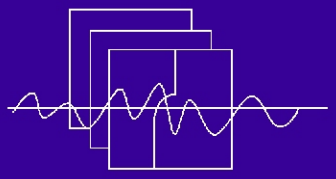
SADCO

Vol 14 No 1 January 2003

SADSO

Magnetic storage of data



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Many of us who have been in the data management field for years, will vouch for the impact that changes in the **data storage technology** have had on data management.

Starting with physically large but storage-small hard disks in the 1960s, accompanied by large magnetic tape drives, the PC era of the 1980s brought a significant downscale in size and increase in storage abilities.

While the size of hard discs and removable disks seems to have remained more or less the same (or become smaller), their *storage capacity* has increased at a significant, almost frightening rate. This means that the storage ***density*** has been the aspect that has brought about the change. Although most of us have been accepting this process of miniaturisation with a "so what" attitude borne and bread during the space age where everything was getting smaller, it is a technological advance of impressive proportions.

In a very interesting article (Do atomic force microscope arrays have the write stuff? by B G Levi, *Physics Today*, October 2002, Vol 55 (10) the intricacies of storing a particular bit of data on a magnetic medium are addressed. The information below was taken from this article.

A head moves over the magnetic material (say, on a disk) and aligns a tiny magnetic "domain" to represent either a "0" or a "1" in a binary sense. Similarly, the same head reads the magnetic field to recompose the information.

Over the years, more data and the requirement for higher-density storage has led to thinner films, smaller domains and tighter packing of domains. This, in turn, has led to weaker signals emanating from these domains and the need to reduce the distance between the read/write head and the storage medium.

In the early 1990s it was considered that the limiting factor on storage density would be the fact that the magnetic alignment of the domain becomes unstable when the domain becomes very small. It has now been found that this not a limiting factor in the drive to increased density (although the issue must still be dealt with).

The innovations that have had the biggest impact on storage density have been in the design of the read heads (reduced size, increased efficiency).

According to the article, the growth in storage density over the past 40 years has been as follows:

- In the 1960's it was less than 0.1 **megabit** per square inch
- By 1990 is was 1 **gigabit** per square inch (10 thousand times larger than 30 years before, or a growth rate of more than a factor of 10 every decade)
- In 1998, a density of 10 gigabits per square inch was achieved
- By 2002 (only 4 years later) the density was 100 gigabits per square inch

The target is set for 1000 gigabits (= 1 terrabit) per square inch by 2006.

The article concludes that magnetic storage still has a significant life ahead.

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Data submitted by the National Marine and Information Centre

Dawid Mouton and Chris Bartholomae

Figure 1:
Dawid Mouton

Figure 2:
Chris Bartholomae

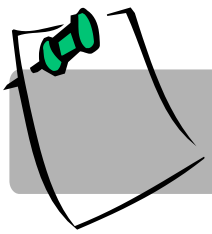
Between 1990 and 2001, through the NORAD sponsored Nansen Programme, a vast amount of fisheries and oceanographic data has been collected on board the R/V *Dr. Fridtjof Nansen* as part of the technical assistance agreement between Norway and the Namibian Ministry of Fisheries and Marine Resources. Oceanographic data was mainly collected on resources surveys, making it a very valuable source of environmental information for studies on fish behaviour, distribution, and abundance in relation with the marine environment.

The dataset consists of a number of hydrographic parameters, including valuable data on bottom conditions, particularly with regards to oxygen, which is of great importance to hake and other fish species. It covers about twelve years of surveys, and Includes around 4 000 CTD stations (see Table, p.3).

The data can be grouped into four sets:

1. Namibian Bottle data (1990 1991) Water bottle measurements of oxygen, salinity and temperature collected between 1990 and 1991. The data was cleaned and obvious spikes removed.
2. Namibian STD data (1992 1993). This data during was collected using the Norwegian-made STD apparatus. The temperature and salinity data was assumed to be of acceptable quality.
3. Namibian casts (1994 1999) Surveys with CTD data collected on Namibian surveys. This data was checked and calibrated and is considered to be of acceptable quality.
4. Namibia Benefit (all) CTD data collected in Namibian waters during BENEFIT surveys between 1997 and 2001. The quality of this data is generally acceptable.

