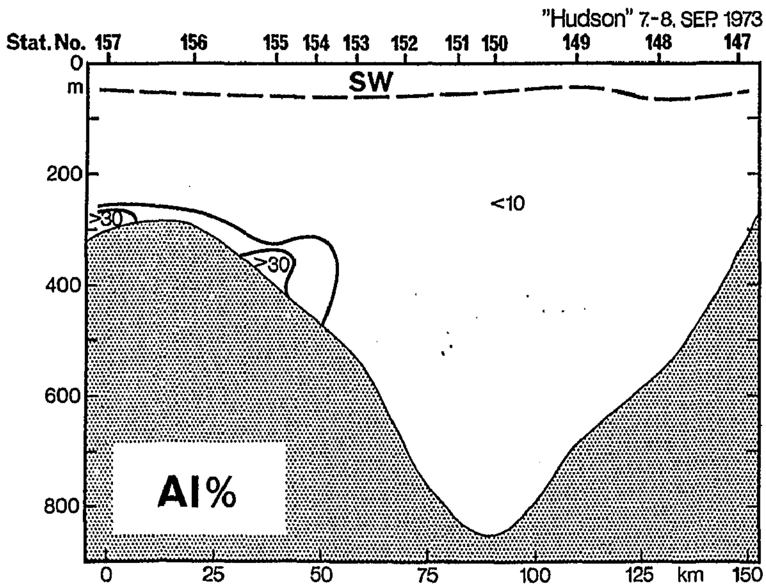

"Hudson" 2.-6. SEP. 1973
Stat. No.
130
129
128
127
124
123
122
114
110
109
105
0
m
200
400
600
800
1000
1200
1400
1600
1800
0
25
50
75
100
125
150
175
200
225
250
275
km
300
SW
<10
>70
50
30
<30
Al%

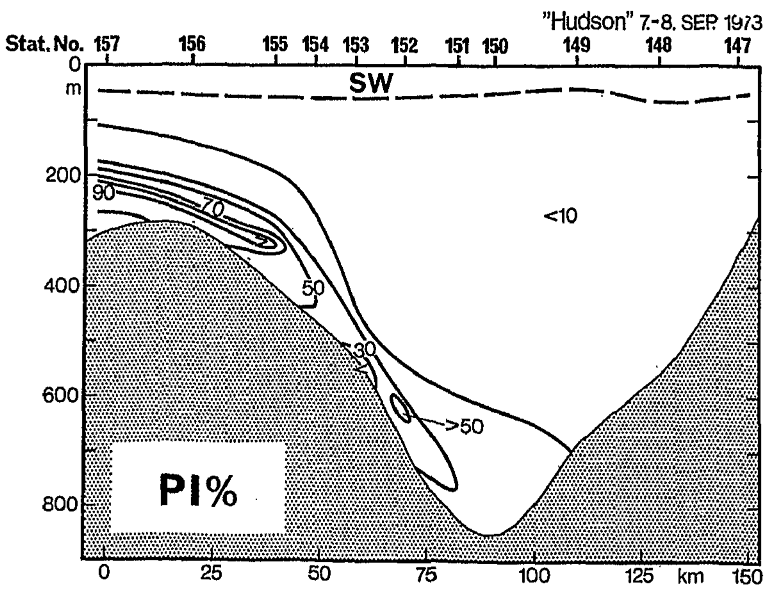

"Hudson" 2.-6. SEP. 1973
Stat. No.
130 128 127 124 123 122 114 110 109 105
m
0 200 400 600 800 1000 1200 1400 1600 1800
0 25 50 75 100 125 150 175 200 225 250 275 km 300
SW
<10
30
50
70
>90
>70
PI%

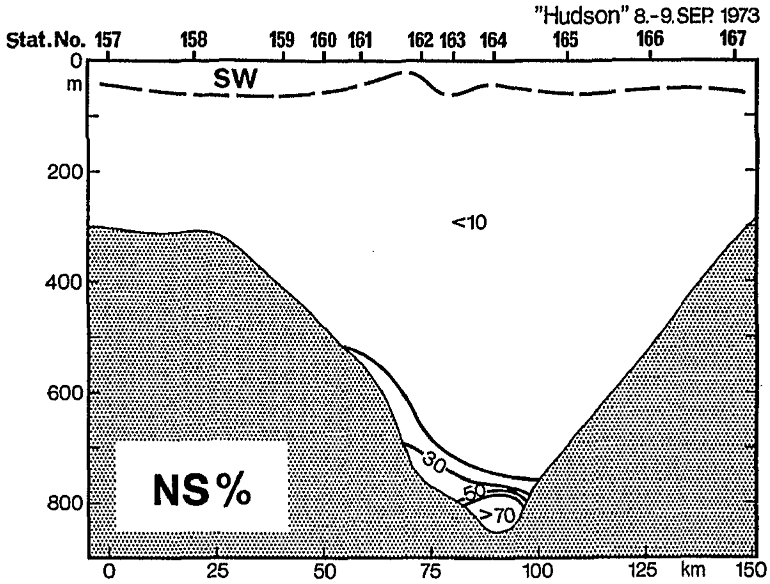

"Hudson" 5.-6. SEP. 1973
Stat. No. 145
144
142
141
140
139
138
0
m
SW
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
<10
30
>50
NS %
0
25
50
75
100
km
125

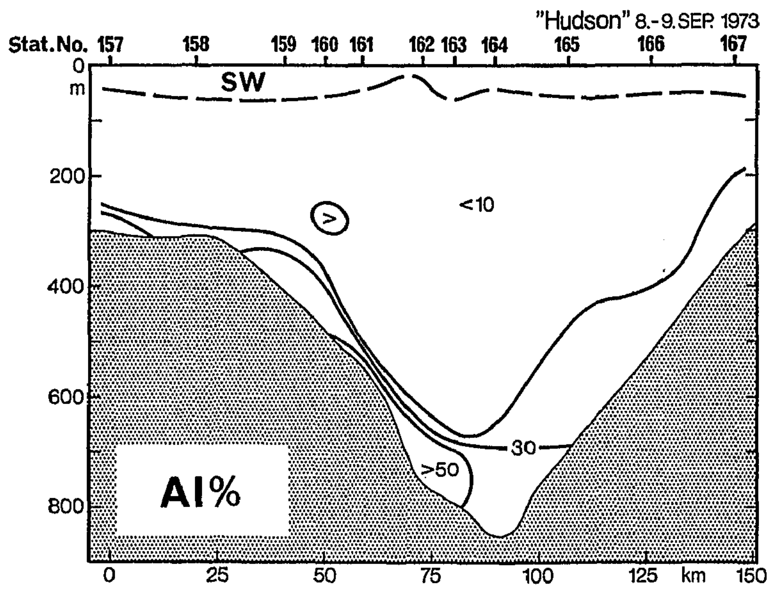

"Hudson" 5.-6. SEP. 1973
Stat. No. 145 144 142 141 140 139 138
0
m
SW
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
<10
>30
PI%
0 25 50 75 100 km 125

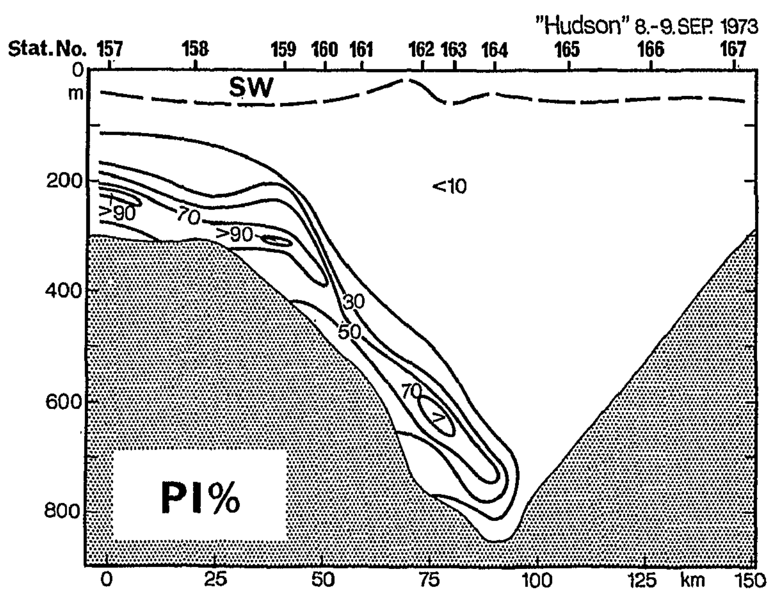

"Hudson" 7.-8. SEP. 1973
Stat. No. 157 156 155 154 153 152 151 150 149 148 147
0 m 200 400 600 800
SW
<10
70
30
50
NS%
0 25 50 75 100 125 km 150

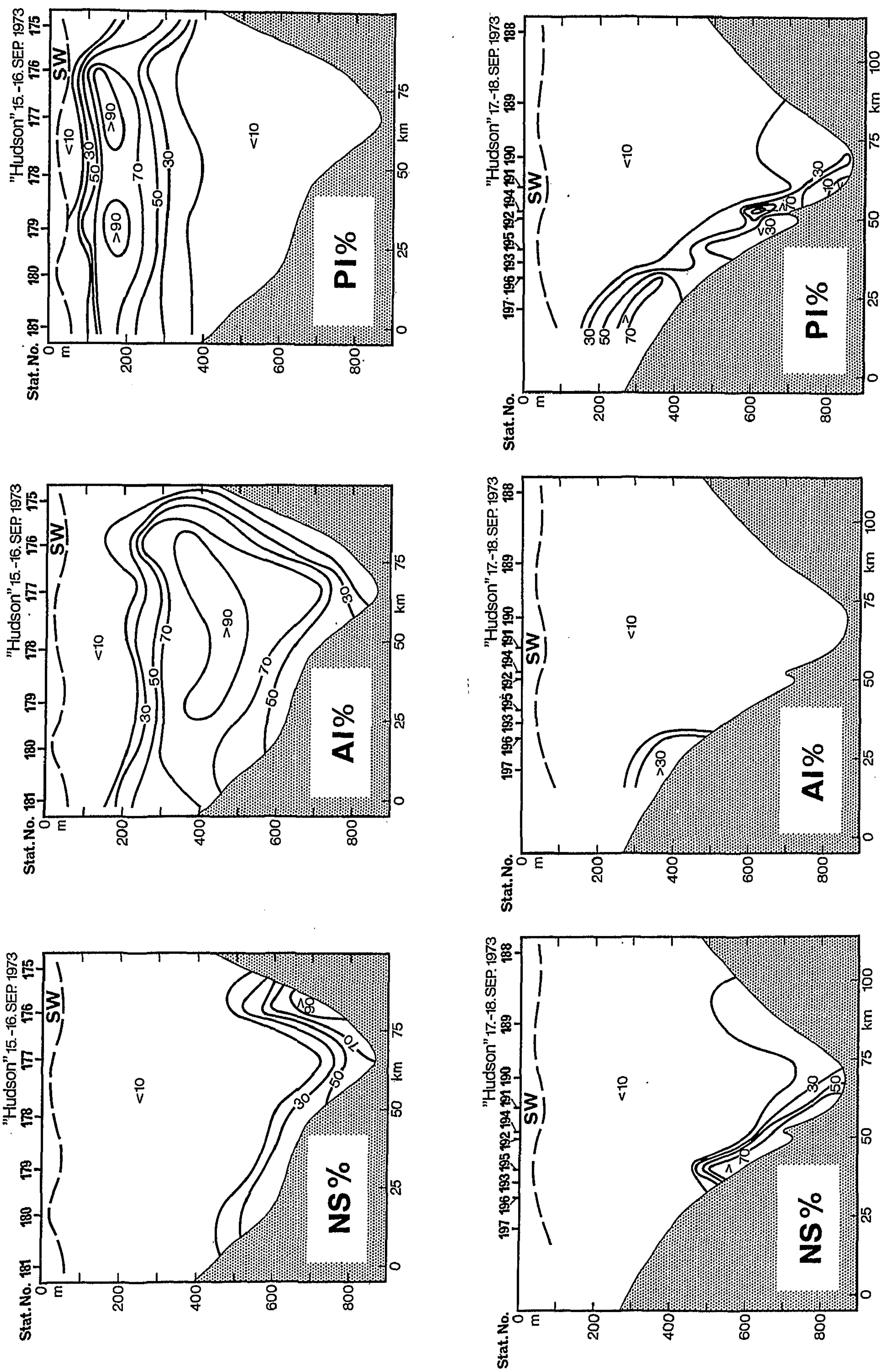

"Hudson" 7.-8. SEP. 1973
Stat. No. 157 156 155 154 153 152 151 150 149 148 147
0 m 200 400 600 800
SW
<10
>30
>30
AI%
0 25 50 75 100 125 km 150

