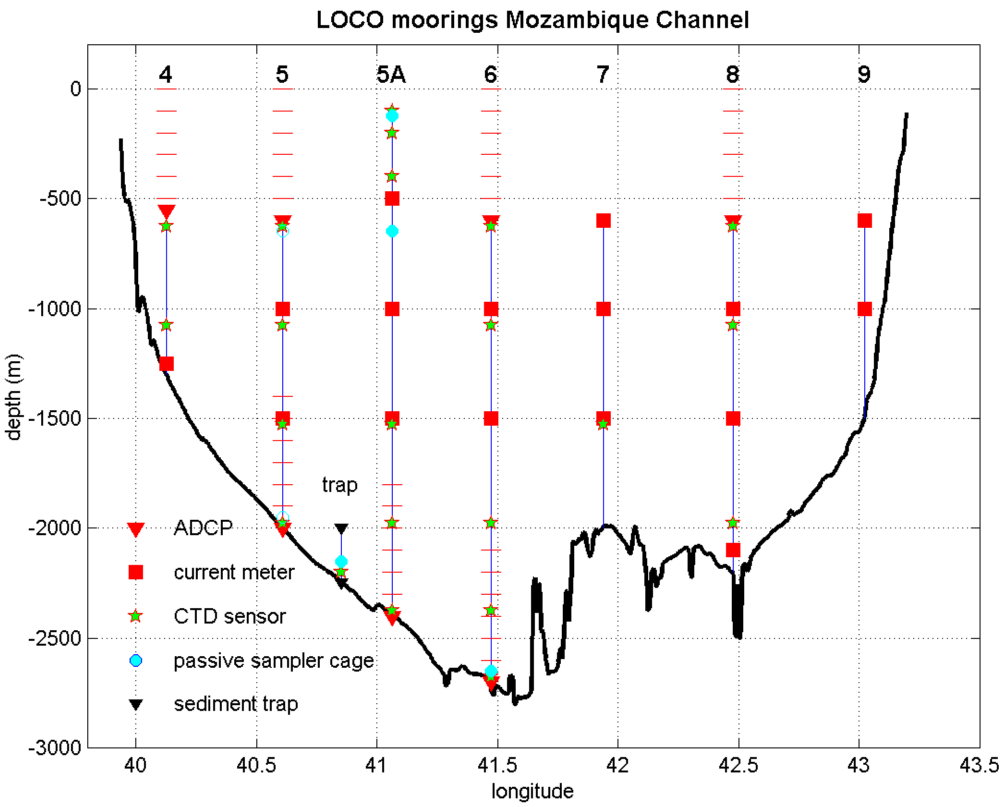
# RV Charles Darwin Cruise Report:

# Cruise 64CD153B

# Mozambique Channel,
# 12 November –27 November 2003


H. Ridderinkhof
Chief Scientist



Royal NIOZ, Texel, 2004

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The research reported here is part of the Dutch Long-term Ocean Climate Observations (LOCO) program. LOCO is funded by the Netherlands Organisation for Scientific Research (NWO)

# 1 Cruise Narrative

## 1.1 Highlights

a: RV Charles Darwin cruise CD153B in the Mozambique Channel

b: Expedition Designation (EXPOCODE): 64CD153B

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d: Ship: RV Charles Darwin, Call Sign: PGRQ
length 66 m.
beam 12.8 m
draft 4 m
maximum speed 12.5 knots

e: Ports of Call: Victoria (Seychelles) to Durban (South Africa)

f: Cruise dates: November 12, 2003 to November 27, 2003

## 1.2 Cruise Summary Information

**Summary**

Early in the morning on Wednesday 12 November 2003 RV Charles Darwin left her anchor position near the harbor of Victoria and headed for the Mozambique Channel to deploy moorings and perform hydrographic observations as well as geochemical sampling at the narrowest section of the Mozambique Channel. In order to reach deep water as soon as possible for the underway deployment of APEX floats, the vessel first followed a westward course during roughly 24 hours. From Thursday 13/11/03 till Sunday 16/11/03 a SSW-ward course was followed to the work area. From Thursday 13/11/03 till Saturday 15/11/03, when the northern entrance of the Mozambique Channel was reached, APEX floats were deployed regularly at a mutual distance of 40-50 nm. These deployments of APEX floats were done in the framework of an observational programme financed by Germany and led by prof. F. Schott and dr. J. Fischer from Kiel.

On Sunday 16/11/03 a hydrographic station was occupied, mainly for testing the instrumentation. During this day the functioning of the ADCP's to be deployed in the moorings was checked and it was discovered that some of these (newly acquired) instruments did not function. Therefore it was decided not to start with the deployment of moorings on Monday but first to occupy some hydrographic stations along the mooring section.

On Monday 17/11/03 the work along the mooring section in the Mozambique Channel started at the eastern, Madagascar, side of the channel. First two hydrographic stations were occupied in which the second (CTD station 2) failed because of a fault on the CTD wire. In the afternoon the first mooring, LMC8, was deployed with instrumentation according to the original plan. During the day, after communicating with RDI and testing all ADCP's, it became clear that 3 ADCP's (out of 10 available) did not function and could not be deployed. Therefore the original plan for the distribution of ADCP's and current meters on the 7 moorings was adapted slightly. During nighttime two hydrographic stations were occupied in which again one of these (CTD station 3) failed because of a fault on the CTD wire. Then, the CTD wire was shortened with a few hundred meters and no failure happened during the remaining observations.

On Tuesday 18/11/03 two moorings were deployed (LMC9 and LMC7) and one CTD station was occupied. After this day no further technical problems were encountered and a regular schedule was followed. From Wednesday 19/11/03 till Saturday 22/11/03 the program for each day consisted of one mooring deployment, 1-2 Multicore stations for bottom sampling and 2-3 CTD stations at 10 nm distance while moving towards the western, Mozambican, side of the channel. At all CTD stations bottle sampling was done at regular depth intervals for the on board determination of nutrients and oxygen. On Sunday 23/11/03 the final CTD station, 2 Multicore stations and one mooring deployment (LMC4) on the slope near the African continental shelf were carried out before the Charles Darwin set course to Durban at 11.00 in the morning.

During almost the entire cruise, starting just after departure from the Seychelles and finishing on Tuesday evening, 25/11/03, underway surface sampling was carried out with an interval of 6 hours in between sampling. Part of these samples were analysed on board to determine the dissolved nutrient concentrations and, for part of the track, also the total dissolved carbon and oxygen. At the same stations, an intensive filtration program was carried out for onshore measurement of organic Nitrogen and Carbon concentration and stable isotope composition, as well as total suspended matter and biogenic silica concentration. This underway sampling was strongly intensified when the vessel passed through an eddy in the centre of the Mozambique Channel on Monday 24/11/03. The position of this eddy was derived from daily satellite-altimetry maps as sent to the ship from Royal NIOZ by e-mail. The exact location of the boundaries of the eddy was estimated from the beginning and ending of the strong cross-currents as experienced by the officers on the bridge, starting early Monday morning and finishing late Monday evening.

The Charles Darwin arrived at the Durban pilot station on Thursday morning, 08.00, and the scientific crew debarked on the same day.

**Cruise Track**

The cruise was carried out from Victoria, Seychelles to Durban, South Africa. The main work area was at the narrowest section of the Mozambique Channel where hydrographic sections were performed and moorings deployed. The complete cruise track is shown in figure 1.

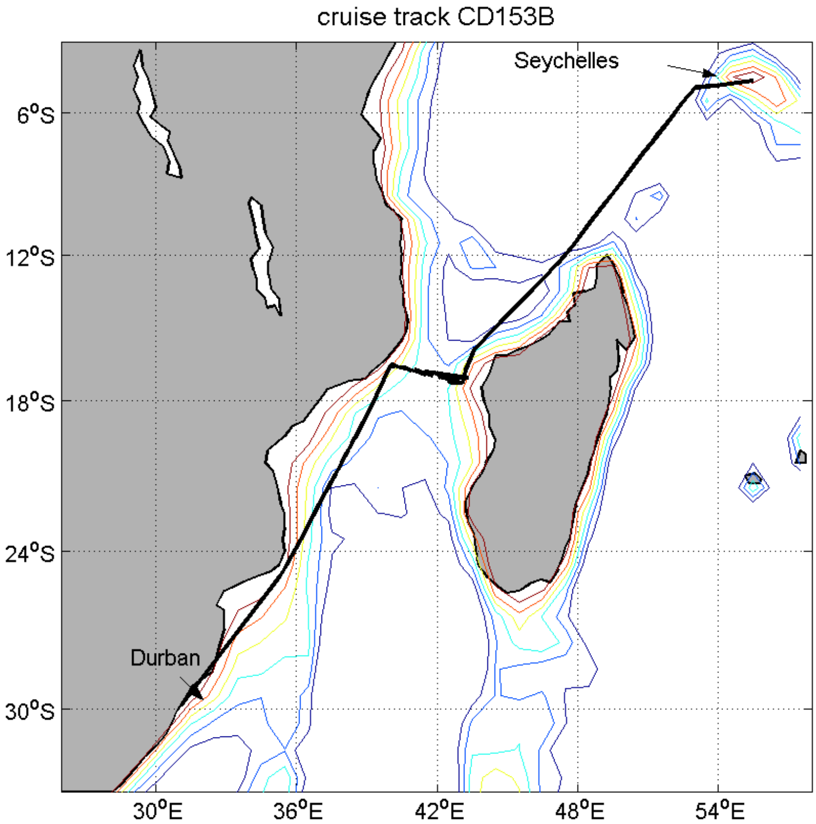



Figure 1. Cruise track of RV Charles Darwin cruise 64CD153B

**Hydrographic Stations**

A total of 18 CTD casts was recorded, including one test cast prior to arrival at the work area. On all of these casts, water samples were taken for the determinations of nutrient, dissolved oxygen and, less frequently, salinity. A lowered Acoustic Doppler Current Profiler (LADCP) was attached to the CTD frame to measure vertical profiles of the current speed and direction. The positions of the hydrographic stations along the mooring sections are indicated in figure 2.

At the hydrographic stations the SBE9/11+ CTD was lowered with a speed of about 1 m/s. Due to the use of an altimeter we were able to sample to within quite a short distance from the bottom (on average 10 m).

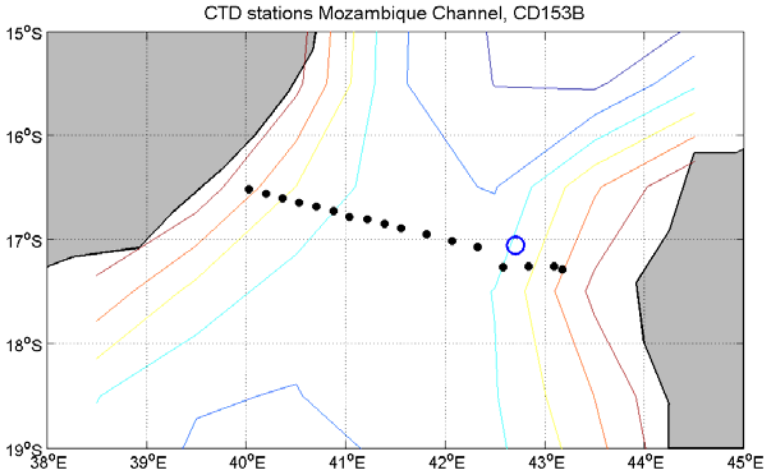



Figure 2. Distribution of hydrographic stations. The isobaths at 200, 500, 1000, 2000 and 3000 m are indicated. Note that one station was shifted slighly southward due to the close proximity of the French island Juan de Nova

**Hydrographic Sampling**

During the up-cast of each CTD/rosette station up to 25 water samples were taken at regular depth intervals. The samples were analysed for nutrients and oxygen. On 12 of the CTD stations filtrations for organic Nitrogen and Carbon were carried out at 4 to 6 depths in the upper water column, across the deep chlorophyll maximum.  For calibration purposes also regularly, but less frequent, samples were analysed for salinity. The vertical distribution of the sampling locations is indicated in table 1.

| **Depth (m)** | **Samples** |
|---|---|
| Bottom | Oxygen, nutrients |
| 2500 | Salinity, oxygen, nutrients |
| 2000 | Oxygen, nutrients |
| 1500 | Oxygen, nutrients |
| 1250 | Oxygen, nutrients |
| 1000 | Oxygen, nutrients |
| 900 | Oxygen, nutrients |
| 800 | Oxygen, nutrients |
| 700 | Oxygen, nutrients |
| 600 | Oxygen, nutrients |
| 500 | Oxygen, nutrients |
| 400 | Oxygen, nutrients |
| 300 | Oxygen, nutrients |
| 200 | Oxygen, nutrients |
| 150 | Oxygen, nutrients |
| 100 | Oxygen, nutrients |
| 50 | Oxygen, nutrients |
| 25 | Oxygen, nutrients |
| 10 | Oxygen, nutrients |
| Fluorescence max | Oxygen, nutrients |

Table 1. Depths at which bottle samples were collected

**Deployment of APEX floats**

APEX floats were launched during transit from the Seychelles to the entrance of the Mozambique Channel. These observations form part of a German research program led by prof. Fritz Schott and dr. Juergen Fischer from Kiel. 10 Floats were launched every 40-50 nm after the Charles Darwin had reached the deep ocean to the west of the Mascarene plateau. The position of the deployment of these floats is indicated on the map in Figure 3.

