

# ++ OCEANS WORMLEY ++

Number 4 (August 2012)

A newsletter linking people who worked at NIO, IOS and IOSDL and those who still carry on their proud traditions.

*OCEANS WORMLEY was the telegraphic address of the Institute. Telex was the means through which much of the communication, particularly with ships, was sent. It seems appropriate to use it as the title of this newsletter.*

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## Special Discovery 50 edition

- Editorial
- Discovery's 50th birthday party
- The "Inch winch" - Charles Clayson
- Recollections of the IIOE - Peter Herring
- A new book by Colin Summerhayes
- More photos - The Wormley review
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## Editorial

This is a rather special edition of the newsletter focussed on the recent birthday party for the Royal Research Ship *Discovery*. The event in Southampton on July 2nd was attended by over 150 people all associated in some way with *Discovery's* life.

tions 16476 - 16667) although the continuity of numbering was broken in the 1980s as Principal Scientists from Universities started to use their own cruise-specific numbering system.

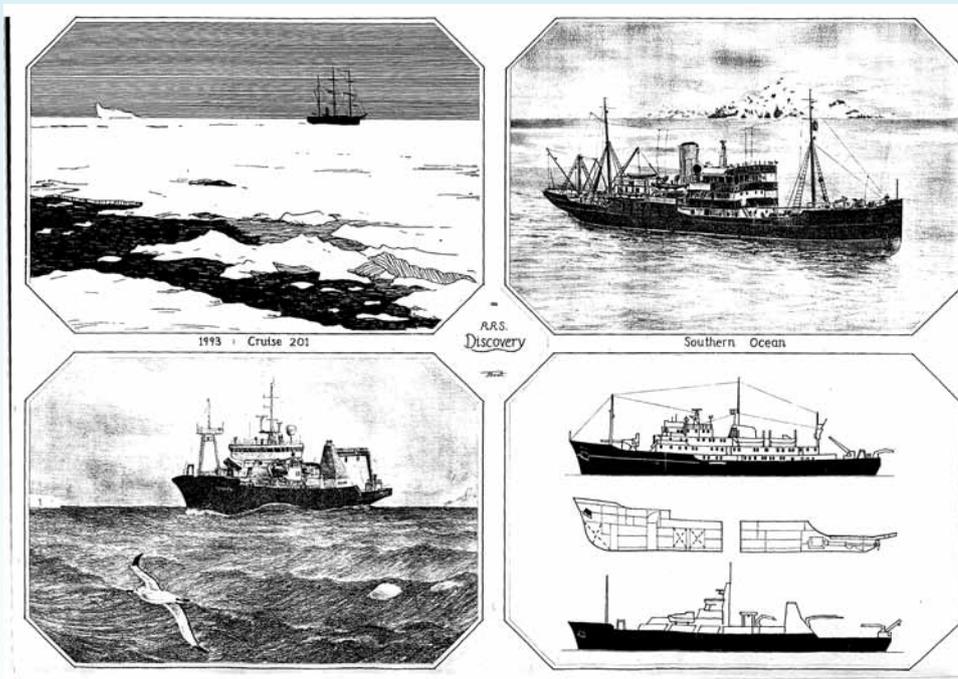
The lower right panel records the fact that the present *Discovery* was transformed by a major refit in 1990-1992 and it is in

that form with a lengthened hull, new engines and a completely new layout that she continues to serve science. Some things have not changed however. Physically the bow section of the hull is unaltered as is her iconic foremast. Most of all, what has not changed is the unique bond of dedicated scientists, technical support, officers and crew who continue to devote large parts of their lives to unravelling the mysteries of the ocean. Neither should we forget that included in that bond are the families who remain at home. That unique bond was much in evidence at the party.

Preparing for the event was a spur for many Wormley alumni and others to delve into their photo albums and into their memories for anecdotes and memorabilia. The NOC archives are already much richer as a consequence. The next challenge will be to make the material more easily accessible.

Before *Discovery* ends her NERC seagoing later this year we hope to have another opportunity for people to see the ship and to say farewell. Maybe we could even preserve her iconic foremast at NOC to act as a monument to all those who sailed on her and to her contribution to ocean science.

