

**GDSO**

# **GEORGI DOBROVOLSKI SOLAR OBSERVATORY**

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## **ANNUAL REPORT**

**FOR  
1998**

**COMPILED BY HOWARD BARNES**

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**GDSO** 1973 - 1998  
*25 YEARS*  
OF SOLAR OBSERVING

**СОЛНЕЧНАЯ ОБСЕРВАТОРИЯ ИМЕНИ ГЕОРГИЯ ДОБРОВОЛЬСКОГО**

## TIMES USED (AND NOT USED) IN THIS PUBLICATION .

The term “Greenwich Mean Time” (GMT) is *not* used in this publication as it is ambiguous and is used, both mistakenly and *wrongly*, in the sense of the Greenwich civil atomic scale, Co-ordinated Universal Time (UTC). From 1675, until the beginning of 1925, Greenwich Mean Time was measured by the Royal Observatory, from GREENWICH MEAN *MID-DAY*, 12 hours **BEHIND** Universal Time (UT).

For the purposes of lengthy solar observations, the GDSO considers all seven Universal Times (UT0, UT1, UT2, UT0R, UT1R, UT2R and UTC) as being the same. Times in this loose sense are labelled UT. If a stated time in this publication is not labelled at all, then it is to be considered as being UT. In Sections A & B, UT is given to the nearest fifth minute (within the time period of the observations); in Section D, it is given to the nearest minute.

For ‘central meridian’ purposes, the GDSO also considers Terrestrial [Dynamical] Time (TT) as being the same as UT. From July 1997 to December 1998 (inclusive), TT-UTC = +63.1840 seconds; from January 1999 to, at least, December 1999 (inclusive), TT-UTC will equal +64.1840 seconds, these values are approximate equivalents to the amount of time the Earth has lost, as a ‘clock’, since 1900.

As this publication has an international distribution, both New Zealand Standard Time (NZST) [UTC + 12 hours] and New Zealand Daylight Time (NZDT) [UTC + 13 hours] are ignored.

## BILLION.

If the word ‘billion’ is ever used in any GDSO report, it is to be taken in its literal sense of ‘million to the power of two’, that is 1 million million. The value of 1000 million might be occasionally referred to, in the GDSO reports, as the ‘sesquillion’, literally ‘million to the power of one and a half’.

## THE DECIMAL POINT.

**From last issue onwards, the full-stop (.) will be used as the decimal point. The previous practice of using the comma, will cease.**

## REFERENCES ON GRAPH PAGES.

Referenced table numbers on graph pages are ‘push-button links’, therefore, to see any table referenced, just press the table number quoted.

## PREFACE.

The Sun was observed 167 times in 1998, showing an increase in solar activity, but quite a slow one. The highest number of sunspots was 72 which was reached twice, once in August and again in December. This compares with 62 for the previous year.

The annual observed mean Wolf Number for 1998 was 67.67, compared with 22.96 for 1997. The corrected Wolf Number ( $R_{GD}$ ) for 1998 is 65.44. That for 1997 is 21.52.

Spotless discs accounted for 1.8% of 1998's observations, compared with 20.6% for 1997. All spotless discs appeared in January.

The coming maximum is predicted to be low, at  $110 \pm 20$  in the Wolf Number scale, slightly lower than the previous GDSO prediction. All indices appear to be very low, with the exception of the 2800 MHz solar flux, when compared with the last cycle (No. 22). The corrected Wolf Number ( $R_{GD}$ ), with a 22 month comparison is 49.5% of Cycle 22. Based on 26 months' data, sunspot area is only 39% of last cycle's values. With 31 months' data, the X-ray flares are a mere 20% of that of Cycle 22. At least, the 2800 MHz solar flux has reached 84% of last cycle (26 months' data).

Group complexity ranged from 4.7 in July to 11.5 for May, with an annual mean of 7.3409 for 1998; up from 6.1871 for 1997. There are no comparative figures for Cycle 22.

The number of penumbrae per region is 1.36 for 1998, a 31% increase on 1997, again, no comparative figures for Cycle 22. The number of spots per region for 1998 is 5.98 compared with 5.15 for 1997, a 16% increase. The last smoothed minimum value was 133% of the previous smoothed minimum value, but 31 months into Cycle 23, the tables have turned with the current cycle only 66% of Cycle 22.

2800 MHz solar flux readings show an annual adjusted mean of  $118.0 \times 10^{-22} \text{ W m}^{-2} \text{ Hz}^{-1}$ , compared with 80.9 for 1997. The baseline of these data should be considered as approximately 67.

All these data show that solar activity is on the rise, but at a much slower rate than Cycle 22. Along with the Wolf Number value of  $110 \pm 20$  for maximum, I believe maximum will occur in April 2000  $\pm 3$  months.

The Annual Report for 1999 will be published in April 2000.

HOWARD BARNES  
April 1999.

**THE GEORGI DOBROVOLSKI  
SOLAR OBSERVATORY.**

**СОЛНЕЧНАЯ ОБСЕРВАТОРИЯ ИМЕНИ ГЕОРГИЯ ДОБРОВОЛЬСКОГО.**

100% Amateur.

100% Privately Owned & Funded.

Observatory's Telescope:

76mm f12 refractor

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-oOo-

**ERRATA.**

(in addition to any other errata)

1991's Report;

page F31, Percentages for 1990 April

D	23.7	should read	24.4
J	18.3	should read	17.6
Annual D	17.53	should read	17.6
Annual J	16.25	should read	16.18

1997's Report;

page F41, GCI value for October 1996 0.00 should read -- [non-existent].

GCI(SW) & (SB13) values for August 1997 5.7873 & 5.7870  
should read 5.7863 & 5.7866

GCI(SW) & (SB13) values for September 1997 5.9638 & 6.1418  
should read 5.9618 & 6.1408

-oOo-

## GEÓRGI TIMOFÉYEVICH DOBROVÓLSKI.

Georgi Dobrovolski (right) was born to Timoféi Dobrovolski and Maria Dobrovólskaya on 1st June 1928, at Odessa, the Ukraine, USSR.

Georgi initially wanted a naval career, but was turned down. He then applied to, and was accepted by, the Air Force. He later joined the cosmonaut corps and became a crew member of Soyúz (Union) 11, with Vladisláv Vólkov and Víktor Patsáyev under his command.

After a successful 23-day stay in space, Georgi along with his colleagues, died just before re-entry into the Earth's atmosphere on the 30th June 1971.

Georgi Timofeyevich left a wife, Lyudmíla, and two daughters, Maria and Natasha, then aged 12 and 4.



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## LIST OF DEFINITIONS IN THIS PUBLICATION.

### WN (Wolf Number):

$$R_{GD} = k(10g + f)$$

where f = number of sunspots,  
 g = number of sunspot regions  
 & k = up- or downgrading figure  
 to bring observatories to a  
 world standard.

WN = observed Wolf Number,  
 same as above, but k = 1.

### BX (Beckindex):

$$BX_{GD} = k \left( \sum_{i=1}^g G_i f_i \right)$$

where g = number of regions,  
 f = number of sunspots,  
 G = region constant,  
 & k = up- or downgrading figure  
 to bring observatories to a  
 world standard.

BX = observed Beckindex, same as  
 above, but k = 1.

see next page for group constants.

### QC (Quality Count):

$$QC = \sum_{i=1}^g Z_i$$

where g = number of regions,  
 Z = region constant based on  
 Zurich classes.

see next page for group constants.

### Micro-hemisphere ( $\mu h$ ):

This unit of area, equal to 1 000 000th of the visible hemisphere of the Sun, is used in Section C of the report. It is approximately equal to 3 000 000 square kilometres. A small spot's area would be in the vicinity of 5 or 10  $\mu h$ , while a large region's area would be greater than 1000  $\mu h$ . A very large region would have an area greater than 2000  $\mu h$ .

### SN (Pettisindex):

$$PX_{GD} = k(10p + s)$$

where s = number of penumbral-free  
 sunspots,  
 p = number of penumbrae,  
 & k = up- or downgrading figure  
 to bring observatories to a  
 world standard.

SN = observed Pettisindex, same as  
 above, but k = 1.

### CV (Classification Value):

$$CV_{GD} = k \left( \sum_{i=1}^g M_i \right)$$

where g = number of regions,  
 M = region constant based on  
 McIntosh classes,  
 k = up- or downgrading figure  
 to bring observatories to a  
 world standard.

CV = observed Classification Value,  
 same as above, but k = 1.

see next page for group constants.

### IS = Inter-Sol Index:

$$IS_{GD} = k(gr + f)$$

where gr = number of multi-spot regions,  
 f = number of sunspots,  
 & k = up- or downgrading figure  
 to bring observatories to a  
 world standard.

IS = observed Inter-Sol Index, same as  
 above, but k = 1.



GROUP CONSTANTS.

The following are group constants for Beckindices, Classification Values and Quality Counts.

BECKINDICES

A	B	C	D	E	F	G	H	J
4	4	8	18	25	36	50	44	37

CLASSIFICATION VALUES

AXX = 1	CRO = 5	DKI = 46	EHC = 59	ESO = 26	FRI = 18
BXI = 3	CSI = 12	DKO = 43	EHJ = 53	FAC = 33	FRO = 15
BXO = 2	CSO = 11	DRI = 16	EHO = 50	FAI = 24	FSC = 36
CAI = 9	DAC = 31	DRO = 13	EKC = 56	FAO = 21	FSI = 30
CAO = 8	DAI = 22	DSC = 34	EKI = 47	FHC = 60	FSO = 27
CHI = 42	DAO = 19	DSI = 28	EKO = 44	FHI = 54	HAX = 7
CHO = 41	DHC = 58	DSO = 25	ERI = 17	FHO = 51	HHX = 40
CKI = 39	DHI = 52	EAC = 32	ERO = 14	FKC = 57	HKX = 37
CKO = 38	DHO = 49	EAI = 23	ESC = 35	FKI = 48	HRX = 4
CRI = 6	DKC = 55	EAO = 20	ESI = 29	FKO = 45	HSX = 10

QUALITY COUNTS

A	B	C	D	E	F	G	H	J
1	2	3	4	5	6	4	3	2

## FORMULÆ.

The following are three formulæ used in the analysis of sunspot data etc.

$\sigma$  (sample standard deviation) is computed as:

$$\sqrt{(\sum x^2 - (\sum x)^2/n) / (n - 1)}$$

The annual  $\sigma$  result is computed from total pool of k values.

$\sigma$  'SIDC' (annual standard deviation based on the SIDC's formula) is computed as:

$$(\sum (\sigma \times \text{NOBS})) / \sum \text{NOBS}$$

E $\sigma$  (estimate of standard deviation) is computed as:

$$\sqrt{\sum (\sigma^2 \times \text{NOBS}) / \sum \text{NOBS}}$$

## SMOOTHING FORMULÆ.

The following are the three formulæ used in the smoothing of GDSO sunspot data. All are based on monthly means ( $\bar{x}$ ).

Data suffixed ( $S^{\text{HBm}}$ ) are computed as:

$$\left( (\bar{x}_{+3} + \bar{x}_{-3}) + 2(\bar{x}_{+2} + \bar{x}_{-2}) + 3(\bar{x}_{+1} + \bar{x}_{-1}) + 4\bar{x}_0 \right) / 16$$

Data suffixed ( $S^{\text{W}}$ ) are computed as:

$$\left( \sum_{-5}^{+5} \bar{x} + (\bar{x}_{+6} + \bar{x}_{-6})/2 \right) / 12$$

Data suffixed ( $S^{\text{B13}}$ ) are computed as:

$$\left( 0.75(\bar{x}_{+6} + \bar{x}_{-6}) + 2(\bar{x}_{+5} + \bar{x}_{-5}) + 3(\bar{x}_{+4} + \bar{x}_{-4}) + 4(\bar{x}_{+3} + \bar{x}_{-3}) + 5(\bar{x}_{+2} + \bar{x}_{-2}) + 6(\bar{x}_{+1} + \bar{x}_{-1}) + 6.5\bar{x}_0 \right) / 48$$

## SUNSPOT MINIMUM — 1996.

Upon the completion of analysis of GDSO data from the 1995-1997 period, a final smoothed minimum of May 1996 has been calculated.

Taking both the Waldmeier and 'Barnes 13' smoothing methods as being equally weighted, and the individual corrected smoothed indices (two values for each index) weighted as follows;

WN	PX	BX (x 0.05)	CV	IS (x 3)	$\Sigma w$
1.0	0.9	0.5	0.2	0.1	5.4

we get the following smoothed results for **1996**;

MONTH	arbitrary scale
January	10.12
February	10.04
March	9.98
April	9.14
May	9.08
June	9.80
July	9.88
August	10.14
September	10.64
October	11.48
November	12.42
December	12.92

These results are from unweighted smoothed data of the five indices (two smoothings) that put minimum in April 1996 (6 times), May (3 times) and August (once).

All monthly smoothed data were published in, either, the Annual Reports of 1996 or 1997, or are published in this issue.



SOLAR OBSERVATIONAL DATA for **1998** obtained using the 76 mm refractor.

ALL TIMES IN UNIVERSAL TIME ( UT ).

CR = Carrington Rotation Number, with fraction of rotation stated.

Rotation 1 commenced at 1853/11/09;1144 UT (approximately).

g = Active Area or group count for WHOLE solar disc.

f = Sunspot count for WHOLE solar disc.

WN = Wolf Number ( k in formula neglected ).

TWN = Truncated Wolf Number (Wolf Number minus A and B class regions).

p = Penumbra count for WHOLE solar disc.

s = Penumbra-free spot count for WHOLE solar disc.

SN = Pettisindex.

BX = Beckindex.

CV = Classification Value.

QC = Quality Count.

IS = Inter-Sol Index.

*See page ix for all definitions.*

Q = Quietness [steadiness] of image (on the Kiepenheuer scale),

1 = steady , 5 = heavy boiling.

S = Sharpness [clarity] of image (on the Kiepenheuer scale),

1 = fine features visible , 5 = umbrae & penumbrae indistinguishable from each other.

T = Transparency of the Earth's atmosphere, where 1 = excellent , 5 = worthless.

*If any of Q, S or T is greater (worse) than 4, the observation will be abandoned.*

DATE	UT	CR	g	f	WN	TWN	p	s	SN	BX	CV	QC	IS	Q	S	T
JANUARY 1998																
01	2020	1931.2444	3	15	45	45	5	5	55	250	61	11	18	2.5	2.5	2.5
02	2030	.2813	2	10	30	17	2	4	24	138	25	6	12	2.5	2.5	2.5
03	2045	.3182	2	9	29	17	3	4	34	134	33	6	11	2.0	2.5	2.5
04	2025	.3543	2	3	23	12	1	2	12	20	12	3	4	2.0	2.0	2.5
05	2015	.3906	1	1	11	0	0	1	1	4	1	1	1	2.0	2.5	2.5
06	2110	.4286	0	0	0	0	0	0	0	0	0	0	0	2.0	2.5	2.5
07	1935	.4628	0	0	0	0	0	0	0	0	0	0	0	1.5	2.5	2.5
09	1955	.5365	0	0	0	0	0	0	0	0	0	0	0	1.5	2.0	2.5
10	1950	.5729	1	4	14	0	0	4	4	16	3	2	5	1.5	2.0	2.5
12	2010	.6466	2	24	44	31	3	18	48	390	34	6	26	2.0	2.5	3.0
13	1955	.6828	3	16	46	24	3	7	37	358	34	7	17	2.0	2.5	3.0
14	1940	.7190	3	21	51	29	3	10	40	350	33	6	22	1.5	2.0	2.5
19	2015	.9028	2	3	23	0	0	3	3	12	3	3	4	2.0	2.5	2.5

## A2

DATE	UT	CR	g	f	WN	TWN	p	s	SN	BX	CV	QC	IS	Q	S	T
JANUARY 1998 continued.																
26	1945	1932.1580	3	23	53	39	3	16	46	389	38	10	26	2.0	3.0	3.0
28	2230	.2353	3	17	47	33	3	11	41	353	36	9	19	2.0	3.0	3.0
31	1940	.3407	1	4	14	14	1	2	12	32	9	3	5	1.5	2.5	2.5
FEBRUARY 1998																
01	1935	1932.3772	2	3	23	12	1	1	11	78	8	3	4	1.5	2.5	3.0
02	2000	.4144	1	1	11	11	1	0	10	37	7	2	1	2.0	2.5	2.5
03	1950	.4507	3	8	38	16	1	6	16	56	11	5	9	1.5	2.5	2.5
05	2005	.5242	3	6	36	13	1	5	15	36	14	6	8	1.5	2.0	2.0
06	2030	.5614	2	5	25	11	1	4	14	53	13	4	6	1.0	2.0	2.5
07	2005	.5974	2	4	24	11	1	3	13	49	13	4	5	2.0	2.5	2.5
08	2145	.6365	2	4	24	12	1	3	13	24	13	5	6	1.5	2.5	2.5
11	1955	.7434	3	8	38	26	2	6	26	85	24	7	10	1.5	2.0	2.5
13	2025	.8173	3	21	51	39	5	13	63	495	68	9	23	2.0	3.0	3.5
14	1950	.8530	3	33	63	52	5	22	72	550	68	8	35	1.5	2.0	2.0
16	2040	.9275	3	22	52	40	5	12	62	348	68	9	25	2.0	3.0	3.5
19	2020	1933.0367	2	13	33	22	2	5	25	220	53	5	14	2.0	2.5	3.0
21	1945	.1090	1	3	13	13	1	1	11	24	38	3	4	1.5	2.0	2.5
24	2000	.2191	5	31	81	59	6	15	75	450	56	12	34	1.5	1.5	2.5
25	2150	.2585	3	28	58	47	7	10	80	490	54	9	30	2.0	2.5	3.0
27	2000	.3289	4	18	58	18	2	15	35	184	28	9	21	2.0	2.5	2.5
MARCH 1998																
01	2005	1933.4022	5	24	74	62	8	14	94	324	67	15	29	1.5	2.5	2.5
03	1955	.4751	2	17	37	37	4	8	48	286	60	7	19	1.5	2.0	2.0
04	2050	.5131	2	16	36	36	3	9	39	268	54	7	18	2.0	2.5	2.5
07	2040	.6226	3	12	42	31	3	8	38	221	33	7	13	2.0	3.0	3.0
08	1955	.6581	4	12	52	28	2	10	30	109	26	8	14	2.0	2.5	2.5
11	2015	.7684	6	34	94	56	5	21	71	499	59	14	38	1.0	2.0	2.5
14	2235	.8818	5	44	94	71	11	19	129	769	90	13	47	2.0	3.0	3.5
16	2120	.9531	4	49	89	78	9	17	107	1085	74	12	52	1.5	2.0	2.5
18	2010	1934.0246	4	50	90	79	8	15	95	1202	72	10	53	2.0	2.5	2.5
19	2135	.0633	4	36	76	64	7	15	85	751	74	12	39	1.5	2.0	2.5
20	2220	.1011	6	35	95	73	6	17	77	658	92	15	38	2.0	2.0	2.5
22	2045	.1720	5	32	82	71	12	12	132	653	141	18	36	2.0	2.5	3.0
23	2045	.2086	3	36	66	66	10	14	114	802	115	13	39	2.0	2.0	2.5
24	2030	.2448	3	29	59	48	8	10	90	850	89	11	31	1.0	2.5	2.5
29	2015	.4276	3	17	47	36	3	13	43	172	68	8	19	1.5	2.5	2.5
30	2035	.4648	3	24	54	43	5	11	61	418	78	9	26	1.0	2.5	2.5
31	2210	.5038	2	36	56	56	8	16	96	802	90	9	38	1.5	2.5	2.5

## A3

DATE	UT	CR	g	f	WN	TWN	p	s	SN	BX	CV	QC	IS	Q	S	T
APRIL 1998																
02	2150	1934.5766	3	25	55	44	8	12	92	569	55	10	27	1.5	2.0	2.5
04	2115	.6490	4	25	65	54	4	19	59	332	72	11	27	2.0	2.5	2.5
05	2055	.6852	5	27	77	53	7	16	86	400	99	14	31	1.5	2.0	2.5
11	2240	.9078	6	24	84	46	7	15	85	320	112	18	30	2.0	2.5	2.5
12	2050	.9417	5	17	67	41	4	11	51	152	48	14	22	1.5	2.5	2.5
13	2135	.9795	6	21	81	42	4	14	54	221	47	14	25	1.5	2.0	2.0
17	2215	1935.1272	2	7	27	15	1	6	16	48	14	5	9	2.0	2.5	3.0
25	2025	.4180	1	4	14	14	1	3	13	32	42	3	5	1.5	2.0	2.5
27	2200	.4938	1	5	15	15	1	3	13	40	39	3	6	2.0	2.5	3.0
28	2040	.5285	2	12	32	21	2	8	28	92	40	4	13	1.5	2.0	2.0
29	2150	.5669	1	6	16	16	1	4	14	48	39	3	7	1.5	2.5	3.0

## MAY 1998

01	2150	1935.6404	2	37	57	57	4	22	62	436	67	7	39	2.0	2.0	2.5
02	2055	.6757	3	42	72	72	6	21	81	585	80	9	44	1.5	2.0	2.5
03	2105	.7126	3	40	70	70	6	18	78	639	104	9	42	2.0	2.5	3.0
04	2050	.7490	4	50	90	78	8	29	109	1060	107	12	53	1.5	2.0	2.5
05	2100	.7860	4	58	98	87	8	23	103	1288	106	11	60	1.5	2.0	2.5
07	2125	.8600	5	36	86	74	9	16	106	773	107	16	40	1.0	2.5	2.5
10	2140	.9706	3	12	42	42	6	4	64	254	51	8	13	2.0	2.0	2.5
11	2045	1936.0059	3	18	48	48	6	8	68	303	80	9	20	2.0	2.0	2.5
14	2045	.1162	3	47	77	77	8	27	107	857	66	12	50	2.0	2.0	2.5
16	2055	.1899	3	56	86	86	7	27	97	921	63	12	59	1.5	2.0	2.5
17	2225	.2289	3	35	65	65	8	16	96	791	89	14	38	2.5	3.0	3.0
18	2050	.2632	3	23	53	53	5	13	63	314	55	10	26	2.5	3.0	2.5
23	2045	.4469	3	14	44	22	3	6	36	224	24	6	15	2.0	2.5	2.5
25	2110	.5210	3	20	50	39	5	5	55	306	40	8	22	1.5	2.0	2.5
27	2105	.5944	3	13	43	32	3	4	34	170	41	8	15	1.5	2.0	2.0
28	2150	.6323	3	9	39	28	3	2	32	128	43	8	11	1.5	2.0	2.0
31	2230	.7436	3	15	45	33	3	10	40	172	36	9	18	2.0	2.0	2.5

DATE	UT	CR	g	f	WN	TWN	p	s	SN	BX	CV	QC	IS	Q	S	T
JUNE 1998																
02	2210	1936.8166	3	19	49	49	5	6	56	368	90	11	21	2.0	2.5	2.5
03	2130	.8523	4	24	64	64	6	13	73	382	94	14	28	1.5	2.0	2.5
15	2120	1937.2933	5	12	62	35	3	8	38	133	62	11	14	2.5	2.5	2.5
18	2135	.4040	4	11	51	40	3	8	38	113	65	9	13	2.0	2.0	2.0
19	2155	.4412	5	21	71	34	2	18	38	169	55	10	24	2.0	2.5	2.5
20	2200	.4781	3	24	54	54	5	13	63	372	81	10	27	2.0	2.5	3.0
23	2140	.5879	4	9	49	37	3	4	34	93	31	10	12	1.5	2.0	2.0
26	2215	.6991	6	23	83	72	6	15	75	417	71	14	25	2.0	2.5	2.5
28	2155	.7721	8	32	112	100	9	16	106	475	89	22	39	1.5	2.0	2.0
JULY 1998																
02	2140	1937.9188	8	18	98	98	9	5	95	365	117	22	24	2.0	2.5	2.0
03	2215	.9565	8	40	120	106	10	22	122	609	143	24	46	1.5	2.0	2.0
05	2215	1938.0300	7	25	95	73	5	13	63	293	82	16	29	1.5	2.0	2.0
06	2150	.0662	6	12	72	27	2	8	28	112	54	11	14	1.5	2.0	2.5
11	2115	.2491	5	12	62	51	4	8	48	179	43	10	13	2.5	2.5	3.0
14	2220	.3610	3	16	46	35	2	12	32	124	22	7	18	2.0	2.0	2.0
17	2140	.4703	3	15	45	45	4	8	48	200	43	10	18	2.0	2.5	3.0
27	2045	.8364	6	28	88	52	6	13	73	439	120	15	32	2.0	2.0	2.0
28	2220	.8755	6	32	92	69	6	20	80	379	119	15	36	1.0	1.5	2.0
AUGUST 1998																
02	2125	1939.0578	8	20	100	51	4	15	55	160	112	18	25	1.5	2.0	2.5
03	2110	.0942	6	24	84	42	5	15	65	302	62	14	28	2.5	2.5	2.5
04	2130	.1314	4	29	69	57	6	17	77	496	54	13	33	2.0	2.5	2.5
05	2120	.1679	5	38	88	77	9	12	102	855	106	16	41	2.0	2.5	3.0
07	2115	.2412	7	42	112	77	11	14	124	1157	98	19	47	2.0	3.0	3.0
11	2050	.3875	7	63	133	111	14	32	172	1432	161	22	68	1.5	2.5	2.5
12	2140	.4255	7	46	116	91	12	27	147	824	154	23	53	1.5	2.5	2.5
13	2100	.4612	6	36	96	73	9	14	104	528	134	19	41	1.5	2.0	2.0
15	2305	.5378	4	27	67	67	7	10	80	540	113	15	30	2.5	3.0	3.5
19	2055	.6813	8	23	103	91	9	9	99	344	122	23	29	2.0	2.0	2.5
20	2050	.7179	7	26	96	85	9	9	99	441	116	19	31	2.5	2.5	2.5
21	2205	.7565	6	28	88	77	9	8	98	508	118	16	31	1.5	2.0	2.0
27	2205	.9768	6	31	91	58	10	12	112	535	78	13	33	2.0	2.5	2.5
28	2130	1940.0126	6	39	99	73	9	19	109	573	94	15	42	2.0	2.0	2.5
30	2040	.0847	6	72	132	110	13	21	151	1599	156	19	76	2.0	2.0	2.0
31	2030	.1211	5	63	113	102	12	18	138	1440	147	18	67	1.5	2.0	2.5



## A5

DATE	UT	CR	g	f	WN	TWN	p	s	SN	BX	CV	QC	IS	Q	S	T
SEPTEMBER 1998																
02	2030	1940.1945	4	46	86	74	6	11	71	1400	88	14	50	1.0	2.0	2.5
03	2030	.2312	7	44	114	92	7	12	82	1410	101	18	47	1.5	2.0	2.0
04	2140	.2697	5	46	96	74	6	10	70	1086	79	12	48	1.5	2.0	2.0
06	2210	.3438	7	52	122	99	7	23	93	1013	109	20	57	1.5	2.0	2.0
07	2105	.3788	8	60	140	117	12	23	143	1399	146	25	66	1.5	2.0	2.5
08	2155	.4168	7	58	128	117	13	28	158	1176	140	24	64	2.0	2.5	2.5
09	2150	.4534	8	44	124	100	11	23	133	693	116	24	50	1.5	2.0	2.0
10	2105	.4889	6	35	95	95	10	12	112	539	92	19	40	1.5	2.5	2.5
11	2100	.5254	5	34	84	84	10	13	113	601	93	17	38	2.0	2.5	2.5
12	2050	.5619	7	34	104	104	14	11	151	572	141	26	41	1.5	2.5	2.5
13	2045	.5984	7	36	106	94	10	19	119	589	113	22	42	1.0	2.0	2.0
16	2055	.7087	6	11	71	37	4	5	45	180	46	12	13	2.0	2.5	2.5
18	2125	.7828	7	20	90	68	6	11	71	221	96	17	24	1.5	2.5	2.5
21	2100	.8921	7	55	125	100	8	38	118	908	81	19	60	2.0	2.0	2.5
30	2115	1941.2225	2	5	25	0	0	5	5	20	4	3	6	1.5	2.5	2.5

## OCTOBER 1998

01	2100	1941.2587	2	2	22	11	1	1	11	41	11	3	2	2.5	2.5	2.5
04	2020	.3677	1	9	19	19	2	4	24	162	22	4	10	2.0	2.5	2.5
06	2020	.4410	4	24	64	28	4	12	52	348	28	9	27	2.0	2.5	3.0
07	2125	.4793	5	35	85	62	7	21	91	328	52	13	39	1.5	2.5	2.5
13	2010	.6973	5	21	71	47	6	11	71	341	58	14	25	1.5	2.0	2.5
16	2000	.8069	6	40	100	89	8	22	102	627	92	18	44	1.5	2.0	2.5
17	2110	.8453	6	42	102	102	12	17	137	675	102	20	47	2.0	2.5	2.5
21	2000	.9901	4	28	68	46	7	11	81	476	67	10	30	2.0	2.5	2.5
23	2000	1942.0634	3	17	47	33	3	12	42	239	40	10	20	2.5	2.5	2.5
24	1940	.0995	5	10	60	27	3	6	36	153	37	11	12	2.0	2.5	2.5
25	1950	.1364	2	5	25	14	1	4	14	36	13	4	6	1.5	2.0	2.5
29	2020	.2837	6	11	71	25	2	8	28	93	58	11	14	1.5	1.5	2.0
31	2205	.3596	3	9	39	39	3	4	34	101	54	8	11	2.5	2.5	2.5

DATE	UT	CR	g	f	WN	TWN	p	s	SN	BX	CV	QC	IS	Q	S	T
NOVEMBER 1998																
01	1945	1942.3927	3	8	38	15	2	5	25	52	55	6	10	1.0	2.0	2.0
05	1940	.5391	7	44	114	77	8	26	106	751	70	17	49	1.5	2.0	2.0
08	2030	.6502	6	34	94	61	7	15	85	519	77	12	36	1.5	2.0	2.0
09	1945	.6857	5	35	85	85	8	12	92	770	123	16	38	2.0	2.0	2.0
10	2030	.7235	5	16	66	66	7	5	75	256	144	16	21	2.5	2.5	2.5
11	1950	.7591	6	23	83	59	4	11	51	168	68	15	28	2.0	2.5	2.5
13	2030	.8333	7	29	99	77	8	14	94	532	118	18	32	2.5	2.5	2.5
14	1930	.8684	6	30	90	66	8	14	94	503	113	17	34	2.5	2.5	3.0
15	2100	.9073	7	24	94	61	6	14	74	348	87	14	26	1.5	2.0	2.5
19	1910	1943.0510	3	14	44	17	2	8	28	154	50	7	16	1.0	2.0	2.5
23	2055	.2001	5	14	64	41	4	8	48	130	52	13	18	2.0	2.5	3.0
24	2120	.2374	5	22	72	72	7	12	82	256	75	16	27	2.0	3.0	3.0
25	2005	.2721	6	34	94	94	12	13	133	602	135	20	39	2.0	2.5	2.5

## DECEMBER 1998

01	2015	1943.4920	6	44	104	93	14	27	167	1186	104	21	49	2.0	3.0	3.0
03	2020	.5653	8	31	111	89	8	19	99	733	143	22	36	2.5	3.0	3.0
05	2015	.6384	7	23	93	59	7	9	79	416	76	18	28	1.0	2.5	2.5
06	1950	.6744	6	30	90	90	9	14	104	708	89	18	35	1.5	2.5	3.0
08	2000	.7478	7	52	122	122	16	20	180	960	153	26	58	2.0	2.5	2.5
13	2050	.9321	5	34	84	71	9	17	107	664	84	16	38	1.5	2.5	2.5
15	2010	1944.0043	5	29	79	57	7	13	83	646	66	13	31	1.5	2.5	2.5
18	2050	.1151	4	30	70	70	9	12	102	460	89	14	34	2.0	3.0	3.5
21	2125	.2258	2	17	37	37	4	11	51	376	51	9	19	1.5	2.5	2.5
22	2200	.2632	2	10	30	30	4	6	46	160	39	7	12	2.0	2.0	2.5
23	2000	.2968	5	14	64	40	5	9	59	185	60	12	17	1.5	2.5	3.0
25	2010	.3702	6	33	93	71	9	16	106	526	98	17	37	1.5	2.0	2.0
28	2205	.4829	4	58	98	87	12	27	147	1293	77	14	61	2.0	2.0	2.0
29	2025	.5170	4	72	112	112	14	21	161	1659	107	15	75	1.5	2.0	2.0
30	2145	.5556	4	55	95	84	9	14	104	1227	97	13	58	2.0	2.5	3.0



## SECTION B

### SUNSPOT REGIONAL BREAKDOWNS.

This section states all regions observed by the GDSO in the format of ;

- \* NOAA / SEC region number ( if known );
- \* co-ordinates of regions in degrees of heliographic latitude ( B ) [ + if NORTH , - if SOUTH ] , and in degrees of heliographic longitude ( CMD ) in respect to the central meridian [ + if WEST , - if EAST ] . CMD increases with time .
- \* f (spots) , p (penumbrae) , s (outlying spots) and five columns which state the distribution of umbrae within penumbrae (see page B2) ;
- \* GDSO's determination of the McIntosh classifications of each observed region .

The central meridian value (CM) is based on the Carrington system of heliographic longitude.

All regions observed are listed in increasing longitudinal order. East is to the LEFT of North when it comes to co-ordinates on the Sun.

Observations during 1998 are numbered 3375 to 3541 inclusive.

ALL TIMES IN UNIVERSAL TIME (UT).

OBS = Number of GDSO observation.

CM values are stated in degrees.

REG. No are NOAA/SEC region numbers.

B = HELIOGRAPHIC LATITUDE OF REGION ( + IF NORTH, - IF SOUTH ).

CMD = HELIOGRAPHIC DEGREES AWAY FROM THE CENTRAL MERIDIAN ( - IF EAST, + IF WEST ). EAST IS TO THE LEFT OF NORTH.

f = NUMBER OF SUNSPOTS IN REGION.

p = NUMBER OF PENUMBRÆ IN REGION.

s = NUMBER OF PENUMBRAL-FREE SUNSPOTS IN REGION.

gr = NUMBER OF MULTI-SPOT GROUPS ( in individual lines, single spot regions = 0, multi-spot regions = 1 ).

grfp = NUMBER OF UMBRÆ WITHIN PENUMBRÆ WITHIN THE GROUPS gr.

grf = NUMBER OF NON-PENUMBRAL SPOTS WITHIN THE GROUPS gr.

efp = NUMBER OF SINGLE PENUMBRAL SPOTS.

ef = NUMBER OF SINGLE NON-PENUMBRAL SPOTS.

LETTERS IN 'CLASS' COLUMN ARE McINTOSH CLASSIFICATIONS DETERMINED BY THE GDSO.

BRUNNER (SINGLE LETTER 'ZURICH') CLASSIFICATIONS ARE THE SAME AS THE INITIAL McINTOSH CLASS LETTER, EXCEPT THE FOLLOWING:

E?O, F?O = G; and HAX, HRX & HSX = J.

gr + efp + ef = g.

grfp + grf + efp + ef = f.

grf + ef = s.

