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Institut für Meereskunde
an der Universität Kiel

Institute of Marine Research
Kiel University
Germany

CRUISE REPORT

R.V. POSEIDON **Cruise No.:** 212/1-5

Dates of Cruise: 12.09.- 29.10.1995

Area of Research: Marine physics, chemistry and biology.

Port calls:		
	Lisbon/Portugal	11.09. - 14.09.
	Las Palmas/Gran Canaria/Spain	18.09. - 20.09.
	Las Palmas/Gran Canaria/Spain	29.09. - 30.09.
	Sta.Cruz/Tenerife/Spain	08.10. - 10.10.
	Funchal/Madeira/Portugal	18.10. - 20.10.
	Bremerhaven	29.10.

IfM Department: Marine Physics

Chief Scientists: Gerold Siedler (P212/1-3), Thomas J. Müller (P212/4-5)

Number of Scientists: 9 (212/1), 10 (212/2), 10 (212/3), 10 (P212/4), 6 (P212/5)

Projects: ESTOC (P212/1-3), JGOFS (P212/4), EUROFLOAT (P212/4-5)

Cruise Report

This Cruise Report consists of 19 pages including cover.

1. Scientific crew

(For abbreviations see chapter 8.)

Leg 212/1

Name	Function	Discipline	Institution
1.Siedler, G., Prof.Dr.	chief scientist	phys. oceanography	IfM
2.Busse, M.	student	phys. oceanography	IfM
3.Carlsen, D.	technician	phys. oceanography	IfM
4.Dugas, P.	engineer	engineering	FSI
5.Haag, C., Dipl.Oz.	scientist	phys. oceanography	IfM
6.Koy, U.	technician	phys. oceanography	IfM
7.Meyer, P.	engineer	phys. oceanography	IfM
8.Spiedt, A., Ms.	student	biol. oceanography	UB
9.Will, S.	technician	chem. oceanography	IfM

Leg 212/2

Name	Function	Discipline	Institution
1.Siedler, G., Prof.Dr.	chief scientist	phys. oceanography	IfM
2.Busse, M.	student	phys. oceanography	IfM
3.Escanez Escanez, J.	scientist	chem. oceanography	IEO
4.Garcia Ramos Hdez, C.	scientist	chem. oceanography	IEO
5.Haag, C., Dipl.Oz.	scientist	phys. oceanography	IfM
6.Koy, U.	technician	phys. oceanography	IfM
7.Lopez Laatzen, F.	scientist	phys. oceanography	IEO
8.Rodriguez Lopez, J.M.	scientist	chem. oceanography	IEO
9.Spiedt, A., Ms.	student	biol. oceanography	UB
10.Will, S.	technician	chem. oceanography	IfM

Leg 212/3

Name	Function	Discipline	Institution
1.Siedler, G., Prof.Dr.	chief scientist	phys. oceanography	IfM
2.Busse, M.	student	phys. oceanography	IfM
3.Delgado Aguiar, E., Ms.	scientist	chem. oceanography	ICCM
4.Gonzalez , M., Prof.Dr.	scientist	chem. oceanography	ULPGC
5.Haag, C., Dipl.Oz.	scientist	phys. oceanography	IfM
6.Koy, U.	technician	phys. oceanography	IfM
7.Neuer,S.,Dr., Ms.	scientist	biol. oceanography	UB
8.Rodriguez Benito, C., Ms.	scientist	biol. oceanography	ICCM
9.Santana Perez, M.R., Ms.	scientist	chem. oceanography	ICCM
10.Torres Padron, M.E., Ms.	scientist	chem. oceanography	ULPGC

Leg 212/4

Name	Function	Discipline	Institution
1.Müller, T.J., Dr.	chief scientist	phys. oceanography	IfM
2.Boebel, O., Dr.	scientist	phys. oceanography	IfM
3.Carlsen, D.	technician	phys. oceanography	IfM
4.Cantos, A., M.Sc.	scientist	phys. oceanography	AINCO
5.Lenz, B.	student	phys. oceanography	IfM
6.Link, R.	technician	phys. oceanography	IfM
7.Meyer, P., Dipl.-Ing.	technician	phys. oceanography	IfM
8.Petersen, J.	technician	chem. oceanography	IfM
9.Sanders, D., Dipl.-Chem.	scientist	chem. oceanography	IfM
10.Zervakis, V., Dr.	scientist	phys. oceanography	AINCO

Leg 212/5

Name	Function	Discipline	Institution
1.Müller, T.J., Dr.	chief scientist	phys. oceanography	IfM
2.Boebel, O., Dr.	scientist	phys. oceanography	IfM
3.Carlsen, D.	technician	phys. oceanography	IfM
4.Lenz, B.	student	phys. oceanography	IfM
5.Link, R.	technician	phys. oceanography	IfM
6.Meyer, P., Dipl.-Ing.	technician	phys. oceanography	IfM

2. Research programme

The cruise was dedicated to investigations in the framework of ESTOC (European Station for Time Series in the Ocean Canary Islands), of JGOFS (Joint Global Ocean Flux Studies) and of the European MAST 2 programme EUROFLOAT. The ESTOC station is providing long time series of physical, chemical and biological data in order to investigate the seasonal and interannual variability of the ocean. The data sets will also be supplementing WOCE and JGOFS data inventories.The position of the station is 60 nautical miles north of Gran Canaria. Monthly measurements and water sampling are performed, usually (but not always) with the research vessel TALIARTE of the ICCM. The regular station work is supposed to be taken over by other Spanish or German ships when they operate in the area.

The IfM has a current meter mooring and UB has a sediment trap mooring at the ESTOC position which are regularly reset. Yearly cruises with POSEIDON, in addition to satellite observations, aim at checking the representativeness of the time series data and improving the understanding of the processes in the larger region. The upper ocean in the region is characterized by the eastern North Atlantic subtropical gyre and the West African upwelling regime, and the atmosphere by the trade wind system and a considerable Saharan dust input from the atmosphere influencing the particle flux in this oceanic region. Another time series is being provided farther offshore by the mooring KIEL276 which has its position halfway between the Canary Islands and the Azores.

POSEIDON cruise 212/1-3 had the goal to study zonal changes of physical, chemical and biological properties in the ocean between the African continental slope and the meridian of La Palma at the latitude of ESTOC and also in the area northeast of that station where interaction with the upwelling regime is possible. Furthermore, the task of the TALIARTE to provide a set of regular station data was taken over for two observation periods. Also the current meter mooring at the ESTOC position was to be exchanged by a follow-up mooring.