John Gould



This drawing by Trevor Boulton, a deck officer on *Discovery* about 10 years ago, nicely captures the ship's life and heritage. She is the successor of the *Discovery* used by Scott that, followed by *Discovery II* was the platform for the Discovery Investigations in the Southern Ocean. (Trevor's cartoon was drawn during a cruise of the present *Discovery* to the Southern Ocean in 2001). The direct link was strengthened as all three ships used the same series of station numbers until Cruise 341 in 2009 (sta-

## Discovery's 50th birthday - a happy event

Just as it is the privilege of a bride on her wedding day to be a little late for the event so *Discovery*, the birthday girl, was late for her party at NOC on July 2nd. The result was that the much-anticipated tours of the ship had to be cancelled but otherwise the day went ahead as planned and a great time was had by all.

The day was structured around talks describing the contributions that *Discovery* had made to our understanding of the oceans, films taken at various stages of the ship's life, picture storyboards of her cruises and a small display of memorabilia from the archives.

Prof Ed Hill, Director of NOC, opened with a welcome and a reminder to us all that *Discovery's* launch in 1962 was a long time ago – the year of the Cuban missile crisis and the first sales of the Ford Cortina. In 1962 *Discovery* had cost a total of £850,000 and soon she will be replaced by a new *Discovery* being built at a cost of £75million. How times have changed!

Howard Roe then regaled the audience with his personal view of life on *Discovery* and the many ways in which it had changed – physically during the ship's 1990-1992 major refit in Portugal when she had been lengthened by 11m and completely reconstructed - how her home port had moved from Plymouth to Barry and finally to Southampton – how life on board had become less formal (no more jacket and tie and silver service for dinner). He paid tribute to the dedication of the officers and crew and also recounted the lighter moments of *Discovery's* life, bars visited, crossing the line ceremonies, musical interludes from the *Discovery* song book – a copy of which was on display from the archives. The theme running through Howard's talk was how *Discovery* had been the catalyst for forging communities.

When John Swallow watched his fellow scientists reading reversing thermometers he sometimes used to query the readings with a quiet, Yorkshire-accented, "Are you sure?". Gwyn Griffiths used this phrase throughout his talk on "Careful measurements by people and instruments" in which he led us with a mostly marine physics perspective from the days of water bottles, though the problems of navigation to the present era of microelectronics and satellite communication. The attention to detail by generations of instrument designers and scientists has meant that *Discovery* was often the vehicle from which pioneering measurements were made. The times when we were "not sure" often led to the most significant of these new discoveries.



Dave Billett then took his audience into the realm of the biologists with a particular focus on his own interest in benthic fauna. Work from *Discovery* using deep-sea cameras and traps had revealed many surprises including the seasonal variability and regional nature of the flux of material onto the sea floor and the wide ranges of abundance of bottom-living organisms. A variety of bottom landers of increasing sophistication had aided those investigations and now the Autosub autonomous vehicle is a new addition to the armoury. He paid tribute to the contributions to that work made by individuals and especially mentioned Roy Wild whose family attended the event.

Roger Searle described the way in which geophysical work from *Discovery* had changed our understanding of the deep sea floor and plate tectonics – starting with work in the Gulf of Aden and then moving to the Mid Atlantic Ridge. Again technology had played a key role particularly GLORIA and ocean bottom seismographs. He ended with a demonstration of how seismic surveys could even reveal the structure of a Meddy (a lens of Mediterranean water).

After a buffet lunch, John Gould talked about "Marine Physics – From top to bottom and all the bits in between". He described *Discovery's* recording of the largest wave (29.01m) in the Rockall Trough in 2000, the huge range of innovative measurements made during the JASIN air-sea interaction experiment in 1978, and followed with a tour of the deep sea floor where measurements of deep flows had been made. He ended by showing how 21st science built on the pioneering work done on *Discovery*. His last slide showed results sent by e-mail from *Discovery* as she sailed past the Lizard the previous evening on passage to Southampton. Another indication of how life has changed.

Peter Burkill ended the science talks by describing *Discovery's* contributions to our understanding of marine biogeochemistry through complex process experiments and the now regular Atlantic Meridional Transects made by ships in transit between the UK and the Southern Ocean. This work is essential in understanding the role played by ocean biology in regulating earth's climate.



*Discovery having her propellor changed in Willoughby's dry dock in Plymouth.*

The highlight of the talks was undoubtedly the one given by Mike Harding who, as a former master of *Discovery*, gave a personal "View from the bridge". This was humorous and insightful and more than any other talk captured the spirit of the ship, her crew and of the scientists.

