

Southern African Data Centre  
for Oceanography  
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South Africa

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## *SADCO is sponsored by ...*

- Department of Environmental Affairs & Tourism
- SA Navy
- CSIR
- SAEON
- Namibian Ministry of Fisheries & Marine Resources



## 20th anniversary and universal free access!

*Coinciding with its 20th anniversary SADCO announces that its data can now be accessed openly and freely for research purposes.*

*For the past two years SADCO has been designing and preparing the new universal access to SADCO's data. From 8 May 2010 onwards, direct, online, and free access is provided to SADCO's extensive data base of ship cruises, surface observations from ships-of-opportunity, weather observations, and moored instruments (see below for more details).*

### 20th anniversary

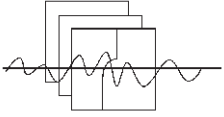
SADCO is also celebrating its 20th anniversary this year.

SADCO has been in existence in various forms since its start in the 1960s at the University of Cape Town. In 1977 the CSIR re-started SADCO having just completed the establishment of an in-house, computerised data base of marine hydrographic data.

In 1989 the operation of SADCO was put out to tender, which was awarded to the CSIR. After a short gap, and with a budget reduced to 20% of its previous level, SADCO re-opened its doors in 1990. The funding would be provided collectively by the (present names) **Department of Environmental Affairs, SA Navy, NRF and CSIR.**

In its present mode of operation SADCO has three "staff members" (Fig. 1 and 2) who spend only part of their time on SADCO, namely a manager (for coordination, reporting, liaison, scouting, oceanography, quality control), a programmer (for data base design and creation, all software for loading and extraction of data, and data base administration) and a data processor (data loading and extraction).

In spite of its size, SADCO has been able to achieve some notable milestones during the past 20 years. The following are some highlights:



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## 20th anniversary and universal free access!

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- Constrained by budget cuts SADC starts in 1990 by severely curtailing its activities and rationalising the data it could handle. E.g., satellite data is one of the disciplines it decided not to manage (re-confirmed in 2003). At the same time, SADC starts scouting for and loading hydrographic data collected within its target area.
- A large effort is made to promote SADC within **the marine community**, through visits, letters, displays and presentations at conferences.
- A quarterly **newsletter** is started in October 1990. Annual Reports are regularly submitted to the Steering Committee. A brochure is produced in 1990.
- In 1994 the data bases are **relocated from Pretoria to Stellenbosch** and onto a new, user friendly **INFORMIX Database Management System (DBMS)**. The data is kept secure though **daily backups** and regular maintenance.
- An inventory accessible via dial-up modems is created in 1994 with 50 000 stations in 3 000 surveys. A User's Manual is produced.
- In 1994 the **Namibian Ministry of Fishing and Marine Resources (NMFMR)** is added to the sponsors. SADC's name is later changed to the Southern African Data Centre for Oceanography.
- Temperature-related products (mixed layer depth, thermocline intensity) are established in 1996.
- The number of hydrographic stations reaches 100 000 in 1997.
- The geographic **target area** of the Data Centre (initially 0 - 70°S, 20°W - 70°E) is extended northward to 10°N in 1997 and the database structure, loading and extraction routines, adapted (data only loaded in 1999).
- Total number of hydrographic stations reaches 150 000 in 2000. In the same year the marine data staff complement of the CSIR experiences heavy setbacks. Neville Paynter (Fig. 3), who had been with SADC since before 1990 and who contributed significantly to the design and software of the data centre, resigns. Fraser Jack, a programmer-in-training, dies, and Leon Coetzee, an excellent programmer and data manager, retires.

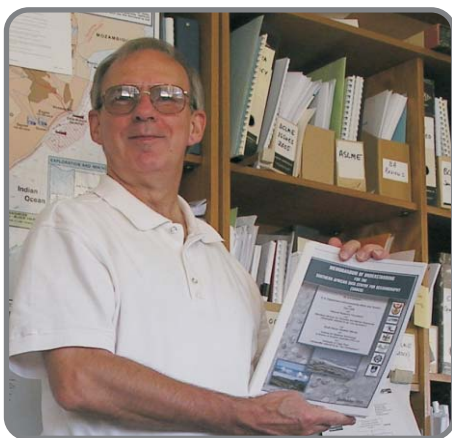


Fig. 1. Marten Grundlingh, manager of SADC



Fig. 2. (left) Louise Watt (data processor) and Ursula von St Ange (programmer analyst)

