
FIRST
SEAmester – South Africa's h Class Afloat
Isabelle Ansorge and Tahlia Henry

Why the need?

DST's 10 year Global Change Grand Challenge requires platforms to *"attract young researchers to the region and retain them by exciting their interest in aspects of global change; while developing their capacity and professional skills in the relevant fields of investigation".*

A key target of Operation Phakisa is *"for the Department of Higher Education and Training to drive alignment between theoretical and workplace learning".*

Berths are restricted on all logistics voyages – meaning that only students linked to a SANAP programme are able to participate.

The strength of "SEAmester" is that postgraduate students combine theoretical classroom learning with the application of this knowledge through ship-based, and more importantly, hands-on research.

SEAmester is not the first Class Afloat!

South Africa's Class Afloat

GET STARTED

Dates & Tuition

Jun 15, 2017 - Jul 4, 2017
$ 5,470

Duration

20
DAYS

View other trips by duration

20 days | 40 days
66 days | 80 days
90 days

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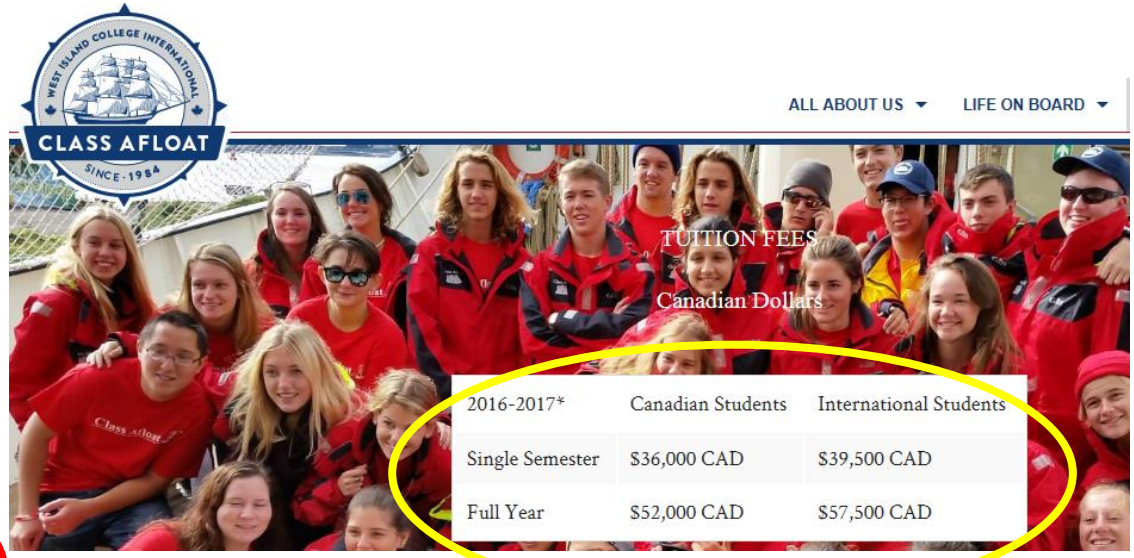

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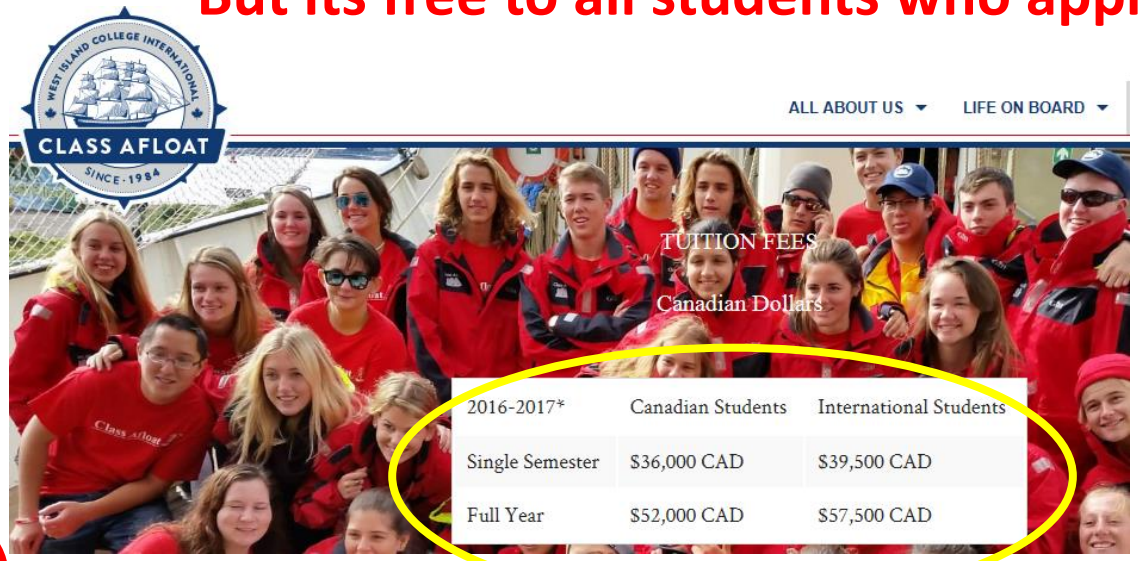
But its free to all students who apply



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Fall 2016 - Spring 2017 SEA Semester Costs

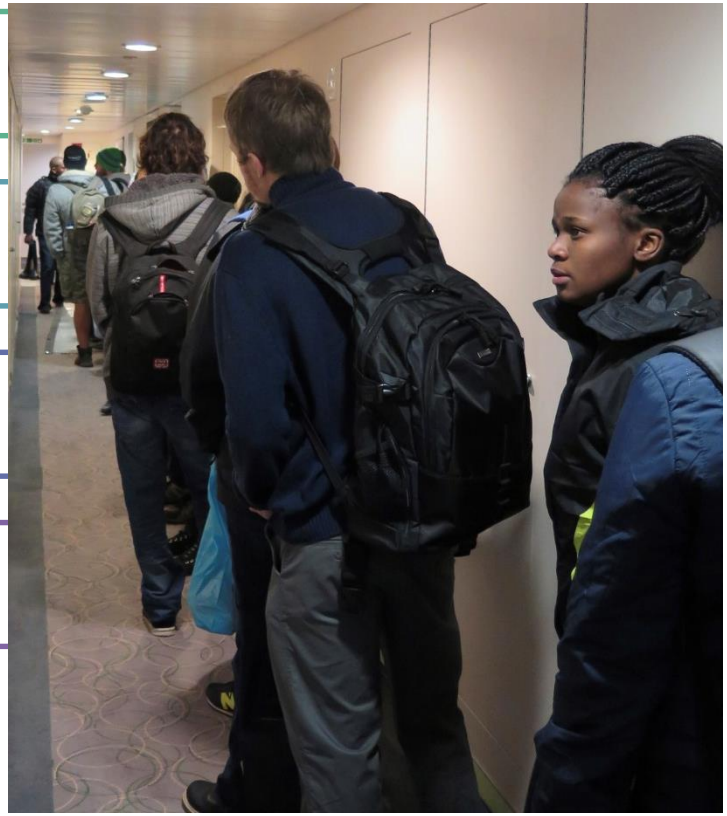
SEA Semester: Sustainability in Polynesian Island Cultures and Ecosystems	$29,700
SEA Semester: The Global Ocean	$29,700
SEA Semester: Marine Biodiversity & Conservation	$29,700
SEA Semester: Colonization to Conservation in the Caribbean	$29,500
SEA Semester: Oceans & Climate	$29,100
SEA Semester: Ocean Exploration	$27,500

Its one of the reasons I studied Oceanography! 6 months on Poland's "Class Afloat" onboard RV Pogoria in 1983-1984 – I spent a lot of time cleaning!

