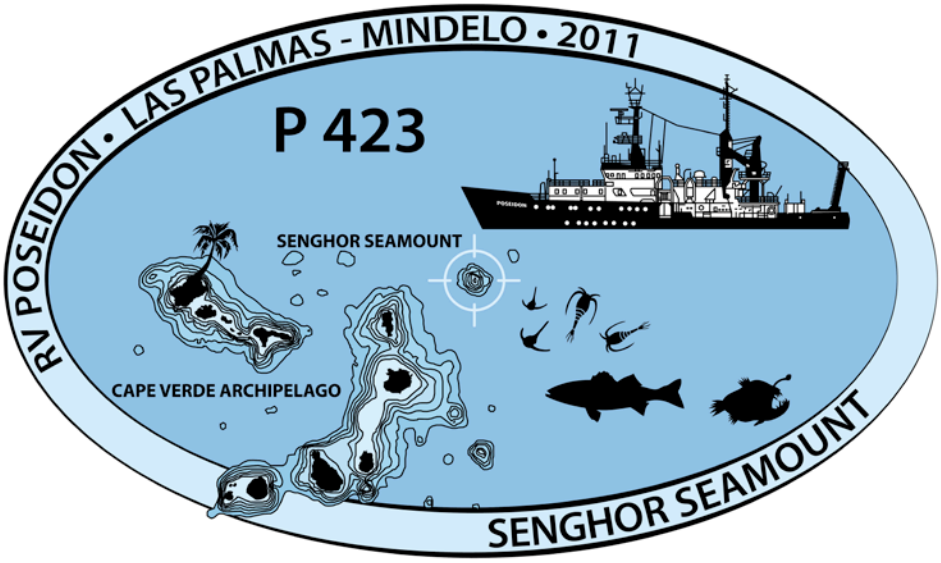
Poseidon 423

Cruise Report



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Cruise Report R.V. *Poseidon*, cruise POS 423

Las Palmas 08.12.11 - Mindelo 18.12.11

Principal scientist: Dr. Bernd Christiansen, Universität Hamburg

Scope of the cruise

Seamounts are commonly considered as biological "hotspots", because they often harbour enhanced biomass, biodiversity and a high number of endemic species. However, recently it has become evident that this statement should not be generalised. Several seamounts are located in the Cape Verde region. The shallower of them are important fishing areas, but information on their ecology is still sparse.

A first multidisciplinary cruise addressing ecological questions was conducted on RV Meteor in 2009. The cruise included geological, physical, biogeochemical and biological studies mainly at Senghor Seamount. R.V. *Poseidon* cruise 423 aimed to complement these study, addressing in particular the following questions:

- Is the POC export flux enhanced at and around Senghor Seamount?
- What is the role of the picoplankton in POC export flux?
- Is a significant portion of the primary production channelled through the micro- and small mesozooplankton?
- How much does the mesozooplankton affect the POC export?

In order to answer these questions, the scientific programme of the cruise included:
- Description of the hydrographic setting at and around Senghor Seamount (water masses, flow field)
- Assessment of the amount of particulate organic material in the water column, and its composition in terms of carbon and nitrogen (POC/NOC)
- Assessment of the small-scale distribution and trophic structure of zooplankton with special reference to the micro- and small mesozooplankton
- Assessment of phytoplankton with special reference to the picoplankton
- Assessment of dissolved, particle-bound and zooplankton-associated Thorium-234 (^{234}Th)

Cruise narratives

The cruise was planned to start in Las Palmas de Gran Canaria on 1 Dec 2011. After leakages in the waste water and fuel tank system had been detected, the departure was postponed, initially until 4 Dec. However, a leaky weld seam caused a further delay. Only on 8 Dec, *Poseidon* finally left the port of Gran Canaria and headed southwards towards the target research area. During the transit, all equipment was assembled and tested. On 10 Dec, a first NEMO float (Fig. 1) was deployed for BSH at 22°45.8'N and 020°31.3'W. In the afternoon of