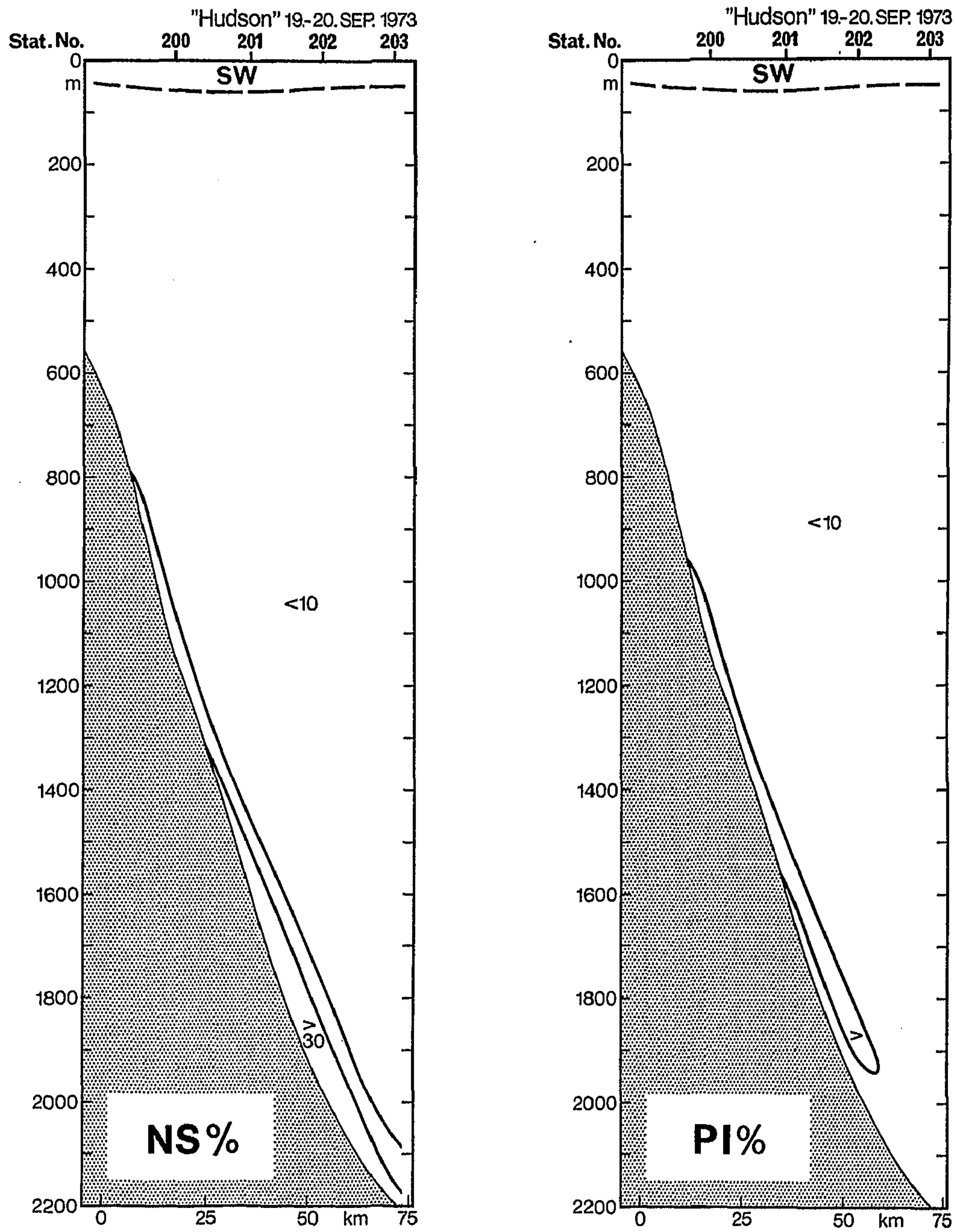

"Hudson" 7.-8. SEP. 1973
Stat. No. 157 156 155 154 153 152 151 150 149 148 147
0 m 200 400 600 800
SW
<10
90
70
50
30
>50
PI%
0 25 50 75 100 125 km 150

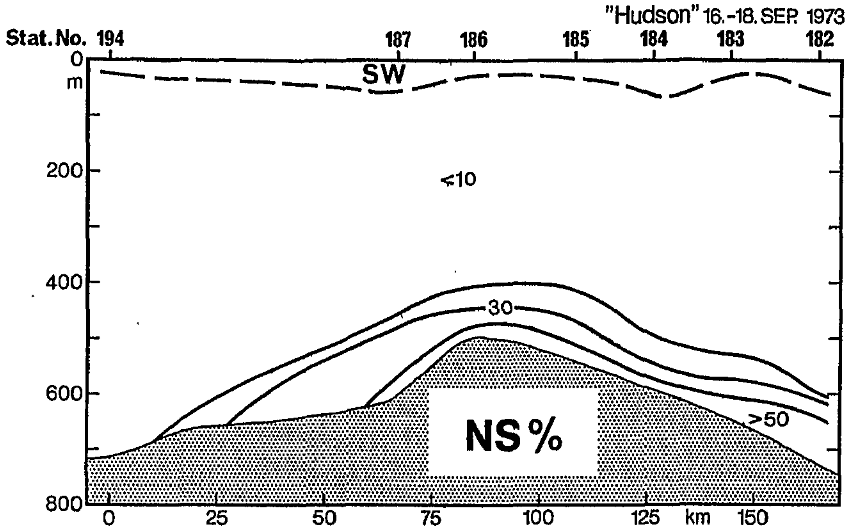

"Hudson" 8.-9.SEP. 1973
Stat.No. 157 158 159 160 161 162 163 164 165 166 167
0
m
SW
200
400
600
800
<10
30
50
>70
NS%
0 25 50 75 100 125 km 150

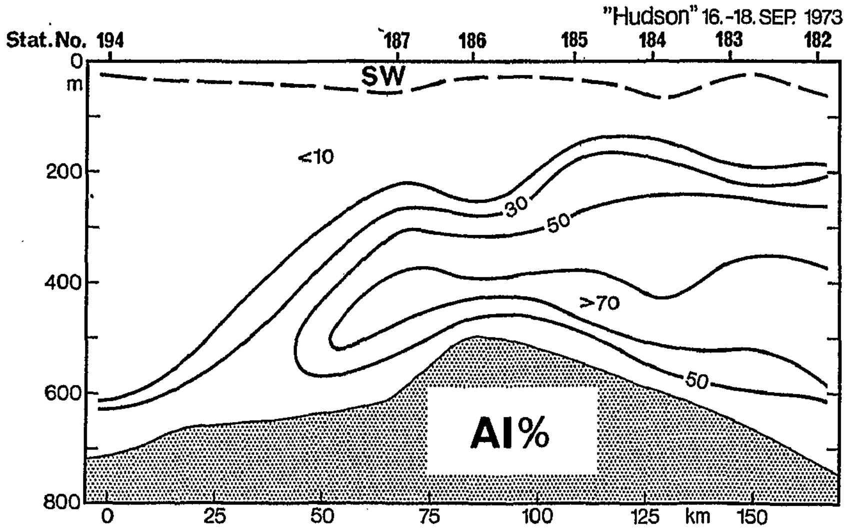

"Hudson" 8.-9.SEP. 1973
Stat.No. 157 158 159 160 161 162 163 164 165 166 167
0
m
SW
200
400
600
800
<10
>
30
>50
AI%
0 25 50 75 100 125 km 150

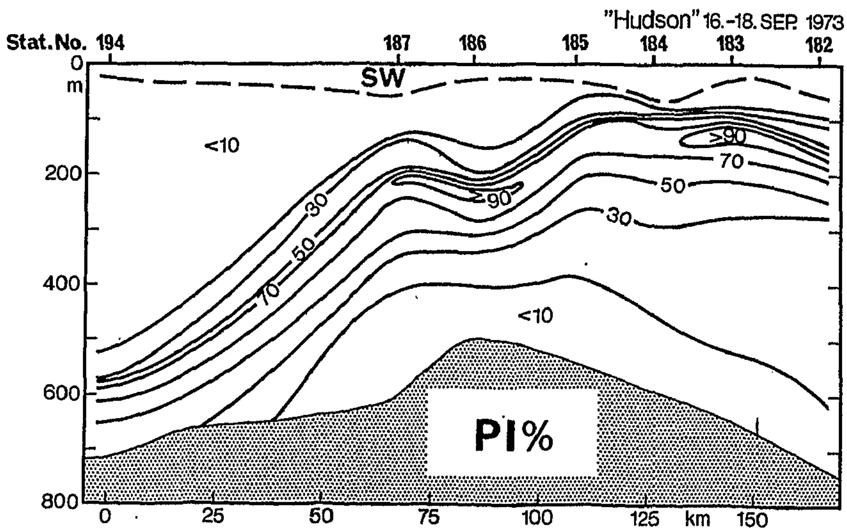

"Hudson" 8.-9.SEP. 1973
Stat.No. 157 158 159 160 161 162 163 164 165 166 167
0
m
SW
200
400
600
800
<10
>90
70
>90
30
50
70
PI%
0 25 50 75 100 125 km 150


"Hudson" 15.-16. SEP. 1973
Stat. No.
m
km
SW
<10
>90
PI%
AI%
NS%
"Hudson" 17.-18. SEP. 1973
>30


"Hudson" 19.-20. SEP. 1973
Stat. No.
200
201
202
203
SW
m
<10
>30
NS%
0
25
50
km
75
"Hudson" 19.-20. SEP. 1973
Stat. No.
200
201
202
203
SW
m
<10
>
PI%
0
25
50
km
75


"Hudson" 16.-18. SEP. 1973
Stat. No. 194
187
186
185
184
183
182
0
m
200
400
600
800
SW
<10
30
>50
NS %
0
25
50
75
100
125
km
150

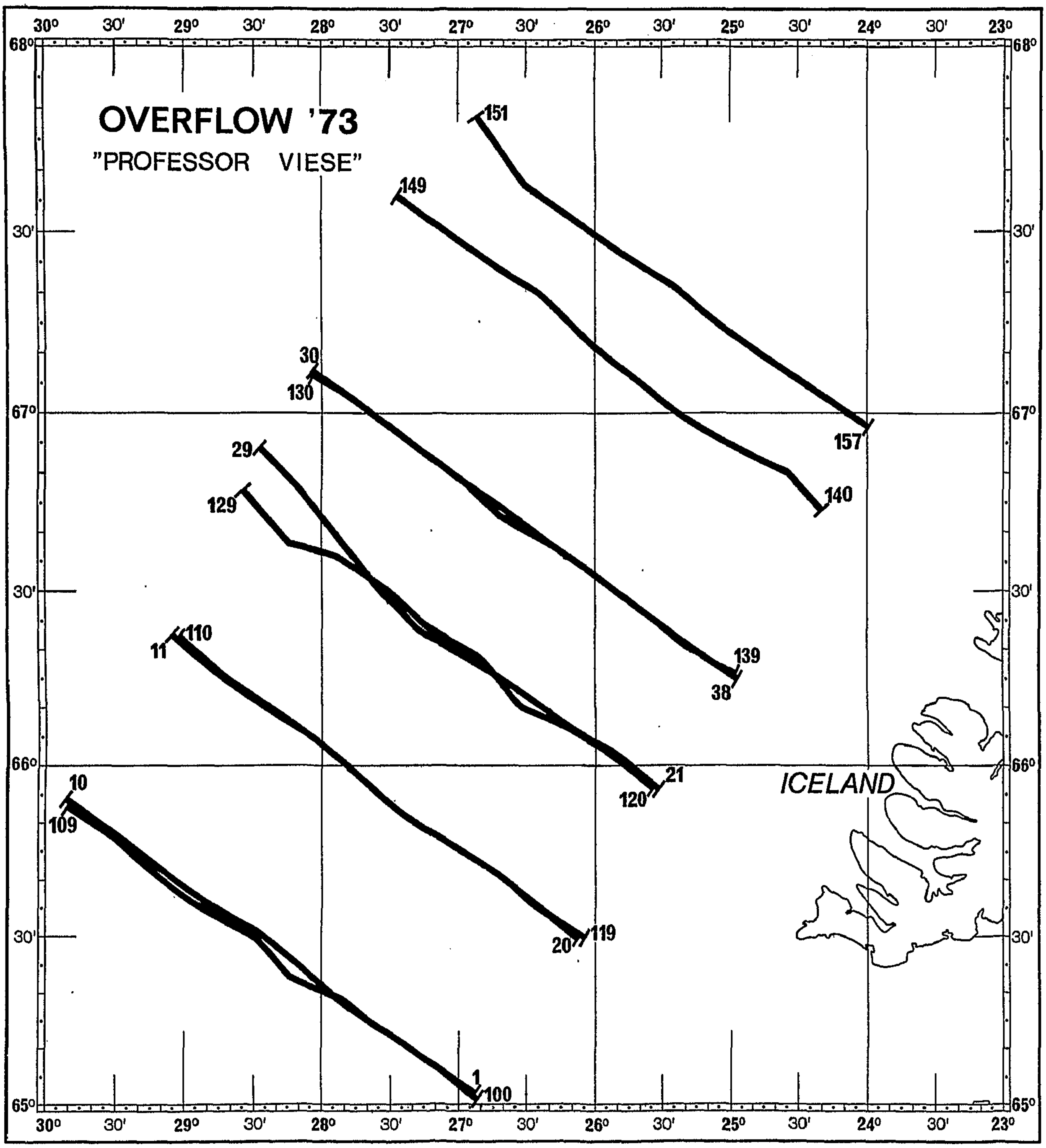

"Hudson" 16.-18. SEP. 1973
Stat. No. 194
187
186
185
184
183
182
0
m
200
400
600
800
SW
<10
30
50
>70
50
AI %
0
25
50
75
100
125
km
150

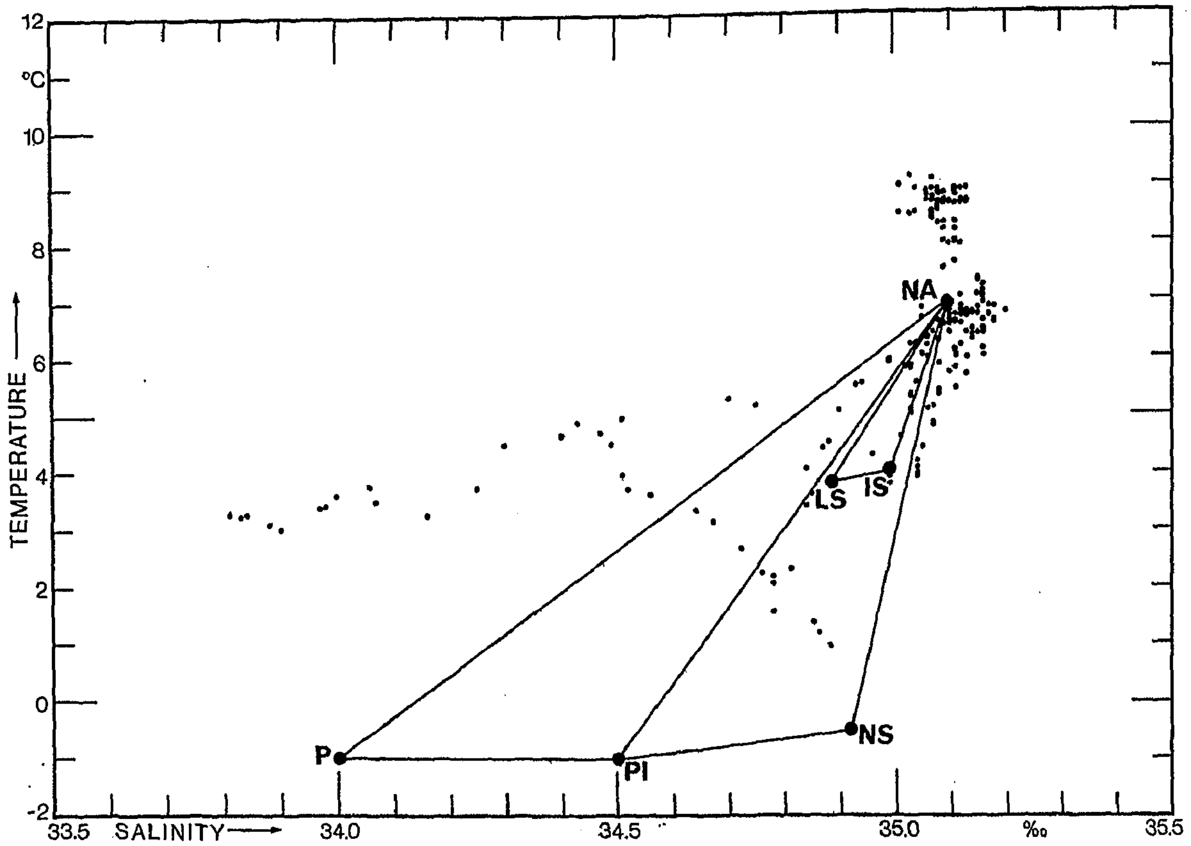

"Hudson" 16.-18. SEP. 1973
Stat. No. 194
187
186
185
184
183
182
0
m
200
400
600
800
SW
<10
30
50
70
>90
>90
70
50
30
<10
PI %
0
25
50
75
100
125
km
150

