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SAEON
South African Environmental
Observation Network



Royal Netherlands Institute for Sea Research

Capacity Development and Skills Transfer Report

Agulhas System Climate Array (ASCA) Cruise and related activities



March and April 2015

Report compiled by the ASCA Coordinator, with input from workshop and cruise participants as noted through the capacity development and skills transfer report.

ASCA Coordinator:

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August 2015

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Executive summary

The Agulhas System Climate Array (ASCA) program is directly aligned with the DST 2008 - 2018 Grand Challenge for Global Climate Change Science, which states that “South Africa’s geographic position as a unique laboratory given its proximity to the Antarctic, the Southern Ocean, and the Agulhas and Benguela Currents...enabling us to play a leading role in climate change science...and one in which South Africa can become a world leader” (pages 5 and 22 of Innovation towards a knowledge based economy – DST report.)

The understanding of the Southern Hemisphere oceans through improved observations, modelling and research is critical to the success of the Grand Challenge and ASCA contributes directly to the knowledge theme of “understanding a changing planet’, responding to all of the five research themes within this and, indirectly, responding to other research themes.

As highlighted in this report, ASCA has a strong thrust towards capacity development in terms of technical, scientific and mentorship/leadership growth, as well as facilitating and strengthening international collaborations and the establishment of research infrastructure.

This report highlights the capacity development that has occurred to date and the plans for the future.

1. Introduction:

The Agulhas System Climate Array is an international oceanographic project with partners from South Africa, the United States of America (USA), and the Netherlands, and funding support from the South African Departments of Science and Technology (DST) and Environmental Affairs (DEA), the US National Science Foundation (NSF) and the Royal Dutch Institute for Sea Research (NIOZ). It is designed to provide long term observations of Agulhas Current volume, heat and salt transport and its variability from mesoscale (eddies), through seasonal to interannual timescales. This will be achieved by means of two shelf and seven full-depth tall moorings, interspersed with five Current- and Pressure-recording Inverted Echo Sounders (CPIES), measuring pressure, current velocities, temperatures and salinities. The ASCA shelf and tall moorings will extend 200 km offshore along the descending TOPEX/Jason satellite ground track # 96, through the core of the Agulhas Current, with CPIES measurements extending the array to 300 km (~ 160 nm) offshore.

An important component of the project is the development of young scientists and technicians within South Africa and ultimately the skills transfer involved with cruise preparation, at sea activities and the data processing to publication of results process. South Africa is expected in this project to take the lead in terms of logistics and support of the ASCA array of moorings and cruise related activities, and ultimately to drive the entire maintenance programme of the ASCA moorings and subsequent data processing. The international partners to the project – the Rosenstiel School for Marine and Atmospheric Science (RSMAS) at the University of Miami and the Royal Netherlands Institute for Sea Research (NIOZ) – will initially provide these skills and training to the South African team and eventually be involved only at a level of scientific collaboration and publication. The ultimate aim is to take an ambitious five-year project of intense training and skill development of mooring design, deployment, retrieval and maintenance coupled with the higher level data processing activities leading to publication of results, and developing it into a long-term sustained monitoring programme with sufficient skills within South Africa to maintain it.

During this first year of the project, the first deployment cruise of two shelf moorings and four tall moorings was undertaken in April 2015 onboard the South African research vessel *Algoa*. Herein we report on three independent capacity development and skills transfer activities, which took place in the preparation stage of the cruise, onboard training and development and finally the project launch activities in Port Elizabeth harbour.

2. Cruise Preparation – East Pier

The April 2015 cruise had involvement from only the NIOZ and South African teams, with only the two shelf moorings and the first four tall moorings (A – D) being deployed. Two technicians and one chief scientist from NIOZ came to South Africa as part of their involvement in the cruise, with their instrument technician, Mr. Roald van der Heide, in Cape Town for the week prior to cruise (23 – 27 April 2015) to setup and train technicians on the instruments used on tall moorings A – D. Mr. van der Heide did not take part in the cruise, but his two NIOZ colleagues did (as described further below).

a. Instrument Preparation:

The DEA shelf moorings consisted of:

- 2 x 300 kHz RD Instruments Workhorse Sentinel Acoustic Doppler Current Profilers (ADCP)
- 1 x SeaBird Microcat (pumped version)
- 4 x Teledyne Benthos 866-A acoustic releases, coupled in pairs to provide a backup release system for the moorings

The NIOZ tall moorings A-D make use of the following equipment:

- 4 x 75 kHz RD Instruments Workhorse Longranger Acoustic Doppler Current Profilers (ADCP)
- 9 x RCM11 Aanderaa single point current meters
- 12 x SeaBird Microcat – four of which were pumped (SAEON) and eight unpumped (NIOZ)
- 8 x IXSEA acoustic releases, coupled in pairs to provide a backup release system for the moorings