*Discovery* will be retire later this year and will be replaced by a new *Discovery* presently under construction in Spain. The new vessel was described in detail by Edward Cooper who is managing the project for NERC.

Throughout the day, films about *Discovery's* life were shown and ranged from one made by Maurice Hill of the Dept of Geodesy and Geophysics in Cambridge showing work at sea



*Discovery berthed near the QEII after a refit in Southampton in the 1970s. This picture is just a few hundred meters from the site of the NOC*

during the IIOE to a NERC film of the 1990s refit when the ship had been lengthened. Few of us perhaps realised that the

bow section was supported on greased steel plates as it was pulled forward to allow the insertion of the new 11m section. Disaster had only narrowly been averted when the bow slewed sideways.



*The funnel is removed during the 1990-2major refit in Portugal*

To end the day Tony Rice summed up by asking "Was it good? Was it justified? Was it unique? Did it tell us anything new?" He likened *Discovery* to the broom that had had three new heads and 4 new handles and just like Nelson's Victory in Portsmouth dockyard, little of the original ship remains. What *Discovery* has shown us is that research ships are unusual, with two groups of professionals, mariners and scientists working together in a unique and challenging setting.



*A sight familiar to everyone who worked at Wormley. Loading containers before a cruise*

The brochure prepared for the event and a flip book of storyboards documenting the work on *Discovery's* many cruises can be downloaded from

<http://noc.ac.uk/news/fifty-years-discovery-ocean-exploration-0>

	Disco 1962	Disco 1994	New Discovery
Main propulsion kW	1491	1500	4400
Bow thruster KW	261	550	2925
LOA	79	90.2	99.7
Beam	14.0	14.0	18.0
Draft	4.7	5.3	6.5
GRT	2707	3008	5941
Operating speed	10.5 kts	10kts	12kts
Operational endurance	28	45 days	50 days
Officers and Crew	45	22	24
Scientists	18	28	28

## The inch winch - not a complete success

Charles Clayson (Wormley and Southampton 1966-2001)

*This was submitted in response to the request for articles describing the successful (or unsuccessful) development of pieces of equipment.*

In the late 1960s, Tom Tucker asked me to make some measurements of ship motion on *Discovery*; these were to be used for specifying the performance requirements of an electric winch system that would compensate for ship motion, thereby improving the records obtained on CTD casts. At that time, the problem was that ship motion – combined with the different temporal and spatial responses of the CTD sensors – corrupted the salinity profiles obtained.

Having duly made records of ship motion in a range of conditions that were considered viable for making CTD casts, using a deck mounted motion sensor, we could estimate the dynamic performance requirements of the winch system. This was to be (in terms of engineering nomenclature) an open-loop system, with the winch speed being controlled so as to result in a (hopefully) constant CTD velocity through the water. The command velocity signal was derived from the integrated output of an accelerometer situated at the outboard sheave. Other institutes had used large servo-driven accumulators to achieve the same end, using closed-loop systems to reduce wire tension variations due to the ship heave motion.

Dicky Dobson and I were the project engineers involved in the design, development and commissioning of the compensating winch system, with the assistance of a number of engineering design staff and members of the workshop. We eventually succeeded in achieving a system that worked – within limits. One has to say that the patience of all those involved was tested sorely over its long gestation period.