6.12 Professor Viese

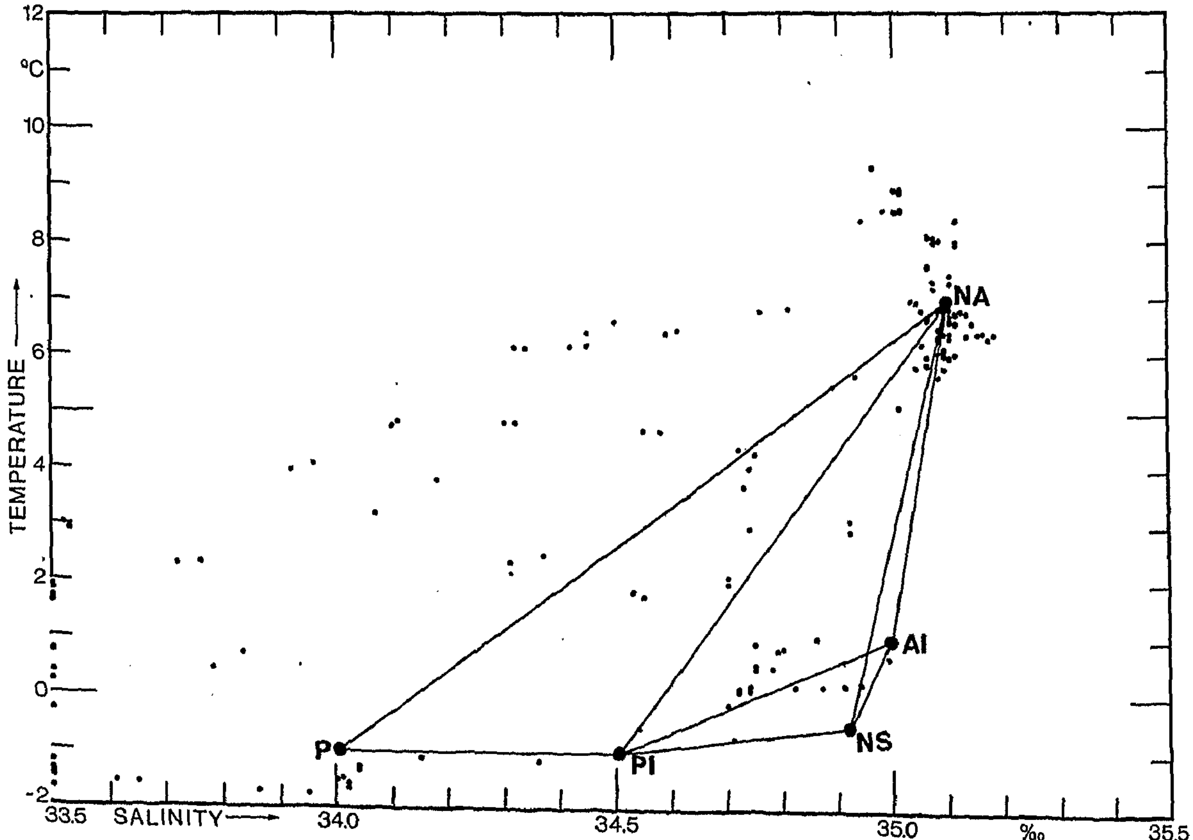
The same water masses as for HUDSON occur, except of LS and IS which could not be clearly identified.

Section	Stat.No.	Mixing triangles (see table 3)
1 - 10	1 - 3	9
	5 - 8	14
	9, 10	11, 14
11 - 20	11 - 13	11, 12, 13
	14, 15, 17 - 19	14
21 - 29	21 - 23	14
	24	11, 14
	25 - 29	11, 12, 13
30 - 38	30 - 36	11, 12, 13
	37, 38	14
100 - 109	100 - 105	9
	106	14
	107 - 109	11, 14
110 - 119	110, 111	11, 12
	112, 113	11, 12, 13
	114 - 119	14
120 - 129	120 - 122	14
	123 - 125	11, 12, 13
	126 - 129	11, 12
130 - 139	130 - 132	11, 12
	133 - 136	11, 12, 13
	137 - 139	14
140 - 149	140, 141	14
	142 - 146	11, 12, 13
	147, 149	11
151 - 157	151	11
	152, 153	11, 12
	154	11, 12, 13
	157	14

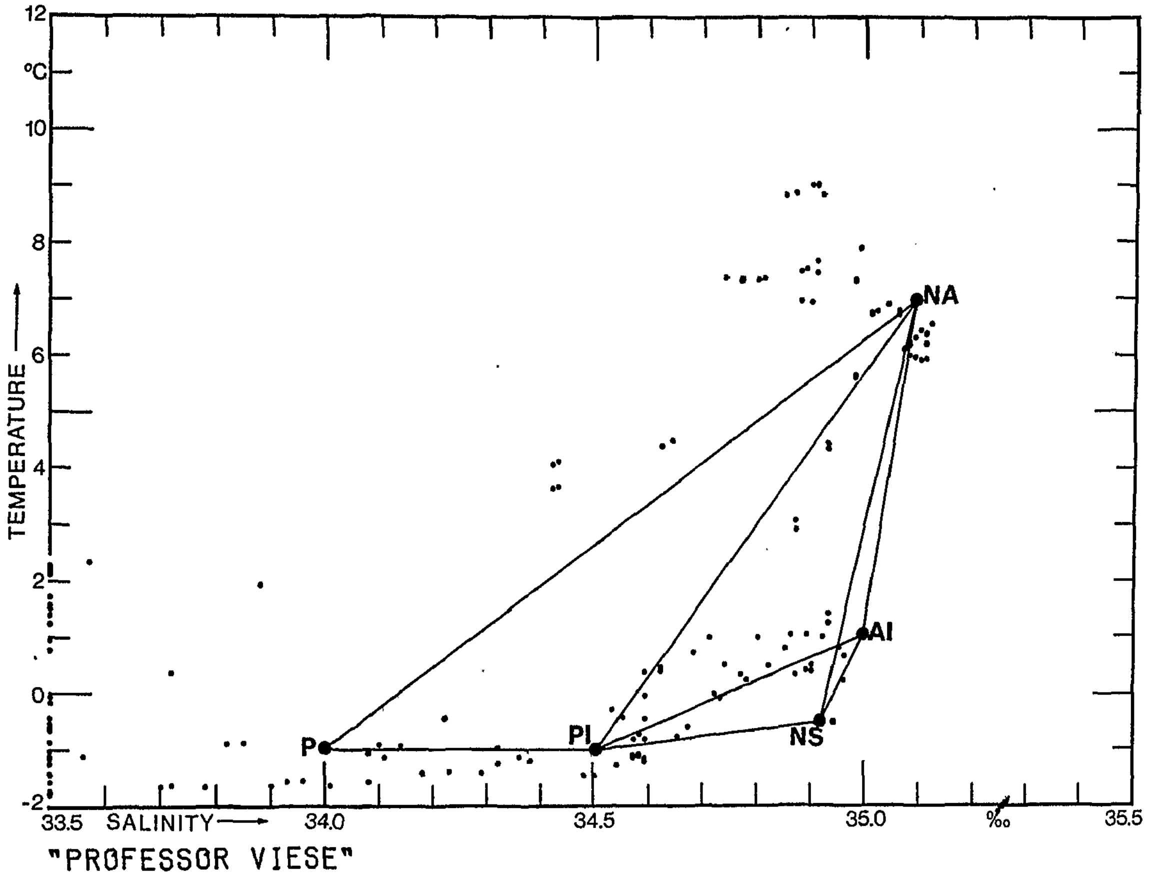

OVERFLOW '73
"PROFESSOR VIESE"
ICELAND
30° 30' 29° 30' 28° 30' 27° 30' 26° 30' 25° 30' 24° 30' 23°
68° 30' 67° 30' 66° 30' 65°
151
149
157
140
30
130
139
38
29
129
11
110
21
120
10
109
20
119
1
100



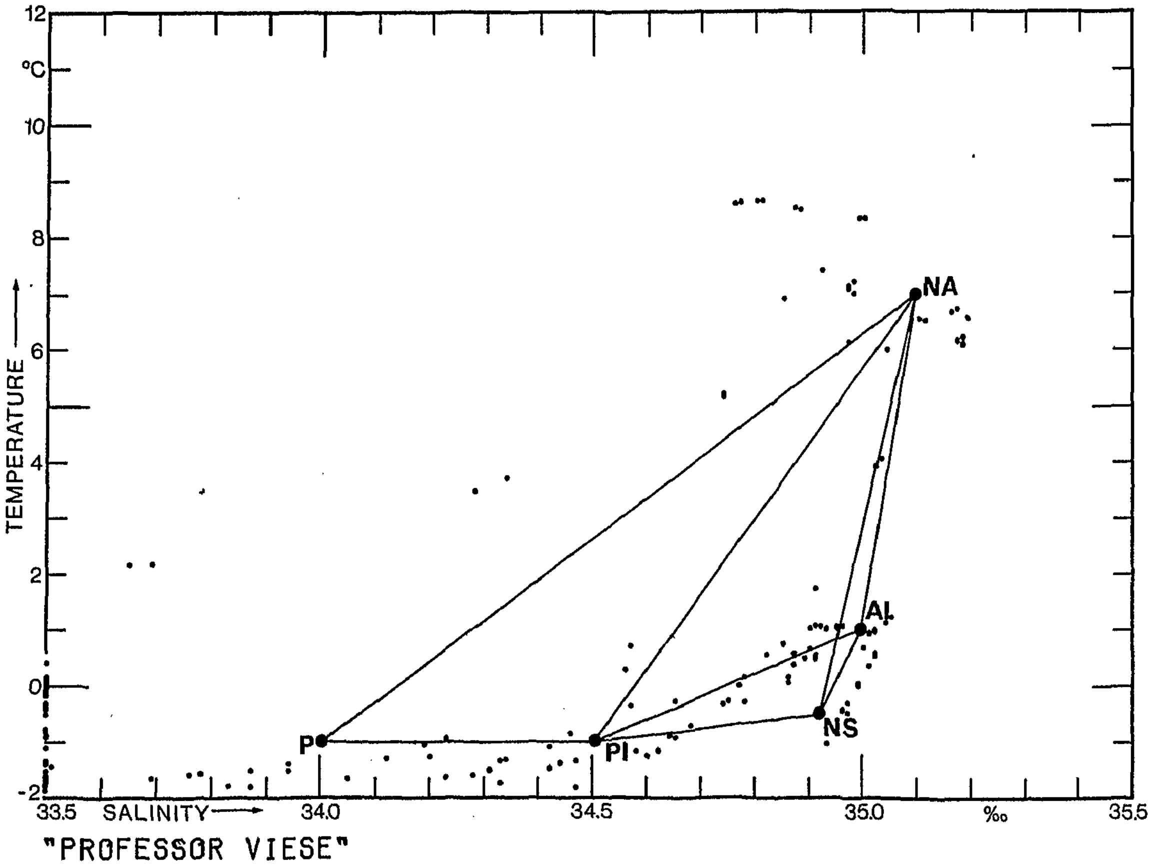
"PROFESSOR VIESE"
14.-15.AUG.1973
STAT.NO.1-10



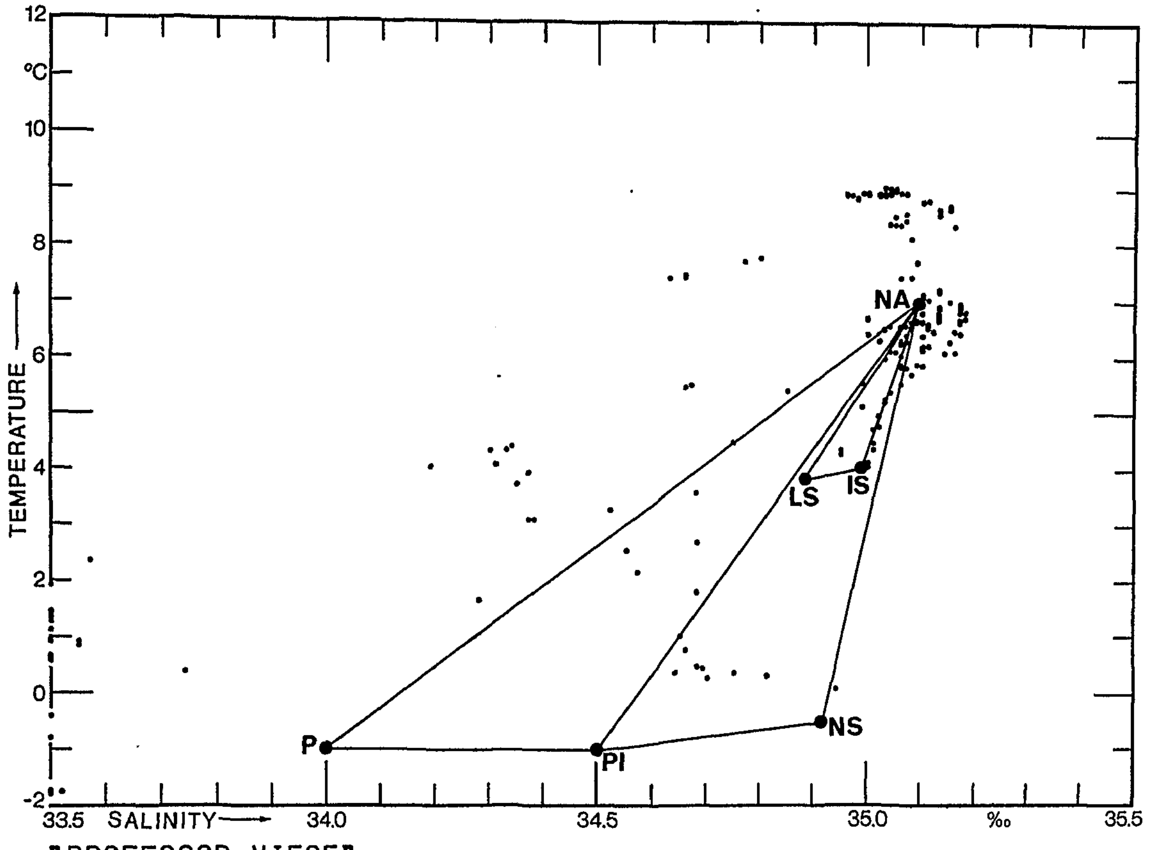
"PROFESSOR VIESE"
15.-16.AUG.1973
STAT.NO.11-20