Instrument preparation and training was overseen by Mr. Roald van der Heide (NIOZ) and Mr. Marcel van den Berg (DEA) and a number of scientists and students were trained on these equipment for deployment on the April 2015 cruise, but also to service and maintain them on subsequent cruises. A list of scientists and students involved with the training and their affiliations below:

i. Ms. Tamaryn Morris	SAEON, and co-CS for cruise
ii. Mr. Gavin Louw	DEA, and co-CS for cruise
iii. Ms. Katherine Moffett	CPUT / SAEON
iv. Mr. Jarred Voorneveld	CPUT / SAEON
v. Mr. Jethan d’Hotman	CPUT
vi. Ms. Estee Vermeulen	UCT

b. East Pier tour of facilities and introduction to project:

A tour of the East Pier facilities where the moorings were being fabricated and instruments setup, coupled with an introduction of the ASCA project to the greater Cape Town marine science community, was held at East Pier on Wednesday, 25 March 2015. Students from the University of Cape Town and the Cape Peninsula University of Technology were invited for the particular knowledge they would gain from seeing *in situ* instruments prepared for mooring work, and understanding the dynamics of working at sea.

Two tours were hosted, one in the morning for students and one later on in the afternoon for research teams such as Lwandle, MSI and others. A list of participants and their affiliations is noted in Annexure 1. The tours were led by the ASCA Coordinator, who gave background to the ASCA project, while Mr. van der Heide and the students who had helped with the instruments setup themselves (listed above) assisted in explaining to the groups what all went in to the preparation of moorings for deployment and the technical specifications of the instruments themselves.

3. Onboard training – RV *Algoa*

As part of the cruise activities, and as noted above, one chief scientist, Prof. Geert-Jan Brummer and one mooring technician, Mr. Leon Wuis, joined the vessel from Cape Town. Prof. Brummer completed the entire cruise, and Mr. Wuis only leg 1 related to the mooring deployments themselves.

a. Leg 1 – Mooring deployments:

The first leg of the cruise focused on the mooring deployments, while undertaking underway chemistry sampling between Cape Town and the ASCA line. The following students and interns, their affiliations and areas where specifically placed for training are noted below (not listed in any specific order). Students and interns were encouraged to become involved in any and all of the activities taking place, and many took advantage of this.

1. Mr. Fehmi Dilmahamod	PhD student – UCT	Moorings and instruments Underway Chemistry
2. Xolisa Dlomo	PhD student – NMMU and SAEON	Moorings and instruments Underway Chemistry
3. Jarred Voorneveld	BTech student – CPUT and SAEON	Moorings and instruments Underway Chemistry
4. Jethan d’Hotman	BTech student – CPUT	Moorings and instruments Underway Chemistry
5. Katherine Moffett	BTech student – CPUT and SAEON	Moorings and instruments Underway Chemistry
6. Elijah Ramphago	Intern – DEA	Electronics Moorings and instruments

Training was offered by the following cruise participants (along with their affiliations and fields of expertise):

1. Geert-Jan Brummer	NIOZ	Cruise coordination
2. Tamaryn Morris	SAEON	Cruise logistics, Instruments
3. Gavin Louw	DEA	Moorings and deck work
4. Bradley Blows	BCRE	Moorings and deck work
5. Leon Wuis	NIOZ	Moorings and deck work
6. Khaya Siswana	DEA	Underway chemistry
7. Mbulelo Makhetha	DEA	Underway chemistry

b. Leg 2 – CTD and Zooplankton Survey:

The second leg of the cruise undertook 16 of the 20 CTD and Vertical Bongo stations (due to bad weather). The following students and interns, their affiliations and areas where specifically placed for training are noted below (not listed in any specific order). The entire scientific compliment was placed in shifts to ensure all work was undertaken successfully. Students and interns were encouraged to become involved in any and all of the activities taking place, and many took advantage of this.

1. Estee Vemeulen	Honours student – UCT	CTD sampling (salinity, nutrients, Chl α), Vertical Bongos
2. Fehmi Dilmahamod	PhD student – UCT	CTD sampling (salinity, nutrients, Chl α), Vertical Bongos
3. Leandro Ponsoni	PhD student – NIOZ	CTD sampling (size frac. Chl α , Phyto ID, nutrients)
4. Mfundo Bizani	PhD student – NMMU and SAEON	CTD sampling (size frac. Chl α , Phyto ID, nutrients)
6. Elijah Ramphago	Intern – DEA	Electronics, CTD and Vertical Bongo operations

Training was offered by the following cruise participants (along with their affiliations and fields of expertise):