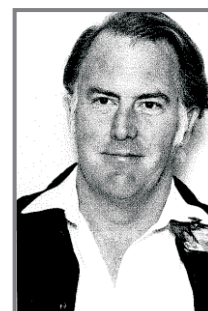
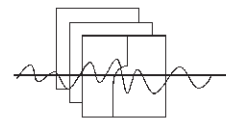


Fig. 3. Neville Paynter



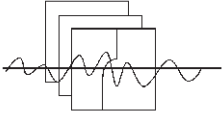
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## *20th anniversary and universal free access!*

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- First **moored current meter** records are loaded in 2001. In 2002 the total number of deployments reaches 400.
- In 2000 SADCO starts **web-enabling** its data bases. The VOS data set is completed in 2001 and the marine set in 2003. The **inventory** is redesigned for open access and moved onto the Internet in 2003.
- SADCO moves to **ORACLE** DBMS in 2003.
- **Quality control** measures are designed and implemented for VOS data in 2003 and for hydrographic data in 2005.
- First **automatic weather stations** are loaded in 2003, augmented in 2006.
- First **moored ADCP** data is loaded in 2005.
- In 2005 SADCO is nominated to establish an African node (**AFROBIS**) for OBIS (Ocean Biogeographic Information System), to contribute to the Census of Marine Life. The project is funded by the Alfred P Sloane Foundation, and when work is concluded in 2006 the system had been commissioned and **3.1 million biogeographic records** loaded.
- The number of hydrographic stations exceeds 200 000 in 2006.
- The **trace metal** data set is “revived” in 2006 and more data added.
- A large amount of data from continuously recording **underwater temperature sensors** (UTRs) is loaded in 2006.
- The **loading software** is improved in 2006, and data extraction in a format **compatible to ODV**, a powerful software package freely available from the Alfred Wegener Institute, is established.
- Historic vertical profiles of **current measurements from a vessel** are loaded in 2006.
- First **ARGO float data** and **wave buoy data** is loaded in 2007.
- In 2008 an additional 250 000 VOS observations from the **CLIWOC** data set is loaded in SADCO's target area, with records dating back to 1660. The VOS data set now comprises about **40-50 million individual observations** of surface parameters.
- An audit of SADCO's data in 2008 shows 243 000 hydrographic stations from 5 172 surveys.
- The **web site** gets a make-over in 2008 and provided with more content.
- **Quality control for time series** and nutrients is initiated in 2008
- The number of ARGO float profiles reaches 31 600 in 2009.
- SADCO moves onto new hardware, and transfers the DBMS to (open source) **POSTGRES** in 2010.

***It is believed that SADCO has managed to keep abreast of marine data collection in southern Africa and has established a user-friendly data base with open access. SADCO is well positioned to continue providing an archiving and data dissemination service in the years to come.***



# New open access is here!

After the Steering Committee decision to make data openly available for research purposes in 2008, considerable effort and planning has been invested in the creation of a user-friendly extraction process. All data in SADCO is stored according to surveys, and it was concluded that the best way (for the time being) was to extract data **on a survey basis, directly from the Inventory**. This method was mentioned for the first time as far back as in the Annual Report of 1994!

The existing extraction programmes will still remain accessible to the sponsors (as before), but the “participating parties” (SAWS, IMT, UCT) are now also included.

The direct extraction required various components of SADCO's data bases to be redesigned for the sake of security, ease of extraction, etc.

## Systems for user registration and security control with extraction

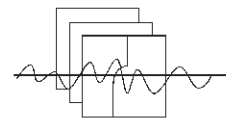
- Users may browse the inventory (as before) without registration or log-in.
- However, to **extract data**, users need to **register** (first time) and **log on** (subsequent sessions). The information is used to communicate with the user during the extraction process (see below), to consider sending free Newsletters and to gauge the interest level of the user. The user also commits to using the data for research purposes only.
- If a user plans to extract data during a session, he/she is advised to log in **before proceeding further** into the Inventory. If a user is not logged in, the buttons for the various on-line extractions are namely not visible.
- Ease and management of extractions is improved by confining the size of extractions.
- **Flagged data** (on instruction of the data provider) is not available for extraction).