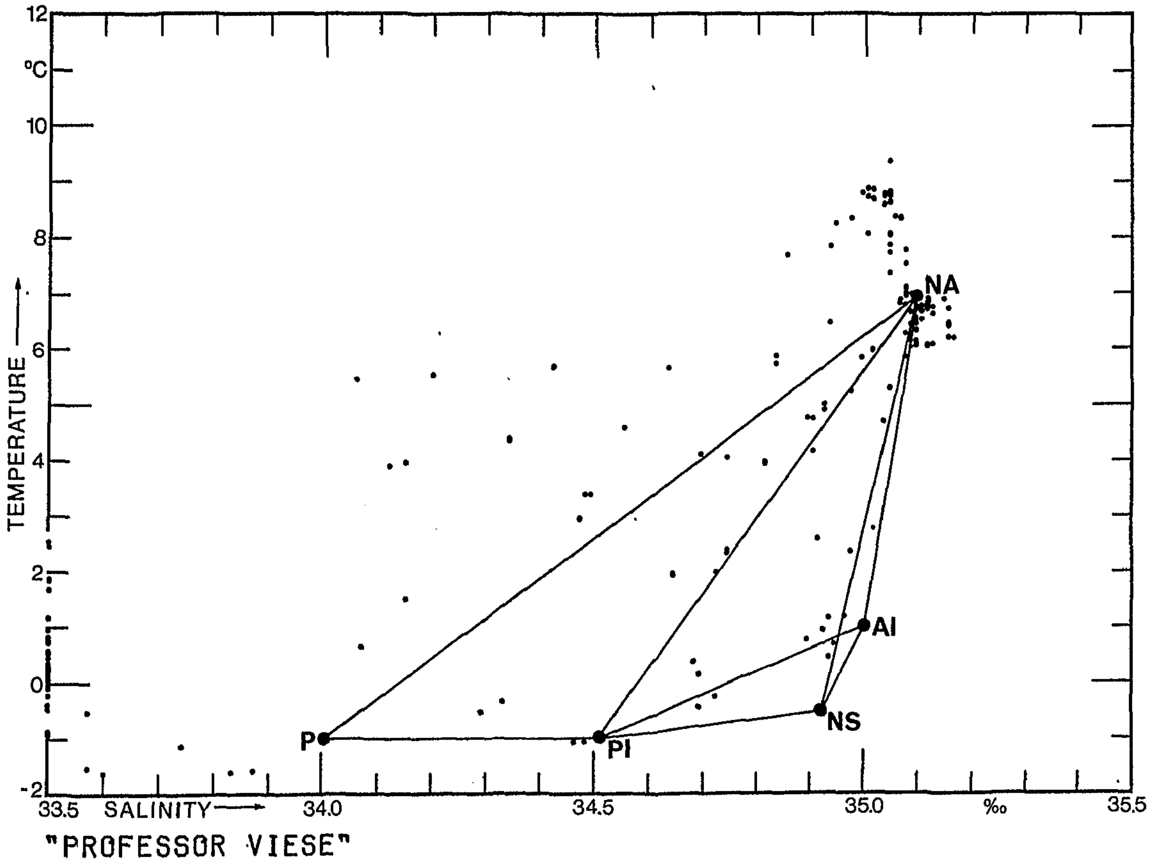
"PROFESSOR VIESE"
16.-17.AUG.1973
STAT.NO.21-29



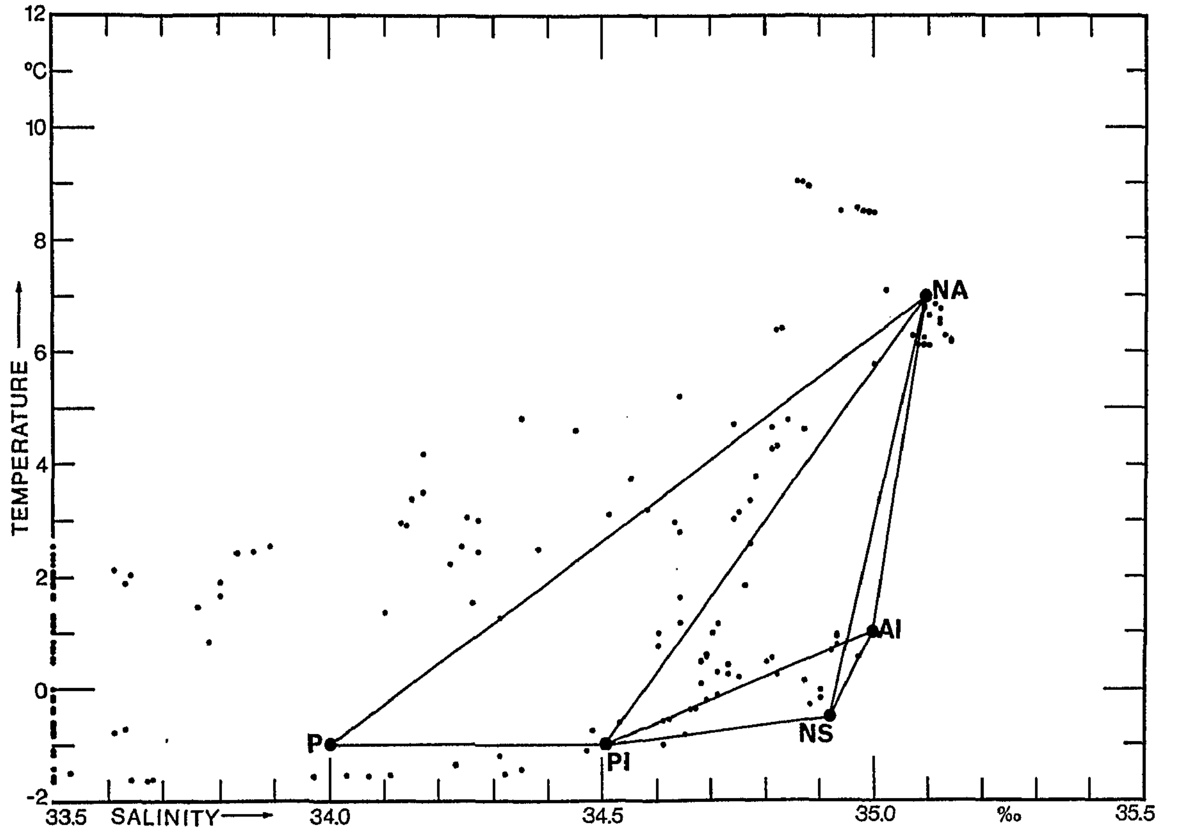
"PROFESSOR VIESE"
17.-18.AUG.1973
STAT.NO.30,32-38



"PROFESSOR VIESE"
9.-11.SEP.1973
STAT.NO.100-109



"PROFESSOR VIESE"
11.-12.SEP.1973
STAT.NO.110-119



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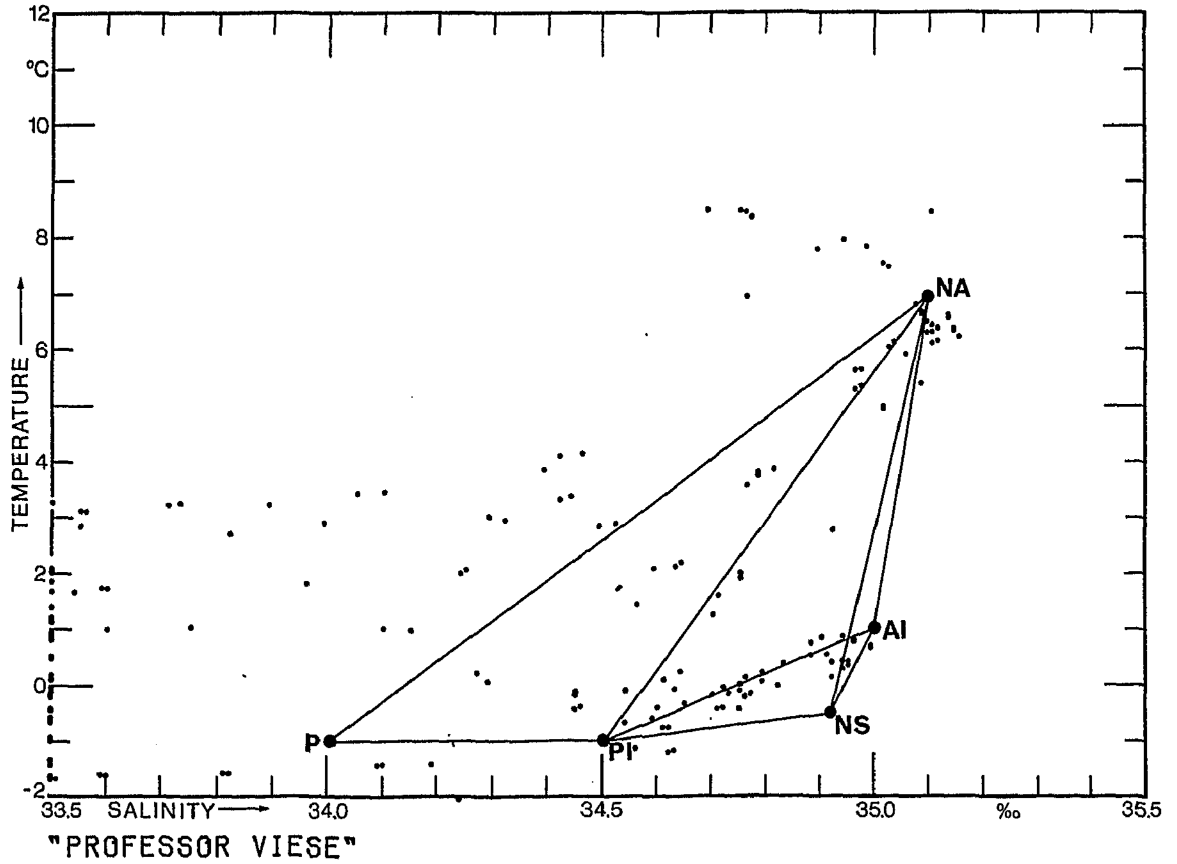
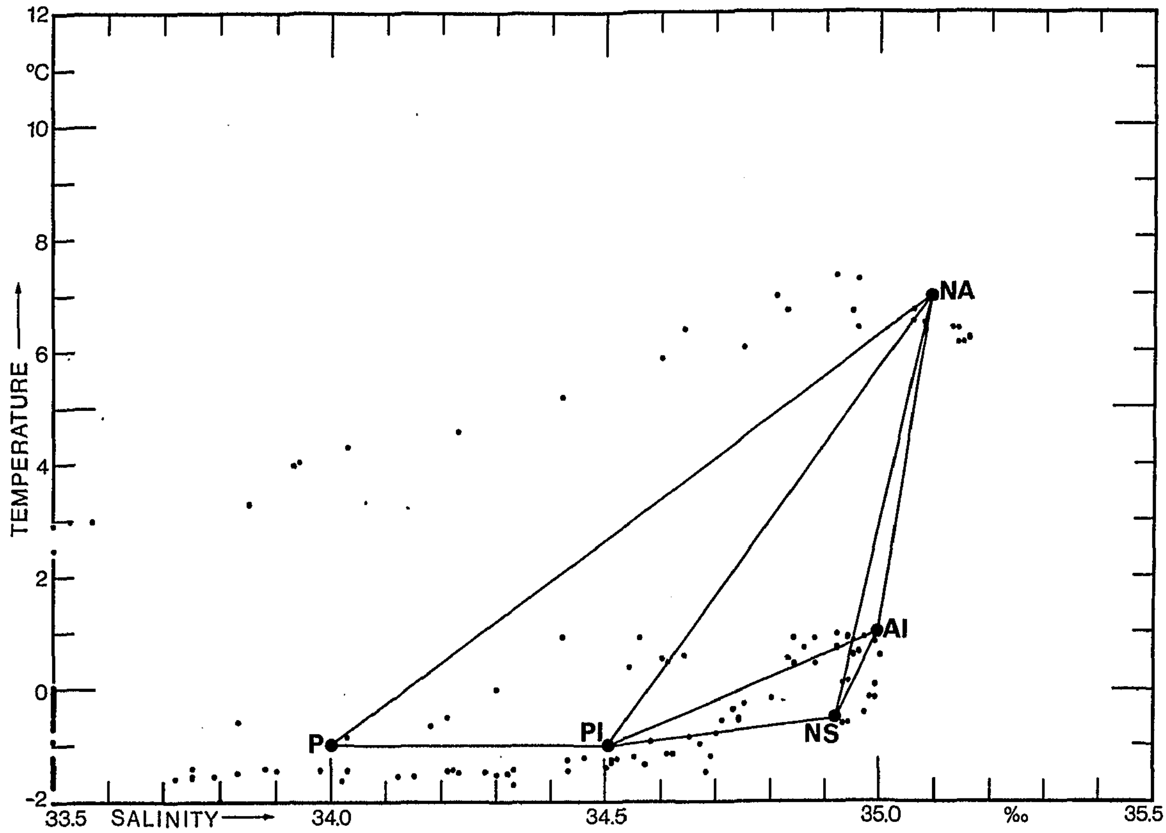
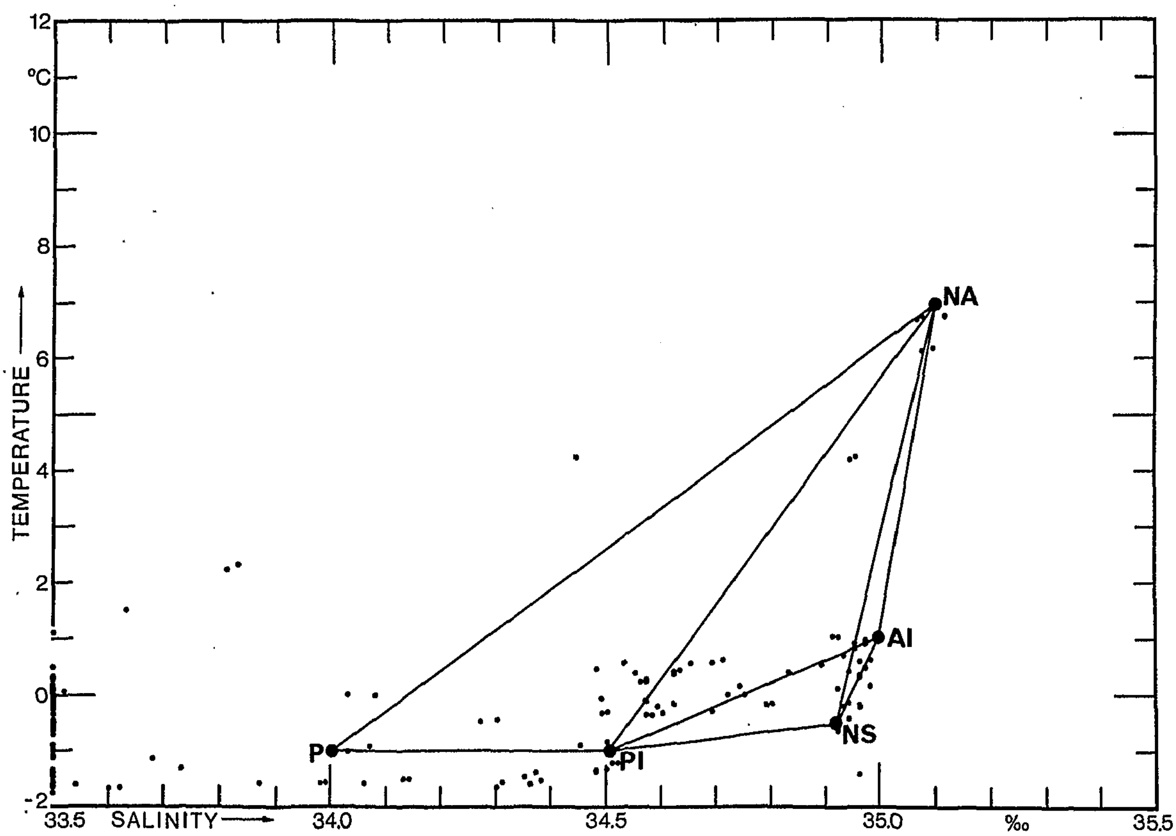
12.SEP.1973
STAT.NO.120-129