1. Geert-Jan Brummer	NIOZ	Cruise coordination, CTD operations
2. Tamaryn Morris	SAEON	Cruise logistics, CTD operations
3. Gavin Louw	DEA	CTD operations
4. Mbulelo Makhetha	DEA	CTD operations, DO sampling
5. Khaya Siswana	DEA	Chemistry
6. Elana Wright	DEA	Vertical bongo operations and net sampling
7. Marjolaine Krug	CSIR	Glider deployments
8. Fred Fourie	STS	Glider deployments

c. Leg 3 – Underway sampling:

The final leg of the cruise, from Port Elizabeth to Cape Town, again undertook underway chemistry sampling, again in shifts to make the work easier. Mr. Gavin Louw took over the role of sole chief scientist very successfully for this leg. The SAEON Egagasini Educational Outreach team, led by Mr. Thomas Mtontsi, also undertook the training of an educator and a learner on this leg.

1. Estee Vemeulen	Honours student – UCT	Underway chemistry sampling
2. Fehmi Dilmahamod	PhD student – UCT	Underway chemistry sampling
3. Hannah Raven	Intern – SAEON	Underway chemistry sampling
4. Denver Bowers	Educator – Ocean View	Underway chemistry sampling

	Secondary	
5. Gilbert Musona	Learner – Ocean View	Underway chemistry sampling
	Secondary	
6. Elijah Ramphago	Intern – DEA	Electronics

Training was offered by the following cruise participants (along with their affiliations and fields of expertise):

1. Gavin Louw	DEA	Cruise coordination
2. Khaya Siswana	DEA	Underway chemistry
3. Mbulelo Makhetha	DEA	Underway chemistry

4. Project Launch – Port Elizabeth

A project launch function was hosted at the end of the second leg of the cruise, prior to the vessel returning to Cape Town, onboard the vessel itself with a public launch to the greater Eastern Cape marine science community, government officials and stakeholders, at the Nelson Mandela Metropolitan University.

a. RV Algoa tours:

Six schools were invited to tour the research vessel Algoa and to learn more about the scientific activities undertaken during the two legs of the cruise. A total of 120 grade 10 and 11 learners visited the vessel. Annexure 2 shows the list of students who took part in the tours. A more formal delegates tour was undertaken after the learners had completed their tours and Annexure 3 has the list of delegates attending from stakeholders to government officials and interested marine science community members from the Eastern Cape.

Scientific staff manned stations within the laboratories and operation control rooms to explain these activities and answer questions posed by the learners and educators. Two tours took place simultaneously of 15 students each, with the rest of the students being lectured on marine science on the foredeck by Mr. Thomas Mtontsi and Ms. Hannah Raven of the SAEON Egagasini Node, with coordination of students undertaken by Mrs. Nozipiwo Hambaze of the SAEON Elwandle Node. Overall coordination and logistics were managed by the SAEON Coordinator, Ms. Tamaryn Morris. Below is the station manning by the scientific team onboard the second leg of the cruise and their affiliations. Noted further below were the staff who worked with Mrs Beate Holscher at NMMU to setup facilities for the public launch:

1. Geert-Jan Brummer	NIOZ	Tour Leader 1
2. Fehmi Dilmahamod	UCT	Tour Leader 2
3. Mbulelo Makhetha	DEA	Operations Control Room
4. Khaya Siswana	DEA	Port Lab – Underway and DO chemistry
5. Gavin Louw	DEA	Aft deck – mooring operations
6. Mfundo Bizani	NMMU/SAEON	Starboard Lab – Phytoplankton samples
7. Elana Wright	DEA	Zooplankton sampling

8. Estee Vermeulen	UCT	Zooplankton nets
9. Leandro Ponsoni	NIOZ	CTD instrument
10. Elijah Ramphago	DEA	Scientific cabins
11. Xolisa Dlomo	NMMU/SAEON	Scientific mess

NMMU launch setup:

- | | |
|--------------------|------|
| 1. Marjolaine Krug | CSIR |
| 2. Fred Fourie | STS |

b. Nelson Mandela Metropolitan University project launch:

The final activity reported on will be the public launch of the ASCA project at the Nelson Mandela Metropolitan University on 24 April 2015. This was attended by officials from South African government departments – DEA and DST, the Eastern Cape government and port officials, the Captain and scientific crew of the RV *Algoa*, the SAEON Egagasini and Elwandle Node managers, scientists, students and interns, NMMU lecturers, members of the Eastern Cape marine science community from various disciplines and various media organizations.

For program follows see Annexure 4.

5. Impact of the Capacity Development activities

As stated in the ASCA Memorandum of Agreement between the parties (dated April 2014) the success of ASCA is dependent not only on sharing of resources between SA and international partners, but also on capacity building and skills transfer. Due to the geographical advantage of South Africa, being situated right on the ‘doorstep’ of oceans and currents with global significance, South African technicians and researchers can make important contributions to this research platform, by providing expertise, support and technical services that would otherwise had to be provided from international partners.