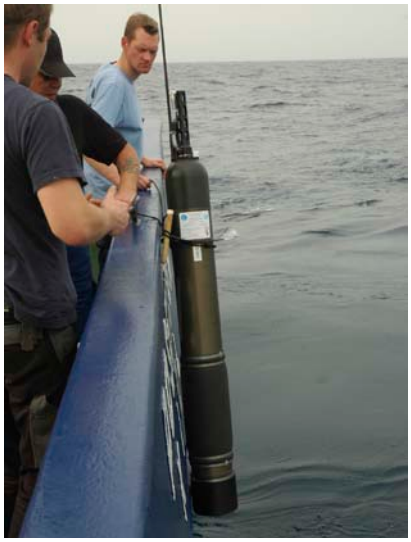

Fig. 1: Launch of a NEMO float. Photo: B. Christiansen

the same day, an emergency call from a sailing boat caused us to leave our track and head westwards to the boat's position, which was about 120 nm away, but after some hours we were released from the case and sailed then directly to the next float deployment position at 21°04.4'N/021°32.6'W. The float was successfully deployed in the evening of 10 Dec, and a last float followed at 19°15.7'N/021°52.1'W on the next day.

Our oceanic reference station 50 nm north of Senghor Seamount was reached in the evening of 11 Dec, and the scientific work started with two CTD/rosette casts for measuring temperature, salinity, oxygen and Chl a, and for sampling water for the analysis of organic

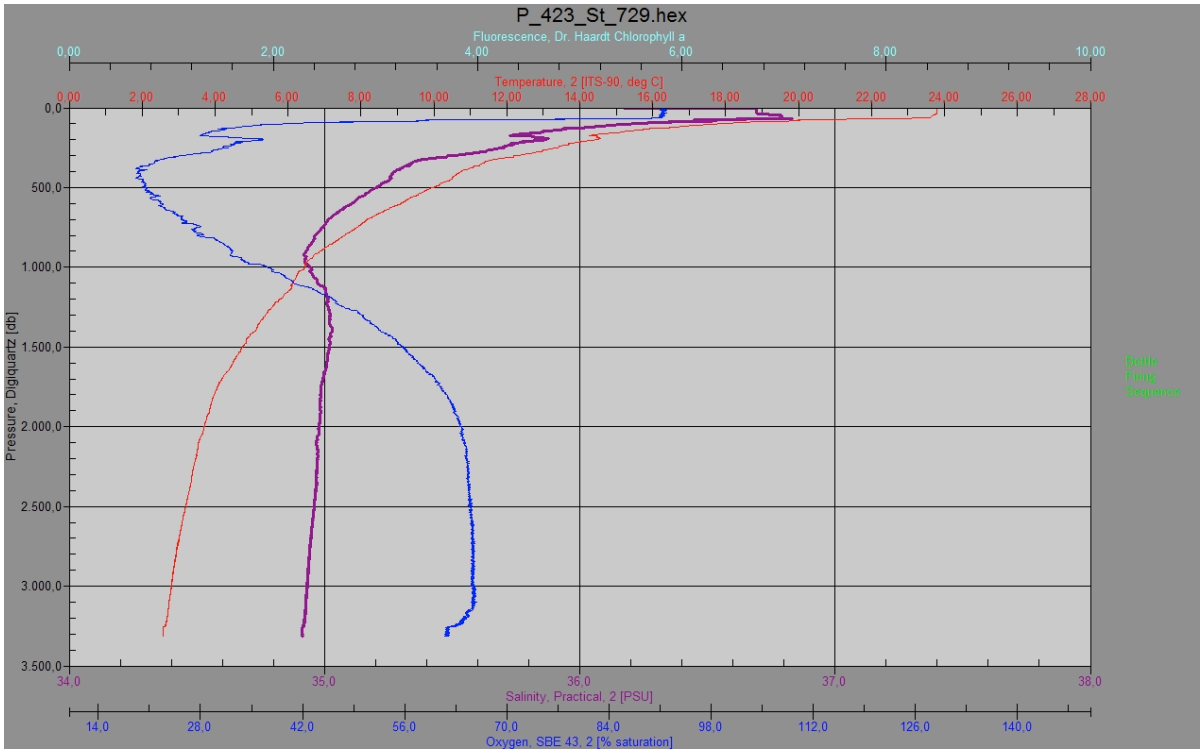

Fig. 2: Plot of temperature, salinity and oxgen against depth; reference station

particles and phytoplankton. The data show a thin, warm surface layer and a strong temperature and salinity gradient below 50 m (Fig. 2). Oxygen also decreased strongly below 50 m; the minimum occurred at 400 m with a saturation of 16 %.