## Redesign of data structure

- The display of a survey's metadata has been enhanced to provide more information [e.g. the total number of stations, a breakdown of the stations per instrument type (e.g. CTD, XBT), and the amount of nutrients and chemicals].
- A mooring shows all depths/bins on that mooring.
- All time series files have been modified to contain no more than 1 year's data, but only one depth/bin can be extracted at a time.

## Extraction of hydrographic and time series surveys

- A user can search the inventory on the data type, vessel name, date of the survey, the area, or (where available) the chief scientist or the project name.
- In the listing of surveys, the two columns on the right indicate whether SADO has **stored** the data, and whether the data is available to the user (i.e. unflagged) (Fig. 4).
- Once a survey has been selected the metadata displayed with the survey can help to verify that this is the right cruise (see Fig. 5).
- After selecting the format (e.g. ODV) for the extracted data, **data can be extracted with a single click** (Fig. 5). Similarly, time series is extracted (only in ASCII) with a single click (see example screen in Fig. 6).
- An extraction takes between 10 seconds and 3 minutes which is, for the time being, considered acceptable for on-line, real-time extraction. Trials indicate that 3 minutes involves an upper limit of about 10 000 records, and this will accommodate many hydrographic cruises (except those CTD cruises or time series that have large numbers of observations).



New open access is here!

Survey ID	Project Name	Survey/Station Name	Platform Name	Chief Scientist	Institute	Start	End	Survey Type	Stored?	Available?
2004-0049	Coelacanth, Second Jago	ALG119	Algoa	M Roberts	Marine and Coastal Management (DEA&T)	2003-04-10	2003-05-11	Hydro	N	N
2004-0226	Namibian Cruises	ww200304EN	Welwitschia	C Bartholomae	National Marine Information and Research Centre	2003-04-15	2003-04-15	Hydro	Y	N
2009-0398	US ARGO PROJECT	D1900156	Profiling Float	S Riser	University of Washington	2003-04-19	2005-01-29	Hydro	Y	Y
2004-0022	Rock Lobster Biochem	Voyage 886	Sardinops	S Brouwer	Marine and Coastal Management (DEA&T)	2003-05-05	2003-05-09	Hydro	N	N
2009-0421	ETO_BB	D1900206	Profiling Float	unknown	unknown	2003-05-09	2005-09-04	Hydro	Y	Y
2009-0423	ETO_BB	D1900208	Profiling Float	unknown	unknown	2003-05-09	2003-12-05	Hydro	Y	Y

Fig. 4 Columns indicating the status of surveys (not loaded, loaded but flagged, loaded and available).

- The user is informed by e-mail when the extraction is complete, with a URL where the data can be viewed or downloaded. Communication with the user will obviously be affected by the speed/bandwidth of his/her own network. The user can also monitor the extraction process.
- To avoid congestion in the extraction queue the extraction of a survey with more than 10 000 observations will automatically be routed to an off-line data extractor for attention. The user is informed by e-mail of this arrangement, and when the extraction is complete the user will be notified again (e-mail).
- Data can easily be downloaded (one click) from the URL and the ODV format option allows straightforward importation into ODV for plotting.

#### Extraction of VOS data

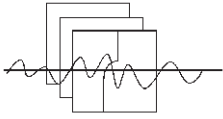
- Since the storage and extraction of VOS data is not done in terms of surveys (such as the cruise data), the extraction is done according to long lat/long rectangles and period.
- The extraction is limited to 10 degree-block years (e.g. 1x1 degree for 10 years, 2x4 degree blocks for 1 year, or equivalent combination).

#### Some additional ocean information (“Fun stuff”)

This section caters for largely uninitiated users of SADCO (say, at school level), by providing insight into characteristics of the oceans around southern Africa, main marine organisations, oceanographic equipment, typical SADCO-generated profiles or sections, etc. (see examples in Fig. 7-10).

It is foreseen that the information can be modified in future, based on comments and suggestions from users.





New open access is here!