[Ed: *The loading of the data was started in January 2003, and examples of the data will be shown in the next Newsletter*].



Louise Watt on leave

Louise, presently handling most of the requests, will be on extended leave from February to June. Please submit all requests directly to Marten Gründlingh and/or to Ursula von St Ange, to ensure that the requests are handled without delay. Their e-mail addresses are:

mgrundli@csir.co.za
uvstange@csir.co.za

NANSEN Datasets

Survey	Date from	Date to	Surv no.	Project	No Stat
Hake & pelagic	26.01.1990	18.03.1990	401	Namibia	39
Pelagic	27.05.1990	20.06.1990	403	Namibia	55
Hake stocks	11.09.1990	06.10.1990	406	Namibia	37
Hake stocks	25.01.1991	28.02.1991	401	Namibia	39
Pelagic	02.03.1991	22.03.1991	402	Namibia	76
Hake stocks	23.10.1991	21.11.1991	405	Namibia	25
Pelagic stocks	23.11.1991	16.12.1991	406	Namibia	15
Hake & oth. demers.	23.04.1992	21.05.1992	405	Namibia	34
Pelagic stocks	24.05.1992	21.06.1992	406	Namibia	6
Hake & oth. demers.	20.10.1992	30.11.1992	409	Namibia	35
Hake & oth. demers.	20.01.1993	25.02.1993	401	Namibia	45
Hake & oth. demers.	21.04.1993	24.05.1993	404	Namibia	32
Hake & oth. demers.	19.01.1994	21.02.1994	401	Namibia	152
Hake & oth. demers.	26.04.1994	30.05.1994	402	Namibia	196
Pelagic	01.06.1994	23.06.1994	402	Namibia	61
Hake & oth. demers.	19.10.1994	23.11.1994	404	Namibia	116
Pelagic	26.11.1994	15.12.1994	405	Namibia	105
Hake & oth. demers.	20.04.1995	28.05.1995	403	Namibia	184
Horse mackerel	31.05.1995	22.06.1995	404	Namibia	71
Hake recruitment	27.09.1995	06.10.1995	408	Namibia	33
Hake & oth. demers.	12.01.1996	18.02.1996	401	Namibia	245
Hake method. & ecol.	10.04.1996	01.05.1996	403	Namibia	28
O-group hake	03.05.1996	13.05.1996	403	Namibia	33
Horse mackerel	04.06.1996	23.06.1996	404	Namibia	67
Behav. pilchard	28.06.1996	13.07.1996	406	Namibia	12
Hake & oth. demers.	09.09.1996	14.10.1996	410	Namibia	253
Hake & oth. demers.	10.01.1997	20.02.1997	401	Namibia	229
Angola Benefitg. front	04.04.1997	22.04.1997	403	Benefit	121
Horse mackerel	11.06.1997	29.06.1997	406	Namibia	71
Valdivia Bank	02.07.1997	13.07.1997	407	Namibia	41
Orange roughy	16.07.1997	01.08.1997	407	Namibia	21
Dentex Angola	06.08.1997	03.09.1997	408	Angola	81
Hake ichthyoplankt.	27.09.1997	20.10.1997	410	Benefit	42
Hake & oth. demers.	12.01.1998	21.02.1998	401	Namibia	234
Young hake	30.03.1998	04.04.1998	403	Namibia	35
Sonar studies	17.04.1998	05.05.1998	404	Benefit	63
Horse mackerel	25.05.1998	14.06.1998	406	Namibia	65
Fish behaviour	16.06.1998	28.06.1998	407	Benefit	23
Orange roughy	01.07.1998	24.07.1998	408	Namibia	54
Early life hake	23.09.1998	05.10.1998	410	Benefit	52
Horse mackerel	07.10.1998	18.10.1998	411	Benefit	23
Hake & oth. demers.	11.01.1999	20.02.1999	401	Namibia	227
0-group hake	22.02.1999	28.02.1999	402	Namibia	52
Pilchard	14.06.1999	04.07.1999	407	Namibia	6
Orange roughy	05.07.1999	31.07.1999	408	Namibia	47
Jellyfish	30.08.1999	05.09.1999	410	Benefit	12
Recruitment hake	28.09.1999	18.10.1999	411	Benefit	122
Recruitment Horse Mac.	16.02.2000	08.03.2000	402	Benefit	121
Angola Demersal Res.	09.03.2000	14.04.2000	403	Angola	38
Rep. trawl catch	27.04.2000	17.05.2000	404	Benefit	5
Angola Pelagic	28.07.2000	20.08.2000	408	Angola	36
Recr. Horse Mac. I	28.03.2001	11.04.2001	403	Benefit	102
Acoustic meth.	17.04.2001	01.05.2001	404	Benefit	35
Horse Mac Diel	20.08.2001	31.08.2001	407	Benefit	10
Jellyfish	01.09.2001	07.09.2001	408	Benefit	18
Multi frequency	08.09.2001	15.09.2001	409	Benefit	8
Efficiency bottom trawl	18.09.2001	22.09.2001	410	Benefit	9