A 1m²-MOCNESS haul for macrozooplankton, covering the water layers down to 1000 m, followed, and then two multinet casts down to 1000 m for micro- and mesozooplankton. An IKMT (Fig. 3) haul to a maximum depth of 500 m, particularly aiming at small epi- and mesopelagic fish, completed the sampling programme at this location.

Fig. 3: Deployment of the IKMT. Photo: Rui Vieira

In the morning of 12 Dec, *Poseidon* left the reference station and sailed to our tidal cycle station about midway between reference and seamount. Here, over 14 h, water column properties from surface to the bottom at 3300 m were measured with a CTD, and near-bottom water samples were taken in regular intervals.

Work at Senghor Seamount started on 13 Dec with two multinet hauls at the northern slope. We proceeded then to the summit plateau, where two CTD casts were taken, each followed by the deployment of a temperature chain mooring. A first combined longline/trap mooring was also deployed on the summit at a water depth of 100 m, after which further multinet and CTD hauls were made. The longline/traps were retrieved successfully after 5 h soak time. The catch was poor with only two moray eels (*Muraena helena*). During the whole day, a Cape Verdian fishing boat was observed in the vicinity. Further MOCNESS and multinet hauls followed in the evening. During the second half of the night, station worked had to be abandoned due to repair work at the hull of the ship, and commenced again in the morning of 14 Dec with two CTD casts at the southern middle slope.

A second longline/trap set was deployed at a water depth of 450 m at the southern upper slope and recovered in the afternoon. The catch was again poor, yielding a few *Helicolenus dactylopterus dactylopterus*. In the meantime, several hauls with multinet and CTD were performed.

The sampling programme during the night included MOCNESS and IKMT hauls, multinet and CTD casts. The IKMT collected large numbers of salps, together with small fish (mainly

Fig. 4: IKMT catch with salps, fish and shrimps. Photo: R. Vieira

myctophids), shrimps and euphausids (Fig. 4). In the morning of 15 Dec, the longline/trap set was deployed at 1000 m depth. CTD and multinet casts followed, before the mooring was recovered in the afternoon. The catch included several specimens of as yet unidentified synaphobranchid eels and one specimen tentatively identified as *Coloconger cadenati*.

Meanwhile the sea condition had deteriorated, and we decided to cancel the deployment of plankton nets for the time being, and instead to complement the hydrographic data with a series of CTD casts in the southern part of the seamount. In the morning of 16 Dec, we tried to locate and recover the two temperature chain moorings. Despite an intensive search in the deployment area, the moorings were not found, and we proceeded with further CTD casts.

Only in the evening of 16 Dec the conditions were favourable again to allow for the deployment of the MOCNESS. Two hauls were performed across the eastern middle slope and the summit, respectively, of the seamount, followed by a CTD cast and two multinet hauls. Station work was finished on 17 Dec at 10:00 h.

Poseidon then sailed to Mindelo, where she arrived in the morning of 18 Dec.

Appendix 1: List of participants

Name	First name	Affiliation	Task
Christiansen	Bernd	UHH/IHF	PI
Denda	Anneke	UHH/IHF	zooplankton
Freitas	Rui	UniCV	fish
Kaufmann	Manfred	UMA, CIMAR	phytoplankton
Reichert	Felician	URO	biogeochemistry
Schuster	Anne	URO	biogeochemistry
Springer	Barbara	SAMS	biogeochemistry
Stefanowitsch	Benjamin	UHH/IHF	zooplankton
Turnewitsch	Robert	SAMS	biogeochemistry
Vieira	Rui	UALG	fish
Wehrmann	Helge	UHH/IHF	zooplankton