Through a series of focused training and awareness activities (lectures, courses, workshops, student supervision and experiential training of students) this goal is pursued.

Marine Science, and particularly Physical Oceanography, is a lesser known, yet popular career in South Africa, especially amongst previously disadvantaged schools and communities. Through the school-based outreach programs learners are exposed to this discipline in an interactive and fun way. Through the vessel tours they could experience aspects of marine research first-hand. It is hoped that these outreach events will stimulate interest in some learners.

A total number of seven SAEON-affiliated postgraduate students were actively involved in the ASCA program. See Annexure 5 for a list of students and relevant details. By mentoring students both in the academic sphere, as well as through on-board training, these students are retained in the marine science domain, and are likely to pursue further studies, leading to a greater output of scientifically trained students.

The positive long-term impact of the training aspect of the ASCA cruise can be summed up as follows:

- Increased awareness of Marine Science, particularly Physical Oceanography, as a career choice.
- Increased awareness on the importance of ocean observations as research platforms that underpin most global change research programmes.
- Increased public awareness on the importance of oceans.
- Increase of post-graduate qualifications
- Increase of expertise in technical oceanographic instrumentation set-up and maintenance.
- Increased collaboration and cross-fertilization of skills and competencies between departments and institutions.
- Increased confidence amongst young technicians and scientist in their own skills, by giving them the opportunity to convey their skills and mentor the students.
- Increased reputation of South African marine science internationally.

In summary, the following numbers of students and interns (here after referred to as trainees) were trained during the various ASCA Capacity Building and Skills Transfer initiatives (as listed below):

1. East Pier Instrument Training: 4 trainees (2 WF, 2 WM)
2. Leg 1 of the ASCA Cruise: 6 trainees (3 BM, 2 WM, 1 WF)
3. Leg 2 of the ASCA Cruise: 5 trainees (3 BM, 1 WM, 1 WF)
4. Leg 3 of the ASCA Cruise: 6 trainees (4 BM, 2 WF)

The very encouraging aspect of the above listed training was the source from which it came. The trainers themselves were from varying ethnicities, both male and female, and the majority of those were South African, with the notable exception of Prof. Geert-Jan Brummer as one of the co-Chief Scientists. This is extremely encouraging within a program such as ASCA where one of the major aims is to develop and grow these scarce skills relating particularly to deep ocean moorings, but marine science as a whole.

6. Ongoing monitoring and future planned activities

The students and interns who took part in the cruise are actively involved in projects with both DEA and SAEON, many of whom have used the experience gained on the vessel to further their studies and interests. These students are being encouraged in their work, and supervision is provided by DEA and SAEON.

Development was also encouraged for the employed emerging scientists and technicians, in terms of leadership roles as well as scientific and technical training. These scientists and technicians will remain integral to the ASCA project and thus we will be able to monitor their career development over the five years of the project.

Given the international partnerships of ASCA, emerging scientists, students and interns are given exposure to the partner organizations, their scientific input and current students, to further engage in

terms of institutional visits and collaborations. Furthermore, the South African marine science community is opened up to ASCA's international partners, facilitating collaborations reaching beyond the ASCA project and its scope of work. Thus developing a two-way flow of training skills and scientific input to projects. This will be further monitored by international exchanges, both to and from South Africa, collaborative research proposals and publications, spin-off projects and co-supervision of students.

The educator and learner from Ocean View Secondary on Leg 3 are working closely with Mr Thomas Mtontsi from SAEON, with the learner, Gilbert Musona, doing a project for the Eskom Young Scientist Expo. A short report from both Gilbert and his educator, Denver, follows in Annexure 7.

The next ASCA Cruise will be requested for April 2016, and the current training initiatives will be further developed and enhanced for this maintenance cruise. This includes the active involvement of students and interns prior to and on the cruise itself, tours of the vessels by secondary education learners, educators and the public, and a number of lecture series' for tertiary and postgraduate level students on the instrumentation and ocean dynamics around ASCA. These activities will include the continued involvement of the SAEON Environmental Education team.