Click on one of the buttons below to search for a survey:

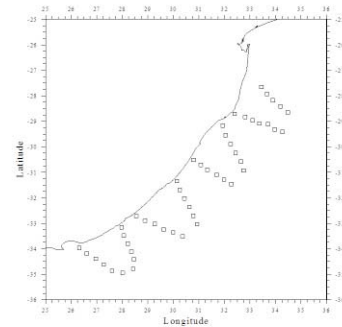
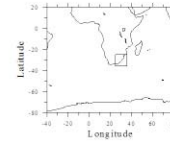
- surveys
- dates
- institutes
- scientists
- platforms
- areas
- data types
- projects

>>> Survey Summaries

Survey ID	1973:0024
Project Name	Bathy
Survey Name	MN7318
Chief Scientist	F.P. Anderson
Institute	NRIO CSIR
Country	South Africa
Ship or Platform	Meiring Naude
Platform Type	Research Vessel
Start Date	1973-08-06
End Date	1973-08-17
Latitude	27.85500 to 34.95000 degrees
Longitude	26.31167 to 34.48333 degrees
Survey Type	Hydro

CRUISE TRACK CHART

Vessel: Meiring Naude  
 Survey id: 1973:0024  
 Stations: 48  
 Area: 27 to 35 S, 26 to 35 E  
 Period: 1973-08-06 to 1973-08-17  
 Project: Bathy  
 Expedition: MN7318  
 Institute: NRIIO CSIR



Please click [here](#) for help.

Database Statistics

Number Of Stations : 48

Data Type	Stations	Records
Water	48	427
OSD	48	427
Nutrients	18	124
Currents	13	106

Water Physical/Nutrient ODV  
 Extract Online

Data can be extracted online

Fig. 5. The data can be extracted by a single click.



Click on one of the buttons below to search for a survey:

- surveys
- dates
- institutes
- scientists
- platforms
- areas
- data types
- projects

>>> Survey Summaries

Survey ID	2009:0543
Station Name	SLANDROP
Chief Scientist	unknown
Institute	National Ports Authority (NPA)
Country	South Africa
Ship or Platform	Waves
Platform Type	none
Start Date	1979-02-03
End Date	1993-06-12
Latitude	34.126667 to 34.126667 degrees
Longitude	18.176667 to 18.176667 degrees
Survey Type	Waves

Please click [here](#) for help.

Waves Database Period Record Counts

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Instruments	Extract
1979	133									102	102	114	318	Wavender	<a href="#">Extract online</a>
1979	114	101	110	112	80	102	119	112	11	26	42		828	Wavender	<a href="#">Extract online</a>
1980			7	101	100	98	123	117	116	97	98	84	948	Wavender	<a href="#">Extract online</a>
1981	77	93	94	111	88	109	107	95	107	83	83	1154	1154	Wavender	<a href="#">Extract online</a>
1982	91	106	111	113	87	36	117	87	94	83	70	114	1089	Wavender	<a href="#">Extract online</a>
1983	119	91	117	117	117	95	92	91	116	116	88	110	1287	Wavender	<a href="#">Extract online</a>
1984	118	103	100	120	56	87	112	86	118	96	102	100	1187	Wavender	<a href="#">Extract online</a>
1985	112	78	58	87	107	83	86	119	83	121	114	114	1139	Wavender	<a href="#">Extract online</a>
1986	85	85	120	131	121	112	48	106	116	120	112	118	1245	Wavender	<a href="#">Extract online</a>
1987	102	108	117	114	86	78	121	120	112	121	4		1050	Wavender	<a href="#">Extract online</a>
1988		6	116	116	223	107	119	100	111	111	110	113	1113	Wavender	<a href="#">Extract online</a>
1989	108	95	116	75	74	95	100	113	118	208	196	187	1480	Wavender	<a href="#">Extract online</a>
1990	217	203	205	119	187	208	184	216	1983	207	217	240	3333	Wavender	<a href="#">Extract online</a>
1991	216	213	234	221	221	160	209	233	201	212	89	228	2426	Wavender	<a href="#">Extract online</a>

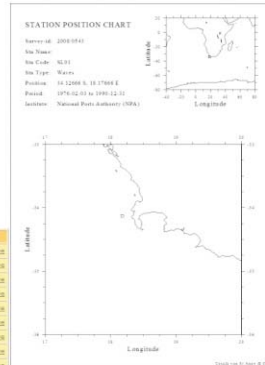
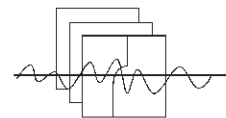


Fig. 6. Example of the new display screen for wave time series data in the Inventory. The arrow indicates the new buttons that have been added for each year for one-click extractions.



New open access is here!