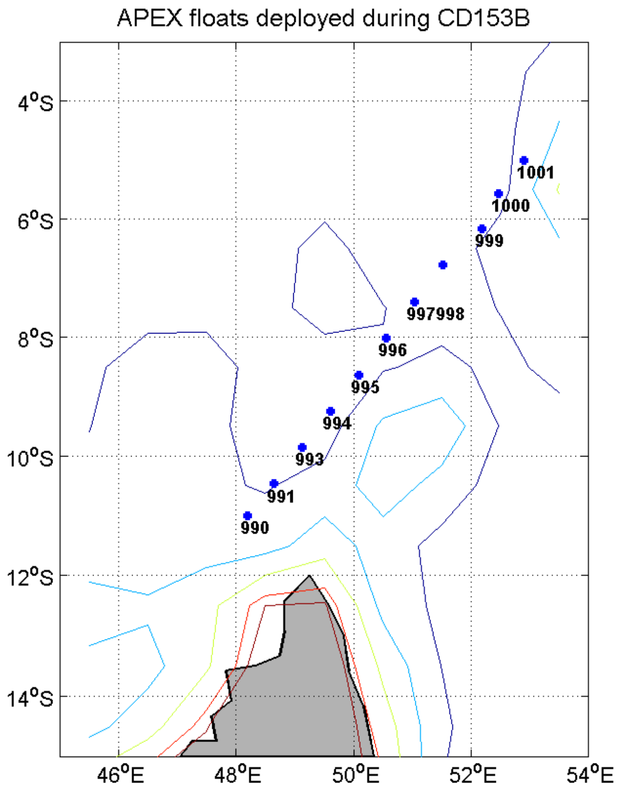
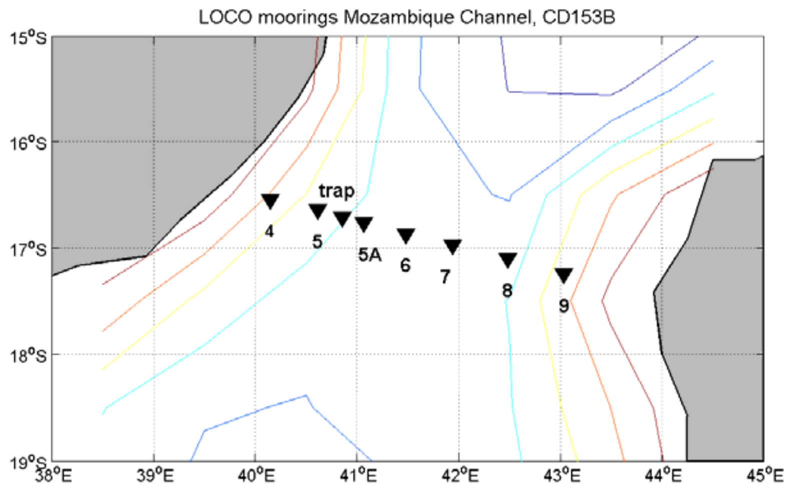



Figure 3. Positions where APEX floats were launched, including their serial numbers.

**Moorings**

The major goal of this cruise was the deployment of long-term moorings at the narrowest part of the Mozambique Channel, more or less evenly distributed over the entire section. These moorings are deployed for a period of 4.5- 5 years. Each 1.5 years these sub-surface moorings will be serviced. 7 moorings are equipped with ADCP's, current meters and T-S sensors. Passive sampler cages for the determination of organic pollutants were attached to some of the mooring cables. In addition, one mooring with 2 sediment traps and a turbidity sensor (OBS) was deployed. The position of the moorings and the location and type of instruments in the cross-section is shown in figure 5. The measuring interval of the physical instruments ranges from 5 minutes (T-S sensors), 12 minutes (OBS), 15 minutes (current meters) to 30 minutes (ADCP's). The cups in the sediment traps collect distinct samples over 24 intervals of 21 days. These moorings are scheduled to be recovered and redeployed in March-April 2005.

Detailed information on the moorings is given in the list in appendix B.



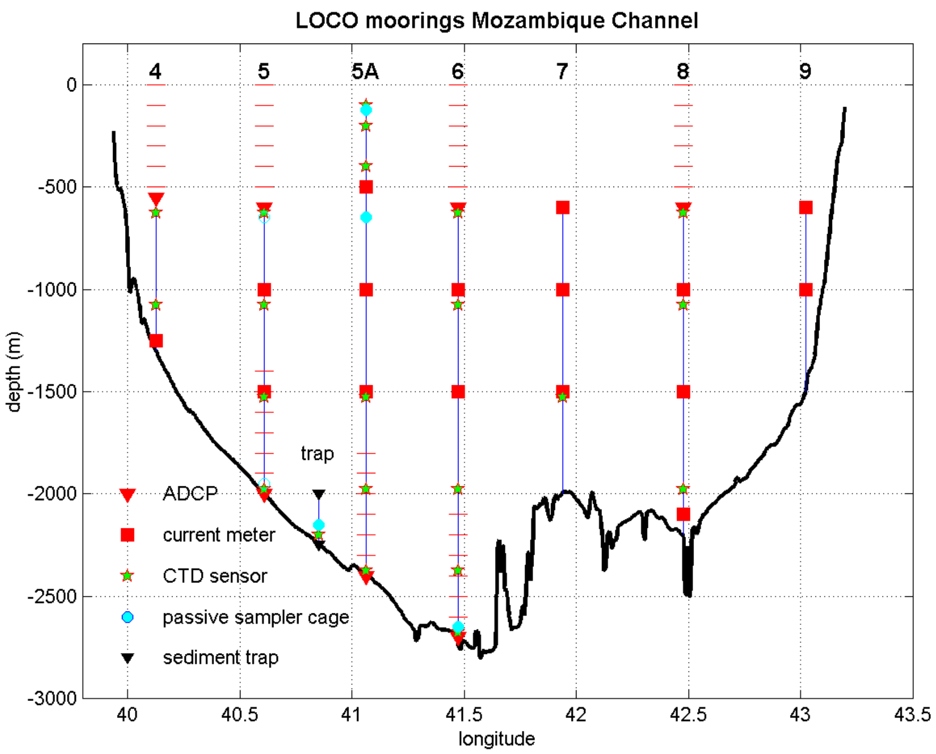




Figure 5. Position of long-term moorings in Mozambique Channel (top) and vertical distribution of the instruments (bottom).

**Multicore stations**

On the western, Mozambican , side of the section 7 Multicore stations were sampled. The bottom samples were sliced to determine the vertical distribution of pore water nutrients and total dissolved carbon in the  cores and to determine the composition of the core top sediments for the best suited location of the sediment trap mooring. Both the deepest station near the centre of the channel and the shallowest station near the continental shelf were less succesfull because the Multicore penetrated too deeply into the bottom sediment for proper geochemical profiling. Figure 6 shows the positions of the Multicore stations.

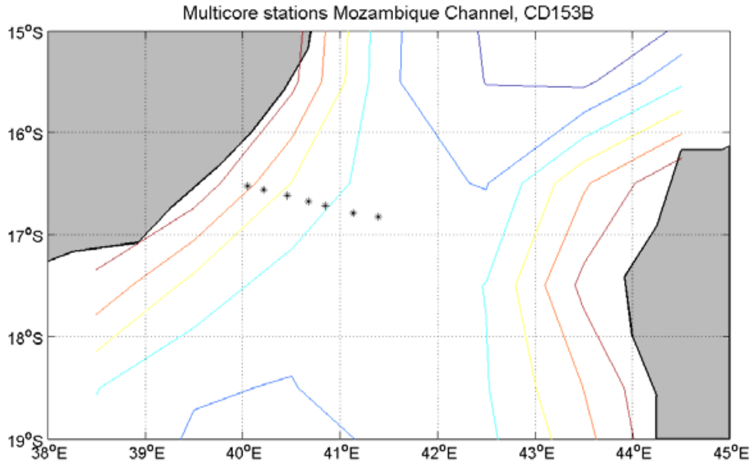



Figure 6. Position of the Multicore stations at the western side of the section.

**Underway stations**

During almost the entire cruise, surface samples were taken each 6 hours. During the passage of an eddy in the central part of the Mozambique Channel this sampling scheme was intensified to one surface sample per hour. The position where surface samples have been taken is indicated in Figure 7.

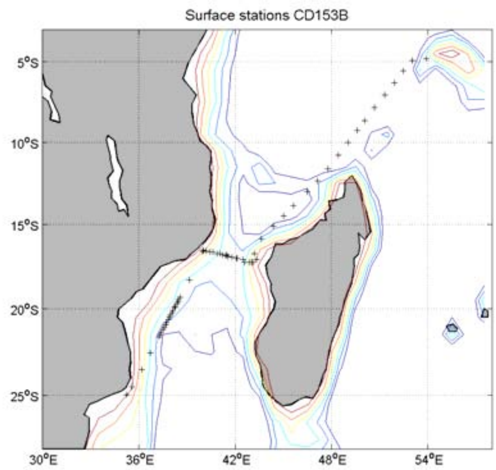



Figure 7. Locations where surface samples have been taken

## 1.3 Scientific Programme and Methods

The goal of this CD153B cruise was 1) to start with long-term monitoring of the currents, some hydrographic properties, organic contaminants and vertical particle fluxes at the narrowest section of the Mozambique Channel 2) to obtain detailed information on the hydrography along this section and 3) to obtain information on the sediment biogeochemistry along the western side of the channel.

*Long-term observations with moorings (see figure 5)*

To adress the first goal 8 moorings were deployed across the Mozambique channels. Of these, 7 moorings were more or less evenly distributed across the channel and these moorings were equipped with recording ADCP's, current meters and T-S sensors. The observations are planned for a period of 4-4.5 years and will be used to determine the water- and heat transport through the channel. During a previous pilot experiment it was found that the currents are dominated by southward migrating anti-cyclonic eddies which fill more or less the entire section. Therefore the original design (also based on the availability of instruments) was such that the top of 6 moorings, at 600 m below surface, was equipped with a Long Ranger ADCP. However, one day prior to the scheduled start of the deployments, 3 ADCP's appeared not to function. It was decided to decrease the number of ADCP's on the top of the moorings from 6 to 4 and near the bottom on the western side from 4 to 3. The near-bottom ADCP's on the western side (moorings 5A, 6,7) are intended to observe the magnitude of the undercurrent carrying NADW equatorward, as discovered during the pilot experiment. One mooring, 5A, extends to 100 m below surface in order to have near surface observations on the (variations in) temperature and salinity. After examination of all Multicore-tops, the sediment trap mooring was deployed in between moorings 5A and 6. These observations will be used to determine the influence of passing eddies on settling fluxes of particles from the upper ocean and resuspension fluxes of particles from the ocean floor (see below). On several moorings near the center of the channel where the currents are expected to be strongest passive sampler cages have been attached to the mooring cable to observe organic pollutants, see below.

*Organic contaminants sampling using passive sampler cages*

Knowledge on concentrations of dissolved organic contaminants in the water phase is crucial for understanding the role of the oceans in the global fate of these compounds, because the aqueous concentrations of organics are closely related to their thermodynamic potential. Existing models identify the tropical and temperate regions as evaporation zones for organics, and the poles as a final sink, where most of these compounds will condense. In these models it is assumed that the ocean is vertically well-mixed with respect to organics, but no data is available to check whether this assumption makes sense at all. In addition, it is assumed, but not tested, that deep ocean currents that are directed from the poles towards the equator play no role in the redistribution of organics on a global scale. The aim of contaminant sampling within the LOCO program is to test whether passive sampling is a convenient technique for measuring aqueous concentrations of organic contaminants on (semi-) permanent moorings, and to validate or disproof some of the basic assumptions in the current global fate models.

