sims foundation supporting sydney institute of marine science

Newsletter

May 2010

David de Rothschild to deliver lecture at SIMS

SIMS is delighted to announce that it will host a lecture by David de Rothschild in the second half of July. David is currently sailing across the Pacific in his 18m catamaran *Plastiki* made from 12,500 discarded plastic bottles. You can follow his progress on the website **www.theplastiki.com**.

David is the founder of Adventure Ecology, an environmental advocacy organisation that harnesses the power of dreams, adventures and stories in order to inspire, educate and activate individuals, communities and businesses to start moving towards a smarter more sustainable way of living and acting.

His mission aboard the *Plastiki* is to highlight cleanup issues and sustainable plastic technologies. The Pacific is littered with rubbish, including the North Pacific Gyre where there is a vast concentration of plastics, chemical sludge and other debris that have been trapped by the currents. It is estimated that plastics make up between 60% and 80% of total marine pollution.

David's view is to recognise "that waste is fundamentally a design flaw – it does not appear in nature. It's about rethinking waste as a resource." The inspiration for the *Plastiki* came from a United Nations Environment Program report "Ecosystems and Biodiversity in Deep Waters and High Seas". This plus Thor Heyerdahl's epic 1947 expedition, *The Kon-Tiki*. Two of Thor Heyerdahl's grandchildren are sailing with David on the *Plastiki*.

The mission with *Plastiki* is to beat waste by thinking smart and showcasing how waste can be used as a valuable resource. The *Plastiki* is engineered almost entirely from 12,500 reclaimed plastic bottles that provide 68% of the boat's buoyancy.

A unique plastic recyclable material made from srPET makes up her superstructure. The mast is reclaimed aluminium irrigation pipe and the sail is hand-made from recycled PET cloth.

Renewable energy systems include solar panels, wind and trailing propeller turbines, bicycle generators, a urine to water recovery system and a rain water catchment system.

The date for this lecture will be publicised as soon as we know when David will be arriving in Sydney on the *Plastiki*.

News in brief

IMOS funding for SIMS

SIMS has received $7.4 million of new federal funding through the Integrated Marine Observing System (IMOS) program to extend observations of the accelerating East Australian Current, its effect on the coastal ecology of New South Wales and to detect changes in the Southern Ocean due to climate change.

Infrastructure at SIMS

The first stages of building are almost ready to go. Construction is expected to commence late June or early July and the first stages should be completed around the end of the year.

Doctoral fellowships

Three doctoral fellowships were awarded at SIMS on 29th April, 2010. The recipients were:

Gwenael Cadiou studying "Fish movements and habitat use - implications for conservation and coastal ecosystems management".

Ana Bugnot studying "Marine Invasions in Australia".

Osmar Luiz "Understanding changes in rocky reef communities caused by global warming".

Full details on page 2.

For the diary

A scientific talk (plus light refreshments) will be held at SIMS on Tuesday 15th June 2010

Professor James Goff
Co-Director of the Australian Tsunami Research Centre

Tsunamis - Coming to a place near you?

Bookings 9969-2664.
Cost is $10 per head.

Top left: Gwenael Cadiou, 2010 Thyne Reid Doctoral Fellow at SIMS.

Bottom left: Ana Bugnot, 2010 Doctoral Fellow at SIMS.

Top right: Osmar Luiz, 2010 Doctoral Fellow at SIMS.

Bottom right: Ian Reid, Chair of the Thyne Reid Foundation, with Peter Steinberg and Gwenael Cadiou at the fellowship award presentation.

All of these doctoral fellows will be carrying out a significant component of their PhD research at SIMS.

Inaugural fellowship awards at SIMS

These are the recipients of the first three doctoral fellowships to be awarded at SIMS. This is an important initiative as there is an urgent need for more marine scientists. The fellowships are awarded on a competitive basis and will play a significant role in encouraging more students to undertake research at PhD level. The aim is that the award of doctoral fellowships will be an important annual event at SIMS.

Gwenael Cadiou: Fish movements and habitat use - implications for conservation and coastal ecosystems management.

Shallow coastal marine habitats can be highly affected by pollution, urbanisation, tourism and fisheries as well as by climate change. These disturbances have direct effects on habitat quality and distribution. A species with a limited home range and a high specialisation for a certain type of habitat or exhibiting high site fidelity (e.g. to a creek, estuary or reef) will likely have less chance to adapt to pressures compared to species utilising a wider range of habitats.