7. Acknowledgments

We would like to acknowledge the following institutions and departments for making this cruise and the training possible, by providing funding, infrastructure support and institutional support:

- The Department of Science and Technology (DST)
- The South African Environmental Observation Network (SAEON)
- The Department of Environmental Affairs (DEA)
- The Department of Agriculture, Forestry and Fisheries (DAFF)
- The Royal Institute of Sea Research (NIOZ)
- National Research Foundation (NRF)
- The Rosenstiel School of Marine and Atmospheric Studies (RSMAS), University of Miami

ANNEXURE 1:
East Pier Tour 25 March 2015 - Sign-In Sheets

RSVP	Signature	Institution	email address
1 Ms Jennifer Mohale		UCF DAFF intern	jennmohale@gmail.com
2 Renae Logston		UCT	renaelogston@gmail.com
3 Kyle Cooper		UCT	greycooper@gmail.com
4 Sifiso Mbambo		DEA Intern	sfisowalter@gmail.com>
5 Lisa Hancke			Lisa@metoceanservices.com
6 nicole du plessis		WESSA	nicole.duplessis86@gmail.com>
7 Caitlynne Francis		UCT	caity.franc19@gmail.com
8 Tania Williams		MSc Oceanography class	Tania.Williams@alumni.uct.ac.za
9 Khushboo Jhugroo		MSc Oceanography class	Khushboo.Jhugroo@alumni.uct.ac.za
10 Marc De Vos		MSc Oceanography class	
11 Ramontsheng Rapolaki		MSc Oceanography class	
12 Tharone Rapeti		MSc Oceanography class	
13 Sanette Gildenhuys		MSI	Sanette@metoceanservices.com
14 Frank Pey		MSI	frank@metoceanservices.com
15 Jason Hayden		MSI	Sanette@metoceanservices.com
16 Henri Gilham		MSI	henry@metoceanservices.com
17 Mohammed Kajee		UCT	Mohammed.Kajee@alumni.uct.ac.za
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20 Brian Godfrey		Lwandle	Brian@lwandle.co.za
21 Andy Russell		Lwandle	Andy@lwandle.co.za
22 Jacques Kasner		Lwandle	Jacques@lwandle.co.za
23 Kate Munnik		Lwandle	Kate@lwandle.co.za
24 Keshia Cable		Lwandle	Keshia@lwandle.co.za
25 Laura Weston		Lwandle	Laura@lwandle.co.za
26 Sergio Petersen		Lwandle	sergio.petersen94@gmail.com
27 Diandra Kuyler		Lwandle	diandrakuyler@gmail.com
28 Lisa Holton		Lwandle	lisaemilyholton@gmail.com

Additional attendees	Signature	Institution	email address
1 Matthew Carr		UCT	matthewcarr03@gmail.com
2 Daniel Wilgan		UCT	wilgan.daniel@gmail.com
3 +2 Honours students (Kate Brink)			
4			
5			
6 William Bond		SABON	
7			
8			
9			
10			
11			
12			

ANNEXURE 2:

RV Algoa Learner Tour Groups 24 April 2015

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Learners Name	Grade	ID Number
1. Isobhanya Jotha	11	9712250915080
2. James Anesipho	11	9708060317089
3. Sonjica Sinozo	11	9902196299080
4. Kethi Nomphele	11	9906100428084
5. Ngqaleka Khanyisa	11	9904146381082
6. Shoco Silekwa	11	9710090844080
7. Somhlolo Oluochwa	11	99022855428089
8. Mandangu Clinton	11	9801020
9. Simogile Odwa	11	9811026382082
10. Matiso Matisole	11	9901194424086
11. Hlati Sinoxolo	10	9910060991081
12. Lukwé Xolani	10	990095522083
13. Ntulo Zintle	10	0003260464080
14. Singane Vuyani	10	9802020696088
15. Moxwasha Thulisa	10	9808290451084
16. Bacele Anjile	10	0003085486086
17. Sambi Selunathi	10	9905020325081
18. Busani Zipho	10	9804065228088
19. Nkomana KThula	10	9909110902080
20. Pini Sambunile	10	9709215708089

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Learners Name	Grade	ID Number
1. Mobealia Vuyokazi	11 ^A	9709220623087
2. Cibi Andiswa	11 ^A	9806210302080
3. Singatha Chumisa	11 ^A	9709040305085
4. Mashane Maud	11 ^A	
5. Balakisi Tamia	11 ^A	9801140607088
6. Jacob Sithembek	11 ^A	9712065123086
7. Huku Lophawo	11 ^A	9801255234082
8. Leve Siphesihle	11 ^A	9804235491087
9. Xaba Sabelo	11 ^A	9807015827081
10. Makana Luthobonhobo	11 ^A	9809155812089
11. Manona Sivime	10 ^A	9803315361087
12. Jela Azola	10 ^A	9906105810083
13. Mbobela Zukisani	10 ^A	9510195773089
14. Ntamo Siyanda	10 ^A	9802175599083
15. Nalethe Simako	10 ^A	9807025661088
16. Mankanku Ohawe	10 ^A	9909160525088
17. Ntswahkane Zizpho	10 ^A	9905240867086
18. Adams Yoneza	10 ^A	9911040389083
19. Bonani Zanele	10 ^A	9911180863085
20. Mahlekehleke Yanga	10 ^A	9806151066082

