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SADCO SADSO

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The next Newsletter (May) will be devoted largely to SADCO's 20th birthday and unveiling aspects of SADCO's new operating strategy

Additional wave buoy data

SADCO's mission is to locate and archive relevant ocean data in a large spatial window around southern Africa (10°N-70°S; 30°W-70°E), and make such data available to users for research and other purposes.

In the process, backlogs of data have been worked off and "new" data sets discovered. In this way, the data holdings have been continuously enhanced and diversified.

One such useful data set is the **wave data** collected by wave buoys around the coast. This unique, quality data set is collected by the CSIR in Stellenbosch on behalf of Transnet, and SADCO is grateful that some of the older sections of the data have previously been released for loading (2007).

Previously loaded data:

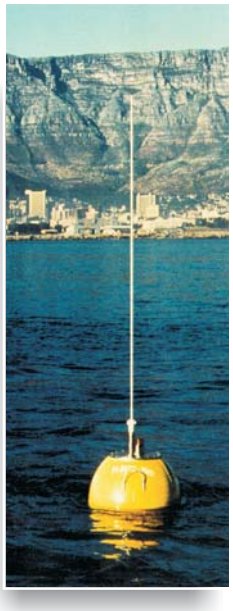
- Richards Bay: 1979 to 1990
- Saldanha Bay: 1982 to 1987 (data gap 1988-1991)
- Slangkop: 1976 to 1990

Permission has now been obtained from the **Transnet National Ports Authority** via the CSIR Manager of coastal engineering activities, **Dave Phelp**, to load the following additional data:

- Cooper Light: August 1992 – December 1993
- East London: April 1992 – December 1993
- Richards Bay: January 1991 to December 1993
- Saldanha Bay: January 1991 to December 1993
- Slangkop: January 1991 to May 1993

This means that not only has the time coverage of some stations been extended to 1993, but new stations have been added.

SADCO extends its appreciation to Transnet NPA and the CSIR for making this data available.



Current meter quality assessment

In a previous Newsletter it was mentioned that SADCO had initiated a quality assessment process of the time series data. The present article indicates how the assessment appears in practise.

By starting to apply quality assessments to **time series data**, SADCO is extending the QC process presently applied only to **profile data**.

As with profile data, time series are often submitted to SADCO with indications that the data set had not been checked 100%. One imagines that the reasons why this happens are the same as for profile data:

- lack of capacity of the data provider
- the initial need for and passion about the data has expired and data archiving is not given a high priority
- the cleaned-up version of the data is not submitted to the data centre
- the data set is old and the data provider is not the data collector.

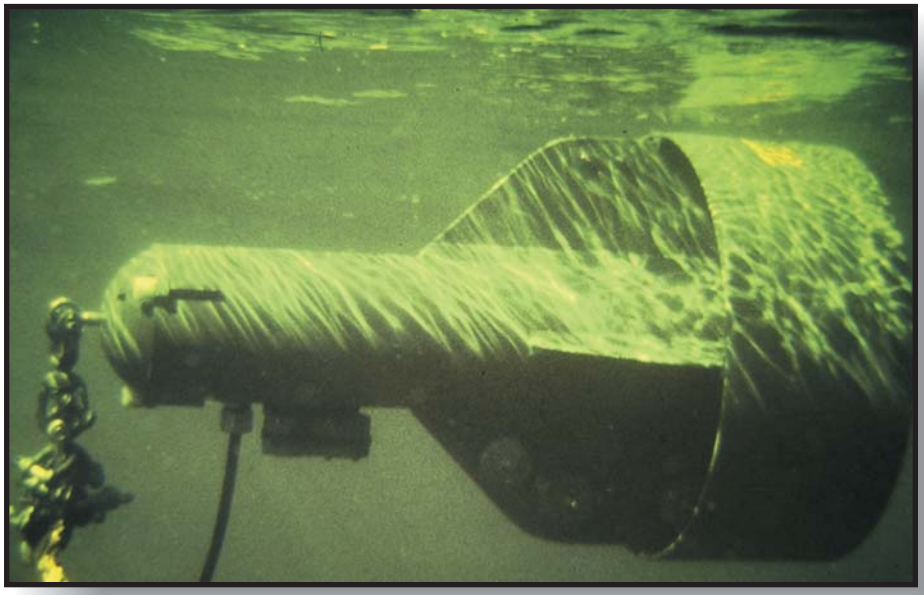
The quality assessment system installed by SADCO for time series is much simpler than the very extensive system adopted for profile data. During the design of the system for time series it was realised that a universal, software-driven system would be quite difficult to construct, and it was decided to establish a lower-level version based on visual inspections.

