

1.4 Cruise diary for RRS Discovery Cruises 285 and 286

29 Oct 2004 (Fri) 303



Demobilization of D284 took all morning. Rearrangement of after deck took the afternoon. No unloading of D285 equipment from the hold was possible. Reports indicate the all the sediment traps being air-freighted via Germany are stuck there and may not arrive until 5 Oct. The small rexroth winch on the side of the gantry has been replaced by a smaller one, apparently by marine side. This may not hold enough Kevlar for satisfactory zooplankton nets. Has there been lack of coordination between RSU and UKORS?

30 Oct 2004 (Sat) 304

Leaving crew paid off so slow start. But all gear out of the hold by noon

31 Oct 2004 (Sun) 305

1 Nov 2004 (Mon) 306

2 Nov 2004 (Tues) 307

Brisk southeaster all day. Moved at 1000 to bunker berth in the Duncan Dock as planned, but there was a queue until 1500 before bunkering started, and it then proceeded much more slowly than expected, so was not completed until 2200? Sailing deferred until 0800 because of weather, lateness and long hours worked.

3 Nov 2004 (Wed) 308

0800 cast off from bunker berth. Near flat calm as we left harbour, on passage all day.

4 Nov 2004 (Thur) 309

1136-1411 streamed the trace metal fish for trials. Fairing adjusted on deployment. A line was attached to the tail and adjusted such that it was taut when stationary to prevent the fish rotating. On passage the line streamed aft to about halfway down the length of the after deck, and the drag turned the tail of the fish inwards so that the fish streamed well out from the ship, a desirable side effect.

At 1730Z (all times GMT hereafter) a Provor Argo float was deployed. (This float reported successfully at 0300 on 8 Nov as programmed)

5 Nov 2004 (Fri) 310

Clocks were advanced one hour to GMT+3.

0715-0905 the vessel was hove to for trial tCTD (Discovery station 15486) cast and net deployment. Here tCTD is the abbreviation for the Titanium rosette and CTD from trace metal work. This distinguishes it from the stainless steel rosette with CTD and LADCP, which we shall refer to as sCTD. The tCTD was lowered to 1000 m. After continuing passage, the vessel hove to again 1112-1253 for a trial sCTD (15487) cast to 1000 m.

6 Nov 2004 (Sat) 311

On passage all day.

7 Nov 2004 (Sun) 312

Clocks were advanced one hour to GMT+4. Once plans for safe deployment and recovery of the SeaSoar were in place and the SeaSoar winch had been load tested, a SeaSoar trial was undertaken in relatively calm conditions. From 1139 to 1201 SeaSoar was deployed (15488) for a trial run, using the starboard crane aft to hold the shieve during deployment. Profiling was gradually adjusted and a depth of 300 m was reached with a reasonable sawtooth pattern at 8 and later 9 kts before the SeaSoar was retrieved 1519-1615

8 Nov 2004 (Mon) 313

On passage all day.

9 Nov 2004 (Tues) 314

The trace metal fish was deployed at 0648. At 1056 station J (42°S, 48°E) was reached and the first station sCTD15489 was worked to 3031m. This position was known to be in the Agulhas Return Current just NW of a tongue of blue, probably HNLC, water seen on satellite images up to 3 Nov. The intention was to work a line of CTDs down to M4, the primary site in the oldest bloom area. The sCTD was recovered at 1757 and followed by a 2 nets. A Provor Argo float was deployed before leaving J. The next station was intended to be in the HNLC tongue, but the combination of low temperature and low chlorophyll (being watched on the underway data stream) proved elusive, and the vessel hove to at 2334 in much colder water, probably already in the bloom regime.

10 Nov 2004 (Wed) 315

However, the weather had deteriorated, and the vessel could not hold station for a CTD. After discussion it was decided to continue on towards M4, as the vessel was running easily with the wind and swell behind. Underway observations were to be taken. By 0806 however it was no longer possible to maintain course SE and the vessel hove to.

11 Nov 2004 (Thur) 316

After creeping west until 0445, the vessel turned to run back east, easing the course round to a little south of east until heaving to at the next CTD station, one to the north of M4 on the original plan (M4-1). By 1032 it was possible to begin sCTD15490, after 26 hours lost to weather. The cast, to 3085 m, ended at 1312, and was followed by one net, the second having to be abandoned when it was seen that the outer sheath of the Kevlar had parted. At the same time, the decision was being made to make the position a Major Station, i.e. one at which both sCTD casts (normal and for 234Th) and a tCTD cast (for iron and productivity), plus nets and SAPS would be taken. This was because there was still a large swell, and station keeping might not be possible in the dark by the time the intended position for the Major Station M4 was reached. Work at M4-1 continued overnight. The tCTD15491 station lasted from 1408 to 1916 (2316 local), halted for 2 h 20 m at 841 m because the scrolling gear on the winch drum failed, a known problem although it had only been renewed in late October. That cast was followed immediately by sCTD15492 to 1000 m for 234Th, with 12? bottles fired at 1000 m to collect water for radium. Meanwhile, the auxiliary winch on the gantry had been stripped of Kevlar and new rope wound on for the zooplankton nets. However, this fouled and the net had to be aborted. The drum specification has been changed and the auxiliary winch will no longer

hold enough Kevlar for net deployments to 200 m. The station ended with a SAPS deployment, hanging two SAPS (one for C/Fe, the second for C/²³⁴Th) on the end of the CTD cable.