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks	
3375	1998 / 01 / 01	2020	272.00	8130	-29	+07	6	2	2	1	4	2	0	0	DSI	—	
				8126	+21	+35	7	2	2	1	5	2	0	0	DAI	—	
				8124	-22	+75	2	1	1	1	1	1	0	0	CSO	—	
3376	1998 / 01 / 02	2030	258.74	8130	-29	+20	3	0	3	1	0	3	0	0	BXI	—	
				8126	+21	+48	7	2	1	1	6	1	0	0	DAI	—	
3377	1998 / 01 / 03	2045	245.43	8130	-29	+34	2	0	2	1	0	2	0	0	BXO	—	
				8126	+21	+61	7	3	2	1	5	2	0	0	DAC	—	
3378	1998 / 01 / 04	2025	232.45	8130	-29	+46	1	0	1	0	0	0	0	1	AXX	small	
				8126	+21	+73	2	1	1	1	1	1	0	0	CSO	—	
3379	1998 / 01 / 05	2015	219.37	8129	+23	+53	1	0	1	0	0	0	0	1	AXX	—	
3380	1998 / 01 / 06	2110	205.69	—	—	—	0	0	0	0	0	0	0	0	—	—	
3381	1998 / 01 / 07	1935	193.39	—	—	—	0	0	0	0	0	0	0	0	—	—	
3382	1998 / 01 / 09	1955	166.87	—	—	—	0	0	0	0	0	0	0	0	—	—	
3383	1998 / 01 / 10	1950	153.75	8131	-26	-23	4	0	4	1	0	4	0	0	BXI	—	
3384	1998 / 01 / 12	2010	127.23	8131	-24	-05	21	3	15	1	6	15	0	0	DAC	—	
				8132	-20	+09	3	0	3	1	0	3	0	0	BXI	—	
3385	1998 / 01 / 13	1955	114.20	8135	-17	-71	1	0	1	0	0	0	0	1	AXX	big	
				8131	-23	+08	14	3	5	1	9	5	0	0	EAC	—	
				8132	-19	+22	1	0	1	0	0	0	0	0	1	AXX	small
3386	1998 / 01 / 14	1940	101.17	8135	-18	-58	1	0	1	0	0	0	0	1	AXX	big	
				8136	+16	-06	1	0	1	0	0	0	0	0	1	AXX	—
				8131	-23	+20	19	3	8	1	11	8	0	0	DAC	—	

## B3

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks
3387	1998 / 01 / 19	2015	35.01	8141	+26	-52	1	0	1	0	0	0	0	1	AXX	small
				8135	-17	+08	2	0	2	1	0	2	0	0	BXO	—
3388	1998 / 01 / 26	1945	303.12	8146	+16	-38	4	0	4	1	0	4	0	0	BXI	—
				8143	-35	-24	13	2	7	1	6	7	0	0	EAI	—
				8142	-21	+45	6	1	5	1	1	5	0	0	CSI	—
3389	1998 / 01 / 28	2230	275.28	8146	+15	-11	4	0	4	1	0	4	0	0	BXI	—
				8143	-35	+04	12	2	7	1	5	7	0	0	EAI	—
				8142	-21	+77	1	1	0	0	0	0	1	0	HSX	—
3390	1998 / 01 / 31	1940	237.34	8143	-35	+44	4	1	2	1	2	2	0	0	CAI	—
3391	1998 / 02 / 01	1935	224.21	8145	+28	+37	1	0	1	0	0	0	0	1	AXX	—
				8143	-35	+61	2	1	0	1	2	0	0	0	HAX	—
3392	1998 / 02 / 02	2000	210.82	8143	-35	+74	1	1	0	0	0	0	1	0	HAX	—
3393	1998 / 02 / 03	1950	197.75	8151	-23	-78	1	0	1	0	0	0	0	1	AXX	—
				8150	+26	+26	6	1	4	1	2	4	0	0	CAI	—
				8143	-35	+87	1	0	1	0	0	0	0	0	1	AXX
3394	1998 / 02 / 05	2005	171.28	8151	-22	-51	3	1	2	1	1	2	0	0	CSO	—
				8152	-20	+42	2	0	2	1	0	2	0	0	BXO	—
				8150	+26	+53	1	0	1	0	0	0	0	0	1	AXX
3395	1998 / 02 / 06	2030	157.88	8151	-22	-38	1	1	0	0	0	0	1	0	HSX	—
				8152	-20	+55	4	0	4	1	0	4	0	0	BXI	—
3396	1998 / 02 / 07	2005	144.94	8151	-21	-25	1	1	0	0	0	0	1	0	HSX	—
				8152	-21	+68	3	0	3	1	0	3	0	0	BXI	—
3397	1998 / 02 / 08	2145	130.86	8153	-40	-40	2	0	2	1	0	2	0	0	BXO	—
				8151	-22	-11	2	1	1	1	1	1	0	0	CSO	—
3398	1998 / 02 / 11	1955	92.36	8156	-23	-58	5	1	4	1	1	4	0	0	CSI	—
				8153	-39	-05	2	0	2	1	0	2	0	0	BXO	—
				8151	-23	+25	1	1	0	0	0	0	1	0	HSX	—
3399	1998 / 02 / 13	2025	65.76	8158	-20	-52	2	0	2	1	0	2	0	0	BXO	—
				8156	-24	-32	18	4	11	1	7	11	0	0	EKC	—
				8151	-23	+51	1	1	0	0	0	0	1	0	HSX	small
3400	1998 / 02 / 14	1950	52.91	8158	-20	-39	3	1	2	1	1	2	0	0	CSI	small
				8156	-24	-19	29	4	19	1	10	19	0	0	DKC	—
				8151	-24	+64	1	0	1	0	0	0	0	0	1	AXX
3401	1998 / 02 / 16	2040	26.11	8160	+23	-26	2	1	1	1	1	1	0	0	CSO	—
				8158	-21	-12	2	0	2	1	0	2	0	0	BXO	—
				8156	-25	+08	18	4	9	1	9	9	0	0	DKC	—

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks	
3402	1998 / 02 / 19	2020	346.79	8158	-21	+27	1	0	1	0	0	0	0	1	AXX	—	
				8156	-24	+45	12	2	4	1	8	4	0	0	DHI	—	
3403	1998 / 02 / 21	1945	320.77	8156	-25	+71	3	1	1	1	2	1	0	0	CKO	—	
3404	1998 / 02 / 24	2000	281.12	8167	-25	-21	5	1	4	1	1	4	0	0	CSI	—	
				8164	+16	-04	21	4	7	1	14	7	0	0	DAC	—	
				8166	+23	+22	1	0	1	0	0	0	0	0	1	AXX	small
				8168	+18	+33	1	0	1	0	0	0	0	0	1	AXX	—
				8163	-22	+53	3	1	2	1	1	2	0	0	0	CSO	class correct
3405	1998 / 02 / 25	2150	266.95	8167	-25	-07	8	2	3	1	5	3	0	0	DAI	—	
				8164	+16	+09	19	5	6	1	13	6	0	0	DAC	—	
				8163	-22	+67	1	0	1	0	0	0	0	1	AXX	—	
3406	1998 / 02 / 27	2000	241.61	8171	-24	-07	2	0	2	1	0	2	0	0	BXO	—	
				8167	-26	+18	7	0	7	1	0	7	0	0	BXI	—	
				8164	+16	+35	8	2	5	1	3	5	0	0	DAI	—	
				8169	-25	+40	1	0	1	0	0	0	0	1	AXX	—	
3407	1998 / 03 / 01	2005	215.22	8172	+23	-07	2	0	2	1	0	2	0	0	BXO	—	
				8171	-24	+21	14	5	8	1	6	8	0	0	DSC	—	
				8167	-26	+44	2	1	1	1	1	1	0	0	CSO	small	
				8164	+16	+63	3	1	1	1	2	1	0	0	CAO	—	
				8169	-22	+69	3	1	2	1	1	2	0	0	CSI	—	
3408	1998 / 03 / 03	1955	188.96	8172	+23	+19	2	1	1	1	1	1	0	0	CRO	—	
				8171	-23	+46	15	3	7	1	8	7	0	0	DKC	—	
3409	1998 / 03 / 04	2050	175.29	8172	+22	+34	2	1	1	1	1	1	0	0	CSO	—	
				8171	-23	+60	14	2	8	1	6	8	0	0	DKO	—	
3410	1998 / 03 / 07	2040	135.85	8176	-40	-69	1	0	1	0	0	0	0	1	AXX	—	
				8175	+45	-62	1	1	0	0	0	0	1	0	HSX	—	
				8174	-17	-40	10	2	7	1	3	7	0	0	DAI	—	
3411	1998 / 03 / 08	1955	123.09	8176	-40	-57	3	0	3	1	0	3	0	0	BXI	—	
				8175	+45	-49	1	1	0	0	0	0	1	0	HSX	—	
				8174	-18	-27	7	1	6	1	1	6	0	0	CSI	—	
				?	-15	-12	1	0	1	0	0	0	0	1	AXX	very small	
3412	1998 / 03 / 11	2015	83.38	8178	-16	-62	1	1	0	0	0	0	1	0	HSX	—	
				8180	-30	-56	3	0	3	1	0	3	0	0	BXI	—	
				8179	-22	-50	4	0	4	1	0	4	0	0	BXI	—	
				8176	-39	-19	23	3	12	1	11	12	0	0	DAC	—	
				8175	+46	-12	1	0	1	0	0	0	0	1	AXX	big	
				8174	-18	+14	2	1	1	1	1	1	0	0	CSO	—	
3413	1998 / 03 / 14	2235	42.56	8178	-17	-22	1	1	0	0	0	0	1	0	HSX	—	
				8180	-29	-20	2	0	2	1	0	2	0	0	BXO	—	
				8179	-22	-10	26	8	7	1	19	7	0	0	DKC	—	
				8176	-39	+21	14	2	9	1	5	9	0	0	DAI	—	
				8175	+47	+24	1	0	1	0	0	0	0	1	AXX	—	

## B5

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks
3414	1998 / 03 / 16	2120	16.88	?	-06	+02	1	0	1	0	0	0	0	1	AXX	small
				8178	-17	+05	3	1	1	1	2	1	0	0	CAO	—
				8179	-23	+15	41	7	13	1	28	13	0	0	EKC	—
				?	-35	+25	4	1	2	1	2	2	0	0	CAI	small
3415	1998 / 03 / 18	2010	351.16	8183	+21	-60	3	1	1	1	2	1	0	0	CAO	—
				?	-20	-25	1	0	1	0	0	0	0	1	AXX	—
				8178	-16	+30	2	1	0	1	2	0	0	0	HAX	—
				8179	-22	+40	44	6	13	1	31	13	0	0	EKC	—
3416	1998 / 03 / 19	2135	337.20	8183	+22	-46	7	1	6	1	1	6	0	0	CSI	—
				8178	-17	+44	1	1	0	0	0	0	1	0	HRX	—
				8179	-22	+54	26	5	7	1	19	7	0	0	EKC	—
				8182	-24	+68	2	0	2	1	0	2	0	0	BXO	—
3417	1998 / 03 / 20	2220	323.60	8185	-23	-66	1	0	1	0	0	0	0	1	AXX	—
				8184	-17	-48	3	1	2	1	1	2	0	0	CSI	—
				8183	+22	-33	8	1	7	1	1	7	0	0	CSI	—
				8178	-17	+57	1	1	0	0	0	0	1	0	HSX	—
				8179	-22	+66	21	3	6	1	15	6	0	0	EKC	—
				8182	-25	+80	1	0	1	0	0	0	0	1	AXX	—
3418	1998 / 03 / 22	2045	298.10	8185	-24	-64	13	4	6	1	7	6	0	0	EKC	—
				8184	-18	-22	5	2	2	1	3	2	0	0	DAI	—
				8183	+22	-07	9	3	3	1	6	3	0	0	DAC	—
				8178	-16	+82	1	0	1	0	0	0	0	1	AXX	—
				8179	-23	+85	4	3	0	1	4	0	0	0	DAC	—
3419	1998 / 03 / 23	2045	284.91	8185	-24	-52	22	5	7	1	15	7	0	0	EKC	—
				8184	-19	-09	5	2	3	1	2	3	0	0	DSI	—
				8183	+22	+05	9	3	4	1	5	4	0	0	DAC	—
3420	1998 / 03 / 24	2030	271.86	8185	-24	-39	19	5	6	1	13	6	0	0	FKC	—
				8184	-20	+03	1	0	1	0	0	0	0	1	AXX	big
				8183	+22	+18	9	3	3	1	6	3	0	0	DAC	—
3421	1998 / 03 / 29	2015	206.06	8190	-20	-68	4	2	1	1	3	1	0	0	DSI	—
				8188	+30	-08	1	0	1	0	0	0	0	1	AXX	—
				8185	-25	+25	12	1	11	1	1	11	0	0	CKI	widespread
3422	1998 / 03 / 30	2035	192.69	8190	-20	-57	7	2	2	1	5	2	0	0	DAI	—
				8185	-25	+36	16	3	8	1	8	8	0	0	DKC	—
				8189	-26	+53	1	0	1	0	0	0	0	1	AXX	—

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks
3423	1998 / 03 / 31	2210	178.63	8190	-20	-40	22	5	7	1	15	7	0	0	EAC	—
				8185	-25	+51	14	3	9	1	5	9	0	0	DHC	—
3424	1998 / 04 / 02	2150	152.42	8190	-20	-12	19	6	8	1	11	8	0	0	EAC	—
				8192	-31	+53	1	0	1	0	0	0	0	1	AXX	—
				8185	-25	+76	5	2	3	1	2	3	0	0	DAI	—
3425	1998 / 04 / 04	2115	126.35	8194	-18	-83	1	1	0	0	0	0	1	0	HHX	—
				8193	-21	-43	10	2	6	1	4	6	0	0	DAI	—
				8190	-20	+14	13	1	12	1	1	12	0	0	CAI	—
				8192	-30	+79	1	0	1	0	0	0	0	0	1	AXX
3426	1998 / 04 / 05	2055	113.34	8195	-27	-78	1	0	1	0	0	0	0	1	AXX	—
				8194	-18	-73	3	2	1	1	2	1	0	0	DHI	—
				8193	-22	-29	17	4	9	1	8	9	0	0	DAC	—
				8191	-22	+15	3	0	3	1	0	3	0	0	BXI	—
				8190	-20	+34	3	1	2	1	1	2	0	0	CSI	—
3427	1998 / 04 / 11	2240	33.18	8198	-27	-23	4	0	4	1	0	4	0	0	BXI	—
				8195	-26	-05	2	0	2	1	0	2	0	0	BXO	—
				8194	-19	+03	7	2	4	1	3	4	0	0	DKI	—
				8200	-21	+20	6	3	2	1	4	2	0	0	DAC	—
				8193	-22	+51	3	2	1	1	2	1	0	0	DSI	—
				8199	-26	+54	2	0	2	1	0	2	0	0	BXO	—
3428	1998 / 04 / 12	2050	20.99	8198	-28	-12	4	0	4	1	0	4	0	0	BXI	—
				8194	-19	+14	4	2	1	1	3	1	0	0	DAI	—
				8200	-21	+32	4	1	2	1	2	2	0	0	CAI	—
				8193	-23	+63	3	1	2	1	1	2	0	0	CSI	—
				8199	-27	+66	2	0	2	1	0	2	0	0	BXO	—
3429	1998 / 04 / 13	2135	7.38	8202	-25	-08	6	0	6	1	0	6	0	0	BXI	—
				8198	-28	-00	1	0	1	0	0	0	0	1	AXX	—
				8195	-25	+20	2	0	2	1	0	2	0	0	BXO	—
				8194	-18	+28	6	2	2	1	4	2	0	0	DAI	—
				8200	-21	+45	5	1	3	1	2	3	0	0	CAI	—
				8193	-22	+76	1	1	0	0	0	0	1	0	HSX	—
3430	1998 / 04 / 17	2215	314.19	8205	+20	-02	5	1	4	1	1	4	0	0	CSI	—
				8203	+32	+51	2	0	2	1	0	2	0	0	BXO	—
3431	1998 / 04 / 25	2025	209.53	8210	-17	-71	4	1	3	1	1	3	0	0	CHI	—
3432	1998 / 04 / 27	2200	182.23	8210	-17	-44	5	1	3	1	2	3	0	0	CKI	—
3433	1998 / 04 / 28	2040	169.75	8210	-17	-32	11	2	7	1	4	7	0	0	CKI	—
				8212	-30	+64	1	0	1	0	0	0	0	1	AXX	—
3434	1998 / 04 / 29	2150	155.90	8210	-17	-18	6	1	4	1	2	4	0	0	CKI	—
3435	1998 / 05 / 01	2150	129.46	8214	+27	-34	14	3	7	1	7	7	0	0	DSI	—
				8210	-17	+09	23	1	15	1	8	15	0	0	CKI	—
3436	1998 / 05 / 02	2055	116.76	8217	-16	-75	1	1	0	0	0	0	1	0	HSX	—
				8214	+27	-22	22	4	11	1	11	11	0	0	DAC	—
				8210	-17	+21	19	1	10	1	9	10	0	0	CKI	—



OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks
3437	1998 / 05 / 03	2105	103.45	8217	-16	-61	1	1	0	0	0	0	1	0	HSX	—
				8214	+27	-08	29	4	15	1	14	15	0	0	DKC	—
				8210	-17	+35	10	1	3	1	7	3	0	0	CKI	—
3438	1998 / 05 / 04	2050	90.36	8217	-16	-48	1	1	0	0	0	0	1	0	HSX	—
				8216	-21	-00	2	0	2	1	0	2	0	0	BXO	—
				8214	+27	+06	39	5	26	1	13	26	0	0	EKC	—
				8210	-17	+47	8	2	1	1	7	1	0	0	CKI	—
3439	1998 / 05 / 05	2100	77.05	?	+30	-40	1	0	1	0	0	0	0	1	AXX	—
				8217	-16	-35	1	1	0	0	0	0	1	0	HSX	—
				8214	+27	+19	47	6	19	1	28	29	0	0	EKC	—
				8210	-16	+60	9	1	3	1	6	3	0	0	CKI	—
3440	1998 / 05 / 07	2125	50.38	8218	-21	-61	9	2	4	1	5	4	0	0	DSI	—
				8219	+28	-56	2	0	2	1	0	2	0	0	BXO	—
				8217	-16	-09	1	1	0	0	0	0	1	0	HSX	—
				8214	+27	+46	22	4	10	1	12	10	0	0	EKC	—
				8210	-16	+84	2	2	0	1	2	0	0	0	CSO	—
3441	1998 / 05 / 10	2140	10.58	8220	-30	-84	1	1	0	0	0	0	1	0	HSX	—
				8218	-21	-23	10	4	4	1	6	4	0	0	DAC	—
				8217	-16	+30	1	1	0	0	0	0	1	0	HSX	—
3442	1998 / 05 / 11	2045	357.86	8220	-30	-70	4	1	3	1	1	3	0	0	CSI	—
				8218	-20	-10	13	4	5	1	8	5	0	0	DHC	—
				8217	-16	+42	1	1	0	0	0	0	1	0	HSX	—
3443	1998 / 05 / 14	2045	318.18	8222	+22	-38	15	3	9	1	6	9	0	0	CAI	class correct
				8220	-28	-35	9	2	5	1	4	5	0	0	DAI	—
				8218	-20	+29	23	3	13	1	10	13	0	0	ESC	—
3444	1998 / 05 / 16	2055	291.64	8222	+22	-12	15	2	4	1	11	4	0	0	DAI	—
				8220	-28	-10	22	1	18	1	4	18	0	0	CAI	—
				8218	-20	+55	19	4	5	1	14	5	0	0	EAC	—
3445	1998 / 05 / 17	2225	277.58	8222	+22	+02	15	3	7	1	8	7	0	0	EAC	—
				8220	-28	+04	12	2	6	1	6	6	0	0	DAI	—
				8218	-20	+68	8	3	3	1	5	3	0	0	ESC	—
3446	1998 / 05 / 18	2050	265.23	8222	+22	+15	13	3	5	1	8	5	0	0	DAC	—
				8220	-27	+16	7	1	6	1	1	6	0	0	CSI	—
				8218	-20	-79	3	1	2	1	1	2	0	0	CSI	—
3447	1998 / 05 / 23	2045	199.13	8225	-18	-64	1	0	1	0	0	0	0	1	AXX	—
				?	+15	-06	1	0	1	0	0	0	0	1	AXX	—
				8226	+18	+11	12	3	4	1	8	4	0	0	DAI	—

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks	
3448	1998 / 05 / 25	2110	172.44	8227	+25	-76	4	1	1	1	3	1	0	0	CAO	—	
				8225	-18	-37	1	0	1	0	0	0	0	0	1	AXX	—
				8226	+18	+38	15	4	3	1	12	3	0	0	0	DAC	—
3449	1998 / 05 / 27	2105	146.03	8227	+26	-51	7	2	0	1	7	0	0	0	DAC	compact	
				8225	-18	-11	1	0	1	0	0	0	0	0	1	AXX	—
				8226	+18	+64	5	1	3	1	2	3	0	0	0	CAI	—
3450	1998 / 05 / 28	2150	132.38	8227	+26	-37	6	2	0	1	6	0	0	0	DAC	compact	
				8229	-18	-26	1	0	1	0	0	0	0	0	1	AXX	—
				8226	+18	+78	2	1	1	1	1	1	0	0	0	CSO	—
3451	1998 / 05 / 31	2230	92.32	8230	-20	-48	7	1	6	1	1	6	0	0	CSI	—	
				8227	+26	+03	6	2	2	1	4	2	0	0	0	DAI	compact
				8228	-22	+38	2	0	2	1	0	2	0	0	0	BXO	—
3452	1998 / 06 / 02	2210	66.03	8232	-18	-76	1	1	0	0	0	0	1	0	HHX	—	
				8230	-20	-24	13	2	5	1	8	5	0	0	0	DAI	—
				8227	+25	+29	5	2	1	1	4	1	0	0	0	DSI	compact
3453	1998 / 06 / 03	2130	53.17	8233	+28	-79	3	1	2	1	1	2	0	0	CSI	—	
				8232	-19	-62	2	1	1	1	1	1	0	0	0	CHO	—
				8230	-20	-11	16	2	10	1	6	10	0	0	0	DAI	—
				8227	+26	+41	3	2	0	1	3	0	0	0	0	DAO	—
3454	1998 / 06 / 15	2120	254.42	8249	-25	-76	1	1	0	0	0	0	1	0	HSX	—	
				8243	+17	-40	1	1	0	0	0	0	0	1	0	HHX	—
				8242	-21	-18	3	1	1	1	2	1	0	0	0	CAO	—
				8244	+35	-04	6	0	6	1	0	6	0	0	0	BXI	—
				?	-07	+03	1	0	1	0	0	0	0	0	1	AXX	small
3455	1998 / 06 / 18	2135	214.57	8249	-27	-38	1	1	0	0	0	0	1	0	HSX	—	
				8243	+18	-02	5	1	4	1	1	4	0	0	0	CHI	—
				8244	+35	+34	4	1	3	1	1	3	0	0	0	CSI	—
				8242	-22	+21	1	0	1	0	0	0	0	0	1	AXX	—
3456	1998 / 06 / 19	2155	201.16	8249	-27	-24	1	1	0	0	0	0	1	0	HSX	—	
				8243	+18	+13	13	1	11	1	2	11	0	0	0	CKI	—
				8251	+17	+22	4	0	4	1	0	4	0	0	0	BXI	—
				8242	-22	+36	1	0	1	0	0	0	0	0	1	AXX	—
				8244	+35	+47	2	0	2	1	0	2	0	0	0	BXO	—
3457	1998 / 06 / 20	2200	187.87	8249	-27	-13	4	1	3	1	1	3	0	0	CSI	—	
				8243	+18	+26	18	3	9	1	9	9	0	0	0	DHC	—
				8251	+16	+38	2	1	1	1	1	1	0	0	0	CSO	—
3458	1998 / 06 / 23	2140	148.35	8253	+18	-68	4	1	1	1	3	1	0	0	CAO	—	
				?	+15	+20	2	0	2	1	0	2	0	0	0	BXO	small
				8249	-27	+28	1	1	0	0	0	0	0	1	0	HSX	—
				8243	+17	+65	2	1	1	1	1	1	0	0	CSO	—	

B9

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks		
3459	1998 / 06 / 26	2215	108.32	8258	-14	-66	1	1	0	0	0	0	1	0	HSX	—		
				8256	-25	-60	1	1	0	0	0	0	0	1	0	HSX	—	
				8255	-22	-40	4	1	3	1	1	3	0	0	0	0	CSI	—
				8253	+18	-27	15	2	11	1	4	11	0	0	0	0	DSI	—
				8257	+30	+18	1	0	1	0	0	0	0	0	0	1	AXX	—
				8249	-28	+67	1	1	0	0	0	0	0	0	1	0	HSX	—
3460	1998 / 06 / 28	2155	82.03	8260	-23	-64	5	1	2	1	3	2	0	0	CAI	—		
				?	-27	-63	2	1	0	1	2	0	0	0	0	HAX	—	
				8259	+26	-63	2	1	1	1	1	1	1	0	0	0	CSO	—
				8258	-15	-41	1	1	0	0	0	0	0	1	0	0	HSX	—
				8256	-25	-34	3	1	2	1	1	2	0	0	0	0	CSO	class correct
				8255	-22	-14	3	1	1	1	2	1	0	0	0	0	CAO	—
				8253	+18	-01	14	3	8	1	6	8	0	0	0	0	DAC	—
				8257	+29	+44	2	0	2	1	0	2	0	0	0	0	BXO	—
3461	1998 / 07 / 02	2140	29.22	8264	+16	-53	2	1	0	1	2	0	0	0	HAX	—		
				8263	-21	-41	1	1	0	0	0	0	0	1	0	HHX	—	
				8259	+27	-15	3	1	2	1	1	2	0	0	0	0	CSI	compact
				8260	-24	-12	4	2	1	1	3	1	0	0	0	0	DAI	—
				8258	-14	+14	2	1	1	1	1	1	1	0	0	0	CSO	—
				8256	-25	+19	3	1	1	1	2	1	0	0	0	0	CAO	—
				8255	-22	+42	2	1	0	1	2	0	0	0	0	0	HAX	—
				8253	+17	+52	1	1	0	0	0	0	0	1	0	0	HSX	—
3462	1998 / 07 / 03	2215	15.66	8264	+16	-43	6	1	4	1	2	4	0	0	CAI	—		
				8263	-21	-28	1	1	0	0	0	0	0	1	0	HHX	—	
				8259	+27	-04	4	0	4	1	0	4	0	0	0	0	BXI	—
				8260	-24	-01	9	2	7	1	2	7	0	0	0	0	DSI	—
				8258	-14	+27	2	1	1	1	1	1	1	0	0	0	CSO	—
				8256	-24	+32	15	3	5	1	10	5	0	0	0	0	DAC	—
				8255	-22	+55	1	1	0	0	0	0	0	1	0	0	HSX	—
				8253	+17	+72	2	1	1	1	1	1	1	0	0	0	CSO	—
3463	1998 / 07 / 05	2215	349.19	8265	+20	-46	1	0	1	0	0	0	0	1	AXX	—		
				8264	+16	-16	7	1	5	1	2	5	0	0	0	0	CAI	—
				8263	-21	-02	2	1	0	1	2	0	0	0	0	0	HHX	—
				8259	+26	+23	1	0	1	0	0	0	0	0	0	1	AXX	—
				8260	-24	+25	8	1	2	1	6	2	0	0	0	0	CAI	—
				8258	-14	+54	1	1	0	0	0	0	0	1	0	0	HSX	small
8256	-24	+59	5	1	4	1	1	4	0	0	0	0	0	CSI	—			

## B10

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks		
3464	1998 / 07 / 06	2150	336.19	8266	+23	-61	1	0	1	0	0	0	0	1	AXX	—		
				8267	+32	-48	1	0	1	0	0	0	0	0	1	AXX	—	
				8264	+16	-01	6	1	3	1	3	3	0	0	0	0	CAI	—
				8263	-21	+10	1	1	0	0	0	0	0	1	0	0	HHX	—
				8260	-23	+38	2	0	2	1	0	2	0	0	0	0	BXO	—
				8258	-14	+67	1	0	1	0	0	0	0	0	0	1	AXX	—
3465	1998 / 07 / 11	2115	270.34	8271	-10	-65	1	0	1	0	0	0	0	1	AXX	—		
				8269	+17	-59	1	1	0	0	0	0	0	1	0	HSX	—	
				8270	-20	-55	8	1	7	1	1	7	0	0	0	0	CSI	—
				8264	+16	+68	1	1	0	0	0	0	0	1	0	0	HSX	—
				8263	-21	+73	1	1	0	0	0	0	0	1	0	0	HSX	—
3466	1998 / 07 / 14	2220	230.04	8269	+17	-18	3	1	2	1	1	2	0	0	CSI	—		
				8271	-10	-17	1	0	1	0	0	0	0	0	1	AXX	—	
				8270	-20	-16	12	1	9	1	3	9	0	0	0	CAI	—	
3467	1998 / 07 / 17	2140	190.71	8274	-20	+04	8	2	4	1	4	4	0	0	DAI	—		
				8273	-28	+05	4	1	2	1	2	2	0	0	0	CAI	—	
				8270	-21	+23	3	1	2	1	1	2	0	0	0	CSI	—	
3468	1998 / 07 / 27	2045	58.91	8283	+26	-70	1	1	0	0	0	0	1	0	HSX	—		
				8286	+18	-56	1	0	1	0	0	0	0	0	1	AXX	—	
				8282	+31	-07	12	2	3	1	9	3	0	0	0	0	DKI	—
				8280	-24	-05	9	3	4	1	5	4	0	0	0	0	DHC	—
				8284	+26	+21	3	0	3	1	0	3	0	0	0	0	BXI	—
				8279	+22	+47	2	0	2	1	0	2	0	0	0	0	BXO	—
3469	1998 / 07 / 28	2220	44.82	8283	+26	-56	1	1	0	0	0	0	1	0	HSX	—		
				8282	+31	+07	13	3	6	1	7	6	0	0	0	0	DKC	—
				8280	-24	+10	7	1	6	1	1	6	0	0	0	0	CHI	—
				8281	+17	+15	2	0	2	1	0	2	0	0	0	0	BXO	—
				8284	+26	+35	8	1	5	1	3	5	0	0	0	0	CAI	—
				8286	+17	+37	1	0	1	0	0	0	0	0	0	1	AXX	—
3470	1998 / 08 / 02	2125	339.19	8293	-20	-71	2	1	1	1	1	1	0	0	CSO	—		
				8290	+16	-38	1	0	1	0	0	0	0	0	1	AXX	—	
				8288	-27	-24	1	0	1	0	0	0	0	0	1	AXX	—	
				8294	+18	-18	3	0	3	1	0	3	0	0	0	0	BXI	—
				8283	+26	+07	3	1	2	1	1	2	0	0	0	0	CSO	—
				8286	+17	+23	4	0	4	1	0	4	0	0	0	0	BXI	—
				8282	+31	+71	5	1	3	1	2	3	0	0	0	0	CHI	—
				8280	-24	+78	1	1	0	0	0	0	0	1	0	0	HHX	—

B11

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks
3471	1998 / 08 / 03	2110	326.10	8293	-20	-62	10	3	3	1	7	3	0	0	DSC	—
				8294	+17	-03	4	0	4	1	0	4	0	0	BXI	—
				8295	+12	-02	6	0	6	1	0	6	0	0	BXI	—
				8283	+26	+19	1	1	0	0	0	0	1	0	HSX	—
				8286	+17	+34	2	0	2	1	0	2	0	0	BXO	—
				8282	+31	+81	1	1	0	0	0	0	1	0	HSX	—
3472	1998 / 08 / 04	2130	312.70	8293	-21	-51	16	4	7	1	9	7	0	0	EAC	—
				8294	+17	+10	2	0	2	1	0	2	0	0	BXO	—
				8295	+13	+11	8	1	6	1	2	6	0	0	CAI	—
				8283	+26	+32	3	1	2	1	1	2	0	0	CSO	—
3473	1998 / 08 / 05	2120	299.56	8297	+30	-85	1	1	0	0	0	0	1	0	HHX	—
				8296	+17	-73	1	0	1	0	0	0	0	1	AXX	—
				8293	-22	-40	27	5	6	1	21	6	0	0	EAC	—
				8295	+13	+24	3	1	2	1	1	2	0	0	CSO	—
				8283	+26	+44	6	2	3	1	3	3	0	0	DAI	—
3474	1998 / 08 / 07	2115	273.16	8299	+16	-77	1	1	0	0	0	0	1	0	HSX	—
				8297	+30	-60	4	1	2	1	2	2	0	0	CHI	—
				8296	+17	-46	1	0	1	0	0	0	0	1	AXX	—
				8298	+18	-18	2	0	2	1	0	2	0	0	BXO	—
				8293	-22	-12	29	8	6	1	23	6	0	0	FAC	—
				8295	+13	+51	2	0	2	1	0	2	0	0	BXO	—
				8283	+27	+68	3	1	1	1	2	1	0	0	CAO	—
3475	1998 / 08 / 11	2050	220.50	8301	-21	-51	3	2	0	1	3	0	0	0	ESO	—
				8299	+16	-30	12	1	8	1	4	8	0	0	CKI	—
				?	+26	-28	1	0	1	0	0	0	0	1	AXX	—
				8297	+29	-14	10	2	6	1	4	6	0	0	CKI	compact
				8300	-28	+26	1	0	1	0	0	0	0	1	AXX	—
				8298	+19	+35	11	2	7	1	4	7	0	0	DAI	—
				8293	-22	+40	25	7	9	1	16	9	0	0	FAC	—
3476	1998 / 08 / 12	2140	206.83	8301	-21	-37	2	2	0	1	2	0	0	0	ESO	—
				8302	-14	-34	2	0	2	1	0	2	0	0	BXO	—
				8299	+16	-16	12	2	7	1	5	7	0	0	CKI	—
				8297	+29	-02	9	2	4	1	5	4	0	0	CKI	—
				8296	+17	+20	3	0	3	1	0	3	0	0	BXI	—
				8298	+19	+49	4	1	3	1	1	3	0	0	CSI	—
				8293	-22	+54	14	5	8	1	6	8	0	0	FAC	—

## B12

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks	
3477	1998 / 08 / 13	2100	193.97	8301	-21	-24	2	2	0	1	2	0	0	0	EAO	—	
				?	-10	-07	1	0	1	0	0	0	0	0	1	AXX	—
				8299	+16	-03	14	2	3	1	11	3	0	0	0	CKI	compact
				8297	+31	+12	11	2	6	1	5	6	0	0	0	CKI	—
				8298	+18	+62	2	0	2	1	0	2	0	0	0	BXO	—
				8293	-22	+67	6	3	2	1	4	2	0	0	0	FAC	—
3478	1998 / 08 / 15	2305	166.38	8304	-30	-66	1	1	0	0	0	0	1	0	HSX	—	
				8301	-21	+03	5	2	3	1	2	3	0	0	0	ESI	—
				8299	+16	+25	13	2	3	1	10	3	0	0	0	DKI	—
				8297	+31	+40	8	2	4	1	4	4	0	0	0	DSI	compact
3479	1998 / 08 / 19	2055	114.72	8307	+31	-75	8	2	2	1	6	2	0	0	DKI	—	
				8308	-21	-62	1	1	0	0	0	0	1	0	0	HSX	—
				8306	+27	-33	1	1	0	0	0	0	1	0	0	HSX	—
				8309	+17	-31	2	1	1	1	1	1	0	0	0	CSO	small
				8304	-30	-18	3	1	2	1	1	2	0	0	0	CSI	—
				8303	+20	+11	2	0	2	1	0	2	0	0	0	BXO	—
				8301	-21	+54	3	1	2	1	1	2	0	0	0	CSI	—
				8299	+16	+76	3	2	0	1	3	0	0	0	0	DAO	—
3480	1998 / 08 / 20	2050	101.54	8310	+23	-70	1	0	1	0	0	0	0	1	AXX	—	
				8307	+31	-62	10	3	2	1	8	2	0	0	0	DKC	—
				8308	-21	-49	2	1	0	1	2	0	0	0	0	HAX	—
				8306	+28	-20	4	1	2	1	2	2	0	0	0	CAI	—
				8309	+17	-18	5	2	2	1	3	2	0	0	0	DAI	—
				8304	-28	-05	3	1	2	1	1	2	0	0	0	CSI	—
				8301	-21	+69	1	1	0	0	0	0	1	0	0	HSX	—
3481	1998 / 08 / 21	2205	87.64	8310	+23	-57	1	1	0	0	0	0	1	0	HSX	small	
				8307	+31	-48	16	3	4	1	12	4	0	0	0	DKC	—
				8308	-21	-35	1	1	0	0	0	0	1	0	0	HSX	—
				8306	+28	-06	1	0	1	0	0	0	0	0	1	AXX	—
				8309	+17	-04	7	3	2	1	5	2	0	0	0	DAC	—
				8304	-28	+09	2	1	1	1	1	1	0	0	0	CSO	—
3482	1998 / 08 / 27	2205	8.36	8321	+32	-76	1	0	1	0	0	0	0	1	AXX	—	
				?	-20	-28	1	0	1	0	0	0	0	0	1	AXX	—
				8319	+19	+02	18	5	7	1	11	7	0	0	0	DAC	circular
				8307	+31	+27	9	4	2	1	7	2	0	0	0	DSC	—
				8308	-22	+45	1	1	0	0	0	0	1	0	0	HSX	—
				?	+15	+54	1	0	1	0	0	0	0	0	1	AXX	—
3483	1998 / 08 / 28	2130	355.48	8323	-22	-83	1	1	0	0	0	0	1	0	HHX	—	
				8321	+32	-63	1	0	1	0	0	0	0	1	AXX	big	
				8322	+21	-03	5	0	5	1	0	5	0	0	0	BXI	—
				8319	+19	+14	22	5	8	1	14	8	0	0	0	DAC	—
				8307	+31	+37	9	2	5	1	4	5	0	0	0	CAI	—
				8308	-22	+58	1	1	0	0	0	0	1	0	0	HSX	—

## B13

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks		
3484	1998 / 08 / 30	2040	329.51	8323	-22	-57	21	3	4	1	17	4	0	0	EKC	—		
				8321	+32	-39	1	0	1	0	0	0	0	0	1	AXX	—	
				8324	+22	+10	1	0	1	0	0	0	0	0	0	1	AXX	—
				8322	+22	+22	13	3	7	1	6	7	0	0	0	0	DAC	—
				8319	+19	+39	32	5	8	1	24	8	0	0	0	0	EKC	—
				8307	+31	+62	4	2	0	1	4	0	0	0	0	0	CSO	—
3485	1998 / 08 / 31	2030	316.40	8323	-22	-42	29	5	6	1	23	6	0	0	EKC	—		
				8321	+32	-25	1	0	1	0	0	0	0	0	1	AXX	—	
				8322	+22	+36	9	2	3	1	6	3	0	0	0	0	DAI	—
				8319	+19	+52	21	3	7	1	14	7	0	0	0	0	EKC	—
				8307	+30	+76	3	2	1	1	2	1	0	0	0	0	CSI	compact
3486	1998 / 09 / 02	2030	289.98	8323	-22	-17	35	3	6	1	29	6	0	0	FKC	—		
				8321	+31	-01	2	0	2	1	0	2	0	0	0	AXX	very tight	
				8322	+22	+63	3	1	1	1	2	1	0	0	0	0	CAO	—
				8319	+19	+79	6	2	2	1	4	2	0	0	0	0	DAI	—
3487	1998 / 09 / 03	2030	276.77	8327	+30	-81	1	1	0	0	0	0	1	0	HSX	—		
				8326	+20	-77	1	1	0	0	0	0	0	1	0	HSX	—	
				?	+24	-70	2	1	1	1	1	1	0	0	0	0	CSO	—
				?	+08	-25	1	0	1	0	0	0	0	0	0	1	AXX	—
				8323	-22	-05	36	3	8	1	28	8	0	0	0	0	FKC	—
				?	-11	+22	1	0	1	0	0	0	0	0	0	1	AXX	—
				8322	+22	+76	2	1	1	1	1	1	1	0	0	0	CSO	—
3488	1998 / 09 / 04	2140	262.91	8328	-17	-73	1	0	1	0	0	0	0	1	AXX	big		
				8326	+20	-63	2	1	1	1	1	1	0	0	0	0	CSO	—
				8327	+29	-67	1	0	1	0	0	0	0	0	1	AXX	big	
				?	+24	-55	1	1	0	0	0	0	0	1	0	0	HSX	—
				8323	-22	+09	41	4	7	1	34	7	0	0	0	0	EKC	—
3489	1998 / 09 / 06	2210	236.23	8331	+25	-74	1	1	0	0	0	0	1	0	HSX	—		
				8330	-20	-68	2	0	2	1	0	2	0	0	0	0	BXO	—
				8328	-17	-46	3	1	2	1	1	2	0	0	0	0	CSI	—
				8329	+15	-39	7	2	5	1	2	5	0	0	0	0	DSI	—
				8326	+21	-39	8	1	6	1	2	6	0	0	0	0	CAI	—
				8327	+30	-40	1	0	1	0	0	0	0	0	0	1	AXX	—
				8323	-22	+36	30	2	7	1	23	7	0	0	0	0	EKI	—