Mooring KIEL276 at 33N, 22W, outside economic zones of coastal states, is in site since 1980 with 7 current meters between 250 m and 5200 m. Since 1993, it is continued as an open ocean JGOFS time series station with additional 4 sediment traps. This mooring was to be reset during P212/4.

The IfM part within the European MAST 2 programme EUROFLOAT is to study the large scale spreading of the Mediterranean water tongue at the 1000 m level in the nothern Canary Basin and ist interaction with the upper ocean Azores Front using RAFOS float technology. Three sound sources to track the floats were to be moored outside economic zones of coastal states, and 15 RAFOS floats to be dropped.

3. Narrative of cruise with technical details

The following narrative of the cruise is supplemented by the maps in chapter 6 and the lists of stations and activities provided in chapter 7.

POSEIDON arrived in Lisbon, Portugal, on 11.09.1995, with captain H.Andresen and chief scientist Dr.L. Mintrop. The task of the chief scientist was transferred on 12.09., 11.00 to Prof. Dr. G.Siedler who had already cooperated with the German Embassy in Lisbon on 11.09. in preparing a press conference and a reception for Portuguese officials and marine scientists which were held on 12.09. Personnel were exchanged, with the new scientific party arriving on 12.09., and laboratories were equipped on 13.09.

POSEIDON departed from Lisbon on 14.09., 08.00 and headed directly for Las Palmas, Gran Canaria, Spain. Some underway repair work was necessary on instrumentation that had already been used on earlier legs of the cruise. On 15.09. the CTD NB1 was lowered for a test at Station 786, and the ICTD 1349 (FSI) was similarly tested on stations 787 and 790. Five RAFOS floats of the EUROFLOAT program were launched on 5 positions en route between 15.09. and 17.09. (Stations 787 - 791). The ESTOC mooring no.367-1 which had been launched on 22.09.1994 by POSEIDON was recovered on 17.09. and replaced by the new mooring no.367-2 on 18.09. During the night from 17.-18.09. tests were performed on acoustic releases, a Plankton multinet and both CTDs. The ship arrived in Las Palmas on 18.09., 16.30.

Three members of the scientific party left on 18. and 19.09., respectively, and 4 Spanish scientists joined the ship on 19.09. and installed their chemical equipment while the ship was in port. The captain and the chief scientist paid a visit to the German consul in Las Palmas on 19.09. to inform him about the ongoing cruise and future Spanish-German marine programs in the Canary region and to provide material for a press release.

POSEIDON left Las Palmas on 29.09., 08.00, and headed to a position about 10 miles due north of the island of La Palma. There the work began on a section to a position 40 nautical miles farther north and from there eastward across the ESTOC position and through the Strait of Bocayna between the islands of Lanzarote and Fuerteventura to the African continental slope.

The ship then went to the northeastern corner of Lanzarote to begin a section across the Canary Current between this island and the African continental slope. This was supplemented by another section between Fuerteventura and the slope. POSEIDON then occupied a station to the south of Fuerteventura to test the ICTD. The leg ended with an XBT section between Fuerteventura and Gran Canaria, including one CTD cast (Station 839) in the middle.

POSEIDON arrived in Las Palmas again on 29.10., 08.30. Personnel was exchanged in port, and the Spanish scientific group from IEO Tenerife was replaced by 3 scientists from the ICCM Telde and 2 scientists from the University of Las Palmas. The ship departed on 30.10., 18.30.

After the passage to the ESTOC position work started with the launching of a drifting sediment trap, followed by CTD casts. The ship then went to a position to the southwest of Fuerteventura (Station 842), and section work began again on a track along the western side of Fueteventura and Lanzarote to the north (Station 846) and from there westward on a zonal course to a position north of ESTOC (Station 851from). After retrieving the drifting sediment trap for the first time, the trap was relaunched at the ESTOC position, and CTD measurements were performed at this location. A north-south section to Tenerife followed to Station 859, and a consecutive sections between Tenerife and Gran Canaria and from there to Fuerteventura (Station 867). The vessel then returned to the ESTOC position in order to recover the drifting sediment trap and to perform standard time series station operations again. After a passage to La Palma (Station 870) the final section of P212/3 led from there to the north coast of Tenerife.

POSEIDON arrived in the port of Sta.Cruz on 08.10., 09.00. The complete scientific group was exchanged, and the task of the chief scientist was transferred from Prof. Dr. G.Siedler to

Dr.T.J.Müller. A reception for the participants of the Second ESTOC Workshop, for scientists of the University of La Laguna and local officials was organized in collaboration with the German consulate in Sta.Cruz. Participants of the cruise joined the 2nd ESTOC workshop organized by the IEO in their facilities in Sta. Cruz.

POSEIDON sailed for leg P212/4 from Sta. Cruz on 10.10., 19.00 heading westward to the position SQ3 at 29°N, 22°W where a sound source mooring V370 (Stat. 875) for EUROFLOAT was launched on 12.10. CTD profiles were taken on this and all other mooring sites as well. Heading northward along 22°W, 4 floats were dropped (stations 877 to 880). An XBT section along 22°W began at 31°10'N to detect the Azores Front. On position SQ2 at 32°50'N, 022°W, the second sound source was placed in mooring V369 (Stat. 880), close to mooring site KIEL276. Mooring KIEL276-15 was replaced by KIEL276-16 (Stat. 882 and 883), and a special hydrocast (Stat. 881) and a deep CTD cast (Stat. 884) taken close to the mooring site. Heading northeast to cross the Azores Front, XBTs No. 11 to 26 and floats 5 to 8 (Stat. 884 to 887) were dropped, and a CTD cast (Stat. 887) occupied at 35°50'N, 20°05'W. Then heading southeast, the front was crossed a second time launching XBTs No. 28 (No. 27 failed) to 38 and the last two floats (Stat. 888 and 890). POSEIDON called port of Funchal on 18.10., 09.00.

The German Honory Consul in Funchal, Frau E. Gesche, had been invited to the ship for lunch, and a party of 6 visited her house next day evening for a cocktail. The chief scientist was contacted by a member of the marine biology group of the University of Madeira, Dipl-Biol. Kaufmann, and visited his laboratory.

The two guest scientists from AINCO and the two members of the IfM marine chemistry group left early morning 20.10. The 3rd. sound source was delivered onboard, and POSEIDON sailed on 20.10., 09.00. Almost on the way at position SQ1, the 3rd. sound source was placed in mooring V368 (Stat. 892) at 36°35'N, 016°40.5'W. The final CTD cast was taken close to the mooring (Stat. 893). Heading directly to Bremerhaven and supported by strong to stormy southerly winds in the Gulf of Biscay, POSEIDON was in port on 29.10. in the afternoon.