Wind data from Marine and Coastal Management

The west coast of southern Africa is characterised by upwelling and a significant fishing industry. To obtain relevant information on the wind field, the Marine and Coastal Management (MCM) of the Department of Environmental Affairs and Tourism has deployed automatic weather stations at various locations for about two decades. These stations recorded wind speed, wind direction, air temperature and barometric pressure at 30-minute or hourly intervals.

The data was collected under the supervision of Grev Nelson (retired) and the programme is presently under the supervision of Ashley Johnstone. During the second half of 2001 Marcel van den Berg started extracting the data from the MCM system and transferring it to SADCO.

As with all historic data, considerable effort had to be invested to (re)process the data. This involved the verification of the sensor calibrations, the data channels, production of data plots to identify and edit suspect data, etc.

The first data set, involving data of 47 deployments up to about 1996, has now been handled (see enclosed Table for list of deployments). The accompanying figures provided examples of the data (time series, histograms, rose).

The data collection is continuing, and the data sets after 1996 will systematically be transferred to SADCO for processing and loading.

Table of wind data sets from MCM

Station	Start		End
Cape Columbine	Oct 85	-	Dec 85
Cape Columbine	Dec-93	-	Mar-94
Cape Columbine	Mar-94	-	Jul-94
Cape Columbine	Jul-94	-	Sep-94
Cape Columbine	Sep-94	-	Feb-95
Cape Columbine	Aug-95		
Cape Columbine	Aug-95	-	Feb-96
Cape Columbine	Feb-96	-	Sep-96
Diaz Point	Aug-89	-	Nov-89
Hondeklip Bay	Sep-82	-	Dec-82
Hondeklip Bay	Dec-82	-	Mar-83
Hondeklip Bay	Mar-83	-	Jun-83
Hondeklip Bay	Jun-83	-	Sep-83
Hondeklip Bay	Mar-84	-	Jun-84
Hondeklip Bay	Nov-88	-	Jan-89
Hondeklip Bay	Jul-89	-	Nov-89
Hondeklip Bay	Nov-89	-	Feb-90
Hondeklip Bay	Feb-90	-	May-90
Hondeklip Bay	May-90	-	Sep-90
Hondeklip Bay	Nov-90	-	Feb-91
Hondeklip Bay	Nov-91	-	Mar-92
Hondeklip Bay	Mar-92	-	Jul-92
Hondeklip Bay	Jul-92	-	Nov-92
Hondeklip Bay	Nov-92	-	May-93
Hondeklip Bay	May-93	-	Oct-93
Hondeklip Bay	Oct-93	-	Mar-94
Hondeklip Bay	Jul-94	-	Feb-95
Kleinzee	Nov-93	-	Jan-94
Nuwedam	Aug-85	-	Feb-86
Olifantsbos	Nov-89	-	Mar-90
Olifantsbos	Mar-90	-	Jun-90
Olifantsbos	Jun-90	-	Nov-90
Olifantsbos	Nov-90	-	Mar-91
Olifantsbos	Mar-91	-	Sep-91
Olifantsbos	Sep-91	-	Mar-92
Olifantsbos	Mar-92	-	Jul-92
Olifantsbos	Jul-92	-	Dec-92
Olifantsbos	Dec-92	-	Jun-93
Olifantsbos	Jun-93	-	Feb-94
Olifantsbos	Feb-94	-	Jul-94
Olifantsbos	Jul-94	-	Mar-95
Olifantsbos	Sep-95	-	Feb-96
Olifantsbos	Feb-96	-	Jul-96
Olifantsbos	Oct-96	-	Jun-97
Pelican Point	Sep-89	-	Oct-89
St.Francis Bay-Seal Point	Aug-94	-	Oct-94
Stompneus	Nov-83	-	Feb-83