## B14

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks	
3490	1998 / 09 / 07	2105	223.62	8331	+25	-66	1	1	0	0	0	0	1	0	HSX	—	
				8330	-20	-58	2	1	1	1	1	1	0	0	CSO	—	
				8328	-17	-35	7	1	4	1	3	4	0	0	CAI	—	
				8327	+30	-29	1	0	1	0	0	0	0	0	1	AXX	—
				8326	+21	-28	12	2	5	1	7	5	0	0	DAI	—	
				8329	+15	-27	11	4	3	1	8	3	0	0	DSC	—	
				8332	-28	-27	2	0	2	1	0	2	0	0	BXO	—	
			8323	-22	+47	24	3	7	1	17	7	0	0	FKC	—		
3491	1998 / 09 / 08	2155	209.95	8331	+25	-52	8	2	3	1	5	3	0	0	DAI	—	
				8330	-21	-45	2	1	1	1	1	1	0	0	CSO	—	
				8328	-17	-21	7	1	4	1	3	4	0	0	CAI	—	
				8327	+29	-15	1	0	1	0	0	0	0	0	1	AXX	—
				8326	+22	-14	7	1	5	1	2	5	0	0	CAI	—	
				8329	+15	-13	16	4	8	1	8	8	0	0	DAC	—	
				8323	-22	+61	17	4	6	1	11	6	0	0	FKC	—	
3492	1998 / 09 / 09	2150	196.79	8331	+25	-39	12	3	5	1	7	5	0	0	DAC	—	
				8330	-21	-32	1	1	0	0	0	0	1	0	HSX	—	
				8328	-18	-08	5	1	2	1	3	2	0	0	CAI	—	
				8327	+29	-02	1	0	1	0	0	0	0	0	1	AXX	—
				8326	+22	-01	4	1	3	1	1	3	0	0	CAI	—	
				8329	+15	+00	14	3	8	1	6	8	0	0	DAC	—	
				8333	+12	+26	3	0	3	1	0	3	0	0	BXO	class correct	
			8323	-22	+74	4	2	1	1	3	1	0	0	EAI	—		
3493	1998 / 09 / 10	2105	184.00	8331	+26	-26	15	4	3	1	12	3	0	0	DAC	—	
				8330	-22	-26	1	1	0	0	0	0	1	0	HRX	—	
				8328	-18	+05	4	1	2	1	2	2	0	0	CAI	—	
				8326	+22	+12	2	1	1	1	1	1	0	0	CSO	small	
				8329	+14	+15	8	2	4	1	4	4	0	0	DSI	—	
				8333	+12	+39	5	1	2	1	3	2	0	0	CAI	—	
3494	1998 / 09 / 11	2100	170.84	8331	+25	-15	13	4	5	1	8	5	0	0	DAC	—	
				8330	-23	-14	1	1	0	0	0	0	1	0	HSX	—	
				8328	-18	+18	3	1	1	1	2	1	0	0	CAO	—	
				8329	+14	+29	6	2	2	1	4	2	0	0	DAI	—	
				8333	+12	+53	11	2	5	1	6	5	0	0	DAI	compact	
3495	1998 / 09 / 12	2050	157.73	8335	-22	-69	4	2	0	1	4	0	0	0	DAO	—	
				8331	+25	-03	16	4	7	1	9	7	0	0	DAC	—	
				8330	-23	-02	2	1	1	1	1	1	0	0	CSO	—	
				8328	-18	+30	2	1	1	1	1	1	0	0	CSO	—	
				8329	+15	+42	3	2	1	1	2	1	0	0	DSI	—	
				8334	-25	+46	3	2	0	1	3	0	0	0	DAO	compact	
			8333	+11	+67	4	2	1	1	3	1	0	0	DAI	compact		



## B15

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks
3496	1998 / 09 / 13	2045	144.57	8335	-22	-57	3	2	0	1	3	0	0	0	DAO	—
				8331	+25	+09	21	3	12	1	9	12	0	0	DAC	—
				8330	-23	+11	2	1	1	1	1	1	0	0	CSO	—
				8328	-18	+44	3	1	2	1	1	2	0	0	CSI	—
				8329	+14	+56	4	2	2	1	2	2	0	0	DSI	—
				8334	+24	+59	2	0	2	1	0	2	0	0	BXO	—
				8333	+11	+80	1	1	0	0	0	0	1	0	HSX	—
3497	1998 / 09 / 16	2055	104.88	8338	+31	-83	1	1	0	0	0	0	1	0	HSX	—
				8336	-29	-53	1	1	0	0	0	0	1	0	HSX	—
				8337	-40	-45	1	0	1	0	0	0	0	1	AXX	—
				8335	-22	-16	5	2	1	1	4	1	0	0	DAI	—
				8331	+26	+45	2	0	2	1	0	2	0	0	BXO	—
				8330	+24	+51	1	0	1	0	0	0	0	1	AXX	—
3498	1998 / 09 / 18	2125	78.20	8340	+21	-65	7	1	5	1	2	5	0	0	CHI	—
				8338	+32	-57	1	1	0	0	0	0	1	0	HSX	—
				8336	-28	-26	2	1	1	1	1	1	0	0	CSO	—
				8337	-40	-17	4	1	3	1	1	3	0	0	CSI	—
				?	+20	+01	1	0	1	0	0	0	0	1	AXX	—
				8335	-22	+11	4	2	0	1	4	0	0	0	DAO	—
				8331	+24	+74	1	0	1	0	0	0	0	1	AXX	—
3499	1998 / 09 / 21	2100	38.83	8343	+37	-40	4	0	4	1	0	4	0	0	BXI	—
				8344	-20	-38	1	0	1	0	0	0	0	1	AXX	big
				8340	+20	-26	27	4	16	1	11	16	0	0	EAC	—
				8338	+32	-19	2	1	1	1	1	1	0	0	CSO	—
				8336	-30	+12	14	1	11	1	3	11	0	0	CSI	—
				8339	-16	+13	6	1	5	1	1	5	0	0	CSI	—
				8335	-21	+50	1	1	0	0	0	0	1	0	HSX	—
3500	1998 / 09 / 30	2115	279.91	?	-21	-17	1	0	1	0	0	0	0	1	AXX	—
				8346	-28	+41	4	0	4	1	0	4	0	0	BXI	—
3501	1998 / 10 / 01	2100	266.85	8350	+20	-81	1	1	0	0	0	0	1	0	HSX	—
				8346	-28	+53	1	0	1	0	0	0	0	1	AXX	—
3502	1998 / 10 / 04	2020	227.64	8350	+19	-43	9	2	4	1	5	4	0	0	DAI	—
3503	1998 / 10 / 06	2020	201.25	8353	+20	-70	1	0	1	0	0	0	0	1	AXX	—
				8350	+19	-17	18	4	6	1	12	6	0	0	DAI	—
				8354	-18	-16	3	0	3	1	0	3	0	0	BXI	—
				8349	-25	+34	2	0	2	1	0	2	0	0	BXO	—

## B16

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks
3504	1998 / 10 / 07	2125	187.46	8355	-22	-66	6	3	1	1	5	1	0	0	DAC	small
				8353	+20	-56	2	0	2	1	0	2	0	0	BXO	—
				8350	+19	-03	21	3	14	1	7	14	0	0	CAI	—
				8354	-18	-02	5	1	3	1	2	3	0	0	CAI	—
				8348	+17	+54	1	0	1	0	0	0	0	1	AXX	—
3505	1998 / 10 / 13	2010	108.99	8360	-19	-05	2	0	2	1	0	2	0	0	BXO	—
				8358	+15	-04	9	2	5	1	4	5	0	0	DAI	—
				8355	-21	+13	7	3	2	1	5	2	0	0	DAI	—
				8359	+22	+43	2	0	2	1	0	2	0	0	BXO	—
				8350	+19	+78	1	1	0	0	0	0	1	0	HSX	—
3506	1998 / 10 / 16	2000	69.51	8362	+19	-63	1	1	0	0	0	0	1	0	HSX	—
				8364	+18	-40	1	0	1	0	0	0	0	1	AXX	—
				8363	+25	-35	8	1	6	1	2	6	0	0	CAI	—
				8361	+14	+20	6	2	4	1	2	4	0	0	DSI	—
				8360	-19	+35	16	2	8	1	8	8	0	0	DAI	—
				8358	+15	+36	8	2	3	1	5	3	0	0	DAI	—
3507	1998 / 10 / 17	2110	55.68	8362	+19	-49	1	1	0	0	0	0	1	0	HSX	—
				8364	+18	-27	3	1	1	1	2	1	0	0	CAO	—
				8363	+25	-21	9	2	3	1	6	3	0	0	DAI	—
				8361	+14	+35	7	1	4	1	3	4	0	0	CAI	—
				8360	+19	+49	8	3	2	1	6	2	0	0	DAI	class correct
				8358	+15	+51	14	4	7	1	7	7	0	0	DAC	—
3508	1998 / 10 / 21	2000	3.56	?	-20	-09	1	0	1	0	0	0	0	1	AXX	small
				8367	+17	-03	11	3	4	1	7	4	0	0	DSC	—
				8365	-27	+30	15	4	5	1	10	5	0	0	DAC	—
				8363	+25	+32	1	0	1	0	0	0	0	1	AXX	—
3509	1998 / 10 / 23	2000	337.19	8366?	-16	+28	4	0	4	1	0	4	0	0	BXI	—
				8367	+17	+24	6	1	4	1	2	4	0	0	CAO	—
				8365	-27	+57	7	2	4	1	3	4	0	0	ESI	—
3510	1998 / 10 / 24	1940	324.18	?	+14	-23	1	0	1	0	0	0	0	1	AXX	small
				8368	+25	+21	1	0	1	0	0	0	0	1	AXX	—
				8367	+17	+38	1	0	1	0	0	0	0	1	AXX	—
				8366	-12	+41	2	1	1	1	1	1	0	0	CSO	—
				8365	-26	+70	5	2	2	1	3	2	0	0	EAI	—
3511	1998 / 10 / 25	1950	310.90	8369	+17	-61	4	1	3	1	1	3	0	0	CSI	—
				8366	-11	+52	1	0	1	0	0	0	0	1	AXX	—
3512	1998 / 10 / 29	2020	257.88	8375	+18	-75	4	1	2	1	2	2	0	0	CHI	—
				8374	-19	-69	1	0	1	0	0	0	0	1	AXX	big
				8373	-25	-59	2	0	2	1	0	2	0	0	BXO	—
				8371	-21	-24	1	0	1	0	0	0	0	1	AXX	—
				8372	+21	-20	2	0	2	1	0	2	0	0	BXO	—
				8369	+18	-08	1	1	0	0	0	0	0	1	0	HSX

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks
3513	1998 / 10 / 31	2205	230.54	8375	+17	-48	6	1	3	1	3	3	0	0	CKI	—
				8374	-18	-42	1	1	0	0	0	0	1	0	HRX	—
				8369	+18	+22	2	1	1	1	1	1	1	0	0	CSO
3514	1998 / 11 / 01	1945	218.64	8375	+17	-35	5	2	2	1	3	2	0	0	CHI	class correct
				8372	+21	+20	2	0	2	1	0	2	0	0	BXO	very small
				8369	+18	+34	1	0	1	0	0	0	0	0	1	AXX
3515	1998 / 11 / 05	1940	165.94	8380	-21	-54	1	0	1	0	0	0	0	1	AXX	—
				8378	+14	-53	1	1	0	0	0	0	1	0	HSX	—
				8377	+22	-39	2	1	0	1	2	0	0	0	HAX	—
				8381	+22	-19	2	0	2	1	0	2	0	0	BXO	—
				8375	+18	+18	28	4	16	1	12	16	0	0	DAC	—
				8373	-22	+29	4	0	4	1	0	4	0	0	BXI	—
				8379	-18	+39	6	2	3	1	3	3	0	0	DRI	—
3516	1998 / 11 / 08	2030	125.92	8383	-14	-79	1	0	1	0	0	0	0	1	AXX	big
				8378	+15	-13	1	1	0	0	0	0	1	0	HSX	—
				8377	+22	-02	7	1	5	1	2	5	0	0	CAI	—
				8381	+22	+21	1	0	1	0	0	0	0	1	AXX	—
				8375	+18	+59	23	5	7	1	16	7	0	0	DKC	—
				8379	-18	+77	1	0	1	0	0	0	0	0	1	AXX
3517	1998 / 11 / 09	1945	113.15	8384	-27	-80	1	1	0	0	0	0	1	0	HHX	—
				8383	-15	-65	3	1	1	1	2	1	0	0	CAO	—
				8378	+15	-00	1	1	0	0	0	0	1	0	HSX	—
				8377	+22	+11	5	1	3	1	2	3	0	0	CAI	—
				8375	+20	+72	25	4	8	1	17	8	0	0	EKC	—
3518	1998 / 11 / 10	2030	99.55	8384	-27	-68	3	1	0	1	3	0	0	0	HXX	—
				8383	-15	-54	4	2	1	1	3	1	0	0	CAO	class correct
				8378	+15	+11	2	1	1	1	1	1	0	0	CHO	—
				8377	+22	+25	5	1	3	1	2	3	0	0	CAI	—
				8375	+21	+83	2	2	0	1	2	0	0	0	DHO	—
3519	1998 / 11 / 11	1950	86.74	8384	-27	-55	6	1	2	1	4	2	0	0	CKI	—
				8383	-15	-43	7	1	3	1	4	3	0	0	CAI	—
				8389?	-17	-08	1	0	1	0	0	0	0	1	AXX	very small
				8378	+14	+26	3	1	1	1	2	1	0	0	CAO	—
				8385	+20	+27	3	0	3	1	0	3	0	0	BXI	—
				8377	+22	+38	3	1	1	1	2	1	0	0	CAO	—

## B18

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks		
3520	1998 / 11 / 13	2030	60.00	8387	+22	-61	1	0	1	0	0	0	0	1	AXX	—		
				8386	-20	-60	1	0	1	0	0	0	0	0	1	AXX	—	
				8384	-27	-29	10	2	4	1	6	4	0	0	0	0	DKI	—
				8383	-15	-17	7	2	4	1	3	4	0	0	0	0	DSI	—
				8378	+14	+53	1	1	0	0	0	0	0	1	0	0	HSX	—
				8385	+20	+54	8	2	4	1	4	4	0	0	0	0	DAI	—
				8377	+22	+65	1	1	0	0	0	0	0	1	0	0	HSX	—
3521	1998 / 11 / 14	1930	47.37	8386	-20	-47	1	0	1	0	0	0	0	1	AXX	—		
				8387	+21	-47	3	0	3	1	0	3	0	0	0	BXI	—	
				8384	-28	-17	12	3	5	1	7	5	0	0	0	0	DKC	—
				8383	-15	-05	7	2	3	1	4	3	0	0	0	0	DAI	—
				8378	+15	+65	1	1	0	0	0	0	0	1	0	0	HSX	—
				8385	+20	+65	6	2	2	1	4	2	0	0	0	0	DAI	—
3522	1998 / 11 / 15	2100	33.37	8387	+21	-33	1	0	1	0	0	0	0	1	AXX	—		
				8386	-20	-33	1	0	1	0	0	0	0	0	1	AXX	—	
				?	+23	-24	1	0	1	0	0	0	0	0	1	AXX	—	
				8384	-28	-04	11	3	5	1	6	5	0	0	0	0	DKC	—
				8383	-15	+09	8	1	6	1	2	6	0	0	0	0	CAI	—
				8385	+21	+79	1	1	0	0	0	0	0	1	0	0	HSX	—
				8378	+15	+80	1	1	0	0	0	0	0	1	0	0	HSX	—
3523	1998 / 11 / 19	1910	341.64	8391	-17	-50	6	0	6	1	0	6	0	0	BXI	—		
				8384	-28	+47	7	2	1	1	6	1	0	0	0	DKI	—	
				8383	-15	+62	1	0	1	0	0	0	0	0	1	AXX	small	
3524	1998 / 11 / 23	2055	287.96	8393	-19	-75	3	2	1	1	2	1	0	0	DSI	—		
				8392	-23	-49	3	1	2	1	1	2	0	0	0	CSI	—	
				?	+26	-31	1	0	1	0	0	0	0	0	1	AXX	—	
				8391	-15	+06	5	1	2	1	3	2	0	0	0	0	CAI	—
				8394	-16	+34	2	0	2	1	0	2	0	0	0	0	BXO	—
3525	1998 / 11 / 24	2120	274.55	8395	+17	-78	2	1	1	1	1	1	0	0	CSO	—		
				8393	-19	-66	8	3	5	1	3	5	0	0	0	DSC	—	
				8392	-24	-36	3	1	2	1	1	2	0	0	0	CSI	—	
				8391	-15	+21	5	1	2	1	3	2	0	0	0	CAI	—	
				8394	-16	+48	4	1	2	1	2	2	0	0	0	CAI	—	
3526	1998 / 11 / 25	2005	262.05	8395	+17	-66	8	4	1	1	4	4	0	0	DSC	—		
				?	+12	-55	1	1	0	0	0	0	1	0	0	HSX	—	
				8393	-19	-53	13	4	4	1	9	4	0	0	0	EHC	—	
				8392	-24	-23	5	1	4	1	1	4	0	0	0	0	CSI	—
				8391	-15	+35	4	1	1	1	3	1	0	0	0	0	CAO	—
8394	-15	+62	3	1	2	1	1	2	0	0	0	0	CSI	—				

## B19

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks	
3527	1998 / 12 / 01	2015	182.89	8403	+21	-78	2	1	1	1	1	1	0	0	CSO	small	
				8402	+17	-67	3	2	1	1	2	1	0	0	DSI	—	
				8397	+15	-47	8	2	5	1	3	5	0	0	DAI	—	
				8401	+12	-16	1	0	1	0	0	0	0	0	1	AXX	—
				8395	+21	+00	26	8	16	1	10	16	0	0	0	FAC	—
				8393	-18	+31	4	1	3	1	1	3	0	0	0	CAI	—
3528	1998 / 12 / 03	2020	156.48	8403	+20	-53	1	1	0	0	0	0	1	0	HSX	—	
				?	+21	-42	1	0	1	0	0	0	0	0	1	AXX	—
				8402	+18	-40	7	2	3	1	4	3	0	0	0	DKI	—
				8397	+15	-21	4	1	3	1	1	3	0	0	0	CHI	—
				8401	+12	+11	3	1	2	1	1	2	0	0	0	CSI	small
				8395	+19	+25	12	2	9	1	3	9	0	0	0	FAI	—
				8393	-16	+58	2	1	0	1	2	0	0	0	0	HAX	—
?	+14	+65	1	0	1	0	0	0	0	0	0	1	AXX	—			
3529	1998 / 12 / 05	2015	130.17	8405	-15	-80	2	0	2	1	0	2	0	0	BXO	—	
				8407?	-14	-50	1	0	1	0	0	0	0	0	1	AXX	—
				8404	-22	-17	1	0	1	0	0	0	0	0	1	AXX	—
				8403	+20	-28	2	1	1	1	1	1	0	0	0	CSO	—
				8402	+17	-13	8	3	2	1	6	2	0	0	0	DAC	—
				8397	+15	+07	5	1	2	1	3	2	0	0	0	CAI	—
				8395	+19	+49	4	2	0	1	4	0	0	0	0	FAO	—
3530	1998 / 12 / 06	1950	117.23	8405	-16	-67	2	1	1	1	1	1	0	0	CSO	—	
				8403	+20	-16	1	1	0	0	0	0	0	1	0	HSX	—
				8404	-22	-03	8	1	7	1	1	7	0	0	0	CSI	—
				8402	+17	-00	10	3	3	1	7	3	0	0	0	DSI	—
				8397	+16	+21	3	1	0	1	3	0	0	0	0	HAX	—
				8395	+20	+62	6	2	3	1	3	3	0	0	0	FAO	class correct
3531	1998 / 12 / 08	2000	90.78	8406	-27	-63	5	2	2	1	3	2	0	0	ESI	—	
				8405	-15	-37	8	2	5	1	3	5	0	0	0	DAI	—
				8407	-16	-08	6	2	3	1	3	3	0	0	0	DAI	—
				8403	+20	+12	1	1	0	0	0	0	0	1	0	HSX	—
				8404	-23	+23	22	5	6	1	16	6	0	0	0	DAC	—
				8402	+17	+28	7	3	3	1	4	3	0	0	0	DAC	—
				8397	+16	+47	3	1	1	1	2	1	0	0	0	CAO	—

## B20

OBS	DATE	UT	CM	REG.No	B	CMD	f	p	s	gr	grfp	grf	efp	ef	Class.	Remarks
3532	1998 / 12 / 13	2050	24.44	8410	+23	-51	1	1	0	0	0	0	1	0	HSX	—
				8411	-28	-40	3	1	1	1	2	1	0	0	CAO	—
				8409	-29	-03	15	4	8	1	7	8	0	0	EAC	—
				8408	-18	+11	12	3	5	1	7	5	0	0	DAC	—
				8412	-15	+24	3	0	3	1	0	3	0	0	BXI	—
3533	1998 / 12 / 15	2010	358.45	8414	+23	-64	1	0	1	0	0	0	0	1	AXX	small
				8410	+25	-25	1	1	0	0	0	0	1	0	HSX	—
				8411	-28	-16	1	0	1	0	0	0	0	1	AXX	—
				8409	-28	+23	19	4	7	1	12	7	0	0	EAC	—
				8408	-18	+37	7	2	4	1	3	4	0	0	DAI	—
3534	1998 / 12 / 18	2050	318.57	8415	+20	-64	13	4	3	1	10	3	0	0	DAC	—
				8410	+24	+14	4	1	3	1	1	3	0	0	CSI	—
				8409	-27	+61	9	3	3	1	6	3	0	0	DSC	—
				8408	-18	+76	4	1	3	1	1	3	0	0	CSI	—
3535	1998 / 12 / 21	2125	278.73	8416	+19	-60	7	2	3	1	4	3	0	0	DAI	—
				8415	+20	-25	10	2	8	1	2	8	0	0	ESI	—
3536	1998 / 12 / 22	2200	265.24	8416	+19	-46	8	3	5	1	3	5	0	0	DSI	class correct
				8415	+20	-12	2	1	1	1	1	1	0	0	CSO	—
3537	1998 / 12 / 23	2000	253.16	8421	+28	-81	1	1	0	0	0	0	1	0	HSX	—
				8420	+18	-67	1	0	1	0	0	0	0	1	AXX	—
				8416	+19	-34	6	3	3	1	3	3	0	0	DSC	—
				8419	+28	-29	3	0	3	1	0	3	0	0	BXI	—
				8415	+21	-02	3	1	2	1	1	2	0	0	CSI	—
3538	1998 / 12 / 25	2010	226.72	8422	-24	-69	6	3	2	1	4	2	0	0	DAC	compact
				8421	+28	-55	11	2	5	1	6	5	0	0	DAI	compact
				8420	+18	-42	1	0	1	0	0	0	0	1	AXX	—
				8416	+20	-08	4	1	3	1	1	3	0	0	CSI	—
				8419	+28	-03	10	3	4	1	6	4	0	0	DAC	—
				8418	-22	+20	1	0	1	0	0	0	0	1	AXX	—
3539	1998 / 12 / 28	2205	186.15	8422	-23	-27	8	1	6	1	2	6	0	0	CAI	—
				8421	+27	-15	35	6	16	1	19	16	0	0	EAC	—
				8416	+18	+32	1	0	1	0	0	0	0	1	AXX	—
				8419	+27	+40	14	5	4	1	10	4	0	0	ESC	—
3540	1998 / 12 / 29	2025	173.90	8422	-23	-15	9	1	7	1	2	7	0	0	CAI	—
				8421	+27	-03	46	7	8	1	38	8	0	0	EKC	—
				8416	+17	+44	1	1	0	0	0	0	1	0	HSX	—
				8419	+27	+51	16	5	6	1	10	6	0	0	EAC	—
3541	1998 / 12 / 30	2145	159.99	8422	-23	-01	5	1	3	1	2	3	0	0	CAI	—
				8421	+26	+11	43	5	7	1	36	7	0	0	EKC	—
				8416	+18	+60	1	0	1	0	0	0	0	1	AXX	—
				8419	+27	+62	6	3	3	1	3	3	0	0	DAC	—



## DAILY SUNSPOT AREA TOTALS - 1998.

All data obtained from United States observatories through the US NOAA.

Data in this section may have accumulated errors of up to 50 units or micro-hemispheres.

All dates are UT dates.

Unit used is 1 000 000th of the visible solar hemisphere, or micro-hemisphere.

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DATE
01	390	120	280	720	490	190	710	570	2010	140	320	1340	01
02	290	110	300	470	660	550	650	520	2250	290	350	950	02
03	160	120	310	410	770	600	640	460	1860	270	540	830	03
04	120	110	560	200	980	670	640	370	1640	260	620	890	04
05	50	90	710	500	1170	650	540	420	1530	250	680	960	05
06	20	100	400	650	1070	540	410	810	1740	330	730	1040	06
07	0	70	80	830	1100	570	380	1060	1500	670	720	950	07
08	0	80	130	940	620	520	310	1300	1490	450	1220	980	08
09	0	60	150	840	530	460	310	1670	960	350	1310	870	09
10	10	110	280	890	540	600	290	1740	640	340	1260	800	10
11	40	80	370	660	430	560	350	1550	690	200	930	1040	11
12	200	220	300	570	460	690	270	1540	870	240	800	740	12
13	160	310	360	430	490	600	110	1270	940	240	850	690	13
14	190	390	420	280	440	470	160	1060	630	330	1050	690	14
15	350	410	900	380	420	270	160	1070	400	450	770	650	15
16	350	580	990	210	500	290	190	1170	280	570	550	570	16
17	330	540	910	130	550	340	240	950	390	730	480	460	17
18	270	420	930	50	370	260	130	1040	700	840	410	510	18
19	90	420	880	90	190	260	160	1150	800	570	360	550	19
20	30	360	910	100	120	280	210	830	790	290	430	340	20
21	10	360	810	70	60	350	450	830	910	220	510	270	21
22	30	230	960	130	60	420	640	820	720	420	320	200	22
23	100	140	650	90	40	400	650	670	760	390	250	250	23
24	250	110	890	0	210	440	810	640	800	260	520	290	24
25	350	200	770	230	460	460	890	700	680	90	950	370	25
26	420	200	720	200	550	460	1040	650	770	90	940	550	26
27	420	140	620	200	570	540	960	460	620	40	900	800	27
28	590	100	580	330	410	680	790	530	550	100	880	1170	28
29	230	—	650	250	210	650	810	810	330	330	990	1170	29
30	140	—	510	310	230	780	680	1630	290	360	930	1270	30
31	120	—	610	—	200	—	680	1820	—	310	—	1070	31
<b>MEAN</b>	184.19	220.71	578.71	372.00	480.65	485.00	492.26	971.29	951.33	336.13	719.00	750.32	<b>MEAN</b>

Quarterly Means: First: 331.44 Second: 446.26 Third: 803.37 Fourth: 600.54

Yearly Mean : 546.85

## SMOOTHED NOAA AREA MONTHLY VALUES — 1990 - 1998.

Data based upon NOAA monthly mean values.

Unit used in observed values is 1 000 000th of the visible solar hemisphere.

Smoothing methods used are the Waldmeier and the 'Barnes 13' methods.

MONTH	Observed	$\zeta^W$	$\zeta^{B13}$	MONTH	Observed	$\zeta^W$	$\zeta^{B13}$	MONTH	Observed	$\zeta^W$	$\zeta^{B13}$
1990 Jan	1457.10	1459.84	1447.69	1993 Jan	438.39	684.60	715.70	1996 Jan	52.90	60.08	55.17
Feb	1079.29	1486.09	1395.16	Feb	1107.50	641.55	677.16	Feb	12.41	62.15	51.98
Mar	1257.74	1446.84	1352.14	Mar	715.16	607.36	627.39	Mar	35.16	62.24	50.12
Apr	1086.00	1397.79	1330.49	Apr	491.67	576.55	568.65	Apr	16.00	52.80	47.11
May	1323.23	1399.05	1336.24	May	408.06	536.41	513.58	May	34.19	50.41	48.42
Jun	915.00	1397.33	1360.66	Jun	425.67	506.04	472.47	Jun	57.00	57.46	55.03
Jul	1448.06	1423.16	1415.21	Jul	343.87	509.95	449.23	Jul	118.39	57.05	60.02
Aug	2310.97	1501.82	1491.35	Aug	292.26	489.23	430.96	Aug	96.13	55.78	62.23
Sep	1133.33	1579.25	1562.42	Sep	222.67	431.42	416.70	Sep	3.67	56.45	62.76
Oct	1328.71	1606.24	1621.17	Oct	570.00	389.84	412.00	Oct	1.29	58.42	63.88
Nov	1812.67	1619.14	1672.53	Nov	468.00	363.45	405.48	Nov	198.33	62.38	65.16
Dec	1551.94	1677.50	1724.80	Dec	487.42	342.04	391.53	Dec	81.67	63.85	62.97
1991 Jan	2294.84	1733.70	1764.60	1994 Jan	735.81	324.62	367.72	1997 Jan	7.74	59.50	57.91
Feb	2219.29	1728.98	1774.15	Feb	312.86	313.35	332.85	Feb	27.14	56.16	54.89
Mar	1976.13	1709.40	1762.20	Mar	122.26	309.96	294.64	Mar	36.45	78.04	62.75
Apr	1015.33	1733.23	1748.30	Apr	86.67	304.13	261.59	Apr	62.00	103.36	76.77
May	1703.55	1722.53	1726.30	May	179.68	279.85	234.28	May	83.23	117.77	92.63
Jun	1935.33	1712.83	1703.53	Jun	140.33	253.46	214.76	Jun	43.33	139.15	116.86
Jul	1776.45	1717.23	1681.24	Jul	210.97	218.07	200.97	Jul	27.74	157.32	147.02
Aug	1869.35	1685.73	1655.18	Aug	154.84	186.92	196.12	Aug	106.45	172.73	179.85
Sep	1105.00	1628.36	1632.35	Sep	278.67	185.18	201.64	Sep	518.67	203.39	215.37
Oct	1929.03	1577.56	1609.92	Oct	374.19	190.25	204.67	Oct	93.87	238.90	249.17
Nov	955.67	1524.07	1571.61	Nov	81.00	189.20	200.08	Nov	451.67	268.38	280.06
Dec	2176.13	1414.70	1502.53	Dec	240.97	185.58	192.28	Dec	341.29	303.34	309.26
1992 Jan	1686.13	1317.28	1414.31	1995 Jan	132.90	179.43	182.37	1998 Jan	184.19	341.10	336.57
Feb	1982.59	1234.93	1305.57	Feb	168.21	171.06	170.53	Feb	220.71	396.49	372.39
Mar	835.48	1166.64	1182.91	Mar	225.16	157.06	155.58	Mar	578.71	450.55	416.91
Apr	936.67	1104.07	1060.09	Apr	105.52	139.51	139.57	Apr	372.00	478.68	459.89
May	498.39	1067.26	959.54	May	135.48	131.25	128.24	May	480.65	499.91	500.59
Jun	515.67	1006.95	878.13	Jun	97.67	122.45	117.81	Jun	485.00	528.09	544.21
Jul	858.06	893.08	809.54	Jul	106.13	111.01	106.88	Jul	492.26	—	—
Aug	811.29	804.63	768.76	Aug	58.71	101.19	96.88	Aug	971.29	—	—
Sep	524.17	763.15	759.76	Sep	39.00	86.78	87.21	Sep	951.33	—	—
Oct	1008.06	739.60	765.05	Oct	192.58	75.13	79.09	Oct	336.13	—	—
Nov	993.33	717.29	761.52	Nov	64.33	67.18	70.31	Nov	719.00	—	—
Dec	690.97	709.78	745.08	Dec	46.45	61.27	61.41	Dec	750.32	—	—



A rectangular box with a grey background and a black border. On the left side, there is a stylized sun icon with a white circle and orange rays. To the right of the icon, the text "SECTION D" is written in a bold, black, sans-serif font.

**SECTION D**

MAJOR SOLAR FLARE TIMINGS .

In this section, data on flares are given in the format of beginning, maximum and ending times, along with the flares' x-ray strengths (in microWatts per square metre). This report deals with 1998's flares.

Flares with a strength of less than 1 microWatt per square metre are not stated.

Analysis of these flare data appears on pages D11 and D12 of this report.

## MAJOR SOLAR FLARES for 1998.

ALL TIMES IN UNIVERSAL TIME (UT).

Times are as at the Earth, the flares actually occurred 8 minutes earlier than the stated times. Data were collected through the US NOAA from a 24-hour satellite watch over the year concerned.

Strength of the flares are stated in microWatts per square metre ( $\mu\text{W m}^{-2}$ ).

If any flares are not  $\geq 1 \mu\text{W m}^{-2}$  in strength, then they are not listed. If the strength of a flare is not known (by the GDSO), or if the strength is questionable, it is also not listed.

If no major flares ( $\geq 1 \mu\text{W m}^{-2}$ ) are observed on any particular day, then the date is left out of the list.

- ◆ A in time columns means the flare continued *after* the end of the observation.
- ◆ B in time columns means the flare started *before* the observation began.
- ◆ OA after maximum time column means the maximum was that time *or after*. This occurs only when the ending time is suffixed with an A and that that time is the same as the maximum time.
- ◆ OB after the maximum time column means the maximum was that time *or before*. This occurs only when the beginning time is suffixed with a B and that that time is the same as the maximum time.
- ◆ U in time columns means 'uncertain'.

If times go beyond 24 hours UT, then 0015 is stated as 2415, etc.

UNIVERSAL TIME					UNIVERSAL TIME					UNIVERSAL TIME					
DATE	BEG.	MAX.	END.	STR	DATE	BEG.	MAX.	END.	STR	DATE	BEG.	MAX.	END.	STR	
1998/01/01	0132	0132	0139	1.8	1998/01/13	1007	1016	1045	1.3	1998/02/16	0302	0326	0342	3.2	
	0304	0308	0317	11	01/14	1311	1312	1325	1.2	02/17	0346	0351	0400	1.0	
	0655	0701	0718	2.4		1540	1600	1626	4.1		0923	0953	1016	2.9	
	1945	1952	1959	1.0		2027	2036	2041	2.3	02/18	0921	0924	0945	1.5	
01/02	0913	0928	0935	6.4	01/15	0109	0118	0136	1.1		1135	1138	1244	5.2	
	1221	1232	1250	1.2		0933	1001	1015	6.8		1221	1226	1230	1.8	
	1302	1303	1306	12		1159	1217	1226	1.1	02/19	0523	0527	0552	1.1	
01/03	1212	1220	1226	3.3		1305	1309	1350	1.4	02/20	1007	1007	1041	1.0	
	1649	1719	1743	27		1437B	1440	1457	10	02/22	1636	1646	1651	1.4	
01/05	0148	0159	0227	1.2		1959	2000	2005	1.1	02/23	0639	0646	0651	1.1	
NO MAJOR FLARES OBSERVED FROM 1998/01/06 TO 1998/01/11 INCLUSIVE.					01/20	1932	1940	1946	1.5		0701	0707	0711	1.8	
					01/25	1530	1530	1536	1.1	02/24	1338	1339	1346	1.0	
						1943	1943	1952	2.8	NO MAJOR FLARES OBSERVED FROM 1998/02/24 TO 1998/02/28 INCLUSIVE.					
1998/01/12	0211	0222	0235	4.5		2128	2132	2158	13						
	0321	0341	0356	2.0	01/26	1439	1444	1500	1.3	1998/03/01	1107	1107	1112	1.0	
	0440	0453	0502	4.4		2224	2227	2254	5.4		1302	1306	1316	1.2	
	0629	0638	0643	1.2	01/28	0249	0253	0255	1.1		1734	1746	1755	1.1	
	0752	0758	0804	1.1	01/29	0147	0150	0207	1.8		03/02	0424	0433	0437	1.0
	0826	0837	0845	2.5	NO MAJOR FLARES OBSERVED FROM 1998/01/30 TO 1998/02/14 INCLUSIVE.						1208	1209	1222	1.2	
	1144B	1148U	1156A	3.8							2354	2401	2404	1.9	
	1502	1519	1529	3.2	1998/02/15	0418	0423	0440	1.3	03/03	0137	0154	0156	1.6	
	1937	2007	2028	1.0		0711	0713	0724	1.0		0248	0250	0259	1.0	
	2105	2105	2109	1.3		1137	1145	1209	1.7		0303	0309	0316	1.1	
						1823	1829	1833	1.8	CONTINUED...					