4. Scientific report and first results

4.1 Temperature-salinity distributions

The CTD/NB1 used for the basic observations carried a fluorescence sensor and an ADCP which both had a depth limit of 3000 m. The CTD casts were therefore done to a maximum depth of 3000 m where bottom depth allowed, except for those cases where shallower depths were required for specific experiments. The profiles usually covered the range of surface water, Central Water, Intermediate Water, and the Upper and Middle North Atlantic Deep Water including a major contribution from the Mediterranean. Large regional differences occurred particularly in the Mediterranean Water level, and in two cases high salinities indicated the existence of Mediterranean Water lenses (MEDDYs).

Changes in the structure of the profiles at the ESTOC position are most noticeable in the upper part of the Central Water, and the investigation of the cause for these variations will be an important part of the future analysis. Thermohaline staircases were quite common throughout the area and existed more frequently than had been expected, thus indicating an important role of double diffusive mixing in the Cental and Upper Deep Water.

The station pattern had been designed to allow for an analysis of several closed boxes. This will facilitate the study of property gradients and budgets in the area around the ESTOC position and in the neighbourhood. The three sections east of Lanzarote will probably provide a good estimate of the Canary Current structure and transports in that area. The CTD measurements which were done by the IFM group will, together with the water sampling performed jointly by the German and Spanish groups, provide the basic data set for all participating groups.groups

4.2 Oxygen-nutrients-chlorophylls

The research group from the ICCM has been involved in the last two years in the study of the seasonal variability of the physico-biochemical characteristics of the ESTOC site. In the POSEIDON cruise 202/1C an east-west section was studied in 1994. The longitudinal distribution of these varianbles was established. In the POSEIDON cruise 212/3 one of the main objectives of this group was to improve the knowledge of the spatial distribution of oxygen, nutrients and chlorophylls around ESTOC area. In order to intercalibrate their determinations with the methods used in other similar stations around the world, new systems and methodologies have been used for oxygen and chlorophyll A determination. For the three parameters studies of accuracy and reproducibility of the data have been performed. The influence of sampling variability is another goal to be studied by this group.

4.3 Carbon dioxide system

Atmospheric CO_2 has increased in the twentieth century due to the burning of fossil fuel and the producion of cement etc. The recent interest in the carbonic system of the ocean has resulted from the "greenhouse effect" of CO_2. The atmospheric CO_2 enters the oceans across the air-sea interface and then moves through the thermocline to the subsuperficial sea water.

The main objective of the work of the cabon dioxide group at the ULPGC was to study the spatial variability of the parameters which define the carbonate system along the water column for the first time in the region just north of the Canary Islands. The parameters to be determined are pH, total alkalinity and total CO_2. Values of pCO_2 will be determined theoretically and related to published pCO_2 values of the atmosphere in order to determine whether the Canary Islands region acts as source or a sink of CO_2. This study will be part of future work in order to study also the seasonal variability of carbon diosxide system related to hydropraphic conditions in the area (subtropical convergence, upwelling).

The pH, total alkalinity and total CO_2 measurements have been done "in situ" by using a potentiometric alkalinity system developed according to WOCE recommendations.

4.4 Dissolved and particle aluminium

Most chemical oceanographic studies have focused on the concentrations and variations of chemical constituents in location and depth in the water column. However, in open-ocean surface waters the concentrations of some constituents can be expected to vary on a range of time-scales in response to temporal changes in input, removal and cycling processes. Atmospheric inputs to the oceans are now recongnized as major components of the global cycle of trace metals which could affect the water column chemistry of trace metals in the sea.

The main objective of the trace metal group at the ULPGC was to study the spatial variability of dissolved aluminium and particulate matter (particulate aluminium) at different stations of POSEIDON cruise 212/3. The results will be compared with data of dust inputs collected with a high-volume sampler placed in Tafira (Las Palmas de Gran Canaria). This will allow to evaluate the behaviour of aluminium with respect to its solubility during and after atmospheric deposition to the ocean and its diffussion to the subsurface waters.

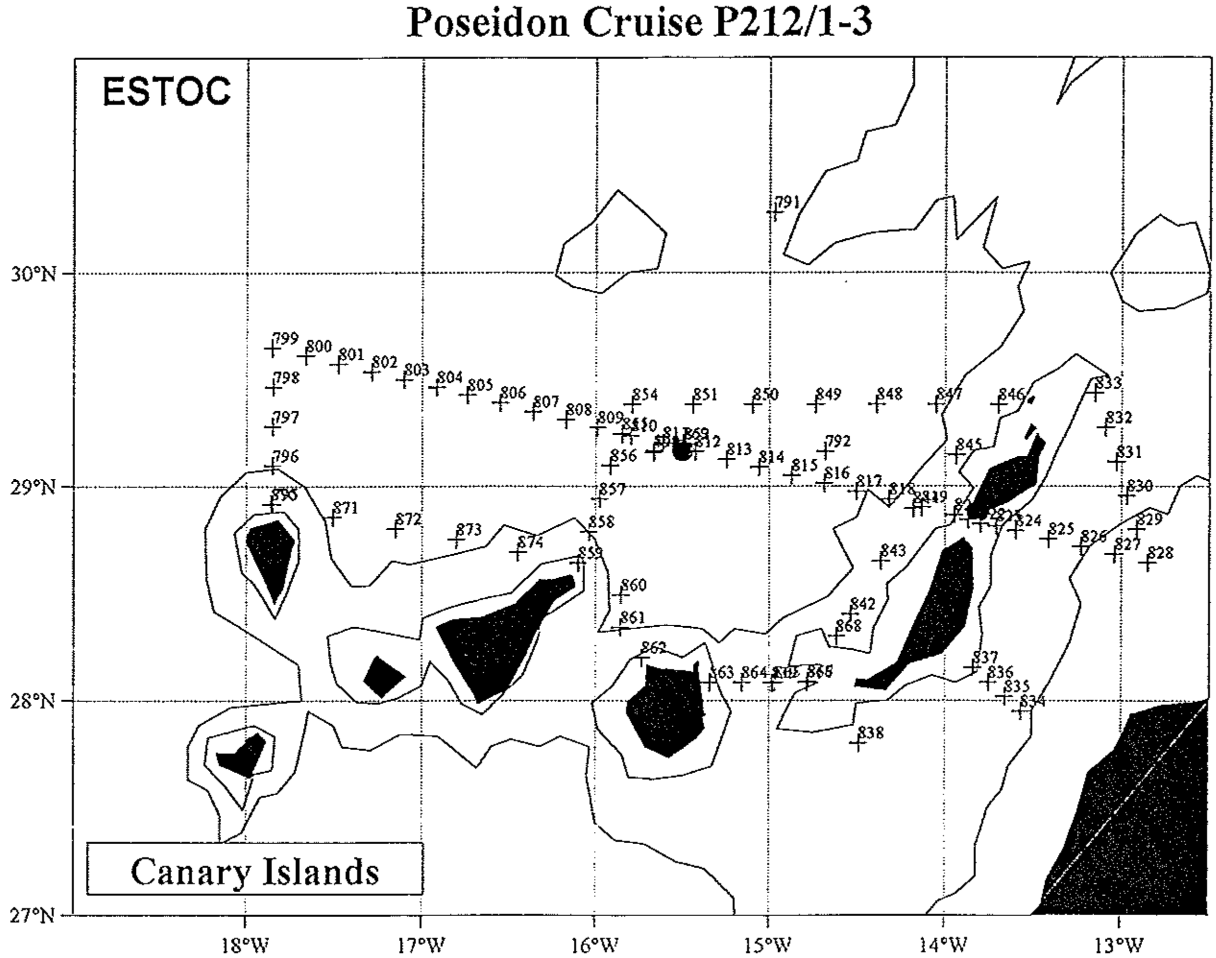
Sea water samples for dissolved aluminium and filters for particulate determinations have been frozen and will be analized in the laboratory onshore by electrochemical techniques.