12 Nov 2004 (Fri) 317

An Argo Provor float was deployed as we left station M4-1. The next station, M4, is planned to be the site for a moored sediment trap. The station position was moved 15' east to 44°30'S, 51°15'E to avoid a seamount. However, only a normal sCTD15493 plus 3 nets was worked from 0620-1103 so that a tCTD could be done at M3 the following day. The CTD signal failed at about 100m on the upcast, so that the near surface bottles could not be fired. In order to reach M3 at a suitable time it had already been decided to skip the CTD casts planned between M4 and M3. In fact, the cause of CTD failure was the cable termination, which was remade during passage and load tested during a temporary course alteration.

13 Nov 2004 (Sat) 318

On arrival at M3 we ran south along a ridge on which the mooring might be set. The ridge had been chosen from a detailed French chart and a swathe bathymetry survey, and the latter proved accurate to pinpoint the ridge crest, as verified by a second pass from west to east. Station sCTD15494 was worked in deeper water just east of the mooring position, followed by three nets. Mooring preparation and deployment lasted from 0230Z (0630 local) until 0815, after which sCTD14595 for ²³⁴Th was done to 1000m (PAR sensor was refitted for this cast), followed by SAPS at 225 m, 2 nets, deployment of an Argo (Webb) float and deployment of Pelagra, the drifting sediment trap. Finally, to finish after dark, tCTD15496 was completed at 1708. At the end of the work at M3, SeaSoar (15497) was deployed running SW into wind on the south side of the mooring M3, and was towed west a short way then north on the west side of the mooring, finally turning onto the first track of the main SeaSoar survey, running east along 46°S towards 54°E.

14 Nov 2004 (Sun) 319

From 0707 until 0723 inadvertent power cycling of the autopilot (while investigating a short-circuit) resulted in loss of gyro input and the vessel steamed a full circle. The ship turned north at 0840, then west at 1207 along 59°30'S for the second SeaSoar leg from 54°E to 51°E.

15 Nov 2004 (Mon) 320

Leg 2 was completed at 0317, and leg 3 eastwards along 45°S started at 0653. During Monday a major activity was preparation of talks to introduce results to date in the evening. This was the third such meeting, and proved most useful for discussion of future plans in the light of progress. Participants involved in the tCTD casts on 11 and 13 Nov had expressed a wish for a three day break to catch up before the next major station, and the meeting agreed to continue the SeaSoar survey with all four tracks, which should be completed in time to do station work overnight on 16 Nov. Leg 3 was completed at 2053 when the northward turn commenced.

16 Nov 2004 (Tues) 321

Leg 4 along 44°30'S began at 0050 and was intended to end at 51°E at 1700. But by then it was clear that a CTD cast would be impossible with strong winds from the west and building swell. It was therefore decided to continue westwards until 49°30'E then turn to the SE back towards M3.

17 Nov 2004 (Wed) 322

The turn was successfully accomplished at 0317 after discussion about the safety of SeaSoar. With a large swell, the normal rate of turn of 10° per minute would be untenable, keeping the ship beam on to the swell for too long. Therefore, the SeaSoar was held at 70 m to stream out aft and the difficult 90° of the turn was done rapidly, then allowing the SeaSoar cable to recover from "abeam" to aft before completing the turn. The turn was 225° to starboard to protect gear on the starboard deck from the weather. The plan to head for M3 was also frustrated, as the wind and swell were shifting round to the SW and the most south-easterly course that could be safely maintained was in fact 085°. Thus perforce we resurveyed the survey area running more or less east along 44°50'S. By the evening the wind and swell were so large that we could neither turn to the SW back towards M3 nor turn into wind to recover SeaSoar, so the eastward passage was continued overnight.

18 Nov 2004 (Thur) 323

By 0155 the turn became possible and course was set 212°T towards the last reported position of Pelagra near M3. In the late afternoon SeaSoar was recovered (1427-1512Z) in preparation for a repeat Major Station at M3 overnight. However, the work had to be cut down to enable Pelagra recovery in the morning. M3 was reached at 1728 and sCTD15498 (full depth, sampled for ²³⁴Th), 3 nets, TiCTD15499 (300 m only), SAPS (205 m) and a final net were completed in quick succession between 1734 and 0016/19th.

19 Nov 2004 (Fri) 324

Pelagra was located and recovered between 0023 and 0333. From satellite fixes received via SOC, it had drifted quite close inshore to the north of Possession Island. In fact it had been over ballasted, so had dropped a weight and come immediately back to the surface after nearly equilibrating at 400 m depth. In good conditions Discovery then proceeded slowly south through the passage between Possession and East Islands, carefully checking depths, but navigating using the Swathe bathymetry map supplied by Dr G Ruzie. Surface water samples for iron and radium were collected during this passage and there were excellent views of the French base on Possession Island.