D3

UNIVERSAL TIME					UNIVERSAL TIME					UNIVERSAL TIME				
DATE	BEG.	MAX.	END.	STR	DATE	BEG.	MAX.	END.	STR	DATE	BEG.	MAX.	END.	STR
1998/03/03	0720	0720	0728	1.2	1998/03/17	1037	1041	1048	2.3	1998/04/02	0519	0530	0539	1.0
cont.	2039	2040	2048	1.8	cont.	1333B	1333U	1346	3.6		0754	0755	0814	1.4
	2135	2139	2149	1.1		1629	1716	1730	1.2		1104	1106U	1151A	1.0
	2158	2208	2230	2.4	03/18	0036	0048	0052	1.9		1152	1247	1328	1.1
03/04	0555	0556	0606	1.9		0258	0302	0311	1.2		1427	1428	1447	2.3
	0714	0716	0726	2.7		1050	1112	1134	10		1643	1647	1712	1.8
	1734	1735	1743	1.5	03/19	0117	0125	0145	12		2152	2216	2311	1.2
	1809	1849	1909	1.3		0410	0414	0417	1.0	04/03	2337	2349	2421	6.7
	1912B	1914U	1927A	2.1		0510	0516	0533	7.5	04/04	0739	0757	0834	6.2
	1941	1943	1945	1.2		0901	0904	0912	1.1		1439	1443	1447	1.2
	2134	2134	2144	2.7		0919	0922	0924	1.0		1819	1825	1833	2.2
03/05	0018	0020	0029	2.8		0953	0958	1006	3.2		2046	2053	2059	2.6
	0807	0814	0822	1.4		1147	1152	1214	1.7	04/05	0355	0402	0412	2.1
	0909	0911	0916	4.4		1843	1851	1853A	2.8		0808	0820	0842	3.3
	1231	1237	1242	2.6		2027B	2028	2037	1.0		1150	1151	1157	1.1
	1300	1325	1343	2.0	03/20	0305	0310	0314	2.7		1303	1315	1324	4.9
	1506	1506	1510	2.5		0442	0448	0457	3.8		1632	1634	1644	10
	1729	1737	1741	1.5		0640	0644	0650	2.0		2155	2200	2205	3.6
	2009	2010	2026	1.4		1203	1208	1211	4.5	04/06	0652	0701	0743	4.7
	2302	2309	2312	5.6		1229	1245	1305	1.7		0946	1014	1032	2.5
03/06	0126	0128	0134	2.7		1445	1454	1500	1.1		1206	1211	1216	1.8
	1231	1236	1240	1.0		1628	1633	1642	1.8		1459	1504	1515	1.2
03/07	0219	0231	0253	1.3		1943	1949	1954	1.8		1630	1634	1707	11
03/08	1902	1924	1939	1.1	03/21	0248	0252	0254	1.0		1715	1720	1748	3.4
03/09	1245	1258	1307	1.1		0527	0531	0538	1.4		1842	1842	1853	2.4
03/12	0114	0122	0131	1.0		1826	1827	1832	1.1	04/07	0107	0110	0112	1.3
03/13	2051	2111	2117	5.8	03/22	0652	0700	0715	11		0133	0138	0142	1.2
03/14	1117	1118	1141	1.1		0829	0833	0837	2.1		0409	0412	0422	1.2
	1147	1152	1156	2.2		1107B	1109U	1121A	2.0		0446	0459	0507	1.3
	1446	1448	1503	1.4		1457	1500	1503	1.1		0657	0702	0706	1.1
03/15	0145	0149	0152	1.6		1634	1634	1641	1.9		1340	1347	1349	1.1
	0427	0433	0436	1.2	03/23	0239	0309	0329	23		2048	2059	2105	1.2
	0725	0729	0731	1.1	03/24	0145	0153	0203	2.3	04/08	0344	0406	0428	2.1
	1154B	1154	1207	2.1		0433	0447	0459	4.3		0848	0858	0936	1.1
	1309	1310	1315	1.6		0650	0705	0755	1.5		1929	1936	1948	1.3
	1606	1616	1720	10		1022	1114	1217	8.0		1949	1950	2007	1.9
	1736	1747	1759	7.5	03/25	1146B	1148U	1151A	1.2		2136	2136	2149	5.7
	1834	1838	1844	1.7		1231	1325	1434	5.3	04/09	0422	0430	0437	2.4
	1913	1921	1943	18	03/26	1247	1254	1348	18		1814	1815	1821	2.9
	2016	2032	2040	3.4	03/27	0036	0046	0127	1.0		1937	1942	1955	1.3
	2141	2146	2150	27		1310	1319	1355	1.3	04/10	0051	0057	0109	1.1
	2155	2247	2301A	5.0		1559	1600	1612	1.0		0111	0114	0116	1.5
03/16	0102	0106	0112	11		2153	2225	2430	24		0201	0215	0241	2.3
	0201	0208	0210	1.9	03/28	0713	0714	0735	4.9		1046B	1047U	1128	1.2
	0739	0815	0842	3.7		1950	1957	2002	1.3	04/11	0426	0455	0531	3.0
	0925	0926	0929	1.0	03/30	1947	1952	1955	1.4		0428	0443	0446	2.1
	1059B	1156	1300	7.9		2345	2351	2355	3.5		0813	0844	0923	4.5
	1642	1646	1659	1.3	03/31	0258	0300	0315	2.0		0909	0912	0949	3.6
	1715	1724	1738	6.4		0358	0401	0404	1.1		1513	1513	1527	1.8
	1833	1836	1927	5.9		0545	0548	0552	1.4	04/13	0332	0343	0412	1.3
	2006	2025	2057	2.1		0855	0907	0916	1.1	04/15	0739	0745	0806	8.8
	2126	2131	2153	2.0		1332	1334	1339	1.0		0801	0812	0822	3.7
	2201	2210	2215	2.4							1201	1223	1245	8.2
03/17	0028	0041	0101	2.0	1998/04/01	0921	0923	0931	2.7		1509	1510	1514	9.9
	0323	0323	0334	2.0		1356	1358	1400	1.4		2140	2149	2210	1.2
	0411	0417	0421	1.2		1522	1538	1632	2.1	04/16	0102	0111	0117	9.5
	0546	0618	0629	1.4		1956	2004	2015	1.0		0222	0222	0228	1.0
	0829	0829	0836	1.1		2202	2210	2228	1.2		0406	0424	0445	1.0
										04/20	0938	1021	1118	14

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UNIVERSAL TIME					UNIVERSAL TIME					UNIVERSAL TIME				
DATE	BEG.	MAX.	END.	STR	DATE	BEG.	MAX.	END.	STR	DATE	BEG.	MAX.	END.	STR
1998/04/23	0535	0555	0623	120	1998/05/06	1653	1656	1658	1.6	1998/05/16	0155	0157	0204	2.2
04/24	0834	0852	0854	8.9	cont.	1711	1712	1721	3.1		0428	0432	0448	1.6
04/25	1118	1123	1127	1.2		1838	1839	1902	2.9		1549	1556	1601	1.1
	1422	1514	1557	3.6		2207	2208	2213	1.5	05/19	0756	0802	0804	4.4
	1801	1816	1835	1.5		2257	2302	2310	2.9		1541	1605	1634	3.0
04/27	0836	0911	1234	100	05/07	0109	0109	0114	3.5		2324	2438	2505	1.1
	1607	1611	1613	1.2		0729B	0729U	0737A	4.8	05/24	0746	0807	0817	1.8
04/29	0138	0143	0203	4.3		1107	1114	1156	29	05/26	2032	2034	2044	1.2
	0745	0818	0907	1.7		1340	1342	1345	13		2113	2113	2117	1.7
	1605	1630	2023	68		1441	1449	1520	3.7	05/27	0609	0609	0613	1.8
04/30	2118	2122	2221	6.6		1614	1621	1643	2.0		0725	0731	0735	1.8
						1637	1642	1646	1.9		0816	0831	0839	1.6
1998/05/01	0303	0308	0312	1.1		2224	2229	2235	1.8		0931	0934	0941	1.5
	1203	1206	1216	1.9	05/08	0149	0204	0217	31		1103	1110	1116	5.8
	1246	1258	1345	11		0553	0608	0626	14		1213	1217	1221	1.8
	1427	1453	1524	1.7		1251B	1304U	1340A	5.4		1330	1335	1450	7.5
	1734	1736	1808	2.1		1350	1415	1437	18		1816	1819	1825	5.0
	2005	2011	2033	2.8		2117	2130	2146	3.5		1836	1837	1839	3.8
	2115	2124	2133	1.2		2256	2256	2304	2.7		2131	2134	2138	2.1
	2143	2151	2201	2.6		2340	2344	2350	3.2		2225	2232	2241	5.4
	2250	2254	2309	12	05/09	0015	0027	0037	8.3		2305	2307	2321	1.6
05/02	0155	0201	0228	2.7		0149	0213	0233	7.0		2343	2344	2348	2.6
	0329	0334	0337	1.1		0304	0340	0355	77	05/28	0104	0104	0109	3.3
	0440	0456	0548	5.4		0534	0540	0545	6.2		0227	0232	0238	3.0
	1006	1020	1035	1.4		1031	1037	1048	2.9		0343	0347	0351	1.2
	1334	1342	1547	110		1102	1104	1113	4.7		0402	0413	0420	2.9
	1749	1750	1754	2.1		1305	1315	1324	6.6		0436	0438	0446	3.1
	2035	2105	2126	5.6		1356	1401	1417	2.0		0621	0622	0625	1.2
05/03	1014B	1015U	1045	2.5		1426	1431	1437	1.9		0721	0724	0729	1.2
	1602	1603	1612	1.0		1726	1738	1757	4.5		0806	0814	0817	1.9
	1826	1833	1921	4.0		2027	2035	2043	3.9		0847	0853	0858	2.8
	2115	2124	2227	14		2127	2136	2145	2.7		0921	0924	0927	1.0
05/04	0341	0357	0430	1.0		2232	2236	2246	1.6		1035	1040	1042	3.2
	1658	1716	1748	2.9		2331	2338	2345	3.5		1126	1126	1131	2.3
	1824	1831	1840	1.1	05/10	0044	0049	0100	1.9		1257	1257	1300	2.6
	2247	2405	2435	3.0		0305	0318	0334	4.0		1346	1349	1356	11
	2258	2305	2315	1.9		0344	0354	0401	5.7		1652	1657	1700	1.5
05/05	0438	0443	0446	1.1		0438	0504	0519	2.4		1859	1912	1918	8.7
	0530	0530	0534	1.5		0523	0528	0534	2.9		2027	2029	2033	2.2
	0932	0942	0946	1.1		0640	0647	0650	1.4		2113	2119	2121	2.4
	1028	1034	1037	2.2		0702	0716	0721	1.3		2243	2252	2301	2.2
	1156	1202	1204	7.7		0724	0728	0733	1.4	05/29	0051	0059	0103	67
	1612	1615	1618	1.2		0815	0826	0845	16		0334	0340	0342	4.1
	1622	1628	1645	3.6		0944	0948	0953	2.1		0655	0711	0715	4.9
	1823	1855	2030	3.5		1055	1058	1102	1.1		1100	1110	1126	4.3
	1927	1938	1942	7.3		1145	1149	1156	1.5		1232	1240	1250	1.9
	2049	2053	2115	2.6		1321	1322	1324	39		1347	1353	1401	2.0
	2214	2218	2224	2.3		1508	1511	1515	1.0		1828	1838	1854	1.9
	2304	2342	2512	2.4		1925	1929	1931	1.6		1916	1920	1923	1.1
	2316	2319	2321	2.1		2025	2028	2031	1.3		2119	2132	2149	2.2
	2329	2341	2445	25	05/12	0507	0546	0637	1.2		2342	2344	2354	3.6
05/06	0441	0442	0447	4.0		1842	1846	1850	1.0	05/30	1044	1048	1052	1.0
	0453	0506	0517	8.4	05/13	1451	1452	1501	1.1	05/31	0353	0515	0841	2.0
	0610	0610	0616	2.8		2224	2225	2230	1.6					
	0627	0629	0635	3.8	05/14	1030	1036	1043	1.5	1998/06/03	0234	0303	0357	1.4
	0702	0704	0707	3.7		1347	1348	1411	2.4		2301	2308	2313	1.6
	0725B	0725U	0745A	29		1655	1704	1709	1.2	06/04	2038	2039	2043	1.0
	0758	0804	0905	270	05/15	0220	0222	0223A	1.8		2137	2144	2152	1.0
	1335	1337	1345	6.8		1002	1009	1015	1.7					

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UNIVERSAL TIME					UNIVERSAL TIME					UNIVERSAL TIME				
DATE	BEG.	MAX.	END.	STR	DATE	BEG.	MAX.	END.	STR	DATE	BEG.	MAX.	END.	STR
1998/06/05	0444	0444	0450	1.4	1998/06/28	0353B	0401	0422	2.9	1998/07/16	0906	0916	0932	1.4
	0950	0951	0958	1.2		0628	0633	0640	1.2	cont.	1023B	1025U	1037A	1.1
	1419	1419	1427	1.1		1912	1916	1918	1.2		1244	1252	1301	1.4
06/07	1446	1453	1528	3.2		1958	2003	2007	1.6		1315	1319	1325	1.6
06/08	1558	1603	1700	5.2		2059	2059	2112	1.8		1621	1624	1647	3.5
	1956	2004	2008	1.0	06/29	0617	0633	0648	1.4		2024	2034	2101	5.0
06/10	0224	0232	0244	1.3		2216	2245	2323	3.4	07/18	1644	1656	1705	2.7
	0402	0408	0413	1.2	06/30	0140	0147	0205A	5.0	07/19	1837	1845	1849	1.4
	2311	2414	2520	1.1		2258	2300	2314	1.3	07/22	0439	0503	0526	6.5
06/11	0957	1027	1118	14							0704	0711	0716	1.4
06/12	0032	0202	0248	1.1	1998/07/01	0004	0005	0028	1.4		1651	1652	1658	1.5
	0251	0252	0256	1.2		1014	1020	1022	1.6	07/23	1602	1603	1614	1.4
	0539	0540	0544	1.4		1801	1814	1826	3.6		1630	1631	1635	1.1
	0613	0617	0621	1.0		1837	1839	1849	6.8		1742	1749	1758	1.0
	0820	0827	0831	1.1	07/02	0116	0122	0125	1.4	07/24	0333	0334	0345	8.2
	0916	0919	0925A	3.1	07/03	0006	0112	0127	12		1656	1712	1721	1.3
	2110	2110	2148	2.1		0518	0602	0620	1.4		1938	1944	1948	2.1
	2304	2319	2333	1.8		1123B	1123U	1132	1.3		2050	2053	2055	1.1
06/13	0149	0155	0200	1.4		1740	1741	1751	1.6	07/25	0419	0426	0432	1.6
	0215	0357	0621	2.6		2015	2015	2022	2.1		0904	0909	1016	1.4
	0418	0419	0439	19		2354	2455	2503	1.7	07/31	0331	0345	0413	1.2
	0909	0917	0932	3.4	07/04	0540	0543	0614	9.4		0528	0539	0708	2.9
	1203	1210	1215	1.3		0822	0825	0830	1.2	1998/08/01	1804	1820	1842	3.3
	1458	1532	1554	2.9		1006	1014	1029	5.8	08/02	0450	0513	0532	1.7
	1721	1728	1741	2.4		1202	1204	1249	12	08/05	1605	1615	1627	1.2
	1757	1759	1803	1.3		1446	1452	1514	5.5	08/06	0633	0643	0711	1.0
06/14	0103	0109	0113	3.0		1635	1639	1710	9.7		1023	1025	1029	1.0
06/15	0600	0750	0937	1.4		1852	1856	1902	2.3		1117	1125	1143	1.0
06/16	1803	1842	1928	10		1917	1925	1951	1.7		1156	1202	1256	2.8
06/20	1419	1426	1456	4.0		2224	2232	2238	2.2		1221	1225	1234	2.6
	2057	2100	2131	1.9		2253	2259	2306	1.3		1425	1428	1437	1.4
	2201	2210	2228	3.9		2307	2318	2324	3.4		1556	1605	1612	2.8
	0459	0515	0519	2.7	07/05	0613	0618	0623	1.2		1801	1802	1808	1.4
	0726	0733	0739	1.6		0852	0858	0904	1.1		1950	1955	2004	1.4
	0953	1002	1047	3.4		1025	1031	1036	1.9		2233	2256	2304	1.3
	1802	1808	1814	1.2		1129	1140	1252	7.3	08/07	0719	0720	0724	4.8
	2106	2109	2116	2.1		1219B	1219U	1316A	1.7		1221	1225	1227	1.1
06/22	0432	0433	0442	2.9		1805	1806	1816	1.6		1416	1419	1450	2.9
	2110	2113	2115	1.4	07/06	1350	1400	1411	1.2		1619	1620	1631	1.2
06/23	1031	1033	1041	1.3	07/07	1010	1013	1030	1.4		1843	1847	1850	1.2
	1918	1922	1930	1.9	07/08	1027	1055	1120	1.9		2227	2235	2241	1.2
06/24	0451	0451	0455	1.0		2246	2313	2329	1.1		2337	2338	2356	1.8
	0502	0508	0518	1.2	07/09	1025	1117	1141	2.5	08/08	0026	0030	0032	1.0
	0905	0906	0910	1.3	07/10	0405	0410	0413	1.2		0212	0221	0236	3.1
	1131	1136	1151	1.6	07/11	0434	0450	0508	1.7		0312	0317	0320	30
	1747	1802	1823	1.6		1249	1253	1257	4.3		0817	0821	0826	2.1
	1901	1904	1910	2.7	07/14	0212	0225	0253	2.4		1240	1248	1252	4.2
	1911	1918	1928	3.8		1053	1056	1128	1.0		1451	1452	1459	4.0
06/25	0318	0340	0354	1.6		1255	1259	1340	46		1832	1840	1856	3.6
	0810	0817	0827	1.1		1853	1903	1911	2.9	07/15	1040	1042	1053	5.7
	1834	1839	1855	1.0		1106B	1106U	1112A	2.8	08/09	0506	0517	0527	2.2
	2038	2047	2221	6.5		1515	1516	1534	1.6		0841B	0844	0925	10
	2145	2151	2209	2.0		1551	1553	1630	3.7		1333	1339	1348	1.0
06/26	2255	2302	2327	2.1		1951	2010	2052	6.8		1415	1423	1430	2.1
06/27	0116	0119	0151	10		2138	2145	2155	1.0		1621	1627	1650	3.4
	0847	0847	0900	1.1	07/16	0022	0022	0033	6.5		1712	1716	1742	33
	1813	1816	1831	1.7		0106	0112	0121	1.5		1941	1946	1952	1.3
	1904	1907	1910	1.1		0755	0759	0815	2.3		2050	2055	2101	2.0
	2102	2108	2118	1.0										

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UNIVERSAL TIME					UNIVERSAL TIME					UNIVERSAL TIME				
DATE	BEG.	MAX.	END.	STR	DATE	BEG.	MAX.	END.	STR	DATE	BEG.	MAX.	END.	STR
1998/08/10	1101	1103	1114	1.6	1998/08/22	1646	1659	1748	1.9	1998/09/02	0158	0207	0213	3.3
	1455	1456	1503	1.0	cont.	1928	1932	1949	2.2		0404	0439	0442A	2.0
	1627	1656	1706	1.7		2030	2033	2035	1.6		0632	0632	0639	1.6
	2111	2113	2116	1.1	08/23	0608	0610	0727	2.8		0856	0936	1004	4.7
08/11	0302	0321	0343	1.4		0626	0637	0650	5.5		1218	1223	1230	2.4
	0454	0459	0509	1.0		0926	0931	1000A	22		1503	1506	1527	2.2
08/12	1155	1201	1206	1.0		1107	1107	1156	3.6		1650	1705	1731	22
	1736	1759	1808	1.3	08/24	1524	1524	1530	1.1	09/03	0027	0034	0040	1.8
08/13	1015	1016	1038	1.5		2148	2204	2508A	100		0111	0117	0124	3.5
	1336	1338	1350	1.3	08/27	1051	1129	1208	3.0		0228	0233	0236	3.7
	1407	1410	1425	1.3		1953	1958	2003	1.6		0345	0421	0440	13
	1504	1509	1512	1.5	08/28	1103	1110	1124	1.8		0542	0545	0549	3.4
	1754	1756	1806	9.5		2211	2216	2220	1.6		1410	1430	1515	3.9
	1923	1924	1926	1.8	08/29	0054	0103	0111	2.5		1516	1517	1534A	11
08/14	0043	0047	0049	1.8		0457	0500	0509	1.7		2303	2307	2310	1.3
	0055	0101	0105	1.5		0533	0538	0544	1.2	09/04	0939	0948	1020	2.2
	0500	0501	0536	1.2		1341	1345	1351	1.0		1454	1454	1459	1.2
	0557	0559	0608	1.9		1532	1534	1547	2.5		2322	2331	2406	3.2
	0826	0826	0842	31		1830	1836	1840	5.3	09/05	0626	0626	0631	1.3
08/15	0026	0038	0045	3.3		2148	2153	2202	1.1		0755B	0803U	0814	2.2
	0236	0244	0257	1.0	08/30	0039	0040	0054	1.8		1053	1056	1059	1.3
	0624	0626	0659	7.6		0151	0156	0202	1.3		1258B	1301U	1311	2.1
	1150	1201	1209	2.4		0236	0240	0244	1.4		1407	1425	1430	1.5
	1632B	1635U	1643	1.2		0336	0340	0359	4.3		1434	1452	1501	1.6
	2327	2331	2341	1.3		0514	0540	0612	10		1727	1731	1737	2.0
08/16	1003	1012	1025	1.2		0618	0620	0646	6.8		1907	1907	1922	1.5
	1456	1500	1505	1.1		0726	0730	0735	2.0		2206	2208	2221	1.3
	1737	1821	1859	31		0932	0935U	0953A	10	09/06	0019	0019	0023	2.6
08/17	0658	0717	0921	1.3		1133	1141	1200	2.4		0211	0213	0226	2.3
	1000	1007	1110	1.5		1253	1255	1310	3.1		0556	0624	0710	2.6
	1458	1511	1523	3.3		1316	1320	1325	2.5		1100	1107	1120	1.3
	1811	1824	1835	6.9		1328	1359	1438	3.4		1559	1603	1622	1.1
	2110	2120	2130	120		1447	1452	1457	2.8		1915	1917	1922	2.5
	2353	2402	2425	1.2		1642	1647	1651	5.4		1949	2018	2058	3.9
08/18	0400	0416	0427	15		1726	1726	1731	2.3	09/07	0101	0105	0110	1.0
	0616	0626	0631	1.2		1807B	1808U	1808A	13	09/08	1014	1041	1136	1.3
	0826	0831	0842	280		1837	1842	1850	3.3		1210	1218	1247	2.5
	2213	2216	2350	490		2017	2031	2037	3.6		1800	1810	1835	1.0
08/19	0923	0928	0934	1.3		2151	2154	2158	2.8		2237	2241	2244	1.4
	1025	1028U	1041A	5.8		2247	2259	2304	3.6		2315	2316	2319	1.1
	1238	1241	1251	23	08/31	0055	0056	0058	2.3	09/09	0441	0444	0447	1.4
	1408	1429	1456	30		0215	0217	0227	2.4		0452	0458	0505	28
	2033	2039	2055	3.2		0522	0524	0555	5.7		1404	1418	1431	1.3
	2207B	2207U	2238A	390		0625	0629	0637	3.8		1641	1644	1648	1.2
08/20	0029	0029	0051	5.7		1529	1541	1609	15		1734	1737	1806	1.7
	1227	1232	1303	1.8		1759	1806	1808	3.8		1826	1829	1833	1.0
	1401	1404	1406	1.0		1954	1957	2006	4.4	09/10	0259	0303	0323	4.2
	1529	1532	1535	1.7		2051	2101	2111	7.8		1303	1311	1318	1.0
	2107	2118	2126	2.1		2315	2318	2324	2.9		2135B	2136U	2147	2.2
08/21	0147	0154	0203	2.5							2159B	2208	2223	2.0
	0617	0625	0635	2.7	1998/09/01	0145	0145	0151	3.1	09/11	0509	0532	0605	1.7
	0853	0903	0915	4.5		0219	0223	0232	3.4		0921	0940	1020	1.6
	1612	1613	1640	1.0		0325	0329	0336	2.1		1054	1056	1111	1.8
	2103	2114	2139	5.1		0452	0453	0514	15		1501	1524	1549	2.5
08/22	0000B	0010	0140A	90		0649	0704	0735	2.8		1558	1603	1607	21
	0847	0849	0852	1.3		0929	0935	0944	2.0		2043	2050	2052	2.0
	1307	1307	1311	1.4		1009	1052	1138	4.9	09/12	0138	0139	0150	1.2
	1506	1506	1511	1.9		1234	1238	1243	4.4		0747	0753	0755	3.1
						1807	1816	1834	3.8		1252B	1253U	1308	1.1
						2245	2245	2249	4.7		2028	2033	2053	1.9

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DATE	UNIVERSAL TIME				DATE	UNIVERSAL TIME				DATE	UNIVERSAL TIME			
	BEG.	MAX.	END.	STR.		BEG.	MAX.	END.	STR.		BEG.	MAX.	END.	STR.
1998/11/08	0235	0236	0238	2.5	1998/11/16	1202A	1204	1227A	2.9	1998/11/26	1136	1139	1141	1.0
	0426	0439	0505	6.9		1321	1328	1333	1.0	cont.	1319	1328	1339	1.6
	0733	0734	0736	2.1		1512	1519	1527	1.0		1644	1644	1652	1.7
	1055	1115	1131	5.9		1639	1643	1657	2.5		1710	1730	1739	1.2
	1316	1322	1340	2.8		2009	2015	2018	7.9		2223	2259	2317	1.5
	1529	1626	1651	6.0		2150	2151	2206	4.9	11/27	0330	0348	0352	1.1
	1708	1714	1745	27		2307	2316	2332	4.5		0419	0425	0436	1.2
	1956	2009	2055	4.8	11/17	0351	0456	0523	2.3		0715	0741	0851	16
	2246	2248	2323	11	11/18	1044	1055	1106	1.0		1052	1055	1102	2.6
11/09	0022	0029	0056	5.3	11/20	1521	1523	1543	2.5		1155	1205	1217	1.6
	0143	0153	0204	3.9		2216	2221	2228	1.3		1232	1237	1248	2.2
	1326	1330	1334	2.2	11/21	0030	0042	0059	1.3		1549	1552	1555	1.2
	1453	1455	1506	3.1		0637	0640	0647	2.2		1612	1625	1631	1.2
	1939	2014	2040	3.4		0807	0808	0812	1.5		1819	1820	1826	2.4
	2111	2114	2120	4.9		1128	1133	1137	1.1		1926	1927	1932	1.4
	2219	2223	2226	3.3		1613	1615	1627	3.0		2137	2147	2159	2.4
11/10	0013	0015	0020	7.9		1656	1657	1708	1.2	11/28	0605B	0609U	0810	330
	0652	0653	0657	3.3		1917	1919	1931	1.3		1723	1726	1730	5.1
	0917	0920	0926	2.0		1959	2010	2027	1.7	11/29	0156	0207	0242	2.1
	1137	1202	1236	4.0		2010	2010	2014	1.3		0626	0630	0633	2.8
	1328	1332	1337	3.5		2054	2054	2100	1.2		0640	0645	0654	2.8
	1523	1532	1536	6.7		2121	2124	2126	1.7		1040	1043	1046	1.6
	1540	1545	1609	18		2328	2358	2410	3.2		1124	1131	1138	1.6
	1724	1728	1731	3.5	11/22	0635	0645	0711	370		2051B	2051U	2116A	2.1
	1751	1754	1758	3.3		1004	1005	1010	1.6	11/30	0042	0053	0058	2.5
	1814	1815	1824	3.7		1215	1231	1247	8.8		0557	0558	0602	2.5
	2047	2051	2058	8.1		1421	1424	1428	1.6		0645	0656	0709	1.7
11/11	0103	0107	0118	3.2		1439	1443	1447	2.5		0747	0756	0759	1.3
	0159	0201	0211	3.0		1615	1618	1703	250		0936	0938	0941	1.8
	0212	0215	0218	3.2		1828	1839	1851	10		1012	1016	1020	3.7
	0309	0316	0319	3.6		2140	2215	2235	18		1114	1123	1156	3.6
	0402	0407	0412	10	11/23	0022	0028	0035	2.8		1237	1242	1250	1.7
	0450	0456	0500	2.6		0357	0400	0402	2.9		1450	1454	1456	2.0
	0639	0645	0654	3.8		0556	0604	0613	4.9		1526	1536	1553	4.9
	0707	0708	0716	2.5		0650	0653	0702	220		1854	1900	1906	1.6
	0733	0738	0743	3.5		1028	1040	1046	3.8		2005	2013	2024	2.1
	0954	0956	0959	4.2		1059	1121	1140	31		2253	2300	2314	3.5
	1010	1016	1024	11	11/24	0207	0220	0237	100					
	1203	1207	1211	1.9		0848	0851	0855	3.4	1998/12/01	0526	0529	0532	1.0
	1309	1312	1323	1.5		1026	1030	1035	2.3		0649	0649	0654	1.2
11/12	0526	0528	0546	10		1233	1237	1242	2.3		1120B	1120U	1132A	2.1
	0620	0624	0630	1.6		1907	1913	1922	1.9		1315	1321	1331	1.1
	0708	0708	0715	1.9		2214	2215	2221	8.4		1622	1623	1632	1.3
	0816	0820	0828	1.4		2341	2342	2346	2.9		1721	1727	1742	1.2
	0950	1135	1300	3.0	11/25	0021	0025	0030	1.3		1807	1809	1854	5.0
	1514	1520	1528	2.1		0330	0335	0343	2.0		2043	2050	2100	2.0
	1841	1858	1917	1.1		0551	0556	0613	2.7	12/02	0110	0114	0119	1.2
	2352	2354	2405	3.8		0944	0947	0953	2.4		0906	0910	0918	1.3
11/13	0312	0312	0319	1.9		1317	1323	1328	4.5		1844	1849	1851	1.1
	2058	2059	2128	5.1		1358	1403	1408	6.4	12/03	0439	0440	0443	1.0
11/14	0203	0210	0216	2.5		2051	2107	2124	2.9		1204	1205	1237	2.0
	0500	0508	0515	1.3		2248	2251	2259	1.1	12/04	0111	0116	0120	1.3
	0518	0519	0529	1.7	11/26	0021	0024	0030	1.0		0249	0253	0300	1.0
	0847	0850	0900	1.7		0149	0238	0313	1.7		1105	1106	1115	1.3
	1440	1440	1448	1.6		0443	0443	0455	1.8		1714B	1715U	1737	1.8
11/15	0114	0119	0124	1.2		0528	0529	0538	1.2	12/05	0433	0437	0439	1.0
	1258	1311	1323	1.2		0759	0805	0817	2.0		1801	1803	1806	1.5
						1028	1032	1051	4.0		2317	2324	2335	1.2

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DATE	UNIVERSAL TIME				DATE	UNIVERSAL TIME				DATE	UNIVERSAL TIME			
	BEG.	MAX.	END.	STR		BEG.	MAX.	END.	STR		BEG.	MAX.	END.	STR
1998/12/06	0004	0008	0013	1.2	1998/12/14	0007	0010	0029	7.0	1998/12/22	1825	1834	1843	1.2
	0333	0339	0345	1.6		0358	0400	0407	1.2		2111	2114	2119	1.3
	0738	0750	0804	1.6		0624	0628	0631	3.6		2345	2351	2355	6.9
	1442	1442	1446	1.0		0941	0944	1008	7.3	12/23	0230	0231	0252	2.2
	1601	1610	1631	1.2		1106	1110	1120	1.3	0326	0332	0350	2.2	
	2343	2352	2401	1.6	1136	1140	1143	1.7	0513	0659	0743	23		
12/07	0400	0409	0434	1.7	1214	1218	1225	1.9	0813	0816	0821	11		
	0949	0950	0955	1.3	1727	1734	1738	1.9	1157	1206	1213	5.0		
	1434	1442	1506	2.3	1913	1919	1923	2.6	12/24	0040	0054	0107	5.0	
	1632	1634	1643	1.9	2222	2226	2231	8.2	0122	0126	0156	6.2		
	2146	2150	2217	3.9	12/15	0224	0231	0238	1.3	1143B	1147U	1213A	17	
12/08	1232	1233	1324	2.9	1052B	1052U	1055	1.0	2048	2122	2216	1.8		
	1403B	1403U	1431A	5.7	1752	1801	1815	1.3	12/25	0031	0031	0040	2.2	
	1613	1618	1631	2.0	1925	1926	1934	1.0	0337	0414	0449	2.9		
	1632	1638	1645	3.5	12/16	0133	0133	0141	1.0	0614	0630	0705	12	
	1808	1851	1924	1.8	0208	0209	0217	1.5	1803	1804	1809	1.0		
	2012	2012	2044	3.1	0944	1001	1012	1.8	2005	2006	2013	1.3		
	2128	2144	2210	1.8	1045	1047	1057	1.0	2017	2020	2023	1.1		
12/09	0124	0126	0131	1.9	1200	1203	1209	1.2	2050	2051	2058	1.2		
	0507	0508	0520	1.2	1905	1910	1925	5.4	12/26	0044	0047	0049	1.3	
	0550	0554	0558	1.4	2012	2015	2019	1.0	0137	0137	0149	2.0		
	0644	0655	0710	1.2	2153	2201	2227	4.0	0510	0511	0520	2.4		
	0815	0816	0836	1.6	12/17	0226	0229	0241	2.2	0558	0558	0602	7.8	
	1114	1132	1140	3.1	0743	0746	0804	32	0707	0731	0803	1.7		
	1206	1211U	1227A	2.1	1101	1101	1105	1.4	0922	0924	0929	2.9		
	1536	1546	1603	1.8	1416	1416	1442	7.2	1447	1457	1559	4.4		
	1737	1741	1843	5.9	1739	1751	1802	6.4	1823	1827	1853	3.5		
	1801	1806	1810	3.2	1808	1840	1911	4.5	2031	2040	2119	2.4		
	2055	2100	2107	1.3	2112	2119	2127	5.9	2338	2344	2403	7.8		
	2210B	2217	2231	1.1	2253	2301	2315	8.3	12/27	0117	0117	0124	2.0	
12/10	0617	0621	0627	1.2	12/18	0302	0305	0315	3.1	0131	0134	0140	3.0	
	0805	0815	0820	1.4	0344	0346	0400	2.5	0310	0312	0322	3.3		
12/11	0325	0326	0331	1.3	0527	0527	0529	3.4	0555	0556	0601	2.2		
	0429	0431	0448	1.2	0712	0716	0720	1.3	0703	0708	0715	2.2		
	1147B	1148U	1203A	1.3	0748	0751	0759	3.4	0916	0920	0936	2.3		
	1729	1752	1819	3.4	0944	0945	0952	1.6	1824	1836	1846	2.0		
	2009	2010	2015	1.1	1251	1253	1257	2.9	2015	2018	2033	3.4		
12/12	0425	0429	0439	1.1	1532	1535	1545	1.3	2117	2123	2129	1.4		
	0511	0513	0519	1.0	1601	1611	1616	2.0	2153	2153	2157	1.4		
	1250B	1250U	1254A	1.3	1717	1722	1845	80	2340	2342	2346	2.7		
	1920	1922	1927	1.3	12/19	0647	0652	0656	2.8	2355	2358	2419	3.6	
	2108	2112	2114	2.5	0949	0950	0952	1.7	12/28	0516	0521	0633	14	
	2312	2312	2319	1.6	1425	1428	1428A	4.4	0536	0548	0623	31		
	2325	2327	2341	3.0	2039	2044	2050	1.6	0843	0845	0850	2.5		
12/13	0153	0156	0159	2.7	2315	2325	2332	5.5	1102	1106	1108	2.8		
	0323	0331	0337	1.8	12/20	0511	0525	0535	3.4	1149B	1157	1221	5.7	
	0432	0436	0450	1.4	0557	0557	0607	1.5	1312	1313	1315	2.3		
	0512	0516	0518	3.0	0725	0730	0736	1.1	1515	1517	1539	3.1		
	0711	0711	0719	5.5	0849	0859	0916	18	1716	1718	1743	5.0		
	1032	1034	1057	3.7	1234	1238	1243	2.2	1811	1813	1833	4.9		
	1845	1855	1908	1.2	12/21	0417	0429	0440	5.6	2301	2323	2435	17	
	2018	2022	2025	1.2	1333	1333	1343	2.0	2324	2335	2356A	21		
	2042	2049	2103	2.8	1942B	1942U	2015A	1.4						

# D10

DATE	UNIVERSAL TIME			STR	
	BEG.	MAX.	END.		
1998/12/29	0552	0605	0627	2.2	
	0741	0743	0751	2.6	
	0828	0939	1018	5.1	
	1303B	1305	1331A	2.0	
	1509	1509	1515	1.6	
	1518	1552	1641	2.4	
	1952	2028	2042	2.0	
	2231	2232	2237	1.6	
	2329	2331	2333	2.0	
	12/30	0003	0007	0012	2.1
		0138	0138	0145	1.5
		0528	0530	0532	2.9
		0532	0539	0630	10
		0741	0744	0748	1.4
0824		0829	0838	1.6	
1218		1225	1256	3.0	
1507		1508	1512	1.3	
1515		1520	1547A	1.9	
1550		1554	1557	1.3	
1807		1807	1856	1.7	
2344		2423	2432	2.1	
12/31		0054	0055	0104A	2.8
		0132	0138	0148	1.6
	0303	0315	0320	1.8	
	0349	0353	0358	1.3	
	0412B	0414U	0416A	3.4	
	0445	0449	0502	1.6	
	0516	0519	0521	1.6	
	0626	0632	0642	4.9	
	0719	0719	0725	4.1	
	0834	0839	0849A	2.3	
	0906	0911	0922	2.2	
	1036	1041	1051	1.9	
	1254	1308	1318	2.0	
	1454	1459	1505	1.4	

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## X-RAY FLARE ANALYSIS, 1997 - 1998.