*Hydrographic observations*

The second goal was addressed by obtaining CTD stations with bottle samples along the entire mooring section. The distance between stations varied between 15 nm at the eastern side and 10 nm at the western side of the channel. The short distance at the western side mainly reflects our interest in the size and magnitude of the equatorward undercurrent along this slope. During a previous cruise the distance between stations was too large to be able to determine the size of the, possibly distinct, undercurrents at intermediate levels (about 1000-1500 m) and in the deepest part of the channel (2000-2500 m).  The present observations can be used to address this question.

*Biogeochemical cycling*

The motivation for the third goal was simply that very little information is available on the biogeochemical cycling in this area, especially with regard to the composition and geochemistry of the seafloor sediment. Therefore bottom samples along the continental slope were taken with a Multicore at locations centred around the prospective deployment site of the sediment trap mooring. Since the bulk of the settling particle fluxes arriving on the ocean floor is generated by biological export production from the upper ocean, both surface and subsurface waters were filtered to determine the concentration and stable isotope composition of the particulate organic carbon and nitrogen as well as the concentration of total suspended matter and biogenic silica. Together with nutrient and total dissolved carbon measurements in both the water column and in the sediment, they will allow to determine the (re)mineralisation fluxes of organic and inorganic matter on different time scales and in different hydrographic regimes.

## Preliminary Results

Hydrographic observations

Figure 8 shows a T-S plot of all observations as obtained along the mooring section in the Mozambique Channel and Figure 9 shows oxygen concentrations as a function of depth.

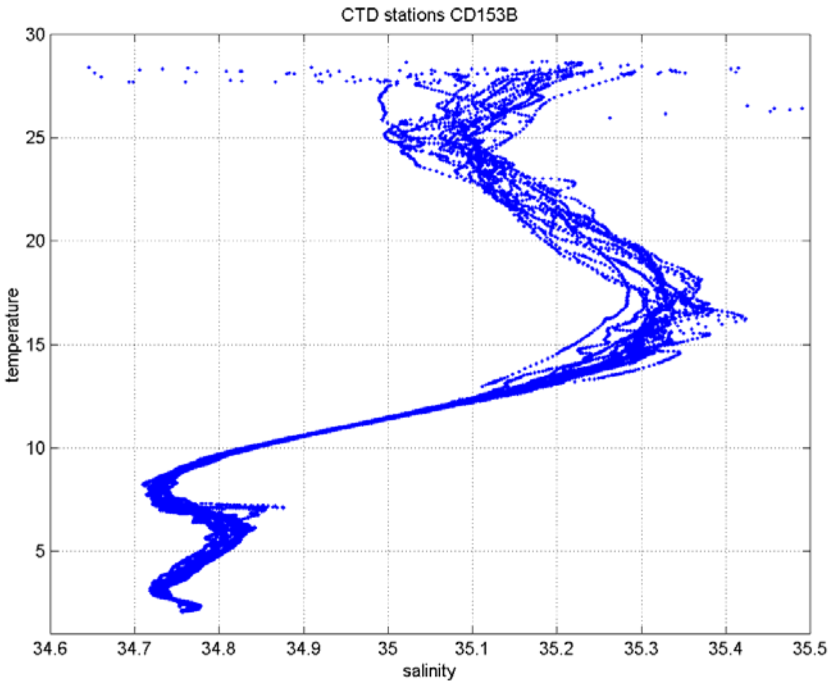



Figure 8. Temperature as a function of salinity along the mooring section in the Mozambique Channel

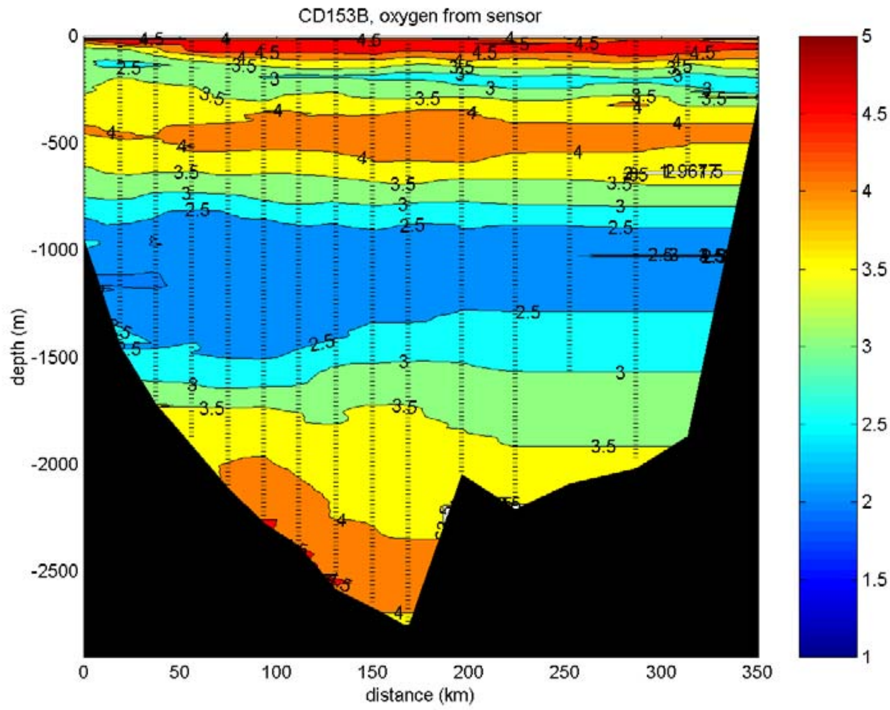



Figure 9. Oxygen concentration at the mooring section

Salty and warm tropical surface water (Indian Central Water) is found in the upper few hundred meters. At intermediate levels relatively salt, low oxygen water of Red Sea origin is found. Below 2000 m, relatively high salinity and oxygen values are found which point to the presence of North Atlantic Deep Water. This is confirmed by the high silica values (not shown)

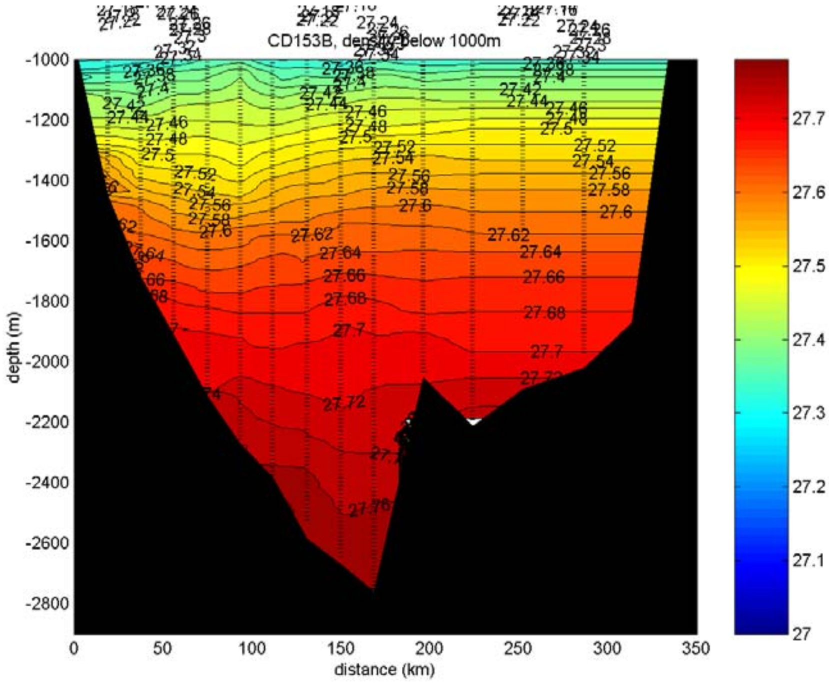



Figure 10 Density distribution below 1000 m at the western, African, side of the Mozambique Channel

The density distribution along the slope at the western side of the channel suggests that two distinct cores of equatorward undercurrents are present, one centred around 1400 m depth and one in the deepest part of channel. In between the horizontal density gradient, associated with these currents is much weaker.

## Multicore geochemistry, preliminary results

First results show that, from the deepest part of the Mozambique Channel to the shallower staitons on the Mozambique Margin, pore water nitrate and ammonium profiles reflect the increased input of organic matter from the shelf (fig.1). At the shallower stations MC5 and MC6, nitrate is used to depletion, resulting in the accumulation of ammonium in the deeper layers of the sediment.

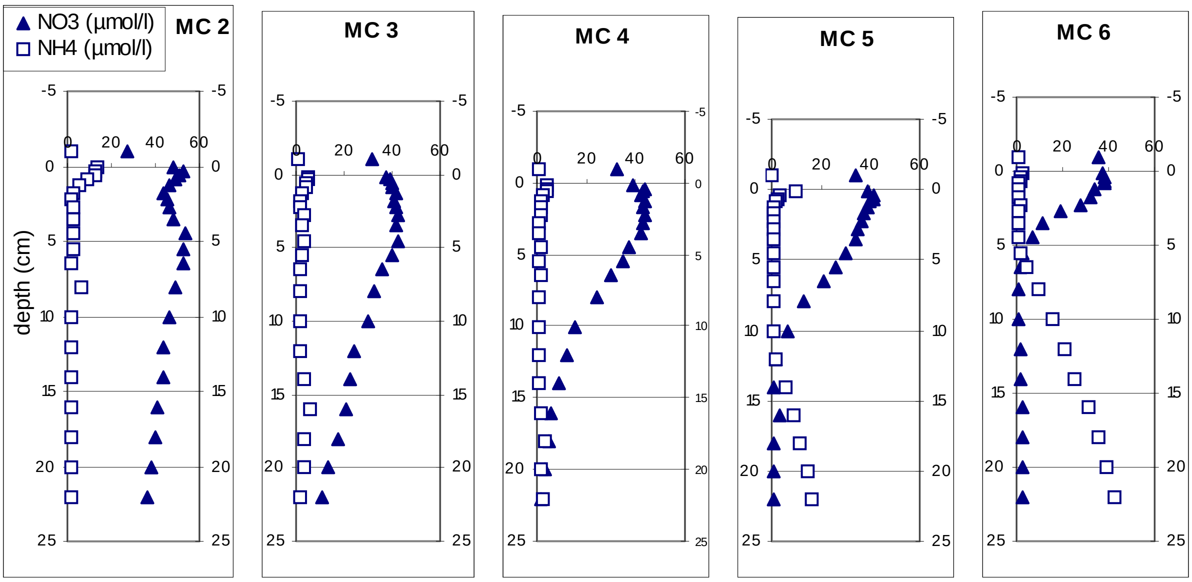



Fig. 11: Profiles of dissolved nitrate (solid triangles) and dissolved ammonium (open squares) along the multicore transect in the Mozambique Channel.

From a third 10cm-diameter core, the top sediment was sieved to obtain information on the composition of the sediment.

## 1.4 Major Problems Encountered during the Cruise

One day before the deployment of the moorings was scheduled to commence, it was discovered that 3 new acquired LR-ADCP’s did not function due to empty batteries. After communicating with RDI and several checks it appeared that these instruments leak considerable energy while powered down. Therefore it was decided not to deploy these instruments and to adapt the mooring design slightly.

Two times a fault in the CTD wire occurred which required shortening of the wire, the first time it was shortened with a few meters, the second time it was shortened with a few hundred meters. The consequence is that CTD observations at station 2 and at the deeper part of station 3 are not available

## 1.5 Lists of Cruise Participants

**Scientific crew**

| Name | Institute | Nationality | Function/ Speciality |
|---|---|---|---|
| Herman Ridderinkhof | NIOZ | NL | Chief scientist |
| GeertJan Brummer | NIOZ | NL | Sediment traps, Surface & CTD sampling |
| Erica Koning | NIOZ | NL | Multicoring, Surface sampling |
| Sharyn Crawford | NIOZ | NL | Chemical analyses |
| Karel Bakker | NIOZ | NL | Nutrients, oxygen |
| Leon Wuis | NIOZ | NL | Moorings |
| Karel Bakker | NIOZ | NL | Moorings |
| Jack Schilling | NIOZ | NL | Moorings |
| Theo Hillebrand | NIOZ | NL | Mooring instruments |
| Virginia Palastanga | University Utrecht | NL | PhD student – CTD-oxygen |
| Janine Nauw – van der Vegt | University Utrecht | NL | PostDoc – CTD-oxygen |
| | | | |
| Jonathan Short<br>Peter Keen | SOC | UK | CTD |
| Robert MacLachlan | SOC | UK | Mooring winch |
| Chris Crowe | SOC | UK | Mooring winch |
| Emma Northrop | SOC | UK | Mooring winch |
| Martin Bridger | SOC | UK | Computer support |

# 2 Underway Measurements

### Navigation

Differential GPS receiver for the determination of the position. The data from the receiver were recorded every  ten seconds in the underway data logging system. Regularly no signal was achieved for a period of a few hours. This occurred almost every day.