5. Scientific equipment, instruments and moorings

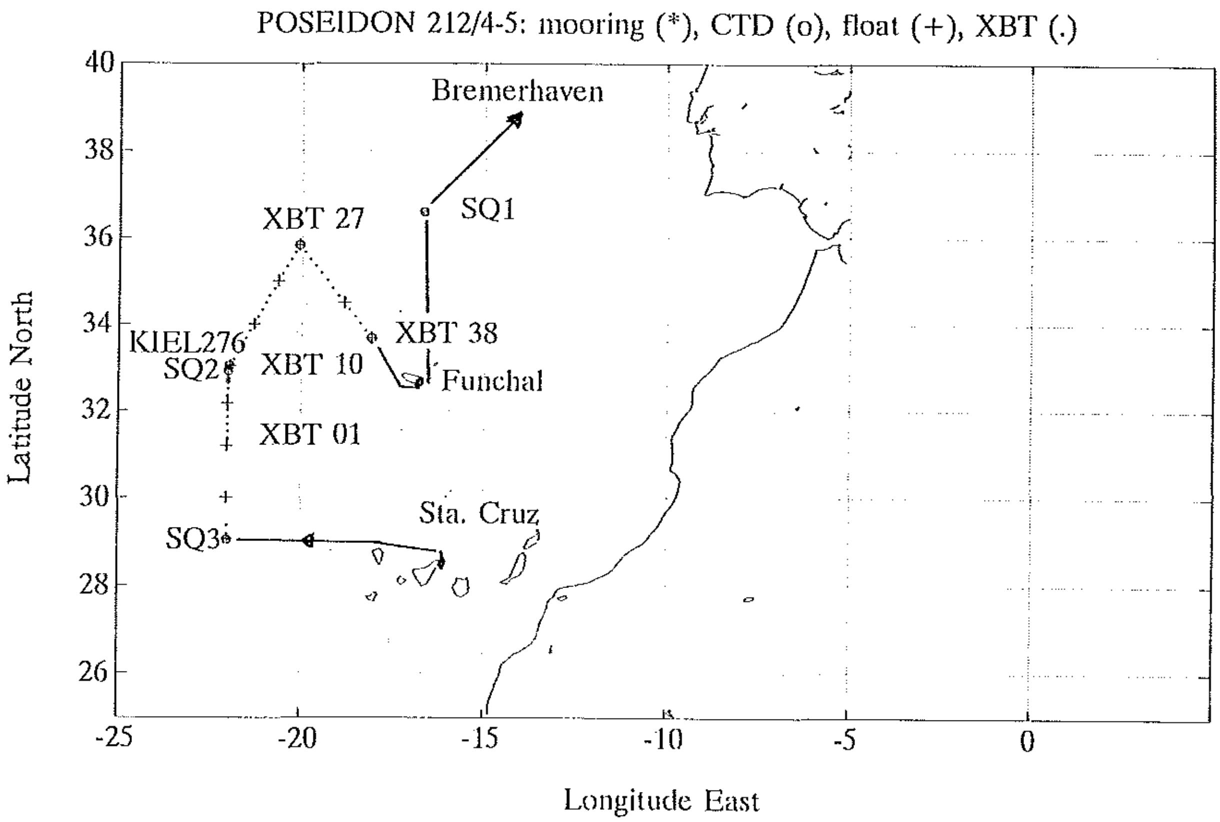
The following instruments, in addition to standard vessel equipment and to water analysis instrumentation onboard, were used:

- CTD NB Mk.3 (NB1) including LADCP (Lowered Acoustic Doppler Profiler, 3000 m maximum depth)
- CTD FSI (altenative of cable-operation and internal recording)
- Plankton single net and multinet
- XBT (VOS)
- Moored current meters and sediment traps
- RAFOS float technology with moored sound sources and floats
- Drifting sediment trap for collecting particles in the upper ocean

6. Maps with cruise tracks



Poseidon cruise 212/1-3, 11.09. - 08.10.1995, Lisbon - Las Palmas - Las Palmas - Sta. Cruz: CTD-stations in the Canary Islands area. The dot indicates the ESTOC time series station. The 1000 m and 3000 m depth contours are included.



Poseidon cruise 212/4-5, 10. - 29.10.1995, Sta. Cruz - Funchal - Bremerhaven: Mooring KIEL276 exchanged, moorings with sound sources are SQ1/V368, SQ2/V369, and SQ3/V370. Positions of launched floats and XBT drops are indicated.

7. Station lists

7.1 Station list POSEIDON 212/1-3

(For abbreviatons see Chapter 8.)