The following is an analysis of solar x-ray flares showing monthly values of 'mean daily output' (MDO), 'mean x-ray strength' (MXS), and 'mean daily mean' (MDM), all expressed in microWatts / square metre.

All data are based on US NOAA satellite data.

d = number of days of data.

n = number of events.

	<b>DATE</b>	<b>MDO</b>	<b>MXS</b>	<b>MDM</b>	<b>d</b>	<b>n</b>
1997	January	0.0000	—	0.0000	31	0
	February	0.6250	2.9167	0.4060	28	6
	March	0.0806	1.2500	0.0806	31	2
	April	1.5167	3.7917	0.6925	30	12
	May	0.9032	4.0000	0.5597	31	7
	June	0.0367	1.1000	0.0367	30	1
	July	0.2548	1.9750	0.1108	31	4
	August	2.2839	3.2182	0.7927	31	22
	September	10.8833	3.9817	2.7423	30	82
	October	0.4516	2.8000	0.3113	31	5
	November	68.5467	15.4617	12.9153	30	133
	December	2.9000	2.4297	1.0652	31	37
1997	Means	7.2879	8.5534	1.6260	365	311
1998	January	4.8613	3.9658	1.6204	31	38
	February	1.0286	1.8000	0.5494	28	16
	March	13.1774	3.4328	3.6112	31	119
	April	17.0967	6.8387	8.9853	30	75
	May	38.1516	7.4384	4.0652	31	159
	June	6.2567	2.6069	2.2856	30	72
	July	8.2097	3.5845	1.9620	31	71
	August	66.2581	14.3636	14.2119	31	143
	September	17.4233	4.5851	4.3563	30	114
	October	7.6194	2.9160	1.9261	31	81
	November	71.2567	10.3772	13.5188	30	206
	December	25.3548	3.6901	3.4139	31	213
1998	Means	23.1847	6.4747	5.0545	365	1307

## SMOOTHED NOAA X-RAY FLARE MONTHLY VALUES — 1990 - 1998.

Data based upon NOAA monthly mean values of MEAN DAILY OUTPUT.

Unit used in observed values is 1 microWatt per square metre.

Smoothing methods used are the Waldmeier and the 'Barnes 13' methods.

MONTH	Observed	S <sub>W</sub>	S <sub>B13</sub>	MONTH	Observed	S <sub>W</sub>	S <sub>B13</sub>	MONTH	Observed	S <sub>W</sub>	S <sub>B13</sub>
1990 Jan	35.4710	80.44	75.07	1993 Jan	4.9903	25.02	24.87	1996 Jan	0.0742	1.07	0.77
Feb	23.5786	75.46	67.80	Feb	35.1929	22.98	22.79	Feb	0.0000	1.52	0.99
Mar	50.5194	66.48	61.39	Mar	29.7258	20.41	20.19	Mar	0.0517	1.54	1.17
Apr	53.3733	58.31	56.79	Apr	11.5833	17.45	17.29	Apr	1.5567	1.35	1.30
May	129.9839	50.96	52.76	May	11.0258	14.47	14.72	May	0.3935	1.24	1.48
Jun	31.7767	48.24	49.79	Jun	22.5900	12.88	12.85	Jun	0.0400	1.36	1.75
Jul	25.4194	50.28	48.81	Jul	4.1323	13.66	11.68	Jul	10.8226	1.39	1.90
Aug	46.9516	53.84	49.26	Aug	2.1548	12.97	10.41	Aug	0.5778	1.41	1.83
Sep	25.3100	66.92	54.04	Sep	5.0633	10.51	9.26	Sep	0.0000	1.44	1.64
Oct	29.6032	78.00	61.88	Oct	6.9581	8.91	8.72	Oct	0.0000	1.44	1.46
Nov	50.3567	75.54	68.99	Nov	6.1400	7.99	8.44	Nov	2.4467	1.46	1.29
Dec	84.7516	84.67	81.19	Dec	16.8774	6.64	7.98	Dec	0.7581	1.48	1.10
1991 Jan	68.0935	98.65	96.78	1994 Jan	20.0742	5.62	7.31	1997 Jan	0.0000	1.04	0.82
Feb	76.2179	101.35	109.88	Feb	3.4821	5.72	6.52	Feb	0.6250	0.67	0.67
Mar	311.9323	103.22	119.35	Mar	2.3968	5.81	5.58	Mar	0.0806	1.20	0.87
Apr	57.7133	108.43	123.92	Apr	0.4333	5.47	4.62	Apr	1.5167	1.67	1.17
May	66.6355	112.27	125.54	May	0.0516	5.04	3.76	May	0.9032	4.44	2.43
Jun	314.3200	114.38	124.46	Jun	1.2467	4.19	3.00	Jun	0.0367	7.28	4.44
Jul	78.4839	115.72	118.55	Jul	1.0323	2.88	2.43	Jul	0.2548	7.58	6.23
Aug	58.6742	115.70	110.04	Aug	7.6323	2.28	2.33	Aug	2.2839	7.80	8.05
Sep	60.8567	103.98	100.04	Sep	1.6600	2.37	2.45	Sep	10.8833	8.36	9.90
Oct	116.6613	90.18	91.07	Oct	2.3194	2.52	2.57	Oct	0.4516	9.55	11.90
Nov	55.4533	86.22	83.88	Nov	0.4500	2.71	2.71	Nov	68.5467	11.75	13.78
Dec	130.3129	71.94	73.36	Dec	2.1677	2.70	2.78	Dec	2.9000	13.57	14.64
1992 Jan	54.6903	58.17	63.67	1995 Jan	3.2074	2.63	2.77	1998 Jan	4.8613	14.16	14.68
Feb	89.1345	54.76	56.50	Feb	6.0214	2.28	2.62	Feb	1.0286	17.15	15.65
Mar	17.6419	52.65	49.04	Mar	2.0867	1.91	2.36	Mar	13.1774	20.09	17.31
Apr	20.7900	48.72	41.95	Apr	4.2033	1.93	2.16	Apr	17.0967	20.66	18.61
May	8.6903	45.07	36.91	May	0.9968	2.02	1.93	May	38.1516	21.07	19.94
Jun	29.5033	39.88	33.41	Jun	0.0900	1.93	1.65	Jun	6.2567	22.12	22.03
Jul	32.8677	32.92	30.76	Jul	0.3129	1.70	1.36	Jul	8.2097	—	—
Aug	22.4097	28.60	29.57	Aug	0.1065	1.32	1.11	Aug	66.2581	—	—
Sep	46.5033	26.86	29.57	Sep	0.1400	0.99	0.95	Sep	17.4233	—	—
Oct	36.5387	26.98	29.77	Oct	4.4581	0.79	0.85	Oct	7.6194	—	—
Nov	48.0033	26.69	28.81	Nov	0.4000	0.66	0.76	Nov	71.2567	—	—
Dec	13.1419	26.50	27.00	Dec	0.0000	0.63	0.68	Dec	25.3548	—	—



2800 MHz ( 107 mm ) SOLAR FLUX.

Daily readings on the wavelength of 107 mm are obtained at Penticton BC, Canada, at approximately 2000 UT (local apparent mid-day) .

These figures are on an approximate scale of 60 to 500; the actual lowest observed value is 63.0 on 1954/06/27, adjusted to 65.1. The highest observed value being 457.0 was obtained on 1947/04/07, being adjusted to 457.9 .

The lowest adjusted value is 61.8 on 1953/02/24, observed as 63.1 . The highest adjusted value is the 1947/04/07 value of 457.9 .

The most recent maximum observed value is 324.3 in June 1989 (adjusted to 334.7), and the most recent minimum observed value is 64.9 in July 1996 (adjusted to 67.0). The most recent minimum adjusted value is 65.7 in February 1996 (observed as 67.5).

The values for 1998 are on pages E2 and E3 of this report. The first of these two tables contains the observed values, some of which are corrected for the occasional burst. The second table contains values adjusted to the distance of 1 AU (149 597 870 km).

$$\begin{aligned} 1 \text{ Flux Unit} &= 100 \text{ yoctoWatts m}^{-2} \text{ Hz}^{-1} \\ &= 1 \times 10^{-22} \text{ Watt m}^{-2} \text{ Hz}^{-1} \end{aligned}$$

THE TERM 'JANSKY' IS NOT USED IN THIS PUBLICATION DUE TO THE TERM'S ORIGINAL USE AS  $1 \text{ W m}^{-2} \text{ Hz}^{-1}$ .

All flux data, courtesy of the Herzberg Institute of Astrophysics, National Research Council, Canada.

**DAILY 2800 MHz SOLAR RADIO FLUX OBSERVED INDICES 1998.**

All data obtained by the Dominion Radio Astrophysical Observatory, Penticton, British Columbia, Canada.

All observations carried out at local apparent mid-day, approximately 2000 UT.

Unit used is  $1 \times 10^{-22} \text{ W m}^{-2} \text{ Hz}^{-1}$ .

<b>DATE</b>	<b>JAN</b>	<b>FEB</b>	<b>MAR</b>	<b>APR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>	<b>OCT</b>	<b>NOV</b>	<b>DEC</b>	<b>DATE</b>
<b>01</b>	101.6	90.7	98.3	105.7	113.4	100.1	126.8	112.1	177.0	118.8	121.4	162.7	<b>01</b>
<b>02</b>	101.0	89.1	91.5	103.4	117.0	104.7	120.4	109.6	163.4	112.7	126.1	151.7	<b>02</b>
<b>03</b>	101.1	88.8	96.6	103.6	117.4	113.1	127.6	108.5	162.7	111.9	151.8	153.1	<b>03</b>
<b>04</b>	90.7	89.1	101.7	110.2	121.1	111.7	129.1	115.8	154.7	114.8	141.4	148.2	<b>04</b>
<b>05</b>	89.3	85.5	96.7	126.2	133.4	115.0	123.5	126.8	154.3	117.1	152.7	142.4	<b>05</b>
<b>06</b>	87.0	84.2	91.7	133.4	130.1	115.1	121.1	138.3	164.6	117.0	140.9	142.3	<b>06</b>
<b>07</b>	84.9	83.1	91.9	135.2	123.3	113.0	114.6	145.0	151.2	124.2	148.5	153.2	<b>07</b>
<b>08</b>	82.2	83.6	91.2	140.6	118.0	116.9	112.4	146.8	153.5	124.1	152.7	162.0	<b>08</b>
<b>09</b>	81.6	83.7	90.0	139.7	110.7	112.3	114.3	154.1	145.3	123.5	162.4	153.9	<b>09</b>
<b>10</b>	80.7	83.7	96.3	129.7	107.2	111.8	109.2	149.2	141.7	120.7	153.8	133.8	<b>10</b>
<b>11</b>	84.8	86.2	100.7	128.3	108.0	112.4	107.7	150.1	138.6	118.9	147.1	143.1	<b>11</b>
<b>12</b>	95.8	90.6	101.6	117.0	112.1	112.2	99.3	147.0	134.9	113.9	141.6	143.3	<b>12</b>
<b>13</b>	90.4	94.7	104.9	114.8	116.6	110.5	106.1	136.8	130.7	118.1	135.4	144.2	<b>13</b>
<b>14</b>	93.9	104.8	119.6	111.9	117.2	101.9	102.9	137.0	121.8	119.0	126.5	144.4	<b>14</b>
<b>15</b>	97.8	107.3	133.0	112.7	116.0	100.4	104.8	133.4	117.3	131.1	126.4	141.6	<b>15</b>
<b>16</b>	97.5	106.8	123.9	106.4	117.7	104.0	106.2	139.7	118.7	131.0	124.6	140.5	<b>16</b>
<b>17</b>	95.9	104.9	125.5	101.3	110.4	100.6	100.3	136.3	117.4	135.4	120.8	146.1	<b>17</b>
<b>18</b>	95.1	103.3	127.0	98.5	102.2	100.1	99.2	132.6	122.5	125.9	114.8	154.7	<b>18</b>
<b>19</b>	93.5	98.5	124.6	95.8	99.2	98.6	101.9	134.6	126.9	117.7	116.5	138.0	<b>19</b>
<b>20</b>	91.4	95.7	126.5	97.7	91.9	101.1	111.8	138.6	132.1	121.2	121.5	134.7	<b>20</b>
<b>21</b>	90.9	94.8	125.8	92.0	89.0	102.0	110.3	132.1	138.3	118.3	121.2	135.3	<b>21</b>
<b>22</b>	93.0	95.5	127.6	87.6	87.4	100.5	114.1	132.9	141.1	114.9	126.1	128.8	<b>22</b>
<b>23</b>	96.9	99.4	122.0	90.2	90.3	95.7	115.4	126.4	143.2	112.5	129.9	139.8	<b>23</b>
<b>24</b>	97.5	98.6	120.6	90.6	95.6	105.3	125.2	121.2	135.4	110.9	140.2	139.4	<b>24</b>
<b>25</b>	108.3	94.7	115.0	91.9	92.3	106.2	121.7	122.1	138.5	107.5	149.5	144.4	<b>25</b>
<b>26</b>	100.0	92.7	110.0	90.7	92.5	109.2	119.1	126.9	135.6	104.1	156.4	144.9	<b>26</b>
<b>27</b>	100.8	90.3	108.1	91.4	94.0	115.2	119.5	135.0	127.4	103.0	158.9	166.8	<b>27</b>
<b>28</b>	96.6	94.0	103.9	98.4	98.4	122.0	121.3	139.2	122.5	107.8	164.8	184.4	<b>28</b>
<b>29</b>	93.6	—	100.3	100.5	94.9	119.3	119.5	146.5	115.9	109.5	167.8	182.8	<b>29</b>
<b>30</b>	91.0	—	107.5	102.5	96.1	120.9	114.8	163.3	121.5	111.5	163.4	179.0	<b>30</b>
<b>31</b>	89.4	—	108.1	—	94.2	—	113.7	178.5	—	118.7	—	174.6	<b>31</b>
<b>MEAN</b>	93.4	93.4	109.1	108.3	106.7	108.4	114.0	136.0	138.3	117.3	140.2	150.1	<b>MEAN</b>

1998 Yearly Mean : 118.1

DAILY 2800 MHz SOLAR RADIO FLUX INDICES - 1998 — **ADJUSTED TO 1 AU.**

All data obtained by the Dominion Radio Astrophysical Observatory, Penticton, British Columbia, Canada.

All observations carried out at local apparent mid-day, approximately 2000 UT.

Unit used is  $1 \times 10^{-22} \text{ W m}^{-2} \text{ Hz}^{-1}$ .

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DATE
<b>01</b>	98.3	88.1	96.5	105.6	115.1	103.0	131.1	115.4	180.2	119.1	119.5	158.2	<b>01</b>
<b>02</b>	97.6	86.5	89.9	103.4	118.8	107.7	124.4	112.9	166.3	112.9	124.1	147.4	<b>02</b>
<b>03</b>	97.7	86.3	95.0	103.6	119.3	116.4	131.9	111.7	165.5	112.0	149.3	148.7	<b>03</b>
<b>04</b>	87.7	86.6	100.0	110.2	123.2	115.0	133.5	119.2	157.3	114.9	139.0	144.0	<b>04</b>
<b>05</b>	86.3	83.1	95.1	126.4	135.7	118.4	127.6	130.5	156.8	117.1	150.1	138.3	<b>05</b>
<b>06</b>	84.1	81.8	90.3	133.7	132.4	118.5	125.2	142.2	167.1	116.9	138.4	138.1	<b>06</b>
<b>07</b>	82.1	80.8	90.5	135.5	125.6	116.4	118.5	149.1	153.5	124.1	145.8	148.7	<b>07</b>
<b>08</b>	79.5	81.3	89.9	141.0	120.2	120.5	116.2	150.9	155.8	123.8	149.9	157.1	<b>08</b>
<b>09</b>	78.9	81.5	88.7	140.2	112.8	115.7	118.2	158.3	147.4	123.2	159.3	149.3	<b>09</b>
<b>10</b>	78.0	81.5	95.0	130.2	109.3	115.3	112.9	153.3	143.6	120.3	150.8	129.8	<b>10</b>
<b>11</b>	82.0	84.0	99.4	128.8	110.2	115.8	111.3	154.1	140.4	118.5	144.1	138.8	<b>11</b>
<b>12</b>	92.7	88.3	100.3	117.6	114.4	115.7	102.6	150.9	136.6	113.4	138.7	138.9	<b>12</b>
<b>13</b>	87.5	92.3	103.7	115.5	119.1	113.9	109.7	140.4	132.3	117.5	132.6	139.7	<b>13</b>
<b>14</b>	90.8	102.3	118.2	112.6	119.8	105.1	106.3	140.6	123.3	118.4	123.8	139.9	<b>14</b>
<b>15</b>	94.6	104.7	131.6	113.5	118.6	103.6	108.2	136.8	118.6	130.4	123.7	137.2	<b>15</b>
<b>16</b>	94.4	104.2	122.6	107.2	120.4	107.3	109.7	143.3	119.9	130.1	121.8	136.1	<b>16</b>
<b>17</b>	92.8	102.4	124.3	102.1	113.0	103.9	103.6	139.7	118.6	134.4	118.0	141.5	<b>17</b>
<b>18</b>	92.0	100.9	125.9	99.4	104.6	103.3	102.4	135.8	123.7	125.0	112.2	149.8	<b>18</b>
<b>19</b>	90.5	96.3	123.5	96.7	101.5	101.8	105.2	137.9	128.0	116.8	113.7	133.6	<b>19</b>
<b>20</b>	88.5	93.6	125.5	98.7	94.1	104.4	115.4	141.9	133.3	120.2	118.6	130.4	<b>20</b>
<b>21</b>	88.0	92.8	124.9	92.9	91.2	105.4	113.9	135.2	139.4	117.2	118.3	130.9	<b>21</b>
<b>22</b>	90.1	93.5	126.8	88.5	89.6	103.8	117.8	135.9	142.1	113.8	123.0	124.6	<b>22</b>
<b>23</b>	93.9	97.3	121.3	91.3	92.6	98.9	119.1	129.3	144.1	111.4	126.7	135.2	<b>23</b>
<b>24</b>	94.5	96.6	119.9	91.7	98.0	108.8	129.2	123.9	136.2	109.6	136.7	134.9	<b>24</b>
<b>25</b>	105.0	92.9	114.4	93.0	94.7	109.7	125.5	124.8	139.2	106.3	145.6	139.6	<b>25</b>
<b>26</b>	96.9	90.9	109.5	91.8	94.9	112.8	122.8	129.6	136.2	102.8	152.3	140.2	<b>26</b>
<b>27</b>	97.7	88.6	107.7	92.6	96.6	119.1	123.2	137.8	128.0	101.8	154.7	161.4	<b>27</b>
<b>28</b>	93.7	92.3	103.6	99.8	101.1	126.1	125.1	142.0	123.0	106.4	160.4	178.3	<b>28</b>
<b>29</b>	90.9	—	100.0	102.0	97.6	123.3	123.1	149.4	116.3	108.0	163.2	176.8	<b>29</b>
<b>30</b>	88.4	—	107.2	104.1	98.8	125.0	118.3	166.4	121.8	109.9	158.9	173.1	<b>30</b>
<b>31</b>	86.8	—	107.9	—	96.8	—	117.2	181.8	—	117.0	—	138.8	<b>31</b>
<b>MEAN</b>	90.4	91.1	108.0	109.0	109.0	111.8	117.7	138.0	139.8	116.6	137.1	144.5	<b>MEAN</b>

1998 Yearly Mean : 118.0

## SMOOTHED NRCC 2800MHz SOLAR FLUX MONTHLY VALUES.

Data based upon NRCC monthly mean values ADJUSTED TO THE DISTANCE OF 1 AU.  
Unit used in observed values is  $1 \times 10^{-22}$  Watt  $m^{-2}$  Hz $^{-1}$ .

Smoothing methods used are the Waldmeier and the 'Barnes 13' methods.

MONTH	Adjusted	S <sup>W</sup>	S <sup>B13</sup>	MONTH	Adjusted	S <sup>W</sup>	S <sup>B13</sup>	MONTH	Adjusted	S <sup>W</sup>	S <sup>B13</sup>			
1990	Jan	203.4	200.3	200.4	1993	Jan	117.2	125.4	127.7	1996	Jan	72.1	72.4	71.9
	Feb	174.1	200.4	197.0		Feb	139.1	122.7	125.7		Feb	69.8	72.2	71.6
	Mar	187.0	198.6	194.2		Mar	135.0	120.3	122.9		Mar	70.0	72.1	71.4
	Apr	186.6	195.5	192.2		Apr	116.7	117.8	119.1		Apr	69.9	71.6	71.3
	May	194.0	192.3	190.5		May	114.9	114.5	114.8		May	71.7	71.4	71.4
	Jun	176.3	189.9	189.7		Jun	112.8	111.1	110.5		Jun	71.8	71.8	71.7
	Jul	186.6	190.4	190.5		Jul	102.2	109.5	107.0		Jul	73.5	72.0	72.0
	Aug	228.1	193.8	192.6		Aug	96.0	107.5	103.9		Aug	74.2	72.0	72.2
	Sep	179.3	198.1	195.0		Sep	87.9	103.9	101.2		Sep	70.1	72.3	72.4
	Oct	180.9	200.4	197.4		Oct	99.7	100.4	99.3		Oct	68.7	72.6	72.6
	Nov	180.3	200.9	200.1		Nov	93.8	97.5	97.8		Nov	76.9	73.0	72.9
	Dec	198.5	202.5	203.4		Dec	101.5	94.7	96.3		Dec	75.3	73.3	73.2
1991	Jan	222.1	205.4	206.9	1994	Jan	111.3	92.6	94.8	1997	Jan	71.6	73.4	73.3
	Feb	237.2	206.2	209.2		Feb	97.2	91.0	92.8		Feb	72.0	73.6	73.5
	Mar	227.6	205.8	210.3		Mar	89.5	89.9	90.5		Mar	72.8	75.1	74.3
	Apr	200.1	206.7	210.5		Apr	79.7	89.1	88.2		Apr	75.0	76.8	75.5
	May	194.5	207.0	209.6		May	81.7	87.9	86.1		May	76.3	78.3	76.9
	Jun	213.3	207.3	208.1		Jun	79.7	86.5	84.3		Jun	74.0	80.0	78.6
	Jul	218.9	207.6	206.3		Jul	83.2	84.4	82.7		Jul	73.4	81.7	80.8
	Aug	215.5	206.7	204.2		Aug	78.0	82.5	81.7		Aug	81.0	83.3	83.3
	Sep	182.5	203.8	202.1		Sep	79.9	81.7	81.4		Sep	97.2	85.5	85.9
	Oct	200.0	199.7	200.1		Oct	87.1	81.4	81.5		Oct	84.3	88.4	88.7
	Nov	168.3	195.3	197.6		Nov	79.1	81.2	81.4		Nov	97.4	91.2	91.4
	Dec	217.0	188.6	193.6		Dec	81.5	80.9	81.3		Dec	95.7	94.1	94.2
1992	Jan	210.6	181.3	188.1	1995	Jan	80.0	80.5	81.1	1998	Jan	90.4	97.5	97.0
	Feb	226.5	174.1	180.8		Feb	83.5	80.2	80.7		Feb	91.1	101.8	100.3
	Mar	169.6	167.7	171.9		Mar	84.2	79.8	80.2		Mar	108.0	105.9	104.1
	Apr	159.7	162.1	162.4		Apr	78.2	79.1	79.3		Apr	109.0	109.0	108.0
	May	128.2	158.1	153.4		May	77.1	78.4	78.5		May	109.0	112.0	111.9
	Jun	120.4	153.5	145.5		Jun	78.1	77.7	77.7		Jun	111.8	115.7	116.1
	Jul	136.5	146.2	138.6		Jul	76.3	76.9	76.7		Jul	117.7		
	Aug	125.1	138.7	133.4		Aug	75.7	76.0	75.8		Aug	138.0		
	Sep	118.0	133.6	130.7		Sep	72.8	74.8	74.8		Sep	139.8		
	Oct	129.9	130.4	129.8		Oct	77.5	73.9	73.9		Oct	116.6		
	Nov	142.0	128.0	129.5		Nov	72.6	73.3	73.2		Nov	137.1		
	Dec	134.7	127.1	129.0		Dec	70.3	72.8	72.5		Dec	144.5		



A grey rectangular box with a black border. On the left side, there is a white circle with orange rays emanating from its right side, resembling a sun. To the right of the sun icon, the text "SECTION F" is written in a bold, black, sans-serif font.

**SECTION F**

ANALYSES AND GRAPHS.

TABLE W1:

**MONTHLY WOLF NUMBER MEANS OF GDSO DATA for 1998.**

g = mean of Active Areas or groups on the solar disc.

f = mean of sunspots on the solar disc.

WN = mean Wolf Number (k neglected; see list of definitions).

TWN = mean Truncated Wolf Number (Wolf Number without A and B class regions).

n = total number of observations.

w = mean weight.

Q = mean quietness [steadiness] of image (on the Kiepenheuer scale).

S = mean sharpness [clarity] of image (on the Kiepenheuer scale).

T = mean transparency of the atmosphere (1 = excellent, 5 = opaque).

C = mean condition  $[(Q+S+T)/3]$ .

MONTH	g	f	WN	TWN	n	w	Q	S	T	C
Jan	1.75	9.38	26.88	16.31	16	0.4343	1.91	2.44	2.62	2.3229
Feb	2.62	13.00	39.25	25.12	16	0.4578	1.69	2.34	2.66	2.2292
Mar	3.76	29.59	67.24	55.00	17	0.4595	1.65	2.38	2.59	2.2059
Apr	3.27	15.73	48.45	32.82	11	0.4671	1.68	2.27	2.55	2.1667
May	3.18	30.88	62.65	56.65	17	0.4679	1.79	2.21	2.50	2.1667
Jun	4.67	19.44	66.11	53.89	9	0.4641	1.89	2.28	2.39	2.1852
Jul	5.78	22.00	79.78	61.78	9	0.4993	1.78	2.11	2.28	2.0556
Aug	6.12	37.94	99.19	77.62	16	0.4502	1.91	2.34	2.53	2.2604
Sep	6.20	38.67	100.67	83.67	15	0.4947	1.57	2.23	2.33	2.0444
Oct	4.00	19.46	59.46	41.69	13	0.4520	1.92	2.31	2.50	2.2436
Nov	5.46	25.15	79.77	60.85	13	0.4649	1.85	2.31	2.46	2.2051
Dec	5.00	35.47	85.47	74.13	15	0.4469	1.73	2.47	2.63	2.2778
Year	4.23	25.34	67.67	53.32	—	0.4617	1.78	2.32	2.52	2.2036

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TABLE W2:

**ROTATIONAL WOLF NUMBER MEANS OF GDSO DATA.**

Abbreviations as above.

ROT.	start date, UT	g	f	WN	TWN	n	w	Q	S	T	C
1931	1997/12/26.17	1.75	10.50	28.00	19.19	16	0.4483	1.91	2.31	2.53	2.2500
1932	1998/01/22.50	2.43	11.36	35.64	23.50	14	0.4473	1.68	2.50	2.68	2.2857
1933	1988/02/18.85	3.54	23.15	58.54	42.92	13	0.4547	1.73	2.35	2.65	2.2436
1934	1998/03/18.17	4.13	28.93	70.27	54.40	15	0.4693	1.63	2.30	2.50	2.1444
1935	1998/04/14.46	2.58	25.75	51.58	46.75	12	0.4664	1.67	2.21	2.62	2.1667
1936	1998/05/11.70	3.08	24.42	55.25	49.67	12	0.4634	1.88	2.25	2.46	2.1944
1937	1998/06/07.91	5.67	21.11	77.78	64.00	9	0.4728	1.89	2.28	2.28	2.1481
1938	1998/07/05.11	5.14	20.00	71.43	50.29	7	0.4982	1.79	2.07	2.36	2.0714
1939	1998/08/01.32	6.23	33.31	95.62	73.62	13	0.4416	1.92	2.42	2.58	2.3077
1940	1998/08/28.56	6.35	44.06	107.59	90.59	17	0.4953	1.62	2.18	2.32	2.0392
1941	1998/09/24.82	3.89	22.89	61.78	44.89	9	0.4454	1.83	2.39	2.56	2.2593
1942	1998/10/22.10	5.07	21.07	71.79	50.36	14	0.4731	1.93	2.21	2.36	2.1667
1943	1998/11/18.41	5.80	29.80	87.80	74.80	10	0.4296	1.75	2.60	2.75	2.3667

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TABLE W3:  
CORRECTED WOLF NUMBERS for 1997 - 1998.

As the GDSO is in suburban Auckland, it can suffer terrible atmospheric conditions, hence the 'observed' Wolf Numbers have to be upgraded to give reflections of international results. International Wolf Number results are computed by the Sunspot Index Data Centre, at the Observatoire Royal de Belgique, Bruxelles, Belgium.

Below are the 'observed' Wolf Numbers along with the monthly k co-efficients and the corrected values ( $R_{GD}$ ) for 1997 - 1998. The SIDC's final values ( $R_I$ ) are also stated.

$I/GDSO$  = SIDC's mean (of days observed by the GDSO) divided by the GDSO's monthly mean.  
 $I/GDSO_A$  = SIDC's mean (of days with GDSO k values) divided by the GDSO's observed mean for the *same* days.

n = number of GDSO observations.

$n_k$  = number of k values.

$\sigma$  = sample standard deviation of k values.

$\sigma$ 'SIDC' = annual  $\sigma$  computed on the SIDC formula.

	WN	k	$R_{GD}$	$\sigma$	$I/GDSO$	$I/GDSO_A$	n	$n_k$	$R_I$
1997 Jan	5.53	0.8445	4.67	0.2366	1.1429	0.8381	19	8	5.7
Feb	7.60	1.0104	7.68	0.3064	1.0132	0.9079	10	3	7.6
Mar	12.07	0.9921	11.98	0.3775	1.0355	0.9645	14	11	8.7
Apr	22.26	0.8387	18.67	0.2512	0.8392	0.7920	19	15	15.5
May	10.92	1.0893	11.90	0.7426	1.0211	1.0458	13	10	18.5
Jun	17.61	0.7026	12.37	0.1448	0.6877	0.6877	18	17	12.7
Jul	10.95	0.9462	10.36	0.4846	1.0000	0.8128	20	10	10.4
Aug	30.57	0.9499	29.04	0.4281	0.9019	0.8879	21	19	24.4
Sep	43.81	1.1756	51.50	0.3054	1.0999	1.0999	16	16	51.3
Oct	29.71	0.8429	25.04	0.1634	0.8396	0.8396	17	17	22.8
Nov	38.64	1.0076	38.94	0.2607	0.9871	0.9871	14	14	39.0
Dec	47.23	0.9639	45.52	0.1756	0.9397	0.9397	13	13	41.2
1997 Means	22.96	0.9373	21.52	—	0.9416	0.9147	—	—	21.5
	$\sigma = 0.3559$		$\sigma$ 'SIDC' = 0.3085			$E\sigma = 0.0279$			
1998 Jan	26.88	0.9841	26.45	0.2961	0.9651	0.9628	16	13	31.9
Feb	39.25	1.0288	40.38	0.2711	0.9682	0.9682	16	16	40.3
Mar	67.24	0.8453	56.83	0.1628	0.8154	0.8154	17	17	54.8
Apr	48.45	1.1644	56.42	0.4699	1.0338	1.0338	11	11	53.4
May	62.65	0.9802	61.41	0.1704	0.9662	0.9662	17	17	56.3
Jun	66.11	0.9828	64.97	0.1427	0.9681	0.9681	9	9	70.7
Jul	79.78	0.9514	75.90	0.1632	0.9262	0.9262	9	9	66.6
Aug	99.19	0.9430	93.53	0.0977	0.9395	0.9395	16	16	92.2
Sep	100.67	0.9588	96.52	0.2349	0.9212	0.9212	15	15	92.9
Oct	59.46	0.9635	57.29	0.2343	0.9017	0.9017	13	13	55.5
Nov	79.77	0.8957	71.45	0.1025	0.8987	0.8987	13	13	74.0
Dec	85.47	0.9635	82.35	0.1771	0.9454	0.9454	15	15	81.9
1998 Means	67.67	0.9670	65.44	—	0.9290	0.9289	—	—	64.3
	$\sigma = 0.2296$		$\sigma$ 'SIDC' = 0.2067			$E\sigma = 0.0177$			

TABLE W4:  
CORRECTED **WOLF NUMBERS** for Rotations 1917 - 1943.

As a k value is attributed to each spotted observation, the k value for any specific rotation is the mean of all the k values for the rotation concerned.

The corrected values are labelled  $R_{GD}$ .

$$R_{GD} = WN \times k.$$

$\sigma$  = sample standard deviation of k values.

I/GDSO = International mean (of days observed by the GDSO) divided by the GDSO's rotation mean.

I/GDSO<sub>A</sub> = International mean (of days observed by the GDSO) divided by the GDSO's observed mean for the *same* days.

n = number of GDSO observations.

$n_k$  = number of k values.

ROTA- TION	START DATE, UT	WN	k	$R_{GD}$	$\sigma$	I/GDSO	I/GDSO <sub>A</sub>	n	$n_k$
1917	1996/12/09.28	13.08	1.0302	13.47	0.1682	1.1059	1.0353	13	8
1918	1997/01/05.61	5.29	0.8604	4.56	0.2509	1.2111	0.8556	17	7
1919	1997/02/01.95	7.60	1.0104	7.68	0.3064	1.0132	0.9079	10	3
1920	1997/03/01.29	10.09	1.0360	10.45	0.4396	1.1171	1.0090	11	8
1921	1997/03/28.60	22.85	0.8528	19.49	0.2349	0.8315	0.8074	20	17
1922	1997/04/24.87	9.75	0.8434	8.22	0.1192	0.8974	0.8302	12	8
1923	1997/05/22.10	19.38	0.9380	18.18	0.6804	0.8492	0.8492	13	13
1924	1997/06/18.31	9.50	0.7023	6.67	0.1783	0.8363	0.6608	18	11
1925	1997/07/15.50	19.60	1.1185	21.92	0.6103	0.9932	0.9558	15	11
1926	1997/08/11.72	34.78	0.8609	29.94	0.2735	0.8482	0.8339	18	16
1927	1997/09/07.97	40.60	1.2107	49.16	0.2902	1.1461	1.1461	15	15
1928	1997/10/05.24	30.06	0.8305	24.97	0.1603	0.8295	0.8295	16	16
1929	1997/11/01.54	38.64	1.0076	38.94	0.2607	0.9871	0.9871	14	14
1930	1997/11/28.84	48.20	0.9762	47.05	0.1960	0.9481	0.9481	10	10
1931	1997/12/26.17	28.00	0.9142	25.60	0.2626	0.8862	0.8839	16	13
1932	1998/01/22.50	35.64	1.0709	38.17	0.2304	1.0621	1.0621	14	14
1933	1988/02/18.85	58.54	0.8839	51.74	0.2647	0.8016	0.8016	13	13
1934	1998/03/18.17	70.27	0.9184	64.53	0.1785	0.8985	0.8985	15	15
1935	1998/04/14.46	51.58	1.1329	58.44	0.4465	0.9887	0.9887	12	12
1936	1998/05/11.70	55.25	1.0124	55.93	0.1926	1.0121	1.0121	12	12
1937	1998/06/07.91	77.78	0.9537	74.18	0.1343	0.9343	0.9343	9	9
1938	1998/07/05.11	71.43	0.9717	69.40	0.1753	0.9500	0.9500	7	7
1939	1998/08/01.32	95.62	0.9436	90.22	0.1075	0.9405	0.9405	13	13
1940	1998/08/28.56	107.59	0.9154	98.49	0.1327	0.9142	0.9142	17	17
1941	1998/09/24.82	61.78	1.0130	62.58	0.3024	0.9209	0.9209	9	9
1942	1998/10/22.10	71.79	0.9599	68.91	0.1847	0.9274	0.9274	14	14
1943	1998/11/18.41	87.80	0.8897	78.12	0.1131	0.9055	0.9055	10	10

TABLE W5:  
SMOOTHED WOLF NUMBERS for 1997 - 1998.

The following are smoothed Wolf Numbers in three different systems. See page xii for all smoothing formulæ.