### Echo Sounding

The 3.5 kHz echo sounder was used on board to determine the water depth. The uncorrected depths from this echo sounder were recorded in the underway data logging system.

### Thermo-Salinograph Measurements

The Sea Surface Temperature, Salinity, Fluorescence and optical transmission were measured continuously with an AQUAFLOW thermo-salinograph system with the water intake at a depth of about 2 m.

### Underway sampling

Every 6 hours along the most of the cruise track (Fig. 7), surface water was sampled from a separate outlet of the thermo-salinograph system and filtered using three different set-ups:

1. For nitrogen stable isotopes, nitrogen and total carbon concentration, 8 liters of surface water were filtered through 25 mm diameter Gelman A/E glass fibre filters (P/N 61630, lot 00541) with a nominal pore size of 1.2 μm, that were transferred to glass vials and stored frozen at -70°C.
2. For organic carbon stable isotopes and organic carbon concentration, 2 liters were filtered through 13 mm diameter Gelman A/E glass fibre filters (P/N 61628, lot 01044) with a nominal pore size of 1.2 μm, that were transferred to glass vials and stored frozen at -70°C.
3. For total suspended matter and biogenic silica, 3 liters were filtered through 47 mm pre-weighed polycarbonate filters with a defined 0.45μm pore size, that were transferred to Gelman Analyslides and stored frozen at -20°C.

At the same time a 6ml sample taken directly from the outlet, was syringe-filtered over 0.2 μm Acrodiscs and transferred to a ponyvial and stored at 4°C in the dark, prior to shipboard nutrient analysis (see below). During the survey of  the large anti-cyclonic eddy "Tulip", additional samples were taken for total dissolved carbon, that were pre-filtered as for the nutrients, and tranferred to glass vials and poisoned with a drop of saturated $HgCl_2$. Also samples were taken and analysed shipboard for dissolved oxygen concentration (see below).

### Vessel mounted ADCP measurements

A 150 kHz vessel mounted ADCP (RDI) recorded the current field continuously. However, these data require considerable effort to become a coherent set. The post-processing includes calibration with data from the lowered ADCP.

# 3 Hydrographic measurements - Descriptions, Techniques, and Calibrations

## Rosette Sampler and Sampler Bottles

A 25 position rosette sampler was used, fitted with Niskin sampler bottles. The general behaviour of the samplers was good. Only a few samples are considered to be suspect because of sampler failure. No errors in the functioning of the rosette sampler itself were detected.

## Salinity Measurements

Water was drawn from the samplers into a 0.5 litre glass sample bottle for the salinity determination after 3 times rinsing. The sample bottles had a massive rubber stopper as well as a screw lid. Salinity of water samples (SALNTY) was determined on board by means of an Guildline Autosal 8400A salinometer. The salinometer was used in a laboratory container, fitted with an air conditioning system. This kept the surrounding air temperature constant within 1°C. The readings of the instrument were performed by computer, giving the average and statistics of 10 consecutive readings. For each sample 3 salinity determinations were carried out. From each deep CTD/rosette cast an extra duplicate sample was drawn. Salinity determinations from the duplicate samples obtained from independent runs were used to determine the reproducibility of the salinity determination.

## Oxygen Measurements

For the oxygen determination water samples were drawn in pre calibrated 120 ml pyrex glass bottles. Before drawing the sample each bottle was flushed with at least 3 times its volume. The determination of the volumetric dissolved oxygen concentration of water samples was carried out by means of measuring the formed Iodine colour at 460nm on a Traacs 800 continuous flow spectro-photometer, combined with a stand alone home made sampler (NIOZ) based on Winkler technique, [see Su-Chen Pai et al., Marine Chemistry 41 (1993), 343-351]. All bottles for measurement were covered with parafilm against evaporation and shielded for the light by PVC caps, to prevent light induced Iodine forming.

A stock solution of $KIO_3$ was used in the analysis spiked to so called seawaterblanks (reversed order addition of the Winkler chemicals) to obtain a calibration line, with a $R^2$=1.0000 for 4 calibrants in each run, to calibrate the used spectrophotometer. The stock solution was stored in an air tight water saturated container (100% humidity) to prevent evaporation.

At each cast duplicate samples were taken from the deepest Rosette-bottle, in order to determine the inter variability between the daily runs of the analysis. Baseline- and gain-drift of the spectrophotometer is corrected by the used AACE software. To obtain accuracy in between the runs a stock-standard of $IO_3$ (Baker Dilut-IT) is measured and as a control a so-called reference bottle, bottled according Winkler from one big saturated container (50l oceanwater). The reference give a narrow banded signal of +/- 0.7 $\mu$Mol on a level of 206 $\mu$Mol $O_2$ between the runs and better than 0.24 $\mu$Mol within a run. From the volumetric oxygen concentration in µMol/dm$^3$ the densimetric oxygen concentration in µMol/kg (OXYGEN) was determined by dividing the sample density at sample temperature and salinity.

## Nutrient Measurements

From all sampler bottles samples were drawn for the determination of the nutrients silica, nitrite, nitrate and phosphate. The samples were collected in polyethylene sample bottles after three times rinsing. The samples were stored dark and cool at 4°C. All samples were analysed for the nutrients silicate, phosphate, nitrate and ammonium within 12 hours with an autoanalyzer based on colorimetry. The lab container was equipped with a Technicon TRAACS 800 autoanalyzer. The samples, taken from the refrigerator, were directly pored in open polyethylene vials (6ml) and put in the auto sampler-trays. A maximum of 60 samples in each run were analysed.

The different nutrients were measured colorimetrical as described by Grashoff (1983);

- Silicate reacts with ammoniummolybdate to a yellow complex, after reduction with ascorbic acid the obtained blue silica-molybdenum complex was measured at 800nm (oxalic acid was used to prevent formation of the blue phosphate-molybdenum).
- Phosphate reacts with ammoniummolybdate at pH 1.0, and potassiumantimonyltartrate was used as an inhibitor. The yellow phosphate-molybdenum complex was reduced by ascorbic acid to blue and measured at 880nm.
- Nitrate was mixed with a buffer imidazole at pH 7.5 and reduced by a copperized-cadmium coil (efficiency> 98%) to nitrite, and measured as nitrite (see nitrite). The reduction-efficiency of the cadmium-column was measured in each run.
- Ammonium is reacted to a coupled indophenol hypochlorite complex described by Helder and de Vries, measured at 630nm .

Calibration standards were prepared by diluting stock solutions of the different nutrients in the same nutrient depleted surface ocean water as used for the baseline water. The standards were kept dark and cool in the same refrigerator as the samples. Standards were prepared fresh every two days. Each run of the system had a correlation coefficient for the standards off at least 0.9998. The samples were measured from the surface to the bottom to get the smallest possible carry-over-effects. In every run a mixed control nutrient standard containing silicate, phosphate and nitrate in a constant and well known ratio, a so-called nutrient-cocktail, was measured, as well as control standards, sterilized in an autoclave or gamma radiation. These standards were used as a guide to check the performance of the analysis and the gain factor of the autoanalyzer channels. As a result for silica there will be a recalculation of about 1.5% later in the lab, after checking the standard. The reduction-efficiency of the cadmium-column in the nitrate lane was measured in each run.

The autoanalyzer determined the volumetric concentration (µMol/dm$^3$) at a temperature of 24°C. In order to obtain the densimetric concentration in µMol/kg the volumetric concentrations were divided by the density of sea water at 24°C, sample salinity, and zero sea pressure.

## Dissolved Inorganic Carbon

Some CTD stations were sampled for DIC to be measured at home.

Samples were filtered over 0.45µm and put in a glass vial (4ml) containing 15µl saturated HgCL2 as a preservative. Measurement will be done home, using a spectrophotometric-method described by Stoll and Bakker (Marine Chemistry 2001).

## CTD Data Collection and Processing

The SBE 9/11+ CTD was fitted with temperature sensor SN2118 and conductivity sensor SN995. For the data collection SEASAVE software, version 4.224, supplied by SBE, was used. The CTD data were recorded with a frequency of 24 data cycles per second. On-line a correction was applied for the sampling time difference due to the forced flushing through a tube system between temperature and salinity sensor. After each CTD cast the data were copied to a hard disk of the ship's computer network, and a daily back-up copy was made on tape. Back on Texel these data have been downloaded into the NIOZ computer network. Separate copies of the back up were taken directly from Durban to Texel.

The up-cast data files were sub-sampled to produce files with CTD data corresponding to each water sample, taken with the rosette sampler. After the determination of the final calibration of the CTD system these values were corrected accordingly.

After the cruise the raw down-cast CTD data were processed with the software supplied by SBE. A correction was applied for the temperature change between the temperature and conductivity sensor due to heat exchange with the flushing tube and conductivity sensor, and for different response times of both sensors. Mean values of the readings were produced for 1 dbar pressure intervals. Consecutively the parameter values in physical units were determined using the final calibration constants.

# 4 Multicore geochemistry

Particulate organic matter settling at the sea floor is recycled in the upper layer of the sediment, thereby releasing dissolved nutrients in the upper layers of the sediments. Oxygen supplies the energy needed for this process; when oxygen is depleted, dissolved nitrate will be used as an oxidant. The build-up of dissolved nutrients in the pore waters results in fluxes from the sediment into the overlying water, where concentrations are generally low.

To investigate nutrient fluxes across the sediment -water interface, seven multicore stations were sampled along the mooring transect in the Mozambique Channel. The positions of the multicore stations, water depth and sediment recovery are listed below.

| Station # | Water depth (m) | Pos. latitude | Pos. longitude | Sediment recovery |
|---|---|---|---|---|
| MC1 | 2662 | 16º 50.00 S | 41º 23.50 E | Too full |
| MC2 | 2488 | 16º 47.77 S | 41º 08.00 E | Good |
| MC3 | 2247 | 16º 43.44 S | 40º 50.95 E | Good |
| MC4 | 2082 | 16º 40.67 S | 40º 40.31 E | Good |
| MC5 | 1817 | 16º 37.29 S | 40º 27.16 E | Good |
| MC6 | 1535 | 16º 34.02 S | 40º 13.11 E | Good |
| MC7 | 1071 | 16º 31.70 S | 40º 03.08 E | Too full |

At all stations, samples were taken with a NIOZ multicorer, equipped with 8 6cm-id cores and 4 10cm-id cores. Immediately upon arrival on deck, the cores were transferred to the temperature-controled lab, maintained at bottom water temperatures (4ºC). For pore water extraction, four 6cm-id cores were sliced using a high-precision hydraulic slicer that positions up to four cores simultanuously. Cores were sliced in 0.25cm slices for the 0-1cm depth interval, in 0.5cm slices for the 1-3cm depth interval, in 1 cm slices for the 3-7cm depth interval and in 2cm slices below 7cm depth. For each depth interval, sediment slices were pooled and centrifuged for 10 minutes at 3000 rpm to extract the pore water. The extracted pore waters were filtered through 0.45µm Acrodisc filters and analyzed onboard ship for dissolved silicate, nitrate, ammonium and phosfate. Samples for dissolved inorganic carbon were collected and will be analyzed at home.

From the other 4 6cm-diameter cores, sediment samples were collected for porosity and organic carbon and nitrogen at intervals corresponding with those samples for the pore waters. Furthermore, samples were collected at 0-0.5, 0.5-1, 1-2, 2-3, 4-6 and 13-17cm depth intervals to be analyzed for $^{234}$Thorium.

Two 10cm-diameter cores were tranferred to the cold lab upon arrival on deck. In the cold lab, the cores were equipped with a stirring device leaving no headspace. The cores were sampled at 3 hour intervals for 18 hrs. to determine the flux of dissolved silicate, nitrate, ammonium and phosfate across the sediment-water interface. Again, samples were collected for dissolved inorganic carbon to be analyzed at home.