This research will study species of fish that are economically significant and will help to identify the degree of susceptibility to environmental changes for each of these species. The project will include studies on fish movements and habitats in both marine protected and unprotected areas to help determine the extent to which the marine protected areas are helpful for conservation.

Ana Bugnot: Marine invasions in Australia.

Invasive species are major threats to native habitats worldwide, and many attempts are being made to prevent them in order to conserve native habitats. A thorough understanding of the ecology of the invasions is essential to the process of designing efficient control strategies.

This study focuses on the ecology of an invasive marine invertebrate *Cirolana harfordi* which is a small crustacean and similar to the woodlouse or slater. It is found on sandy beaches and under boulders in its native North America. The species was first recorded in Australia in 1972 at Berry's Bay in NSW, and later was found in Fremantle in Western Australia and and Lorne in Victoria. It is believed to have been introduced by intensive shipping activities.

Earlier research done at the University of Sydney has shown that *Cirolana harfordi* is abundant in Sydney Harbour and is commonly found in mussel and oyster beds. This study will lead to an accurate evaluation of its impact on native communities and native habitats and will allow us to determine whether it has a positive impact, by acting as an alternative food item for fishes and other invertebrates, or a negative impact by reducing the abundance, and limiting the distribution of native species.

Osmar Luiz: Understanding changes in rocky reef communities caused by global warming.

One of the most pervasive effects of climate change are shifts in where plant and animal species live. Polar species are under threat due to a shrinking environment and tropical species are expanding their ranges pole wards.

Recent research has detected sea urchins moving south to the cooler waters around Tasmania with signifant impact on the lobster and abalone popluations. The warming waters along coastal New South Wales are bringing tropical fish southward and some of these are now overwintering in the Sydney area.

Most of management decisions dealing with invasive species are based on the assumption that they cause environmental and economic damage. However, environmental change may mean that resident species might themselves become poorly adapted to the local environment in which case new species might be important for enriching local biodiversity and maintaining ecosystem services. This project will help regional fisheries managers understand potential changes in the ecology of fish species due to warmer waters along the NSW coast.

IMOS funding

SIMS has received $7.4 million of new federal funding through the Integrated Marine Observing System (IMOS) program to extend observations of the strengthening East Australian Current (EAC), its effect on the coastal ecology of NSW, and to detect changes in the Southern Ocean due to climate change.

IMOS is a national research infrastructure program established for long term monitoring and research into Australia's marine environment. IMOS commenced in 2007 and this funding, through the Nation-building Economic Stimulus Plan and the Education Investment Fund, is for stage 2 of IMOS up to 2013. There are six geographic nodes of IMOS spread around Australia and SIMS manages the NSW node.

The EAC, which starts in the tropics and flows along the east coast of Australia, has warmed southeastern Australia by over 2 degrees Celsius in less than 80 years, and is forecast to continue to warm the region by 0.12ºC per decade.

There will be hundreds of sensors and monitoring devices in the water including:

- Oceanographic moorings off Sydney and Coffs Harbour to measure currents, temperature and salinity, and responses of phytoplankton which are at the base of marine foodwebs.
- An Autonomous Underwater Vehicle which will survey the distribution of seafloor communities, including kelp forests, down to 120 m depth. Areas in and around marine parks will be a focus of these deployments, to help determine their benefits to the conservation of marine habitats and communities.
- Arrays of acoustic receivers which will record the movements of acoustically tagged fish and sharks, and miniature satellite transmitters for monitoring seal and seabird foraging movements.
- Ocean gliders that can be deployed for several weeks to acquire physical, chemical and biological properties from oceans adjacent to the NSW coast.
- A radar system for monitoring coastal currents and waves to be deployed off Coffs Harbour and Solitary Islands Marine Park.

The voyage of an ocean glider

Iain Suthers, NSW Node Leader for IMOS, reports on the most recent voyage of the Slocum ocean glider.

Slocum ocean gliders are a new breed of underwater vehicles that gain their propulsion from the ocean itself. By changing their buoyancy they ascend and descend whilst using very little energy. They are unmanned and can work around the clock in all weather conditions, continuously sampling the water for temperature, salinity, dissolved oxygen, chlorophyll and turbidity. They use GPS when they surface at four hourly intervals to send data via Iridium satellite and to receive new commands from the scientists re where to head next.