YEAR	MONTH	WN	WN(S <sup>HBm</sup> )	WN(S <sup>W</sup> )	WN(S <sup>B13</sup> )	R <sub>GD</sub>	R <sub>GD</sub> (S <sup>W</sup> )	R <sub>GD</sub> (S <sup>B13</sup> )
1997	Jan	5.53	10.06	11.71	10.92	4.67	10.27	9.99
	Feb	7.60	11.18	12.06	11.61	7.68	10.86	10.70
	Mar	12.07	12.45	14.19	13.30	11.98	13.52	12.43
	Apr	22.26	14.06	17.14	15.54	18.67	16.66	14.67
	May	10.92	15.47	19.20	17.71	11.90	18.61	16.81
	Jun	17.61	18.60	21.56	20.36	12.37	20.91	19.48
	Jul	10.95	21.86	23.96	23.50	10.36	23.21	22.71
	Aug	30.57	26.92	26.17	26.74	29.04	25.48	26.16
	Sep	43.81	32.51	29.79	30.20	51.50	28.71	29.63
	Oct	29.71	34.98	33.18	33.50	25.04	32.16	32.86
	Nov	38.64	37.29	36.43	36.82	38.94	35.79	36.21
	Dec	47.23	39.65	40.60	40.34	45.52	40.05	39.72
1998	Jan	26.88	41.06	45.49	44.09	26.45	44.97	43.41
	Feb	39.25	45.75	51.22	48.65	40.38	50.39	47.71
	Mar	67.24	51.53	56.45	53.87	56.83	54.95	52.59
	Apr	48.45	56.30	60.06	59.01	56.42	58.17	57.54
	May	62.65	64.17	63.01	63.92	61.41	60.87	62.17
	Jun	66.11	72.18	66.32	68.81	64.97	63.76	66.54
	Jul	79.78	78.10	69.44	73.27	75.90	—	—
	Aug	99.19	83.23	72.22	76.45	93.53	—	—
	Sep	100.67	84.33	74.30	77.92	96.52	—	—
	Oct	59.46	80.74	—	—	57.29	—	—
	Nov	79.77	78.18	—	—	71.45	—	—
	Dec	85.47	76.08	—	—	82.35	—	—

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TABLE W6:  
 QUARTERLY AND YEARLY **WOLF NUMBER** MEANS for 1994 - 1998.

YEAR/ QUARTER	WN	WN(S <sup>HBm</sup> )	WN(S <sup>W</sup> )	WN(S <sup>B13</sup> )	R <sub>GD</sub>	g	f
1994 / 1	52.27	47.06	40.24	42.74	40.01	3.35	18.81
2	23.46	31.01	38.77	35.96	18.75	1.72	6.24
3	31.10	31.99	31.82	31.50	27.59	2.22	8.86
4	32.96	31.29	29.55	30.43	28.61	2.23	10.68
1994	34.70	35.34	35.09	35.16	28.92	2.37	11.03
1995 / 1	29.36	27.88	26.72	27.21	27.57	1.93	10.07
2	20.27	21.97	21.94	21.95	15.94	1.13	9.00
3	12.76	16.12	18.25	17.41	11.06	0.92	3.55
4	17.32	14.68	13.37	13.78	14.08	1.34	3.91
1995	20.25	20.16	20.07	20.09	17.33	1.34	6.85
1996 / 1	10.29	10.04	12.03	11.22	8.76	0.73	2.94
2	7.22	9.41	10.14	9.83	5.70	0.52	2.02
3	12.81	10.52	9.46	9.86	9.54	0.88	3.98
4	9.27	9.23	10.94	10.27	9.39	0.54	3.88
1996	9.78	9.80	10.64	10.29	8.25	0.66	3.19
1997 / 1	8.14	11.23	12.65	11.94	7.66	0.58	2.33
2	17.64	16.04	19.30	17.87	14.88	1.28	4.84
3	27.40	27.10	26.65	26.81	28.21	1.70	10.39
4	37.73	37.31	36.74	36.89	35.13	2.45	13.18
1997	22.96	22.92	23.83	23.38	21.52	1.52	7.80
1998 / 1	44.92	46.11	51.05	48.87	42.60	2.73	17.57
2	59.27	64.22	63.13	63.91	61.38	3.57	23.59
3	95.38	81.89	71.99	75.88	90.68	6.08	34.62
4	75.41	78.33	—	—	71.04	4.83	27.12
1998	67.67	67.64	—	—	65.44	4.23	25.34

NB: WN(S<sup>HBm</sup>), WN(S<sup>W</sup>) & WN(S<sup>B13</sup>) quarterly values are means of 3 monthly values.

WN(S<sup>HBm</sup>), WN(S<sup>W</sup>) & WN(S<sup>B13</sup>) yearly values are means of 12 monthly values.

R<sub>GD</sub> quarterly values are computed as quarterly WN means multiplied by quarterly k means.

Annual values of R<sub>GD</sub> are annual Wolf Number means multiplied by annual k means.

TABLE G3:  
CORRECTED ACTIVE AREA (g) VALUES for 1997 - 1998.

As the GDSO is in suburban Auckland, it can suffer terrible atmospheric conditions, hence the 'observed' Active Area means have to be upgraded to give reflections of international results. International Active Area results are computed by the Solar Section of the British Astronomical Association. Below are the 'observed' Active Area (g) means along with the monthly k co-efficients and the corrected values ( $g_{GD}$ ) for 1997 - 1998. The BAA's final values ( $g_B$ ) are also stated.

$I/GDSO$  = BAA's mean (of days observed by the GDSO) divided by the GDSO's monthly mean.

$I/GDSO_A$  = BAA's mean (of days with GDSO k values) divided by the GDSO's observed mean for the same days.

n = number of GDSO observations.

$n_k$  = number of k values.

$\sigma$  = sample standard deviation of k values.

$\sigma$ 'SIDC' = annual  $\sigma$  computed on the SIDC formula.

$E\sigma$  = annual estimate of standard deviation.

	g	k	$g_{GD}$	$\sigma$	$I/GDSO$	$I/GDSO_A$	n	$n_k$	$g_B$
1997 Jan	0.42	1.1250	0.47	0.3536	1.6250	1.1250	19	8	0.58
Feb	0.50	1.3333	0.67	0.5774	1.4000	1.2000	10	3	0.71
Mar	0.86	1.0500	0.90	0.3689	1.0000	1.0000	14	10	0.67
Apr	1.47	1.0556	1.56	0.4163	1.0000	0.9643	19	15	1.30
May	0.92	1.3500	1.25	1.0014	1.1667	1.2727	13	10	1.74
Jun	1.33	0.9412	1.25	0.1661	0.9167	0.9167	18	17	1.30
Jul	0.85	1.1944	1.02	0.6821	1.2352	1.0625	20	9	0.90
Aug	2.05	1.2456	2.55	0.5967	1.1163	1.1163	21	19	2.09
Sep	2.31	1.0469	2.42	0.3191	1.0000	1.0000	16	16	2.66
Oct	2.18	1.0882	2.37	0.4087	1.0541	1.0541	17	17	2.06
Nov	2.21	1.1548	2.56	0.4504	1.1613	1.1613	14	14	2.36
Dec	3.08	1.1282	3.47	0.2599	1.1000	1.1000	13	13	2.77
1997 Means	1.52	1.1214	1.70	—	1.0918	1.0653	—	—	1.59
	$\sigma = 0.4777$		$\sigma$ 'SIDC' = 0.4407			$E\sigma = 0.0395$			
1998 Jan	1.75	1.1250	1.97	0.4981	1.0357	1.0741	16	12	2.51
Feb	2.62	1.0833	2.84	0.3443	1.0714	1.0714	16	16	2.89
Mar	3.76	1.0706	4.03	0.3330	1.0156	1.0156	17	17	3.77
Apr	3.27	1.3894	4.55	0.6273	1.2500	1.2500	11	11	3.93
May	3.18	1.0275	3.26	0.2300	1.0000	1.0000	17	17	3.12
Jun	4.67	1.0435	4.87	0.2557	1.0238	1.0238	9	9	5.06
Jul	5.78	1.0333	5.97	0.2769	1.0000	1.0000	9	9	5.29
Aug	6.12	1.0584	6.48	0.1240	1.0510	1.0510	16	16	6.25
Sep	6.20	1.0548	6.54	0.2707	1.0215	1.0215	15	15	6.53
Oct	4.00	0.9795	3.92	0.2613	0.9231	0.9231	13	13	3.64
Nov	5.46	1.0260	5.60	0.3258	1.0423	1.0423	13	13	5.20
Dec	5.00	1.1167	5.58	0.3220	1.0533	1.0533	15	15	5.61
1998 Means	4.23	1.0801	4.57	—	1.0354	1.0368	—	—	4.48
	$\sigma = 0.3367$		$\sigma$ 'SIDC' = 0.3145			$E\sigma = 0.0263$			

TABLE G4:  
CORRECTED **ACTIVE AREA (g)** VALUES for Rotations 1917 - 1943.

As a k value is attributed to each spotted observation, the k value for any specific rotation is the mean of all the k values for the rotation concerned.

The corrected values are labelled  $g_{GD}$ .

$g_{GD} = g \times k$ .

$\sigma$  = sample standard deviation of k values.

I/GDSO = International mean (of days observed by the GDSO) divided by the GDSO's rotation mean.

I/GDSO<sub>A</sub> = International mean (of days observed by the GDSO) divided by the GDSO's observed mean for the *same* days.

n = number of GDSO observations.

$n_k$  = number of k values.

ROTA- TION	START DATE, UT	g	k	$g_{GD}$	$\sigma$	I/GDSO	I/GDSO <sub>A</sub>	n	$n_k$
1917	1996/12/09.28	1.00	1.0000	1.00	0.0000	1.0000	1.0000	13	8
1918	1997/01/05.61	0.41	1.1429	0.47	0.3780	1.7143	1.1429	17	7
1919	1997/02/01.95	0.50	1.3333	0.67	0.5774	1.4000	1.2000	10	3
1920	1997/03/01.29	0.82	1.0714	0.88	0.4499	1.0000	1.0000	11	7
1921	1997/03/28.60	1.45	1.0784	1.56	0.3638	1.0000	1.0000	20	17
1922	1997/04/24.87	0.83	0.9375	0.78	0.1768	0.9000	0.8889	12	8
1923	1997/05/22.10	1.46	1.2692	1.86	0.8807	1.1579	1.1579	13	13
1924	1997/06/18.31	0.78	0.9000	0.70	0.2108	1.0000	0.8462	18	10
1925	1997/07/15.50	1.40	1.3712	1.92	0.8160	1.2381	1.1905	15	11
1926	1997/08/11.72	2.33	1.1302	2.64	0.4644	1.0238	1.0238	18	16
1927	1997/09/07.97	2.07	1.1333	2.34	0.3994	1.0968	1.0968	15	15
1928	1997/10/05.24	2.19	1.0312	2.26	0.3454	1.0000	1.0000	16	16
1929	1997/11/01.54	2.21	1.1548	2.56	0.4504	1.1613	1.1613	14	14
1930	1997/11/28.84	3.30	1.1167	3.68	0.2663	1.0909	1.0909	10	10
1931	1997/12/26.17	1.75	1.0278	1.80	0.3946	0.9643	1.0000	16	12
1932	1998/01/22.50	2.43	1.2857	3.12	0.3606	1.2647	1.2647	14	14
1933	1988/02/18.85	3.54	0.8872	3.14	0.2096	0.8913	0.8913	13	13
1934	1998/03/18.17	4.13	1.1633	4.81	0.3401	1.1129	1.1129	15	15
1935	1998/04/14.46	2.58	1.2750	3.29	0.6576	1.0968	1.0968	12	12
1936	1998/05/11.70	3.08	1.0556	3.25	0.1925	1.0541	1.0541	12	12
1937	1998/06/07.91	5.67	1.0435	5.91	0.2557	1.0196	1.0196	9	9
1938	1998/07/05.11	5.14	1.0429	5.36	0.3190	1.0000	1.0000	7	7
1939	1998/08/01.32	6.23	1.0719	6.68	0.1163	1.0617	1.0617	13	13
1940	1998/08/28.56	6.35	1.0190	6.47	0.2332	1.0093	1.0093	17	17
1941	1998/09/24.82	3.89	1.0704	4.16	0.2847	1.0000	1.0000	9	9
1942	1998/10/22.10	5.07	1.0218	5.18	0.3373	1.0141	1.0141	14	14
1943	1998/11/18.41	5.80	1.0167	5.90	0.2022	1.0345	1.0345	10	10



TABLE G5:  
SMOOTHED **ACTIVE AREA (g)** VALUES for **1997 - 1998**.

The following are smoothed Active Area (g) values in three different systems.  
See page xii for all smoothing formulæ.

YEAR	MONTH	g	g(S <sup>HBm</sup> )	g(S <sup>W</sup> )	g(S <sup>B13</sup> )	g <sub>GD</sub>	g <sub>GD</sub> (S <sup>W</sup> )	g <sub>GD</sub> (S <sup>B13</sup> )
1997	Jan	0.42	0.6619	0.8074	0.7382	0.47	0.8403	0.7852
	Feb	0.50	0.7639	0.8342	0.7984	0.67	0.9062	0.8743
	Mar	0.86	0.8865	0.9474	0.9147	0.90	1.0559	1.0181
	Apr	1.47	1.0094	1.1249	1.0644	1.56	1.2482	1.1896
	May	0.92	1.1281	1.2713	1.2092	1.25	1.4170	1.3563
	Jun	1.33	1.3025	1.4210	1.3703	1.25	1.5972	1.5411
	Jul	0.85	1.4781	1.5704	1.5532	1.02	1.7700	1.7498
	Aug	2.05	1.7394	1.7142	1.7409	2.55	1.9229	1.9587
	Sep	2.31	2.0288	1.9233	1.9373	2.42	2.1438	2.1706
	Oct	2.18	2.1962	2.1192	2.1272	2.37	2.3988	2.3908
	Nov	2.21	2.3381	2.2883	2.3127	2.56	2.6071	2.6109
	Dec	3.08	2.4919	2.5217	2.5121	3.47	2.8417	2.8341
1998	Jan	1.75	2.5931	2.8662	2.7522	1.97	3.1988	3.0920
	Feb	2.62	2.8188	3.2412	3.0470	2.84	3.5688	3.3982
	Mar	3.76	3.1450	3.5729	3.3830	4.03	3.9042	3.7511
	Apr	3.27	3.5006	3.8108	3.7192	4.55	4.1404	4.0915
	May	3.18	4.0225	4.0221	4.0569	3.26	4.3317	4.4046
	Jun	4.67	4.6438	4.2375	4.4009	4.87	4.5462	4.7223
	Jul	5.78	5.0950	4.3962	4.6923	5.97	—	—
	Aug	6.12	5.4000	4.5788	4.8954	6.48	—	—
	Sep	6.20	5.4569	4.7342	4.9935	6.54	—	—
	Oct	4.00	5.1650	—	—	3.92	—	—
	Nov	5.46	4.9844	—	—	5.60	—	—
	Dec	5.00	4.7950	—	—	5.58	—	—

TABLE G6:  
 QUARTERLY & YEARLY **ACTIVE AREA (g)** MEANS for 1994 - 1998.

YEAR/ QUARTER	g	$g(S^{HBm})$	$g(S^W)$	$g(S^{B13})$	$g_{GD}$
1994 / 1	3.35	2.99	2.62	2.74	3.07
2	1.72	2.21	2.55	2.44	1.66
3	2.22	2.23	2.22	2.20	2.34
4	2.23	2.14	1.99	2.06	2.26
1994	2.37	2.39	2.34	2.36	2.34
1995 / 1	1.93	1.81	1.75	1.77	2.21
2	1.13	1.33	1.45	1.40	1.07
3	0.92	1.11	1.23	1.18	0.96
4	1.34	1.12	0.95	1.01	1.42
1995	1.34	1.34	1.35	1.34	1.41
1996 / 1	0.73	0.75	0.89	0.83	0.70
2	0.52	0.66	0.72	0.70	0.51
3	0.88	0.71	0.64	0.66	0.76
4	0.54	0.57	0.74	0.67	0.46
1996	0.66	0.67	0.75	0.72	0.63
1997 / 1	0.58	0.77	0.86	0.82	0.65
2	1.28	1.15	1.27	1.21	1.38
3	1.70	1.75	1.74	1.74	1.98
4	2.45	2.34	2.31	2.32	2.75
1997	1.52	1.50	1.55	1.52	1.70
1998 / 1	2.73	2.85	3.23	3.06	2.98
2	3.57	4.06	4.02	4.06	4.06
3	6.08	5.32	4.57	4.86	6.39
4	4.83	4.98	—	—	5.04
1998	4.23	4.30	—	—	4.57

NB:  $g(S^{HBm})$ ,  $g(S^W)$  &  $g(S^{B13})$  quarterly values are means of 3 monthly values.

$g(S^{HBm})$ ,  $g(S^W)$  &  $g(S^{B13})$  yearly values are means of 12 monthly values.

$g_{GD}$  quarterly values are computed as quarterly g means multiplied by quarterly k means.

Annual values of  $g_{GD}$  are annual Active Area means multiplied by annual k means.

TABLE P1:

MONTHLY **PETTISINDEX** MEANS OF GDSO DATA for **1998**.

p = mean of penumbrae on the solar disc.

s = mean of penumbral-free sunspots on the solar disc.

SN = mean Pettisindex (k neglected; see list of definitions).

n = total number of observations.

w = mean weight.

Q = mean quietness [steadiness] of image (on the Kiepenheuer scale).

S = mean sharpness [clarity] of image (on the Kiepenheuer scale).

T = mean transparency of the atmosphere (1 = excellent, 5 = opaque).

C = mean condition  $[(Q+S+T)/3]$ .

MONTH	p	s	SN	n	w	Q	S	T	C
Jan	1.69	5.44	22.31	16	0.4343	1.91	2.44	2.62	2.3229
Feb	2.62	7.56	33.81	16	0.4578	1.69	2.34	2.66	2.2292
Mar	6.59	13.47	79.35	17	0.4595	1.65	2.38	2.59	2.2059
Apr	3.64	10.09	46.45	11	0.4671	1.68	2.27	2.55	2.1667
May	5.76	14.76	72.41	17	0.4679	1.79	2.21	2.50	2.1667
Jun	4.67	11.22	57.89	9	0.4641	1.89	2.28	2.39	2.1852
Jul	5.33	12.11	65.44	9	0.4993	1.78	2.11	2.28	2.0556
Aug	9.25	15.75	108.25	16	0.4502	1.91	2.34	2.53	2.2604
Sep	8.27	16.27	98.93	15	0.4947	1.57	2.23	2.33	2.0444
Oct	4.54	10.23	55.62	13	0.4520	1.92	2.31	2.50	2.2436
Nov	6.38	12.08	75.92	13	0.4649	1.85	2.31	2.46	2.2051
Dec	9.07	15.67	106.33	15	0.4469	1.73	2.47	2.63	2.2778
Year	5.75	12.16	69.58	—	0.4617	1.78	2.32	2.52	2.2036

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TABLE P2:

ROTATIONAL **PETTISINDEX** MEANS OF GDSO DATA.

Abbreviations as above.

ROT.	start date, UT	p	s	SN	n	w	Q	S	T	C
1931	1997/12/26.17	2.12	5.25	26.50	16	0.4483	1.91	2.31	2.53	2.2500
1932	1998/01/22.50	2.21	7.43	29.57	14	0.4473	1.68	2.50	2.68	2.2857
1933	1988/02/18.85	4.85	11.69	60.15	13	0.4547	1.73	2.35	2.65	2.2436
1934	1998/03/18.17	6.73	14.00	81.33	15	0.4693	1.63	2.30	2.50	2.1444
1935	1998/04/14.46	4.42	13.08	57.25	12	0.4664	1.67	2.21	2.62	2.1667
1936	1998/05/11.70	5.17	11.42	63.08	12	0.4634	1.88	2.25	2.46	2.1944
1937	1998/06/07.91	5.56	12.11	67.67	9	0.4728	1.89	2.28	2.28	2.1481
1938	1998/07/05.11	4.14	11.71	53.14	7	0.4982	1.79	2.07	2.36	2.0714
1939	1998/08/01.32	8.77	14.92	102.62	13	0.4416	1.92	2.42	2.58	2.3077
1940	1998/08/28.56	9.29	17.47	110.41	17	0.4953	1.62	2.18	2.32	2.0392
1941	1998/09/24.82	5.22	11.56	63.78	9	0.4454	1.83	2.39	2.56	2.2593
1942	1998/10/22.10	5.00	10.71	60.71	14	0.4731	1.93	2.21	2.36	2.1667
1943	1998/11/18.41	8.80	14.70	102.70	10	0.4296	1.75	2.60	2.75	2.3667

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TABLE P3:  
CORRECTED PETTISINDICES for 1997 - 1998.

As the GDSO is in suburban Auckland, it can suffer terrible atmospheric conditions, hence the 'observed' Pettisindices have to be upgraded to give reflections of international results. International Pettisindex results are computed by Siegfried Gonzi, St Paul, Austria, on behalf of Sonne, Germany.

Below are the 'observed' Pettisindices along with the monthly k co-efficients and the corrected values ( $PX_{GD}$ ) for 1997 - 1998. Sonne's final values ( $PX_I$ ) are also stated.

$I/GDSO$  = Sonne's mean (of days observed by the GDSO) divided by the GDSO's monthly mean.

$I/GDSO_A$  = Sonne's mean (of days with GDSO k values) divided by the GDSO's observed mean for the *same* days.

n = number of GDSO observations.

$n_k$  = number of k values.

$\sigma$  = sample standard deviation of k values.

$\sigma$ 'SIDC' = annual  $\sigma$  computed on the SIDC formula.

	SN	k	$PX_{GD}$	$\sigma$	$I/GDSO$	$I/GDSO_A$	n	$n_k$	$PX_I$
1997 Jan	3.16	1.9301	6.10	1.8460	1.2000	1.1724	19	7	2.7
Feb	8.60	3.3725	29.00	4.0092	1.1744	1.1628	10	3	9.5
Mar	8.21	2.6215	21.53	2.2516	1.7391	1.7304	14	11	10.5
Apr	20.05	1.9036	38.17	1.5208	1.3386	1.3307	19	15	20.9
May	6.54	3.2662	21.36	5.5809	1.7294	1.7176	13	11	20.3
Jun	8.89	2.2612	20.10	1.8026	1.5938	1.5875	18	17	14.4
Jul	5.30	4.0134	21.27	6.1102	1.3019	1.2075	20	10	6.8
Aug	25.67	1.5009	38.52	0.4494	1.4471	1.4397	21	19	31.1
Sep	52.44	1.4903	78.15	0.3601	1.3600	1.3600	16	16	73.8
Oct	21.76	1.6329	35.54	0.7439	1.3730	1.3730	17	17	27.7
Nov	40.93	1.7525	71.73	1.8656	1.2478	1.2478	14	14	54.8
Dec	49.31	1.2996	64.08	0.3025	1.2153	1.2153	13	13	58.4
1997 Means	20.95	2.0724	43.42	—	1.3517	1.3461	—	—	27.6
$\sigma =$	2.5430		$\sigma$ 'SIDC' =	1.8475		$E\sigma =$	0.2066		
1998 Jan	22.31						16		
Feb	33.81			DATA			16		
Mar	79.35						17		
Apr	46.45			UNOBTAINABLE			11		
May	72.41						17		
Jun	57.89			AT			9		
Jul	65.44						9		
Aug	108.25			TIME			16		
Sep	98.93			OF			15		
Oct	55.62						13		
Nov	75.92			PRINT.			13		
Dec	106.33						15		
1998 Means	69.58			—			—	—	
$\sigma =$			$\sigma$ 'SIDC' =			$E\sigma =$			

TABLE P4:  
CORRECTED **PETTISINDICES** for Rotations 1917 - 1943.

As a k value is attributed to each spotted observation, the k value for any specific rotation is the mean of all the k values for the rotation concerned.

The corrected values are labelled  $PX_{GD}$ .

$$PX_{GD} = SN \times k.$$

$\sigma$  = sample standard deviation of k values.

I/GDSO = International mean (of days observed by the GDSO) divided by the GDSO's rotation mean.

I/GDSO<sub>A</sub> = International mean (of days observed by the GDSO) divided by the GDSO's observed mean for the *same* days.

n = number of GDSO observations.

$n_k$  = number of k values.

ROTA- TION	START DATE, UT	SN	k	$PX_{GD}$	$\sigma$	I/GDSO	I/GDSO <sub>A</sub>	n	$n_k$
1917	1996/12/09.28	10.62	1.1483	12.19	0.4176	1.2681	1.2609	13	8
1918	1997/01/05.61	3.24	2.2184	7.18	1.8414	1.2727	1.2642	17	6
1919	1997/02/01.95	8.60	3.3725	29.00	4.0092	1.1744	1.1628	10	3
1920	1997/03/01.29	4.36	2.9559	12.90	2.5956	1.9167	1.8958	11	8
1921	1997/03/28.60	21.75	1.9125	41.60	1.4202	1.3793	1.3770	20	17
1922	1997/04/24.87	7.42	1.3288	9.86	0.2734	1.4045	1.3708	12	9
1923	1997/05/22.10	11.15	3.6807	41.05	5.2832	1.6621	1.6621	13	13
1924	1997/06/18.31	1.72	2.2765	3.92	1.2745	2.3548	2.1290	18	11
1925	1997/07/15.50	14.47	3.4723	50.23	5.8781	1.3088	1.2903	15	11
1926	1997/08/11.72	28.50	1.4628	41.69	0.3647	1.3957	1.3879	18	16
1927	1997/09/07.97	50.67	1.5508	78.57	0.3380	1.3961	1.3961	15	15
1928	1997/10/05.24	22.31	1.6340	36.46	0.7683	1.3641	1.3641	16	16
1929	1997/11/01.54	40.93	1.7525	71.73	1.8656	1.2478	1.2478	14	14
1930	1997/11/28.84	47.50	1.3140	62.41	0.3424	1.2042	1.2042	10	10
1931	1997/12/26.17	26.50						16	
1932	1998/01/22.50	29.57			DATA			14	
1933	1988/02/18.85	60.15						13	
1934	1998/03/18.17	81.33			UNOBTAINABLE			15	
1935	1998/04/14.46	57.25						12	
1936	1998/05/11.70	63.08			AT			12	
1937	1998/06/07.91	67.67						9	
1938	1998/07/05.11	53.14			TIME			7	
1939	1998/08/01.32	102.62						13	
1940	1998/08/28.56	110.41						17	
1941	1998/09/24.82	63.78			PRINT.			9	
1942	1998/10/22.10	60.71						14	
1943	1998/11/18.41	102.70						10	

TABLE P5:  
SMOOTHED **PETTISINDICES** for **1996 - 1998**.

The following are smoothed Pettisindices in three different systems. See page xii for all smoothing formulæ.

YEAR	MONTH	SN	SN(S <sup>HBm</sup> )	SN(S <sup>W</sup> )	SN(S <sup>B13</sup> )	PX <sub>GD</sub>	PX <sub>GD</sub> (S <sup>W</sup> )	PX <sub>GD</sub> (S <sup>B13</sup> )
1996	Jan	5.73	7.24	8.86	8.19	13.28	13.32	12.81
	Feb	3.38	5.88	8.96	7.85	5.87	13.66	12.54
	Mar	8.11	6.01	8.85	7.69	10.68	13.69	12.45
	Apr	3.44	6.50	7.69	7.34	10.04	12.12	12.02
	May	8.44	7.91	7.31	7.38	14.52	12.38	12.23
	Jun	7.57	8.66	8.00	7.94	9.99	13.85	13.11
	Jul	12.92	8.67	8.02	8.35	17.93	13.50	13.67
	Aug	14.29	8.99	8.13	8.53	23.58	14.16	14.28
	Sep	0.54	8.39	8.35	8.55	0.45	15.58	15.03
	Oct	0.00	8.45	9.05	8.89	0.00	17.20	16.35
	Nov	22.75	9.52	9.66	9.37	46.47	18.66	17.99
	Dec	10.35	9.07	9.64	9.48	12.77	19.37	19.12
1997	Jan	3.16	9.47	9.37	9.39	6.10	19.93	20.11
	Feb	8.60	9.91	9.53	9.62	29.00	20.69	21.47
	Mar	8.21	9.84	12.17	10.96	21.53	24.55	23.98
	Apr	20.05	10.49	15.24	12.81	38.17	29.27	26.88
	May	6.54	10.89	16.90	14.57	21.36	31.80	29.39
	Jun	8.89	13.95	19.28	17.17	20.10	34.99	32.82
	Jul	5.30	17.79	21.70	20.55	21.27	—	—
	Aug	25.67	24.04	23.55	24.11	38.52	—	—
	Sep	52.44	31.42	27.57	28.11	78.15	—	—
	Oct	21.76	34.04	31.63	32.02	35.54	—	—
	Nov	40.93	36.62	35.47	36.00	71.73	—	—
	Dec	49.31	39.37	40.26	40.14	64.08	—	—
1998	Jan	22.31	40.46	44.81	44.01	—	—	—
	Feb	33.81	46.57	50.76	48.69	—	—	—
	Mar	79.35	53.43	56.13	54.01	—	—	—
	Apr	46.45	57.01	59.48	59.01	—	—	—
	May	72.41	64.64	62.35	63.54	—	—	—
	Jun	57.89	70.80	66.18	68.16	—	—	—
	Jul	65.44	75.31	70.63	73.00	—	—	—
	Aug	108.25	81.34	74.09	76.82	—	—	—
	Sep	98.93	83.39	76.38	78.86	—	—	—
	Oct	55.62	82.10	—	—	—	—	—
	Nov	75.92	81.67	—	—	—	—	—
	Dec	106.33	82.15	—	—	—	—	—

TABLE P6:  
 QUARTERLY AND YEARLY **PETTISINDEX** MEANS for 1994 - 1998.

YEAR/ QUARTER	SN	SN(S <sup>HBm</sup> )	SN(S <sup>W</sup> )	SN(S <sup>B13</sup> )	PX <sub>GD</sub>	p	s
1994 / 1	54.62	50.44	41.42	44.92	56.86	4.58	8.85
2	18.24	26.13	38.80	33.98	24.94	1.44	3.80
3	27.03	28.45	28.25	27.89	41.06	2.19	5.14
4	30.96	28.95	26.82	27.79	44.64	2.47	6.23
1994	32.39	33.49	33.82	33.64	43.47	2.64	5.96
1995 / 1	26.09	25.64	24.83	25.27	38.46	2.00	6.09
2	20.69	21.01	19.65	20.15	37.10	1.51	5.60
3	10.16	13.46	15.47	14.74	14.26	0.78	2.31
4	12.66	10.35	10.33	10.14	17.57	1.02	2.43
1995	17.83	17.62	17.57	17.58	27.32	1.36	4.24
1996 / 1	6.27	6.38	8.89	7.91	11.45	0.41	2.18
2	6.40	7.69	7.67	7.55	12.33	0.50	1.40
3	9.72	8.69	8.17	8.47	14.65	0.72	2.51
4	10.38	9.01	9.45	9.25	17.22	0.83	2.12
1996	8.16	7.94	8.54	8.30	14.02	0.61	2.03
1997 / 1	6.07	9.74	10.36	9.99	15.16	0.44	1.65
2	12.52	11.78	17.14	14.85	29.97	0.94	3.12
3	26.04	24.42	24.27	24.26	53.52	1.96	6.39
4	36.00	36.68	35.79	36.05	56.61	2.89	7.14
1997	20.95	20.65	21.89	21.29	43.42	1.57	5.23
1998 / 1	45.86	46.82	50.57	48.90	—	3.69	8.92
2	61.16	64.15	62.67	63.57	—	4.86	12.51
3	95.12	80.01	73.70	76.23	—	8.00	15.12
4	80.61	81.97	—	—	—	6.78	12.80
1998	69.58	68.24	—	—	—	5.75	12.16

NB: SN(S<sup>HBm</sup>), SN(S<sup>W</sup>) & SN(S<sup>B13</sup>) quarterly values are means of 3 monthly values.  
 SN(S<sup>HBm</sup>), SN(S<sup>W</sup>) & SN(S<sup>B13</sup>) yearly values are means of 12 monthly values.  
 PX<sub>GD</sub> quarterly values are computed as quarterly SN means multiplied by quarterly k means.  
 Annual values of PX<sub>GD</sub> are annual Pettisindex means multiplied by annual k means.

TABLE B1:  
 MONTHLY **BECKINDEX** MEANS OF GDSO DATA for **1998**.  
 BX = mean Beckindex (k neglected; see list of definitions).  
 n = total number of observations.  
 w = mean weight.  
 Q = mean quietness [steadiness] of image (on the Kiepenheuer scale).  
 S = mean sharpness [clarity] of image (on the Kiepenheuer scale).  
 T = mean transparency of the atmosphere (1 = excellent, 5 = opaque).  
 C = mean condition [(Q+S+T)/3].

MONTH	BX	n	w	Q	S	T	C
Jan	152.88	16	0.4343	1.91	2.44	2.62	2.3229
Feb	198.69	16	0.4578	1.69	2.34	2.66	2.2292
Mar	580.53	17	0.4595	1.65	2.38	2.59	2.2059
Apr	204.91	11	0.4671	1.68	2.27	2.55	2.1667
May	542.41	17	0.4679	1.79	2.21	2.50	2.1667
Jun	280.22	9	0.4641	1.89	2.28	2.39	2.1852
Jul	300.00	9	0.4993	1.78	2.11	2.28	2.0556
Aug	733.38	16	0.4502	1.91	2.34	2.53	2.2604
Sep	787.13	15	0.4947	1.57	2.23	2.33	2.0444
Oct	278.46	13	0.4520	1.92	2.31	2.50	2.2436
Nov	387.77	13	0.4649	1.85	2.31	2.46	2.2051
Dec	746.60	15	0.4469	1.73	2.47	2.63	2.2778
Year	452.65	—	0.4617	1.78	2.32	2.52	2.2036

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TABLE B2:  
 ROTATIONAL **BECKINDEX** MEANS OF GDSO DATA.  
 Abbreviations as above.

ROT.	start date, UT	BX	n	w	Q	S	T	C
1931	1997/12/26.17	178.44	16	0.4483	1.91	2.31	2.53	2.2500
1932	1998/01/22.50	184.64	14	0.4473	1.68	2.50	2.68	2.2857
1933	1988/02/18.85	379.15	13	0.4547	1.73	2.35	2.65	2.2436
1934	1998/03/18.17	553.47	15	0.4693	1.63	2.30	2.50	2.1444
1935	1998/04/14.46	441.25	12	0.4664	1.67	2.21	2.62	2.1667
1936	1998/05/11.70	411.33	12	0.4634	1.88	2.25	2.46	2.1944
1937	1998/06/07.91	305.11	9	0.4728	1.89	2.28	2.28	2.1481
1938	1998/07/05.11	246.57	7	0.4982	1.79	2.07	2.36	2.0714
1939	1998/08/01.32	624.77	13	0.4416	1.92	2.42	2.58	2.3077
1940	1998/08/28.56	905.82	17	0.4953	1.62	2.18	2.32	2.0392
1941	1998/09/24.82	335.33	9	0.4454	1.83	2.39	2.56	2.2593
1942	1998/10/22.10	322.93	14	0.4731	1.93	2.21	2.36	2.1667
1943	1998/11/18.41	580.90	10	0.4296	1.75	2.60	2.75	2.3667

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TABLE B3:  
CORRECTED **BECKINDICES** for **1997 - 1998**.

As the GDSO is in suburban Auckland, it can suffer terrible atmospheric conditions, hence the 'observed' Beckindices have to be upgraded to give reflections of international results. International Beckindex results are computed by Sonne, Germany.

Below are the 'observed' Beckindices along with the monthly k co-efficients and the corrected values ( $BX_{GD}$ ) for 1997 - 1998. Sonne's final values ( $BX_I$ ) are also stated.

$I/GDSO$  = Sonne's mean (of days observed by the GDSO) divided by the GDSO's monthly mean.

$I/GDSO_A$  = Sonne's mean (of days with GDSO k values) divided by the GDSO's observed mean for the *same* days.

n = number of GDSO observations.

$n_k$  = number of k values.

$\sigma$  = sample standard deviation of k values.

$\sigma$ 'SIDC' = annual  $\sigma$  computed on the SIDC formula.

	BX	k	$BX_{GD}$	$\sigma$	$I/GDSO$	$I/GDSO_A$	n	$n_k$	$BX_I$
1997 Jan	9.47	1.3927	13.19	1.2602	1.1333	1.0833	19	8	9
Feb	33.40	5.8260	194.59	7.2968	1.7305	1.7156	10	3	45
Mar	33.36	3.8158	127.28	2.7857	2.5589	2.5503	14	11	60
Apr	114.53	2.1340	244.40	1.5397	1.3061	1.3001	19	15	114
May	21.62	5.9564	128.75	8.0021	3.5409	3.5884	13	10	129
Jun	38.67	2.6361	101.93	1.8356	1.9382	1.9325	18	17	77
Jul	24.50	3.7148	91.01	6.2063	1.3898	1.3633	20	10	33
Aug	174.33	2.0843	363.36	0.8910	1.6569	1.6531	21	19	226
Sep	367.75	2.8257	1039.15	1.3453	1.9041	1.9041	16	16	685
Oct	97.82	2.5343	247.91	1.2663	1.9194	1.9194	17	17	151
Nov	291.14	2.7628	804.37	3.8999	1.4249	1.4249	14	14	509
Dec	275.00	1.6075	442.05	0.6505	1.3975	1.3975	13	13	470
1997 Means	121.05	2.8209	341.46	—	1.6655	1.6631	—	—	209
	$\sigma = 3.3189$		$\sigma$ 'SIDC' = 2.4970			$E\sigma = 0.2668$			
1998 Jan	152.88	2.5662	392.31	1.7939	1.6337	1.6333	16	13	247
Feb	198.69	2.2682	450.66	1.3315	1.5948	1.5948	16	16	332
Mar	580.53	1.5837	919.40	0.7473	1.4448	1.4448	17	17	821
Apr	204.91	2.7531	564.14	1.4087	1.9911	1.9911	11	11	475
May	542.41	1.9880	1078.33	0.6247	1.8122	1.8122	17	17	829
Jun	280.22	2.2863	640.67	1.0363	1.9092	1.9092	9	9	572
Jul	300.00	2.2339	670.16	0.8678	1.9670	1.9670	9	9	540
Aug	733.38	1.7523	1285.09	0.4904	1.6368	1.6368	16	16	1228
Sep	787.13	2.2036	1734.52	1.5745	1.6372	1.6372	15	15	1205
Oct	278.46							13	
Nov	387.77							13	
Dec	746.60							15	
1998 Means	452.65			—			—	—	
	$\sigma =$		$\sigma$ 'SIDC' =			$E\sigma =$			

TABLE B4:  
CORRECTED **BECKINDICES** for Rotations 1917 - 1943.

