Institut für Meereskunde
an der Universität Kiel

Date: 15.03.2001

Cruise Report

Compiled by: Thomas J. Müller

F.S.Poseidon **Cruise No.: 262**

Dates of Cruise: 19.07. - 30.07.2000

Areas of Research: Physical oceanography

Port Calls: Reykjavik, 30.07. - 03.08.2000

Institute: Institut für Meereskunde, Kiel, Germany

Chief Scientist: Dr. Thomas J. Müller

Number of Scientists: 9

Projects: Special research programme 'Thermohaline Circulation Variability in the North Atlantic' (Thermohaline Zirkulationsschwankungen im Nordatlantik), Sonderforschungsbereich 460, Universität Kiel, TP A1

Cruise Report

This cruise report consists of 9 pages, 1 appendix (Station list) and 3 figures

1. Scientific crew

P262: 19.07.-30.07.2000, Reykjavik - Reykjavik

Name	**Institute**	**Function**
Müller, Dr. Thomas J.	IFMK	Chief scientist
Dombrowsky, Uwe	IFMK	TA, CTD
Lentz, Uwe	IFMK	TA, moorings
Link, Rudolph	IFMK	TA, moorings
Fidler, Julia	IFMK	Student
Heilmann, Johanna	IFMK	Student
Macrander, Andreas	IFMK	Student
Reppin, Jörg	IFMK	Phys. oceanogr.
Valdimarsson, Dr. Hedinn	MRI	Phys. oceanogr.
Total	**9**	

Participating institutions
IFMK Institut für Meerekunde an der Universität Kiel, Kiel, Germany
MRI Marine Research Institute, Reykjavik

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2. Research programme

The special research programme 'Variability of the Thermohaline Circulation in the North Atlantic' has been set up in Germany four years ago, with with major contributions from the *Institut für Meereskunde, Kiel*. One of its projects aims at a better understanding of the transport dynamics and balances in the Denmark Strait, in particular of the overflow of cold and dense water from the Norwegian Sea into the Irminger Sea which is the densest component that forms the North Atlantic Deep Water. The project's observational part uses moored and shipborne instrumentation for in-situ measurements to identify water masses, to estimate transport rates and to support the calibration of high resolution process models.

The main objective of POSEIDON cruise 262 was to deploy a series of long term moorings near the bottom at the sill and northwest of the strait, and to run repeated sections with CTD and vmADCP normal to the strait in order to get estimates of transport rates. Two of the moorings would carry near bottom upward looking ADCPs: at the northwestern edge of the sill, a long ranger 75 kHz ADCP would be mounted in a standard subsurface mooring, and some 10 nm nortwestward on the Greenlandic shelf, a standard 150 kHz ADCP would be moored in a shielded anchor system at the bottom. These two moored ADCPs will be complemented by a third ADCP to be moored later in August 2000 by colleagues from the MRI, Reykjavik.

Halfway between the three moored ADCPs (two in site, one scheduled), two inverted echo sounders with integrated pressure sensor (PIES) were to be moored at the bottom to measure the sea surface distance from the bottom. The aim is to cross check geostrophic estimates with directly measured currents. Finally, a mooring with a 400 m long thermistor cable some 60 nm northeast of this array provides information on changes of temperature profiles in the water column. During the planning phase, aspects of the intensive fishing activity in the area were taken into account with respect to both, the selection of mooring sites and mooring designs.

The observations are performed in close co-operation with colleagues from the Marine Research Institute, Reykjavik.

3. Narrative of cruise with technical details

The chief scientist and the student A. Macrander were already onboard since the previous cruise, P261. Five members of the scientific party (U. Dombrowsky, U. Lentz, R. Link, J. Fidler, J. Heilmann) arrived during the night 17 to 18 July, J. Reppin embarked on 18 July, and the guest scientist from the MRI at Reykjavik, Iceland, Dr. H. Valdimarsson embarked shortly before sailing on 19 July.

On 18 July, the scientific equipment was set up in port, in particular the heavy gear of the shielded ADCP and the stands for the two PIES were mounted on deck while in port. Together with the captain and the chief mate, the chief scientist and the three students took the chance to visit the new Icelandic fishery research vessel 'Arni Fridriksson'; this interesting visit was arranged by Dr. Hedinn Valdimarsson from the MRI.

The vessel sailed on schedule on 19 July at 14:00 UTC from Reykjavik. The southeastern edge of the vmADCP and CTD sections planned to be repeated normal to the Denmark Strait's sill (close to Stat. 215 in Fig. 1), was reached during the night. While changing course towards the Northwest and starting a test section for the vessel mounted ADCP (vmADCP), here, outside the 12 nm zone of Iceland, routine logging of underway measurements began:

- precise navigational information from an Ashtech GG24 system
- heading, pitch and roll information from a 3-dimensional Ashtech ADU2 system
- sea surface temperature and salinity using a thermosalinograph
- standard meteorological parameters (note: starboard sensors only)
- profiles of ocean currents down to ca. 300 m using a 150 kHz RDI ADCP system

On 20 July in the morning, we reached the southeastern part of the strait's sill where we sighted a continous ice border at about 3 nm distance towards the northwest. As it was not possible to steam further to that direction where we planned to deploy the shielded ADCP (SK in Fig. 1), the PIES and the LR-ADCP mooring (LR in Fig. 1), we decided to have the first (test) station (Stat. 212, 460 m depth) here; the new SeaBird 911 worked well. However, the 12 kHz pinger attached to the rosette showed weak sigals only on the recording chart, and several trials to improve the result failed; thus, estimates of bottom distances are uncertain with this instrument

As the ice conditions did not improve until afternoon, we decided to repeat the section southeastward, now with three additional CTD station (Stat. 213, 214, 215), and then again to repeat the section towards the Northwest as a regular vmADCP section, expecting that ice conditions would improve due to a change in wind direction from W to NNE and allow mooring work in that area next day.

Although ice conditions had continuously improved on 21 and 22 July, it still was not possible to deploy the shielded ADCP (mooring V423). Therefore, two more times the CTD-section was repeated. Also, the vmADCP-section running from SE towards NW was repeated, now modulo with nominally multiples of 1/4 phase shifts with respect to the M2 tide.

The shielded ADCP has two different types of radio transmitters aimed at supporting it's surface location after release: a newly designed 4H-Jena ARGOS transmitter (S/N 720001, ID 09243) succeeded a pressure test up to 205 dbar on Station 214. The second transmitter, a BENTHOS 27 MHz, did not show enough transmission energy, probably due to a problem in the electronics which could not be overcome onboard; therefore, a comparable and ready to use IBAK type 27 MHz was adjusted mechanically to be used on the shielded mooring.