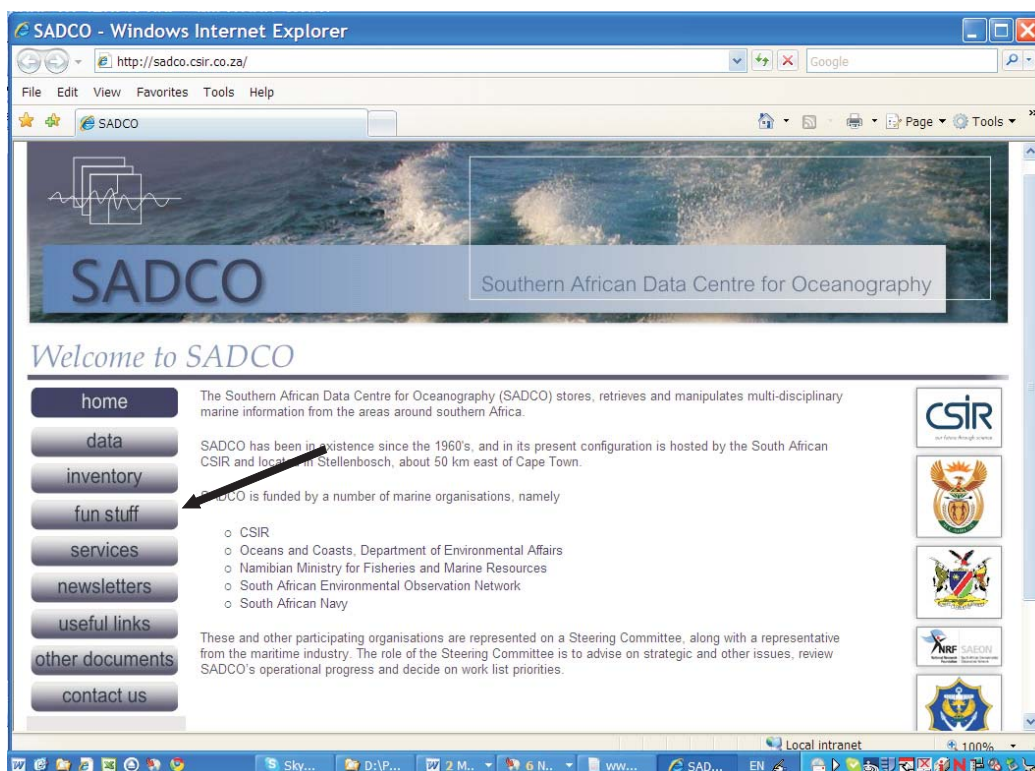


Fig. 7 "Fun stuff" button on the SADC Home Page

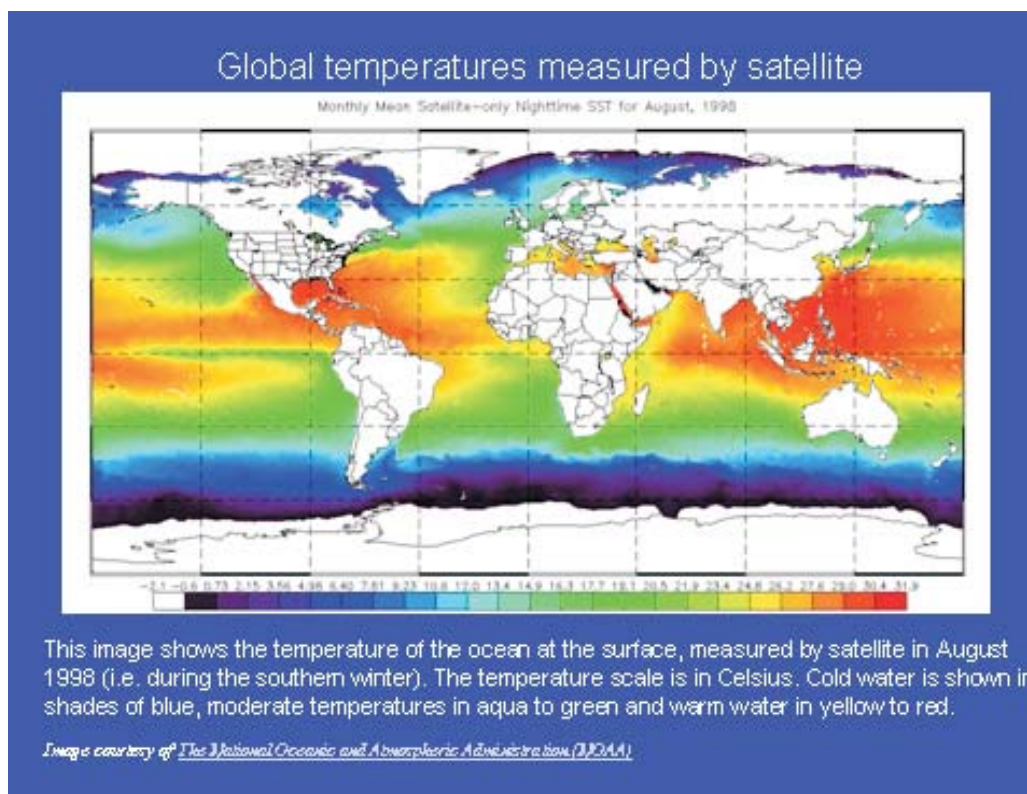
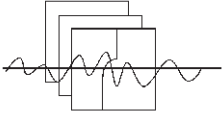