Each time series was assessed using the table below.

Here, a "**broad range**" error occurs when the parameter value falls outside a set of limits. Errors in this category are normally fatal and can be traced to calibration issues, or complete malfunction of the instrument. A "**Spike**" error is evidence of a sharp, significant increase in the parameter, confined to a single observation. "**Sensor drift**" is a slow but accelerating, persistent change (normally a decrease) in the parameter value. The drift can be attributed to a sensor becoming overgrown with seaweed or barnacles, and normally occurs on a time scale of weeks, and should not be confused with seasonal variations. "**Gaps**" are short periods (hours, days) when the instrument was not recording (normally during a change-over of equipment), or when data for a limited period was removed. A "**Leader/trailer**" error occurs when the instrument is deployed or recovered and the sensor has not acclimatised yet to its new environment.

		Error present				
		broad range	spikes	sensor drift	data gaps	leader/trailer
1	speed	0	0	0	1	0
1	direction	0	0	0	1	0
1	temperature	0	0	0	0	1
1	salinity	0	0	1	0	0
	oxygen					
	pressure					
	pH					

Current meter quality assessment continued...



In the example shown in the table, the instrument recorded 4 parameters, namely current speed, direction, temperature and salinity. In the specific aspect that is evaluated, “0” means “no error observed”; and “1” means “error present”. The assessment shows that the particular time series had data gaps in the speed and direction, the temperature record showed a leader and/or trailer and the salinity sensor drifted.

The inventory will in future show whether such an assessment has been done on a particular time series, and the downloaded data will contain this assessment itself. This will serve to alert the user that some errors are visibly present in the data.

It should be stressed that the assessment does not validate the data. Aspects that come into play for a validation would include the calibration of the equipment, application of data processing checks and modifications (e.g. conversion from magnetic north to true north, use of universal time, checking against other equipment and results in the same area), application of filtering, etc.

SADCO's chemical data: scope and extent

The set of chemical data in SADCO is considerably smaller than the set of physical data. It is also the least is known. We provide here a brief introduction to the data, and indicate the type of parameters and extent of the data.

What data falls into this category?

The "chemical data" under discussion is not the same as the nutrient data, although both deal with chemistry of the oceans. The "nutrients" are the phosphates, nitrates, etc., while the "chemical data" include the light metals (calcium, magnesium, sodium, …) and heavy metals (iron, mercury, lead, selenium, ….). Warren Joubert, marine geochemist in the CSIR, indicated some of the reasons why this differentiation between nutrients and metals is appropriate:

- Nutrients have a larger, more direct link with biological processes in the sea, compared to metals.
- Because nutrients become consumed in the biological processes, they are not conservative and cannot operate as trace elements, while the light and heavy metals can.
- Heavy metals are used as indicators of pollution. Nevertheless, some elements in sediment (e.g. arsenic) occur naturally in the sea.
- The trace elements can help with water mass identification and tracking.
- Radio-active isotopes (SADCO does not have any) can provide insight into the age of the water masses.
- Practical limitations and analysis methods (in terms of how the samples must be collected to prevent sample contamination, use of special sampling equipment, and the analyses themselves) make metal analyses much more expensive than that of nutrients.

So why is the presence of heavy metal of any relevance?

Heavy metals form a key indicator of marine water quality when an assessment is made of pollution levels associated with marine effluent. The process of dumping material in the sea requires permits (approval) to safeguard the receiving water quality. In most cases, the chemical measurements that have been submitted to SADCO have been recorded as part of permit-driven, water quality assessments around ports and point sources of effluent (such as pipelines).