On 23 July, the ice conditions further had improved. However, dense fog required careful navigation to avoid remenant ice in the area of the planned mooring position. In the afternoon, we finally reached the nominal position for the shielded ADCP mooring. It was deployed without any problems using the deep sea coring wire (mooring V423, Stat. 228; SK in Fig. 1). Also, the two PIES could be deployed on their nominal position (moorings V422, Stat. 229; V421, 230). The vmADCP section towards the SE and then again to the NW was repeated once again during the night. On 24 July, and with 5 m swell under difficult conditions, a long ranger ADCP was moored near the bottom on its nominal position on the NW flank of the Denmark Strait's sill (mooring V425, Stat. 232, LR in Fig. 1), again using the deep sea coring wire. As the sweell did not decrease, we decided not to risk the CTD/rosette system while on station, but ran twice more the vmADCP section until. From 25 to 26 July, the section along the Denmark Strait sill’s mooring sites was completed southeastwards with CTD stations 233 to 240.

From the southeastern end of the sill section, we steamed 45 nm northeastwards to deploy a mooring with a 400 m long cable with 10 thermistors between 70 m and 470 m at about 700 m water depth (TK in Fig. 1). The site chosen should characterize the inflow of Atlantic waters into the northern seas. On 26 July, we deployed the mooring. However, due to a broken Kevlar cable, we had to recover and redeploy the mooring a second time, thereby exchanging all Kevlar cables against Perlon ropes. Next morning, after almost having completed a section across the northern part of the strait (section N in Fig. 1), the top flag of the mooring was sighted. The top two glass buyancies with the flag were taken onboard, and the rope below was cut leaving the upper-most (main) buyancy now at 22 m depth and the 400 m thermistor string starting at 50 m instead of 70 m. Figure 2 plots all mooring sites in more detail.

Early afternoon of 27 July, we started to repeat for the last time during the cruise the vmADCP section across the strait's sill (Fig. 1), now with a new long ranger 75 kHz ADCP which had replaced the 150 kHz instrument since 26 July evening. Due to ice conditions, we had to change course from NNW to W at 66° 04' N, 027° 25' W, then ran a vmADCP section towards SE onto the the Icelandic shelf (65° 15' N, 026° 15' W) and then NW onto the Greenland shelf (65° 35' N, 030° 40' W). Here, on 28 July at noon, a section with a MKIIIb

CTD (replacing the SBE CTD for test purposes for a later cruise), began towards the SE to cover the exit of the overflow and the major part of the inflowing Atlantic water (Stat. 247-259, Fig. 1). On 29 July at noon, the section was finished. POSEIDON called int to Reykjavik where cruise P262 finished on 30 July at 08:00 UTC.

4. Scientific report and first results

Because of the ice conditions, the main section across the sill of Denmark Strait which passes the mooring sites can be constructed only once by combining sections 3 and 4 (Stat. 225-240, Fig. 3). As an example for the complicated structure of water masses and currents in the Denmark Strait region, it will briefly be described here. A more complete discussion of all sections is left for later analysis.

Both, temperature and salinity (Fig. 3a, b) show sharp fronts and layering indicating different water masses and strong meso-scale activity. The core of Atlantic water (salinity higher 35.1, Fig. 3b) is found in the eastern part of the strait between 100 and 300 m depth. Towards the East, the core reaches onto the shelf until Station 226 from where on shelf waters at lower salinites and higher (summer) temperatures (Fig. 3a) and much less density (Fig. 3c) dominate. Towards the West, the boundary of Atlantic water is found as a sharp front above 300 m depth above the western flank of the strait between Stations 235 and 236 with polar waters of different origin towards the West. As a water mass boundary, it also denotes the boundary of general inflow of Atlantic water in the East and outflow of polar waters in the West which, however, is disturbed by eddies on each side.

Overflow water (T<0.5°C, 34.85< S <34.90) fills the deep (> 350 m) western part of the strait. The associated density field suggests two cores of strong overflow currents: one at the deep (> 500 m) western flank where the long ranger ADCP (LR) is moored, and one over the deep (~500 m) plateau next to the flank where the shielded ADCP (SK) is moored.

Six vmADCP sections were partially repeated across the sill depth along the mooring sites starting in the southeast: The first to fifth section were obtained with the 150 kHz instrument, the sixth with a self-recording 75 kHz longranger. Before analyzing the processed data in detail for the meso-scale current field, the tidal signal which can make up to ~50 cm/s in this region, must be removed. However, regions with strong horizontal and vertical gradients may be identified without doing so. Figure 3d plots the along-channel component of the only complete section across the sill which was obtained with the 150 kHz instrument that reaches to a maximum depth of nominally 300 m. Note the remarkably sharp front with (zero current component) just west of 27°W which coincides with the doming of isopycnals between 100 m and 500 m depth in the centre of the strait (Fig. 3c). From the upper 300 m horizontal structure of the current normal to the density section, one may speculate that inflow of Atlantic waters occurs east of the water mass front which is disturbed by a strong anticyclonic eddy above the strait, and that southward outflow of polar waters occurs in the western part of the section at about 28°W, which is also disturbed by a cyclonic eddy east of its centre, and that both eddies are tied together. However as noted above, removal of the tidal signal is essential to prove such speculation for further analysis.

Taking the phase of the M2 tide at the start of the first section as 0, Table 1 displays the phase shifts at the starting times for the repeated sill sections..

Table 1: Repeated vmADCP section, start position 65° 40.0'N, 025° 10.0'W, course 298° and nominal speed 7 kn across the Denmark Strait's sill and along moorings V421, V422, V423, V425. Phases of M2 tide (12.42 h period) in % relative to the start of the first section

M2 tide, phase 0		Start vmADCP section		
Date 2000	Time UTC	Date 2000	Time UTC	Phase / %
20.07.	23:32	20.07.	23.32	0
22.07.	00:22	21.07.	22:30	-15 / 85
22.07.	12:48	22.07.	21:30	-32 / 68
24.07.	02:02	24.07.	03:56	-85 / 15
24.07.	14:27	24.07.	21:30	-44 / 56
27.07.	04:34	27.07.	13:14	-30 / 70

Results from the moored instruments, in particular transport estimates in different water mass layers are expected after recovery which is scheduled for the time period February to August 2001 depending on available ship time, and wheather and ice conditions.

5. Scientific equipment, instruments and moorings

5.1 Moorings

During P262, five moorings were deployed as indicated in Table 2. Recovery is scheduled for the time period February to August 2001, depending on available ship time, and wheather and ice conditions.