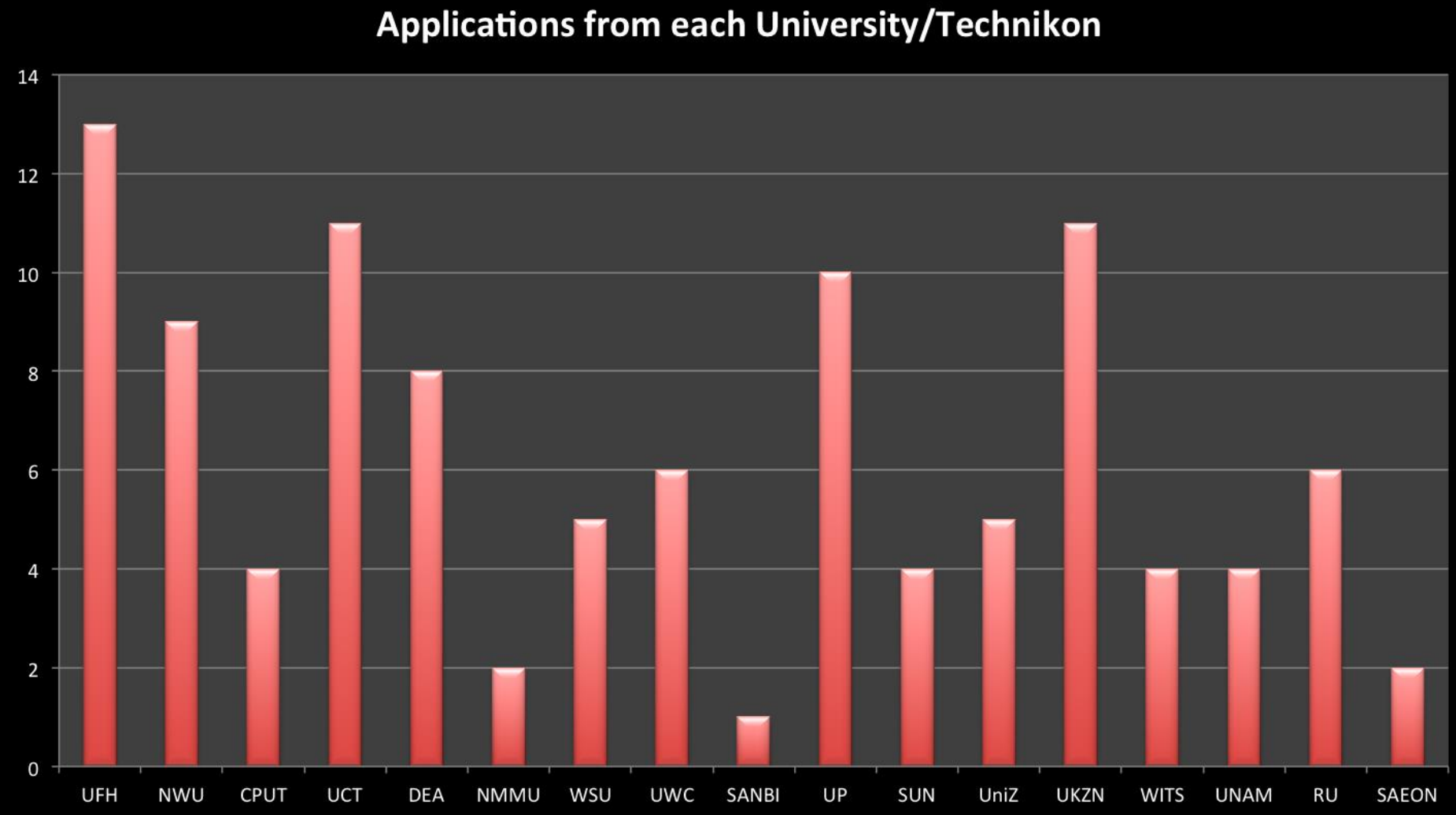
SEAmester

South Africa's Class Afloat

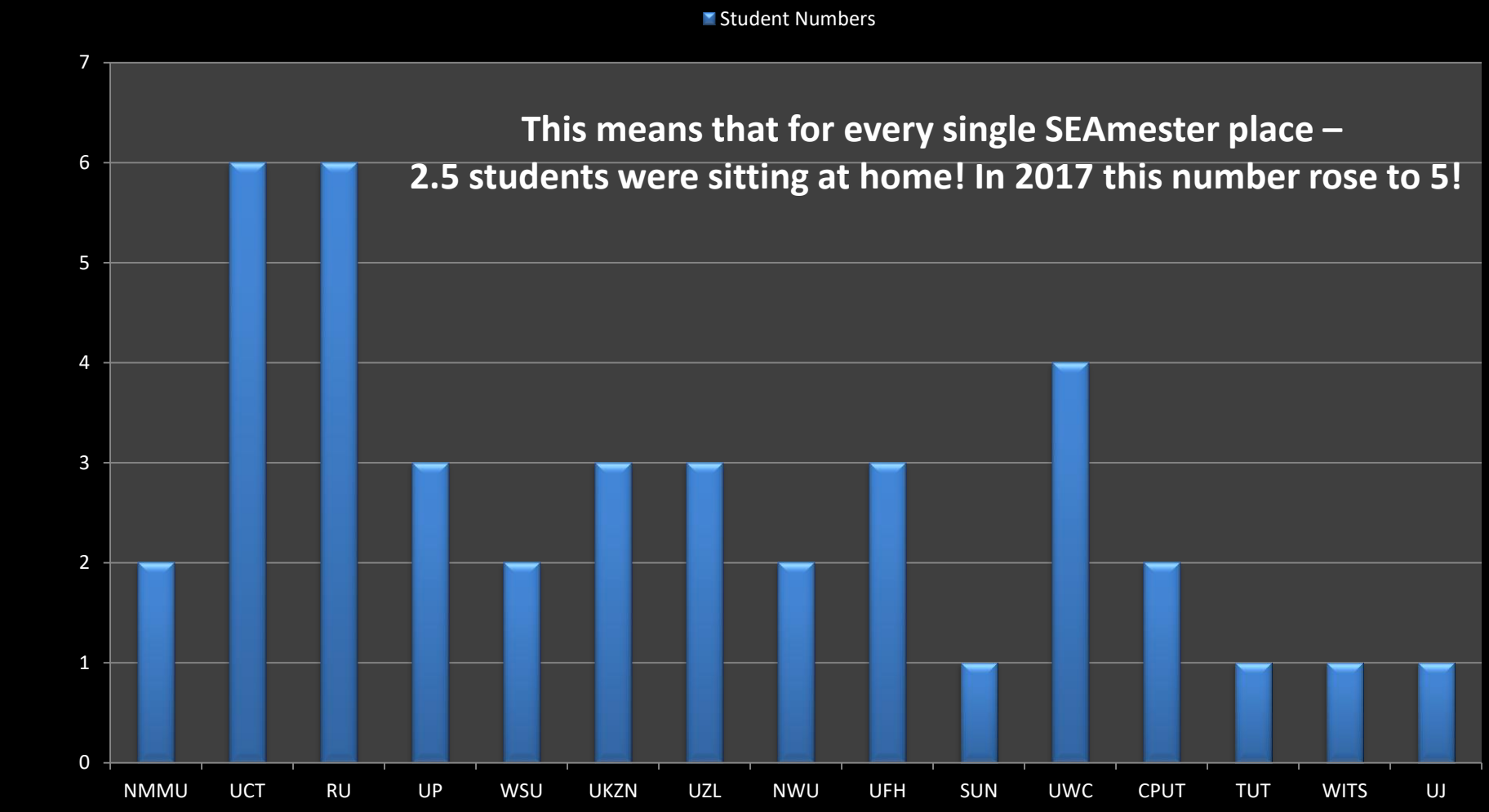
- Email from Tracy 30th May – announcing SEAmester would happen
- Email and SEAmester application form sent out via SANCOR 31st May
- Closing date of applications 8th June – 142 submitted
- SEAmester committee – 9th June - 40 selected
- All students notified – 9th June
- Students depart on SEAmester 5th July