Fig. 8 Example of an item in the "Fun stuff" section showing the mean sea surface temperature of the world.



New open access is here!

## RS Ellen Khuzwayo (2007 -)



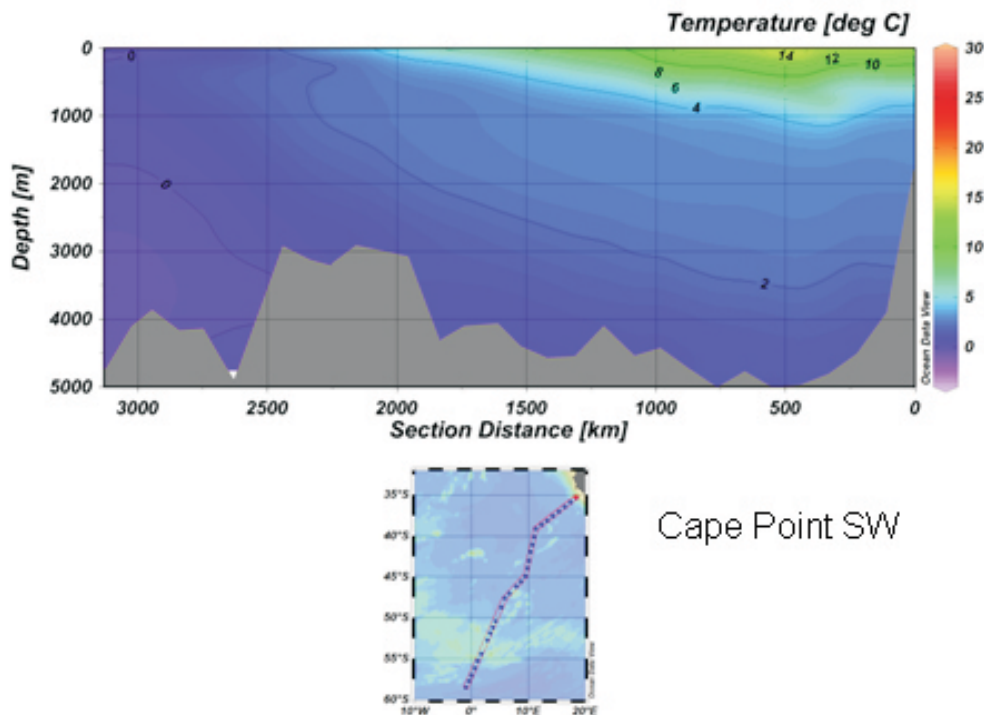
**Fig. 9** Example of an item in the “Fun stuff” section showing a description of a South African research vessel.

Department of Environmental Affairs replaced *Sardinops* (operated from 1959 to 2008); 43.2m; range 2500 nm; endurance 20 days; cruise speed 13 knots; 21 scientists. Built: Farocean Marine (Pty), Cape Town.

Six winches (incl CTD, towing, vertical, long line);  
A frame; Seabird CTD, ADCP, echo sounders; extensive navigation and communications.

Main research: fish, rock lobster, marine mammals

Information supplied:  
Dr S du Plessis, DEA



**Fig. 10** Example of an item in the “Fun stuff” section showing a vertical section of temperature southwest of Cape Town.