Table 2: Moorings deployed during P262.

Date 2000	Time UTC	Position	Water depth	ID	Instruments	Remarks
23.07.	15:23	66° 11.56'N 027° 35.49'W	494 m	V423	150 kHz ADCP	shielded at bottom
23.07.	18:06	66° 09.92'N 027° 26.28'W	493 m	V421	PIES 006	bottom stand
23.07.	19:49	66° 06.48'N 027° 10.52'W	625 m	V422	PIES 005	bottom stand
24.07.	14:12	66° 07.60'N 027° 16.10'W	582 m	V425	75 kHz broad band ADCP (long ranger)	near bottom
26.07.	15:55	66° 35.59'N 025° 26.45'W	664 m	V424	400 m thermistor string	30 m to 430 m

5.2 CTD/rosette and salinometer
Two different sytems for CTD-measurements were used:

- a SeaBird 911 (Stat. 212 to 246) as main instrument with a recent calibration from the manufacturer
- a NBIS MKIIIB (IFMK internal code NB1, Stat. 247 to 259) for testing purposes at the end of the cruise, with aboratory calibrations for the pressure and temperature sensors by IFMK from March 1998 and December 2000, and a *in-situ* calibration for the conductivity cell.

Water samples for CTD salinity calibration were taken from near the bottom and near the surface. The samples were analysed on a Guildline AUTOSAL model 8400A (IFMK internal code AS4) using standard seawater batch P134 for instrumental calibration. As the laboratories onboard are not temperature stable, the estimated accuracy of individual bottle salinities after removing outliers is 0.005 on the ISS78 scale, slightly worse than usual.

All CTD casts are processed and calibrated according to the routines described by Müller (1999). The final accuracies of CTD data on 2 dbar processed and interpolated intervals are < 1dbar, < 2 mK, and < 0.003 in salinity for both systems.

5.3 Underway measurements

5.3.1 PC-Log
A PC-based programme package, PC-Log, is used to log consecutively the data streams from navigational units, the ship's meteorological sensors, the deep sea echosounder and from the thermosalinograph. Standard ouput format is binary, but ASCII transformation is an option that was used.

5.3.2 Navigational data
An Ashtech GG24 unit merges positionings from high rate GPS data with high precision GLONASS data. A problem occured with the date from GG24 which is offset into the past. This offset is constant (7168 d; 15-Nov-1980 indicated on 01-Jul-2000) and can be removed. The UTC time is ok.

Three dimensional GPS data from an Ashtech ADU2 are used to estimate heading, pitch and roll. A check of the September 1997 antenna calibration while in port between P261 and P262, gave no corrections.

Both, GG24 and ADU2 data are input for the standard vmADCP data acquisition and for the underway logging system PC-Log.

5.3.3 Meteorological data
The meteorological sensors have not been served since almost two years because the vessel was out of home port since January 1999 and no regular service is provided. Only the wind and the dry temperature sensors on the starboard side, and the water temperature sensor were working. The digital output is transferred to the PC-Log system.

5.3.4 Deep sea echosounder
A 12 kHz echosounder by ELAC provides depth information, both as standard graph and as digital output. The sound velocity converting travel times to sounding depths was 1500 m/s. The digital output was input to the PC-Log system.

5.3.5 Thermosalinograph
The digital output of the thermosalinograph raw data is transferred to the PC-Log system where it is converted to physical units for temperature and salinity. The accuracy is 0.05 K and 0.2 for temperature and salinity, respectively. Corrections with near surface CTD data while on station, improve the accuracy estimates to 0.02 K and 0.15 for temperature and salinity, respectively.

5.3.6 vmADCP
Two types of vessel monted ADCPs were used *en route*. First, a standard 150 kHz instrument made by RDI was mounted in the moon pool. Data from this ADCP were melted with the navigational data from the GG24 and the 3-dimensional ADU2, using RDI's data acquisition software DAS (RDI, 1990). Data were then processed along the CODAS version 3.1 programme package (Firing et al., 1995).

From 26 Jul, (Stat 242) on until the end of the cruise, a 75 kHz broadband ADCP replaced the standard ADCP for testing purposes. This instrument was designed for internal recording; therefore, the navigational data (GG24, ADU2) were recorded seperately on two different computers at 1 Hz rate. Merging of the acoustic and navigational data will be through the time and course information later. A first glance at the acoustic data show that the instrument may cover the upper 1000 m in this ocean area.

6. Additional remarks

We would like to thank Captain Bülow and his crew for the excellent advise and help during this cruise with its difficult ice conditions, often under fog. We also greatfully acknowledge logistic help by Johannes Briem from the MRI, Reykjavik. The research programme and in particular POSEIDON cruise 262 is supported by the *Deutsche Forschungsgemeinschaft*, Bonn, under grant SFB460.

7. References

Firing, E., Ranada, J. and P. Caldwell (1993): Processing ADCP Data with the CODAS Software System, Version 3.1. Intern. Rep. Univ. Hawaii & NODC.

Müller, T.J. (1999): Determination of salinity. *In: Grasshoff, K., K. Kremling and M Ehrhardt (editors), Methods of Seawater Analysis*, 3rd rev, Wiley-CH, 600 pp.

RD Instruments (1990): User's Manual for the RD Instruments Data Acquisition Software (DAS). RD Instruments, San Diego, CA, U.S.A.

8. Appendix

App. 1:

P262 station and sample log

Figure captions:

Fig. 1: Cruise track during P262; circles indicate CTD casts with station numbers; locations of bottom moorings of a shielded 150 kHz ADCP (SK), a long ranger 75 kHz ADCP (LR) and a 400 m thermistor cable (TK) are indicated. Two inverted echosounders with pressure sensors are moored close to SK and LR.

Fig. 2: Details of mooring sites

Fig. 3: Denmark Strait cross sill sections (west left) of (a) potential temperature, (b) salinity, (c) potential density, (d) current component normal to the section (positive to to 45°), tidal signal not removed.