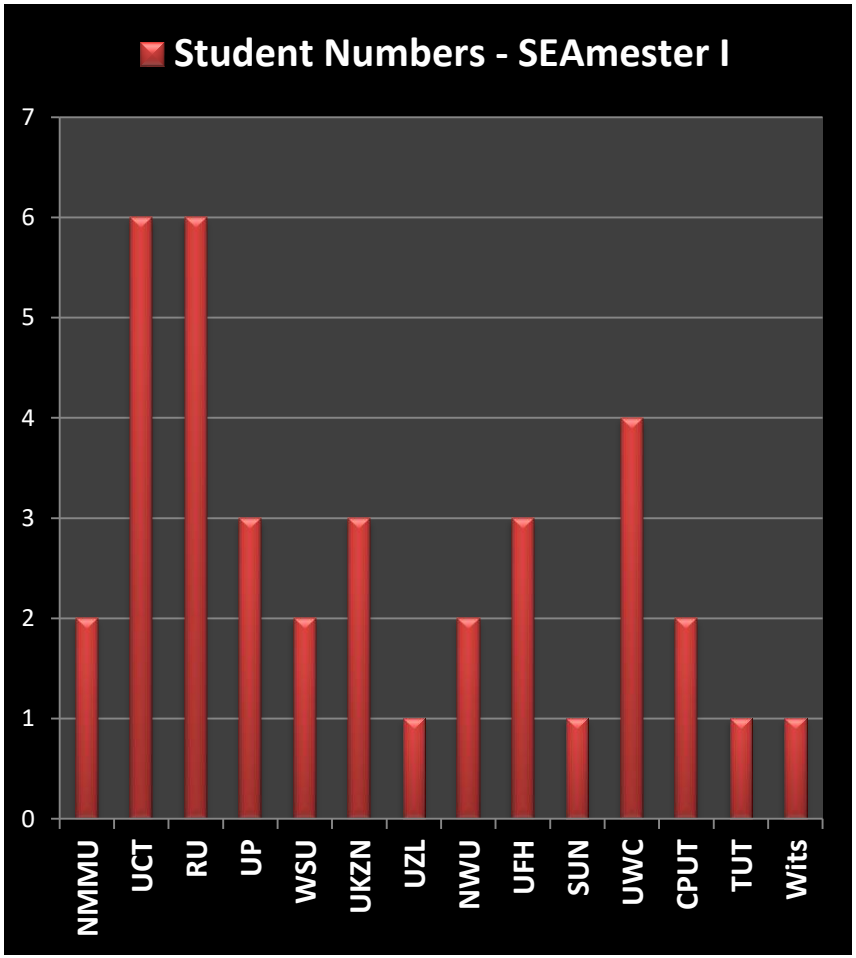
40 chosen from 132 applications

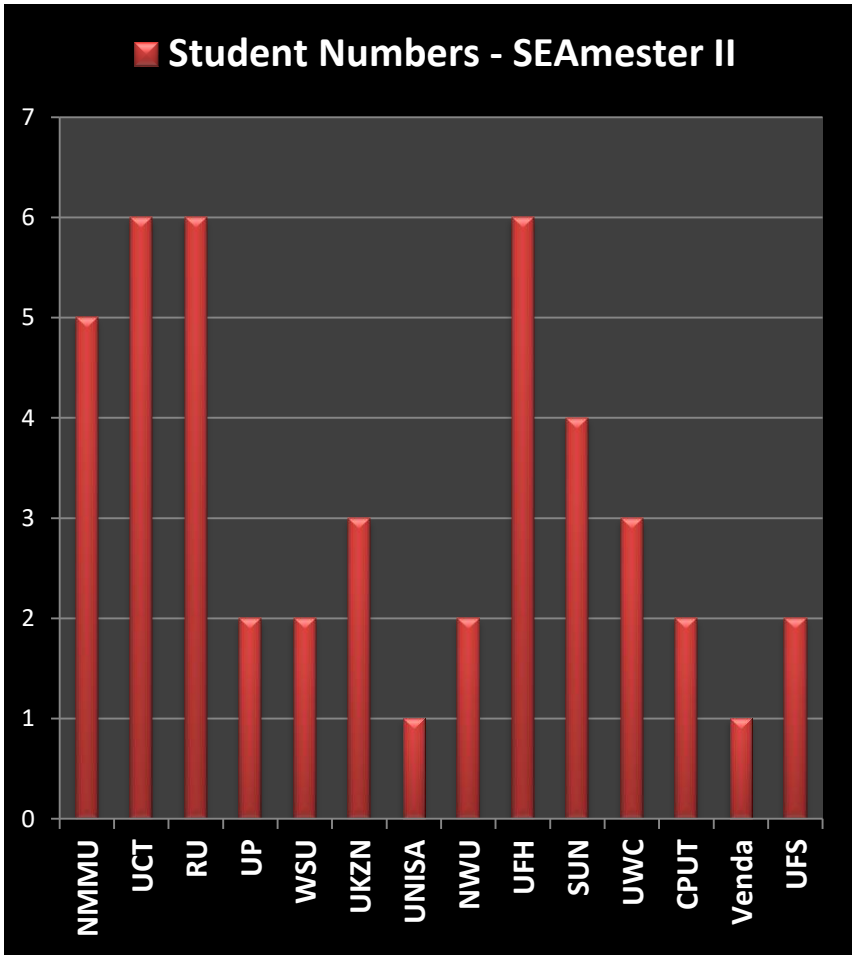


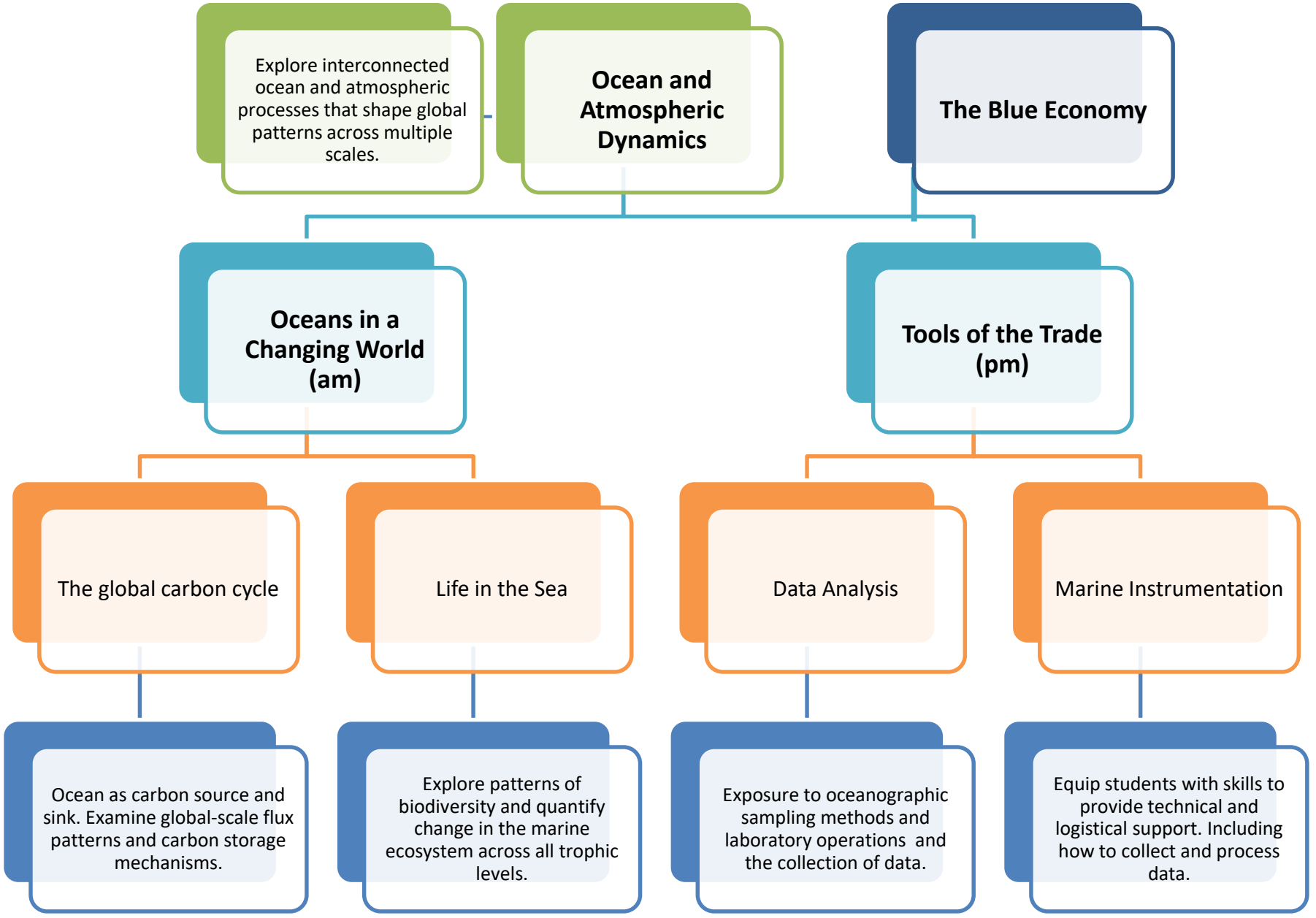
Final spread in 2016 15 Universities are represented on SEAmester



SEAmester 2016 and 2017






Explore interconnected ocean and atmospheric processes that shape global patterns across multiple scales.
Ocean and Atmospheric Dynamics
The Blue Economy
Oceans in a Changing World (am)
Tools of the Trade (pm)
The global carbon cycle
Life in the Sea
Data Analysis
Marine Instrumentation
Ocean as carbon source and sink. Examine global-scale flux patterns and carbon storage mechanisms.
Explore patterns of biodiversity and quantify change in the marine ecosystem across all trophic levels.
Exposure to oceanographic sampling methods and laboratory operations and the collection of data.
Equip students with skills to provide technical and logistical support. Including how to collect and process data.

SEAmester – Assignment plan

DAILY HAND-IN OF ASSIGNMENTS

AT 08.00

in Groups of 2

MOVIE PRESENTATION – 14th July 20.00

Oceans in a Changing Climate Stream to put together a 10 minute movie or powerpoint presentation of your experience during SEAmester

PROJECT PRESENTATIONS 14TH JULY
AT 15.00

in Groups of 5

MOVIE PRESENTATION – 14th July 20.30

Tools of Trade Stream to put together a 10 minute movie or powerpoint presentation of your experience during SEAmester

SEAmester week

5th	6th - Transit to ASCA array
DEPARTURE FROM CAPE TOWN	DEBRIEF 08.00 to 08.30
ONBOARD BY 08.00	Global Ocean Observing Systems - The ASCA array 08.30 to 10.00
IMMIGRATION FROM 08.30 AND DEPARTURE ON COMPLETION	SA Agulhas II - Trials..and tribulations 10.00 to 11.30
DECK TRIALS	
INTRODUCTION TO SA AGULHAS II AND LIFE BOAT DRILL, INTRODUCTION TO SEAmester - PRESENTATION OF PROGRAMME, ASSIGNMENTS, SHORT MOVIE DISCUSSION	Deck Orientation and Logbooks 10.00 to 11.30
	A Student's Guide to the NRF 12.30 to 14.00
	SA Agulhas II - Trials..and tribulations 14.00 to 15.30
	Deck Orientation and Logbooks 14.00 to 15.30
Evening for settling in	Birding 101 - How to observe birds from the SA Agulhas II 20.00 to 21.00

STREAM 1	OCEANS IN A CHANGING CLIMATE
STREAM 2	TOOLS OF THE TRADE
	ALL

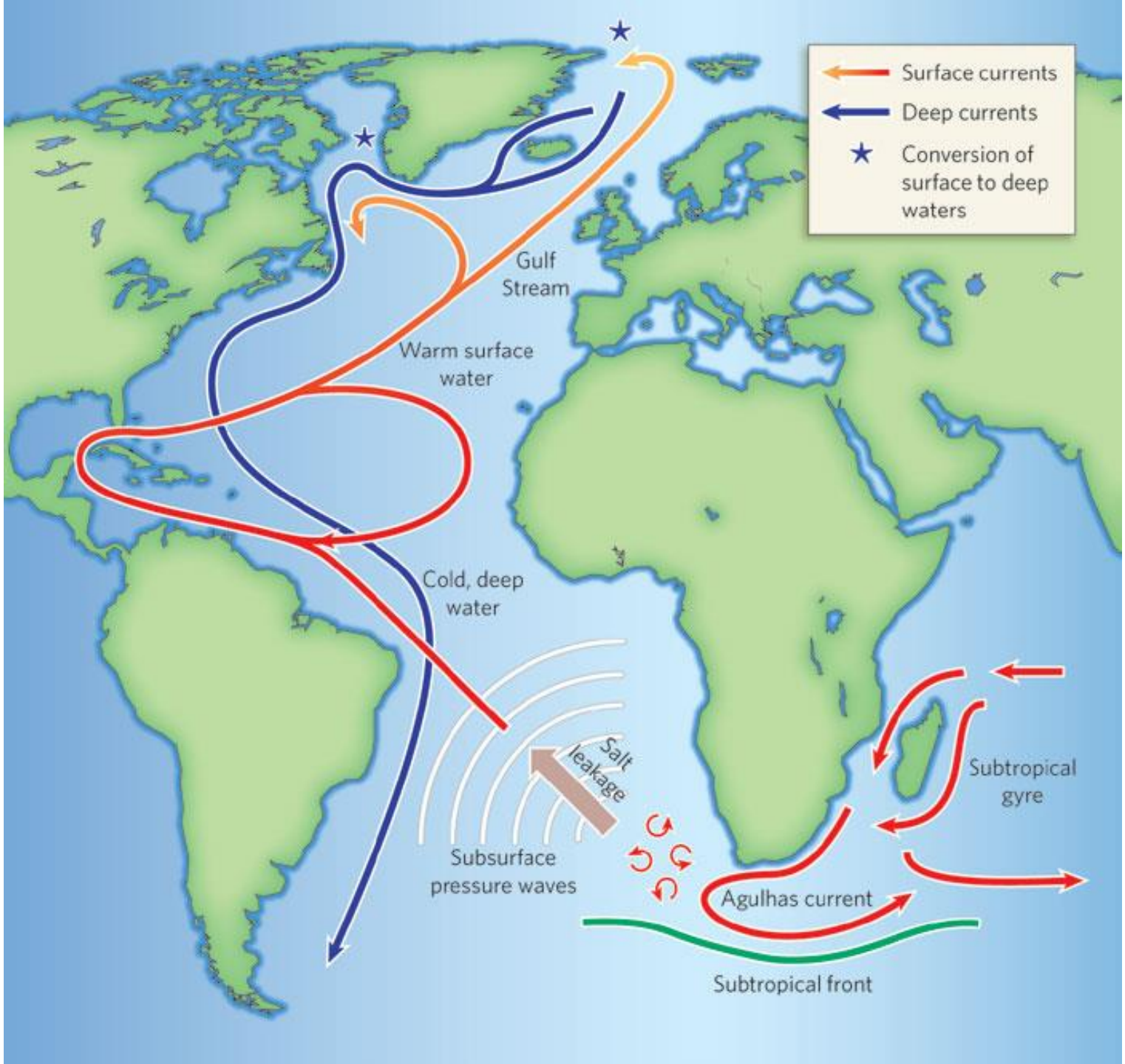
LECTURES - 7th to 13th SEE TIMETABLE FOR DETAIL		14th	15th
			ARRIVAL CAPE TOWN
DAILY DEBRIEF 08.00 to 08.30		DAY FREE TO CLEAN ALL LABORATORIES AND CABINS, AND COMPLETE ALL PRESENTATIONS FOR 15.00	
08.30 to 9.30	OCEAN DYNAMICS		
9.30 to 12.00	OCEANS IN A CHANGING CLIMATE		
9.30 to 13.30	DECK WORK - STREAM 2		
OPTIONAL TOURS AND LECTURES - 12.30 to 13.45			
14.30 to 17.00	TOOLS OF THE TRADE		
14.30 to 18.30	DECK WORK - STREAM 1		
20.00 to 21.00	Evening Lectures on Photography (Jean) and Climate Change (Ian)		
	FAREWELL AND THEME PARTY "PIRATES OF THE AGULHAS CURRENT" 13TH JULY		