## 5 Sediment trap sampling

Site selection was based on sampling of the bottom sediment by the Multicorer at 7 sites on the Mozambique margin, proceeding from the assumption that a "good" sedimentary record would be the best guarantee that a quality particle flux record would be recovered. As it appeared, site MC-3 at 2242 m bottom depth and situated directly underneath the path of the eddies, proved to be better or at least no worse than any of the other sites sampled (see above). Therefore it was decided to deploy the sediment trap mooring there, on November 22, 2003 at 07:42 UTC. The pre-programmed sampling intervals are kept the same at 21 days for every of the 24 collecting cups, starting on November 23, 2003 at 01:00 UTC, thus ending on April 10, 2005. The time-series sediment traps used are Technicap PPS-5/2 with a collecting area of 1.0 $m^2$ and provided with a 1.5 cm honeycomb baffle. Sample cups were filled with seawater collected at the deployment depth of each trap and from the actual deployment site, to which a biocide ($HgCl_2$; end-concentration 0.95 g $l^{-1}$) and a pH-buffer ($Na_2B_4O_7{\cdot}10H_2O$; end concentration 1.9 g $l^{-1}$) were added supplemented by milliQ-water to a density slightly in excess of the ambient seawater. A blank sample was taken for later comparison with the actual collecting cups to determine chemical dissolution fluxes.

## 6 Organic contaminants sampling

Low-density polyethylene (LDPE) strips, silicone strips, and triolein-filled semipermeable membrane devices (SPMDs) are mounted in exposure cages that are clamped to the mooring line for moorings LMC5, LMC5A, LMC6, and the sediment trap mooring, at five water depths (one per mooring, except for LMC5A; see table below). The samplers absorb organic contaminants from the water phase. The uptake kinetics will be calibrated by measuring the dissipation of performance reference compounds (PRCs) that are spiked into the samplers prior to exposure. After exposure, the samplers will be extracted, and analysed for hexachlorocyclohexanes, hexachlorobenzene, polychlorinated biphenyls, polyaromatic hydrocarbons, and polybrominated biphenyl ethers.

| Mooring | position on the cable | Depth below surface (m) | cage # |
|---|---|---|---|
| LMC4 | not applicable | | none |
| LMC5 | - as high as practically achievable<br>- as low as practically achievable | 600<br>2000 | 13<br>14 |
| Sediment trap mooring | just below the upper sediment trap | 2150 | 15 |
| LMC5A | - as high as practically achievable<br>- at approximately the same depth as cage 13 on LMC5 | 150<br>600 | 16<br>17 |
| LMC6 | as low as practically achievable | 2700 | 18 |
| LMC7<br>LMC8<br>LMC9 | not applicable | | none |

**Acknowledgements**

The research reported here was funded by the Netherlands Organisation for Scientific Research (NWO). I thank the ships crew and the personnel of the supporting technical departments of NERC-SOC for their professional support and active participation in the preparation and execution of the cruise reported here.

# Appendix A

**cruise summary (*.SUM file) of Pelagia cruise 64PE156**

# LOCO-MC Cruise Summary Charles Darwin cruise CD 153B

Cast types and Parameters may be added from the "codes" sheet

Cast types:

| | |
|---|---|
| ROS | CTD+Rosette |
| MOR | Mooring |
| SUR | Surface sampling |
| APEX | Deployment APEX float |
| MC | Multicore |
| WATER | Surface water sampling |

Event codes:

| | |
|---|---|
| BE | begin |
| BO | bottom |
| EN | end |
| DEP | deployment |

UTC

MMM dd, yyyy hh:mm:ss

| SHIP/CRS. EXPOCOD | Station | Action | Type | Event | Datum/ Tijd | | Latitude | | Longitude | | Uncorrected Depth | Comments / Opmerking | NAV | Measurement Subjec | CTD directory name |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Date | Time | deg S | min S | deg E | min E | | | | | |
| 64CD153B | 1 | 1 | SUR | BE | 12-Nov-03 | 17:59 | 4 | 50.18 | 53 | 53.58 | | P1 | | Chemistry surface | |
| 64CD153B | 2 | 1 | SUR | BE | 13-Nov-03 | 0:01 | 4 | 54.80 | 53 | 1.57 | | P2 | | Chemistry surface | |
| 64CD153B | 3 | 1 | APEX | DEP | 13-Nov-03 | 0:58 | 4 | 59.99 | 52 | 54.00 | | S/N 1001 | GPS | APEX/Argos float | |
| 64CD153B | 4 | 1 | APEX | DEP | 13-Nov-03 | 5:40 | 5 | 33.99 | 52 | 28.60 | | S/N 1000 | | APEX/Argos float | |
| 64CD153B | 5 | 1 | SUR | DEP | 13-Nov-03 | 6:00 | 5 | 34.39 | 52 | 27.10 | | P3 | | Chemistry surface | |
| 64CD153B | 6 | 1 | APEX | DEP | 13-Nov-03 | 11:00 | 6 | 10.00 | 52 | 10.97 | | S/N 999 | | APEX/Argos float | |
| | 7 | 1 | WATER | BE | 13-Nov-03 | 11:15 | 6 | 12.00 | 52 | 7.00 | | intake of | | from 2 meter through | |
| | | | | EN | 13-Nov-03 | 14:40 | 6 | 40.00 | 51 | 37.00 | | 1250 liter | | PP-coated steel | |
| 64CD153B | 8 | 1 | SUR | BE | 13-Nov-03 | 12:00 | 6 | 19.05 | 51 | 54.80 | | P4 | | Chemistry surface | |
| 64CD153B | 9 | 1 | APEX | DEP | 13-Nov-03 | 15:48 | 6 | 47.01 | 51 | 30.99 | | S/N 998 | | APEX/Argos float | |
| 64CD153B | 10 | 1 | SUR | BE | 13-Nov-03 | 18:00 | 7 | | 51 | | | P5 | | Chemistry surface | |
| 64CD153B | 11 | 1 | APEX | DEP | 13-Nov-03 | 20:35 | 7 | 24.04 | 51 | 2.00 | | S/N 997 | | APEX/Argos float | |
| 64CD153B | 12 | 1 | SUR | BE | 14-Nov-03 | 0:01 | 7 | 50.32 | 50 | 41.27 | | P6 | | Chemistry surface | |
| 64CD153B | 13 | 1 | APEX | DEP | 14-Nov-03 | 1:16 | 8 | 0.99 | 50 | 32.99 | | S/N 996 | | APEX/Argos float | |
| 64CD153B | 14 | 1 | APEX | DEP | 14-Nov-03 | 5:57 | 8 | 38.01 | 50 | 4.99 | | S/N 995 | | APEX/Argos float | |
| 64CD153B | 15 | 1 | SUR | BE | 14-Nov-03 | 6:00 | 8 | 38.58 | 50 | 4.54 | | P7 | | Chemistry surface | |

# LOCO-MC **Cruise Summary Charles Darwin cruise CD 153B**

Cast types and Parameters may be added from the "codes" sheet

Cast types:

| | |
|---|---|
| ROS | CTD+Rosette |
| MOR | Mooring |
| SUR | Surface sampling |
| APEX | Deployment APEX float |
| MC | Multicore |
| WATER | Surface water sampling |

Event codes:

| | |
|---|---|
| BE | begin |
| BO | bottom |
| EN | end |
| DEP | deployment |

| SHIP/CRS. EXPOCOD | Station | Action | Type | Event | UTC MMM dd, yyyy hh:mm:ss Datum/ Tijd | | Latitude | | Longitude | | Uncorrected Depth | Comments / Opmerking | NAV | Measurement Subjec | CTD directory name |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64CD153B | 16 | 1 | ROS | BE | 14-Nov-03 | 9:24 | 9 | 3.80 | 49 | 45.00 | | test CTD | | till 1000 m | n.a |
| | | | ROS | EN | 14-Nov-03 | 10:31 | 9 | 3.60 | 49 | 44.60 | | | | bottles at 500 m | |
| 64CD153B | 17 | 1 | SUR | BE | 14-Nov-03 | 12:00 | 9 | 14.77 | 49 | 36.27 | | P8 | | Chemistry surface | |
| 64CD153B | 18 | 1 | APEX | DEP | 14-Nov-03 | 12:06 | 9 | 15.04 | 49 | 36.08 | | S/N 994 | | APEX/Argos float | |
| 64CD153B | 19 | 1 | APEX | DEP | 14-Nov-03 | 16:52 | 9 | 51.01 | 49 | 7.50 | | S/N 993 | | APEX/Argos float | |
| 64CD153B | 20 | 1 | SUR | BE | 14-Nov-03 | 18:00 | 9 | 59.60 | 49 | 1.00 | | P9 | | Chemistry surface | |
| 64CD153B | 21 | 1 | APEX | DEP | 14-Nov-03 | 21:39 | 10 | 27.99 | 48 | 39.00 | | S/N 991 | | APEX/Argos float | |
| 64CD153B | 22 | 1 | SUR | BE | 15-Nov-03 | 0:00 | 10 | 45.67 | 48 | 24.46 | | P10 | | Chemistry surface | |
| 64CD153B | 23 | 1 | APEX | DEP | 15-Nov-03 | 1:50 | 10 | 59.99 | 48 | 12.00 | | S/N 990 | | APEX/Argos float | |
| 64CD153B | 24 | 1 | SUR | BE | 15-Nov-03 | 6:00 | 11 | 36.48 | 47 | 47.16 | | P11 | | Chemistry surface | |
| 64CD153B | 25 | 1 | SUR | BE | 15-Nov-03 | 12:05 | 12 | 21.55 | 47 | 40.44 | | P12 | | Chemistry surface | |
| 64CD153B | 26 | 1 | SUR | BE | 15-Nov-03 | 18:00 | 13 | 0.69 | 46 | 28.38 | | P13 | | Chemistry surface | |
| 64CD153B | 27 | 1 | SUR | BE | 16-Nov-03 | 0:01 | 13 | 51.55 | 45 | 37.31 | | P14 | | Chemistry surface | |
| 64CD153B | 28 | 1 | SUR | BE | 16-Nov-03 | 7:00 | 14 | 28.26 | 45 | 0.60 | | P15 | | Chemistry surface | |
| 64CD153B | 29 | 1 | SUR | BE | 16-Nov-03 | 13:00 | 15 | 5.85 | 44 | 22.85 | | P16 | | Chemistry surface | |
| 64CD153B | 30 | 1 | SUR | BE | 16-Nov-03 | 19:00 | 15 | 50.84 | 43 | 37.24 | | P17 | | Chemistry surface | |
| 64CD153B | 31 | 1 | SUR | BE | 17-Nov-03 | 1:00 | 16 | 44.15 | 43 | 12.58 | | P18 | | Chemistry surface | |

# LOCO-MC **Cruise Summary Charles Darwin cruise CD 153B**

Cast types and Parameters may be added from the "codes" sheet

Cast types:

| | |
|---|---|
| ROS | CTD+Rosette |
| MOR | Mooring |
| SUR | Surface sampling |
| APEX | Deployment APEX float |
| MC | Multicore |
| WATER | Surface water sampling |

Event codes:

| | |
|---|---|
| BE | begin |
| BO | bottom |
| EN | end |
| DEP | deployment |

| SHIP/CRS. EXPOCOD | Station | Action | Type | Event | UTC MMM dd, yyyy hh:mm:ss Datum/ Tijd | | Latitude | | Longitude | | Uncorrected Depth | Comments / Opmerking | NAV | Measurement Subjec | CTD directory name |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64CD153B | 32 | 1 | ROS | BE | 17-Nov-03 | 5:18 | 17 | 17.30 | 43 | 10.78 | 300 | station 1 | | failure | CTD1 |
| 64CD153B | | | ROS | BO | 17-Nov-03 | | | | | | | | | broken terminator | |
| 64CD153B | | | ROS | EN | 17-Nov-03 | 5:54 | 17 | 17.18 | 43 | 11.01 | | | | | |
| 64CD153B | 33 | 1 | ROS | BE | 17-Nov-03 | 7:02 | 17 | 15.94 | 43 | 5.58 | 1030 | station 2 | | failure | CTD2 |
| 64CD153B | | | ROS | BO | 17-Nov-03 | | | | | | | | | broken terminator | |
| 64CD153B | | | ROS | EN | 17-Nov-03 | 7:16 | 17 | 16.07 | 43 | 5.68 | | | | | |
| 64CD153B | 34 | 1 | SUR | BE | 17-Nov-03 | 7:06 | 17 | 15.97 | 43 | 5.55 | | P19 | | Chemistry surface | |
| 64CD153B | 35 | 1 | SUR | BE | 17-Nov-03 | 13:00 | 17 | 6.07 | 42 | 28.60 | | P20 | | Chemistry surface | |
| 64CD153B | 36 | 1 | MOR | DEP | 17-Nov-03 | 16:07 | 17 | 6.19 | 42 | 28.80 | 2202 | LMC8 | | LOCO mooring | |
| 64CD153B | 37 | 1 | SUR | BE | 17-Nov-03 | 19:01 | 17 | 16.07 | 42 | 34.78 | | P21 | | Chemistry surface | |
| 64CD153B | 38 | 1 | ROS | BE | 17-Nov-03 | 18:20 | 17 | 15.99 | 42 | 34.70 | 2020 | station 4 | | | CTD3 |
| 64CD153B | | | ROS | BO | 17-Nov-03 | | | | | | | | | | |
| 64CD153B | | | ROS | EN | 17-Nov-03 | 20:45 | 17 | 16.39 | 42 | 34.60 | | | | | |
| 64CD153B | 39 | 1 | ROS | BE | 17-Nov-03 | 22:39 | 17 | 15.80 | 42 | 50.20 | 1869 | station 3 | | failure | CTD4 |
| 64CD153B | | | ROS | BO | 17-Nov-03 | | | | | | | | | broken terminator | |
| 64CD153B | | | ROS | EN | 17-Nov-03 | 23:20 | 17 | 16.60 | 42 | 50.30 | | | | | |
| 64CD153B | 40 | 1 | SUR | BE | 18-Nov-03 | 0:35 | 17 | 16.40 | 42 | 53.44 | | P22 | | Chemistry surface | |