Att: Nozi Hambaze



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SCHOOL NAME: Mary Waters High School

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Learners Name	Grade	ID Number
1. Shanice Mackay	11 B	9901070603085
2. Ashleigh Oerson	11 B	980711 1130 083
3. Narsite Kirkwood	11 B	981190286084
4. Keeshne' May	11 B	990311 0364 086
5. Shona-Lee Van Nijk	11 B	980731 0710 084
6. Patronica Doodstee	11 B	980818 0158 084
7. Zanne Randall	11 A	940 111 0291 086
8. Allistine Stuurman	11 A	960805 1145 085
9. Albernique Williams	10 A	99 03 22 0061 085
10. Bradley Platjies	10 A	99 02 14 5190 086
11. Vinchesto Holster	11 A	9710 23 6202 087
12. Dwayne Johnson	11 A	980320 5104 084
13. Ingrid Claasen	10 A	9911160209085
14. Lameez van Heerden	11 C	981105 0156 083
15. Kay Alexander	11 C	990420 0217 085
16. Jody Nel	10 B	981222 5891083
17. JUNIOR DENSTON	10 B	991115489082
18. Ashley - Klesniel	11 E	9603015128082
19. Vinique Jeggels	10 A	9902110218086
20. Siphosihle Mzizi	10 11 E	9702035470089

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SCHOOL NAME: SANDISILWAZI High School

CONTACT NO: 042-2381 623

Learners Name	Grade	ID Number
1. APOLISI ANELISA	10	1999.08.29
2. BADU SINEMHLALI	10	1998.07.09
3. BHOLO ACHUMA	11	1998.07.10
4. BIKLET SINESIPHO	10	1999.02.23
5. DJALVAN THEMBILE	11	1997.09.27
6. HESHU PHEKISA	10	1999.07.24
7. KANA AZOLA	11	1996.04.21
8. KANA SIPHAMANDLA	11	1994.11.07
9. KEJE NEEBIDA	11	1997.04.13
10. LINDA ABONGILE	10	1999.01.11
11. MATSANKO GNABENGA	11	1998.05.06
12. MBEDEZI KHOSIWA	11	1996.07.23
13. NEXAGANA JOLISA	11	1998.07.24
14. NYAMAKARI SISIPTO	10	1998.02.13
15. JIM XOKELA	11	1997.04.08
16. SKEZI ABISIPTO	10	1999.04.29
17. SONTSELOU LONIBANO	10	1998.11.16
18. TWANA SIJANDA	11	1998.04.11
19. MAME ZONIBABELE	TEACHER	7302285602085
20. MABOTE LITRILANE	TEACHER	652035959082



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1. DAWETI SIPHOSETHU	11	950221 0654 082
2. HANA BE ANATHI	11	940704 0514 083
3. HANI LUNGELWA	11	941227 0582 081
4. JALI NOSIPHO	11	950327 0323 084
5. KEPE AMANDA	11	960424 0455 089
6. KOLO THABISA	11	930913 0420 083
7. KOM SINATHI	11	941029 5349 080
8. MEULA LUVENI	11	950606 5006 082
9. VAYO SIJABONGA	11	941023 5850 084
10. ZANI NOLUYISO	11	960707 0239 085
11. BASSON SIPHO	10	950717 5264 089
12. FABA SINYILE	10	950506 5444 089
13. FIHLANI AJABULELA	10	960621 5767 088
14. FANA NTOMBOSZUKO	10	950510 0673 085
15. HOZI ANDILE	10	950503 5876 084
16. LWANA THATO	10	960421 5276 081
17. MONI ANELE	10	980925 5654 084
18. TATA APHINDIWE	10	960411 0427 085
19. VANLITJH THEMBALETHU	10	940907 5446 082
20. ZIGWASI BAPHELELE	10	950624 5799 082



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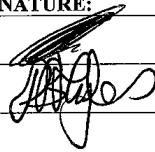
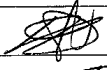
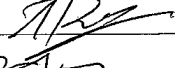
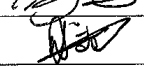
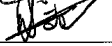
CONTACT NO: 046-6370411

Learners Name	Grade	ID Number
1. DYOSINI SIMABONGA	10	19990202
2. GRABOTI GCOBANI	10	20000403
3. LOTENI SINDUVUYO	10	19990709
4. MANGELE THEMBULILE	10	19980316
5. NQUMFA XOLISA	10	20000129
6. SIWA LIYEMA	10	19990413
7. TETANI ANGELE	10	20000719
8. TSHILA LIZO	10	19990126
9. TJHANSULA ZUSIBE	10	19991112
10. FANISI THEMBELANI	10	19991203
11. CANCA ABONGA	11	19990222
12. DYUBULU SIYANDA	11	19981213
13. KONDLO ABONGILE	11	19981003
14. MABOLO UBERNAM	11	19981110
15. MBEROLA SINAZO	11	19980212
16. MBOZANI ANDISIWE	11	19980414
17. MLATA SINENRANTRA	11	19980820
18. NGCETHE SINESIPHO	11	19980306
19. NKAKALA ZIPHO	11	19990517
20. SPRINGBOK AVIWE	11	19990915