Lisbon - Las Palmas - Las Palmas - Sta.Cruz de Tenerife
12.09.-08.10.1995

STATION NO.	DATE 1995	TIME (UTC) start	stop	POSITION φ (°N)	λ (°W)	DEPTH corr. (m)	INSTRUMENTS
P212/1							
786	15.09.	08.08	11.50	35°23.2	11°37.3	4855	NB1 (test)
787	15.09.	20.00	22.00	34°15.9	12°20.7	4453	Float 1, ICTD-cable (test)
788	16.09.	05.00	05.01	33°20.5	12°57.9	4358	Float 2
789	16.09.	11.58	11.59	32°24.4	13°34.9	4261	Float 3
790	16.09.	19.00	19.02	31°25.0	14°13.5	3790	Float 4
		19.30	21.10				ICTD-intern
791	17.09.	05.00	05.02	30°16.8	14°58.3	3138	Float 5
792	17.09.	13.00	15.05	29°09.8	14°40.8	3513	Recovery Mooring 367-01
793	17.09.	15.02	2348	29°09.7	15°40.1	3615	Release test
							Multinet (test)
							NB1 (test)
							ICTD-intern (test)
							NB1 (test)
794	18.09.	05.57	08.32	29°09.5	15°40.2	3655	Launching Mooring 367-02
P212/2							
795	20.09.	21.48	23.35	28°55.0	17°51.0	1989	CTD/LADCP
796	21.09.	00.55	03.27	29°05.9	17°51.0	3472	CTD/LADCP
							Plankton net
797	21.09.	04.50	07.20	29°16.9	17°51.0	3966	CTD/LADCP
798	21.09.	08.50	12.02	29°28.0	17°50.9	4184	CTD/LADCP
799	21.09.	13.20	20.00	29°39.0	17°51.1	4306	CTD/LADCP, Cocco
							Plankton net
							CTD/LADCP
800	21.09.	21.30	00.55	29°36.8	17°39.9	4276	CTD/LADCP
							Multi net
801	22.09.	01.55	04.08	29°34.5	17°28.6	4216	CTD/LADCP
802	22.09.	05.14	07.39	29°32.3	17°17.4	4092	CTD/LADCP
	. .	07.42	08.10	29°31.9	17°16.0	4091	Plankton net
803	22.09.	09.11	11.21	29°30.0	17°06.2	4004	CTD/LADCP
	. .	11.25	12.25	29°30.4	17°04.9	3982	Multinet
804	22.09.	13.50	16.13	29°27.8	16°54.8	4017	CTD/LADCP
805	22.09.	17.15	20.17	29°25.7	16°44.3	3815	CTD/LADCP
	. .	20.24	20.40	29°25.9	16°42.5	3806	

STATION NO.	DATE 1995	TIME (UTC) start	stop	POSITION φ (°N)	λ (°W)	DEPTH corr. (m)	INSTRUMENTS
806	22.09.	21.44	00.05	29°23.4	16°32.9	3780	CTD/LADCP, Cocco
807	23.09.	01.00	03.10	29°21.0	16°21.6	3708	CTD/LADCP
808	23.09.	05.00	07.23	29°18.8	16°10.2	3672	CTD/LADCP
	. .	07.32	08.39	29°18.5	16°09.8	3678	Multinet
	. .	08.46	09.05	29°14.6	16°10.2	3681	Plankton net
809	23.09.	10.15	12.22	29°16.6	15°59.2	3653	CTD/LADCP
810	23.09.	13.35	15.40	29°14.2	15°48.0	3650	CTD/LADCP
	. .	16.19	19.00	29°14.3	15°48.1	3644	ICTD-cable
811	23.09.	20.10	22.08	29°12.1	15°36.9	3632	CTD/LADCP
	. .	22.20	22.37	29°12.4	15°36.1	3641	Plankton net
812	23.09.	23.45	01.50	29°09.8	15°25.8	3622	CTD/LADCP
	. .	02.02	04.17	29°09.8	15°25.6	3623	ICTD-cable (ESTOC position)
813	24.09.	05.26	07.38	29°07.6	15°14.7	3523	CTD/LADCP
	. .	07.48	08.45	29°08.1	15°13.9	3525	Multinet ICTD-cable
814	24.09.	10.04	12.32	29°05.4	15°03.5	3596	CTD/LADCP, Cocco
	. .	14.48	13.04	29°05.2	15°03.3	3601	Plankton net
815	24.09.	14.21	16.50	29°03.1	14°52.3	3574	CTD/LADCP
	. .	17.08	19.28	29°03.1	14°52.1	3571	ICTD-cable
816	24.09.	20.50	23.35	29°00.9	14°41.3	3390	CTD/LADCP
817	25.09.	01.25	03.48	28°58.5	14°30.0	3064	CTD/LADCP
	. .	03.53	04.10	28°58.9	14°30.2	3071	Plankton net
818	.25. 09	06.17	08.40	28°56.4	14°18.8	3081	CTD/LADCP
	. .	08.50	09.55	28°56.7	14°18.7	3068	Multinet
819	25.09.	11.32	13.15	28°54.1	14°07.7	2184	TD/LADCP, Cocco
	. .	13.37	15.07	28°54.1	14°07.6	2189	ICTD-cable
820	25.09.	16.39	17.55	28°51.9	13°56.6	1204	CTD/LADCP
	. .	18.00	18.20	28°51.8	13°56.5	1195	Plankton net
821	25.09.	19.25	19.55	28°50.6	13°52.0	83	CTD/LADCP (Strait of Bocayna)
822	25.09.	20.30	20.45	28°49.4	13°47.7	25	disbanded because of depth too shallow
823	25.09.	21.27	22.21	28°48.9	13°42.2	853	CTD/LADCP
	25.09.	23.09	.	28°48.6	13°42.0	883	XBT 01
	. .	23.21	.	28°48.6	13°40.1	1001	XBT 02
	. .	23.37	.	28°48.0	13°38.1	1083	XBT 03
824	25.09.	23.55	00.53	28°47.6	13°35.5	1135	CTD/LADCP
	. .	01.00	01.55	28°47.5	13°35.4	1137	Multinet
	. .	02.05	.	28°47.5	13°35.4	1142	XBT 04
	. .	02.31	.	28°46.8	13°31.7	1242	XBT 05
	. .	02.55	.	28°46.1	13°27.9	1297	XBT 06
825	26.09.	03.22	05.28	28°45.2	13°24.3	1335	CTD/LADCP
	. .	05.04	05.29	28°45.4	13°24.4	1334	Plankton net
	. .	05.32	06.26	28°45.3	13°24.8	1334	ICTD-cable
	. .	06.50	.	28°44.9	13°22.1	1348	XBT 07
	. .	06.59	.	28°44.6	13°20.8	1240	XBT 08
	. .	07.25	.	28°43.9	13°17.2	1231	XBT 09
826	26.09.	08.03	09.10	28°43.1	13°13.2	1080	CTD/LADCP