As a k value is attributed to each spotted observation, the k value for any specific rotation is the mean of all the k values for the rotation concerned.

The corrected values are labelled  $BX_{GD}$ .

$BX_{GD} = BX \times k$ .

$\sigma$  = sample standard deviation of k values.

I/GDSO = International mean (of days observed by the GDSO) divided by the GDSO's rotation mean.

$I/GDSO_A$  = International mean (of days observed by the GDSO) divided by the GDSO's observed mean for the *same* days.

n = number of GDSO observations.

$n_k$  = number of k values.

ROTA- TION	START DATE, UT	BX	k	$BX_{GD}$	$\sigma$	I/GDSO	$I/GDSO_A$	n	$n_k$
1917	1996/12/09.28	32.46	2.3145	75.13	1.6169	2.2867	2.2796	13	8
1918	1997/01/05.61	9.41	1.5774	14.85	1.2387	1.2625	1.2062	17	7
1919	1997/02/01.95	33.40	5.8260	194.59	7.2968	1.7305	1.7156	10	3
1920	1997/03/01.29	12.09	4.3859	53.03	3.0811	3.6692	3.6391	11	8
1921	1997/03/28.60	124.10	2.1725	269.61	1.4754	1.4037	1.4025	20	17
1922	1997/04/24.87	22.75	3.3535	76.29	2.6782	3.0842	3.0892	12	8
1923	1997/05/22.10	48.92	4.6357	226.79	7.1684	2.0314	2.0314	13	13
1924	1997/06/18.31	6.89	2.2443	15.46	1.7142	2.5968	2.4758	18	11
1925	1997/07/15.50	67.60	4.0379	272.96	5.7428	1.6203	1.6183	15	11
1926	1997/08/11.72	202.50	1.9184	388.48	0.6737	1.6620	1.6582	18	16
1927	1997/09/07.97	359.80	2.9690	1068.23	1.3392	1.9188	1.9188	15	15
1928	1997/10/05.24	100.88	2.4975	251.93	1.2984	1.8829	1.8829	16	16
1929	1997/11/01.54	291.14	2.7628	804.37	3.8999	1.4249	1.4249	14	14
1930	1997/11/28.84	239.20	1.6866	403.44	0.7244	1.4335	1.4335	10	10
1931	1997/12/26.17	178.44	2.3156	413.19	1.8096	1.4567	1.4564	16	13
1932	1998/01/22.50	184.64	2.2688	418.91	1.0042	1.7574	1.7574	14	14
1933	1988/02/18.85	379.15	1.7792	674.61	1.2993	1.4127	1.4127	13	13
1934	1998/03/18.17	553.47	1.8025	997.62	0.8255	1.5411	1.5411	15	15
1935	1998/04/14.46	441.25	2.7728	1223.51	1.2768	2.0123	2.0123	12	12
1936	1998/05/11.70	411.33	1.8708	769.54	0.7084	1.6465	1.6465	12	12
1937	1998/06/07.91	305.11	2.2643	690.85	1.0651	1.8176	1.8176	9	9
1938	1998/07/05.11	246.57	2.4617	606.99	0.8382	2.3082	2.3082	7	7
1939	1998/08/01.32	624.77	1.7895	1118.03	0.5313	1.6892	1.6892	13	13
1940	1998/08/28.56	905.82						17	
1941	1998/09/24.82	335.33						9	
1942	1998/10/22.10	322.93						14	
1943	1998/11/18.41	580.90						10	

TABLE B5:  
SMOOTHED **BECKINDICES** for **1996 - 1998**.

The following are smoothed Beckindices in three different systems. See page xii for all smoothing formulæ.

YEAR	MONTH	BX	BX(S <sup>HBm</sup> )	BX(S <sup>W</sup> )	BX(S <sup>B13</sup> )	BX <sub>GD</sub>	BX <sub>GD</sub> (S <sup>W</sup> )	BX <sub>GD</sub> (S <sup>B13</sup> )
1996	Jan	27.18	27.2	36.1	32.1	88.09	88.1	81.2
	Feb	13.00	23.1	37.7	31.9	15.64	91.5	79.2
	Mar	34.00	25.1	37.9	32.7	79.36	94.6	80.1
	Apr	12.22	28.9	33.5	32.6	43.90	81.8	78.2
	May	40.56	37.3	36.7	35.6	89.25	88.1	84.1
	Jun	33.29	42.4	44.1	41.4	80.35	106.2	97.3
	Jul	69.38	44.2	43.7	45.4	118.62	103.5	106.2
	Aug	77.53	51.6	43.9	47.7	218.58	107.8	114.1
	Sep	2.15	52.0	44.7	48.8	1.44	117.3	121.3
	Oct	0.00	55.2	48.9	51.6	0.00	127.6	131.1
	Nov	194.19	62.6	52.4	54.1	469.81	137.6	141.2
	Dec	30.35	52.2	51.8	52.9	74.26	140.2	143.5
1997	Jan	9.47	49.9	50.2	50.3	13.19	139.9	142.7
	Feb	33.40	48.0	52.3	50.4	194.59	144.8	146.3
	Mar	33.36	44.3	71.6	58.7	127.28	194.1	168.0
	Apr	114.53	50.1	90.9	70.5	244.40	247.6	198.8
	May	21.62	54.3	99.0	81.9	128.75	271.9	229.1
	Jun	38.67	79.5	113.3	100.0	101.93	301.2	271.6
	Jul	24.50	108.0	129.4	123.9	91.01	332.3	324.3
	Aug	174.33	153.7	142.3	148.7	363.36	358.8	379.3
	Sep	367.75	202.0	172.0	176.4	1039.15	402.4	433.6
	Oct	97.82	215.2	198.6	202.1	247.91	448.8	479.0
	Nov	291.14	231.1	224.0	228.1	804.37	501.7	521.9
	Dec	275.00	248.3	255.8	255.0	442.05	563.7	563.7
1998	Jan	152.88	254.9	277.3	276.8	392.31	610.2	598.0
	Feb	198.69	299.3	312.1	303.7	450.66	672.8	639.2
	Mar	580.53	342.4	352.9	337.4	919.40	740.2	694.1
	Apr	204.91	349.9	377.9	369.6	564.14	—	—
	May	542.41	394.9	389.4	395.9	1078.33	—	—
	Jun	280.22	430.8	413.1	423.3	640.67	—	—
	Jul	300.00	461.5	453.4	458.5	670.16	—	—
	Aug	733.38	515.2	478.4	489.4	1285.09	—	—
	Sep	787.13	536.6	495.4	508.8	1734.52	—	—
	Oct	278.46	534.2	—	—	—	—	—
	Nov	387.77	533.4	—	—	—	—	—
	Dec	746.60	558.0	—	—	—	—	—

TABLE B6:  
 QUARTERLY AND YEARLY **BECKINDEX** MEANS for 1994 - 1998.

YEAR/ QUARTER	BX	BX(S <sup>HBm</sup> )	BX(S <sup>W</sup> )	BX(S <sup>B13</sup> )	BX <sub>GD</sub>	n
1994 / 1	396.63	364.85	278.17	313.45	619.09	52
2	75.63	124.91	253.11	202.96	152.68	54
3	133.74	147.99	150.35	146.41	303.69	58
4	194.79	168.33	148.88	156.57	449.72	57
1994	197.14	201.52	207.63	204.85	402.62	221
1995 / 1	131.91	147.96	144.30	147.66	355.50	56
2	144.04	128.22	109.09	115.76	357.72	55
3	42.25	64.68	80.95	75.34	102.42	51
4	44.02	38.24	47.30	42.32	108.28	44
1995	94.18	94.77	95.41	95.27	238.54	206
1996 / 1	27.51	25.10	37.26	32.23	70.94	49
2	28.32	36.17	38.11	36.57	75.95	50
3	52.28	49.28	44.10	47.28	125.21	43
4	69.67	56.67	51.05	52.87	169.46	52
1996	44.51	41.81	42.63	42.24	112.09	194
1997 / 1	22.81	47.39	58.05	53.14	73.21	43
2	63.06	61.30	101.08	84.13	204.78	50
3	176.05	154.59	147.92	149.64	477.15	57
4	211.68	231.54	226.13	228.40	493.88	44
1997	121.05	123.71	133.28	128.83	341.46	194
1998 / 1	316.20	298.87	314.10	305.97	663.86	49
2	378.30	391.87	393.47	396.27	865.56	37
3	656.02	504.43	475.73	485.57	1331.66	40
4	484.39	541.87	—	—	—	41
1998	452.65	434.26	—	—	—	167

NB: BX(S<sup>HBm</sup>), BX(S<sup>W</sup>) & BX(S<sup>B13</sup>) quarterly values are means of 3 monthly values.  
 BX(S<sup>HBm</sup>), BX(S<sup>W</sup>) & BX(S<sup>B13</sup>) yearly values are means of 12 monthly values.  
 BX<sub>GD</sub> quarterly values are computed as quarterly BX means multiplied by quarterly k means.  
 Annual values of BX<sub>GD</sub> are annual Beckindex means multiplied by annual k means.

TABLE C1:

**MONTHLY CLASSIFICATION VALUE MEANS OF GDSO DATA for 1998.**

CV = mean Classification Value (k neglected; see list of definitions).

n = total number of observations.

w = mean weight.

Q = mean quietness [steadiness] of image (on the Kiepenheuer scale).

S = mean sharpness [clarity] of image (on the Kiepenheuer scale).

T = mean transparency of the atmosphere (1 = excellent, 5 = opaque).

C = mean condition  $[(Q+S+T)/3]$ .

MONTH	CV	n	w	Q	S	T	C
Jan	20.12	16	0.4343	1.91	2.44	2.62	2.3229
Feb	33.50	16	0.4578	1.69	2.34	2.66	2.2292
Mar	75.41	17	0.4595	1.65	2.38	2.59	2.2059
Apr	55.18	11	0.4671	1.68	2.27	2.55	2.1667
May	68.18	17	0.4679	1.79	2.21	2.50	2.1667
Jun	70.89	9	0.4641	1.89	2.28	2.39	2.1852
Jul	82.56	9	0.4993	1.78	2.11	2.28	2.0556
Aug	114.06	16	0.4502	1.91	2.34	2.53	2.2604
Sep	96.33	15	0.4947	1.57	2.23	2.33	2.0444
Oct	48.77	13	0.4520	1.92	2.31	2.50	2.2436
Nov	89.77	13	0.4649	1.85	2.31	2.46	2.2051
Dec	88.87	15	0.4469	1.73	2.47	2.63	2.2778
Year	70.01	—	0.4617	1.78	2.32	2.52	2.2036

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TABLE C2:

**ROTATIONAL CLASSIFICATION VALUE MEANS OF GDSO DATA.**

Abbreviations as above.

ROT.	start date, UT	CV	n	w	Q	S	T	C
1931	1997/12/26.17	29.06	16	0.4483	1.91	2.31	2.53	2.2500
1932	1998/01/22.50	27.86	14	0.4473	1.68	2.50	2.68	2.2857
1933	1988/02/18.85	53.23	13	0.4547	1.73	2.35	2.65	2.2436
1934	1998/03/18.17	83.47	15	0.4693	1.63	2.30	2.50	2.1444
1935	1998/04/14.46	66.33	12	0.4664	1.67	2.21	2.62	2.1667
1936	1998/05/11.70	60.08	12	0.4634	1.88	2.25	2.46	2.1944
1937	1998/06/07.91	79.33	9	0.4728	1.89	2.28	2.28	2.1481
1938	1998/07/05.11	69.00	7	0.4982	1.79	2.07	2.36	2.0714
1939	1998/08/01.32	109.85	13	0.4416	1.92	2.42	2.58	2.3077
1940	1998/08/28.56	108.12	17	0.4953	1.62	2.18	2.32	2.0392
1941	1998/09/24.82	48.44	9	0.4454	1.83	2.39	2.56	2.2593
1942	1998/10/22.10	75.50	14	0.4731	1.93	2.21	2.36	2.1667
1943	1998/11/18.41	96.10	10	0.4296	1.75	2.60	2.75	2.3667

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TABLE C3:  
CORRECTED CLASSIFICATION VALUES for 1997 - 1998.

As the GDSO is in suburban Auckland, it can suffer terrible atmospheric conditions, hence the 'observed' Classification Values have to be upgraded to give reflections of international results. International Classification Value results are computed by Kjell Inge Malde, of Norway.

Below are the 'observed' Classification Values along with the monthly k co-efficients and the corrected values ( $CV_{GD}$ ) for 1997 - 1998. Norway's final values ( $CV_I$ ) are also stated.

$I/GDSO$  = Norway's mean (of days observed by the GDSO) divided by the GDSO's monthly mean.  
 $I/GDSO_A$  = Norway's mean (of days with GDSO k values) divided by the GDSO's observed mean for the *same* days.

n = number of GDSO observations.

$n_k$  = number of k values.

$\sigma$  = sample standard deviation of k values.

$\sigma$ 'SIDC' = annual  $\sigma$  computed on the SIDC formula.

$E\sigma$  = annual estimate of standard deviation.

		CV	k	$CV_{GD}$	$\sigma$	$I/GDSO$	$I/GDSO_A$	n	$n_k$	$CV_I$
1997	Jan	2.58	0.7321	1.89	0.5903	0.7043	0.6404	19	8	1.42
	Feb	8.30	1.2809	10.63	0.9406	0.7911	0.7871	10	3	5.74
	Mar	6.00	1.4483	8.69	0.8272	1.3201	1.2993	14	11	7.35
	Apr	17.42	1.0409	18.13	0.5873	0.8222	0.8190	19	15	13.17
	May	6.31	2.2700	14.32	2.9695	1.5022	1.4998	13	11	16.88
	Jun	7.89	1.4144	11.16	1.4575	1.0582	1.0465	18	17	9.20
	Jul	4.95	1.9654	9.73	3.4700	0.7656	0.7391	20	10	4.56
	Aug	20.52	1.0842	22.25	0.4869	1.0175	1.0059	21	19	20.72
	Sep	65.12	1.3928	90.70	1.0349	1.0052	1.0052	16	16	71.56
	Oct	20.06	1.2485	25.04	0.5887	1.1640	1.1640	17	17	22.18
	Nov	35.79	2.0672	73.98	4.0628	1.0116	1.0116	14	14	46.00
	Dec	54.85	0.9857	54.06	0.2688	0.9091	0.9091	13	13	51.88
1997	Means	20.09	1.4011	28.15	—	0.9929	0.9889	—	—	22.55
		$\sigma = 1.8357$		$\sigma$ 'SIDC' = 1.3882		$E\sigma = 0.1497$				
1998	Jan	20.12	1.6621	33.45	0.9766	1.3038	1.2954	16	13	29.11
	Feb	33.50	1.2151	40.71	0.4957	0.9782	0.9782	16	16	35.26
	Mar	75.41	0.9765	73.64	0.1468	0.9533	0.9533	17	17	70.64
	Apr	55.18	1.0101	55.74	0.3700	0.9312	0.9312	11	11	53.34
	May	68.18	1.0592	72.21	0.2290	1.0122	1.0122	17	17	62.94
	Jun	70.89	0.9213	65.31	0.3291	0.8833	0.8833	9	9	70.01
	Jul	82.56	1.0551	87.11	0.1900	0.9915	0.9915	9	9	74.91
	Aug	114.06	1.0219	116.56	0.1571	1.0101	1.0101	16	16	114.46
	Sep	96.33	1.5313	147.51	1.7473	1.0884	1.0884	15	15	101.88
	Oct	48.77	1.2205	59.52	0.4091	1.0823	1.0823	13	13	51.91
	Nov	89.77	0.9750	87.53	0.1667	0.9590	0.9590	13	13	80.70
	Dec	88.87	1.0311	91.63	0.2452	1.0319	1.0319	15	15	98.52
1998	Means	70.01	1.1456	80.20	—	1.0095	1.0093	—	—	70.53
		$\sigma = 0.6699$		$\sigma$ 'SIDC' = 0.4612		$E\sigma = 0.0510$				

TABLE C4:

**CORRECTED CLASSIFICATION VALUES** for Rotations 1917 - 1943.

As a  $k$  value is attributed to each spotted observation, the  $k$  value for any specific rotation is the mean of all the  $k$  values for the rotation concerned.

The corrected values are labelled  $CV_{GD}$ .

$$CV_{GD} = CV \times k.$$

$\sigma$  = sample standard deviation of  $k$  values.

$I/GDSO$  = International mean (of days observed by the GDSO) divided by the GDSO's rotation mean.

$I/GDSO_A$  = International mean (of days observed by the GDSO) divided by the GDSO's observed mean for the *same* days.

$n$  = number of GDSO observations.

$n_k$  = number of  $k$  values.

ROTA- TION	START DATE, UT	CV	k	$CV_{GD}$	$\sigma$	$I/GDSO$	$I/GDSO_A$	n	$n_k$
1917	1996/12/09.28	9.77	1.2162	11.88	0.6264	1.4199	1.3937	13	8
1918	1997/01/05.61	2.71	0.7891	2.14	0.6134	0.7213	0.6604	17	7
1919	1997/02/01.95	8.30	1.2809	10.63	0.9406	0.7911	0.7871	10	3
1920	1997/03/01.29	4.00	1.4096	5.64	0.9531	1.1955	1.1557	11	8
1921	1997/03/28.60	17.90	1.1533	20.64	0.5965	0.8986	0.8960	20	17
1922	1997/04/24.87	7.33	1.1195	8.21	0.4863	1.2188	1.2149	12	9
1923	1997/05/22.10	10.08	2.4370	24.56	3.0502	1.1817	1.1817	13	13
1924	1997/06/18.31	1.39	1.0080	1.40	0.5288	1.0556	0.9456	18	11
1925	1997/07/15.50	13.27	1.9085	25.32	3.3001	0.7930	0.7852	15	11
1926	1997/08/11.72	22.72	1.1160	25.36	0.5016	1.0310	1.0188	18	16
1927	1997/09/07.97	64.67	1.5198	98.28	1.0646	1.0367	1.0367	15	15
1928	1997/10/05.24	20.50	1.1843	24.28	0.5429	1.1199	1.1199	16	16
1929	1997/11/01.54	35.79	2.0672	73.98	4.0628	1.0116	1.0116	14	14
1930	1997/11/28.84	48.70	1.0217	49.75	0.2915	0.9335	0.9335	10	10
1931	1997/12/26.17	29.06	1.5299	44.46	1.0363	1.0106	1.0048	16	13
1932	1998/01/22.50	27.86	1.4295	39.82	0.5270	1.1847	1.1847	14	14
1933	1988/02/18.85	53.23	0.9676	51.51	0.1658	0.9369	0.9369	13	13
1934	1998/03/18.17	83.47	0.9980	83.30	0.2465	0.9556	0.9556	15	15
1935	1998/04/14.46	66.33	0.9670	64.14	0.2560	0.9312	0.9312	12	12
1936	1998/05/11.70	60.08	1.0892	65.44	0.2586	1.0416	1.0416	12	12
1937	1998/06/07.91	79.33	0.9208	73.05	0.3385	0.8801	0.8801	9	9
1938	1998/07/05.11	69.00	1.0961	75.63	0.1751	1.0431	1.0431	7	7
1939	1998/08/01.32	109.85	1.0324	113.40	0.1737	1.0187	1.0187	13	13
1940	1998/08/28.56	108.12	1.0627	114.90	0.1200	1.0501	1.0501	17	17
1941	1998/09/24.82	48.44	2.0070	97.23	2.2234	1.1815	1.1815	9	9
1942	1998/10/22.10	75.50	1.0421	78.68	0.2691	0.9782	0.9782	14	14
1943	1998/11/18.41	96.10	1.0541	101.30	0.1674	1.0452	1.0452	10	10

TABLE C5:  
SMOOTHED CLASSIFICATION VALUES for 1996 - 1998.

The following are smoothed Classification Values in three different systems.  
See page xii for all smoothing formulæ.

YEAR	MONTH	CV	CV(S <sup>HBm</sup> )	CV(S <sup>W</sup> )	CV(S <sup>B13</sup> )	CV <sub>GD</sub>	CV <sub>GD</sub> (S <sup>W</sup> )	CV <sub>GD</sub> (S <sup>B13</sup> )
1996	Jan	4.18	8.44	10.91	9.98	7.28	13.51	12.23
	Feb	2.62	5.52	11.10	9.19	3.58	13.85	11.90
	Mar	6.32	5.26	11.22	8.76	9.39	14.21	12.08
	Apr	4.00	6.23	9.30	8.05	10.48	12.48	11.89
	May	8.33	8.35	7.84	7.86	12.75	11.48	12.03
	Jun	6.14	9.71	8.27	8.55	11.34	12.01	12.78
	Jul	18.08	10.47	8.34	9.17	21.61	11.87	13.29
	Aug	18.41	10.70	8.51	9.40	29.72	11.94	13.28
	Sep	0.46	9.56	8.73	9.28	0.09	12.21	12.77
	Oct	0.00	9.05	9.28	9.34	0.00	12.50	12.36
	Nov	21.25	9.44	9.75	9.52	25.08	12.88	12.24
	Dec	11.06	8.67	9.74	9.35	13.83	12.94	11.92
1997	Jan	2.58	8.77	9.27	8.94	1.89	12.44	11.44
	Feb	8.30	8.97	8.81	8.79	10.63	11.63	11.29
	Mar	6.00	8.62	11.59	10.05	8.69	15.09	13.06
	Apr	17.42	9.16	15.12	12.10	18.13	19.91	16.04
	May	6.31	9.49	16.56	13.98	14.32	22.99	19.21
	Jun	7.89	13.27	18.99	16.76	11.16	26.71	23.46
	Jul	4.95	17.84	21.55	20.38	9.73	29.70	28.45
	Aug	20.52	24.39	23.33	24.22	22.25	32.26	33.77
	Sep	65.12	32.90	27.27	28.41	90.70	36.22	39.07
	Oct	20.06	34.92	31.74	32.40	25.04	40.50	43.58
	Nov	35.79	37.02	35.89	36.41	73.98	44.48	47.43
	Dec	54.85	39.67	41.09	40.72	54.06	49.15	50.78
1998	Jan	20.12	40.20	46.95	45.13	33.45	54.63	53.83
	Feb	33.50	46.54	54.08	50.54	40.71	61.78	57.74
	Mar	75.41	54.38	59.28	56.48	73.64	68.08	62.67
	Apr	55.18	60.18	61.77	61.99	55.74	71.88	68.08
	May	68.18	69.65	65.22	67.30	72.21	73.88	73.33
	Jun	70.89	77.88	68.89	72.35	65.31	76.01	78.72
	Jul	82.56	82.38	71.92	76.76	87.11	—	—
	Aug	114.06	86.89	75.49	79.81	116.56	—	—
	Sep	96.33	86.14	78.30	80.93	147.51	—	—
	Oct	48.77	81.29	—	—	59.52	—	—
	Nov	89.77	79.80	—	—	87.53	—	—
	Dec	88.87	78.25	—	—	91.63	—	—



TABLE C6:  
 QUARTERLY & YEARLY **CLASSIFICATION VALUE** MEANS for 1994 - 1998.

YEAR/ QUARTER	CV	CV(S <sup>HBm</sup> )	CV(S <sup>W</sup> )	CV(S <sup>B13</sup> )	CV <sub>GD</sub>
1994 / 1	52.25	51.65	45.83	47.94	49.87
2	25.67	31.26	42.91	38.42	34.37
3	36.03	35.09	32.40	33.19	38.21
4	34.46	32.67	29.21	30.59	46.17
1994	36.91	37.67	37.59	37.53	41.58
1995 / 1	21.57	23.38	26.55	25.49	31.89
2	20.76	21.23	21.01	20.87	28.00
3	12.63	17.39	17.32	17.64	17.19
4	20.50	14.83	12.66	13.21	22.51
1995	18.91	19.21	19.39	19.30	25.32
1996 / 1	4.76	6.40	11.07	9.31	7.51
2	6.16	8.10	8.47	8.15	11.99
3	12.88	10.24	8.53	9.28	18.22
4	10.15	9.05	9.59	9.40	12.32
1996	8.37	8.45	9.41	9.04	12.87
1997 / 1	5.02	8.78	9.89	9.26	5.85
2	11.10	10.64	16.89	14.28	16.68
3	27.58	25.04	24.05	24.34	38.33
4	35.34	37.20	36.24	36.51	50.59
1997	20.09	20.42	21.77	21.10	28.15
1998 / 1	43.67	47.04	53.44	50.72	54.73
2	64.97	69.24	65.29	67.21	65.69
3	100.32	85.14	75.24	79.17	122.44
4	76.44	79.78	—	—	82.05
1998	70.01	70.30	—	—	80.20

NB: CV(S<sup>HBm</sup>), CV(S<sup>W</sup>) & CV(S<sup>B13</sup>) quarterly values are means of 3 monthly values.  
 CV(S<sup>HBm</sup>), CV(S<sup>W</sup>) & CV(S<sup>B13</sup>) yearly values are means of 12 monthly values.  
 CV<sub>GD</sub> quarterly values are computed as quarterly CV means multiplied by quarterly k means.  
 Annual values of CV<sub>GD</sub> are annual Classification Value means multiplied by annual k means.

TABLE Q1:

**MONTHLY QUALITY COUNT MEANS OF GDSO DATA for 1998.**

QC = mean Quality Count (see list of definitions).

n = total number of observations.

w = mean weight.

Q = mean quietness [steadiness] of image (on the Kiepenheuer scale).

S = mean sharpness [clarity] of image (on the Kiepenheuer scale).

T = mean transparency of the atmosphere (1 = excellent, 5 = opaque).

C = mean condition [(Q+S+T)/3].

MONTH	QC	$\Sigma g$	n	w	Q	S	T	C
Jan	4.56	28	16	0.4343	1.91	2.44	2.62	2.3229
Feb	6.25	42	16	0.4578	1.69	2.34	2.66	2.2292
Mar	11.06	64	17	0.4595	1.65	2.38	2.59	2.2059
Apr	9.00	36	11	0.4671	1.68	2.27	2.55	2.1667
May	9.88	54	17	0.4679	1.79	2.21	2.50	2.1667
Jun	12.33	42	9	0.4641	1.89	2.28	2.39	2.1852
Jul	14.44	52	9	0.4993	1.78	2.11	2.28	2.0556
Aug	17.62	98	16	0.4502	1.91	2.34	2.53	2.2604
Sep	18.13	93	15	0.4947	1.57	2.23	2.33	2.0444
Oct	10.38	52	13	0.4520	1.92	2.31	2.50	2.2436
Nov	14.38	71	13	0.4649	1.85	2.31	2.46	2.2051
Dec	15.67	75	15	0.4469	1.73	2.47	2.63	2.2778
Year	11.86	—	—	0.4617	1.78	2.32	2.52	2.2036

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TABLE Q2:

**ROTATIONAL QUALITY COUNT MEANS OF GDSO DATA.**

Abbreviations as above.

ROT.	start date, UT	QC	$\Sigma g$	n	w	Q	S	T	C
1931	1997/12/26.17	4.88	28	16	0.4483	1.91	2.31	2.53	2.2500
1932	1998/01/22.50	6.00	34	14	0.4473	1.68	2.50	2.68	2.2857
1933	1988/02/18.85	9.31	46	13	0.4547	1.73	2.35	2.65	2.2436
1934	1998/03/18.17	12.40	62	15	0.4693	1.63	2.30	2.50	2.1444
1935	1998/04/14.46	7.50	31	12	0.4664	1.67	2.21	2.62	2.1667
1936	1998/05/11.70	10.08	37	12	0.4634	1.88	2.25	2.46	2.1944
1937	1998/06/07.91	14.67	51	9	0.4728	1.89	2.28	2.28	2.1481
1938	1998/07/05.11	12.00	36	7	0.4982	1.79	2.07	2.36	2.0714
1939	1998/08/01.32	17.69	81	13	0.4416	1.92	2.42	2.58	2.3077
1940	1998/08/28.56	18.88	108	17	0.4953	1.62	2.18	2.32	2.0392
1941	1998/09/24.82	10.44	35	9	0.4454	1.83	2.39	2.56	2.2593
1942	1998/10/22.10	12.50	71	14	0.4731	1.93	2.21	2.36	2.1667
1943	1998/11/18.41	17.70	58	10	0.4296	1.75	2.60	2.75	2.3667

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TABLE Q3:  
COMPARED **QUALITY COUNTS** for **1997 - 1998**.

Data unobtainable.

TABLE Q5:  
SMOOTHED **QUALITY COUNT** VALUES for **1997 - 1998**.

The following are smoothed Quality Count values in three different systems.  
See page xii for all smoothing formulæ.

YEAR	MONTH	QC	QC(S <sup>HBm</sup> )	QC(S <sup>W</sup> )	QC(S <sup>B13</sup> )
1997	Jan	1.05	1.8135	1.9808	1.8927
	Feb	1.50	2.0225	2.0190	2.0049
	Mar	2.00	2.2178	2.4090	2.2910
	Apr	4.11	2.4350	2.9567	2.6754
	May	1.77	2.5819	3.3384	3.0421
	Jun	2.78	3.0806	3.8598	3.5287
	Jul	1.60	3.6638	4.3712	4.1349
	Aug	4.86	4.5781	4.7154	4.7542
	Sep	8.12	5.8294	5.2908	5.4068
	Oct	5.41	6.4612	5.8721	6.0293
	Nov	6.50	6.9812	6.4138	6.6422
	Dec	11.00	7.4800	7.1496	7.2657
1998	Jan	4.56	7.4700	8.0825	7.8956
	Feb	6.25	8.0150	9.1492	8.6472
	Mar	11.06	8.8875	10.0979	9.5308
	Apr	9.00	9.6862	10.7221	10.4167
	May	9.88	11.1488	11.2575	11.2848
	Jun	12.33	12.7944	11.7804	12.1604
	Jul	14.44	13.9381	12.2167	12.9683
	Aug	17.62	14.8669	12.7442	13.5815
	Sep	18.13	15.1350	13.2150	13.8918
	Oct	10.38	14.4019	—	—
	Nov	14.38	13.9612	—	—
	Dec	15.67	13.5944	—	—

TABLE Q6:  
 QUARTERLY AND YEARLY **QUALITY COUNT** MEANS for 1994 - 1998.

YEAR/ QUARTER	QC	QC(S <sup>HBm</sup> )	QC(S <sup>W</sup> )	QC(S <sup>B13</sup> )
1994 / 1	10.00	8.84	7.51	7.99
2	4.30	5.71	7.21	6.67
3	5.83	5.90	5.85	5.80
4	5.96	5.71	5.28	5.49
1994	6.47	6.54	6.46	6.49
1995 / 1	5.14	4.82	4.75	4.78
2	3.29	3.73	3.82	3.78
3	2.37	2.86	3.12	3.02
4	3.09	2.53	2.31	2.38
1995	3.52	3.49	3.50	3.49
1996 / 1	1.57	1.64	2.08	1.91
2	1.38	1.67	1.70	1.68
3	2.09	1.75	1.63	1.68
4	1.58	1.56	1.89	1.76
1996	1.64	1.66	1.82	1.76
1997 / 1	1.47	2.02	2.14	2.06
2	3.02	2.70	3.38	3.08
3	4.63	4.69	4.79	4.77
4	7.41	6.97	6.48	6.65
1997	4.14	4.10	4.20	4.14
1998 / 1	7.37	8.12	9.11	8.69
2	10.22	11.21	11.25	11.29
3	17.10	14.65	12.73	13.48
4	13.59	13.99	—	—
1998	11.86	11.99	—	—

NB: QC(S<sup>HBm</sup>), QC(S<sup>W</sup>) & QC(S<sup>B13</sup>) quarterly values are means of 3 monthly values.  
 QC(S<sup>HBm</sup>), QC(S<sup>W</sup>) & QC(S<sup>B13</sup>) yearly values are means of 12 monthly values.

TABLE I-1:

**MONTHLY INTER-SOL INDEX MEANS OF GDSO DATA for 1998.**

IS = mean Inter-Sol Index (k neglected; see list of definitions).

n = total number of observations.

w = mean weight.

Q = mean quietness [steadiness] of image (on the Kiepenheuer scale).

S = mean sharpness [clarity] of image (on the Kiepenheuer scale).

T = mean transparency of the atmosphere (1 = excellent, 5 = opaque).

C = mean condition  $[(Q+S+T)/3]$ .

MONTH	IS	n	w	Q	S	T	C
Jan	10.62	16	0.4343	1.91	2.44	2.62	2.3229
Feb	14.69	16	0.4578	1.69	2.34	2.66	2.2292
Mar	32.29	17	0.4595	1.65	2.38	2.59	2.2059
Apr	18.36	11	0.4671	1.68	2.27	2.55	2.1667
May	33.24	17	0.4679	1.79	2.21	2.50	2.1667
Jun	22.56	9	0.4641	1.89	2.28	2.39	2.1852
Jul	25.56	9	0.4993	1.78	2.11	2.28	2.0556
Aug	42.19	16	0.4502	1.91	2.34	2.53	2.2604
Sep	43.07	15	0.4947	1.57	2.23	2.33	2.0444
Oct	22.08	13	0.4520	1.92	2.31	2.50	2.2436
Nov	28.77	13	0.4649	1.85	2.31	2.46	2.2051
Dec	39.20	15	0.4469	1.73	2.47	2.63	2.2778
Year	28.29	—	0.4617	1.78	2.32	2.52	2.2036

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TABLE I-2:

**ROTATIONAL INTER-SOL INDEX MEANS OF GDSO DATA.**

Abbreviations as above.

ROT.	start date, UT	IS	n	w	Q	S	T	C
1931	1997/12/26.17	11.81	16	0.4483	1.91	2.31	2.53	2.2500
1932	1998/01/22.50	13.00	14	0.4473	1.68	2.50	2.68	2.2857
1933	1988/02/18.85	25.62	13	0.4547	1.73	2.35	2.65	2.2436
1934	1998/03/18.17	32.07	15	0.4693	1.63	2.30	2.50	2.1444
1935	1998/04/14.46	27.58	12	0.4664	1.67	2.21	2.62	2.1667
1936	1998/05/11.70	26.92	12	0.4634	1.88	2.25	2.46	2.1944
1937	1998/06/07.91	24.89	9	0.4728	1.89	2.28	2.28	2.1481
1938	1998/07/05.11	22.86	7	0.4982	1.79	2.07	2.36	2.0714
1939	1998/08/01.32	37.69	13	0.4416	1.92	2.42	2.58	2.3077
1940	1998/08/28.56	48.53	17	0.4953	1.62	2.18	2.32	2.0392
1941	1998/09/24.82	25.56	9	0.4454	1.83	2.39	2.56	2.2593
1942	1998/10/22.10	24.07	14	0.4731	1.93	2.21	2.36	2.1667
1943	1998/11/18.41	34.40	10	0.4296	1.75	2.60	2.75	2.3667

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TABLE I-3:  
CORRECTED INTER-SOL INDICES for 1997 - 1998.

As the GDSO is in suburban Auckland, it can suffer terrible atmospheric conditions, hence the 'observed' Inter-Sol Indices have to be upgraded to give reflections of international results. International Inter-Sol Index results are computed by Paderborn Public Observatory, Germany.

Below are the 'observed' Inter-Sol Indices along with the monthly k co-efficients and the corrected values ( $IS_{GD}$ ) for 1997 - 1998. Paderborn's final values ( $IS_I$ ) are also stated.  $I/GDSO$  = Paderborn's mean (of days observed by the GDSO) divided by the GDSO's monthly mean.

$I/GDSO_A$  = Paderborn's mean (of days with GDSO k values) divided by the GDSO's observed mean for the *same* days.

n = number of GDSO observations.

$n_k$  = number of k values.

$\sigma$  = sample standard deviation of k values.

$\sigma$ 'SIDC' = annual  $s$  computed on the SIDC formula.

$E\sigma$  = annual estimate of standard deviation.

	IS	k	$IS_{GD}$	$\sigma$	$I/GDSO$	$I/GDSO_A$	n	$n_k$	$IS_I$
1997 Jan	1.74	1.0382	1.80	0.5883	1.1045	1.0109	19	8	1.35
Feb	3.00	2.1229	6.37	1.4795	1.3477	1.3340	10	3	3.58
Mar	4.14	1.4911	6.18	0.5629	1.3621	1.3526	14	11	4.10
Apr	8.63	1.1052	9.54	0.4172	1.0294	1.0060	19	15	7.29
May	2.00	2.3395	4.68	2.1315	1.7615	1.7323	13	11	7.40
Jun	5.17	1.2191	6.30	0.3620	1.1539	1.1424	18	17	6.69
Jul	2.90	1.8880	5.48	1.9826	1.4459	1.2784	20	10	3.95
Aug	11.14	1.6212	18.07	1.0102	1.2694	1.2554	21	19	11.70
Sep	22.81	1.2019	27.42	0.3785	1.0110	1.0110	16	16	24.10
Oct	9.53	1.2749	12.15	0.6311	1.1119	1.1119	17	17	9.54
Nov	18.14	1.0250	18.60	0.5207	0.8718	0.8718	14	14	18.90
Dec	18.69	1.0906	20.39	0.2792	1.0573	1.0573	13	13	19.36
1997 Means	8.87	1.3846	12.28	—	1.0966	1.0834	—	—	9.83
	$\sigma = 0.9846$		$\sigma$ 'SIDC' = 0.7657		$E\sigma = 0.0769$				
1998 Jan	10.62	1.0624	11.29	0.3240	1.0798	1.0764	16	13	13.27
Feb	14.69	1.0756	15.80	0.3170	0.9837	0.9837	16	16	15.45
Mar	32.29	1.0105	32.63	0.2132	0.9600	0.9600	17	17	29.88
Apr	18.36	1.3126	24.10	0.4868	1.2377	1.2377	11	11	24.28
May	33.24	1.2871	42.78	0.2613	1.2203	1.2203	17	17	36.37
Jun	22.56	1.3441	30.32	0.2292	1.3018	1.3018	9	9	31.98
Jul	25.56	1.4225	36.35	0.2801	1.3652	1.3652	9	9	32.16
Aug	42.19	1.1107	46.86	0.1399	1.1191	1.1191	16	16	46.50
Sep	43.07	1.2741	54.87	0.2397	1.2325	1.2325	15	15	51.74
Oct	22.08	1.6190	35.74	1.7061	1.1797	1.1797	13	13	27.61
Nov	28.77						13	13	
Dec	39.20						15	15	
1998 Means	28.29								
	$\sigma =$		$\sigma$ 'SIDC' =		$E\sigma =$				

TABLE I-4:

**CORRECTED INTER-SOL INDICES** for Rotations 1916 - 1943.

As a k value is attributed to each spotted observation, the k value for any specific rotation is the mean of all the k values for the rotation concerned.