# LOCO-MC Cruise Summary Charles Darwin cruise CD 153B

Cast types and Parameters may be added from the "codes" sheet

Cast types:

| | |
|---|---|
| ROS | CTD+Rosette |
| MOR | Mooring |
| SUR | Surface sampling |
| APEX | Deployment APEX float |
| MC | Multicore |
| WATER | Surface water sampling |

Event codes:

| | |
|---|---|
| BE | begin |
| BO | bottom |
| EN | end |
| DEP | deployment |

| SHIP/CRS. EXPOCOD | Station | Action | Type | Event | Datum/ Tijd | UTC MMM dd, yyyy hh:mm:ss | Latitude | | Longitude | | Uncorrected Depth | Comments / Opmerking | NAV | Measurement Subjec | CTD directory name |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64CD153B | 41 | 1 | SUR | BE | 18-Nov-03 | 7:00 | 17 | 14.70 | 43 | 1.36 | | P23 | | Chemistry surface | |
| 64CD153B | 42 | 1 | MOR | DEP | 18-Nov-03 | 7:11 | 17 | 14.90 | 43 | 2.10 | 1440 | LMC9 | | LOCO mooring | |
| 64CD153B | 43 | 1 | SUR | BE | 18-Nov-03 | 13:00 | 17 | 0.57 | 42 | 6.63 | | P24 | | Chemistry surface | |
| 64CD153B | 44 | 1 | MOR | DEP | 18-Nov-03 | 15:20 | 16 | 58.6 | 41 | 56.30 | 1995 | LMC7 | | LOCO mooring | |
| 64CD153B | 45 | 1 | ROS | BE | 18-Nov-03 | 17:41 | 17 | 1.00 | 42 | 4.20 | 2211 | station 6 | | | CTD5 |
| 64CD153B | | | ROS | BO | 18-Nov-03 | | | | | | | | | | |
| 64CD153B | | | ROS | EN | 18-Nov-03 | 20:20 | 17 | 1.70 | 42 | 4.50 | | | | | |
| 64CD153B | 46 | 1 | SUR | BE | 18-Nov-03 | 19:00 | 17 | 1.43 | 42 | 4.20 | | P25 | | Chemistry surface | |
| 64CD153B | 47 | 1 | ROS | BE | 18-Nov-03 | 22:03 | 17 | 4.60 | 42 | 19.30 | 2090 | station 5 | | | CTD6 |
| 64CD153B | | | ROS | BO | 18-Nov-03 | | | | | | | | | | |
| 64CD153B | | | ROS | EN | 19-Nov-03 | 0:58 | 17 | 4.60 | 42 | 19.60 | | | | | |
| 64CD153B | 48 | 1 | SUR | BE | 19-Nov-03 | 00:51 | 17 | 4.59 | 43 | 19.61 | | P26 | | Chemistry surface | |
| 64CD153B | 49 | 1 | MOR | DEP | 19-Nov-03 | 09:14 | 16 | 52.22 | 41 | 28.72 | 2692 | LMC6 | | LOCO mooring | |
| 64CD153B | 50 | 1 | SUR | BE | 19-Nov-03 | 07:00 | 16 | 49.28 | 41 | 28.70 | | P27 | | Chemistry surface | |
| 64CD153B | 51 | 1 | ROS | BE | 19-Nov-03 | 11:47 | 16 | 57.34 | 41 | 48.78 | 2050 | station 7 | | | CTD7 |
| 64CD153B | | | ROS | BO | 19-Nov-03 | | | | | | | | | | |
| 64CD153B | | | ROS | EN | 19-Nov-03 | 14:20 | 16 | 57.80 | 41 | 48.52 | | | | | |

# LOCO-MC Cruise Summary Charles Darwin cruise CD 153B

Cast types and Parameters may be added from the "codes" sheet

Cast types:

| | |
|---|---|
| ROS | CTD+Rosette |
| MOR | Mooring |
| SUR | Surface sampling |
| APEX | Deployment APEX float |
| MC | Multicore |
| WATER | Surface water sampling |

Event codes:

| | |
|---|---|
| BE | begin |
| BO | bottom |
| EN | end |
| DEP | deployment |

| SHIP/CRS. EXPOCOD | Station | Action | Type | Event | Datum/ Tijd (UTC, MMM dd, yyyy hh:mm:ss) | | Latitude | | Longitude | | Uncorrected Depth | Comments / Opmerking | NAV | Measurement Subjec | CTD directory name |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64CD153B | 52 | 1 | SUR | BE | 19-Nov-03 | 14:18 | 16 | 57.81 | 41 | 48.51 | | P28 | | Chemistry surface | |
| 64CD153B | 53 | 1 | MC | BE | 19-Nov-03 | 17:38 | 16 | 50.00 | 41 | 23.50 | | MC1 | | bottom fluxes and | |
| 64CD153B | | | | BO | 19-Nov-03 | 18:30 | 16 | 50.10 | 41 | 23.60 | | | | composition | |
| 64CD153B | | | | EN | 19-Nov-03 | 19:30 | 16 | 50.22 | 41 | 23.90 | | | | too deep penetration | |
| 64CD153B | 54 | 1 | SUR | BE | 19-Nov-03 | 18:26 | 16 | 50.19 | 41 | 23.56 | | P29 | | Chemistry surface | |
| 64CD153B | 55 | 1 | ROS | BE | 19-Nov-03 | 21:01 | 16 | 53.73 | 41 | 33.40 | 2761 | station 8 | | | CTD8 |
| 64CD153B | | | ROS | BO | 19-Nov-03 | | | | | | | | | | |
| 64CD153B | | | ROS | EN | 20-Nov-03 | 0:16 | 16 | 54.10 | 41 | 32.40 | | | | | |
| 64CD153B | 56 | 1 | SUR | BE | 20-Nov-03 | 00:21 | 16 | 54.19 | 41 | 32.25 | | P30 | | Chemistry surface | |
| 64CD153B | 57 | 1 | MC | BE | 20-Nov-03 | 3:10 | 16 | 47.77 | 41 | 8.00 | 2489 | MC2 | | bottom fluxes and | |
| 64CD153B | | | | BO | 20-Nov-03 | 3:59 | 16 | 47.77 | 41 | 8.01 | | | | composition | |
| 64CD153B | | | | EN | 20-Nov-03 | 4:46 | 16 | 47.78 | 41 | 7.99 | | | | too shallow penetration | |
| 64CD153B | 58 | 1 | SUR | BE | 20-Nov-03 | 06:00 | 16 | 45.28 | 41 | 3.25 | | P31 | | Chemistry surface | |
| 64CD153B | 59 | 1 | MOR | DEP | 20-Nov-03 | 07:42 | 16 | 45.94 | 41 | 3.93 | 2400 | LMC5A | | LOCO mooring | |
| 64CD153B | 60 | 1 | MC | BE | 20-Nov-03 | 08:38 | 16 | 47.8 | 41 | 8.00 | | MC2 | | bottom fluxes and | |
| 64CD153B | | | | BO | 20-Nov-03 | 09:21 | 16 | 47.6 | 41 | 7.90 | | | | composition | |
| 64CD153B | | | | EN | 20-Nov-03 | 10:19 | 16 | 47.58 | 41 | 7.95 | | | | | |

Summary Page 5

# LOCO-MC Cruise Summary Charles Darwin cruise CD 153B

Cast types and Parameters may be added from the "codes" sheet

Cast types:

| | |
|---|---|
| ROS | CTD+Rosette |
| MOR | Mooring |
| SUR | Surface sampling |
| APEX | Deployment APEX float |
| MC | Multicore |
| WATER | Surface water sampling |

Event codes:

| | |
|---|---|
| BE | begin |
| BO | bottom |
| EN | end |
| DEP | deployment |

| SHIP/CRS. EXPOCOD | Station | Action | Type | Event | Datum/ Tijd (UTC MMM dd, yyyy hh:mm:ss) | | Latitude | | Longitude | | Uncorrected Depth | Comments / Opmerking | NAV | Measurement Subjec | CTD directory name |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64CD153B | 61 | 1 | ROS | BE | 20-Nov-03 | 12:11 | 16 | 51.18 | 41 | 23.47 | 2669 | station 9 | | | CTD9 |
| 64CD153B | | | ROS | BO | 20-Nov-03 | | | | | | | | | | |
| 64CD153B | | | ROS | EN | 20-Nov-03 | 15:04 | 16 | 51.08 | 41 | 23.34 | | | | | |
| 64CD153B | 62 | 1 | SUR | BE | 20-Nov-03 | 13:04 | 16 | 51.14 | 41 | 23.61 | | P32 | | Chemistry surface | |
| 64CD153B | 63 | 1 | ROS | BE | 20-Nov-03 | 16:47 | 16 | 48.69 | 41 | 13.11 | 2586 | station 10 | | | CTD10 |
| 64CD153B | | | ROS | BO | 20-Nov-03 | | | | | | | | | | |
| 64CD153B | | | ROS | EN | 20-Nov-03 | 19:42 | 16 | 48.54 | 41 | 13.18 | | | | | |
| 64CD153B | 64 | 1 | SUR | BE | 20-Nov-03 | 19:03 | 16 | 48.61 | 41 | 13.20 | | P33 | | Chemistry surface | |
| 64CD153B | 65 | 1 | ROS | BE | 20-Nov-03 | 21:27 | 16 | 47.31 | 41 | 2.34 | 2382 | station 11 | | | CTD11 |
| 64CD153B | | | ROS | BO | 20-Nov-03 | | | | | | | | | | |
| 64CD153B | | | ROS | EN | 21-Nov-03 | 0:31 | 16 | 47.47 | 41 | 2.69 | | | | | |
| 64CD153B | 66 | 1 | SUR | BE | 21-Nov-03 | 01:35 | 16 | 44.45 | 40 | 54.17 | | P34 | | Chemistry surface | |
| 64CD153B | 67 | 1 | MC | BE | 21-Nov-03 | 02:17 | 16 | 43.44 | 40 | 50.95 | | MC3 | | bottom fluxes and | |
| 64CD153B | | | | BO | 21-Nov-03 | 03:02 | 16 | 43.44 | 40 | 50.97 | | | | composition | |
| 64CD153B | | | | EN | 21-Nov-03 | 03:45 | 16 | 43.42 | 40 | 50.98 | | | | | |
| 64CD153B | 68 | 1 | SUR | BE | 21-Nov-03 | 07:06 | 16 | 38.38 | 40 | 36.46 | | P35 | | Chemistry surface | |
| 64CD153B | 69 | 1 | MOR | DEP | 21-Nov-03 | 07:49 | 16 | 38.74 | 40 | 36.71 | 1992 | LMC5 | | LOCO mooring | |

Summary Page 6

# LOCO-MC Cruise Summary Charles Darwin cruise CD 153B

Cast types and Parameters may be added from the "codes" sheet

Cast types:

| | |
|---|---|
| ROS | CTD+Rosette |
| MOR | Mooring |
| SUR | Surface sampling |
| APEX | Deployment APEX float |
| MC | Multicore |
| WATER | Surface water sampling |