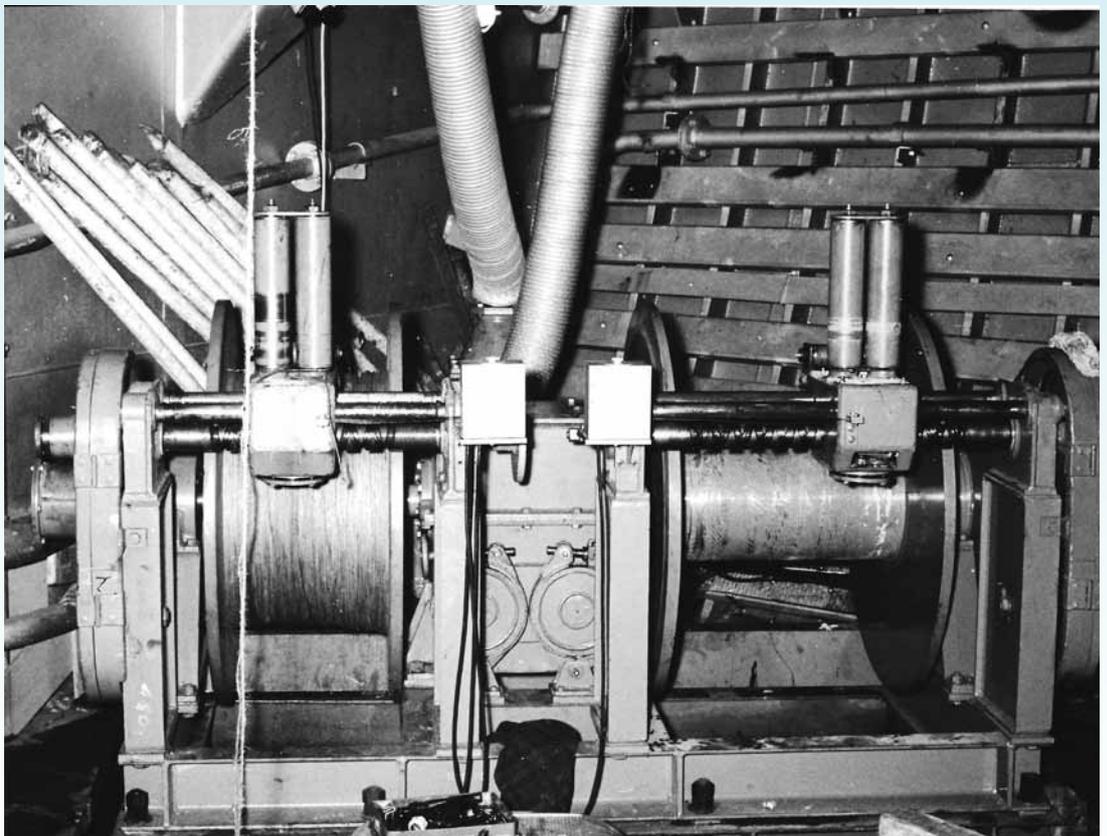
For various reasons, the winch motor and spools had to be accommodated in the *Discovery*'s lower forward hold, resulting in a rather tortuous wire route passing over many intermediate sheaves before the final outboard sheave. This was a recipe for trouble as it was prone to developing slack wire in the event of any errors in heave compensation. Slack wire detectors linked to the winch control system and audible alarms were amongst the measures adopted to improve safety and reliability. For safety, the winch was also restricted

to mean wire speeds well below the capacity of its powerful 40 h.p. motor. This led to the nickname of the "Inch Winch".

We did, on one cruise, experiment by using the signal from a pressure sensor on the payload to close the loop of the system - with a degree of success. On one occasion, which I would like to be able to forget, a wire break resulted in the loss of a number of John Swallow's precious reversing thermometers, much to the chagrin of John Moorey who had lovingly cared for them for many years. I can still remember the horrified look on all our faces when the wire parted somewhere in the bowels of the ship and whistled out over the side.

Eventually, the "inch winch" was replaced by the mid-ships hydraulic winch, an altogether more sanitary arrangement, which also offered more comfortable working conditions for the operator, being in a less exposed situation.

In retrospect, one might say that the electric winch project was based on misconceived ideas; its lack of success was not due to lack of effort in trying to rectify its deficiencies. Indeed, I shall never forget the experience of working with Dicky Dobson; he was a great character and a highly talented engineer, who is sadly no longer with us.



*The "inch-winch" drums deep in the forward hold  
(NOC archive image 3201- 36a)*

# Sir George Deacon, Discovery, and memories of Cruise 1

*Peter Herring (Wormley and Southampton 1966-2000)*

*Peter was a student aboard the first research cruise of Discovery. This article is a shortened version of material that unfortunately could not be fitted into "Of Seas and Ships and Scientists" with some photographs added from the NOC archives*

Sir George Deacon was a founder member of SCOR (The Scientific Committee on Oceanic Research) and its first meeting in Woods Hole in 1957 recommended "a combined assault on the largest unknown area on earth, the deep waters and seabed of the Indian Ocean". Thus was born the International Indian Ocean Expedition (IIOE). In July and August 1962 Deacon, Roger Revelle and Anton Bruun combined the various proposals into a coherent programme involving the developing countries bordering the region. Deacon was also Chairman of the BNCOR (the British National Committee on Oceanic research) which drew up the UK science programme for it. The impending IIOE expedited the replacement of *Discovery II* by the new *R.R.S. Discovery*, but it was a fine-run thing. After trials in 1963 *Discovery* sailed from Plymouth on June 1st for three Indian Ocean cruises (Cruises 1, 2 & 3) that would extend until her return in September 1964 (interrupted only by a brief and unscheduled return to the UK over Christmas for essential refit).