What is the extent of SADCO's chemical data holdings?

The metal concentration is determined in four source categories, namely

- Water
- Sediment
- Tissue
- Plankton

Table 1 below indicates the present numbers of observations in SADCO for the various metals and sources. Over the past 20 years the observational numbers have increased mainly in sediment (158%) and water (73%), while the increase in tissue analyses was below 5%. No further analyses in plankton have been submitted to SADCO in the past 20 years.

It is uncertain what proportion of all the marine chemical analyses conducted in the country is submitted to SADCO. ***If there are any data providers that would like to submit their data to SADCO, please contact the Manager (mgrundli@csir.co.za).***

SADCO's chemical data: scope and extent continued...

What is the geographic distribution of the data?

Figures 1 - 4 show the spatial distribution of some of the data.

The graphs indicate that most of the data has been collected quite close to the coast and clustered around specific areas. These may be pipelines or other marine effluent sources, estuaries, rivers, or ports.

Because the data is very site-specific, probably collected to monitor pollution levels at potentially problematic sources, the metal values are not representative of a larger region. In addition, any abnormal values may have led to modifications in the treatment plants, and this may have reduced the concentrations. The use of such data therefore needs a very careful screening and analysis before any conclusions can be drawn. In most cases, detailed analyses have already been made in relation to a specific data set (and reported to the principles), and it is highly recommended that such reports be located and inspected.

Table 1. *Amount of metal data in SADCO, according to the source of the data.*

	Water	Sediment	Tissue	Plankton
Light metals				
Calsium	498	-	-	-
Magnesium	145	-	-	-
Potassium	145	-	-	-
Sodium	145	-	-	-
Strontium	85	-	-	-
Sulphate	85	-	-	-
Suspended solids	1008	-	-	-
TOTAL	**2111**	-	-	-
Heavy metals				
Arsenic	1153	2106	145	
Cadmium	3269	6764	3311	23
Chromium	1881	6455	2875	23
Cobalt	758	3726	1476	9
Copper	3074	6817	3317	23
Iron	1280	3764	2780	23
Manganese	780	3764	2529	-
Mercury	2589	4576	1788	23
Lead	3213	6763	3277	23
Nickel	2106	6339	2907	23
Selenium	1207	2088	146	-
Silver	-	-	51	-
Zinc	2880	6812	3316	23
TOTAL	**24190**	**59974**	**27918**	**193**

SADCO's chemical data: scope and extent continued...