The next objective was to work south via M2 to M6, the supposed HNLC control sites. M2 was relocated substantially east of its planned (47.5°S 50.8°E) position to 47.8°S, 52.85°E, based on satellite images which showed an eddy of not-very-low chlorophyll affecting the planned site, and the "bluest" water at the new site. It proved to be HNMediumC in fact, which was a surprise. Two sCTDs were planned on passage to M2, but only the first, sCTD15500 (1139-1430) during which there was an emergency drill, followed by nets, could be occupied in order to complete the productivity cast at M2 before dawn on Saturday.

As a test of ballasting, pelagra15501 was deployed for a short 7 hour cycle 2 miles before heaving to for Major Station M2.

20 Nov 2004 (Sat) 325

The TiCTD15502 (3800 m) was occupied first, ending at 0006, followed by 3 nets, sCTD15503 (500m for 234Th) and SAPS, ending at 0430. As Pelagra was by then visible on the surface, it was recovered at 0520 before again heaving to for sCTD15504 (3800 m). Given the calm conditions, the first Longhurst Hardy Plankton Recorder (LHPR) tow was successfully undertaken from 1001-1225. Finally an Argo Provor float was deployed thus completing work at M2 by 1233. The TiCTD and megacorer were swapped over while the weather permitted. By a lucky chance, the circular base of the megacorer frame was exactly the same diameter as that of the TiCTD rosette rig, so the megacorer could be safely placed onto the rail track. Course was then set towards the southernmost site M6, with 2 sCTD casts planned en route. The first, sCTD15506 (3825 m) and nets was completed (1658-2150).

21 Nov 2004 (Sun) 326

However, after heaving to for the second sCTD, conditions were marginally too rough to occupy a long station, so it was decided to continue on and complete the site survey for megacorer work instead. Running west from M6 (49°S, 51°30'E), along the 4200 m contour, there was a 20 mile stretch of relatively flat terrain (we ran west to 50°54'E) after a mound a few miles west of M6. It was therefore decided to set the moorings at the nominated M6, east of the mound, to be clear of the trawling ground to the west. The site survey was therefore completed with a reverse leg eastwards along 48°57'S three miles north of the first survey line. By the time the vessel returned to M6, conditions had abated, so a CTD cast was possible. However, once on station, over two hours was lost while a fault on the emergency stop panel was traced and temporarily fixed. From 1526-1850, sCTD15507 (4170 m) was occupied, followed by nets. Pelagra15508 was deployed for another overnight period at 2006 and bathysnap (15509) was deployed at 2035. During passage back to west of the mound, water was drawn for a second iron addition experiment. Megacoring began at 2320.

22 Nov 2004 (Mon) 327

Through much of the day, three megacore deployments (15510) were made, taking 4 hr 8 min, 4 hr 51 min, and 5 hr 3 min respectively, including turnaround time. By the time the third megacore was inboard, 1422Z, personnel needed a break, so coring was ended. The success rate had improved with each core, with 5 reasonable barrels retrieved on the third cast. In addition, the wind was increasing, so the megacorer and TiCTD were swapped over while conditions permitted. The plan was to complete the M6 station some miles to the east with the usual Major Station. On passage back to it, it was worthwhile searching for Pelagra, and, with the aid of a recent satellite fix from a special email transfer, Pelagra was spotted close to 2000 local time just before the light faded. It was retrieved by 1625 and the vessel was hove to on station at 1718.

A rapidly dropping barometer and squally showers delayed the start of the M6 station work, but the front went through quickly, and a shallow SAPS deployment to 175 m ran from 1925 to 2139. By then the wind had dropped, so the full depth TiCTD15511 (4200 m) was occupied starting at 2203.

23 Nov 2004 (Tues) 328

The TiCTD was followed by two nets, and work at M6 ended at 0400 after the sCTD15512 thorium cast. The next task was to occupy the final sCTD15513 + nets along the M2 to M6 line, which it had not been possible to work on 21 Nov. After completing this station at 1231, the SeaSoar (15514) was deployed for a short survey south of the islands while on passage back to M3.

24 Nov 2004 (Wed) 329

The survey ran as close as possible to the Ile des Pingouins to seek the apparent source of the bloom just south of there as seen in satellite images, then southeast and east along the south side of the Crozet Plateau. Underway sampling was enhanced to 15 minute intervals for part of this run. Unfortunately, the trace metal fish was out of action (pump stuck) for the crucial part of the run. SeaSoar was recovered at 1740 before a night time passage between the main islands back to M3.