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App. 1: Station and sample log

POSEIDON 262 station and sample log
Status: 21-MAR-2001

List of abbreviations:

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St      : Station no.
C       : CTD cast no., monotonically increasing during the cruise;
x          all casts to near bottom if not indicated else
Wd      : Sounding, 1500 m/s
Instr   : Type of instrumentation or mooring or equipment
x         1 mooring
x         2 NB1     : Neil Brown CTD, IFMK code NB1 with 12x2.5 l bottle rosette
x         2 SBE     : Sea-Bird 911 plus with 12x10 l GO bottle rosette
x         3 float
x         4 vADCP   : vessel mounted RDI ADCP, 150 KHz
x         4 vmLRADCP: vessel mounted RDI Longranger ADCP
x         4 PC-LOG  : on-line log of GPS date, time, position, pitch & roll;
x                     near-surface T, S; meteorological data
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Additional sensors on and samples taken from CTD/rosette:
S salt

Date Time year 2000 UTC MM DD hhmm	St	C	Latitude North DD MM.MM	Longitude East DDD MM.MM	Wd m	Inst. depth m	Inst. type	Samples / remarks
07 19 1400	-9	-9	64 10.00	-021 -55.00	-999	-999	4	Sail from Reykjavik
07 19 1400	-9	-9	64 40.00	-024 -55.00	-999	4	4	Test PC-log
07 20 0502	-9	-9	65 45.55	-025 -36.30	-999	4	4	Start vADCP and PC-log
07 20 0849	212	001	66 01.79	-026 -46.45	453	438	2	SBE, S; Benthos pinger test
07 20 1010	212	-9	66 01.98	-026 -46.10	459	350	2	SBE, Benthos Pinger test, no CTD-data stored
07 20 1625	-9	-9	-99 99.99	-999 -99.99	282	-999	4	GG24 failure
07 20 1632	-9	-9	65 57.43	-026 -28.92	283	-999	4	GG24 ok
07 20 1756	213	002	65 53.62	-026 -11.89	278	263	2	SBE, S
07 20 2020	214	003	65 46.83	-025 -41.39	226	211	2	SBE, S; Argos sender test
07 20 2257	215	004	65 40.09	-025 -09.79	78	68	2	SBE, S
07 20 2332	-9	-9	65 40.99	-025 -08.92	79	4	4	vADCP-section to NW started
07 21 0810	-9	-9	-99 99.99	-026 -30.00	-999	4	4	vADCP-data acquisition stopped
07 21 0921	-9	-9	65 59.86	-026 -39.02	-999	4	4	vADCP-data acquisition restarted
07 21 1113	216	005	66 01.73	-027 -04.72	624	613	2	SBE, S; end of vADCP-section
07 21 1427	217	006	65 56.46	-026 -12.27	284	269	2	SBE, S
07 21 1559	218	007	65 53.68	-026 -12.27	278	263	2	SBE, S
07 21 1720	219	008	65 50.24	-025 -56.68	219	204	2	SBE, S
07 21 1821	220	009	65 46.89	-025 -41.42	224	209	2	SBE, S
07 21 2012	221	010	65 43.45	-025 -25.31	172	157	2	SBE, S
07 21 2142	222	011	65 40.04	-025 -10.11	86	71	2	SBE, S
07 21 2235	-9	-9	65 40.27	-025 -10.83	99	4	4	vADCP-section to NW started
07 22 0814	-9	-9	66 04.43	-027 -00.53	644	600	4	LR-ADCP-test
07 22 0907	-9	-9	66 04.88	-026 -59.16	645	-999	4	End of LR-ADCP-test
07 22 0938	-9	-9	66 03.22	-026 -58.70	621	500	4	Acoustic releaser test
07 22 1009	-9	-9	66 03.70	-026 -58.61	629	500	4	Double acoustic releaser test
07 22 1038	-9	-9	66 04.34	-026 -58.48	635	-999	4	End of releaser tests
07 22 1220	-9	-9	-99 99.99	-999 -99.99	-999	-999	4	Turn back to SE due to ice
07 22 1303	223	012	66 04.92	-027 -04.46	668	653	2	SBE, S
07 22 1610	224	013	65 57.50	-026 -29.85	285	270	2	SBE, S
07 22 1754	225	014	65 53.72	-026 -11.98	277	252	2	SBE, S
07 22 2020	226	015	65 46.93	-025 -41.54	222	207	2	SBE, S
07 22 2306	227	016	65 40.09	-025 -09.97	81	66	2	SBE, S
07 22 2320	-9	-9	65 40.45	-025 -09.81	81	4	4	vADCP-section to NW started
07 23 0815	-9	-9	66 07.79	-027 -17.02	554	-999	4	Standby, waiting for drift ice
07 23 1010	-9	-9	66 07.67	-027 -18.20	539	4	4	Continuing sail course 300 deg
07 23 1052	-9	-9	66 09.19	-027 -25.09	495	-999	4	Standby, waiting for drift ice
07 23 1230	-9	-9	66 09.54	-027 -26.07	493	4	4	Continuing sail course 280 deg
07 23 1523	228	-9	66 11.56	-027 -35.49	495	494	1	V 423-01 shielded ADCP depl.
07 23 1806	229	-9	66 09.92	-027 -26.28	488	487	1	V 421-01 PIES06 deployment
07 23 1949	230	-9	66 06.48	-027 -10.52	625	624	1	V 422-01 PIES05 deployment
07 23 2034	231	017	66 05.02	-027 -04.38	658	643	2	SBE, S