The scientific complement, under the direction of Ron Currie and John Swallow, was largely from NIO, alongside scientists from the fisheries laboratories and the Marine Biological Association in Plymouth. Five PhD students were recruited to serve the full 16 month period: chemists Peter Brewer and Graham Topping from Liverpool, ornithologist Roger Bailey from Oxford, and zoologists Martin Angel and me from Bristol and Cambridge, (Somehow we were omitted from the personnel list in the cruise report...).

None of us knew what to expect – or what was to hit us. The novelty of the Mediterranean and Suez Canal became serious science once we were in the Gulf of Aden. An emergency call to the ship's doctor to treat an injured lighthouse keeper (who had been "fallen on by a donkey") became pure farce when it transpired he'd been bandaged so tightly that he almost suffocated. Brown boobies flew aboard while we were awaiting the casualty, presenting our bird man with his first sampling problem. His attempts to wrestle with them and induce them to vomit up their previous meal provided great entertainment and generated several (unhelpful) suggestions.

Once off the Arabian coast in the SW monsoon life got serious and the seas rough. Lines of stations at frequent intervals were intensively sampled with nets, water bottles and current meters, usually simultaneously. The ability of the bridge to keep three wires vertical, all at different depths (up to

trawls added to the variety. A key interest was the possibility of exploitable fish stocks in the region and echosounder watches kept an acoustic eye not only on the bottom but also the scattering layers. The chemists received a near-continuous stream of water samples which backed up like motorway traffic if they paused for sleep! We had to deal with the plankton samples, but once preserved we could collapse briefly – until the next station. Most systems broke down at some point: one winch failure left 3km of wire and bottles to be wound in by hand! Cold surface water, fog, dense blooms of algae and zooplankton were dramatic markers of the upwelling. One night we entered



*Discovery in the Indian Ocean photographed from RV Atlantic II by Bob Munns (WHOI). (From NOC archives)*

a huge swarm of luminous ostracods, so numerous that they sat glowing on the wings of emerging flyingfish. The experience triggered Martin Angel's lifelong enthusiasm for ostracods, and mine for bioluminescence.

An 8 hours-on, 8 hours-off watch system was death to our biological clocks, but breakfast at the end of the 12-8 was nirvana. We worked alongside the leaders in their fields, but only fully appreciated our good fortune later. It was an eye-opener to discover that one eminent fisheries scientist littered his field notes with expletives! A brief port call at Karachi introduced a different world, including a surreal night-time camel ride to watch turtles coming ashore to lay eggs.

On return to Aden the science for Cruise 2 changed to geophysics, led by Maurice Hill from Cambridge. Martin Angel and I left for the fisheries laboratory in Zanzibar (where we stayed with Nigel Merrett), but the other three students remained with the ship, which worked in tandem with *HMS Owen* for parts of the cruise. Tony Laughton was Hill's deputy and was

## Photo gallery



The Ocean Instrumentation Group outside the Wormley lab in July/August 1995 Photo from Gwyn Griffiths



Photos from the IOS Christmas reviews courtesy of Colin Pelton.  
More photos and captions are available at <http://flickr.com/gp/38916796@N08/a7y0t2/>