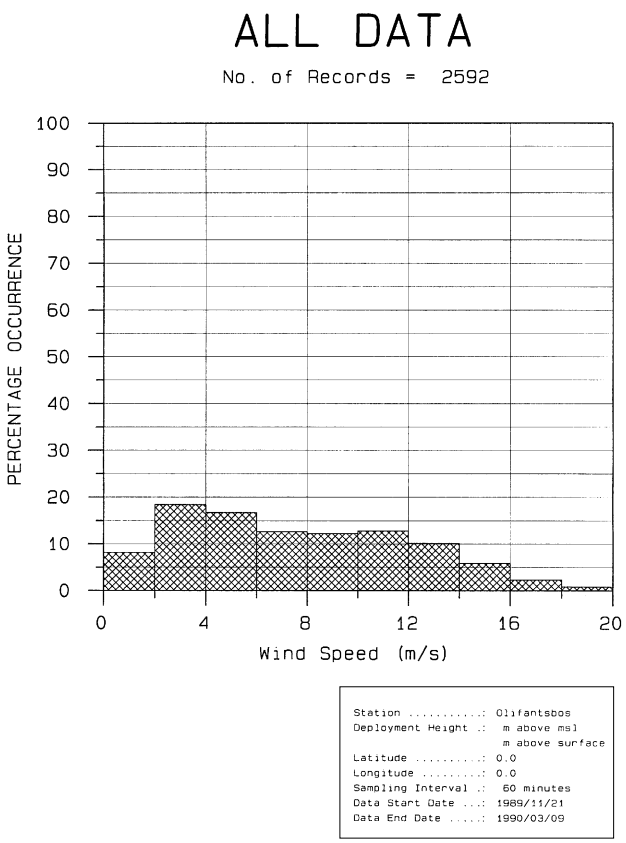


Figure 3: Olifantsbos
Original file: OB891104
Serial no. 0518-02
OCCURRENCE HISTOGRAM OF
WIND SPEED
1989 - 1990

Figure 4: Olifantsbos
Original file: OB891104
Serial no. 0518-02
OCCURRENCE HISTOGRAM OF
WIND DIRECTION
1989 - 1990