25 Nov 2004 (Thur) 330

Shortly before arrival at M3, Pelagra was launched (15515), and at M3 a Major Station was worked, albeit with some shallow casts. TiCTD15516 (0039-0117) was followed by 3 nets, sCTD15517 (0211-0254) to 300 m for 234Th and SAPS (0315-0534). The trace metal fish was recovered at 0534 to be checked over, and because of suspect iron values. It was found that the connection between the nose water intake and the flexible tubing that carries water up to deck had sheared off. While the sCTD was rerigged, Discovery repositioned to the nominal M3 CTD position and sCTD15518 (0618-0903) was followed by two nets (0909-0930). The CTD had to be restarted near the bottom of the cast (2350 m), when the bottles refused to fire. Restarting cleared the fault. After completing work at M3, course was set to retrieve Pelagra, which was inboard at 1126.

It had been decided that priority must be given to surveying to the north of the Crozet main plateau whence the bloom appeared to originate, so a line of CTDs was planned. A short SeaSoar run (15519) was started on passage to the first CTD position, and successfully proved that the "shallow" OPC was working satisfactorily once SeaSoar was in the water. However, worsening weather terminated the run, and SeaSoar was recovered by 1554 and the vessel hove to.

26 Nov 2004 (Fri) 331

After nearly 12 hours hove to, it was possible to run back to the CTD position and sCTD15520 was occupied 0529 to 0824, followed by nets. The trace metal fish had been out of action for some time, but an attempt to deploy it after the CTD was aborted when the tubing kinked. To gain time, it was decided to skip two CTD stations and SeaSoar to the next Major Station position. SeaSoar was deployed at 0951 but recovered again shortly afterwards (completed by 1153) when the penguin computer crashed. On passage to the next position the trace metal fish was tested a couple of times.

Just short of the station position, Pelagra (15522) was deployed (later designated M8E) for two days. However, the CTD cast had to be aborted before it went into the water when the wire twisted.

27 Nov 2004 (Sat) 332

Since retermination and load testing would take 4-5 hours, it was decided to press on towards 45°30'S 49°E, the original site chosen for a major station M7, shown by satellite images to be in a bloom. By the time the wire was reterminated and position M7 reached, the weather had deteriorated, and the vessel hove to at 0648. At 1300 the vessel repositioned and sCTD15523 for 234Thorium was occupied to 300 m from 1448 to 1530. However, conditions remained marginal, and it was decided not to attempt another cast until they eased. After again repositioning, work restarted at 1835 with a shallow TiCTD15524 down to 500 m primarily to collect water for primary productivity experiments. A SAPS deployment to 150m was then possible, and was followed by full depth (2710 m) sCTD15525.

28 Nov 2004 (Sun) 333

The sCTD was recovered at 0105 and was followed by two nets, a full depth TiCTD 15526, and a further three nets, ending work at M7 at 0612.

The intention was then to complete a line of 4 CTDs west along 45°30'S from 49°E to 47°E, of which sCTD15525 at M7 was. This line would cross the major northward branch of the ACC which bounds the survey region. The second CTD, sCTD15527 to 2854 m followed by 3 nets was worked from 0919 to 1353. However, on arrival at the next CTD position at 1658, the weather had deteriorated and gear could not be deployed. The initial decision was to skip that station and continue to the westernmost station (at position A, 45°30'S, 47°E), but it was shortly realized that A was in only 1600 m of water, and it was more important to obtain an LADCP profile in the deep channel. So the vessel returned to 45°30'S, 47°40'E to await weather abatement. An Argo float was deployed at this position at 2252.

29 Nov 2004 (Mon) 334

By daylight the wind had dropped sufficiently for the station to become workable, and sCTD15528 was begun at 0038, after time lost to weather of 7 h 40 m. The CTD and subsequent nets were completed at 0328. The intention was to SeaSoar back to Pelagra position M8E in time for a Major Station overnight and SeaSoar (15529) was deployed by 0408. Two problems then arose. First, the SeaSoar winch scroll bar ceased traversing just at the last 50 m of wire was paid out. The SeaSoar was stopped off as usual and could have been operated perfectly normally while the winch was fixed had it not been that the SeaSoar refused to respond to commands to profile as soon as the ship speed was increased. Slow passage had to be maintained with the SeaSoar vehicle more or less at constant depth while the winch was fixed. The scroll bar had seized on the shaft that supports it, as a result of a bit of shotblast grit that had scored the shaft and eventually seized. The shaft had to be knocked out, surfaces sanded and cleaned, and the winch was reassembled by 0738. SeaSoar was recovered and the vessel hove to while the fault was traced to a broken connector pin. This was replaced by 1144. Meanwhile, the pole sampler had been prepared to collect an uncontaminated water sample for iron analysis, so this was collected just before the SeaSoar was relaunched. In fact, the sample was found on analysis to be contaminated, probably because the ship had been hove to on one spot for a while. The SeaSoar run 15530 was finally begun at 1210 (downtime 8 h), and recovery commenced at 2304 at M8E.