Date Time year 2000 UTC MM DD hhmm	St	C	Latitude North DD MM.MM	Longitude East DDD MM.MM	Wd m	Inst. depth m	Inst. type	Samples / remarks
07 24 0356	-9	-9	65 40.00	-025 -10.02	83	4	4	vADCP-section to NW started
07 24 1412	232	-9	66 07.60	-027 -16.10	582	576	1	V 425-01 LR-ADCP deployment
07 24 1445	-9	-9	66 07.00	-027 -15.14	600	4	4	vADCP-section to SE started
07 24 2100	-9	-9	65 40.00	-025 -10.14	85	4	4	vADCP-section to NW started
07 25 1517	233	018	66 24.29	-028 -33.25	307	292	2	SBE, S
07 25 1805	234	019	66 17.58	-028 -02.03	353	338	2	SBE, S
07 25 2039	235	020	66 10.84	-027 -30.83	494	479	2	SBE, S
07 25 2147	236	021	66 08.81	-027 -21.05	494	479	2	SBE, S
07 25 2250	237	022	66 07.00	-027 -13.63	603	588	2	SBE, S
07 26 0010	238	023	66 04.93	-027 -04.88	665	650	2	SBE, S
07 26 0202	239	024	66 01.12	-026 -46.90	434	419	2	SBE, S
07 26 0335	240	025	65 57.52	-026 -30.21	289	274	2	SBE, S
07 26 1549	241	-9	66 35.60	-025 -26.30	666	30	1	V 424-01 Thermistor chain depl.
07 26 1613	242	026	66 35.17	-025 -27.25	664	649	2	SBE, S
07 26 1649	-9	-9	66 35.15	-025 -27.51	663	4	4	vADCP built out
07 26 2149	-9	-9	66 36.28	-025 -26.64	686	4	4	vmLR-ADCP started
07 26 2157	-9	-9	66 36.07	-025 -27.29	687	4	4	vmLR-ADCP section started
07 27 0105	243	027	66 44.99	-026 -16.15	607	592	2	SBE, S
07 27 0235	244	028	66 42.00	-025 -59.96	700	685	2	SBE, S
07 27 0405	245	029	66 37.94	-025 -42.63	803	788	2	SBE, S
07 27 0545	245	-9	66 35.51	-025 -26.71	667	0	1	V 424-01 top flag in sight
07 27 0646	245	-9	66 35.59	-025 -26.47	664	20	1	V 424-01 top buoy cut off
07 27 0746	246	030	66 32.53	-025 -04.75	259	244	2	SBE, S
07 27 1032	-9	-9	66 07.47	-025 -06.90	100	4	4	vmLR-ADCP checked
07 27 1045	-9	-9	66 07.30	-025 -06.87	100	4	4	vmLR-ADCP lowered again
07 27 1314	-9	-9	65 39.93	-025 -09.39	152	4	4	vmLR-ADCP-section started
07 27 1928	-9	-9	66 03.03	-027 -22.98	600	4	4	vmLR-ADCP-section started
07 28 0047	-9	-9	65 15.02	-026 -15.11	150	4	4	vmLR-ADCP-section started
07 28 1156	247	001	65 34.98	-030 -40.02	408	393	2	NB-1, S
07 28 1333	248	002	65 30.77	-030 -19.04	382	367	2	NB-1, S
07 28 1507	249	003	65 26.56	-029 -58.00	750	735	2	NB-1, S
07 28 1643	250	004	65 22.38	-029 -36.94	1214	1199	2	NB-1, S
07 28 1833	251	005	65 18.18	-029 -16.03	1474	1459	2	NB-1, S
07 28 2031	252	006	65 13.99	-028 -54.98	1375	1360	2	NB-1, S
07 28 2234	253	007	65 09.12	-028 -34.10	1237	1222	2	NB-1, S
07 29 0035	254	008	65 04.29	-028 -13.30	1036	1021	2	NB-1
07 29 0215	255	009	64 59.34	-027 -52.38	848	833	2	NB-1
07 29 0400	256	010	64 54.60	-027 -31.61	578	563	2	NB-1
07 29 0525	257	011	64 49.68	-027 -10.73	393	378	2	NB-1
07 29 0647	258	012	64 44.94	-026 -49.98	257	242	2	NB-1
07 29 0811	259	013	64 40.08	-026 -28.70	275	260	2	NB-1; last station on P262
07 29 0841	-9	-9	64 39.87	-026 -27.47	276	4	4	PC-Log switched off
07 29 0841	-9	-9	64 39.87	-026 -27.47	276	4	4	vmLR-ADCP off
07 30 0800	-9	-9	64 10.00	-021 -55.00	-999	-999	4	Reykjavik; end of P262

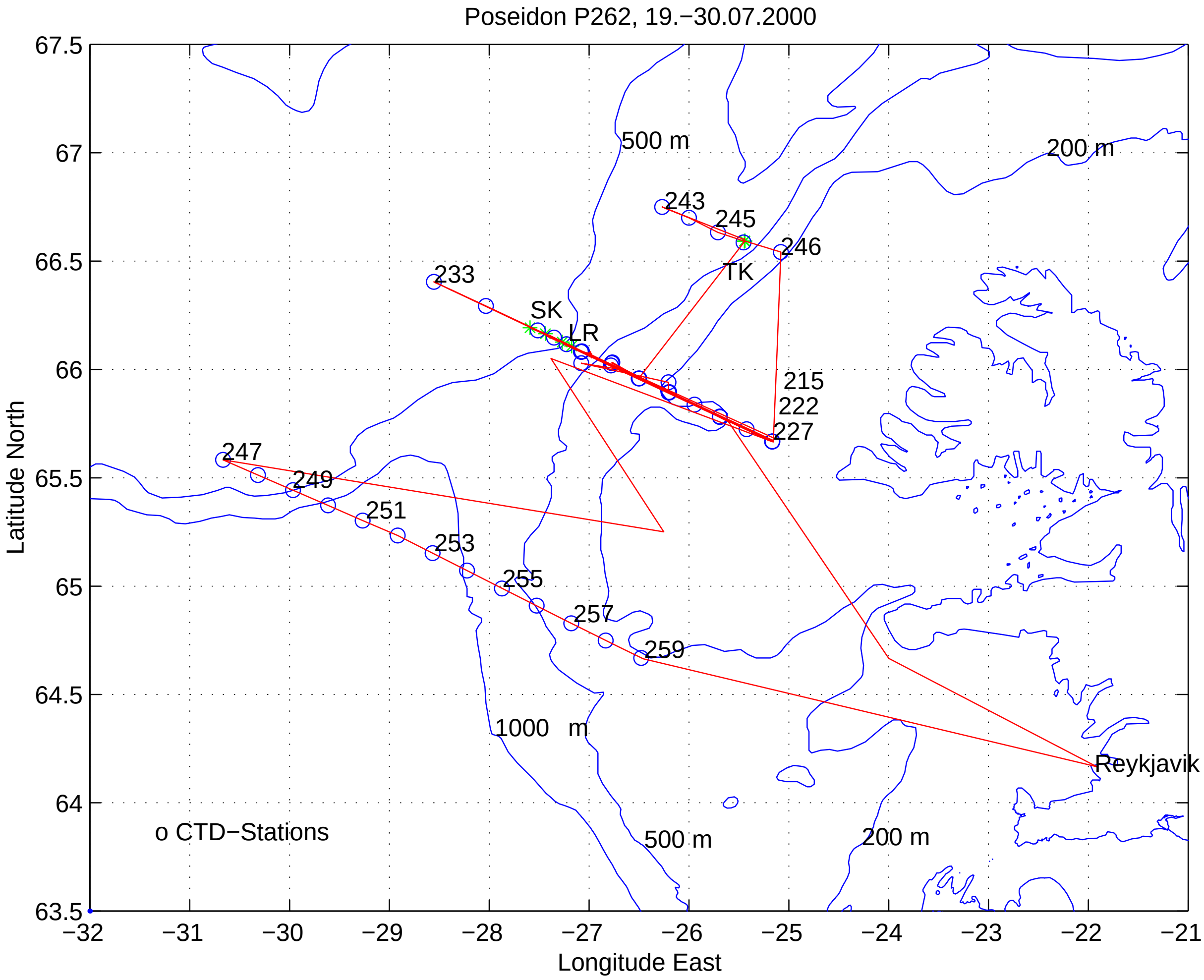
POSEIDON cruise 262 report

Figure captions:

Fig. 1: Cruise track during P262; circles indicate CTD casts with station numbers; locations of bottom moorings of a shielded 150 kHz ADCP (SK), a long ranger 75 kHz ADCP (LR) and a 400 m thermistor cable (TK) are indicated. Two inverted echosounders with pressure sensors are moored close to SK and LR.