STATION NO.	DATE 1995	TIME (UTC) start	stop	POSITION φ (°N)	λ (°W)	DEPTH corr. (m)	INSTRUMENTS
	26.09.	08.03	09.10	28°43.1	13°13.2	1080	CTD/LADCP
	. .	09.21	.	28°43.0	13°13.1	1064	XBT 10
	. .	09.47	.	28°42.6	13°09.7	1036	XBT 11
	. .	10.12	.	28°41.6	13°06.0	838	XBT 12
827	26.09.	10.41	11.40	28°40.9	13°02.1	708	CTD/LADCP
	. .	12.25	.	28°40.9	13°02.0	712	XBT 13
	. .	12.51	.	28°40.1	12°58.4	553	XBT 14
	. .	13.16	.	28°39.4	12°54.5	397	XBT 15
828	26.09.	13.42	14.11	28°38.6	12°51.0	308	CTD/LADCP
	. .	14.17	14.39	28°38.7	12°50.9	315	Multinet
	. .	14.45	15.10	28°38.8	12°51.0	318	Plankton net
	. .	15.29	.	28°38.6	12°51.0	309	XBT 16
	. .	15.58	.	28°41.7	12°52.2	459	XBT 17
	. .	16.25	18	28°44.9	12°53.4	718	XBT 18
829	26.09.	16.55	19.55	28°48.0	12°54.6	877	CTD/LADCP, Cocco
		19.00	19.01	28°48.2	12°54.5	888	XBT 19
		19.25	.	28°51.3	12°55.7	1005	XBT 20
		19.56	.	28°54.3	12°56.8	1009	XBT 21
830	26.09.	20.25	22.11	28°57.4	12°58.0	1251	CTD/LADCP
	. .	22.20	.	28°57.6	12°58.0	1256	XBT 22
	. .	22.45	.	29°00.8	12°59.2	1351	XBT 23
	26.09.	23.16	.	29°03.9	13°00.4	1451	XBT 24
831	26.09.	23.45	00.53	29°06.9	13°01.6	1435	CTD/LADCP
	. .	01.00	01.55	29°07.2	13°01.2	1444	Multinet
	. .	02.03	02.20	29°07.7	13°01.2	1455	Plankton net
	. .	03.29	.	29°13.4	13°03.9	1483	XBT 28
832	27.09.	04.00	06.10	29°16.5	13°05.2	1483	CTD/LADCP
	. .	06.16	.	29°16.5	13°05.2	1489	XBT 29
	. .	06.41	.	29°19.8	13°06.3	1455	XBT 30
	. .	07.05	07.10	29°22.4	13°07.4	1473	XBT 31
833	27.09.	07.42	09.07	29°26.2	13°08.7	1443	CTD/LADCP
	. .	09.14	10.25	29°26.4	13°08.6	1446	Multinet
	. .	10.28	10.50	29°27.0	13°08.9	1447	Plankton net
	. .	11.07	11.12	29°26.0	13°08.7	1446	XBT 32
834	27.09.	20.36	21.40	27°57.0	13°33.6	1208	CTD/LADCP
	. .	21.47	23.05	27°57.0	13°33.2	1194	Multinet
	..	23.10	23.30	27°57.5	13°33.7	1217	Plankton net
	. .	23.39	23.44	27°57.0	13°33.7	1217	XBT 33
	. .	23.53	.	27°58.4	13°35.5	1303	XBT 34
	. .	00.07	.	27°50.6	13°37.4	1366	XBT 35
835	28.09.	00.27	01.35	28°01.1	13°39.1	1406	CTD/ADCP
	. .	01.50	.	28°01.1	13°39.2	1422	XBT 36
	. .	02.06	.	28°02.5	13°41.1	1449	XBT 37
	. .	02.19	03.	28°03.7	13°42.9	1556	XBT 38
836	28.09.	02.47	03.59	28°05.1	13°44.8	1562	CTD/ADCP
	. .	04.05	.	28°05.2	13°44.8	1563	XBT 39
	. .	04.19	.	28°06.6	13°46.6	1404	XBT 40
	. .	04.32	.	28°07.9	13°48.3	966	XBT 41
837	28.09.	04.54	ß5.38	28°09.2	13°50.2	756	CTD/ADCP

STATION NO.	DATE 1995	TIME (UTC) start	stop	POSITION φ (°N)	λ (°W)	DEPTH corr. (m)	INSTRUMENTS
	. .	05.43	06.34	28°09.0	13°50.4	692	Multinet
	. .	06.45	07.03	28°09.3	13°50.2	698	Plankton net
	. .	07.08	.	28°09.2	13°50.2	750	XBT 42
838	28.09.	13.13	14.19	27°48.1	14°29.2	2069	ICTD-intern
	. .	15.17	15.26	27°48.9	14°28.9	2061	ICTD-intern
	. .	16.55	17.42	27°49.0	14°29.1	2063	ICTD-intern
	. .	22.00	.	28°05.0	14°36.0	107	XBT 43
	. .	22.22	.	28°05.0	14°39.5	586	XBT44
	. .	22.36	.	28°05.0	14°43.0	966	XBT 45
	. .	22.55	.	28°05.0	14°46.4	900	XBT 46
	. .	23.06	.	28°05.0	14°49.8	1334	XBT 47
	29.09.	23.36	.	28°05.0	14°53.4	1434	XBT 48
839	29.09.	00.20	01.33	28°04.9	14°59.0	1567	CTD/LADCP
	. .	01.58	.	28°05.0	14°58.0	1564	XBT 49
	. .	02.38	.	28°05.1	15°01.0	1601	XBT 50
	. .	03.24	.	28°05.5	15°04.5	1696	XBT 51
	. .	04.11	.	28°05.0	15°08.0	1770	XBT 52
	. .	05.01	.	28°10.0	15°11.4	1484	XBT 53
	. .	05.53	.	28°05.0	15°14.8	1318	XBT 54
	. .	06.31	.	28°05.0	15°18.3	1121	XBT 55
	. .	07.07	.	28°05.0	15°20.5	699	XBT 56
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840	01.10.	02.00	02.32	29°09.9	15°40.0	3513	CTD/ADCP
	. .	02.40	04.15	29°10.0	15°40.0	3513	ICTD
	. .	04.26	07.07	29°10.0	15°40.1	3513	CTD
841	01.10.	08.20	08.39	29°10.0	15°40.1	3638	Launching drifting sediment trap no.7848
842	01.10.	16.55	18.32	28°24.0	14°32.0	2010	CTD/ADCP
	. .	19.34	19.55	28°24.0	14°31.9	3014	CTD (30 m)
843	01.10.	22.00	23.38	28°39.0	14°21.5	1905	CTD/ADCP
844	02.10.	01.45	03.23	20°53.9	14°10.5	2289	CTD/ADCP
845	02.10.	05.50	07.34	29°09.0	13°55.9	2089	CTD/ADCP
846	02.10.	09.46	11.20	29°23.0	13°41.5	1908	CTD/ADCP
	. .	12.41	13.15	29°23.0	13°41.6	1872	CTD
847	02.10.	15.18	17.37	29°23.0	14°02.8	3305	CTD/ADCP
848	02.10.	19.44	22.16	29°23.0	14°23.1	3442	CTD/ADCP
849	03.10.	00.25	02.28	29°22.9	14°44.4	3538	CTD/ADCP
850	03.10.	04.30	06.45	29°23.0	15°05.8	3587	CTD/ADCP
851	03.10.	08.55	11.38	29°23.0	15°26.6	3619	CTD/ADCP
	. .	12.15	12.40	29°23.0	15°26.6	3618	CTD/ADCP (500m)
852	03.10.	15.15	15.35	29°08.7	15°48.5	3638	Retrieval drifting sediment trap
853	03.10.	17.30	17.46	29°12.0	15°30.0	3622	Launching drifting sediment trap
	. .	18.00	18.12	29°11.8	15°29.5	3622	CTD/LADCP (30m)
	. .	19.45	22.02	29°11.9	15°29.5	3623	CTD/LADCP
854	04.10.	00.20	02.10	29°23.0	15°47.5	3641	CTD/LADCP