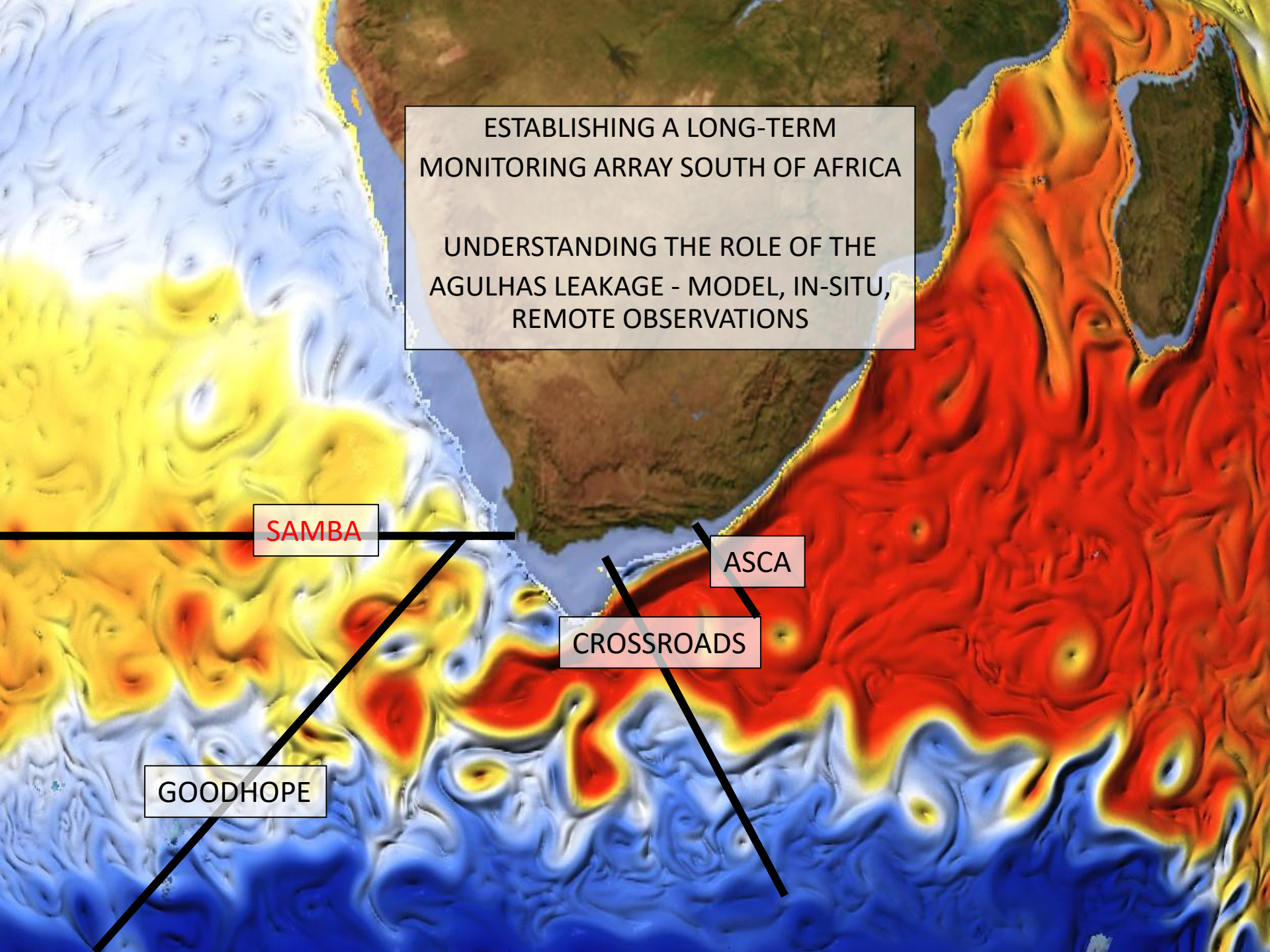
SEAmester lecture plan 25 lecturers!

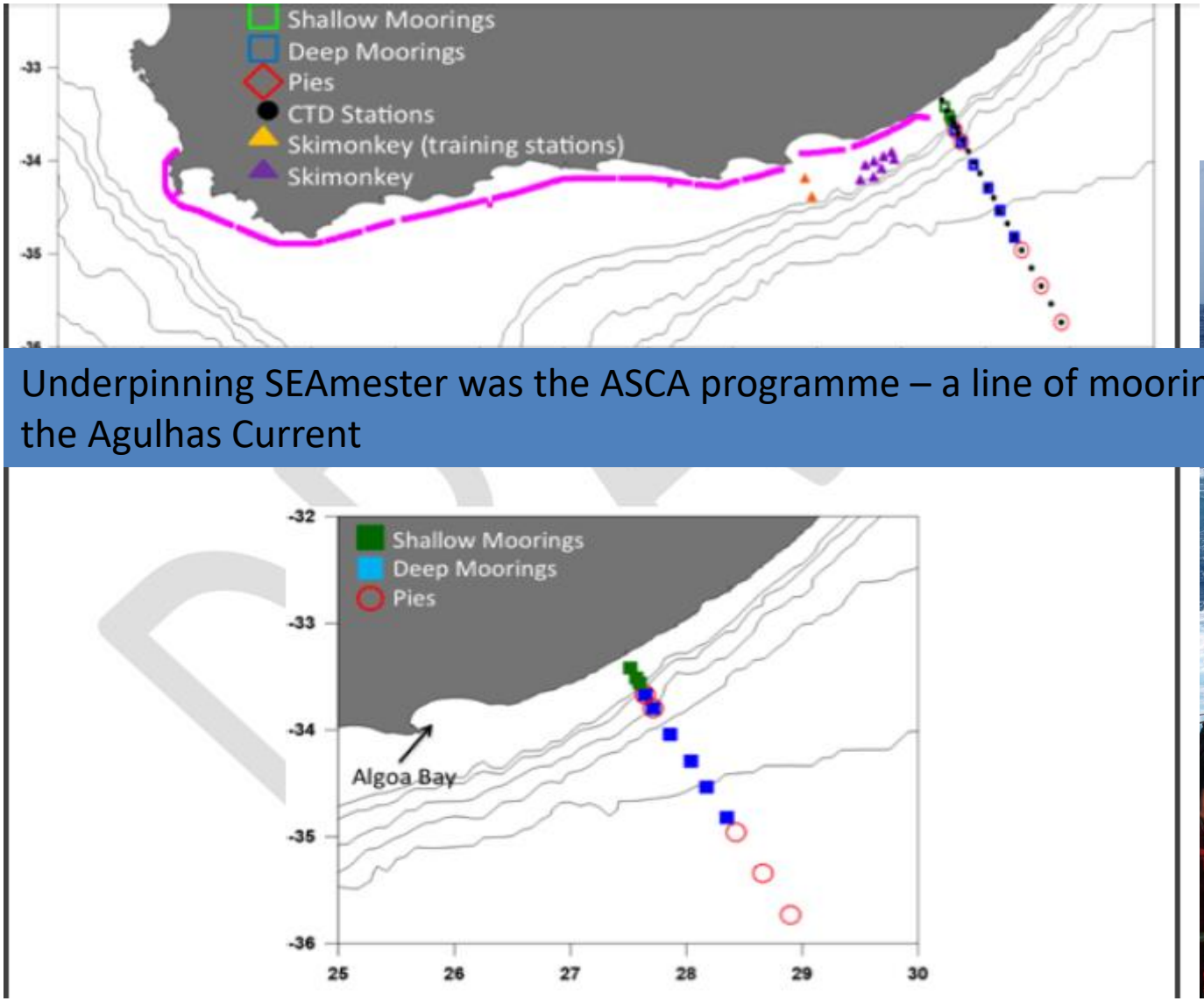
JULY		7th	8th	9th	10th	11th	12th	13th	14th
		BREAKFAST 07.30 to 08.00							
8.30 to 9.30 OCEAN DYNAMICS		Principles of oceanography	Wind patterns; trades and westerlies; solar energy input into the ocean	Wind driven circulation; thermal wind; geostrophic flow; Rossby	Stratification and turbulence; thermohaline circulation; Richardson	Meridional heat transport; global balance through inter-ocean exchange	Western boundary currents; gyral systems; bottom flows; Stommel	Mesoscale eddies; life history; Agulhas	PROJECT PRESENTATIONS 15.00
		ISABELLE	IZIDINE	GEOFF	GEOFF	IZIDINE	GEOFF	GEOFF	
	CRUISE PROJECT	Understanding the Greater Agulhas Current - Cruise planning - proposal, equipment, budget							
DECK WORK		STREAM 2 - TOOLS OF THE TRADE 9.30 to 13.30							
9.30 to 12.00 OCEANS IN A CHANGING CLIMATE	MARINE CARBON CYCLE	Introduction to the chemistry of the oceans	The global marine carbon cycle	The chemistry of living organisms	The origin and fate of metals and minerals	Redfield and biogeochemical tracers	Microbes and molecular biology II	Zooplankton	
		DAVID G	SARAH	DAVID G	DAVID G	SARAH	ROSIE	DAVID W	
	LIFE IN THE SEA	Important chemical ocean systems	Nutrient cycles and productivity	Phytoplankton and productivity I	Phytoplankton and productivity II	Microbes and molecular biology I	Making the connections	Past and future climate changes	
		DAVID G	SARAH	DAVID W	DAVID W	ROSIE	DAVID G	SARAH	
	ASSIGNMENT	Chemistry of the oceans	Production	Phytoplankton	Carbonate chemistry	Redfield	Microbes	Zooplankton	
		LUNCH 12.00 to 12.30							
DECK WORK		STREAM 1 - OCEANS IN A CHANGING CLIMATE 14.00 to 18.00							
14.30 to 17.00 TOOLS OF THE TRADE	MARINE INSTRUMENTS	Ocean Data View - ISABELLE AND TAHLIA	Lagrangian - Argo to Glider	Eulerian - CTD and moorings	Underway TSG, ADCP	Remote Sensing		Ocean Acoustics - FANNIE	
			MARCEL	TAHLIA/JETH	RAYMOND	MARCEL	MARCEL		
	DATA ANALYSIS		Weather Forecasting	CTD Profiles	Fine tune mapping - TSG	Ocean Gradients	Ocean state		
			MARC	RAYMOND	RAYMOND	MARCEL	MARCEL		
	ASSIGNMENT	ODV Mapping	SAWS Observations	Water masses	Scales	Calculations		Practical	
		SUPPER 19.00 to 19.30							