**ANNEXURE 3:
RV *Algoa* Delegates Tour Groups 24 April 2015**

Agulhas System Climate Array – Research Vessel *Algoa* Tour


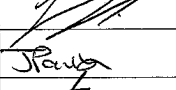
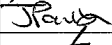
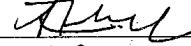






Indemnity Sheet

NAME:	EMAIL ADDRESS:	SIGNATURE:
Mr Leluma Matookane		
Peter Myles		
Ms Nontuthuzelo Mlobeli		
Mrs Sibulele Nondoda		
Mr Nomgugutho Bangindawu		
Mr Xolani Charles		
Johann Botha	X	
Robert Landmann	X	
Kirsten du Plessis	kistend@j.co.za	
Andrew Frederick Radford	aradford@csiro.co.za	
Nikki James	n.james@saiab.ac.za	
Nick Ridder	n.ridder@saiab.ac.za	

I hereby indemnify the Research Vessel *Algoa* and her owners, the Department of Environmental Affairs, for this visit in Port Elizabeth Harbour on 24 April 2015

Agulhas System Climate Array – Research Vessel *Algoa* Tour

Indemnity Sheet

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Annemie Jacobs		
RYAN FURLAN		

I hereby indemnify the Research Vessel *Algoa* and her owners, the Department of Environmental Affairs, for this visit in Port Elizabeth Harbour on 24 April 2015

**ANNEXURE 4:
Launch Programme - NMMU**



***Agulhas System Climate Array (ASCA) Project Launch
Programme***

***Friday, 24 April 2015 14:30 – 17:00
Nelson Mandela Metropolitan University Conference Center***

Prior to the launch at the University there will be an opportunity for dignitaries to tour the RV Algoa which will be docked in the Port Elizabeth Harbour.

Welcome by NMMU DVC Research and Engagement, Prof Andrew Leitch

Opening by Councillor Wandisile Jikeka, Nelson Mandela Bay Municipality

Launch of ASCA program by acting NRF CEO, Dr Beverley Damonse

Overview of ASCA, SAEON, Dr Juliet Hermes

Cruise highlights by Co-chief scientists, Ms Tamaryn Morris (SAEON), Mr Gavin Louw (DEA) and Geert-Jan Brummer (NIOZ)

Speech by DEA Deputy Director, Mr Mthu Gulekana

Thanks by DST representative, Prof Yonah Seleti

Tour of interactive stalls and interaction with scientists, technicians and students from
the project.



**ANNEXURE 5:
SAEON Affiliated Postgraduate Students on the Cruise**

Student Surname	Student Name	University	Department	Degree	Gender	Race	Citizenship	ID / Passport number	Student Number
Bizani	Mfundo	NMMU	Zoology	PhD	M	B	SA	8805155509080	215334604
d'Hotman	Jethan	CPUT	Marine Science	BTech	M	W	SA	9112315051080	211212504
Dilmahamod	Fehmi	UCT	Oceanography	PhD	M	B	Mauritius	1118409	DLMAHM001
Dlomo	Xolisa	NMMU	Oceanography	PhD	M	B	SA	8602026719083	215286863
Moffett	Katherine	CPUT	Marine Science	BTech	F	W	SA	9110040098087	211262714
Voorneveld	Jarred	CPUT	Marine Science	BTech	M	W	SA	9010155105083	210008881
Vermeulen	Estee	UCT	Oceanography	Hons BSc	F	W	SA	9304010106083	

**ANNEXURE 6:
Photos**



Figure 1: Preparation of dissolved oxygen Auto-titrator by Mbulelo Makhetha (DEA). Photo: B. Hölscher



Figure 2: Mooring preparation prior to leaving Cape Town harbor. Photo: B. Hölscher



Figure 3: Preparation of anchor weights by Bradley Blows (BCRE) and Gavin Louw (DEA). Photo: B. Hölscher



Figure 4: CTD operations with Mbulelo Makhetha and Elijah Ramphago, both from DEA. Photo: B. Hölscher