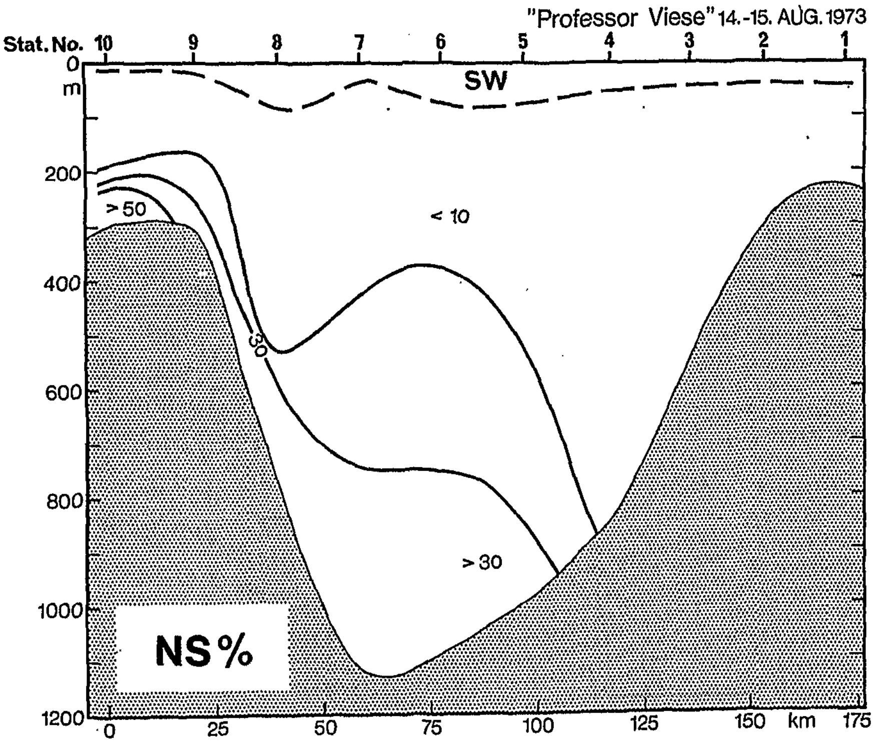
"PROFESSOR VIESE"
13.SEP.1973
STAT.NO.130-139

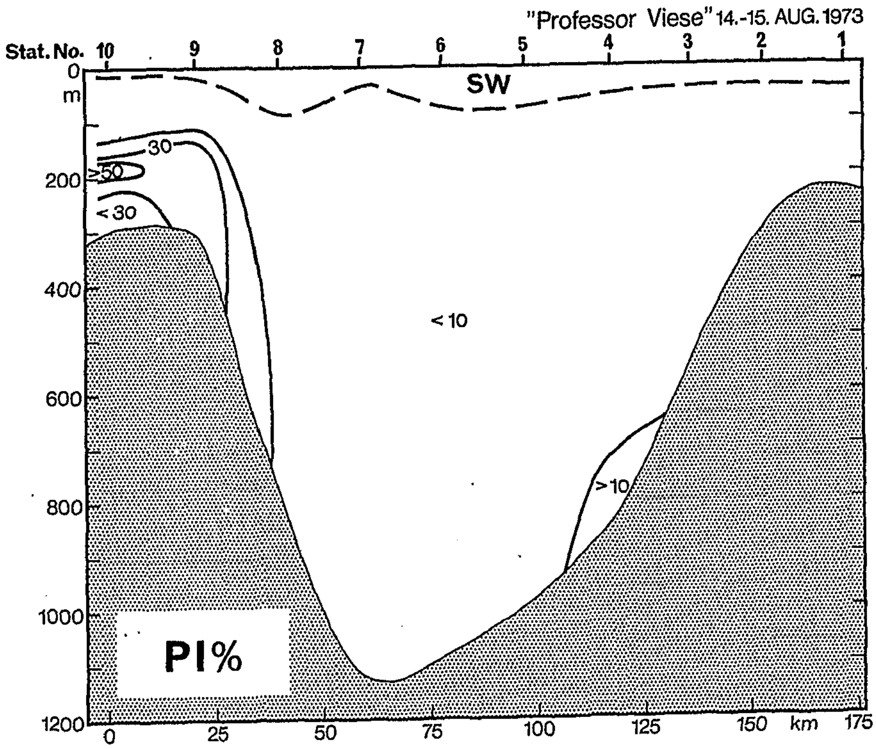


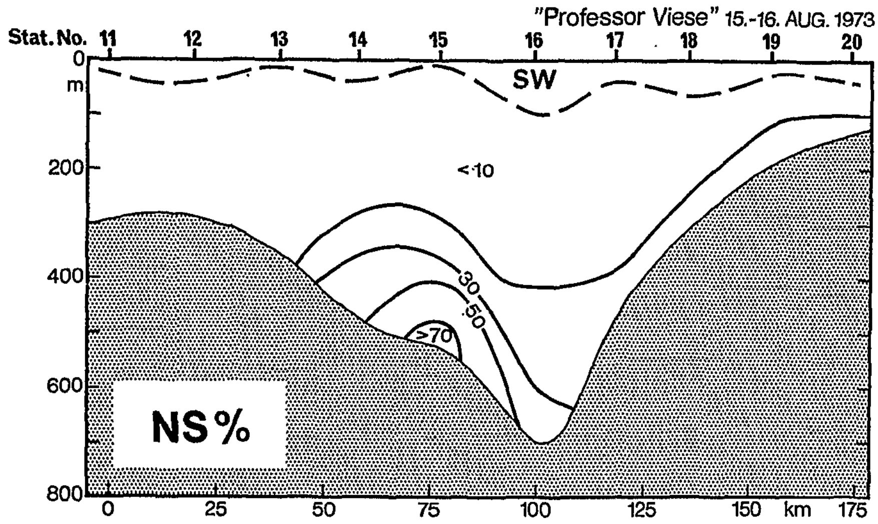
"PROFESSOR VIESE"
13-14.SEP.1973
STAT.NO.140-147,149

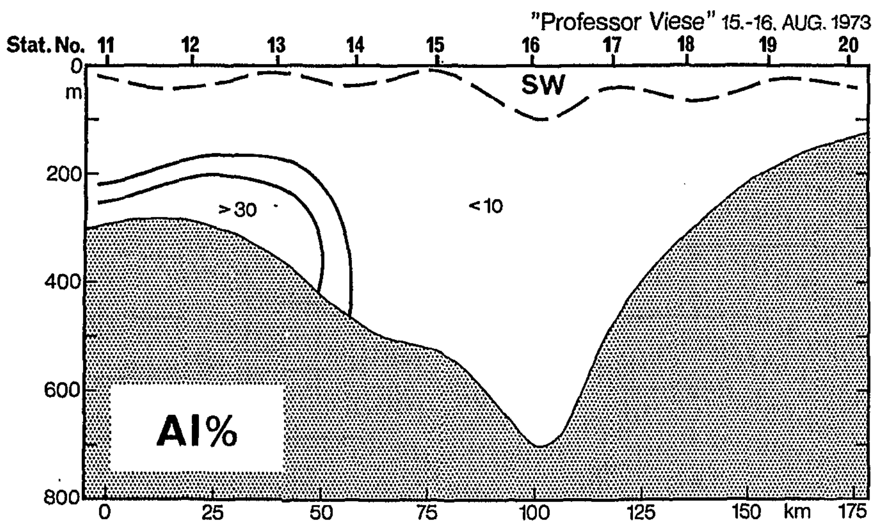


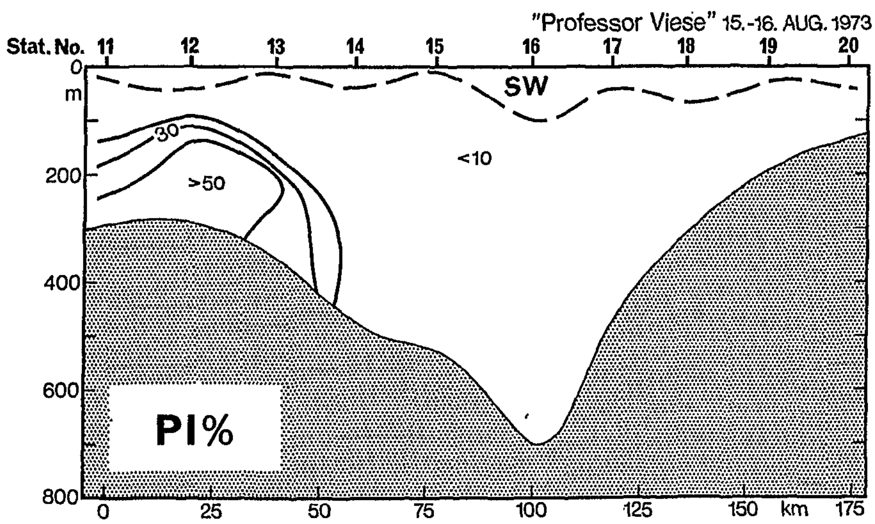
"PROFESSOR VIESE"
15-16.SEP.1973
STAT.NO.151-157

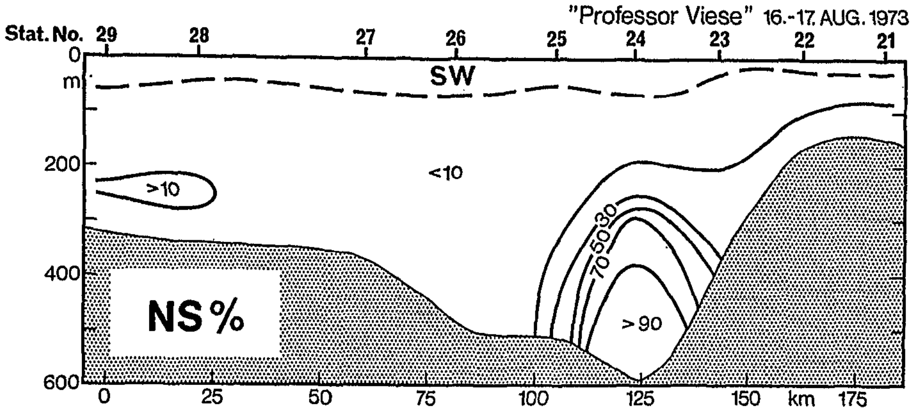

"Professor Viese" 14.-15. AUG. 1973
Stat. No. 10 9 8 7 6 5 4 3 2 1
0 m
200
400
600
800
1000
1200
SW
> 50
< 10
30
> 30
NS %
0 25 50 75 100 125 150 km 175

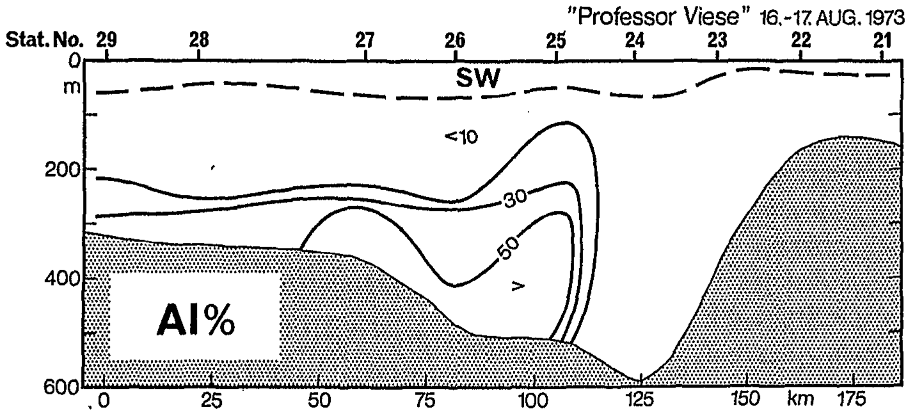

"Professor Viese" 14.-15. AUG. 1973
Stat. No. 10 9 8 7 6 5 4 3 2 1
0 m
200
400
600
800
1000
1200
SW
30
> 50
< 30
< 10
> 10
PI%
0 25 50 75 100 125 150 km 175