Example of Tools of the Trade

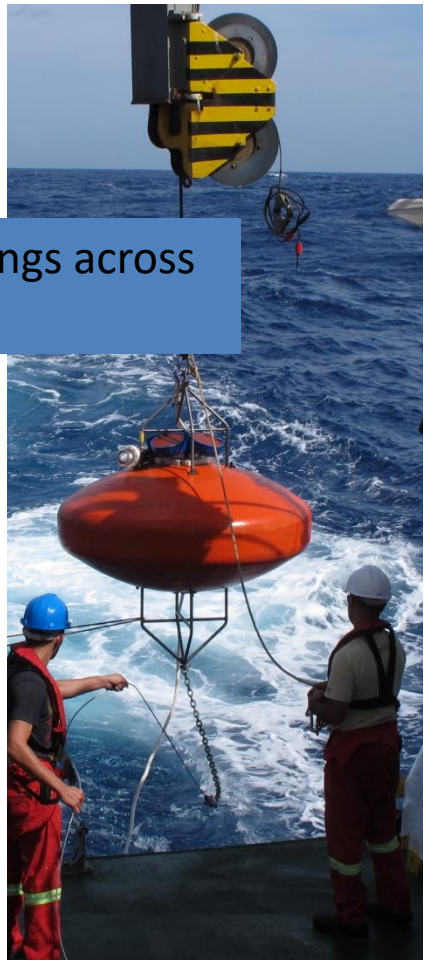
		D	E	F	G	H	I	J	K
	JULY	19th	20th	21st	22nd	23rd	24th	25th	26th
		BREAKFAST 07.30 to 08.00							
8.30 to 9.30 OCEAN DYNAMICS		Principles of oceanography	Wind patterns; trades and westerlies; solar energy input into the ocean	Wind driven ocean circulation: geostrophy and thermal wind, intro to potential vorticity	Sverdrup balance, western intensification, Rossby waves	Meridional heat transport; global balance through inter-ocean exchange	Stratification and turbulence; thermohaline circulation	Mesoscale eddies; life history; Agulhas Rings and Water Masses	PROJECT PRESENTATIONS 15.00
		ISABELLE	KATYE	KATHERINE	KATHERINE	KATYE	ISABELLE	ISABELLE	
	CRUISE								
DECK WORK		STREAM 2 – TOOLS OF THE TRADE 9.30 to 13.30							
Daily Deck Training on all Ocean Equipment – Groups of 4 or 5		CTD and Deck Operations – Argo, CPIES, Drifter,	CTD Data software	CTD Calibrations - TSG, Oxygen and salinity	CTD and Deck Operations – Argo, CPIES, Drifter, Benthic	CTD Data software	CTD Calibrations - TSG, Oxygen and salinity	Echo system acoustic d	
ceanography in Practic		Ocean Design – A practical engineering solution to Oceanographic sampling challenges by Gordon Fawcett							
9.30 to 12.00 Deck Work Tools of the Trade	Instrumentation	Whale Surveys and Sightings - deck training	Demonstration of TSG system in TSG lab	Observe waves from the deck; infer wave	Measuring wave conditions;	Gather met data; SAWS	satellite SST, chl-a, SSH mapping	Passive vs Active acoustic data analysis	
	Analysis		Analysis of photographs of coastal problems and design solutions Followed by Ocean instrumentation	Wave data characteristics from Cape Point; wave buoy records	Prepare forecast based on given maps	Interpretation of satellite imagery	Google Earth design of MPA network	Hand-held GPS/GIS	
		LUNCH 12.00 to 12.30							
CLASSROOM		STREAM 2 – TOOLS OF THE TRADE 9.30 to 13.30							
14.30 to 17.00 TOOLS OF THE TRADE	Instrumentation	Intro to TSG	Waves in Oceanic and Coastal Waters	The Global Wave Climate	Observing the Weather: Marine and Surface Met	Principles of Marine Remote Sensing	Tools in Marine Spatial Planning	Active Acoustic Technology	
		NGWAKO	CHRISTO	CARLOS	MARC	TUMELO	MANDY	FANNIE	
	Analysis	Large Scale Geographic Variation of	The Wave Climate of Western SA	Forecasting: The What, the How and the Why	Introduction to Remote Sensing	What is Marine Spatial Planning?	Passive Acoustic Monitoring in SA	Development of a conservation management plan:	
		CHRISTO	CARLOS	MARC	TUMELO	MANDY	FANNIE	KEN	
	ASSIGNMENT	TSG data	Wave spectrum analysis	ve climate along SAM	Compiling a full-set of marine met obs	MPA design cont	larine mammal acoustic	ign target abundance su	
		SUPPER 19.00 to 19.30							


Surface currents
Deep currents
Conversion of surface to deep waters
Gulf Stream
Warm surface water
Cold, deep water
Salt leakage
Subsurface pressure waves
Subtropical gyre
Agulhas current
Subtropical front


ESTABLISHING A LONG-TERM MONITORING ARRAY SOUTH OF AFRICA
UNDERSTANDING THE ROLE OF THE AGULHAS LEAKAGE - MODEL, IN-SITU, REMOTE OBSERVATIONS
SAMBA
ASCA
CROSSROADS
GOODHOPE



Underpinning SEAmester was the ASCA programme – a line of moorings across the Agulhas Current



http://www.saeon.ac.za/enewsletter/archives/2015/february2015/doc02

So what are we doing in South Africa ?

EOS
EOS, TRANSACTIONS, AMERICAN GEOPHYSICAL UNION

VOLUME 95 NUMBER 6
11 February 2014
PAGES 53–60

Basin-Wide Oceanographic Array Bridges the South Atlantic

PAGES 53–54

The meridional overturning circulation (MOC) is a global system of surface, intermediate, and deep ocean currents. The MOC connects the surface layer of the ocean and the atmosphere with the huge reservoir of the deep sea and is the primary mechanism for transporting heat, freshwater, and carbon between ocean basins. Climate models show that past changes in the strength of the MOC were linked to historical climate variations. Further research suggests that the MOC will continue to modulate climate change scenarios on time scales ranging from decades to centuries [*Latif et al.*, 2006].

At present, the majority of observations of the MOC come from the Rapid Climate Change (RAPID) MOC/Meridional Overturning Circulation and Heat Flux Array (MOCHA). This is a collaborative project between the U.K. National Oceanography Centre (NOC); the Rosenstiel School of Marine and Atmospheric Science, in Miami, Fla.; and the U.S. National Oceanic and Atmospheric Administration (NOAA). Preliminary results from this array of sensors, which extends across the North Atlantic along 26.5°N, have shown that the strength of the overturning circulation varies considerably on time scales as short as weeks to months [*Rayner et al.*, 2011].

Given the complex, multibasin nature of the MOC, achieving a more complete understanding of its behavior requires a more comprehensive observing system, one that extends across neighboring ocean basins. Though Argo floats, gliders, and satellite measurements continue to revolutionize the study of the upper ocean, there is still a clear need to study the full ocean depth with moored instruments. Recognition of this critical importance led to the creation of the South Atlantic MOC (SAMOC) initiative [*Garzoli et al.*, 2010].

The Importance of 34.5°S

The current exchange pathways south of Africa and South America drive water mass interactions between the Indian, Pacific, and Atlantic oceans. Specifically, recent model simulations suggest that the leakage of Agulhas Current water across 34.5°S into the South Atlantic is important to circulation patterns far afield [*Biastoch et al.*, 2008]. The Agulhas Current, which flows westward around the southern coast of South Africa, contributes strongly to the upper limb of the MOC northward flow in the Atlantic Ocean. Additionally, the shedding of Agulhas rings into the eastern South Atlantic is a major source of salinity to the region (Figure 1). Other investigations

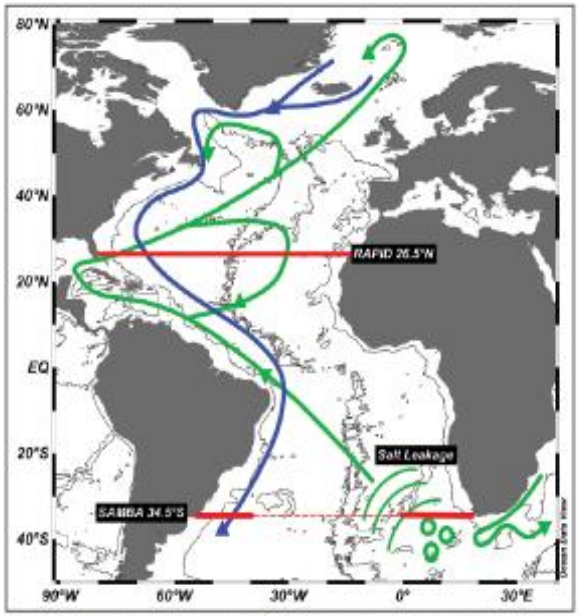
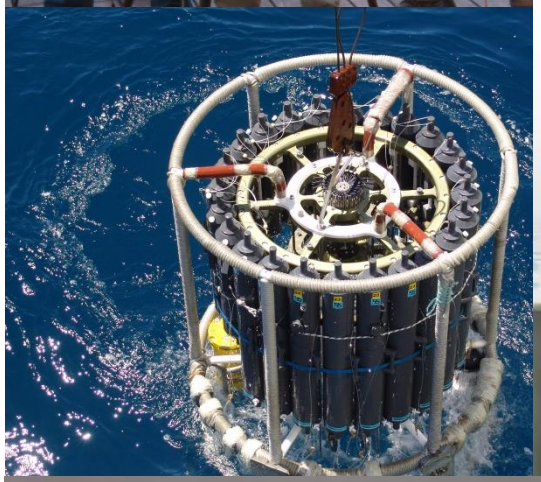