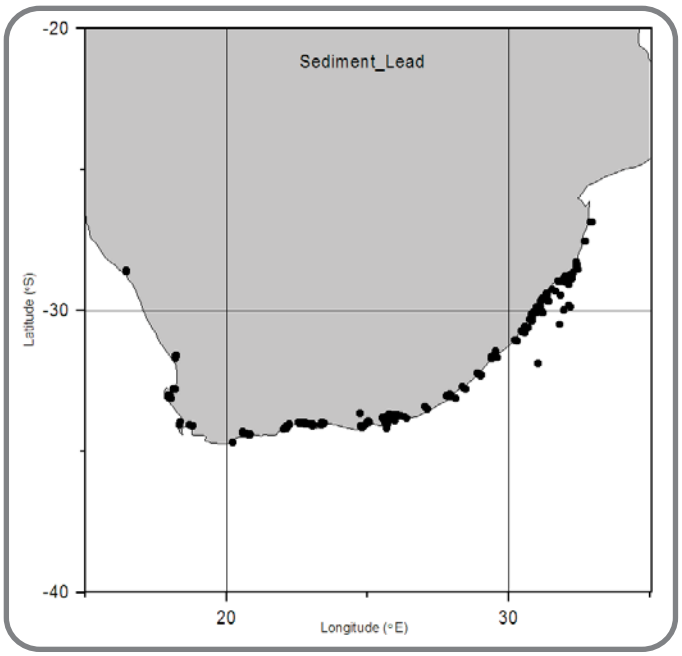


Fig. 1. *Locations of data where* ***lead*** *was analysed in* ***sediment.***

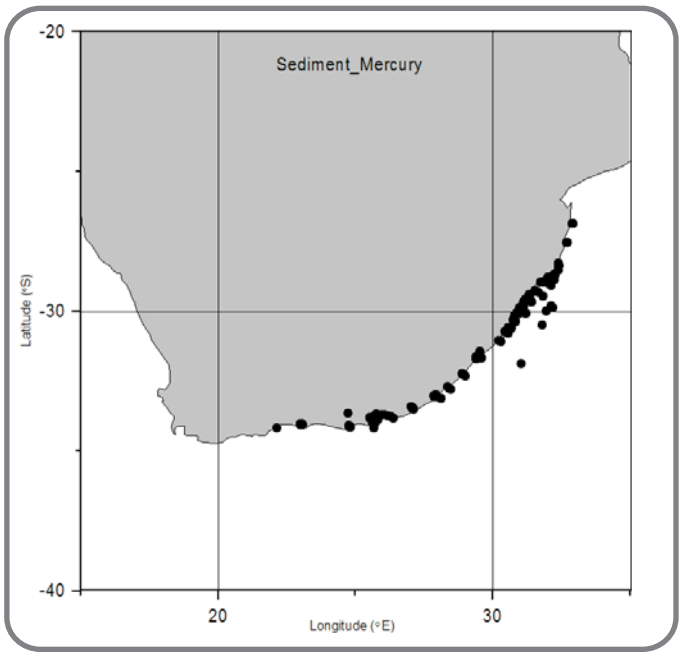


Fig. 2. *Locations of data where* ***mercury*** *was analysed in* ***sediment.***