30 Nov 2004 (Tues) 335

The Major station M8E (44°55'E, 49°54'E) began with a shallow TiCTD15531 to 150 m for productivity and shallow iron measurements, followed by full depth sCTD15532 (2710 m) then 3 nets. The fog lifted a little at 0800 local time so Pelagra was found and recovered in the space of 1 h 20 m. A crane hose broke just after Pelagra was stowed, spraying hydraulic oil over the crane operator, the after deck and incubation rig. The weather was deteriorating, so the remaining work was done at the Pelagra recovery site (44°57'S, 49°57.7'E) rather than repositioning the ship about 3 n.m. back to the earlier site. A 1000 m sCTD15533 cast for Thorium was followed by SAPS and a single net. Work was then suspended for a short while when a violent rain squall came through, but the final TiCTD15534 was deployed at 1003. However, it had to be limited to 1000m, and was inboard by 1158.

The future work plan had meanwhile been discussed in detail. It had been decided not to return to the planned bloom site M4, as that was now believed to be at a cusp of a wave in the Agulhas Return Current. Rather, the emerging circulation pattern suggested that the present site was the most likely origin of iron-rich water with non-zero silicate signal. However, M8E had turned out to be in HNLC water just east of a northward extending tongue of relatively high bloom. Therefore, the vessel proceeded west for about 10 n.m. while the front went through, to look for the high chlorophyll patch. This was found, and pelagra redeployed at M8W (44°53.2'E, 49°40.9'E) at 1600. Conditions had by then eased, so SeaSoar was deployed at 1615 for a day-long tow round a triangular track designed to span the tongue of high chlorophyll and the relatively HNLC water on either side of the tongue. The first 050°T leg was completed at 2316.

1 Dec 2004 (Wed) 336

The second leg ran west along 44°20'S starting at 50°34'E. The third and final leg 123°T was begun at 1006 from position 44°20'S, 48°32'E. After running past M8W and into the HNLC water a few miles to the east, SeaSoar was recovered by 1905 and the Major Station at M8W begun at 2230, after careful positioning to the centre of the bloom based on underway fluorimeter data.

2 Dec 2004 (Thur) 337

TiCTD15537 to the bottom (2770 m) was completed at 0045, and followed by sCTD15538 also to the bottom (2758 m). After repositioning to the centre of the bloom, 4 nets were worked, then sCTD15539 to 500 m for Thorium, followed by SAPS until 0932. Pelagra was then located and recovered by 1258. It was clear that M8E and M8W had been in strongly contrasting sites, with massive export at M8W. Consideration was given to repeating M8W, but time constraints made it necessary to begin working westwards. SeaSoar deployment began at 1341 but was aborted when it was found that the conductivity sensor was u/s. The Chelsea minipack CTD had been changed after the previous run because of drift in the temperature sensor, but the only option was to swap back in the drifting minipack.

By 1600 the SeaSoar was again ready to deploy, but it was decided to do a final shallow CTD at M8W partly to see if the bloom had changed, partly for SeaSoar calibration. After sCTD15540 to 400 m, the vessel repositioned 16 n.m. to the east in order to survey

one final time the transition between M8E and M8W and also pass the recent CTD position with SeaSoar fully profiling. SeaSoar 15541 was begun at 1924.

3 Dec 2004 (Fri) 338

SeaSoar was towed on course 311°T but changed to 352°T at 2300 when analysis of a recent satellite image showed that the bloom at the western end of the overall Crozet bloom area had shifted significantly in the past few days. During emergency drill in the afternoon the course was temporarily changed to west then north, but by 1359 it was clear that the bloom had shifted again, probably to the north. Course was altered to north then west and SeaSoar was recovered at 1646 when the bloom centre had been passed.

The vessel was then repositioned to the centre of the high bloom area and the final Major Station, M9, was begun at 2035 with sCTD15542 to 500 m for thorium, followed by a single net for gut fluorescence, then TiCTD15543 to 2870 m.

4 Dec 2004 (Sat) 339

Work at M9 continued with SAPS, , three nets and finally sCTD15544, finishing at 0745.

When Discovery first arrived in the bloom area on 10 Nov, severe weather had made a good CTD section from J to M4 impossible, so a full depth CTD section across the bloom boundary on passage home was planned. Four stations at 40 n.m. intervals were to be worked along the line from M9 to 42°S 44°E, each consisting of a CTD and nets. On passage, engine revs were restricted because of overheating. The first two stations were sCTD15545 and sCTD15546, the latter completed at 0116/5th.

5 Dec 2004 (Sun) 340

The final two stations, sCTD15547 and sCTD15548 were worked, though the latter had to be abbreviated at 1000 m. This was because the time of departure from the last station had been brought forward by 3.5 hours because of the engine problems. Bottles fired at 1000 m were used for Thorium calibration. An Argo float was deployed at the last station before course was set for Port Elizabeth.

6 Dec 2004 (Mon) 341

During the morning the core wire was streamed in order to relay it correctly on the drum. An Argo float was deployed at 1325.

7 Dec 2004 (Tues) 342

Clocks were retarded by an hour. The trace metal and PES fish were recovered at 0615. An Argo float was deployed at 1645.

8 Dec 2004 (Wed) 343

A new SeaSoar cable was streamed and wound on to the winch. A final scientific discussion was held in the evening in the saloon.