Event codes:

| | |
|---|---|
| BE | begin |
| BO | bottom |
| EN | end |
| DEP | deployment |

UTC

MMM dd, yyyy hh:mm:ss

| SHIP/CRS. EXPOCOD | Station | Action | Type | Event | Datum/ Tijd | | Latitude | | Longitude | | Uncorrected Depth | Comments / Opmerking | NAV | Measurement Subjec | CTD directory name |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64CD153B | 70 | 1 | MC | BE | 21-Nov-03 | 09:15 | 16 | 40.67 | 40 | 40.31 | | MC4 | | bottom fluxes and | |
| 64CD153B | | | | BO | 21-Nov-03 | 10:00 | 16 | 40.7 | 40 | 40.21 | | | | composition | |
| 64CD153B | | | | EN | 21-Nov-03 | 10:53 | 16 | 40.92 | 40 | 40.11 | | | | | |
| 64CD153B | 71 | 1 | ROS | BE | 21-Nov-03 | 12:29 | 16 | 43.70 | 40 | 52.70 | 2273 | station 12 | | | CTD12 |
| 64CD153B | | | ROS | BO | 21-Nov-03 | 13:28 | | 43.65 | 40 | 52.60 | | | | | |
| 64CD153B | | | ROS | EN | 21-Nov-03 | 15:02 | 16 | 43.60 | 40 | 52.60 | | | | | |
| 64CD153B | 72 | 1 | ROS | BE | 21-Nov-03 | 17:04 | 16 | 41.20 | 40 | 42.45 | 2113 | station 13 | | | CTD13 |
| 64CD153B | | | ROS | BO | 21-Nov-03 | 18:00 | 16 | 41.31 | 40 | 42.40 | | | | | |
| 64CD153B | | | ROS | EN | 21-Nov-03 | 19:38 | 16 | 41.57 | 40 | 42.31 | | | | | |
| 64CD153B | 73 | 1 | ROS | BE | 21-Nov-03 | 21:28 | 16 | 38.90 | 40 | 32.10 | 1912 | station 14 | | | CTD14 |
| 64CD153B | | | ROS | BO | 21-Nov-03 | | | | | | | | | | |
| 64CD153B | | | ROS | EN | 21-Nov-03 | 23:48 | 16 | 40.30 | 40 | 31.40 | | | | | |
| 64CD153B | 74 | 1 | SUR | BE | 22-Nov-03 | 01:30 | 16 | 37.68 | 40 | 26.97 | | P36 | | Chemistry surface | |
| 64CD153B | 75 | 1 | MC | BE | 22-Nov-03 | 02:16 | 16 | 37.29 | 40 | 27.16 | 1833 | MC5 | | bottom fluxes and | |
| 64CD153B | | | | BO | 22-Nov-03 | 02:54 | 16 | 37.57 | 40 | 26.99 | | | | composition | |
| 64CD153B | | | | EN | 22-Nov-03 | 03:27 | 16 | 37.92 | 40 | 26.84 | | | | | |
| 64CD153B | 76 | 1 | MOR | DEP | 22-Nov-03 | 07:42 | 16 | 42.82 | 40 | 51.13 | 2242 | LMC trap | | trap mooring | |

Summary Page 7

**LOCO-MC** **Cruise Summary Charles Darwin cruise CD 153B**

Cast types and Parameters may be added from the "codes" sheet

Cast types:

| | |
|---|---|
| ROS | CTD+Rosette |
| MOR | Mooring |
| SUR | Surface sampling |
| APEX | Deployment APEX float |
| MC | Multicore |
| WATER | Surface water sampling |

Event codes:

| | |
|---|---|
| BE | begin |
| BO | bottom |
| EN | end |
| DEP | deployment |

UTC

MMM dd, yyyy hh:mm:ss

| SHIP/CRS. EXPOCOD | Station | Action | Type | Event | Datum/ Tijd | | Latitude | | Longitude | | Uncorrected Depth | Comments / Opmerking | NAV | Measurement Subjec | CTD directory name |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64CD153B | 77 | 1 | SUR | BE | 22-Nov-03 | 14:01 | 16 | 31.45 | 40 | 1.73 | | P37 | | Chemistry surface | |
| 64CD153B | 78 | 1 | ROS | BE | 22-Nov-03 | 13:26 | 16 | 31.40 | 40 | 1.70 | 945 | station 17 | | | CTD15 |
| 64CD153B | | | ROS | BO | 22-Nov-03 | | | | | | | | | | |
| 64CD153B | | | ROS | EN | 22-Nov-03 | 15:18 | 16 | 31.40 | 40 | 1.70 | | | | | |
| 64CD153B | 79 | 1 | ROS | BE | 22-Nov-03 | 17:30 | 16 | 33.80 | 40 | 11.80 | 1450 | station 16 | | | CTD16 |
| 64CD153B | | | ROS | BO | 22-Nov-03 | | | | | | | | | | |
| 64CD153B | | | ROS | EN | 22-Nov-03 | 19:10 | 16 | 34.60 | 40 | 11.99 | | | | | |
| 64CD153B | 80 | 1 | SUR | BE | 22-Nov-03 | 19:07 | 16 | 34.58 | 40 | 11.97 | | P38 | | Chemistry surface | |
| 64CD153B | 81 | 1 | ROS | BE | 22-Nov-03 | 21:10 | 16 | 36.42 | 40 | 21.94 | 1719 | station 15 | | | CTD17 |
| 64CD153B | | | ROS | BO | 22-Nov-03 | | | | | | | | | | |
| 64CD153B | | | ROS | EN | 22-Nov-03 | 23:26 | 16 | 36.72 | 40 | 21.42 | | | | | |
| 64CD153B | 82 | 1 | MC | BE | 23-Nov-03 | 00:34 | 16 | 34.02 | 40 | 13.11 | | MC6 | | bottom fluxes and | |
| 64CD153B | | | | BO | 23-Nov-03 | | | | | | | | | composition | |
| 64CD153B | | | | EN | 23-Nov-03 | 02:10 | 16 | 34.21 | 40 | 13.32 | | | | | |
| 64CD153B | 83 | 1 | MC | BE | 23-Nov-03 | 03:54 | 16 | 31.7 | 40 | 3.08 | | MC7 | | bottom fluxes and | |
| 64CD153B | | | | BO | 23-Nov-03 | | | | | | | | | composition | |
| 64CD153B | | | | EN | 23-Nov-03 | 04:52 | 16 | 31.7 | 40 | 3.01 | | | | wrong sample | |

# LOCO-MC Cruise Summary Charles Darwin cruise CD 153B

Cast types and Parameters may be added from the "codes" sheet

Cast types:

| | |
|---|---|
| ROS | CTD+Rosette |
| MOR | Mooring |
| SUR | Surface sampling |
| APEX | Deployment APEX float |
| MC | Multicore |
| WATER | Surface water sampling |

Event codes:

| | |
|---|---|
| BE | begin |
| BO | bottom |
| EN | end |
| DEP | deployment |

| SHIP/CRS. EXPOCOD | Station | Action | Type | Event | Datum/ Tijd | UTC MMM dd, yyyy hh:mm:ss | Latitude | | Longitude | | Uncorrected Depth | Comments / Opmerking | NAV | Measurement Subjec | CTD directory name |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64CD153B | 84 | 1 | MC | BE | 23-Nov-03 | 05:30 | 16 | 31.69 | 40 | 3.00 | | MC7 | | bottom fluxes and | |
| 64CD153B | | | | BO | 23-Nov-03 | | | | | | | | | composition | |
| 64CD153B | | | | EN | 23-Nov-03 | 06:12 | 16 | 31.87 | 40 | 3.03 | | | | wrong sample | |
| 64CD153B | 85 | 1 | MOR | DEP | 23-Nov-03 | 07:40 | 16 | 32.78 | 40 | 8.98 | 1352 | LMC4 | | LOCO mooring | |
| 64CD153B | 86 | 1 | SUR | BE | 23-Nov-03 | 13:00 | 16 | 35.58 | 40 | -1.50 | | P39 | | Chemistry surface | |
| 64CD153B | 87 | 1 | SUR | BE | 23-Nov-03 | 19:14 | 18 | 18.43 | 39 | 8.59 | | P40 | | Chemistry surface | |
| 64CD153B | 88 | 1 | SUR | BE | 24-Nov-03 | 02:19 | 19 | 18.76 | 38 | 34.69 | | P41 | | Chemistry surface | |
| 64CD153B | 89 | 1 | SUR | BE | 24-Nov-03 | 03:25 | 19 | 27.95 | 38 | 29.39 | | P42 | | Chemistry surface | |
| 64CD153B | 90 | 1 | SUR | BE | 24-Nov-03 | 04:21 | 19 | 35.09 | 38 | 25.37 | | P43 | | Chemistry surface | |
| 64CD153B | 91 | 1 | SUR | BE | 24-Nov-03 | 05:18 | 19 | 42.96 | 38 | 21.03 | | P44 | | Chemistry surface | |
| 64CD153B | 92 | 1 | SUR | BE | 24-Nov-03 | 06:20 | 19 | 51.70 | 38 | 15.90 | | P45 | | Chemistry surface | |
| 64CD153B | 93 | 1 | SUR | BE | 24-Nov-03 | 07:18 | 19 | 57.04 | 38 | 12.77 | | P46 | | Chemistry surface | |
| 64CD153B | 94 | 1 | SUR | BE | 24-Nov-03 | 08:21 | 20 | 5.85 | 38 | 7.95 | | P47 | | Chemistry surface | |
| 64CD153B | 95 | 1 | SUR | BE | 24-Nov-03 | 09:18 | 20 | 13.36 | 38 | 3.80 | | P48 | | Chemistry surface | |
| 64CD153B | 96 | 1 | SUR | BE | 24-Nov-03 | 10:18 | 20 | 21.60 | 37 | 59.15 | | P49 | | Chemistry surface | |
| 64CD153B | 97 | 1 | SUR | BE | 24-Nov-03 | 11:18 | 20 | 30.07 | 37 | 54.42 | | P50 | | Chemistry surface | |
| 64CD153B | 98 | 1 | SUR | BE | 24-Nov-03 | 12:15 | 20 | 38.45 | 37 | 49.61 | | P51 | | Chemistry surface | |

# LOCO-MC Cruise Summary Charles Darwin cruise CD 153B

Cast types and Parameters may be added from the "codes" sheet

Cast types:

| | |
|---|---|
| ROS | CTD+Rosette |
| MOR | Mooring |
| SUR | Surface sampling |
| APEX | Deployment APEX float |
| MC | Multicore |
| WATER | Surface water sampling |

Event codes:

| | |
|---|---|
| BE | begin |
| BO | bottom |
| EN | end |
| DEP | deployment |

| SHIP/CRS. EXPOCOD | Station | Action | Type | Event | Datum/ Tijd (UTC MMM dd, yyyy hh:mm:ss) | | Latitude | | Longitude | | Uncorrected Depth | Comments / Opmerking | NAV | Measurement Subjec | CTD directory name |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64CD153B | 99 | 1 | SUR | BE | 24-Nov-03 | 13:26 | 20 | 48.10 | 37 | 44.20 | | P52 | | Chemistry surface | |
| 64CD153B | 100 | 1 | SUR | BE | 24-Nov-03 | 14:18 | 20 | 55.53 | 37 | 40.22 | | P53 | | Chemistry surface | |
| 64CD153B | 101 | 1 | SUR | BE | 24-Nov-03 | 15:18 | 21 | 4.28 | 37 | 35.48 | | P54 | | Chemistry surface | |
| 64CD153B | 102 | 1 | SUR | BE | 24-Nov-03 | 16:18 | 21 | 12.89 | 37 | 30.39 | | P55 | | Chemistry surface | |
| 64CD153B | 103 | 1 | SUR | BE | 24-Nov-03 | 17:18 | 21 | 21.75 | 37 | 25.04 | | P56 | | Chemistry surface | |
| 64CD153B | 104 | 1 | SUR | BE | 24-Nov-03 | 18:19 | 21 | 30.74 | 37 | 19.74 | | P57 | | Chemistry surface | |
| 64CD153B | 105 | 1 | SUR | BE | 24-Nov-03 | 19:18 | 21 | 39.38 | 37 | 14.81 | | P58 | | Chemistry surface | |
| 64CD153B | 106 | 1 | SUR | BE | 25-Nov-03 | 02:04 | 22 | 34.36 | 36 | 42.69 | | P59 | | Chemistry surface | |
| 64CD153B | 107 | 1 | SUR | BE | 25-Nov-03 | 08:00 | 23 | 30.54 | 36 | 10.52 | | P60 | | Chemistry surface | |
| 64CD153B | 108 | 1 | SUR | BE | 25-Nov-03 | 14:07 | 24 | 30.50 | 35 | 35.24 | | P61 | | Chemistry surface | |
| 64CD153B | 109 | 1 | SUR | BE | 25-Nov-03 | 17:02 | 24 | 57.44 | 35 | 16.26 | | P62 | | Chemistry surface | |