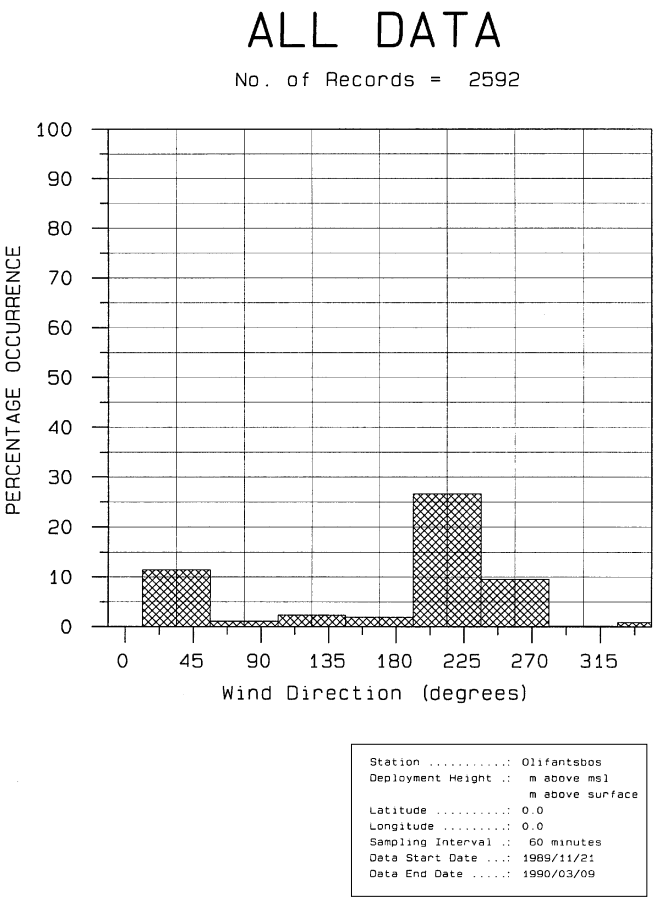


Figure 5: Olifantsbos
Original file: OB891104
Serial no. 0518-02
WIND SPEED vs
DIRECTION
1989 11 21 to 1990
03 09

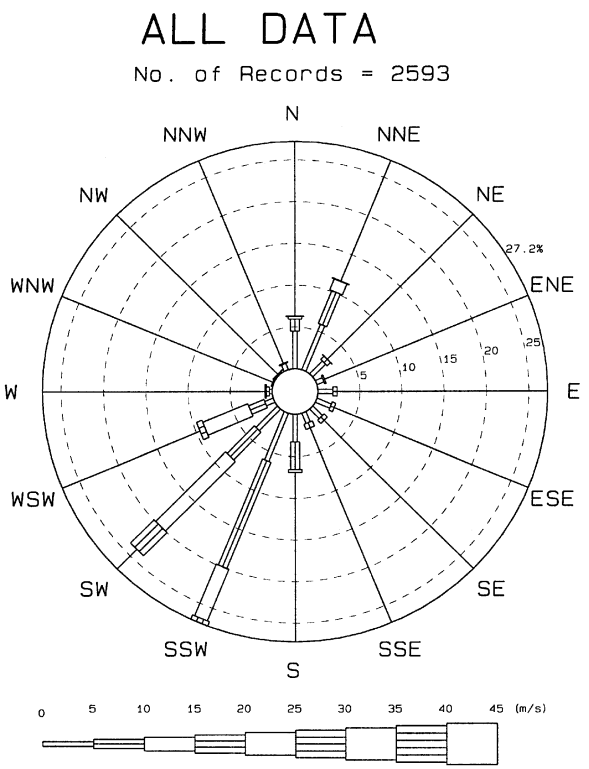


Figure 6: Olifantsbos Original file:
OB891104 Serial no. 0518-02
WEATHER DATA TIME
HISTORIES
December 1989