UHH/IHF	Universität Hamburg, Institut für Hydrobiologie und Fischereiwissenschaft
UMA	University of Madeira Marine Biology Station of Funchal
CIMAR	Centre of Marine and Environmental Research, Porto
UniCV	Universidade de Cabo Verde
UALG	Universidade do Algarve, Centre of Marine Sciences
URO	Universität Rostock, Institut für Aquatische Ökologie – Meeresbiologie

Appendix 2: List of stations. Times and positions correspond to commencement of stations

Station	Date	Time UTC	Position Lat	Position Lon	Depth m	Gear
POS423/725	12/10/11	9:00	22° 45.81' N	20° 31.25' W	4171.0	Nemo Float
POS423/726	12/10/11	23:47	21° 4.43' N	21° 32.61' W	4260.6	Nemo Float
POS423/727	12/11/11	10:36	19° 15.75' N	21° 52.06' W	3516.7	Nemo Float
POS423/728	12/11/11	17:53	18° 5.00' N	22° 0.00' W	3294.4	CTD/rosette
POS423/729	12/11/11	19:02	18° 5.03' N	22° 0.02' W	3294.6	CTD/rosette
POS423/730	12/11/11	22:20	18° 5.16' N	21° 59.96' W	3294.5	MOCNESS
POS423/730	12/12/11	0:27	18° 8.76' N	21° 58.27' W	3291.0	MOCNESS
POS423/731	12/12/11	1:29	18° 5.00' N	22° 0.00' W	3298.6	Multinet
POS423/732	12/12/11	1:53	18° 4.99' N	21° 59.98' W	3294.7	Multinet
POS423/733	12/12/11	3:00	18° 5.00' N	22° 0.03' W	3295.2	Multinet
POS423/734	12/12/11	3:30	18° 4.99' N	22° 0.02' W	3294.4	Multinet
POS423/735	12/12/11	5:00	18° 5.01' N	22° 0.00' W	3294.1	IKMT
POS423/736	12/12/11	9:48	17° 37.24' N	21° 49.77' W	3346.8	CTD/rosette
POS423/737	12/13/11	4:15	17° 14.49' N	21° 57.54' W	1097.1	Multinet
POS423/738	12/13/11	4:43	17° 14.49' N	21° 57.52' W	1107.2	Multinet
POS423/739	12/13/11	6:37	17° 12.39' N	21° 57.80' W	0.6	CTD/rosette
POS423/740	12/13/11	7:55	17° 12.40' N	21° 57.82' W	133.6	Mooring
POS423/741	12/13/11	8:52	17° 10.30' N	21° 56.58' W	161.4	CTD/rosette
POS423/742	12/13/11	9:35	17° 10.28' N	21° 56.59' W	169.4	Mooring
POS423/743	12/13/11	10:28	17° 11.52' N	21° 57.19' W	101.5	Longline/traps deployment
POS423/744	12/13/11	11:35	17° 14.49' N	21° 57.55' W	1059.1	CTD/rosette
POS423/745	12/13/11	12:29	17° 14.48' N	21° 57.56' W	1078.3	Multinet
POS423/746	12/13/11	12:59	17° 14.46' N	21° 57.54' W	1069.1	Multinet
POS423/747	12/13/11	14:08	17° 14.52' N	21° 57.51' W	1100.6	Multinet
POS423/748	12/13/11	15:17	17° 12.64' N	21° 57.42' W	276.5	CTD/rosette
POS423/749	12/13/11	15:57	17° 12.18' N	21° 57.08' W	233.1	Longline/traps recovery
POS423/750	12/13/11	18:11	17° 7.54' N	21° 55.42' W	1541.8	MOCNESS
POS423/750	12/13/11	19:13	17° 8.77' N	21° 54.13' W	1295.1	MOCNESS
POS423/751	12/13/11	21:10	17° 11.61' N	21° 54.78' W	1040.3	Multinet
POS423/752	12/13/11	21:43	17° 11.62' N	21° 54.79' W	1030.0	Multinet
POS423/753	12/14/11	7:00	17° 6.86' N	21° 56.15' W	1652.5	CTD/rosette
POS423/754	12/14/11	8:45	17° 6.86' N	21° 56.16' W	1687.0	CTD/rosette
POS423/755	12/14/11	10:03	17° 9.42' N	21° 56.16' W	439.6	Longline/traps deployment
POS423/756	12/14/11	11:42	17° 11.61' N	21° 54.78' W	1031.6	Multinet
POS423/757	12/14/11	12:03	17° 11.62' N	21° 54.79' W	1030.8	Multinet
POS423/758	12/14/11	13:52	17° 12.63' N	21° 57.48' W	232.6	Multinet
POS423/759	12/14/11	13:59	17° 12.63' N	21° 57.49' W	229.2	CTD/rosette
POS423/760	12/14/11	14:27	17° 12.67' N	21° 57.48' W	260.7	Longline/traps recovery