STATION NO.	DATE 1995	TIME (UTC) start	stop	POSITION φ (°N)	λ (°W)	DEPTH corr. (m)	INSTRUMENTS
855	04.10.	03.48	06.05	29°14.7	15°51.2	3644	CTD/LADCP
856	04.10.	07.20	10.28	29°.05.7	15°54.8	3638	CTD/LADCP
857	04.10.	11.47	13.57	28°56.5	15°58.5	3611	CTD/LADCP
858	04.10.	15.15	17.27	28°47.2	16°02.3	3381	CTD/LADCP
859	04.10.	18.45	19.30	28°38.4	16°06.0	466	CTD/LADCP
860	04.10.	20.54	23.30	28°29.5	15°58.4	2929	CTD/LADCP
861	05.10.	05.20	07.54	28°20.4	15°51.4	3272	CTD/LADCP
862	05.10.	09.25	10.12	28°12.0	15°44.1	463	CTD/LADCP
863	05.10.	13.10	13.50	28°05.0	15°20.5	543	CTD/LADCP
864	05.10.	15.05	16.34	28°05.0	15°09.3	1690	CTD/LADCP
865	05.10.	18.00	19.27	28°05.0	14°58.0	1569	CTD/LADCP
866	05.10.	20.40	21.55	28°05.0	14°47.0	988	CTD/LADCP
867	06.10.	00.10	01.30	28°17.9	14°37.1	1414	CTD/LADCP
868	06.10.	08.08	09.20	28°58.0	15°40.2	3624	Retrieval drifting sediment trap
869	06.10.	11.55	12.10	29°11.9	15°30.0	3625	CTD/LADCP (200m)
	. .	12.48	15.18	29°12.0	15°30.0	3624	CTD/LADCP
	. .	16.24	16.55	29°12.0	15°29.7	3623	CTD/LADCP (300m)
870							
871							
872							
873							
874							

7.2 Samples in addition to salinity

Station no.	Oxygen	Nutrients	Chlorophyll	Zooplankton
795	XXX	XXX		
796	XXX	XXX	XXX	XXX
797	XXX	XXX		
798	XXX	XXX		
799	XXX	XXX	XXX	XXX
800	XXX	XXX		
801	XXX	XXX		
802	XXX	XXX	XXX	XXX
803	XXX	XXX		
804	XXX	XXX		
805	XXX	XXX	XXX	XXX
806	XXX	XXX		
807	XXX	XXX		
808	XXX	XXX	XXX	XXX
809	XXX	XXX		
810	XXX	XXX		
811	XXX	XXX	XXX	XXX
812	XXX	XXX		
813	XXX	XXX		
814	XXX	XXX	XXX	XXX
815	XXX	XXX		
816	XXX	XXX		
817	XXX	XXX	XXX	XXX
818	XXX	XXX		
819	XXX	XXX		
820	XXX	XXX	XXX	XXX
821	b. opened			
822	too shallow			
823	XXX	XXX		
824	XXX	XXX		
825	XXX	XXX	XXX	XXX
826	XXX	XXX		
827	XXX	XXX		
828	XXX	XXX		XXX
829	XXX	XXX		
830	XXX	XXX		
831	XXX	XXX		XXX
832	XXX	XXX	XXX	
833	XXX	XXX	XXX	XXX
834	XXX	XXX	XXX	XXX
835	XXX	XXX		
836	XXX	XXX		
837	XXX	XXX	XXX	XXX
838	not samples			
839	XXX	XXX		

7.2 Samples in addition to salinity (continued)

Station no.	Oxygen	TCO_2, TALK, pH	Dissolved metals (Al)	Particulate matter (Al)	Nutrients	Chlorophyll
840	XXX	XXX	XXX		XXX	XXX
841						
842	XXX	XXX	XXX	XXX	XXX	XXX
843	XXX	XXX	XXX	XXX	XXX	XXX
844	XXX	XXX	XXX		XXX	XXX
845	XXX	XXX	XXX		XXX	XXX
846	XXX	XXX	XXX	XXX	XXX	XXX
847					XXX	XXX
848	XXX	XXX	XXX		XXX	XXX
849	XXX				XXX	XXX
850	XXX	XXX	XXX	XXX	XXX	XXX
851					XXX	XXX
852						
853	XXX	XXX	XXX	XXX	XXX	XXX
854	XXX	XXX	XXX	XXX	XXX	XXX
855	XXX	XXX	XXX		XXX	XXX
856					XXX	XXX
857	XXX	XXX	XXX	XXX	XXX	XXX
858					XXX	XXX
859	XXX	XXX			XXX	XXX
860	XXX	XXX			XXX	XXX
861	XXX	XXX			XXX	XXX
862					XXX	XXX
863					XXX	XXX
864	XXX	XXX	XXX	XXX	XXX	XXX
865	XXX	XXX			XXX	XXX
866	XXX	XXX	XXX	XXX	XXX	XXX
867	XXX	XXX			XXX	XXX
868						
869	XXX	XXX		XXX	XXX	XXX
870	XXX	XXX			XXX	XXX
871	XXX	XXX			XXX	XXX
872	XXX	XXX			XXX	XXX
873					XXX	XXX
874	XXX	XXX			XXX	XXX