Fig. 2: Details of mooring sites

Fig. 3: Denmark Strait cross sill sections (west is left) of (a) potential temperature, (b) salinity, (c) potential density, (d) current component normal to the section (positive to 45°), tidal signal not removed.



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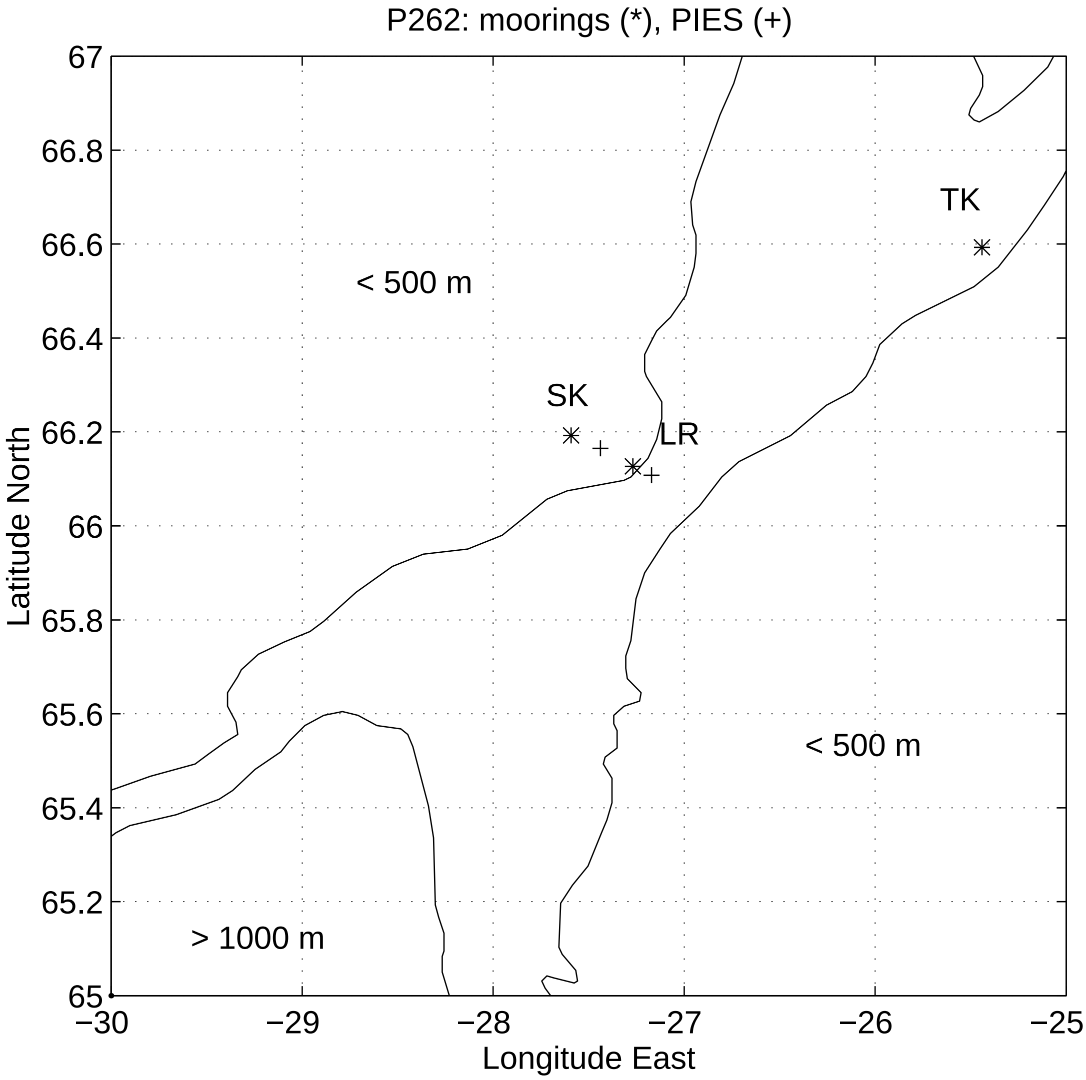