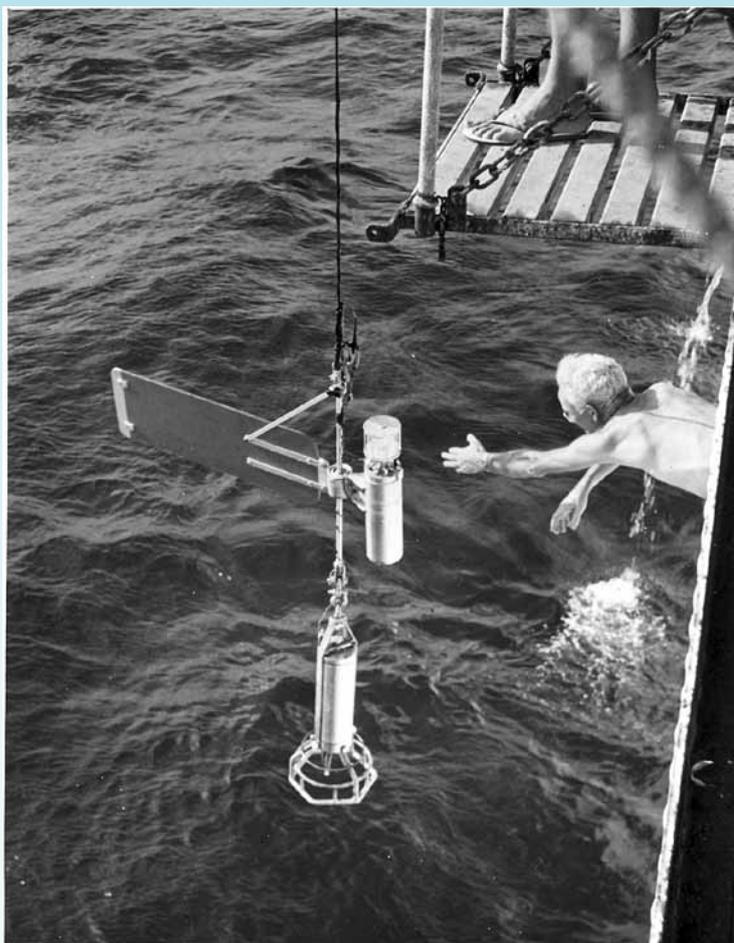
Some more photos from the Discovery 50th celebrations

Left. The mooring team John Cherriman, Keith Goy and Ian Waddington. Right. Pam Draper, Brian McCartney and Ted Pitt. Centre Participants in the IIOE cruises Bob Whitmarsh, Arthur Fisher, John Moorey, John Jones, Peter Herring, Jim Crease, Martin Angel, Bob Belderson.

## Peter Herring, contd from page 5

responsible for the seafloor photography. At its end *Discovery* returned to the UK for refit, returning to Aden on March 3rd 1964 on Cruise 3, a series of biological and physical studies in the Western Indian Ocean, emphasising the Somali and equatorial currents. Martin and I rejoined our companions, after some unexpected experiences. *Atlantis II* had called in to Zanzibar and I joined her complement under Arthur "Rocky" Miller, visiting the Seychelles, Mauritius and Cape Town, and returning to Zanzibar in December, where independence and a bloody revolution followed in rapid succession. Return to *Discovery* was quite a relief for us!

Cruise 3 lasted to 28th September 1964, with port calls at Aden, Mauritius, Cochin, Seychelles, Mombasa, and Aden again, before returning home. John Swallow was principal sci-



*Bruce Hamon , tending the prototype CTD (TSD) and recording current meter from the midships winch platform. These were sadly both lost when the wire broke.*

entist for seven legs, and Ron Currie for two. The physics programme was to investigate the current systems, while biology involved repeat sections off the Arabian coast and comparative work north and south of the equator. More midwater trawls were undertaken, reflecting the particular interests of Peter Foxton and Malcolm Clarke. By now we were more prepared for the fray. Nevertheless the emphasis on hydrography caused the water samples to accumulate again and it was a relief to have additional help from Dave Rochford, Bruce Hamon and Fred Davies (CSIRO Cronulla, Australia), bringing with them not only a prototype TSD (which we lost!), but also the opportunity for inter-calibration of techniques.

Current speeds made life very difficult. With two wires out at different depths, one could be streaming for'ard and the other aft while the ship struggled to maintain station against a surface current of up to 7 kt! "Vertical" nets presented particular difficulties, with the ship's screw lying in wait for any errant gear. Dramatic fronts, marked by sudden surface temperature changes of up to 7°C, demonstrated the intensity of the upwelling. Oceanic regions had a more muted dynamism, and biological sampling could include night fishing for squid, where even the poorest of anglers had a reasonable chance of success. A shore party visited the island of Hasikaya (off the Arabian coast) to sample the seabirds. Such visits were always a break from routine, but plans for others were mere Will o' the Wisps. Proposed visits to the Cargados shoals, Agalega, the Farquhar Islands, Astove, and Aldabra all came and went during the Mauritius-Mombasa leg, beaten by the weather. Student enthusiasm for the impending Mombasa port call was not shared by John Swallow, whose science programme had been disrupted.

Science continued in spectacular fashion in the Red Sea on the return home. Where suspiciously warm water had been noticed earlier, John Swallow set a deep hydrocast over a seafloor depression of about 200m (later named Discovery Deep) in a bottom of ~2000m. The samples nearest the bottom contained hot brine (44° C), so saline (>270 0/00) that it crystallised on deck! The hot, dense, brine pools produced an odd acoustic layering visible in the PES records. We had had a preliminary glimpse of the existence of seabed volcanism, culminating in the hydrothermal vents that were only discovered some 13 years later. It was a fitting finale to a spectacular voyage.