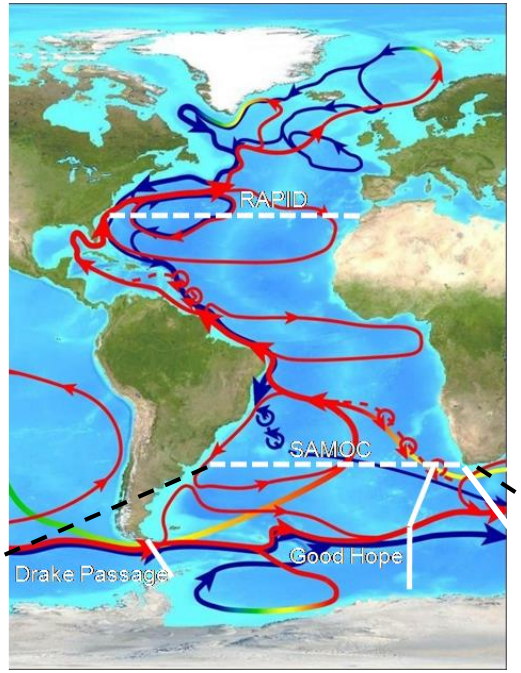
Fig. 1. A simplified schematic highlighting the meridional overturning circulation (MOC)—how currents flow between the southern and northern Atlantic Ocean. Blue lines refer to the pathway of the cold, deep water masses formed in the northern Atlantic; green lines correspond to the northward surface flow (including the Agulhas Current system south of Africa). Agulhas rings (green circles) and their saline influence into the eastern South Atlantic (green arcs) are shown. The existing South Atlantic MOC Basin-wide Array (SAMBA) array along 34.5°S is shown as a solid red line, and the proposed full transect, to be completed in 2014 and 2015, is shown as a dashed line. The Rapid Climate Change (RAPID) MOC/Meridional Overturning Circulation and Heat Flux Array (MOCHA) in the North Atlantic (referred to here as RAPID) is shown also as a solid red line along 26.5°N. Schematic adapted from Zahn [2009].

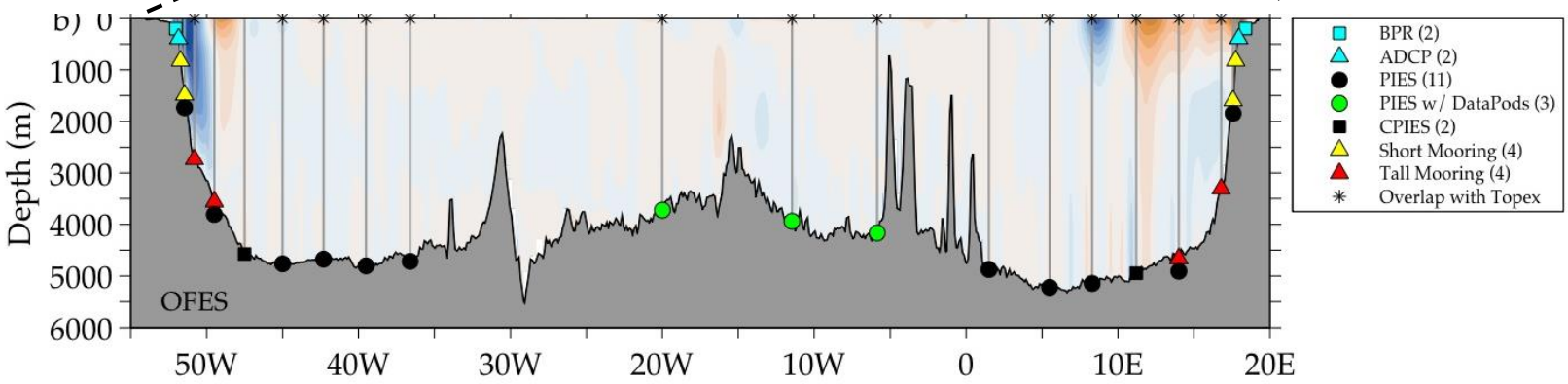
By I. J. Ansorge, M. O. Baringer, E. J. D. Campos, S. Dong, R. A. Fine, S. L. Garzoli, G. Goni, C. S. Meinen, R. C. Perez, A. R. Piola, M. J. Roberts, S. Speich, J. Sprintall, T. Tessi, and M. A. Van den Berg



SAMBA – South Atlantic Mooring Basin Array under SAMOC July 2013

Moorings across the South Atlantic – north/southward pathways between the Southern Ocean and South Atlantic






SEAmester
South Africa's Class Afloat
5th to 15th July 2016

Which aspects of SEAmester did you like best? Why?

- Hands on experience with the equipment during the deck hours
- Interaction with all the lecturers and scientists and being able to network during the 10 days
- Meeting and living with students from various backgrounds, universities and interests
- Having students also lecture - allows us to learn from our peers
- Evening non-scientific lectures provided another view on science
- Being able to put science into a wider context
- Connecting lectures to assignments – pulled our understanding together

What the SEAmester students said!

"This programme has been the best experience in my life. It changed my outlook on how to gather knowledge, where to do research, how to think logically as well as to be creative and intuitive"

"I have made so many new friends and build up my contacts for future endeavours"

"SEAmester has made me realise that I have a passion for ocean-based research"

"It has greatly influenced my general career goals and aims"

"I really enjoyed meeting so many people from a diverse range of backgrounds and sciences"

"I loved the way the content of SEAmester has helped me to link up all the theory that I have learnt over the years"

"The group presentations and video promoted teamwork and bonding"

"SEAmester was the best experience of my life"

"I hope that SEAmester will continue in years so other students get the chance to have such an awesome experience"

"I have been changed positively by this course – I am more motivated to tackle my studies"

Just being together as a team – it didn't matter what your background was

"It was a time of my life that I will never ever forget"

and when they were back home!

I want to just say a massive thank you for putting me on the SEAmester program and giving me an all-time experience. The content learnt, friendships made and real science experience will stick with me forever. It truly was a special time, especially that we had top lecturers and professors willing to share their knowledge at any time of the day.

Immediately after setting foot onto land I was gripped with a deep desire to return to the sea aboard the Agulhas II. The things I'd do to get just one more week on that incredible ship with all those whom I built fond relationships with....

Recounting the experience with others has proven difficult. It is an experience that has bound us all together. So thank you for giving me this experience, which I shall never forget, and for a seafaring family who I shall forever cherish. I am so grateful and thankful for you and your team's efforts

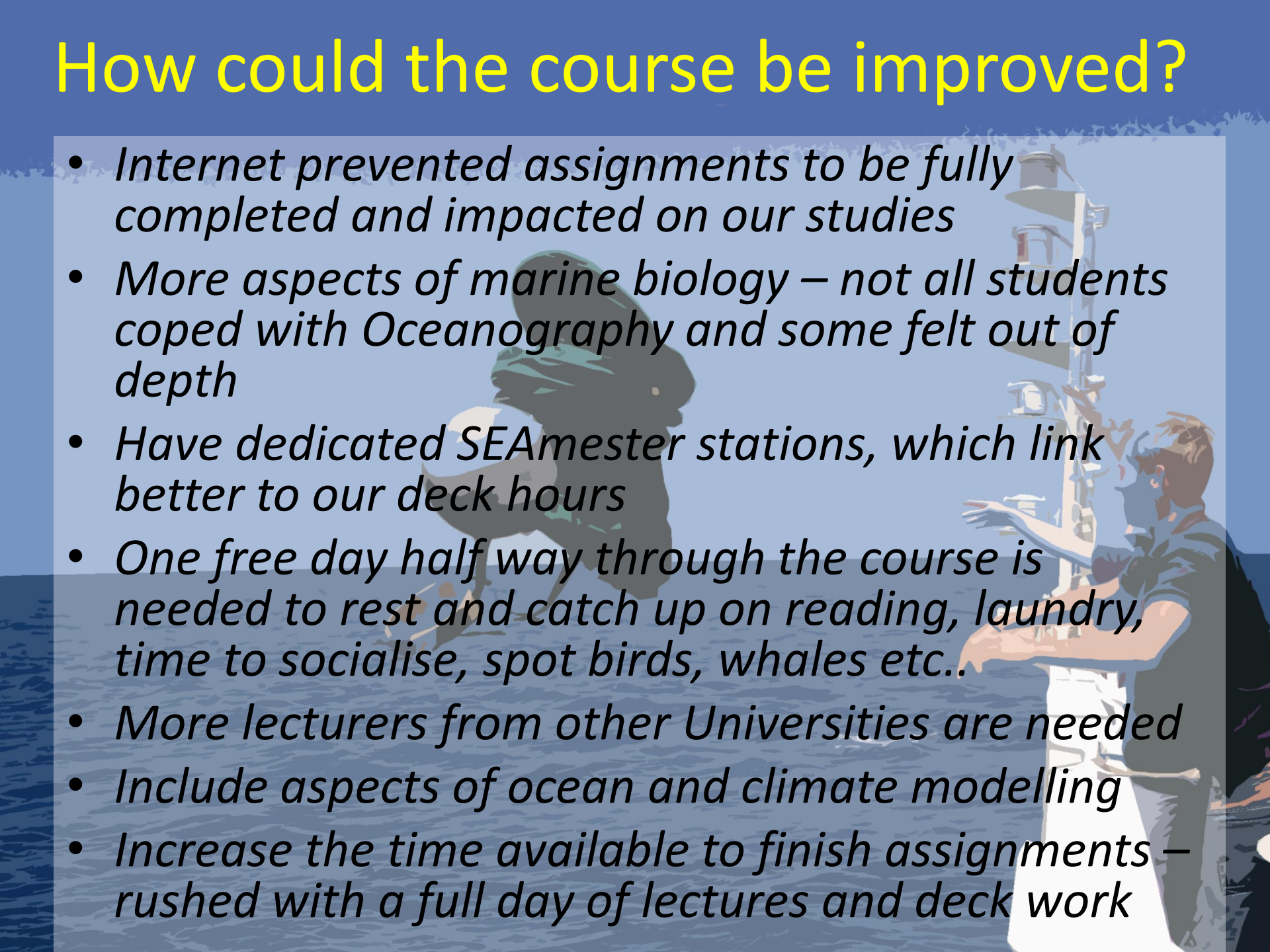
Since SEAmester I've had a much clearer idea of where I'd like to go with oceanography

and what the Minister said!

"..most interesting, the excitement of the academic staff, researchers and students is very evident. Well done to Dr Siko and your team on this positive initiative. Glad to see inclusion of UWC, UFH and universities of technology" – Minister Naledi Pandor

How could the course be improved?