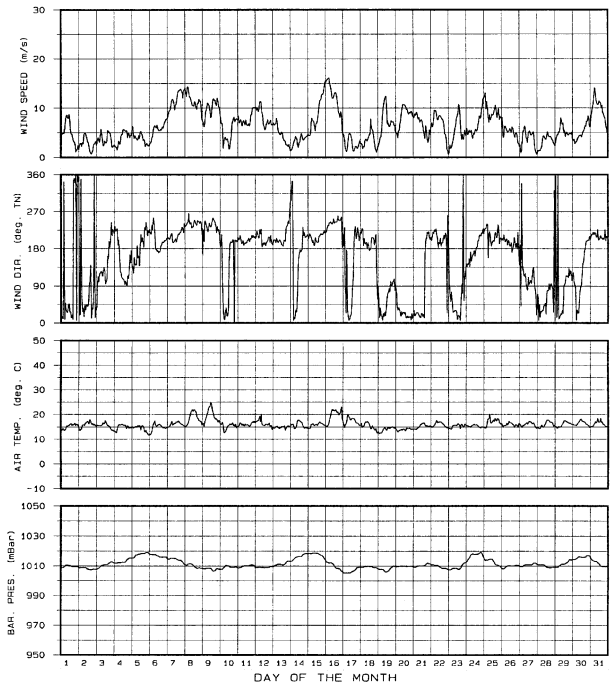
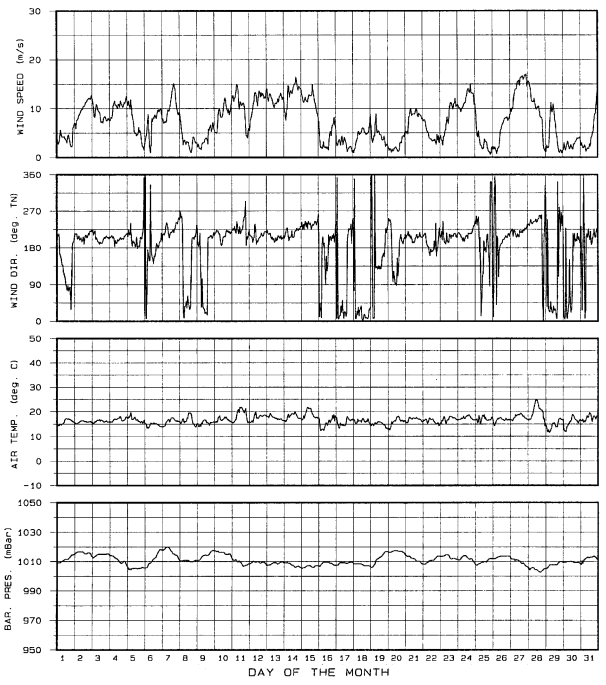


Figure 7: Olifantsbos Original file:
OB891104 Serial no. 0518-02
WEATHER DATA TIME
HISTORIES
January 1990



Ship-borne current measurements

In the previous newsletter information was presented on the ADCP (Acoustic Doppler Current Profile) data collected by Marine and Coastal Management from the Africana, Algoa and Nansen.

It was also mentioned that a smaller number of current measurements were made from the CSIR's previous research vessel, *Meiring Naudé*.

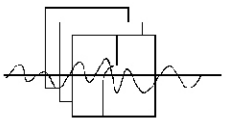
SADCO was recently requested to have a closer look at the *Meiring Naudé* data, because this was collected off the east coast (while the bulk of the ADCP data is located off the west coast).

An inventory of the current measurements was established, and this is represented in Table below. In the 1960's, the CSIR also used other vessels, namely a small launch (*Queen,* cruise ID *QU*), two whale catchers (*RK Fraay* (cruise ID RK) and the *Frank Harvey* (cruise ID FH) and the Antarctic supply vessel (*RSA,* cruise ID RSA). Later, the CSIR used only the RV *Meiring Naudé* (cruise ID MN).

Measurements were normally done at standard depths. Only about 10% of the stations have been loaded into SADCO.

Cruise	Month	Stations with currents
QU62/01-10	OCT-DEC 62	62
QU63/01-34	JAN-DEC 63	249
QU64/01-35	JAN-AUG 64	158
RSA65/01	JUN 65	50
RK66/02	JUN 66	17
RK66/03	JUN 66	40
RK66/05	OCT-NOV 66	109
RK67/02	MAY 67	142
MN68/12	JUL 68	36
MN68/19	SEP 68	72
MN68/26	NOV 68	45
MN69/04	FEB 69	146
MN/69/10	APR-MAY 69	67
MN69/14	JUN 69	120
MN69/22	AUG 69	10
MN69/31	OCT 69	80
MN70/15	MAY 70	72
MN70/19	JUL 70	94
MN70/24	SEP 70	105
MN70/30	NOV 70	102
MN70/32	DEC 70	64
MN71/01	JAN-FEB	19
MN71/03	FEB 71	104
MN71/06	MAR 71	25
MN71/07	MAR-APR	10
MN71/10	APR 71	109
MN71/13	MAY 71	13
MN71/14	MAY 71	11
MN71/16	JUN 71	119
MN71/21	JUL-AUG	18
MN71/23	AUG 71	98
MN71/24	SEP 71	15
MN71/26	SEP-OCT	19
MN71/28	OCT 71	99
MN71/29	NOV 71	14
MN71/31	NOV 71	19
MN71/32	DEC 71	119
MN72/02	JAN 72	109
MN72/03	FEB 72	15
MN72/04	FEB-MRT	19
MN72/06	MAR 72	132
MN72/16	JUN 72	17
MN72/17	JUL 72	19
MN72/20	AUG 72	24
MN72/23	SEP 72	24
MN72/24	OCT 72	36
MN72/25	OCT 72	30