Fig. 2: Details of mooring sites

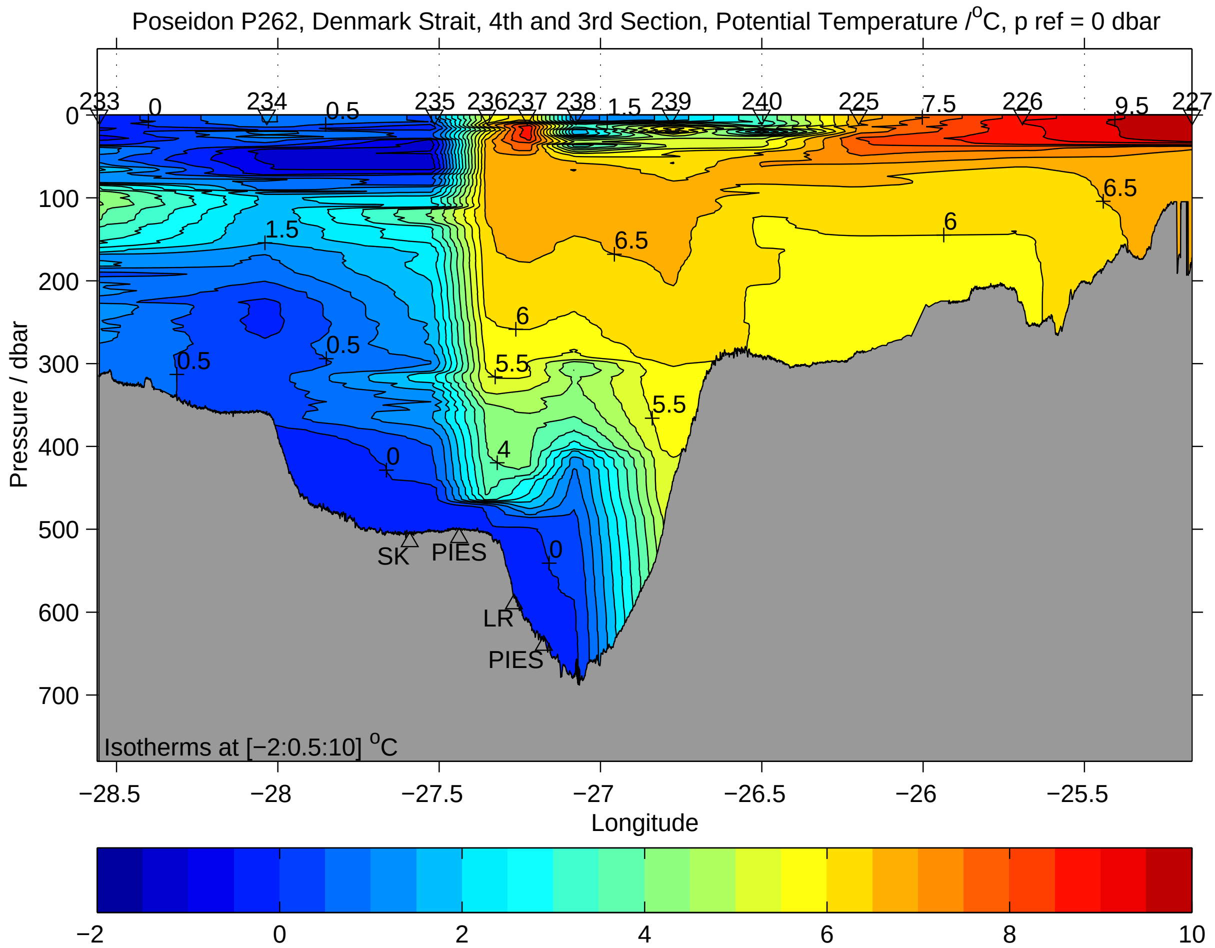

Fig. 3a: Denmark Strait cross sill sections (west is left) of potential temperature, (b) salinity, (c) potential density, (d) current component normal to the section (positive to to 45°), tidal signal not removed.