7.3 Station list POSEIDON 212/4-5
(For abbreviations see Chapter 8)

Sta. Cruz de Tenerife - Funchal/Madeira - Bremerhaven
10.10. - 29.10.1995

STATION NO.	DATE 1995	TIME (UTC) start	TIME (UTC) stop	POSITION φ (°N)	POSITION λ (°W)	DEPTH corr. (m)	INSTRUMENTS
	10.10.	19.00					Sail Sta. Cruz
875	12.10.	08.15	10.44	29°00.05	22°00.97	4860	Launch mooring V370 (sound source)
876		11.26	14.36	29°02.07	22°01.11	4929	CTD
		14.41		29°03.43	22°00.94	4917	Float 01
		16.34		29°22.04	22°00.81	4930	XBT 00, test launch
877		20.24		29°59.99	22°00.71	5043	Float 02
878	13.10	03.54		31°10.00	22°00.50	5070	Float 03
		05.06		31°20.00	22°00.41	5058	XBT 01
		06.08		31°30.00	22°00.28	5074	XBT 02
		07.18		31°40.00	22°00.25	5085	XBT 03
		08.24		31°50.00	22°00.25	5083	XBT 04
		09.32		32°00.00	22°00.26	5099	XBT 05
879		10.45	11.53	32°10.00	22°00.22	5132	Check acoustic release
		11.56		32°09.77	22°01.22	5149	Float 04
		11.59		32°09.82	22°01.32	5154	XBT 06
		13.08		32°20.01	22°00.70	5180	XBT 07
		14.17		32°30.00	22°00.20	5222	XBT 08
		15.23		32°39.98	21°59.96	5210	XBT 09
880		15.44	18.11	32°43.12	21°58.81	5270	Launch mooring V369 (sound source)
		19.51		32°50.00	22°00.12	5256	XBT 10
881		20.28	00.20	32°55.00	22°00.01	5266	2 x hydrocast, GoFlo, (1000m, 2000m)
882	14.10.	08.35	10.55	32°57.41	22°01.30	5272	Recover mooring 276-15 (current meters, sediment traps)
883	15.10.	08.20	12.00	33°00.14	21°57.85	5270	Launch mooring V276-16 (current meters, sediment traps)
884		12.25	15.21	33°02.35	21°57.89	5271	CTD
		15.26		33°02.26	21°56.89	5275	Float 05
		16.24		33°10.00	21°51.32	5302	XBT 11
		17.33		33°20.00	21°44.75	5317	XBT 12
		18.43		33°30.00	21°38.40	5324	XBT 13
		19.55		33°40.00	21°31.44	5336	XBT 14
		21.04		33°50.00	21°24.68	5276	XBT 15
		22.15		34°00.00	21°17.92	5266	XBT 16
885		22.24		34°00.33	21°17.78	5252	Float 06
		23.42		34°10.00	21°11.55	5237	XBT 17

STATION NO.	DATE 1995	TIME (UTC) start	stop	POSITION φ (°N)	λ (°W)	DEPTH corr. (m)	INSTRUMENTS
	16.10	00.56		34°20.05	21°05.01	5214	XBT 18
		02.11		34°30.00	20°58.17	5244	XBT 19
		03.27		34°40.02	20°53.51	5194	XBT 20
		04.38		34°50.00	20°45.00	5235	XBT 21
		05.55		35°00.00	20°38.46	5024	XBT 22
886		06.00		35°00.33	20°38.36	5129	Float 07
		07.22		35°10.00	20°31.52	5235	XBT 23
		08.39		35°20.00	20°25.11	5222	XBT 24
		09.53		35°30.00	20°18.33	5263	XBT 25
		11.06		35°40.00	20°11.49	5135	XBT 26
887		12.26	15.35	35°49.97	20°04.84	5366	CTD
		15.38		35°50.05	20°04.62	5364	Float 08
		17.05		35°40.00	19°55.63	5327	XBT 27, bad
		18.20		35°30.00	19°46.66	5298	XBT 28
		19.40		35°20.00	19°37.30	5271	XBT 29
		21.00		35°10.00	19°27.94	5150	XBT 30
		22.21		35°00.00	19°18.71	5123	XBT 31
		23.41		34°50.00	19°09.61	5086	XBT 32
	17.10	01.05		34°40.00	19°00.24	5018	XBT 33, failed
		01.14		34°39.05	18°59.28	5033	XBT 34, internally no. 33
		02.29		34°30.00	18°50.58	5047	XBT 35
888		02.37		34°29.42	18°50.21	5046	Float 09
		03.54		34°20.00	18°41.61	4976	XBT 36
		05.20		34°10.00	18°32.70	4842	XBT 37
		06.37		34°00.00	18°23.46	4668	XBT 38
		08.18		33°50.00	18°14.28	4394	XBT 39
889		10.00	12.39	33°40.09	18°04.97	3907	CTD
890		12.48		33°39.99	18°05.55	3931	Float 10
	18.10.	09.00					Funchal
<u>P212/5</u>							
	20.10.	09.00					Sail Funchal
891		19.00	19.36	33°53.60	16°33.50		Check acoustic release
892	21.10.	14.12	16.25	36°33.14	16°39.24	4180	Launch mooring V368 (sound source)
893		16.50	19.15	36°35.09	16°39.13	4117	CTD
	29.10.						Bremerhaven

8 Acronyms

AINCO	AINCO-Interocean, Madrid, Spain
CTD	Conductivity - Temperature - Depth sonde
ESTOC	European Station for Time Series in the Ocean, Canary Islands Estación Europea de Series Oceanicas de Canarias
FSI	Falmouth Scientific Inc.
ICCM	Instituto Canario de Ciencias de Mar, Telde, Gran Canaria
ICTD	Integrated CTD (FSI)
IEO	Instituto Español de Oceanografia, Santa Cruz de Tenerife y Madrid
IFM	Institut für Meereskunde an der Universität Kiel
JGOFS	Joint Ocean Global Flux Study
LADCP	Lowered Acoustic Doppler Profiler
MEDDY	Mediterranean Water Eddy
NB	Neil Brown
RAFOS	Inverted SOFAR system (Sound Fixing And Ranging)
UB	Fachbereich Geowissenschaften der Universität Bremen
ULPCG	University of Las Palmas, Gran Canaria
VOS	Voluntary Observing System
WOCE	World Ocean Circulation Experiment
XBT	Expendable Bathythermograph