Figure 5: Leg 1 Scientific Team – ASCA Mooring Deployments. Photo: B. Hölscher



Figure 6: Acoustic release deployment by mooring technicians. Photo: B. Hölscher



Figure 7: Leg 2 Scientific Team – ASCA Survey. Photo: T. Morris



Figure 8: RV *Algoa* tour with Mbulelo Makhetha. Photo: T. Morris



Figure 9: Leg 2 scientists manning the RV *Algoa* tour stations to highlight the different aspects of the project and equipment used. From L to R – Leandro Ponsoni (NIOZ), Estee Vermeulen (UCT), Gavin Louw (DEA) and Mfundo Bizani (NMMU). Photos: T. Morris

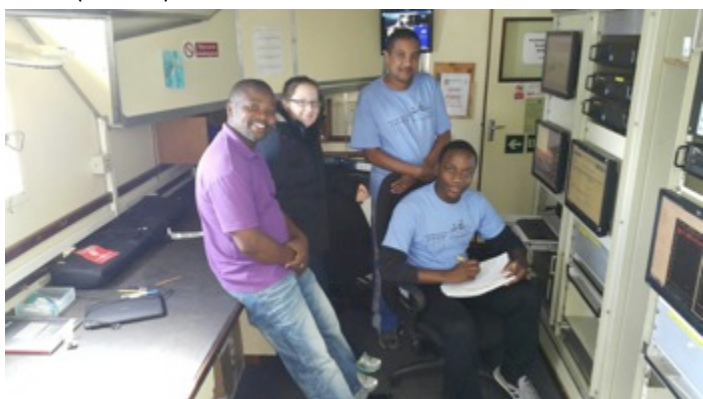


Figure 10: Leg 3 SAEON Environmental Education team: Thomas Mtontsi and Hannah Raven (SAEON), Denver Bowers and Gilbert Musona (Ocean View Secondary). Photo: T. Mtontsi



Figure 11: Gilbert Musona receiving training from Gavin Louw (DEA) on dissolved oxygen titrations. Photo: T. Mtontsi

ANNEXURE 7:
Learner and Educator Report – Ocean View Secondary

The Learner: Gilbert Musonah

On the 24th of April my teacher, Mr Bowers and I were privileged to fly to Port Elizabeth. With the excitement of the trip we enjoyed our flight. As Part of the program I also got a chance of getting to Nelson Mandela University. At this university was the launched of the ASCA project that I unfortunately attended late. However, I got an opportunity to meet, interview and interact with different experts of different fields and departments in Marine Sciences. Such a privilege inspired me and was beneficial to me in making me understand the Agulhas System Climate Array Project. The Environmental Affairs also extended support for project; needs of any research work, data or consultations concerning my projects.

Later we went to the Algoa Vessel ship which took us back home to Cape Town. On this ship were experts who had been working on the ship for 20days and I joined them for 2 of the days. On the ship a project of collecting scientific samples of sea water, filter paper (which enabled the collection of nutrients in the sea after filtering sea water) and oxygen volume was conducted. Gladly I was also included in the shifts of the project were I got a chance to be a real scientist for some time. As I held this practical task I grew to understand the basic relationship between chlorophyll, region(latitude and longitude) and oxygen, and the factors influencing the decrease or increase of these components. This has been beneficial to my Life Science studies in related topics.

Besides the educative side had a lot of fun with awesome scientists and experts who treated me like their little brother despite the fact of meeting for the first time. For my first time on a ship in the ocean, I had an awesome time not to mention the sea sickness that my teacher and I suffered but it was just for Friday evening. I enjoyed the service of accommodation, meals and the programming of the days we spent on the ship. I saw lively active nature i.e. dolphins, seals another floating species of zooplankton. The trip was an opportunity that has given me focus, determination and inspiration. I am forever grateful for such an honour. It therefore has given me better understanding of my project of comparing the volume of oxygen per region, determined by the chlorophyll present, to previously collected data. On behalf of Ocean View Secondary, Mr Bowers and myself, I would to say thank you SAEON for such an opportunity and privilege.

The Teacher: Mr. Denvor Bowers

This is to attest to my experience on the recent expedition from PE to Cape Town.

From all the things that I have done, this was surely the most interesting adventure. From boarding to disembarking at the docks in Cape Town, I felt the sense that sea life does not accommodate very well with everyone.

Although the sea got the better of me, I enjoyed the moments where I have had the upper hand over the sea. Seeing what these guys do for weeks on a vessel, was really astounding. I have never really seen how samples were collected, analysed and results compiled, but after seeing them at work, I now have the greatest respect and admiration for these okes. I have enjoyed the adventure to a certain extent, that I was able to observe them, in the latter part of the journey.

When questioned if they enjoyed being at sea, I got the sense that they really enjoyed their work. What I enjoyed the most was when I had to do an observation. With all the gadgets and computers, I got to sea, and the experience what these guys go through on a journey.

I found that this trip was very educational, informative and enjoyable.

I wish to thank SAEON for the opportunity granted to actually see what these guys do. Keep up the good work.