"Professor Viese" 15.-16. AUG. 1973
Stat. No. 11 12 13 14 15 16 17 18 19 20
SW
<10
30
50
>70
NS%
0 m 200 400 600 800
0 25 50 75 100 125 150 km 175


"Professor Viese" 15.-16. AUG. 1973
Stat. No. 11 12 13 14 15 16 17 18 19 20
SW
>30
<10
AI%
0 m 200 400 600 800
0 25 50 75 100 125 150 km 175


"Professor Viese" 15.-16. AUG. 1973
Stat. No. 11 12 13 14 15 16 17 18 19 20
SW
30
>50
<10
PI%
0 m 200 400 600 800
0 25 50 75 100 125 150 km 175


"Professor Viese" 16.-17. AUG. 1973
Stat. No. 29 28 27 26 25 24 23 22 21
0
m
200
400
600
SW
>10
<10
30
50
70
>90
NS %
0 25 50 75 100 125 150 km 175


"Professor Viese" 16.-17. AUG. 1973
Stat. No. 29 28 27 26 25 24 23 22 21
0
m
200
400
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SW
<10
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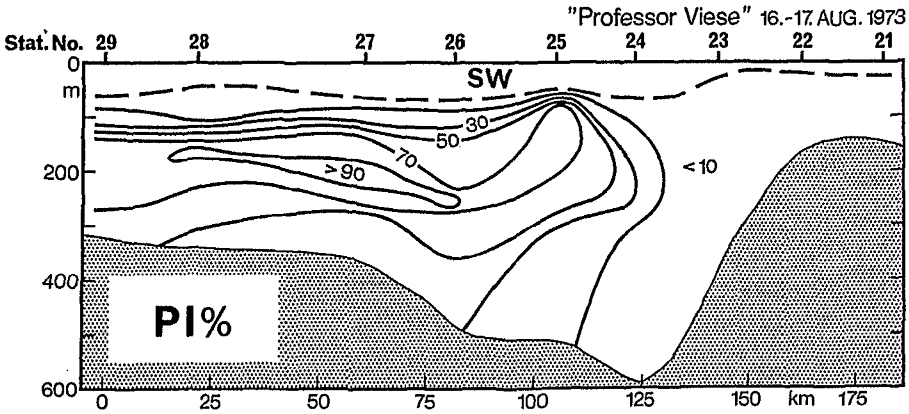
>
Al %
0 25 50 75 100 125 150 km 175


"Professor Viese" 16.-17. AUG. 1973
Stat. No. 29 28 27 26 25 24 23 22 21
0
m
200
400
600
SW
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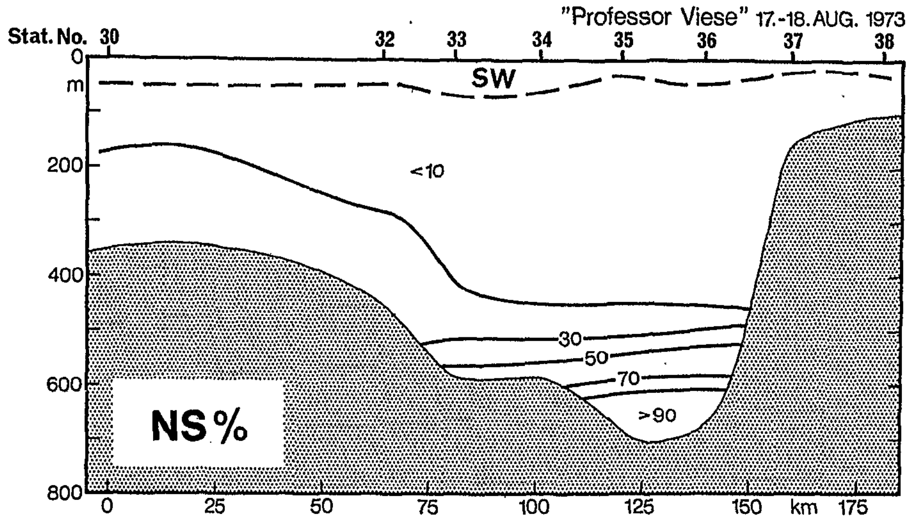
>90
<10
Pl %
0 25 50 75 100 125 150 km 175


"Professor Viese" 17.-18. AUG. 1973
Stat. No. 30 32 33 34 35 36 37 38
0
m
200
400
600
800
SW
<10
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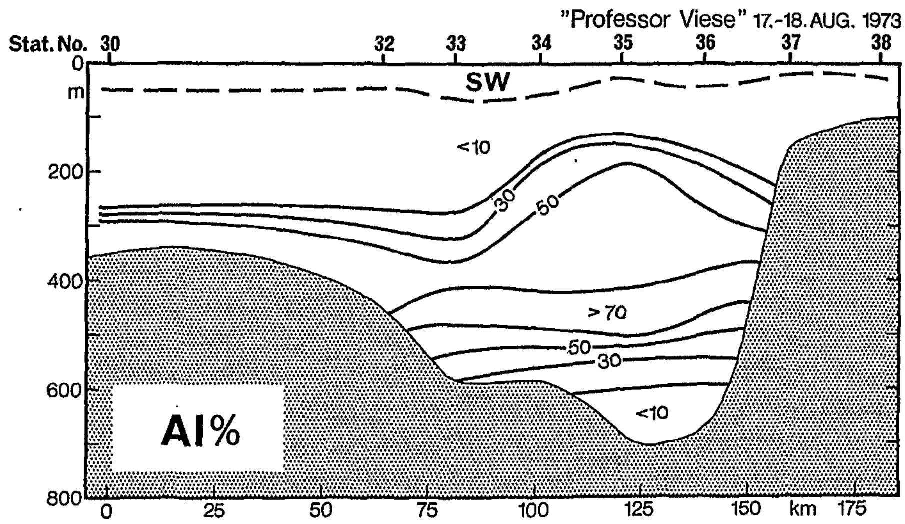
50
70
>90
NS%
0 25 50 75 100 125 150 km 175


"Professor Viese" 17.-18. AUG. 1973
Stat. No. 30 32 33 34 35 36 37 38
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SW
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>70
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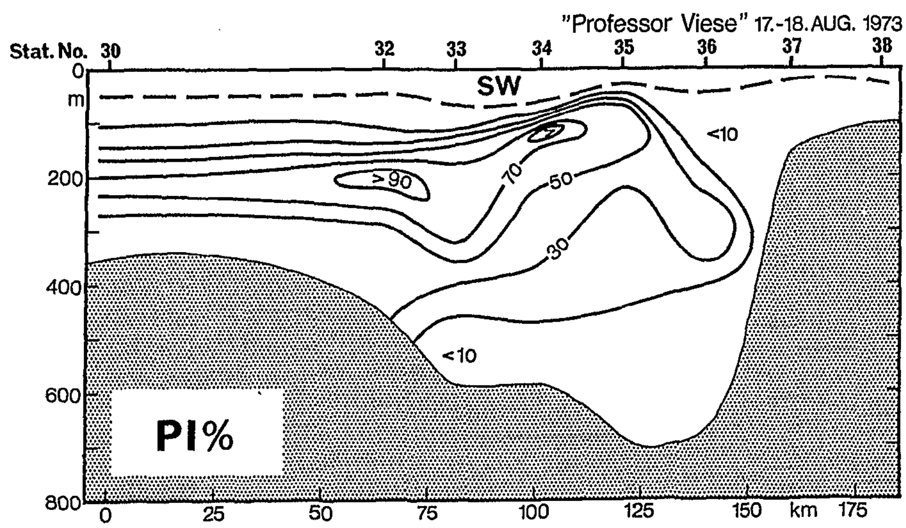
<10
AI%
0 25 50 75 100 125 150 km 175


"Professor Viese" 17.-18. AUG. 1973
Stat. No. 30 32 33 34 35 36 37 38
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SW
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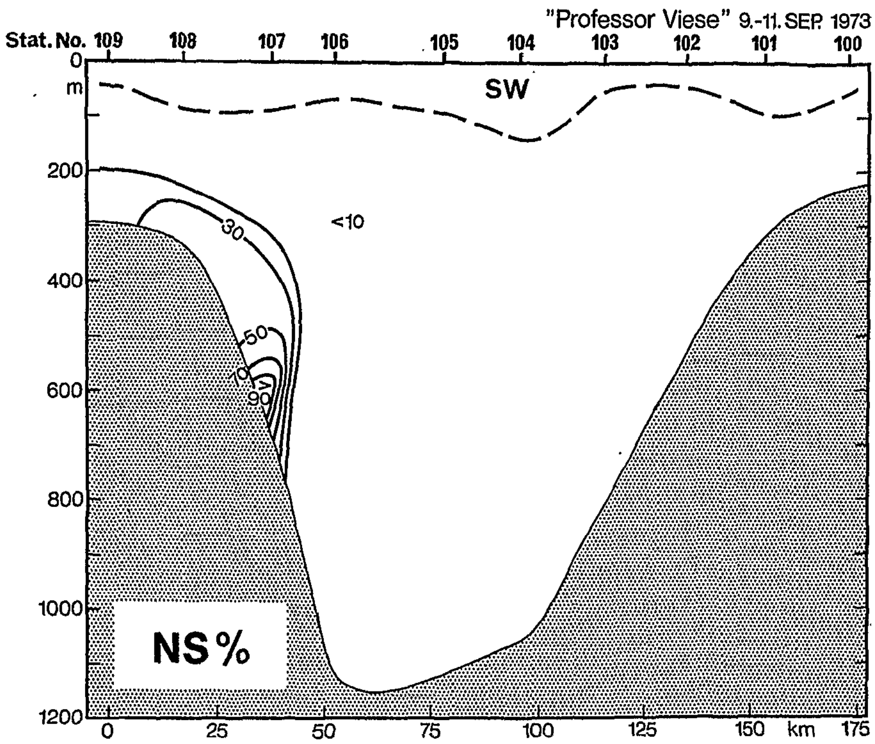
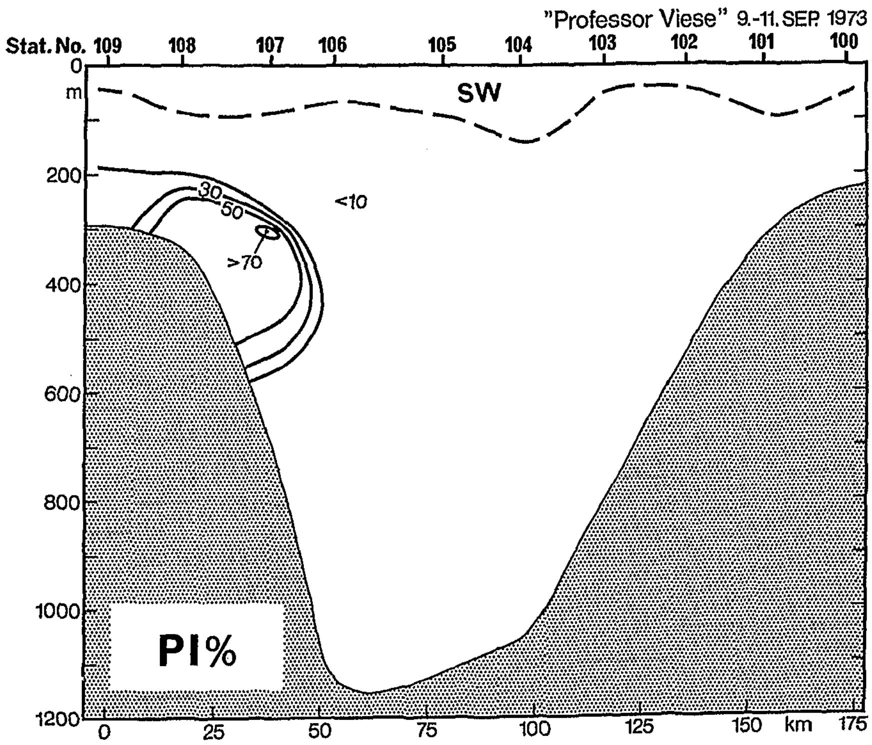
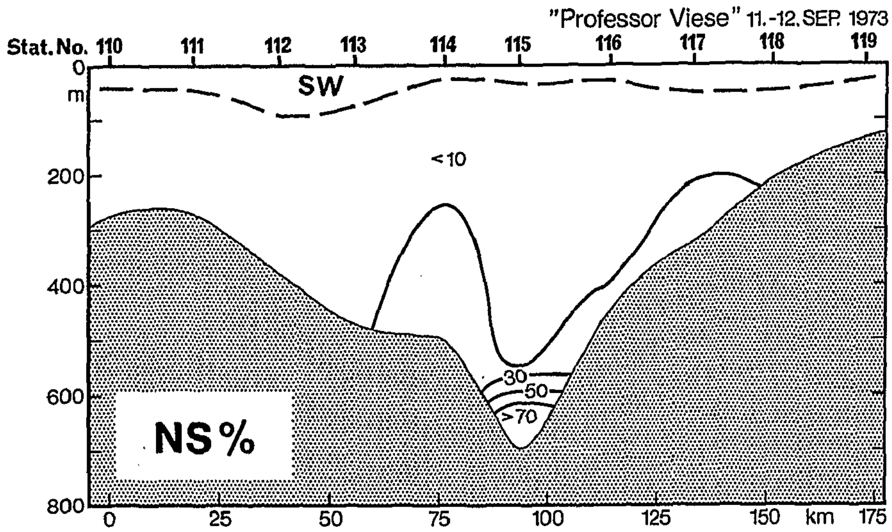
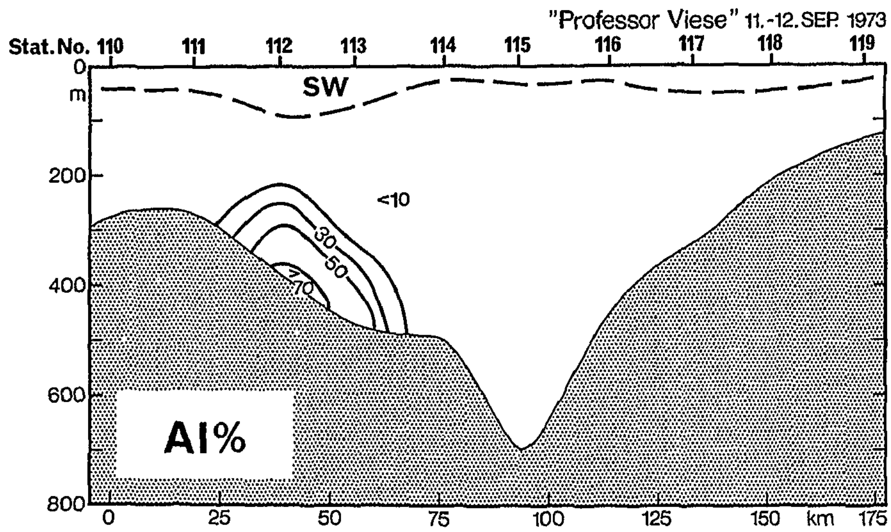
<10
PI%
0 25 50 75 100 125 150 km 175