The IIOE ran from 1959-1965 and involved 40 research vessels and 33 countries. What was NIO's achievement? The three Discovery cruise reports give the outline. Yet it was much, much, more. It vindicated all the effort that Sir George Deacon had invested in its genesis, it tested the capabilities of the new ship to the full, it gave a real feel of international seagoing collaboration (with NIO in the vanguard), it cemented relationships between individuals and disciplines as no other activity could have done, and it stimulated a whole range of new interests and techniques that have kept NIO/IOS/NOC at the oceanographic forefront. Finally, five students had the times and experiences of their lives and couldn't wait to sign on for the longer term!

*PS from the editor.*

*A similar set of reminiscences by Malcolm Clarke also largely focussed on his experiences during the IIOE with available at the Discovery50 event.*

## The Third Reich in Antarctica. A new book by Colin Summerhayes (1988-97)

The great rivals of *Discovery* and its team in the South Atlantic in the pre-war years were the Germans, on the *Gauss*, the *Valdivia* and the *Meteor*. Less well known is that Hitler sent his own expedition to the Antarctic across the Southern Ocean, on the *MV Schwabenland*. The *Schwabenland* and *Discovery II* were working in much the same area along the Greenwich Meridian south of Cape Town, around Bouvet and on the coast of Dron-

ning Maud Land in January 1939. The Germans found a big seamount, which in honour of *Discovery's* work they named Discovery Bank. George Deacon reported it in his 1939 paper to the Royal Geographical Society. The Germans were the first to collect echo-soundings in the South Atlantic, on the *Meteor*, and continued doing this on the *Schwabenland* at 5 minute intervals or closer, producing the first axis-parallel bathymetric track down the flanks of the mid Atlantic ridge between Ascension and Tristan da Cunha, and taking another profile en route home between Cape Town and Recife, which nicely showed the

valley at the ridge crest. They weren't down there mainly to do oceanography, but to map Antarctica (Dronning Maud Land) from the air, with seaplanes launched from the ship, a heroic and dangerous feat that discovered a 1000 km long mountain range - the Muhlign-Hoffman Mountains, as well as the unexpected Schirmacher Oasis of freshwater lakes (unfrozen!!). They were also the first to map Antarctic submarine channels near the ice edge that we now know are the heads of submarine canyons. Several canyons have now been named after the ship and its key personnel. The oceanographic and biological data they collected, and which was also collected by German whalers with scientists aboard, replicated what Deacon and others were finding. Unfortunately for the Germans (and everyone else!), war broke out when they returned to Germany and their results did not get the international exposure that might otherwise have been expected. Indeed, half of the scientific party was killed in the war, and it was not until 1958 that they were able to produce a report, in German, of their results, as a

contribution to the IGY of 1957-58. Once again, it got little international notice, having been published in German. The tale of this saga has just been published, in English for the first time, and some of the newsletter's readers may find it of interest - not least in the connection to the work of *Discovery II*.  
*Luedecke and Summerhayes, 2012, The Third Reich in Antarctica. Bluntisham Books.*  
(Can be ordered on line <http://www.bluntishambooks.co.uk/> £27.50.)



Crew and scientists from *Schwabenland* (background) landing on an ice floe to capture emperor penguins.

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Since this is a summer Newsletter - Here is a picture of a wintertime refit. In South Shields? Who can identify all three?

### The next ++ OCEANS WORMLEY ++

I'm grateful for the material that has been sent to me. It would be good if we could have more from our biologists. I will do the layout for the next issue (though I'm not a design expert) but will need text and photos. Here are some ideas for possible items

- Reminiscences of memorable cruises
- Reminiscences of life at Wormley (not necessarily about science)  
Are there photos of the IOS Christmas reviews?
- Photographs, preferably including people.
- Articles linking science in the Wormley days to science today.
- Glorious failures (the bits of kit that didn't work).

Please send any material to me at [wjg@noc.soton.ac.uk](mailto:wjg@noc.soton.ac.uk)

I would aim for the next issue in December 2013.

#### Spreading the word

Not everyone has e-mail access so please print copies and give them to anyone you know who might be interested and please let me know the e-mail address of others who might like to be on the mailing list..