The Slocum glider moves up and down to about 200m deep, four times every hour. They have a saw-tooth forward motion and their maximum speed is about 25km per day - much slower than the speed of the East Australian Current (EAC).

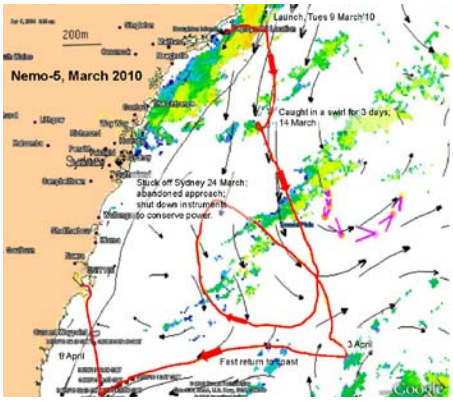
The glider gives a much better view of the ocean than does a satellite image. The satellite view is only about the top one metre of the ocean whereas the Slocum glider is surveying the ocean in detail down to 200m.

The most recent voyage of the SIMS based Slocum glider illustrates the challenges of managing this type of vessel in the EAC, about which we still know relatively little. Two scientists released the glider at Port Stephens and after crossing the continental shelf it soon entered the warm water of the EAC, heading south. The glider was aimed for the core of a cold eddy, first crossing the main currents that could be inferred from the satellite images. The first two weeks of the voyage went to plan apart from three days when the glider circled in a small eddy. The glider gathered good data in this time.

When time came for the glider to head back towards Sydney, the plans started to go awry. The strength of the current sweeping off the coast captured the glider and swept it 40 nautical miles (nm) off the coast - too far for easy retrieval by boat.

With a fading battery, it was decided to shut down most instruments and restrict satellite communication to just GPS. Still the glider was stuck in a large eddy and was now 150 nm east of Sydney. Iain and his

A slocum glider in the water

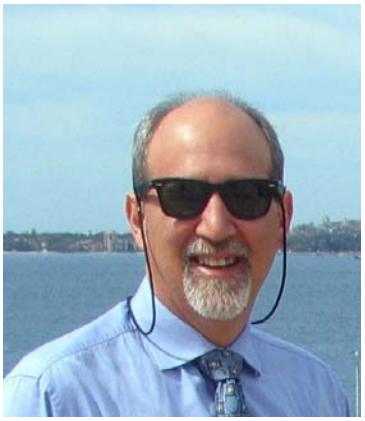


Glider's course on this trip (in red)

colleagues made slow progress directing the glider southwards trying to reach an anti-clockwise warm eddy to head back towards the coast. This eddy, now with the glider, was moving rapidly and turned south as it reached the coast. The glider was caught and was heading towards Tasmania very quickly. Simo's Afloat, a charter operator from Jervis Bay chased the glider 80 nm southwards into the teeth of an early southerly change which pushed up a 4m to 5m swell in the southerly current. Finally, in the rays of the setting sun, the three scientists on board spied the glider 40 nm off Montague Island. Just as they were about to retrieve the glider the stern of the boat dropped into a deep trough and all three disappeared under half a metre of green unbroken water. Seconds later the stern arose and they emerged, still clinging onto the glider. Life as a marine scientist is not dull!!

The data from this trip has revealed a lot about the waters flowing off the continental shelf and the coastal plankton that is carried with those waters.

Meet the SIMS Director, Peter Steinberg



Late last year, SIMS announced the appointment of Professor Peter Steinberg to the key post as the first Director and CEO of SIMS. Professor Steinberg is concurrently the Director of the Centre for Marine Bio-Innovation and a professor in biological sciences at the University of New South Wales, and was formerly the CEO of biotechnology company Biosignal Ltd.

Coming, as it does, on the back of substantial funding to build world class infrastructure for SIMS, this appointment will be vital in ensuring strong growth and an increasing national and international profile for the institute over the next 3-5 years. Merilyn Sleigh spoke to Peter Steinberg recently to get his take on the future for SIMS under his leadership.

Q: Tell us about your background and how you got interested in marine science?