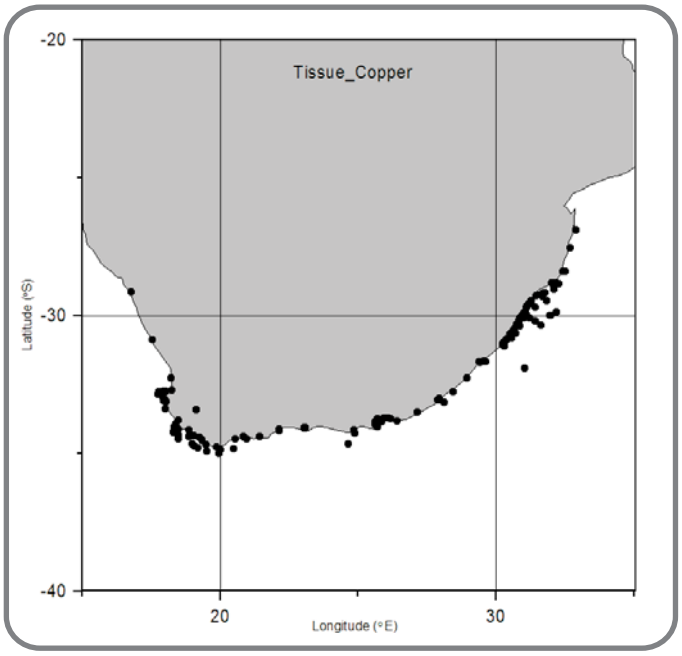


Fig. 3. *Locations of data where* ***copper*** *was analysed in* ***tissue.***

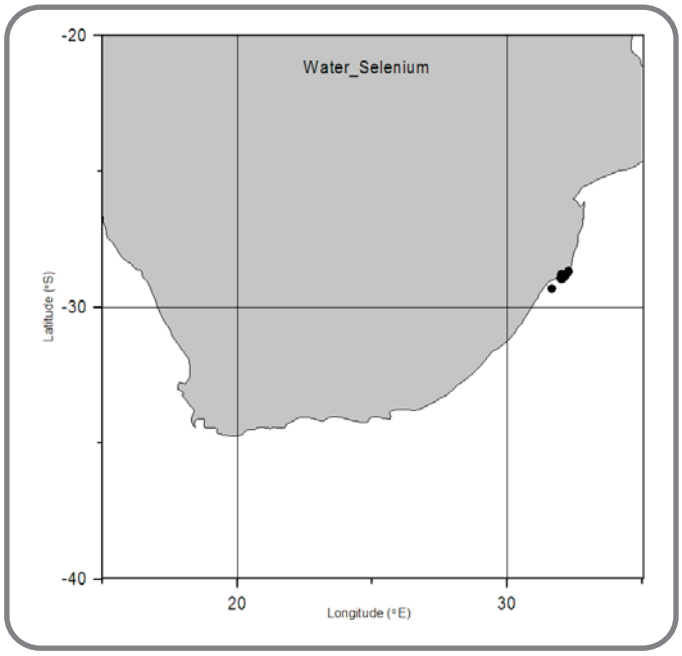


Fig. 4. *Locations of data where* ***selenium*** *was analysed in* ***water.***

IODE Workshop on quality of Chemical Oceanographic Data

Andrew Pascall, Manager Analytical Labs, CSIR (Stellenbosch and Durban)

The IODE Workshop on QC/QA of Chemical Oceanographic Data was held at the IOC Project Office for IODE in Oostende, Belgium between 8 and 11 February 2010. The meeting which was proposed and organized by the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices (GE-BICH) welcomed 20 experts in chemical data management from 12 countries. The objective of the meeting was to define a minimum set of QA/QC procedures and criteria. The outcome of the meeting includes a proposal for a QC quality flag scheme (which will be submitted to the Ocean Data Standards process), terminology for dissolved inorganic nutrients and dissolved oxygen in seawater, a scheme for 5 data processing levels and a work plan to prepare minimum QC tests for nutrients and oxygen. The minutes and report from the meeting will be available in March 2010 and will be posted on the IODE web site.

Fig. 5. *Andrew Pascall enjoying a refreshing break during the GE-BICH workshop.*

What is GE-BICH?

It is a working group formed by the International Oceanographic Data and Information Exchange (IODE) programme of the Intergovernmental Oceanographic Commission (IOC).

GE-BICH's remit is to address issues related to the management and exchange of biological and chemical data collected in the world's oceans.

The group is formally composed of:

- four long-term members nominated by members of the IODE committee;
- four additional experts chosen by the long-term members for their specific expertise on issues relevant to the group's priorities.

Since its first session in 2002, GE-BICH has consulted with experts from external organisations such as ICES, FAO, the ICSU's WDCs, European projects and networks such as SeaDataNet and EUR-OCEANS, from international initiatives such as OBIS and WoRMS, and also from other IOC programmes. Such collaborations are essential in helping to identify priorities while minimising duplication of effort, developing interoperability and ensuring that GE-BICH does not act in isolation.

AfrOBIS: Biogeographic data from BCLME

http://afrobis.csir.co.za

It is believed that the BCLME (Benguela Current Large Marine Ecosystem) made a lasting impact on the insight into the Benguela marine environment. At the end of the programme, Neville Sweijd provided AfrOBIS with the set of marine biogeographic data that had been collated by **Anja van der Plas** of NATMIRC. This data has now been loaded and Fig. 6 shows the on-line data set entry as part of the list of some 720 data sets in OBIS to date. Fig. 7 shows the location of the data set as plotted with the on-line ACON plotter at the OBIS site (Rutgers). The extraction and plotting of the data set takes a few seconds.