9 Dec 2004 (Thur) 344

An Argo float was deployed at 0718.

10 Dec 2004 (Fri) 345

The vessel docked at Port Elizabeth at 0800 (10 a.m. local) after a comfortable passage from the Crozet Islands. Work commenced on loading a container to send home with surplus equipment and on loading equipment including 6 McLane sediment traps.



11 Dec 2004 (Sat) 346

Mobilization continued including the satisfactory testing of all 6 traps. Many personnel went on safari and saw leopards, giraffe, rhino, lions and assorted antelope as well as embarking on a river cruise.

12 Dec 2004 (Sun) 347

Mobilization continued including a trial deployment of the Gravity Corer. A wooden infill for the CTD railway track, considered a prerequisite for gravity coring was made and agreed by all to be a useful safety feature.

13 Dec 2004 (Mon) 348

Bunkers were taken 8 a.m. – 2 p.m. after moving to an iron ore loading berth. The hold was opened and scientific equipment retrieved. The hangar was tidied and everything lashed down. Discovery sailed at 2:30 p.m. following a scare with the VMADCP. The VMADCP computer was subsequently stopped to allow installation of new software. This resulted in the motherboard blowing of the PC which displayed the results. This was fixed by the use of another motherboard. A short transect of radium samples across the African shelf was taken.

14 Dec 2004 (Tues) 349

On passage. The new ADCP software was installed on new computer and the ADCP connected to it, the result was that no communication with the instrument was possible. Reconnection of the old machine produced the same result. The instrument was thus unusable. Minor faults with sediment oxygen probe fixed. A meeting to discuss coring was held. The penguin system on SeaSoar was assembled and a new termination performed. The decision to shift sediment trap mooring from M10 to M4 was made in light of bathymetry at M10 and ADCP indications of strong currents in that region. A SeaSoar/ CTD approach path to the mooring site was devised. The PES and TM fishes were deployed and the CTD cable reterminated. A meeting with the captain and senior officers to run through the science programme was held. A science meeting was held which included a presentation by Mike Lucas on D285 results and a presentation by Sanders on the shore based modelling efforts.

15 Dec 2004 (Wed) 350

On passage. The iron analyser was replumbed and the ropes for the first mooring wound onto the storage drum. Bottles for the sediment traps were engraved and formalin prepared. Further efforts to communicate with the ADCP were unsuccessful. The SeaSoar penguin system was tested and a processing pathway for seabird CTD initialized.

16 Dec 2004 (Thur) 351

On passage, VMADCP communications achieved, SeaSoar, Net and CTD trials were undertaken.

17 Dec 2004 (Fri) 352

SeaSoar was deployed at 0900Z for a run repeating the final CTD section of the previous cruise.

18 Dec 2004 (Sat) 353

We arrived at our first biological station at M9, a repeat of the last process station carried out on the last leg. SeaSoar was hauled at 8.30 pm and the Titanium CTD deployed. As it was being recovered the wire jumped and required retermination.

19 Dec 2004 (Sun) 354

Nets were hauled and at 0815 the stainless CTD was deployed followed by SAPS. These were followed by a stainless CTD for Thorium. When this was recovered the first biological station of D286 had been occupied. Course was set for the next CTD station on the transect from the edge of the work area to M3 via the next biological station and first mooring deployment at M10. This was occupied without incident at 1908, followed by nets.

20 Dec 2004 (Mon) 355 -

The next CTD station was reached at 0402. The Stainless CTD was deployed and nets taken, course was made for the next CTD station at M10. This was occupied at noon when Pelagra was launched. A bottom survey was commenced to find a suitable spot for the mooring. Deployment commenced at 1400 and was fully deployed by 1459 and then the LHPR deployed. The biological station at M10 commenced at 1906 with a stainless CTD to 500m for thorium followed by SAPS and a 200m Titanium cast.

21 Dec 2004 (Tues) 356

The M10 process station continued with a SS CTD, a full depth Titanium cast and finally a stainless cast for neodymium and radium. The hunt for Pelagra was successfully concluded at 1237 and course set towards the next station at 1309. Course was slightly modified to ease motion and a CTD station occupied at 2100. Nets were aborted thereafter due to weather.

22 Dec 2004 (Wed) 357

The intended Pelagra deployment at M3 was abandoned and the vessel approached Baie Americaine on Isle de la Possession with the intention of landing a shore party to collect water samples. This would have followed 75 years after her predecessor Discovery I had anchored there in 1929. Strong katabatic winds meant that landing was unfeasible however nets were taken and the opportunity was taken to work a mixed transect of titanium and stainless steel CTDs at three sites going away from the island to investigate whether substantial amounts of dissolved iron are advected offshore from its putative source region.

23 Dec 2004 (Thur) 358

Discovery arrived at M3 at 0100 to begin the biological station. This commenced with a Pelagra deployment followed by a Titanium CTD to 500m, a stainless CTD, SAPS, a thorium CTD and then nets. SeaSoar was then deployed for a run W to M5. Following some technical problems the vehicle was in the water by 1336 and course made towards M5. Pelagra was not recovered, probably due to a faulty timer preventing the unit from surfacing.