Station	Date	Time UTC	Position Lat	Position Lon	Depth m	Gear
POS423/761	12/14/11	17:58	17° 7.50' N	21° 55.53' W	1535.9	MOCNESS
POS423/761	12/14/11	20:22	17° 10.65' N	21° 52.15' W	1970.1	MOCNESS
POS423/762	12/14/11	21:34	17° 7.96' N	21° 55.90' W	1304.8	IKMT
POS423/763	12/15/11	0:06	17° 8.01' N	21° 55.84' W	1291.0	IKMT
POS423/764	12/15/11	2:31	17° 11.07' N	22° 0.78' W	0.0	Multinet
POS423/765	12/15/11	2:51	17° 11.07' N	22° 0.77' W	1063.0	Multinet
POS423/766	12/15/11	5:20	17° 6.10' N	21° 56.80' W	0.0	Multinet
POS423/767	12/15/11	5:50	17° 6.12' N	21° 56.00' W	0.0	Multinet
POS423/768	12/15/11	7:27	17° 4.99' N	21° 55.81' W	2723.9	CTD/rosette
POS423/769	12/15/11	9:57	17° 4.99' N	21° 55.77' W	0.0	CTD/rosette
POS423/770	12/15/11	11:25	17° 8.83' N	21° 55.30' W	986.8	Longline/traps deployment
POS423/771	12/15/11	13:25	17° 11.03' N	22° 0.77' W	1079.3	CTD/rosette
POS423/772	12/15/11	14:20	17° 11.07' N	22° 0.76' W	1054.9	Multinet
POS423/773	12/15/11	17:11	17° 8.53' N	21° 55.41' W	888.0	Longline/traps recovery
POS423/774	12/15/11	19:43	17° 6.71' N	22° 3.25' W	2742.7	CTD/rosette
POS423/775	12/15/11	23:48	17° 0.27' N	22° 5.08' W	3322.9	CTD/rosette
POS423/776	12/16/11	5:10	17° 11.66' N	22° 3.01' W	0.0	CTD/rosette
POS423/777	12/16/11	7:58	17° 15.71' N	21° 59.85' W	1601.3	CTD/rosette
POS423/778	12/16/11	13:11	17° 11.80' N	21° 52.43' W	0.0	CTD/rosette
POS423/779	12/16/11	15:40	17° 15.57' N	21° 54.82' W	2018.4	CTD/rosette
POS423/780	12/16/11	17:59	17° 11.68' N	21° 54.78' W	1031.3	CTD/rosette
POS423/781	12/16/11	20:33	17° 11.92' N	22° 1.79' W	1467.7	MOCNESS
POS423/782	12/17/11	0:13	17° 18.82' N	21° 59.51' W	2274.6	MOCNESS
POS423/781	12/17/11	0:13	17° 18.82' N	21° 59.51' W	2274.6	MOCNESS
POS423/782	12/17/11	5:25	17° 14.10' N	21° 56.45' W	808.2	MOCNESS
POS423/783	12/17/11	5:59	17° 16.42' N	21° 57.04' W	1968.4	CTD/rosette
POS423/784	12/17/11	8:05	17° 11.29' N	21° 57.27' W	100.5	Multinet
POS423/785	12/17/11	8:57	17° 11.04' N	22° 0.77' W	1073.9	Multinet
POS423/786	12/17/11	9:28	17° 11.05' N	22° 0.74' W	1021.2	Multinet