Continued on p.8...



Ship-borne current measurements continued...

Cruise	Month	Stations with currents
MN72/27	NOV 72	28
MN73/01	JAN 73	24
MN73/03	FEB 73	31
MN73/04	FEB 73	36
MN73/06	MAR 73	13
MN73/09	APR 73	25
MN73/10	APR 73	10
MN73/11	MAY 73	22
MN73/13	JUN 73	40
MN73/14	JUN 73	18
MN73/15	JUL 73	13
MN73/16	JUL 73	18
MN73/17	JUL 73	37
MN73/18	AUG 73	14
MN73/19	AUG 73	30
MN73/20	SEP 73	33
MN73/21	OCT 73	93
MN73/24	NOV 73	38
MN73/26	DEC 73	24
MN74/02	FEB 74	95
MN74/06	MAR 74	37
MN74/07	MAR 74	9
MN74/08	MAR 74	16
MN74/10	APR 74	12
MN74/11	APR 74	12
MN74/13	APR 74	5
MN74/14	MAY 74	15
MN74/15	MAY 74	30
MN74/16	JUN 74	8
MN74/18	JUN 74	12
MN74/21	AUG 74	40
MN74/22	AUG 74	11
MN74/23	AUG 74	99
MN74/24	SEP 74	20
MN74/26	SEP 74	8
MN74/28	OCT 74	18
MN74/29	OCT 74	20
MN74/30	NOV 74	23
MN74/34	DEC 74	9
MN74/35	DEC 74	22
MN75/02	JAN 75	49
MN75/03	FEB 75	13
MN75/04	FEB 75	21
MN75/06	MAR 75	26
MN75/07	MAR 75	2
MN75/09	APR 75	24
MN75/10	APR 75	40
MN75/11	MAY 75	8
MN75/17	JUN 75	17
MN75/18	JUN 75	98

Cruise	Month	Stations with currents
MN75/19	JUL 75	19
MN75/22	AUG 75	138
MN75/24	SEP 75	9
MN75/24	SEP 75	9
MN75/29	OCT 75	20
MN75/30	NOV 75	9
MN75/33	NOV 75	125
MN75/34	DEC 75	24
MN76/01	JAN 76	13
MN76/02	JAN-FEB	19
MN76/04	FEB 76	5
MN76/05	MAR 76	22
MN76/07	APR 76	12
MN76/10	APR 76	10
MN76/12	JUN 76	20
MN76/16	AUG 76	20
MN76/17	AUG 76	9
MN76/20	OCT 76	17
MN76/26	NOV 76	14
MN77/02	JAN-NOV	120
MN77/03	FEB 77	14
MN77/07	MAR 77	19
MN77/09	MAR 77	3
MN77/10	APR 77	10
MN77/13	APR 77	14
MN77/19	JUN 77	16
MN77/22	AUG 77	18
MN77/27	SEP 77	7
MN78/01	JAN 78	16
MN78/06	MAR 78	5
MN78/08	APR 78	9
MN78/10	APR 78	4
MN78/11	MAY 78	1
MN78/14	JUN 78	8
MN78/15	JUN 78	6
MN78/16	JUN 78	1
MN79/06	MAR 79	11
MN79/07	APR 79	38
MN79/12	MAY 79	8
MN79/22	SEP 79	9
MN79/23	SEP 79	6
MN80/05	MAR 80	25
MN80/13	JUN 80	13
MN80/17	JULY-AUG	5
	TOTAL	5342