24 Dec 2004 (Fri) 359

Discovery was on passage to M5 with SeaSoar in the water until 15:50 when recovery was completed. This was followed by a full depth SSCTD. Following that a 3.5 KHz survey to find suitable sites for coring, trawling and mooring deployment was started. A Christmas Eve carol concert was enjoyed by all present.

25 Dec 2004 (Sat) 360

The site survey continued through Christmas dinner which was enlivened by a message purportedly from "her Majesty the Queen". At 1600 megacoring commenced. This continued for 15 hours overnight.

26 Dec 2004 (Sun) 361

At 0950 the mooring deployment began with the weight being released at 1138. The LHPR was then deployed and recovered at 1454. Vessel repositioning followed and SAPS were taken for paleo crozex with coring being resumed again at 1852.

27 Dec 2004 (Mon) 362

Coring continued until 0823. Nets were then deployed and the megacorer and gravity corers exchanged. Three gravity corer deployments separated by nets were undertaken followed by the swapping of the Titanium CTD frame for the gravity corer. This allowed the overnight biological station to commence at 1855 with a Thorium CTD. SAPS were then deployed, then nets and finally the Titanium CTD.

28 Dec 2004 (Tues) 363

At 0218 the Titanium CTD landed on deck. Nets followed and the stainless steel CTD was then deployed. More nets ensued and the titanium CTD and the megacorer were swapped by 0715. Three megacorer deployments followed with intervening nets. At 2139 work at station M5 finished and a float and bathysnap were deployed before Discovery headed W back to M3 with the intention of working a CTD section en route.

29 Dec 2004 (Wed) 364

The first CTD station was reached at 0401. Severe winds prevented deployment of the CTD package so Discovery proceeded to the next CTD station. Severe weather prevented any work so Discovery crept west into the weather for the remainder of the day. At 1945 the ship was turned and returned to 55E where the CTD was deployed at 2300.

30 Dec 2004 (Thur) 365

The CTD was recovered at 0211 and nets collected. Discovery then steamed W towards the next station arriving at 0840. The opportunity was taken to swap the Titanium CTD for the megacorer in daylight and the CTD deployed at 0906. Upon recovery net samples

were taken and the vessel proceeded to the next station, arriving at 1600. The Stainless steel CTD was deployed immediately and recovered at 1844. Nets were then taken and the next station reached at 2245. The stainless steel CTD was then deployed.

31 Dec 2004 (Fri) 366

The stainless steel CTD was recovered at 0138 and course towards M3 set. Pelagra was deployed there at 0733 and the final stainless CTD of the transect deployed at 0802. Recovery at 958 was followed by nets, a thorium CTD and SAPS. Pelagra was then recovered by 1516. A stainless steel CTD profile was then undertaken to collect water for radium analyses and nets undertaken. The final part of the M3 biological station was a titanium CTD deployed at 1809, with recovery at 1840. SeaSoar was then deployed at 1918 for a run south to M6 between the islands. The passage through the islands passed without incident and the New Year was celebrated in traditional style in the Discovery bar.

1 Jan 2005 (Sat) 367/1

Discovery was on passage to site M6 with SeaSoar deployed. A large iceberg was seen. Heavy weather required the course to be modified and M6 was reached at 2028. SeaSoar was then recovered and crane operations to switch the megacorer for the titanium CTD undertaken. Pelagra was deployed. Severe weather prevented further operations.

2 Jan 2005 (Sun) 368/2

Discovery was hove to all day in heavy weather.

3 Jan 2005 (Mon) 369/3

The mooring was set at 1016 and the hunt for Pelagra started. Two attempts later the instrument was on deck by 1903 and at 2150 Discovery was hove to on station for biological work at M6. This began with a Thorium CTD followed by SAPS, a stainless steel CTD and nets.

4 Jan 2005 (Tues) 370/4

The megacorer and the titanium CTD were swapped and megacoring commenced at 0720. Three deployments later nets were hauled, the megacorer and titanium CTD were swapped and a titanium CTD was undertaken.

5 Jan 2005 (Wed) 371/5

Nets were followed by SAPS and then the gravity corer was swapped for the titanium CTD. Gravity coring commenced at 0700 and two cores were taken before at 1222 the megacorer was reinstated for the gravity corer. Nets followed and then the megacorer was deployed three times.

6 Jan 2005 (Thur) 372/6

The final megacorer deployment ended at 0219. After a brief inspection of the weather the SS CTD was deployed. Work at M6 ended with the launch of SeaSoar for a run northeast to M2 at 0414. SeaSoar was recovered at 1628 and the last mooring was then deployed with the weight being released at 1931. The M2 biological station began with a Titanium CTD.

7 Jan 2005 (Fri) 373/7

The titanium CTD was followed with SAPS, nets, a stainless CTD and then the LHPR. SeaSoar was deployed at 1040 for a run east of the islands. Fog reduced visibility at 1505 and speed was reduced given the earlier observation of a large iceberg between the islands and M6. SeaSoar malfunctioned at 1909 and it was hauled shortly after with the intention of replacing the SeaSoar survey with a CTD section. At the first CTD station, reached at 2326 the CTD winch failed on deployment.