PS: I was born in New York, but we moved around quite a bit in my early years. Despite a childhood dominated by play with toy animals rather than toy soldiers, and a total fascination with a Hawaiian coral reef discovered while snorkeling on holiday at age 15, it took me until my early undergraduate days to start thinking of marine science as a career rather than a hobby. A key moment was when I encountered the remarkable world of marine invertebrates for the first time, which set me on the path to becoming a marine ecologist. Over time I moved west – to California to complete my PhD and then to Australia on a Fulbright Fellowship in 1984.

Q: What brought you to Australia?

PS: My research at the time was focused on the complex interactions that keep the populations of different plants and animals in balance (the "finely balanced ecosystems" we hear so much about). In North America, the sea otter is a voracious consumer of sea urchins and other marine plant-eating creatures – in fact it can eat up to a quarter of its body weight of these creatures a day. This is a great way of controlling sea urchin populations which otherwise in their turn consume vast amounts of kelp. In Australia there are no sea otters or anything equivalent to sit at the top of such a feeding chain, so I came here to investigate how kelp protects itself from being completely wiped out by sea urchins. I suspected the kelp might have evolved a more effective chemical defence system, and this turned out to be the case.

Q: Surprisingly, this line of enquiry led you into the commercial world. How did this come about?

PS: I noticed that a particular type of red seaweed called *Delisea* was resistant to being covered by algae and other "fouling" organisms, which can blanket many other organisms on the sea bottom. This looked like a great example of chemical defence in action. It led on to a very productive collaboration with a team of microbiologists, and establishment of a company, Biosignal. The focus was on looking at how these defensive chemicals could be developed in applications as diverse as preventing microbial corrosion in oil pipes to stopping films of bacteria forming on contact lenses. From 2007-mid 2009 I was CEO of Biosignal, marrying my research interests with the realities of financing and running a company listed on the Australian Stock Exchange.

Q: What attracted you to the position at SIMS?

PS: All marine biologists dream of having a facility like SIMS on their doorsteps, and I was involved with SIMS right from its beginnings, as the first chair of its scientific advisory committee and as a Board member. I was also strongly involved in the effort to secure substantial funding for SIMS from IMOS (the Integrated Marine Observing System), a national initiative funded by the federal government. Later the opportunity to build world class infrastructure for SIMS came along, through more federal funding.

One of the great strengths of SIMS (although also one of its challenges!) is its focus on partnership among its member universities and with other stakeholders and supporters including the Sydney Harbour Federation Trust and the NSW State government. I already knew from my research and commercial work of the power of collaborations between scientists from different disciplines in solving major problems. So when I was approached about becoming Director of SIMS it seemed like a great opportunity to use the momentum provided by the federal funding to build on these strengthening linkages, helping to create a major collaborative research institute with a unique focus on Sydney Harbour and the NSW coastline.

Q: What particular attributes do you bring to the role of Director?

PS: My enthusiasm for and achievements in scientific research, my linkages nationally and internationally in marine science, and long experience in the university sector, understanding its priorities and constraints. I am attracted to the challenge of institution building - the idea of SIMS as an entity which is greater than the sum of its individual research projects and research teams. My excursion into the commercial side of science has given me an extra perspective – to realise how much can be achieved when excellent science is aligned with the needs and contributions of stakeholders, whether they be investors, customers, governments or the community.

Q: Do you have any particular model in mind in your vision for the future of SIMS?

PS: It is easy to point to the great US marine science institutes – Woods Hole and the Scripps Institute of Oceanography for example – as aspirational models. Making SIMS a world class marine facility is a headline goal, but I think SIMS can also be different from these models. We can build from our collaborative foundations, involving partners with different areas of strength, to apply many different scientific disciplines to the key problems that face coastal Australia. Sydney is the largest urban estuary system in the country, and is really the place where population and industrial pressures are meeting climate change face to face. There is a lot at stake for the State's economy as well as for the quality of our life around the harbour.

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The photo below shows the historic buildings at Chowder Bay where SIMS has its headquarters. The infrastructure building program has been planned to ensure that the heritage values of these buildings are not disturbed.

All building works are approved in advance by the Sydney Harbour Federation Trust. The Harbour Trust has done a wonderful job in restoring the whole of this area on Middle Head.

TO MAKE A DONATION:

Go to www.sims.org.au and click the DONATE NOW button.

Otherwise download our donation form and send a cheque or credit card details.