# Appendix B

# Mooring information file of Pelagia cruise 64PE156

Mooring data LOCO Mozambique Channel: deployment in 2003

| Mooring ID | Location of deployment: Latitude deg S | Latitude min S | Longitude deg | Longitude min E | Water depth | measurement Type | instrument Type | Instrument ID | meters below surface | Recording interval(s) | DSU No. | Start date | Start time(UTC) | Deployment date | Deployment time | Releases Oceano AR-861 Nr. | Releases code | Argos buoy ID/SN | code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LMC4** | 16 | 32.78 | 40 | 8.98 | 1352 | ADCP | LR | 1428 | 591 | 1800 | | 21-Nov | 11:40 | 23-Nov-03 | 07:40 | 150 | 04c5 | CML 60668 | 22312 |
| | | | | | | CTD | SBE-37-SM | 2649 | 625 | 300 | | 21-Nov | 08:38 | | | 151 | 04c6 | | |
| | | | | | | CTD | SBE-37-SM | 2650 | 1075 | 300 | | 21-Nov | 08:42 | | | | | | |
| | | | | | | currentmeter | RCM11 | 240 | 1292 | 900 | 13744 | 21-Nov | 13:06 | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| **LMC 5** | 16 | 38.74 | 40 | 36.71 | 1992 | ADCP | LR | 1431 | 591 | 1800 | | 20-Nov | 12:30 | 21-Nov-03 | 07:49 | 152 | 04C7 | CML 60669 | 23495 |
| | | | | | | CTD | SBE-37-SM | 2651 | 625 | 300 | | 20-Nov | 15:42 | | | 153 | 04C8 | | |
| | | | | | | PASSAM | | 13 | 626 | | | 21-Nov | | | | | | | |
| | | | | | | currentmeter | RCM11 | 200 | 991 | 900 | 13525 | 20-Nov | 13:50 | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2652 | 1025 | 300 | | 20-Nov | 15:38 | | | | | | |
| | | | | | | currentmeter | RCM11 | 201 | 1491 | 900 | 13526 | 20-Nov | 13:39 | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2653 | 1525 | 300 | | 20-Nov | 15:34 | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2654 | 1975 | 300 | | 20-Nov | 15:30 | | | | | | |
| | | | | | | PASSAM | | 14 | 1976 | | | 21-Nov | | | | | | | |
| | | | | | | ADCP | LR | 3596 | 1995 | 1800 | | 20-Nov | 12:45 | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| **LMC5A** | 16 | 45.94 | 41 | 3.93 | 2400 | CTD | SBE-37-SM | 2655 | 110 | 300 | | 19-Nov | 12:55 | 20-Nov-03 | 07:42 | 162 | 04D2 | CML 60661 | 22429 |
| | | | | | | PASSAM | | 16 | 111 | | | 20-Nov | | | | 163 | 04D3 | | |
| | | | | | | CTD | SBE-37-SM | 2656 | 200 | 300 | | 19-Nov | 12:57 | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2657 | 400 | 300 | | 19-Nov | 12:52 | | | | | | |
| | | | | | | currentmeter | RCM11 | 202 | 481 | 900 | 13527 | 19-Nov | 14:13 | | | | | | |
| | | | | | | PASSAM | | 17 | 626 | | | 20-Nov | | | | | | | |
| | | | | | | currentmeter | RCM11 | 203 | 992 | 900 | 13528 | 19-Nov | 13:58 | | | | | | |
| | | | | | | currentmeter | RCM11 | 204 | 1491 | 900 | 13529 | 19-Nov | 13:49 | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2658 | 1525 | 300 | | 19-Nov | 12:53:15 | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2659 | 1975 | 300 | | 19-Nov | 12:49:00 | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2660 | 2375 | 300 | | 19-Nov | 12:46:30 | | | | | | |
| | | | | | | ADCP | LR | 3702 | 2391 | 1800 | | 19-Nov | 15:10:00 | | | | | | |

Mooring data LOCO Mozambique Channel: deployment in 2003

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LMC6** | 16 | 52.22 | 41 | 28.72 | 2692 | ADCP | LR | 3641 | 591 | 1800 | | 19-Nov | 06:10 | 19-Nov-03 | 09:14 | 154 | 04C9 | CML 60670 | 22621 |
| | | | | | | CTD | SBE-37-SM | 2662 | 625 | 300 | | 19-Nov | 12:15 | | | 155 | 04CA | | |
| | | | | | | currentmeter | RCM11 | 205 | 991 | 900 | 13530 | 19-Nov | 04:30 | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2663 | 1025 | 300 | | 18-Nov | 12:12 | | | | | | |
| | | | | | | currentmeter | RCM11 | 206 | 1491 | 900 | 13531 | 19-Nov | 04:16 | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2664 | 1975 | 300 | | 18-Nov | 12:10 | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2665 | 2375 | 300 | | 18-Nov | 12:05 | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2666 | 2675 | 300 | | 18-Nov | 11:52 | | | | | | |
| | | | | | | PASSAM | | 18 | 2676 | | | 19-Nov | | | | | | | |
| | | | | | | ADCP | LR | 3701 | 2689 | 1800 | | | | | | | | | |
| | | | | | | | | | | | | | ;00 | | | | | | |
| **LMC7** | 16 | 58.6 | 41 | 56.30 | 1995 | currentmeter | RCM11 | 239 | 621 | 900 | 13743 | 18-Nov | 13:25 | 18-Nov-03 | 15:20 | 156 | 04CB | CML 60671 | 23490 |
| | | | | | | currentmeter | RCM11 | 236 | 992 | 900 | 13740 | 18-Nov | 13:38 | | | 157 | 04CC | | |
| | | | | | | currentmeter | RCM11 | 237 | 1491 | 900 | 13741 | 18-Nov | 13:47 | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2667 | 1525 | 300 | | 18-Nov | 11:45 | | | | | | |
| **LMC8** | 17 | 6.19 | 42 | 28.80 | 2202 | ADCP | LR | 3440 | 596 | 1800 | | check on ADCP recorder | | 17-Nov-03 | 16:07 | 158 | 04CD | CML 60672 | 23201 |
| | | | | | | CTD | SBE-37-SM | 2668 | 625 | 300 | | check on SBE recorder | | | | 159 | 04CE | | |
| | | | | | | currentmeter | RCM11 | 238 | 994 | 900 | 13742 | heck on DSU | | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2669 | 1025 | 300 | | check on SBE recorder | | | | | | | |
| | | | | | | currentmeter | RCM8 | 12755 | 1493 | ? | | Check on DSU | | | | | | | |
| | | | | | | CTD | SBE-37-SM | 2670 | 2075 | 300 | | Check on SBE recorder | | | | | | | |
| | | | | | | currentmeter | RCM8 | 12052 | 2092 | ? | | Check on DSU | | | | | | | |
| **LMC9** | 17 | 14.90 | 43 | 2.10 | 1440 | currentmeter | RCM11 | 242 | 628 | 900 | 13746 | 18-Nov | 04:10 | 18-Nov-03 | 07:11 | 160 | 04CF | CML 60673 | 23339 |
| | | | | | | currentmeter | RCM11 | 241 | 1026 | 900 | 13745 | 18-Nov | 04:14 | | | 161 | 04D1 | | |
| **trap** | 16 | 42.82 | 40 | 51.13 | 2242 | trap | | 51 | 2011 | | | | | 22-Nov-03 | 07:42 | Benthos | | ID1770 | SN1207 |
| | | | | | | CTD | SBE-37-SM | 1626 | 2200 | 300 | | | | | | 949 | D/B | MDL3721 | |
| | | | | | | PASSAM | | 15 | 2201 | | | | | | | 948 | C/A | | |
| | | | | | | trap | PPS5 | 09-Jun | 2245 | | | | | | | | | | |

# Appendix C

## Rotation schedule sediment traps

**Mooring MOZ-1: deployed November 22, 2003 during LOCO/CD153B (EL LOCO)**

Prospective recovery by April/May, 2005 by RRV Discovery

**all dates and times in UTC** **position:** **16 deg 42.82S, 40 deg 51.13E**

| **Position Number** | **date UTC** dd-m-yy hr:min | **sampling** cups | **date UTC** dd-m-yy hr:min | **collecting interval (days)** | **bottle number** | **remarks** |
|---|---|---|---|---|---|---|
| **1** | 23-11-2003 1:00 | start sample #1 | 23-nov-03 01:00 | **21** | **MOZ-1-A/B-1** | programmed as if 1975 |
| **2** | 14-12-2003 1:00 | start sample #2 | 14-dec-03 01:00 | **21** | **MOZ-1-A/B-2** | |
| **3** | 4-1-2004 1:00 | start sample #3 | 4-jan-04 01:00 | **21** | **MOZ-1-A/B-3** | |
| **4** | 25-1-2004 1:00 | start sample #4 | 25-jan-04 01:00 | **21** | **MOZ-1-A/B-4** | |
| **5** | 15-2-2004 1:00 | start sample #5 | 15-feb-04 01:00 | **21** | **MOZ-1-A/B-5** | **Feb. 29, 2004** |
| **6** | 7-3-2004 1:00 | start sample #6 | 7-mrt-04 01:00 | **21** | **MOZ-1-A/B-6** | **Feb. 29, 2004** |
| **7** | 28-3-2004 1:00 | start sample #7 | 28-mrt-04 01:00 | **21** | **MOZ-1-A/B-7** | |
| **8** | 18-4-2004 1:00 | start sample #8 | 18-apr-04 01:00 | **21** | **MOZ-1-A/B-8** | |
| **9** | 9-5-2004 1:00 | start sample #9 | 9-mei-04 01:00 | **21** | **MOZ-1-A/B-9** | |
| **10** | 30-5-2004 1:00 | start sample #10 | 30-mei-04 01:00 | **21** | **MOZ-1-A/B-10** | |
| **11** | 20-6-2004 1:00 | start sample #11 | 20-jun-04 01:00 | **21** | **MOZ-1-A/B-11** | |
| **12** | 11-7-2004 1:00 | start sample #12 | 11-jul-04 01:00 | **21** | **MOZ-1-A/B-12** | |
| **13** | 1-8-2004 1:00 | start sample #13 | 1-aug-04 01:00 | **21** | **MOZ-1-A/B-13** | |
| **14** | 22-8-2004 1:00 | start sample #14 | 22-aug-04 01:00 | **21** | **MOZ-1-A/B-14** | |
| **15** | 12-9-2004 1:00 | start sample #15 | 12-sep-04 01:00 | **21** | **MOZ-1-A/B-15** | |
| **16** | 3-10-2004 1:00 | start sample #16 | 3-okt-04 01:00 | **21** | **MOZ-1-A/B-16** | |
| **17** | 24-10-2004 1:00 | start sample #17 | 24-okt-04 01:00 | **21** | **MOZ-1-A/B-17** | |
| **18** | 14-11-2004 1:00 | start sample #18 | 14-nov-04 01:00 | **21** | **MOZ-1-A/B-18** | |
| **19** | 5-12-2004 1:00 | start sample #19 | 5-dec-04 01:00 | **21** | **MOZ-1-A/B-19** | |
| **20** | 26-12-2004 1:00 | start sample #20 | 26-dec-04 01:00 | **21** | **MOZ-1-A/B-20** | |
| **21** | 16-1-2005 1:00 | start sample #21 | 16-jan-05 01:00 | **21** | **MOZ-1-A/B-21** | |
| **22** | 6-2-2005 1:00 | start sample #22 | 6-feb-05 01:00 | **21** | **MOZ-1-A/B-22** | |
| **23** | 27-2-2005 1:00 | start sample #23 | 27-feb-05 01:00 | **21** | **MOZ-1-A/B-23** | |
| **24** | 20-3-2005 1:00 | start sample #24 | 20-mrt-05 01:00 | **21** | **MOZ-1-A/B-24** | |
| **25** | 10-4-2005 1:00 | end sample #24 | 10-apr-05 01:00 | | | |