8 Jan 2005 (Sat) 374/8

Nets were taken and the vessel proceeded to another net station at 0529. Discovery then steamed south down the passage between the islands to Port Alfred with the intention of landing a shore sampling party. High winds impeded anchoring; the opportunity was taken to load test the new termination. Working on the principle that high winds inshore were likely be replicated offshore and thus that conditions were likely to become workable faster in Canal des Orques than offshore the decision was made to stay hove to and await an improvement in the weather. At 1253 the weather moderated and Discovery anchored in Crique du Navire, 76 years after her predecessor Discovery I had anchored in Baie Americaine in 1929. The shore party were landed at 1343 and the remainder of the ships company then availed themselves of the opportunity to inspect the numerous King penguins and Elephant seals at close quarters from the ship's boat. The shore party was recovered at 1945 and Discovery then steamed north towards M3 to sample an intense phytoplankton bloom which had developed there. A short survey ensued before the biological station to find the bloom centre.

9 Jan 2005 (Sun) 375/9

At 0212 Pelagra was released and the biological station began with a titanium CTD followed by SAPS, Nets and a stainless steel CTD. These events concluded at 1031 and Discovery headed for the mooring deployed on D285 at M3. The acoustic release was fired at 12:06 and the buoyancy package sighted at 1211. Recovery was complex due to the mooring line breaking but all components were on board by 1750. In the process of recovery the Trace Metal fish had fouled the PES fish and the former was recovered for repairs. Pelagra was briefly sought but the attempt was truncated by a SeaSoar deployment intended to survey the region N of the Islands, commencing at 21:00. SeaSoar failed on launch and instead a line of CTDs north of the islands was embarked on.

10 Jan 2005 (Mon) 376/10

A line of CTDs across the N flank of the plateau was worked; Discovery reached the vicinity of the M3 bloom at 14:01. Pelagra was recovered by 1615 and a short survey of the M3 bloom undertaken before the Biological station which began at 2024. Initially a Thorium CTD was deployed followed by Pelagra and then a titanium CTD and nets.

11 Jan 2005 (Tues) 377/11

A further titanium CTD deployment was followed by SAPS and then the search for pelagra began. Severe weather prevented visual identification and Discovery steamed west to undertake a CTD station to 500m and deploy nets. The weather having improved the search for Pelagra resumed and visual identification was established at 1436. Two

attempts were required before the instrument was on board at 19:01. SeaSoar was deployed at 2215 and a survey of the region around the bloom commenced.

12 Jan 2005 (Wed) 378/12

The SeaSoar survey continued in beautiful sunshine with lovely views of both islands and of a large group of pilot whales. SeaSoar was recovered at the M3 bloom at 1617 and a LHPR tow commenced. This finished at 1939 and a short survey of the bloom area to pick the site of maximum plankton biomass was undertaken in preparation for the overnight biological station. This commenced with a Pelagra deployment, a Thorium CTD and SAPS.

13 Jan (Thur) 379/13

SAPS were deployed to just below the chlorophyll maximum to collect samples coincident with the thorium cast. A Stainless Steel CTD station was performed followed by a Titanium CTD and four zooplankton nets. Pelagra was recovered and the final biological station was thus concluded. The vessel repositioned for a SeaSoar survey of the northern part of the bloom and SeaSoar was deployed around 10:00. After initial problems with Penguin satisfactory communications were achieved and the vehicle flew well overnight, albeit in heavy seas.

14 Jan 2005 (Fri) 380/14

At 03:00 SeaSoar stopped communicating with its control unit in the main lab. Heavy weather precluded immediate recovery however by 0800 the weather had moderated sufficiently to recover the instrument. This was done without incident and fault finding commenced whilst the ship steamed on to the furthest west position and hove to awaiting a repaired termination. The repair was effected by 1700 and the SeaSoar tow towards M10 resumed. The rest of the day passed without incident.

15 Jan 2005 (Sat) 381/15

The SeaSoar tow finished at 0800 at M10 and the ship relocated to the haul point to undertake a CTD to 1000 m. Crane operations to swap the gravity corer and the Titanium CTD were undertaken before gravity coring commenced. Three cores were recovered. The first slumped badly on recovery, the second was very short however the third deployment retrieved a 1.5 m core overlain by clear water. Coring then switched to the megacorer once crane operations to swap the corers had taken place and a first deployment yielded two perfect and one disturbed cores.

16 Jan 2005 (Sun) 382/16

The megacorer came inboard after its second deployment with the main shackle and swivel caught underneath the coring unit and the cores exposed. Strops were placed around the frame and the load transferred to the CTD wire and the corer lowered to the deck. The single long core collected was disturbed but archived. Damage to the megacorer prevented further deployments so a final CTD cast to the bottom was undertaken. Discovery then began the long passage Northwest to Durban in heavy weather.