Appendix 3: Maps of sampling locations

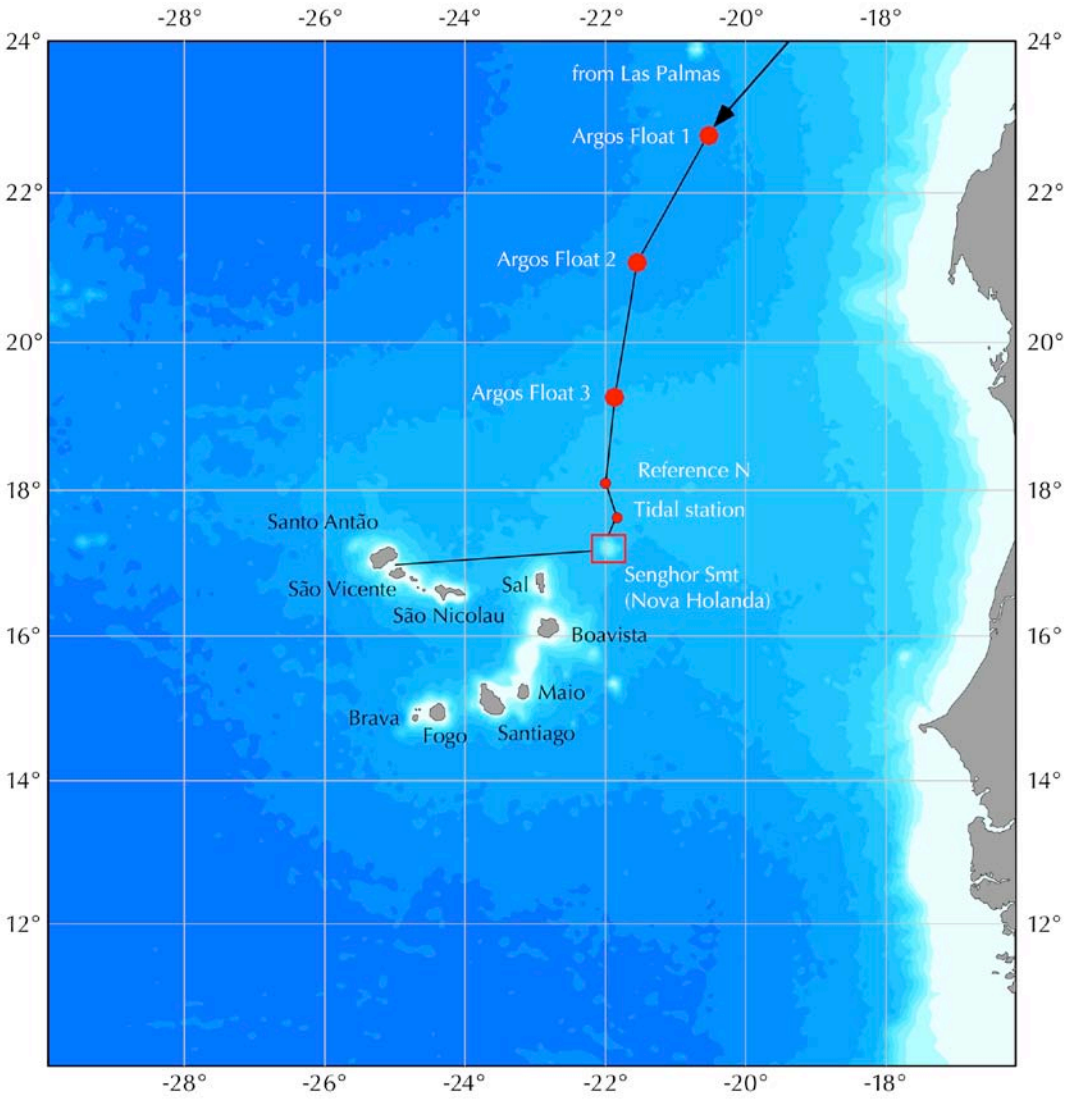

Fig. A1: POS423 cruise track and