- *Internet prevented assignments to be fully completed and impacted on our studies*
- *More aspects of marine biology – not all students coped with Oceanography and some felt out of depth*
- *Have dedicated SEAmester stations, which link better to our deck hours*
- *One free day half way through the course is needed to rest and catch up on reading, laundry, time to socialise, spot birds, whales etc..*
- *More lecturers from other Universities are needed*
- *Include aspects of ocean and climate modelling*
- *Increase the time available to finish assignments – rushed with a full day of lectures and deck work*



SEAmester - Lectures	Oceans in a Changing Climate Tools of the Trade				
	stongly agree	agree	neutral	disagree	strongly disagree
SEAmester interested me	24	5	2		
SEAmester left me with a sense of intellectual achievement	18	13			
I am able to transfer skills learnt in SEAmester to my own studies	14	11	2	2	2
Rate the purpose of SEAmester: The course meets my expectations and is relevant to my programme as a whole.	17	10	3	1	
Rate the organisation of SEAmester: The course is well-planned and well-managed.	18	11	2		
Rate the learning environment provided for SEAmester: properly resourced and supported, e.g. library facilities, venues, technical, administrative and IT support are adequate	18	9	2	2	
Rate the benefits you are gaining from SEAmester: e.g. The course has contributed to my own development/ expanded my worldview/ changed my thinking.	24	6	1		
Rate the level of difficulty of SEAmester: The course is pitched at the correct level of difficulty for me.	18	10	2	1	

Additional comments

Tumelo Mathe - Tumelo is currently studying tow
Geography. His interests include marine remote s
emphasis on SST and Chlorophyll-a. He has been a
currently is an assistant lecturer in the departmen
Remote Sensing at University of Fort Hare. He is d
PhD in 2017. Tumelo was onboard in 2016 as one
SEAmester students!

Prof Ken Findlay - Ken Findlay is the Res
Oceans Economy at the Centre for Susta
CPUT. He previously directed the MRI W
University of Pretoria. He has comprehe
mammal research experience and is a m
IWC SC, and the IUCN Cetacean and Sire
Groups.

Dr Pierre Cilliers - Dr Cilliers was the pr
an International Polar Year project on Sp
studies which involved the deployment
instruments for ionospheric observation
African research bases in Antarctica, on
and on Gough Island. He has been a par
several SANAP projects.

SEAmester – South Africa's *first* class afloat

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Isidro Pinto[7]
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The Department of Science and Technology's (DST's) 10-year Global Change Grand Challenge programme requires platforms to 'attract young researches to the region and retain them by exciting their interest in aspects of global change, while developing their capacity and professional skills in the relevant fields of investigation'[1]. In addition, in July 2014, President Zuma officially launched Operation Phakisa and announced that a key target of this Oceans Economy initiative would be "for the Department of Higher Education and Training to drive alignment between theoretical and workplace learning"[2].

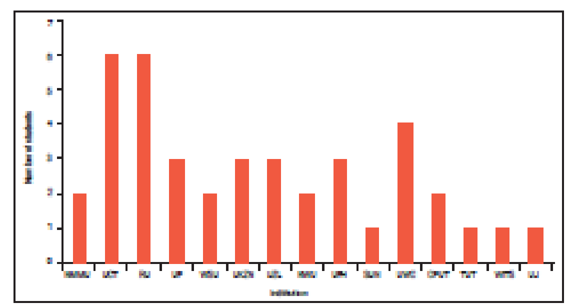
SEAmester – South Africa's recently established Class Afloat – achieves just that. SEAmester introduces marine science as an applied and cross-disciplinary field to students who have shown an affinity for core science disciplines. It identifies with government's National Development Plan[3] on education, training and innovation – critical to South Africa's long-term development and investment in this sector.

SEAmester has a long-term vision aimed at building capacity within the marine sciences by coordinating and fostering cross-disciplinary research projects and achieving this goal through a highly innovative programme. The strength of SEAmester is that postgraduate students combine theoretical classroom learning with the application of this knowledge through ship-based, and more importantly, hands-on research. The state-of-the-art research vessel, *SA Agulhas II*, provides an ideal teaching and research platform for this programme; its size, comfort and shipboard facilities allow large groups of students and lecturers to productively interact over a period of 10 days.

Introduction

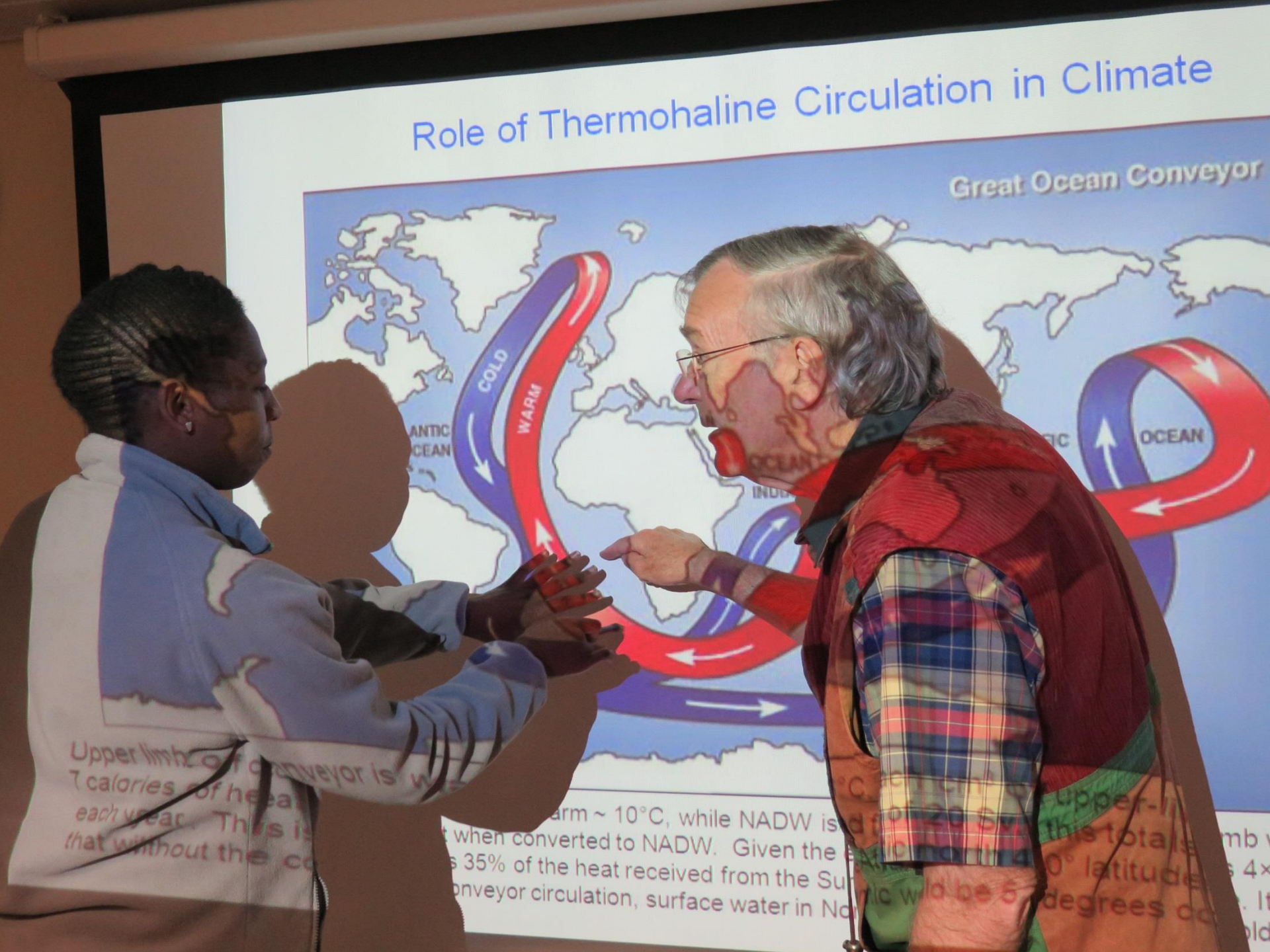
Marine science is a highly competitive environment. The need to improve the cohort of South African postgraduates, who would be recognised both nationally and internationally for their scientific excellence, is crucial. It is possible to attract students early on in their careers to this discipline via cutting-edge science, technology and unique field experiences. Through the engagement of students with real-life experiences such as SEAmester, universities supporting marine science postgraduate degree programmes can attract a sustainable throughput of numerically proficient students. By achieving a more quantitative and experienced input into our postgraduate degree programmes, we will, as a scientific community, greatly improve our long-term capabilities to accurately measure, model and predict the impacts of current climate change scenarios.

The short-term goal is to attract and establish a cohort of proficient marine and atmospheric science graduates who will contribute to filling the capacity needs of South African marine science as a whole. The SEAmester programme, by involving researchers from across all the relevant disciplines and tertiary institutions, provides an opportunity to build a network of collaborative teaching within the marine field. In doing so, these researchers will foster and strengthen new and current collaborations between historically white and black universities (Figure 1). The long-term objective of SEAmester is to build critical mass within the marine sciences to ensure sustained growth of human capacity in marine science in South Africa – aligning closely with the current DST Research and Development strategies and the Operation Phakisa Oceans Economy initiative.



NMMU, Nelson Mandela Metropolitan University; UCT, University of Cape Town; RU, Rhodes University; UP, University of Pretoria; WSU, Walter Sisulu University; UKZN, University of KwaZulu-Natal; UZL, University of Zululand; NWU, North West University; UFH, University of Fort Hare; SUN, Stellenbosch University; UWC, University of the Western Cape; CPUT, Cape Peninsula University of Technology; TUT, Tshwane University of Technology; WITS, University of the Witwatersrand; UJ, University of Johannesburg.

Figure 1: A histogram showing the range of universities represented on board the 2016 SEAmester cruise.