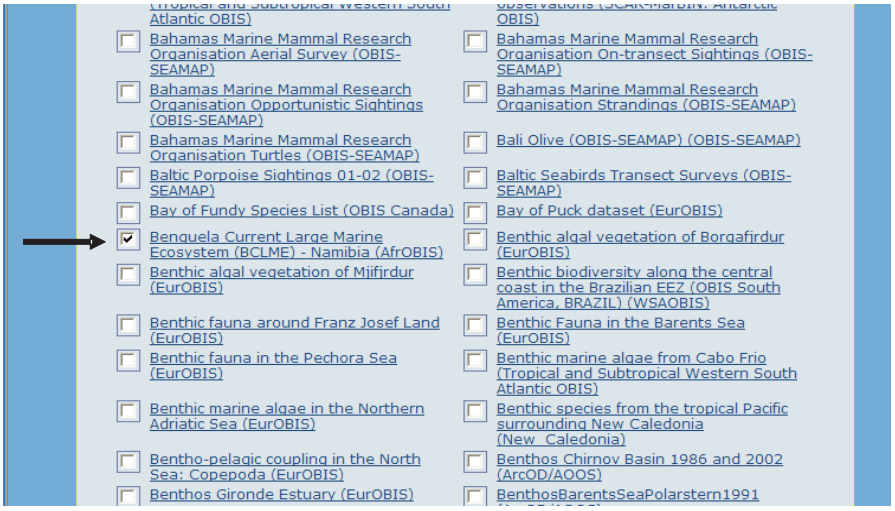


Fig. 6. *Section of the 720 data sets in OBIS. The indicated data set (BCLME data) is one of the data sets submitted to AfrOBIS.*

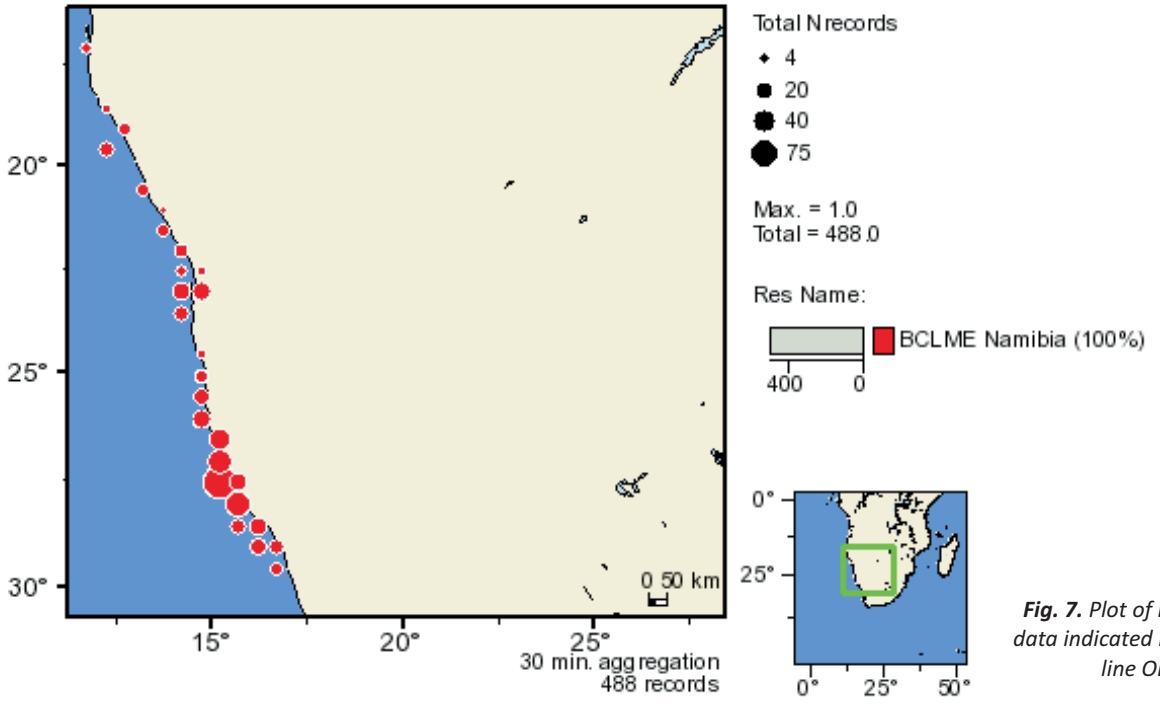


Fig. 7. *Plot of BCLME biogeographic data indicated in Fig. 1 (plots with on-line OBIS software).*

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