sampling locations

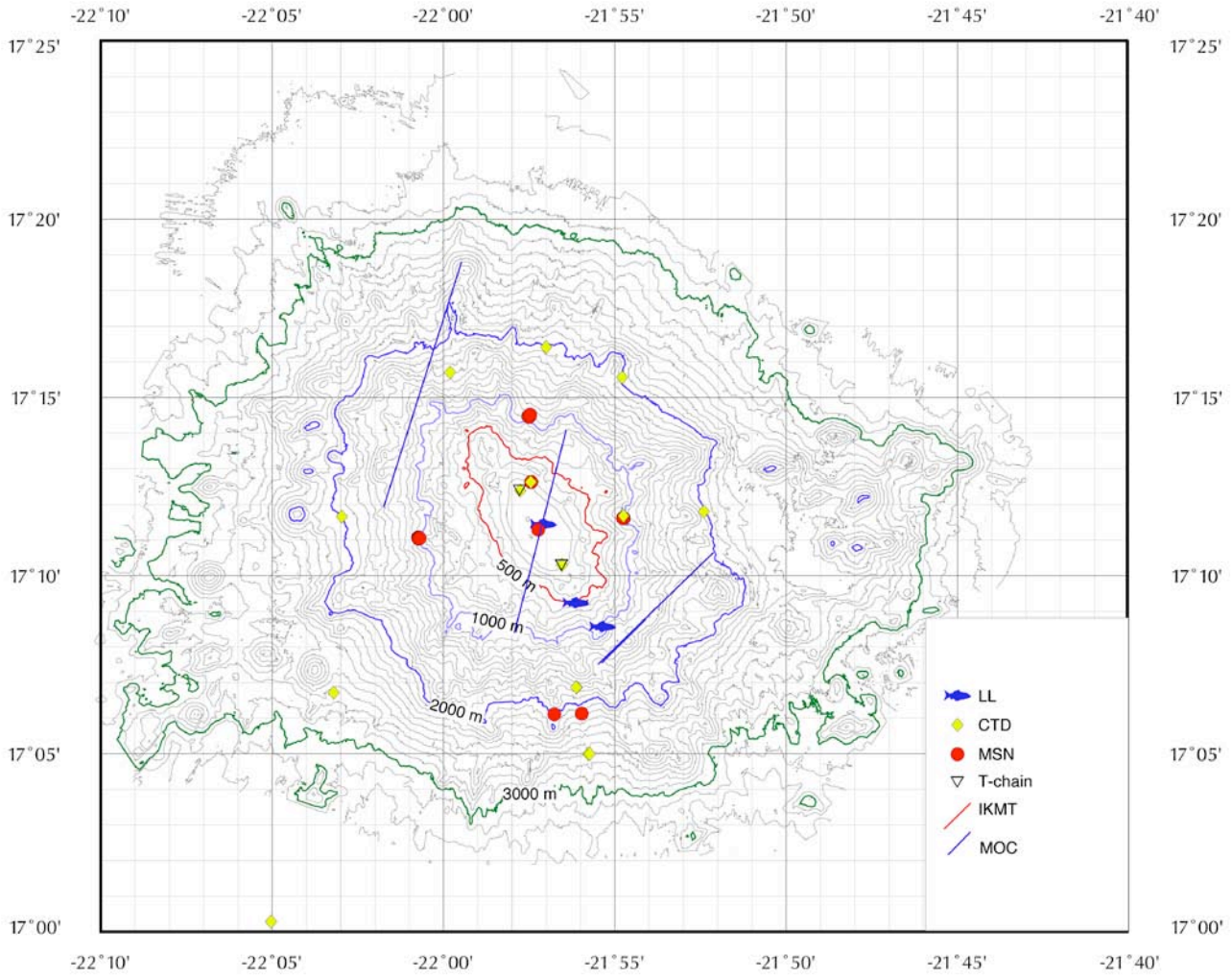

Fig. A2: Senghor Seamount, POS423 sampling stations