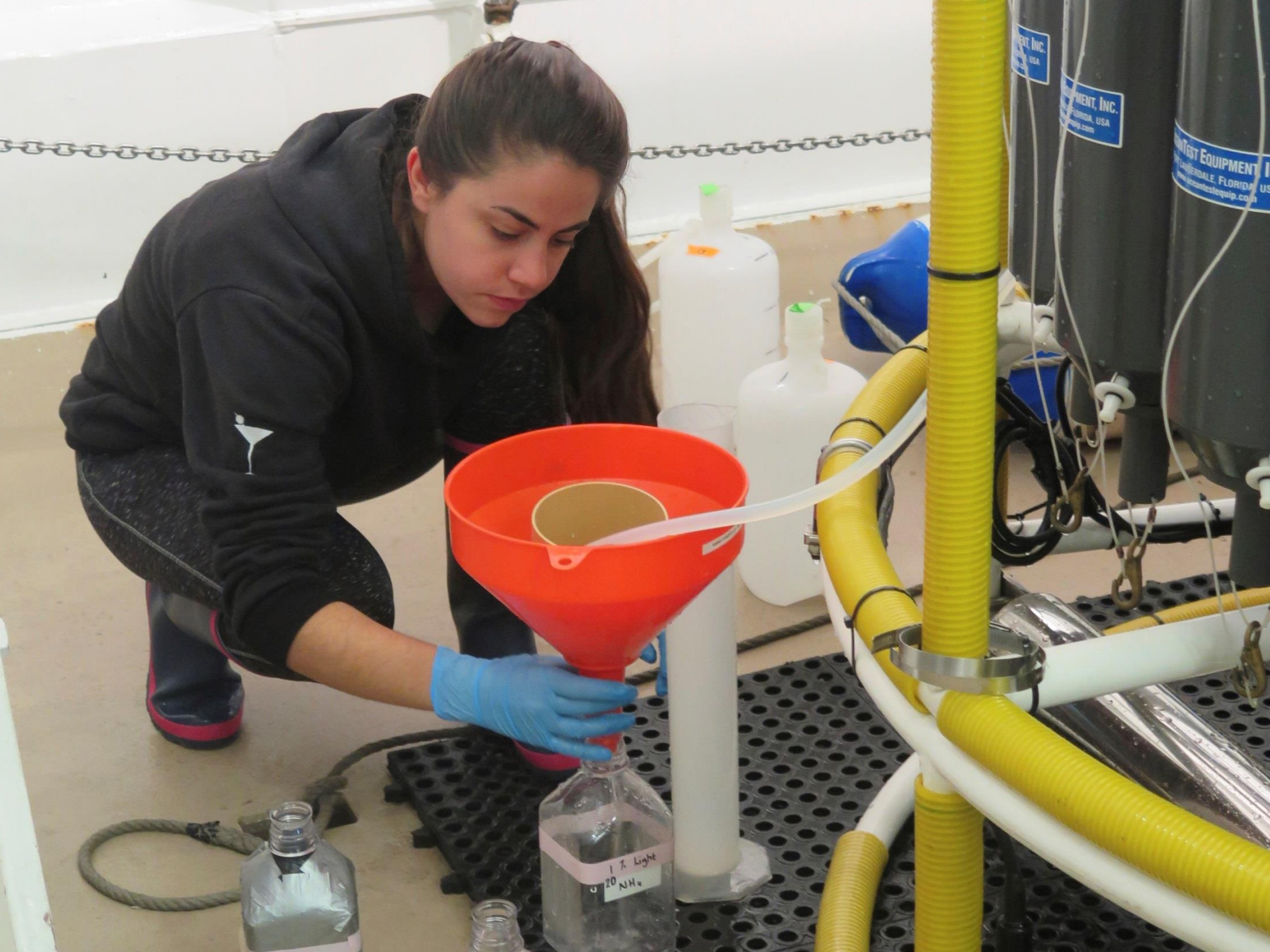

Role of Thermohaline Circulation in Climate
Great Ocean Conveyor
COLD
WARM
OCEAN


FIRE


I AM AN ADVENTIST

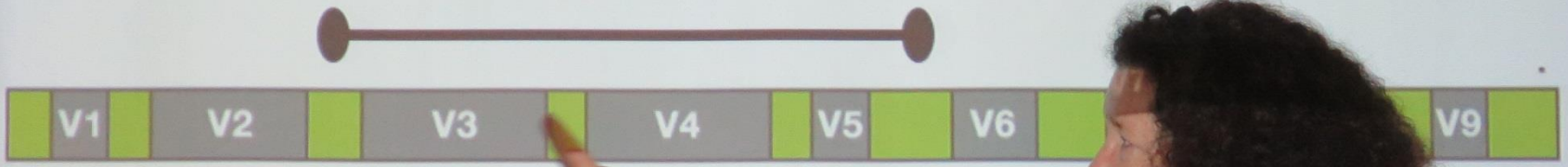

FRIES


1,5t


1 % Light
20 NH4

Barcoding bacteria

16S rRNA gene sequence

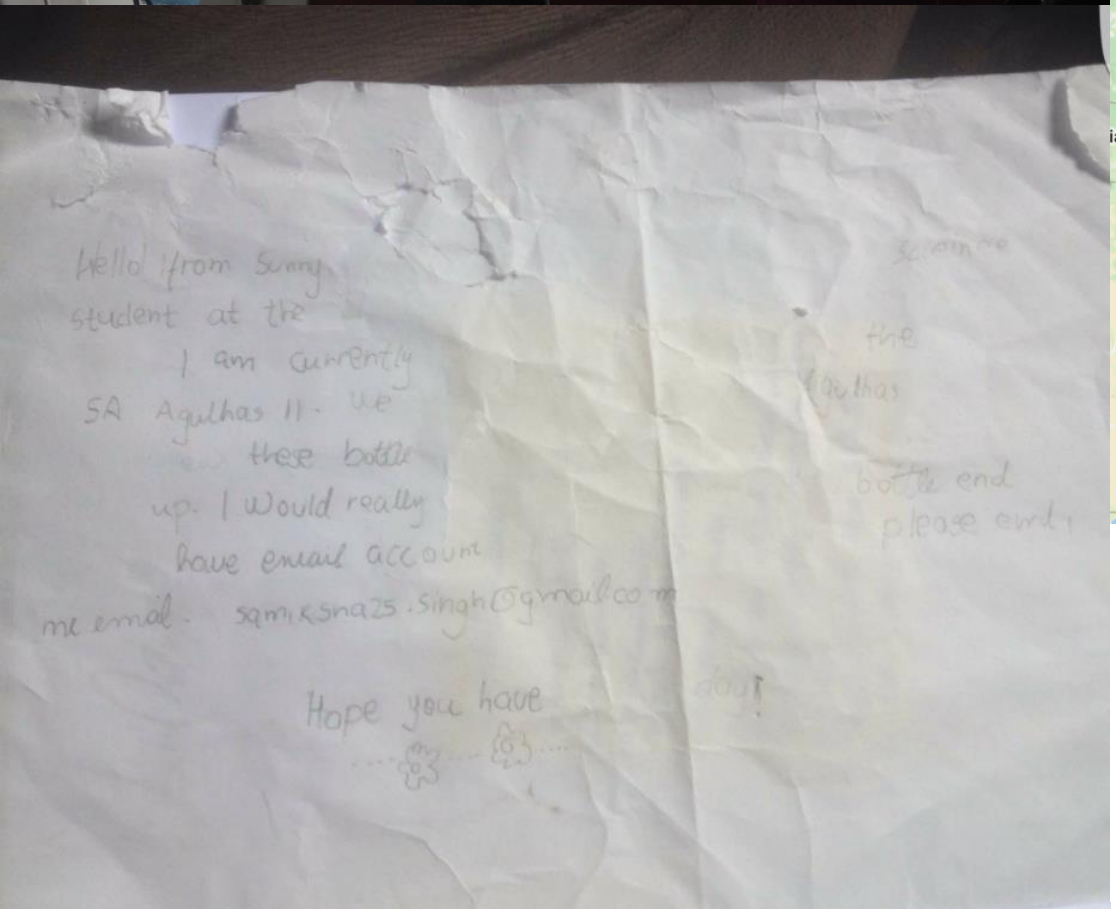


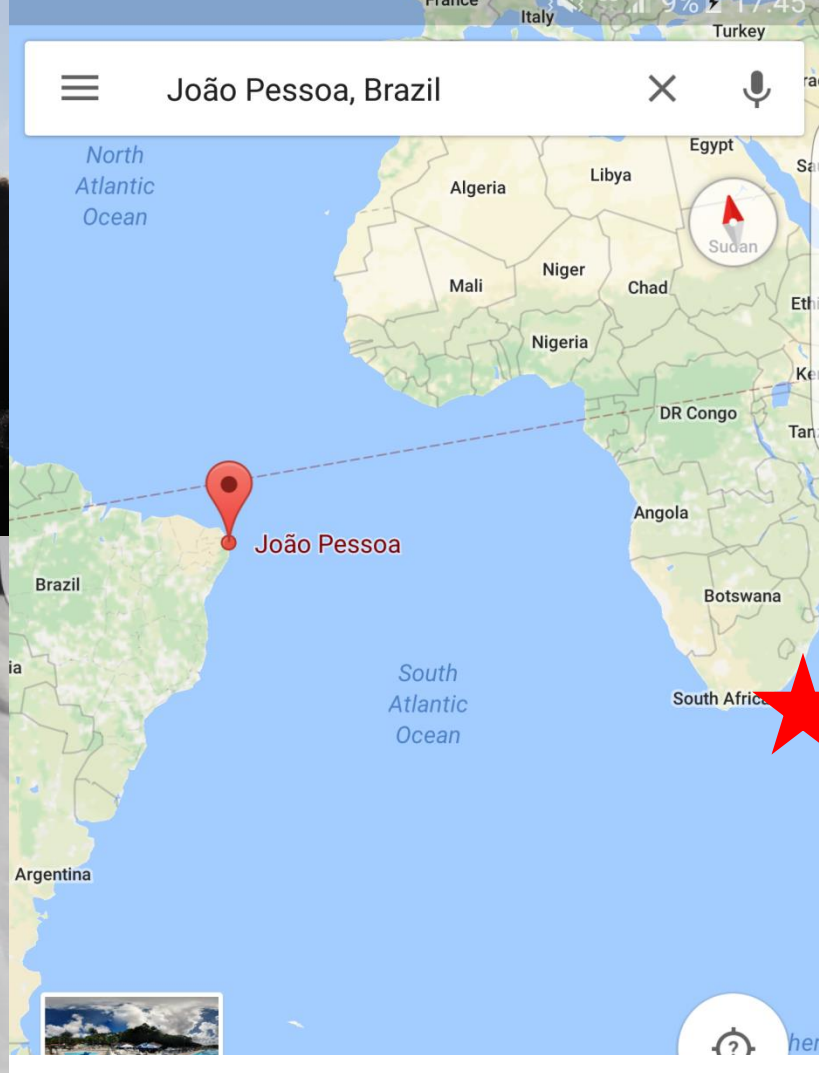
Conserved sequence

Variable regions

H
11.0t

- **WHAT NOW?**
- **“SEAmester” now provides a recognisable “pool” of students for postgraduate studies into the marine sciences**
- **UCT willing to consider an accreditation for “SEAmester”**
- **New faces for cruises – SANAE 2016 - UniZ, SUN, UCT and UFH students will now participate**





SEAmester

South Africa's Class Afloat