"Professor Viese" 9.-11. SEP. 1973
Stat. No. 109 108 107 106 105 104 103 102 101 100
SW
<10
30
50
70
90
NS %
0 m 200 400 600 800 1000 1200
0 25 50 75 100 125 150 km 175


"Professor Viese" 9.-11. SEP. 1973
Stat. No. 109 108 107 106 105 104 103 102 101 100
SW
<10
30
50
>70
PI%
0 m 200 400 600 800 1000 1200
0 25 50 75 100 125 150 km 175


"Professor Viese" 11.-12. SEP. 1973
Stat. No. 110 111 112 113 114 115 116 117 118 119
0 m 200 400 600 800
SW
<10
30
50
>70
NS%
0 25 50 75 100 125 150 km 175


"Professor Viese" 11.-12. SEP. 1973
Stat. No. 110 111 112 113 114 115 116 117 118 119
0 m 200 400 600 800
SW
<10
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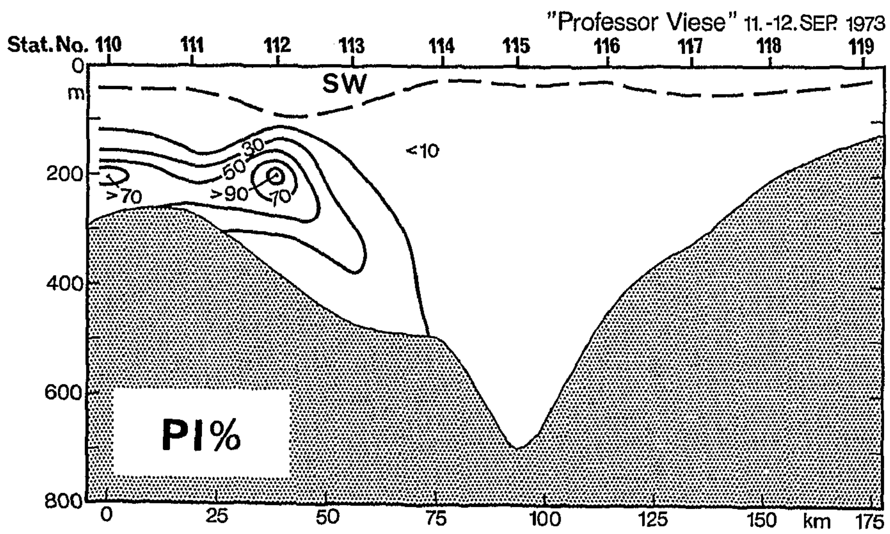
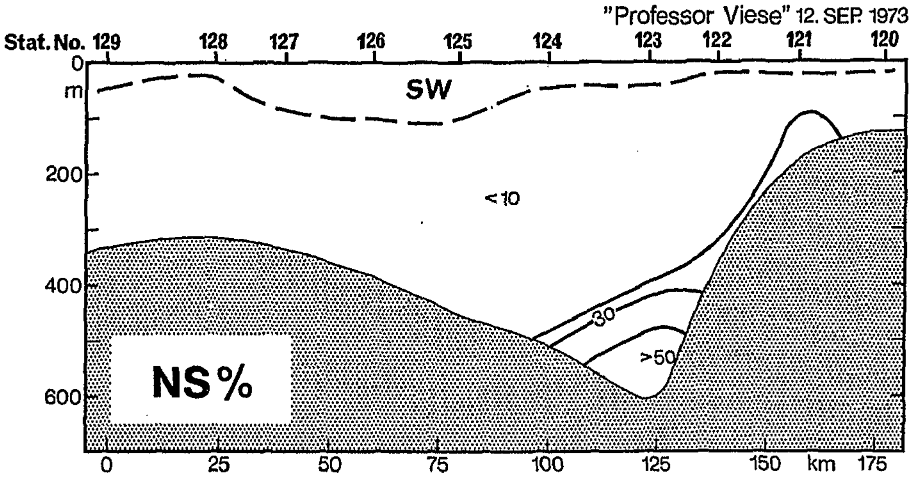
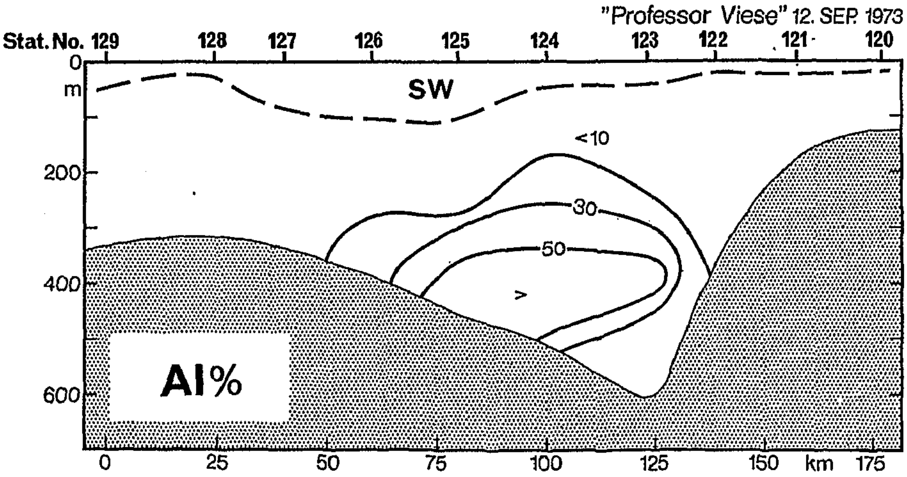
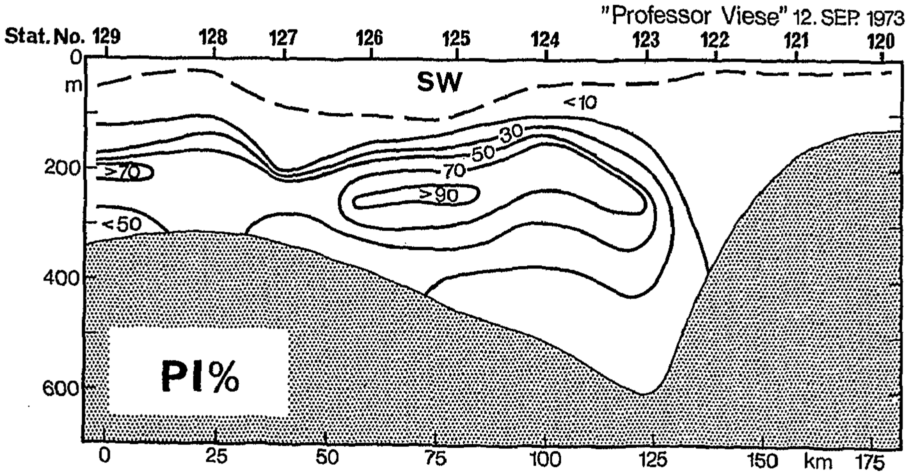
>70
AI%
0 25 50 75 100 125 150 km 175


"Professor Viese" 11.-12. SEP. 1973
Stat. No. 110 111 112 113 114 115 116 117 118 119
0 m 200 400 600 800
SW
<10
30
50
>70
>90
70
PI%
0 25 50 75 100 125 150 km 175


"Professor Viese" 12. SEP. 1973
Stat. No. 129 128 127 126 125 124 123 122 121 120
0 m 200 400 600
SW
<10
30
>50
NS%
0 25 50 75 100 125 150 km 175


"Professor Viese" 12. SEP. 1973
Stat. No. 129 128 127 126 125 124 123 122 121 120
0 m 200 400 600
SW
<10
30
50
>
Al%
0 25 50 75 100 125 150 km 175


"Professor Viese" 12. SEP. 1973
Stat. No. 129 128 127 126 125 124 123 122 121 120
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SW
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>90
>70
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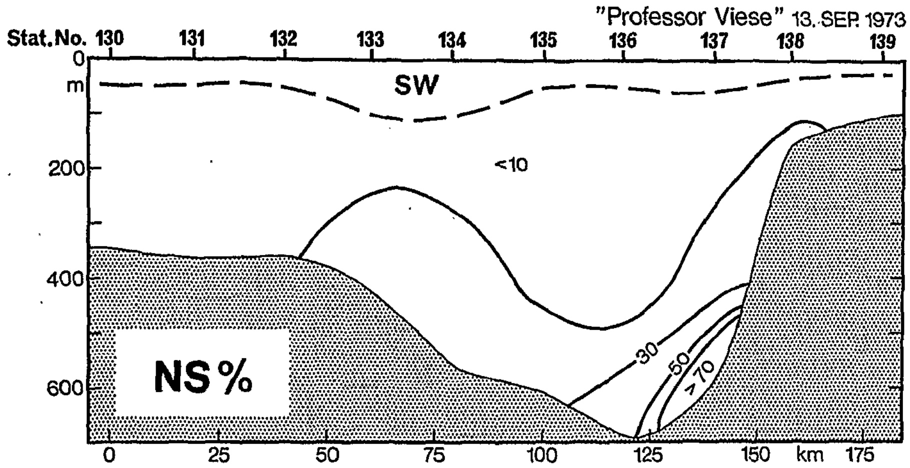
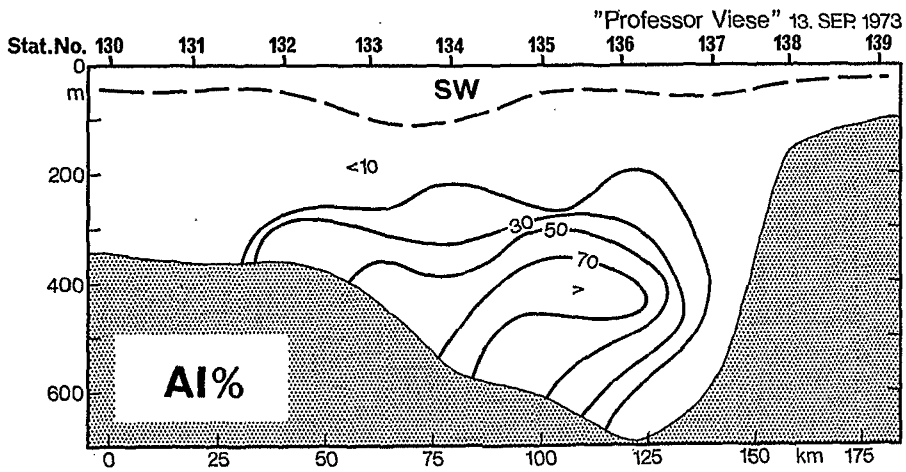
Pl%
0 25 50 75 100 125 150 km 175


"Professor Viese" 13. SEP. 1973
Stat.No. 130 131 132 133 134 135 136 137 138 139
0
m
200
400
600
SW
<10
30
50
>70
NS%
0 25 50 75 100 125 150 km 175