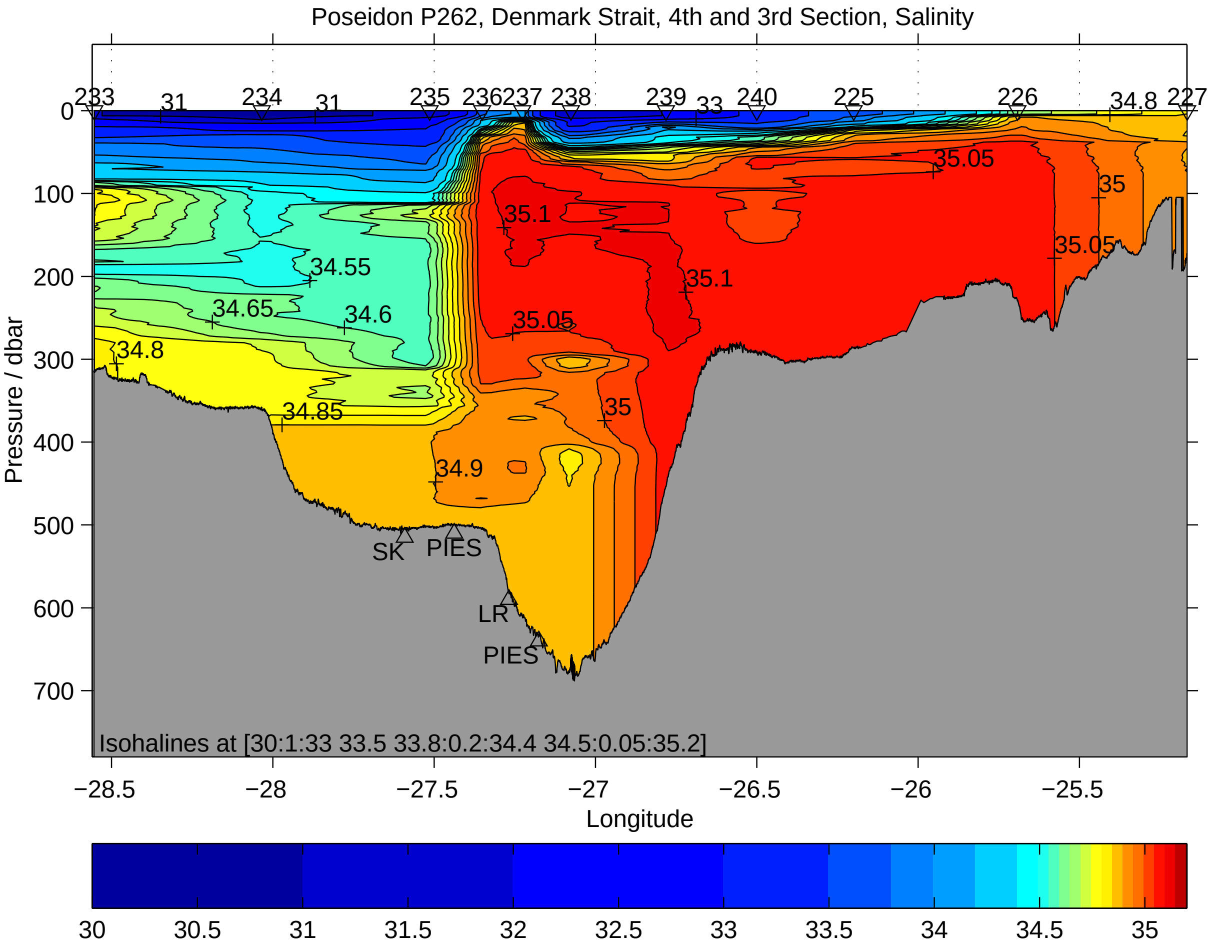

Fig. 3b: As Fig. 3a for salinity

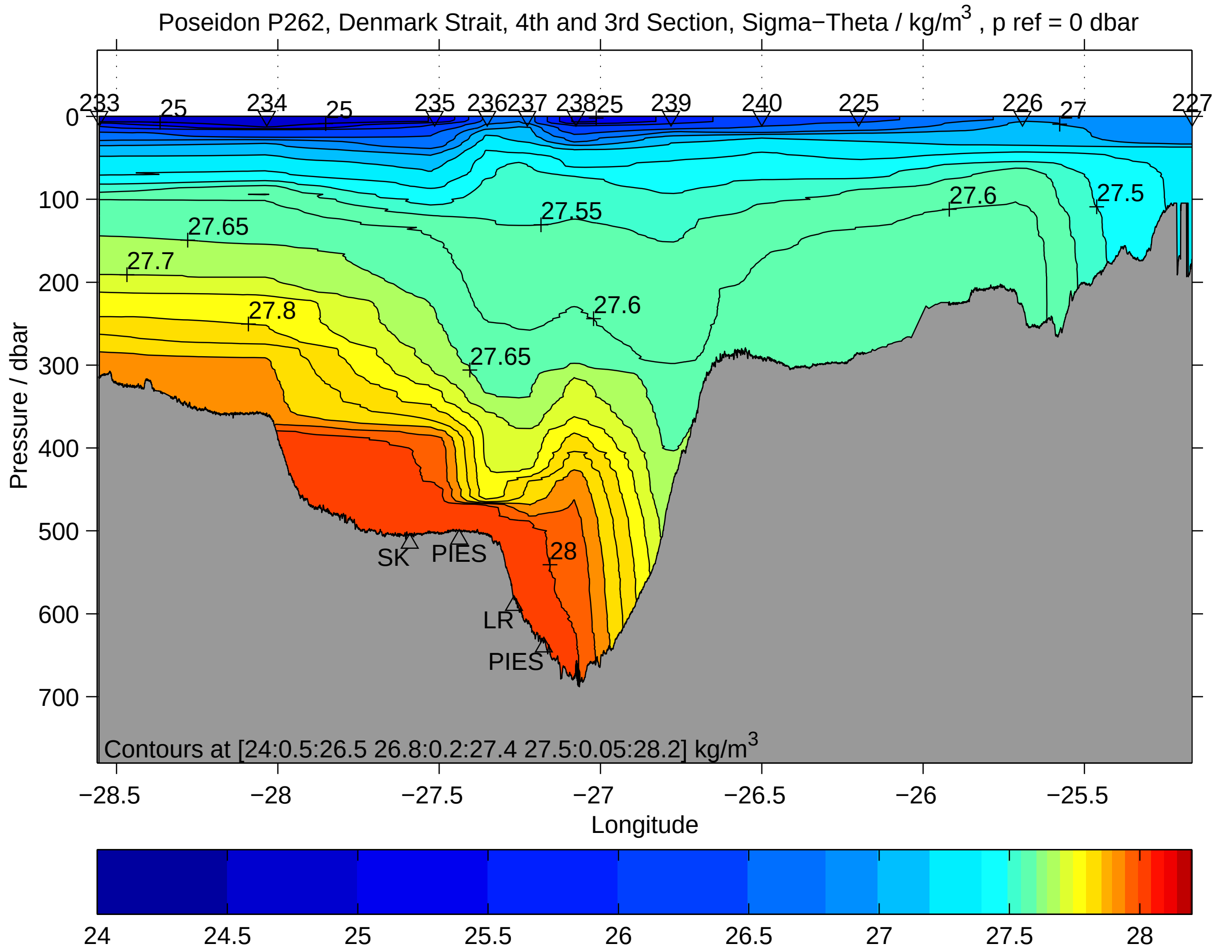

Fig. 3c: As Fig. 3a for potential density

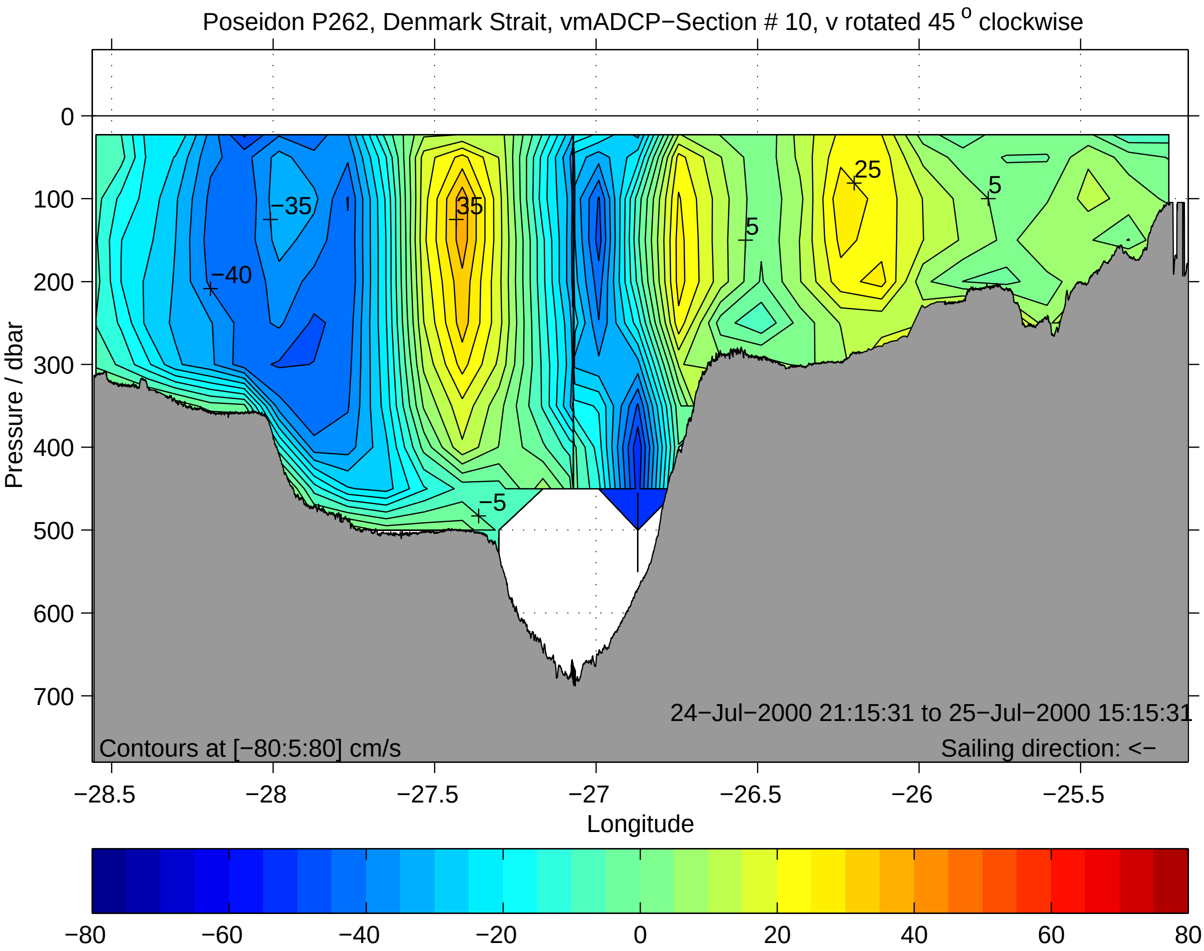

Fig. 3d: As Fig. 3a for current component normal to the section (positive to 45°), tidal signal not removed.