"Professor Viese" 13. SEP. 1973
Stat.No. 130 131 132 133 134 135 136 137 138 139
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m
200
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SW
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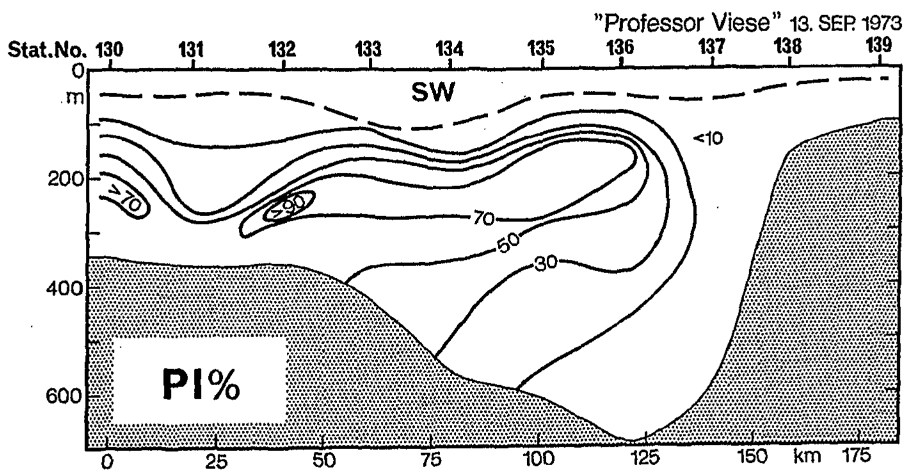
AI%
0 25 50 75 100 125 150 km 175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Stat.No. 130 131 132 133 134 135 136 137 138 139
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m
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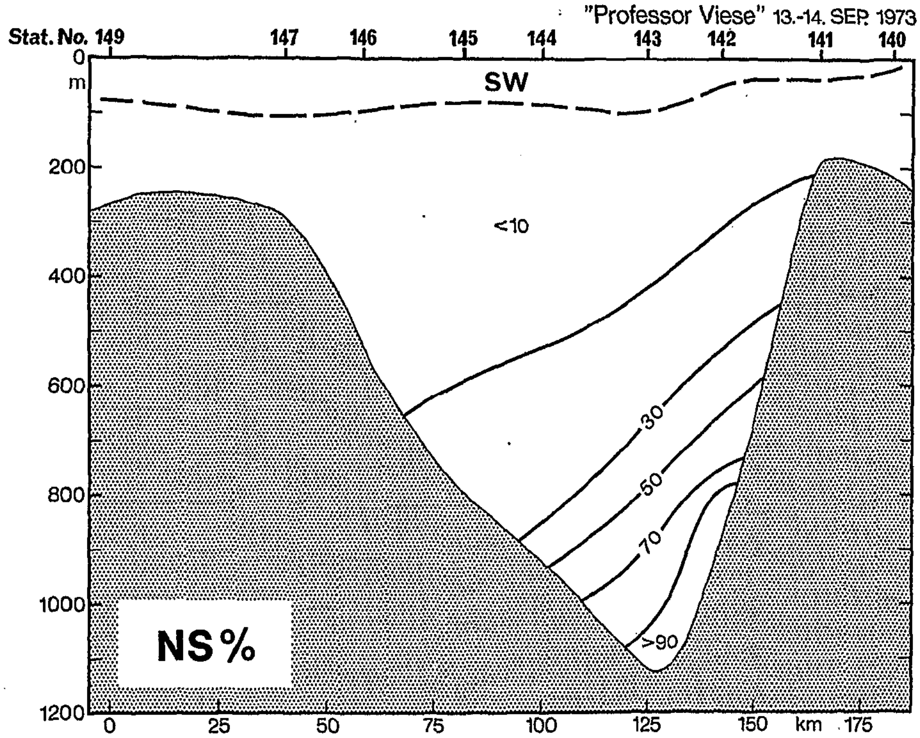
PI%
0 25 50 75 100 125 150 km 175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147
146
145
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143
142
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m
200
400
600
800
1000
1200
SW
<10
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>90
NS%
0
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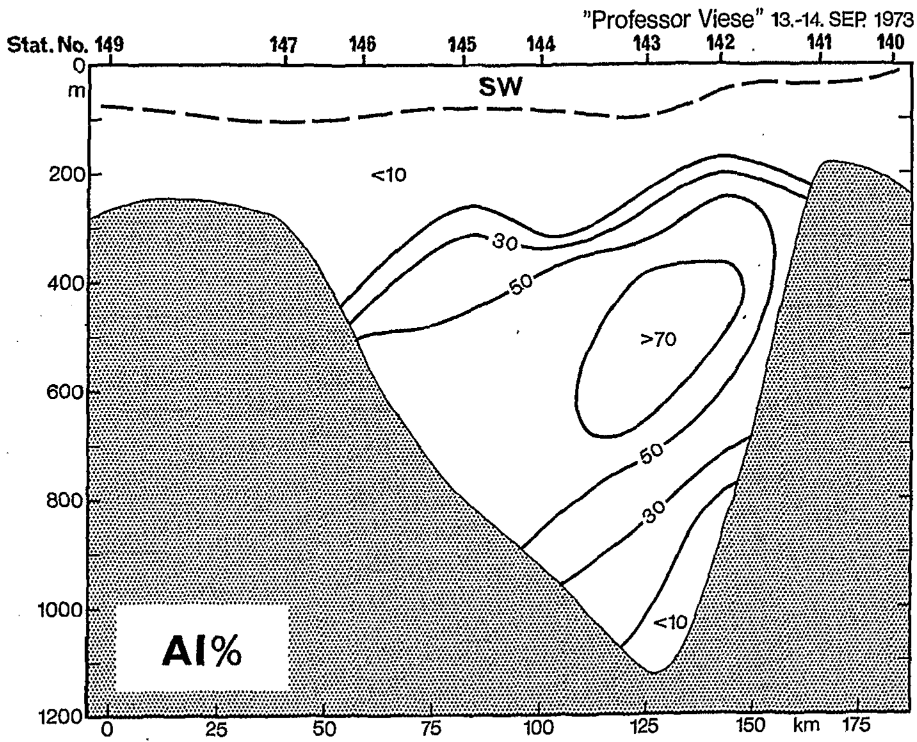
125
150
km
175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m
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AI%
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km
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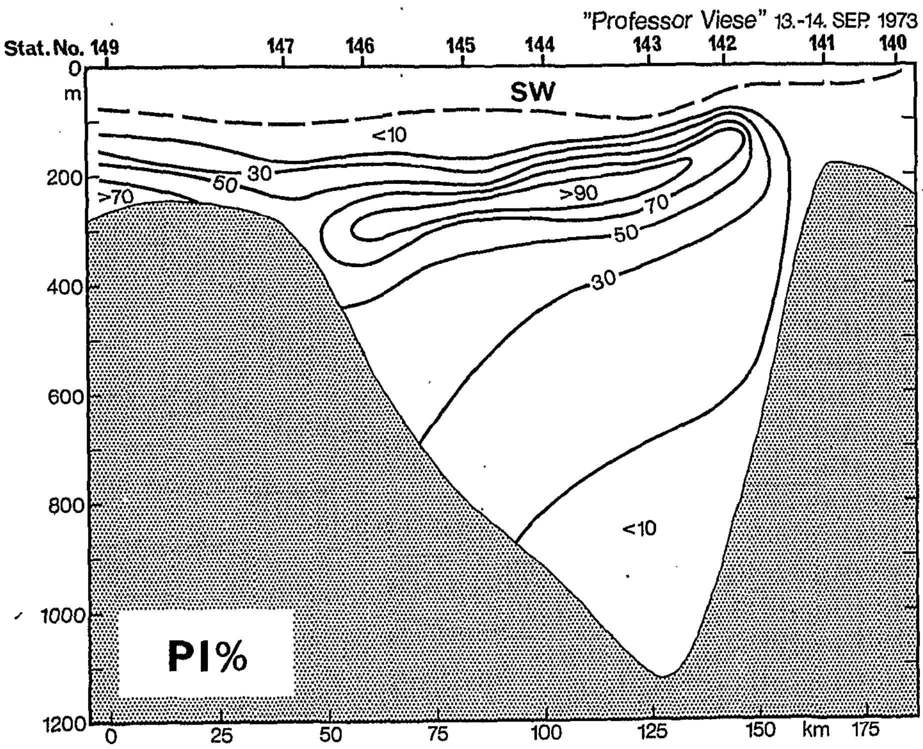
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Stat. No. 149
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m
SW
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km
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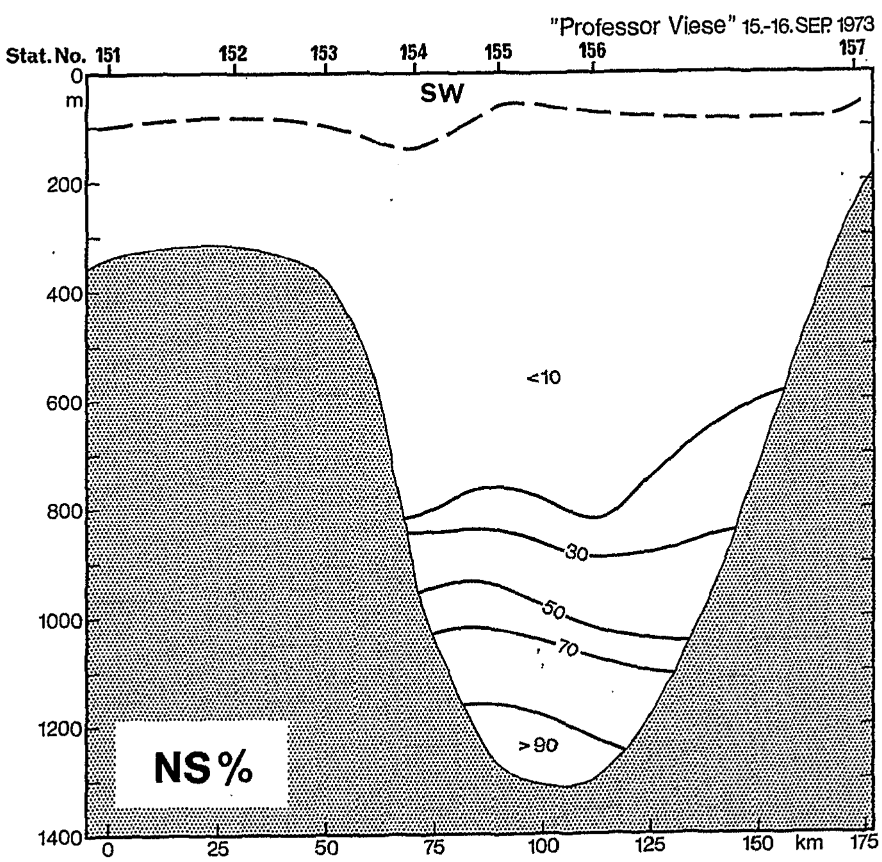
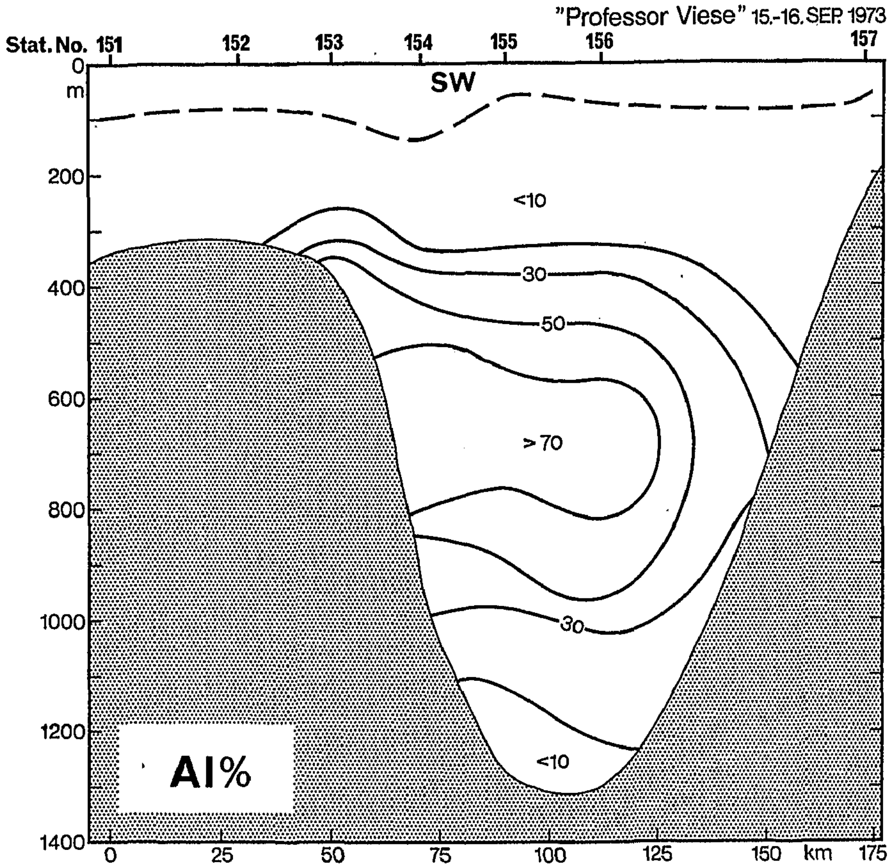
PI%


"Professor Viese" 15.-16. SEP. 1973
Stat. No. 151
152
153
154
155
156
157
0
m
SW
<10
30
50
70
>90
200
400
600
800
1000
1200
1400
0
25
50
75
100
125
150
km
175
NS%


"Professor Viese" 15.-16. SEP. 1973
Stat. No. 151 152 153 154 155 156 157
SW
<10
30
50
>70
30
<10
AI%
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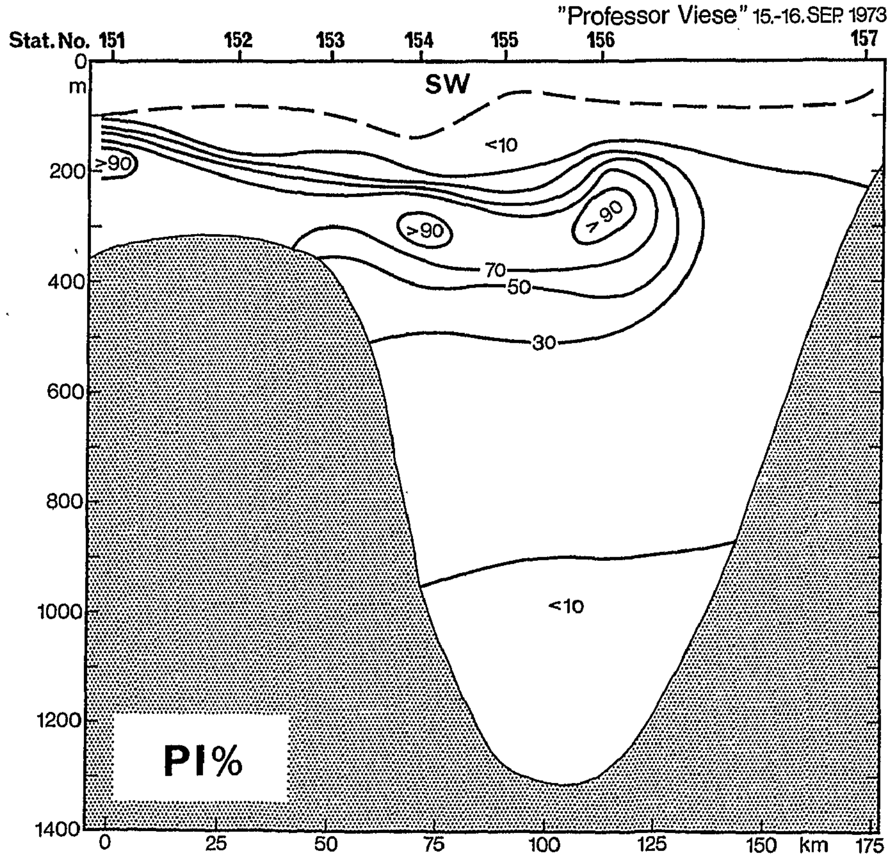
0 m 200 400 600 800 1000 1200 1400


"Professor Viese" 15.-16. SEP. 1973
Stat. No. 151 152 153 154 155 156 157
SW
<10
≥90
>90
>90
70
50
30
<10
PI%
0 25 50 75 100 125 150 km 175
0 m 200 400 600 800 1000 1200 1400

Berichte aus dem Institut für Meereskunde, Nr. 62, 1979

CORRIGENDUM

1. p. 14, Table 1: Replace the table by the new one, appended.

2. p. 103, after W. Herwig
   Insert: "TS-values from the upper 90 m have not been analysed".

3. p. 111 to 124 : In all sections the phrase "no data" is to be replaced by "not analysed".

(T.J. Müller)

5. Tables

Table 1 List of origin of data

Ship	Institute/Organisation
Explorer	DAFS, Marine Laboratory, Aberdeen
Helland-Hansen	Geophysical Institute, Bergen
J.C. Svabo	Institute for Physical Oceanography, Copenhagen
Challenger	SMBA, Oban; ICES
Cirolana	Fish. Lab. Lowestoft
Shackleton	IOS-Wormley
B. Davydov	Hydrogr. Serv. of the Navy, Leningrad; ICES
Meteor	Institut für Meereskunde, Kiel
Bj. Saemundsson	Marine Research Institute, Reykjavik; ICES
W. Herwig	COB, Plouzané
Hudson	Bedford Institute of Oceanography, Dartmouth
Prof. Viese	Arctic and Antarctic Research Institute, Leningrad; ICES