The corrected values are labelled  $IS_{GD}$ .

$$IS_{GD} = IS \times k.$$

$\sigma$  = sample standard deviation of k values.

I/GDSO = International mean (of days observed by the GDSO) divided by the GDSO's rotation mean.

$I/GDSO_A$  = International mean (of days observed by the GDSO) divided by the GDSO's observed mean for the *same* days.

n = number of GDSO observations.

$n_k$  = number of k values.

ROTA- TION	START DATE, UT	IS	k	$IS_{GD}$	$\sigma$	I/GDSO	$I/GDSO_A$	n	$n_k$
1916	1996/11/11.97	11.31	1.3608	15.39	0.9004	0.9812	0.9777	16	12
1917	1996/12/09.28	3.77	1.0053	3.79	0.2384	1.0355	0.9822	13	8
1918	1997/01/05.61	1.59	1.0899	1.73	0.6155	1.1863	1.0852	17	7
1919	1997/02/01.95	3.00	2.1229	6.37	1.4795	1.3477	1.3340	10	3
1920	1997/03/01.29	2.45	1.5359	3.77	0.6122	1.3570	1.3367	11	8
1921	1997/03/28.60	9.50	1.1386	10.82	0.4376	1.0647	1.0561	20	17
1922	1997/04/24.87	1.67	2.1172	3.53	1.9120	1.9240	1.7765	12	9
1923	1997/05/22.10	5.77	1.5670	9.04	1.3608	1.2239	1.2239	13	13
1924	1997/06/18.31	2.06	1.2921	2.66	0.5906	1.3524	1.1670	18	11
1925	1997/07/15.50	6.67	1.8749	12.50	1.8359	1.3507	1.3115	15	11
1926	1997/08/11.72	12.56	1.5616	19.61	1.1169	1.1705	1.1560	18	16
1927	1997/09/07.97	21.87	1.2450	27.22	0.3699	1.0307	1.0307	15	15
1928	1997/10/05.24	9.81	1.2785	12.55	0.6516	1.1085	1.1085	16	16
1929	1997/11/01.54	18.14	1.0250	18.60	0.5207	0.8718	0.8718	14	14
1930	1997/11/28.84	17.40	1.1236	19.55	0.2934	1.0989	1.0989	10	10
1931	1997/12/26.17	11.81	1.0107	11.94	0.3220	0.9819	0.9787	16	13
1932	1998/01/22.50	13.00	1.1504	14.95	0.2843	1.1503	1.1503	14	14
1933	1988/02/18.85	25.62	0.9698	24.84	0.2316	0.8968	0.8968	13	13
1934	1998/03/18.17	32.07	1.1016	35.33	0.2891	1.0578	1.0578	15	15
1935	1998/04/14.46	27.58	1.2557	34.64	0.4648	1.0895	1.0895	12	12
1936	1998/05/11.70	26.92	1.3949	37.55	0.1741	1.3968	1.3968	12	12
1937	1998/06/07.91	24.89	1.3679	34.05	0.2658	1.3139	1.3139	9	9
1938	1998/07/05.11	22.86	1.4094	32.21	0.2870	1.3549	1.3549	7	7
1939	1998/08/01.32	37.69	1.1026	41.56	0.1429	1.1196	1.1196	13	13
1940	1998/08/28.56	48.53	1.2340	59.89	0.2212	1.2043	1.2043	17	17
1941	1998/09/24.82	25.56	1.8763	47.95	2.0307	1.2090	1.2090	9	9
1942	1998/10/22.10							14	
1943	1998/11/18.41							10	

TABLE I-5:  
SMOOTHED INTER-SOL INDICES for 1996 - 1998.

The following are smoothed Inter-Sol Indices in three different systems.  
See page xii for all smoothing formulæ.

YEAR	MONTH	IS	IS(S <sup>HBm</sup> )	IS(S <sup>W</sup> )	IS(S <sup>B13</sup> )	IS <sub>GD</sub>	IS <sub>GD</sub> (S <sup>W</sup> )	IS <sub>GD</sub> (S <sup>B13</sup> )
1996	Jan	3.27	3.27	3.66	3.46	4.30	4.74	4.51
	Feb	2.62	2.82	3.73	3.37	4.51	4.88	4.47
	Mar	3.84	2.81	3.77	3.34	4.37	4.91	4.46
	Apr	1.17	2.83	3.35	3.22	2.01	4.42	4.33
	May	3.06	3.30	3.28	3.27	3.77	4.40	4.40
	Jun	3.14	3.64	3.63	3.53	4.13	4.82	4.72
	Jul	5.08	3.76	3.60	3.70	8.20	4.74	4.90
	Aug	7.24	4.14	3.55	3.76	8.25	4.71	4.95
	Sep	0.69	3.89	3.58	3.76	1.09	4.86	4.98
	Oct	0.00	3.85	3.90	3.91	0.00	5.25	5.19
	Nov	10.69	4.20	4.17	4.09	13.71	5.61	5.45
	Dec	3.12	3.79	4.21	4.11	3.76	5.73	5.53
1997	Jan	1.74	3.97	4.20	4.07	1.80	5.71	5.56
	Feb	3.00	4.11	4.27	4.18	6.37	6.01	5.86
	Mar	4.14	4.20	5.36	4.78	6.18	7.51	6.74
	Apr	8.63	4.62	6.68	5.61	9.54	9.12	7.84
	May	2.00	4.85	7.38	6.42	4.68	9.83	8.86
	Jun	5.17	6.37	8.34	7.57	6.30	10.72	10.18
	Jul	2.90	8.02	9.36	9.02	5.48	11.81	11.81
	Aug	11.14	10.70	10.22	10.53	18.07	12.60	13.37
	Sep	22.81	13.70	11.88	12.18	27.42	14.09	14.88
	Oct	9.53	14.63	13.46	13.73	12.15	15.80	16.26
	Nov	18.14	15.62	15.16	15.35	18.60	18.00	17.83
	Dec	18.69	16.54	17.19	17.02	20.39	20.58	19.63
1998	Jan	10.62	16.96	18.86	18.54	11.29	22.87	21.47
	Feb	14.69	19.56	21.10	20.35	15.80	25.36	23.70
	Mar	32.29	22.33	23.23	22.43	32.63	27.70	26.44
	Apr	18.36	23.79	24.60	24.42	24.10	29.83	29.48
	May	33.24	26.77	25.57	26.17	42.78	—	—
	Jun	22.56	28.94	26.86	27.84	30.32	—	—
	Jul	25.56	30.60	28.51	29.56	36.35	—	—
	Aug	42.19	32.87	29.58	30.85	46.86	—	—
	Sep	43.07	33.47	30.19	31.39	54.87	—	—
	Oct	22.08	32.61	—	—	35.74	—	—
	Nov	28.77	31.73	—	—	—	—	—
	Dec	39.20	31.39	—	—	—	—	—



TABLE I-6:  
 QUARTERLY & YEARLY **INTER-SOL INDEX** MEANS for 1994 - 1998.

YEAR/ QUARTER	IS	IS(S <sup>HBm</sup> )	IS(S <sup>W</sup> )	IS(S <sup>B13</sup> )	IS <sub>GD</sub>
1994 / 1	21.27	19.23	15.86	17.21	23.36
2	7.41	10.37	14.99	13.22	10.49
3	10.26	11.14	11.08	10.94	13.94
4	12.09	11.29	11.04	11.18	15.23
1994	12.62	13.01	13.24	13.14	16.11
1995 / 1	11.54	11.12	10.40	10.74	14.64
2	9.89	9.66	8.47	8.94	12.22
3	4.18	5.74	6.81	6.41	5.49
4	4.66	4.11	4.47	4.26	5.96
1995	7.81	7.66	7.54	7.59	9.92
1996 / 1	3.39	2.96	3.72	3.39	4.43
2	2.40	3.26	3.42	3.34	3.36
3	4.60	3.93	3.57	3.74	6.14
4	4.31	3.95	4.09	4.03	5.37
1996	3.65	3.53	3.70	3.63	4.83
1997 / 1	2.81	4.10	4.61	4.34	3.97
2	5.66	5.28	7.47	6.53	8.30
3	11.53	10.81	10.49	10.58	17.65
4	14.98	15.60	15.27	15.37	17.09
1997	8.87	8.95	9.46	9.20	12.28
1998 / 1	19.47	19.62	21.06	20.44	20.40
2	26.22	26.50	25.68	26.14	34.30
3	38.78	32.31	29.43	30.60	48.16
4	30.46	31.91	—	—	—
1998	28.29	27.58	—	—	—

NB: IS(S<sup>HBm</sup>), IS(S<sup>W</sup>) & IS(S<sup>B13</sup>) quarterly values are means of 3 monthly values.

IS(S<sup>HBm</sup>), IS(S<sup>W</sup>) & IS(S<sup>B13</sup>) yearly values are means of 12 monthly values.

IS<sub>GD</sub> quarterly values are computed as quarterly IS means multiplied by quarterly k means.

Annual values of IS<sub>GD</sub> are annual Inter-Sol means multiplied by annual k means.

## MISCELLANEOUS DATA.

TABLE M7:

REGION CLASSIFICATION **PERCENTAGES** 1996 - 1998.

		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>	<b>J</b>	<b>Σg</b>	<b>NOBS</b>
1996	Jan	58.8	5.9	29.4	5.9	0.0	0.0	0.0	0.0	0.0	17	22
	Feb	50.0	33.3	16.7	0.0	0.0	0.0	0.0	0.0	0.0	6	8
	Mar	7.7	23.1	53.8	15.4	0.0	0.0	0.0	0.0	0.0	13	19
	Apr	33.3	16.7	16.7	33.3	0.0	0.0	0.0	0.0	0.0	6	18
	May	0.0	25.0	12.5	62.5	0.0	0.0	0.0	0.0	0.0	8	18
	Jun	25.0	16.7	33.3	8.3	0.0	0.0	0.0	0.0	16.7	12	14
	Jul	27.3	18.2	9.1	45.5	0.0	0.0	0.0	0.0	0.0	11	13
	Aug	29.2	25.0	25.0	16.7	0.0	0.0	0.0	0.0	4.2	24	17
	Sep	33.3	66.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3	13
	Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	19
	Nov	14.3	21.4	14.3	35.7	14.3	0.0	0.0	0.0	0.0	14	16
	Dec	0.0	14.3	42.9	14.3	0.0	0.0	0.0	0.0	28.6	14	17
<b>1996</b>		<b>25.0</b>	<b>20.3</b>	<b>26.6</b>	<b>21.1</b>	<b>1.6</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>5.5</b>	<b>128</b>	<b>194</b>
1997	Jan	0.0	62.5	25.0	12.5	0.0	0.0	0.0	0.0	0.0	8	19
	Feb	20.0	0.0	40.0	40.0	0.0	0.0	0.0	0.0	0.0	5	10
	Mar	16.7	33.3	33.3	8.3	0.0	0.0	0.0	0.0	8.3	12	14
	Apr	17.9	14.3	28.6	28.6	3.6	0.0	0.0	0.0	7.1	28	19
	May	25.0	16.7	16.7	0.0	0.0	0.0	0.0	0.0	41.7	12	13
	Jun	33.3	41.7	8.3	16.7	0.0	0.0	0.0	0.0	0.0	24	18
	Jul	47.1	29.4	11.8	11.8	0.0	0.0	0.0	0.0	0.0	17	20
	Aug	20.9	16.3	16.3	14.0	4.7	0.0	0.0	0.0	27.9	43	21
	Sep	5.4	5.4	29.7	43.2	13.5	0.0	0.0	0.0	2.7	37	16
	Oct	18.9	21.6	35.1	16.2	0.0	0.0	0.0	0.0	8.1	37	17
	Nov	25.8	3.2	35.5	12.9	19.4	0.0	0.0	0.0	3.2	31	14
	Dec	12.5	15.0	17.5	30.0	5.0	0.0	0.0	7.5	12.5	40	13
<b>1997</b>		<b>19.7</b>	<b>18.4</b>	<b>24.1</b>	<b>21.1</b>	<b>5.4</b>	<b>0.0</b>	<b>0.0</b>	<b>1.0</b>	<b>10.2</b>	<b>294</b>	<b>194</b>
1998	Jan	25.0	25.0	14.3	21.4	10.7	0.0	0.0	0.0	3.6	28	16
	Feb	23.8	21.4	21.4	16.7	2.4	0.0	0.0	0.0	14.3	42	16
	Mar	18.8	9.4	21.9	26.6	10.9	1.6	0.0	0.0	10.9	64	17
	Apr	13.9	25.0	27.8	25.0	2.8	0.0	0.0	2.8	2.8	36	11
	May	11.1	5.6	27.8	27.8	13.0	0.0	0.0	0.0	14.8	54	17
	Jun	9.5	11.9	35.7	16.7	0.0	0.0	0.0	4.8	21.4	42	9
	Jul	17.3	9.6	32.7	13.5	0.0	0.0	0.0	7.7	19.2	52	9
	Aug	16.3	13.3	24.8	16.3	7.1	4.1	3.1	3.1	12.2	98	16
	Sep	16.1	7.5	29.0	24.7	4.3	4.3	0.0	0.0	14.0	93	15
	Oct	23.1	15.4	21.2	25.0	3.8	0.0	0.0	0.0	11.5	52	13
	Nov	19.7	9.9	29.6	21.1	2.8	0.0	0.0	2.8	14.1	71	13
	Dec	16.0	4.0	24.0	26.7	12.0	2.7	2.7	0.0	12.0	75	15
<b>1998</b>		<b>17.3</b>	<b>11.6</b>	<b>26.2</b>	<b>21.9</b>	<b>6.1</b>	<b>1.6</b>	<b>0.7</b>	<b>1.7</b>	<b>13.0</b>	<b>707</b>	<b>167</b>

## MISCELLANEOUS DATA continued.

TABLE M8:  
REGION CLASSIFICATION MEANS 1996 - 1998.

YEAR	MONTH	A	B	C	D	E	F	G	H	J	$\Sigma g$	NOBS
1996	Jan	0.45	0.05	0.23	0.05	0.00	0.00	0.00	0.00	0.00	17	22
	Feb	0.38	0.25	0.12	0.00	0.00	0.00	0.00	0.00	0.00	6	8
	Mar	0.05	0.16	0.37	0.11	0.00	0.00	0.00	0.00	0.00	13	19
	Apr	0.11	0.06	0.06	0.11	0.00	0.00	0.00	0.00	0.00	6	18
	May	0.00	0.11	0.06	0.28	0.00	0.00	0.00	0.00	0.00	8	18
	Jun	0.21	0.14	0.29	0.07	0.00	0.00	0.00	0.00	0.14	12	14
	Jul	0.23	0.15	0.08	0.38	0.00	0.00	0.00	0.00	0.00	11	13
	Aug	0.41	0.35	0.35	0.24	0.00	0.00	0.00	0.00	0.06	24	17
	Sep	0.08	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3	13
	Oct	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	19
	Nov	0.12	0.19	0.12	0.31	0.12	0.00	0.00	0.00	0.00	14	16
	Dec	0.00	0.12	0.35	0.12	0.00	0.00	0.00	0.00	0.24	14	17
1996		0.16	0.13	0.18	0.14	0.01	0.00	0.00	0.00	0.04	128	194
1997	Jan	0.00	0.26	0.11	0.05	0.00	0.00	0.00	0.00	0.00	8	19
	Feb	0.10	0.00	0.20	0.20	0.00	0.00	0.00	0.00	0.00	5	10
	Mar	0.14	0.29	0.29	0.07	0.00	0.00	0.00	0.00	0.07	12	14
	Apr	0.26	0.21	0.42	0.42	0.05	0.00	0.00	0.00	0.11	28	19
	May	0.23	0.15	0.15	0.00	0.00	0.00	0.00	0.00	0.38	12	13
	Jun	0.44	0.56	0.11	0.22	0.00	0.00	0.00	0.00	0.00	24	18
	Jul	0.40	0.25	0.10	0.10	0.00	0.00	0.00	0.00	0.00	17	20
	Aug	0.43	0.33	0.33	0.29	0.10	0.00	0.00	0.00	0.57	43	21
	Sep	0.12	0.12	0.69	1.00	0.31	0.00	0.00	0.00	0.06	37	16
	Oct	0.41	0.47	0.76	0.35	0.00	0.00	0.00	0.00	0.18	37	17
	Nov	0.57	0.07	0.79	0.29	0.43	0.00	0.00	0.00	0.07	31	14
	Dec	0.38	0.46	0.54	0.92	0.15	0.00	0.00	0.23	0.38	40	13
1997		0.30	0.28	0.37	0.32	0.08	0.00	0.00	0.02	0.15	294	194
1998	Jan	0.44	0.44	0.25	0.38	0.19	0.00	0.00	0.00	0.06	28	16
	Feb	0.62	0.56	0.56	0.44	0.06	0.00	0.00	0.00	0.38	42	16
	Mar	0.71	0.35	0.82	1.00	0.41	0.06	0.00	0.00	0.41	64	17
	Apr	0.45	0.82	0.91	0.82	0.09	0.00	0.00	0.09	0.09	36	11
	May	0.35	0.18	0.88	0.88	0.41	0.00	0.00	0.00	0.47	54	17
	Jun	0.44	0.56	1.67	0.78	0.00	0.00	0.00	0.22	1.00	42	9
	Jul	1.00	0.56	1.89	0.78	0.00	0.00	0.00	0.44	1.11	52	9
	Aug	1.00	0.81	1.50	1.00	0.44	0.25	0.19	0.19	0.75	98	16
	Sep	1.00	0.47	1.80	1.53	0.27	0.27	0.00	0.00	0.87	93	15
	Oct	0.92	0.62	0.85	1.00	0.15	0.00	0.00	0.00	0.46	52	13
	Nov	1.08	0.54	1.62	1.15	0.15	0.00	0.00	0.15	0.77	71	13
	Dec	0.80	0.20	1.20	1.33	0.60	0.13	0.13	0.00	0.60	75	15
1998		0.73	0.49	1.11	0.93	0.26	0.07	0.03	0.07	0.55	707	167

## MISCELLANEOUS DATA continued.

TABLE M9A:  
PENUMBRA/GROUP MEANS 1997 - 1998.

The following  $\overline{p/g}$  data are obtained by averaging each  $p/g$  value from every observation within the period concerned, ie. the number of penumbrae per group per observation.

The  $\overline{p/g}$  data are obtained by dividing the total number of penumbrae by the total number of groups within the period concerned, ie. the number of penumbrae per group, the true arithmetical mean.

$\sigma$  values are sample standard deviations.

n = number of observations.

OWS = observations *with* sunspots.

YEAR	MTH	$\overline{p/g}$	$\sigma$	$\overline{p/g}(S^W)$	$\overline{p/g}(S^{B13})$	$\overline{p/g}$	$\overline{p/g}(S^W)$	$\overline{p/g}(S^{B13})$	$\Sigma g$	n	OWS
1997	Jan	0.5000	0.7559	0.7774	0.8524	0.5000	0.7717	0.8533	8	19	8
	Feb	1.1667	1.0408	0.7394	0.8312	1.4000	0.7450	0.8427	5	10	3
	Mar	0.6818	0.9020	0.8160	0.8362	0.6667	0.8275	0.8530	12	14	11
	Apr	1.0333	0.6522	0.9174	0.8407	1.0714	0.9334	0.8604	28	19	15
	May	0.6364	0.5045	0.9231	0.8211	0.5833	0.9432	0.8438	12	13	11
	Jun	0.5294	0.8564	0.9063	0.8210	0.4167	0.9309	0.8465	24	18	17
	Jul	0.2000	0.4216	0.9314	0.8640	0.4118	0.9608	0.8913	17	20	10
	Aug	0.9518	0.3207	0.9378	0.9213	0.9302	0.9635	0.9469	43	21	19
	Sep	1.6510	0.7675	0.9785	0.9907	1.7568	0.9919	1.0122	37	16	16
	Oct	0.7843	0.5230	1.0309	1.0592	0.7838	1.0387	1.0766	37	17	17
	Nov	1.4524	0.7856	1.0830	1.1274	1.4516	1.0917	1.1407	31	14	14
	Dec	1.4103	0.5417	1.1537	1.1919	1.3250	1.1673	1.2020	40	13	13
1997		0.9416	0.7658	—	—	1.0374	—	—	294	194	154
1998	Jan	0.8590	0.5727	1.2052	1.2332	0.9643	1.2129	1.2371	28	16	13
	Feb	0.9604	0.5987	1.2599	1.2656	1.0000	1.2584	1.2619	42	16	16
	Mar	1.8647	0.9141	1.2694	1.2855	1.7500	1.2649	1.2764	64	17	17
	Apr	1.1091	0.5688	1.2681	1.2957	1.1111	1.2619	1.2849	36	11	11
	May	1.8118	0.5397	1.2693	1.2938	1.8148	1.2647	1.2843	54	17	17
	Jun	1.0509	0.4712	1.2777	1.2878	1.0000	1.2733	1.2790	42	9	9
	Jul	0.9136	0.3161	1.3224	1.3007	0.9231	1.3191	1.2932	52	9	9
	Aug	1.5508	0.4708	1.3479	1.3140	1.5102	1.3509	1.3125	98	16	16
	Sep	1.2796	0.5360	1.3431	1.3156	1.3333	1.3539	1.3231	93	15	15
	Oct	1.1244	0.5610	—	—	1.1346	—	—	52	13	13
	Nov	1.1418	0.4075	—	—	1.1690	—	—	71	13	13
	Dec	1.9213	0.7258	—	—	1.8133	—	—	75	15	15
1998		1.3488	0.6888	—	—	1.3564	—	—	707	167	164

## MISCELLANEOUS DATA continued.

TABLE M9B:  
SUNSPOT/GROUP MEANS 1997 - 1998.

The following  $\overline{f/g}$  data are obtained by averaging each  $\overline{f/g}$  value from every observation within the period concerned, ie. the number of sunspots per group per observation.

The  $\overline{f/g}$  data are obtained by dividing the total number of sunspots by the total number of groups within the period concerned, ie. the number of sunspots per group, the true arithmetical mean.

$\sigma$  values are sample standard deviations.

$\Sigma g$  = number of regions observed.

n = number of observations.

OWS = observations *with* sunspots.

YEAR	MTH	$\overline{f/g}$	$\sigma$	$\overline{f/g}(S^w)$	$\overline{f/g}(S^{B13})$	$\overline{f/g}$	$\overline{f/g}(S^w)$	$\overline{f/g}(S^{B13})$	$\Sigma g$	n	OWS
1997	Jan	3.1250	0.9910	4.0412	4.2558	3.1250	3.9844	4.1966	8	19	8
	Feb	4.5000	4.0927	3.9124	4.1385	5.2000	3.9062	4.1202	5	10	3
	Mar	4.3182	3.5936	4.1759	4.1410	4.0833	4.2031	4.1528	12	14	11
	Apr	5.1556	2.7592	4.5761	4.1604	5.1071	4.6307	4.2107	28	19	15
	May	1.8636	1.4507	4.5462	4.0941	1.8333	4.6200	4.1858	12	13	11
	Jun	3.5000	2.2430	4.4658	4.1609	3.2083	4.5522	4.2806	24	18	17
	Jul	2.0833	1.6087	4.6432	4.4200	2.8824	4.7401	4.5532	17	20	10
	Aug	5.0526	4.2005	4.7166	4.6991	4.9302	4.8228	4.8397	43	21	19
	Sep	7.9479	5.3607	4.8828	4.9930	8.9459	4.9699	5.1286	37	16	16
	Oct	3.6569	2.3158	5.0461	5.2616	3.6486	5.1146	5.3700	37	17	17
	Nov	7.7738	4.9414	5.3736	5.5644	7.4516	5.4308	5.6332	31	14	14
	Dec	5.8359	2.4560	5.7444	5.8335	5.3500	5.7994	5.8709	40	13	13
1997		4.7675	3.7654	—	—	5.1497	—	—	294	194	154
1998	Jan	4.9359	2.9349	5.8605	5.9598	5.3571	5.8779	5.9630	28	16	13
	Feb	4.4500	3.0519	5.9965	6.0451	4.9524	5.9691	6.0054	42	16	16
	Mar	8.3578	3.7599	5.9830	6.0869	7.8594	5.9089	5.9989	64	17	17
	Apr	5.0348	1.5453	5.9603	6.1053	4.8056	5.8467	5.9870	36	11	11
	May	9.8451	5.2821	5.8738	6.0396	9.7222	5.7788	5.9209	54	17	17
	Jun	4.4185	1.9723	5.8148	5.9198	4.1667	5.7329	5.7991	42	9	9
	Jul	3.9505	1.4046	5.9613	5.8805	3.8077	5.8937	5.7605	52	9	9
	Aug	6.4496	2.8786	5.9767	5.8431	6.1939	5.9251	5.7452	98	16	16
	Sep	6.2254	2.6080	5.8816	5.7590	6.2366	5.8485	5.7044	93	15	15
	Oct	4.8359	2.5461	—	—	4.8654			52	13	13
	Nov	4.5198	1.3572	—	—	4.6056			71	13	13
	Dec	7.6715	4.4060	—	—	7.0933			75	15	15
1998		6.1512	3.6195	—	—	5.9844	—	—	707	167	164

## MISCELLANEOUS DATA continued.

TABLE M9C:  
GROUP COMPLEXITY INDICES 1997 - 1998.

The Group Complexity Index (GCI) is an index for showing how complex sunspot groups can get throughout the sunspot cycle. It is not an activity index like the Wolf Number etc.

The GCI is computed as  $(\bar{p} + \bar{f})/\bar{g}$  as long as there is the same number of observations for each component, as well as the same observations for each component, whatever period is concerned. If the three components are not common to all observations, then incomplete observations are ignored.

The minimum GCI value is 1 (spotless observations do not count), and the approximate maximum value is about 20.

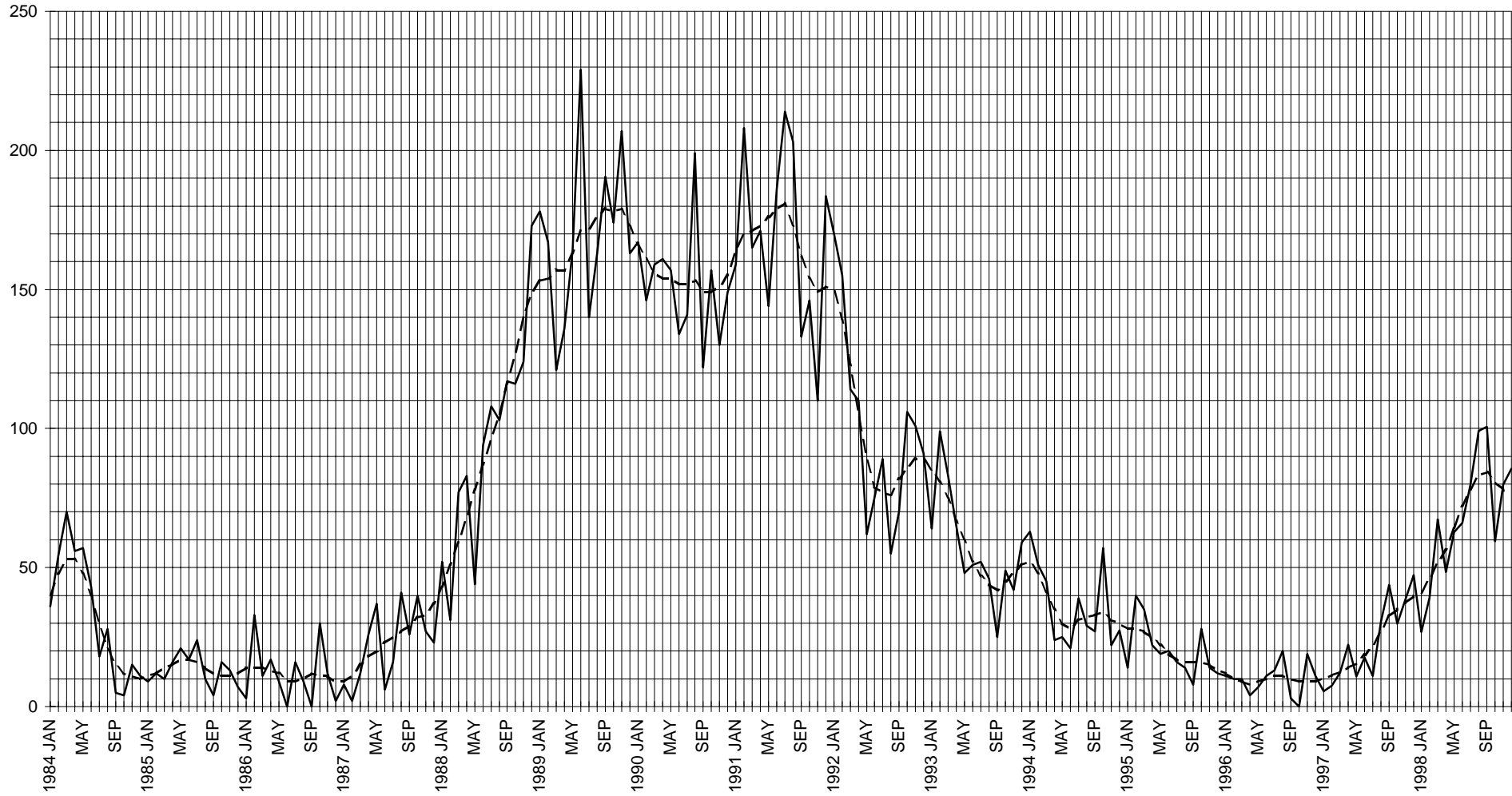
$\Sigma g$  = number of regions observed.

n = number of observations.

OWS = observations *with* sunspots.

YEAR	MTH	$\bar{p}/\bar{g}$	$\bar{f}/\bar{g}$	GCI	GCI(S <sup>W</sup> )	GCI(S <sup>B13</sup> )	$\Sigma g$	n	OWS
1997	Jan	0.5000	3.1250	3.6250	4.7561	5.0500	8	19	8
	Feb	1.4000	5.2000	6.6000	4.6513	4.9630	5	10	3
	Mar	0.6667	4.0833	4.7500	5.0307	5.0058	12	14	11
	Apr	1.0714	5.1071	6.1786	5.5641	5.0712	28	19	15
	May	0.5833	1.8333	2.4167	5.5632	5.0296	12	13	11
	Jun	0.4167	3.2083	3.6250	5.4831	5.1271	24	18	17
	Jul	0.4118	2.8824	3.2941	5.7010	5.4445	17	20	10
	Aug	0.9302	4.9302	5.8605	5.7863	5.7866	43	21	19
	Sep	1.7568	8.9459	10.7027	5.9618	6.1408	37	16	16
	Oct	0.7838	3.6486	4.4324	6.1534	6.4467	37	17	17
	Nov	1.4516	7.4516	8.9032	6.5225	6.7739	31	14	14
	Dec	1.3250	5.3500	6.6750	6.9667	7.0728	40	13	13
1997		1.0374	5.1497	6.1871	—	—	294	194	154
1998	Jan	0.9643	5.3571	6.3214	7.0908	7.2001	28	16	13
	Feb	1.0000	4.9524	5.9524	7.2275	7.2673	42	16	16
	Mar	1.7500	7.8594	9.6094	7.1738	7.2753	64	17	17
	Apr	1.1111	4.8056	5.9167	7.1086	7.2719	36	11	11
	May	1.8148	9.7222	11.5370	7.0435	7.2052	54	17	17
	Jun	1.0000	4.1667	5.1667	7.0062	7.0781	42	9	9
	Jul	0.9231	3.8077	4.7308	7.2128	7.0536	52	9	9
	Aug	1.5102	6.1939	7.7041	7.2760	7.0577	98	16	16
	Sep	1.3333	6.2366	7.5699	7.2024	7.0275	93	15	15
	Oct	1.1346	4.8654	6.0000	—	—	52	13	13
	Nov	1.1690	4.6056	5.7746	—	—	71	13	13
	Dec	1.8133	7.0933	8.9067	—	—	75	15	15
1998		1.3564	5.9844	7.3409	—	—	707	167	164

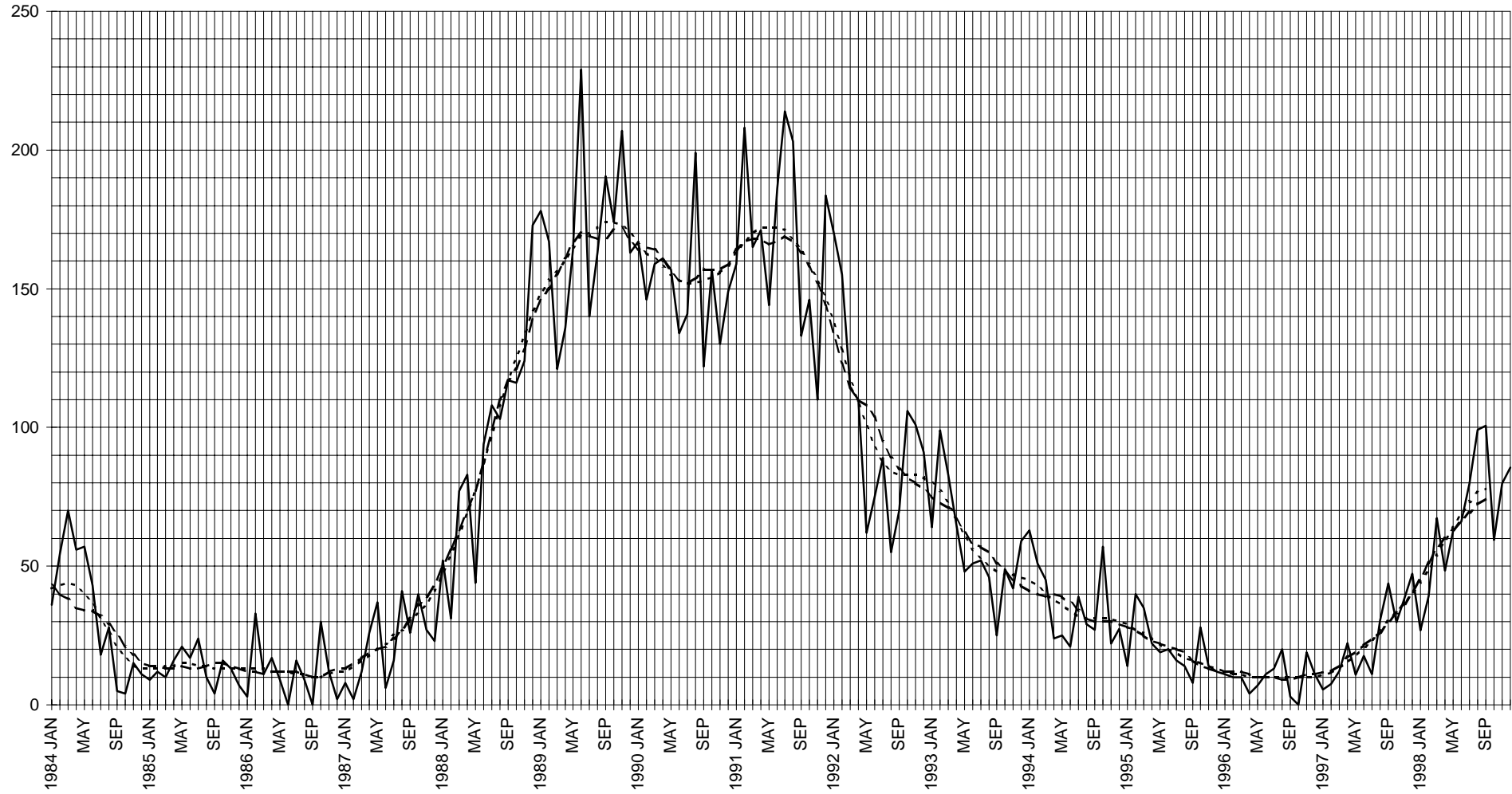
**OBSERVED and SMOOTHED GDSO WOLF NUMBERS (WN and WN[SHBm] 1984-1998**  
**SOLID = OBSERVED, DASHED = SHBm**  
**FOR EXACT VALUES, SEE TABLE W5 (IN THIS AND PREVIOUS REPORTS)**



**OBSERVED and SMOOTHED GDSO WOLF NUMBERS (WN,WN[SW] and WN[SB13]) 1984-1998**

**SOLID = OBSERVED, DASHED = SW, DOTTED = SB13**

**FOR EXACT VALUES, SEE TABLE W5 (IN THIS AND PREVIOUS REPORTS)**

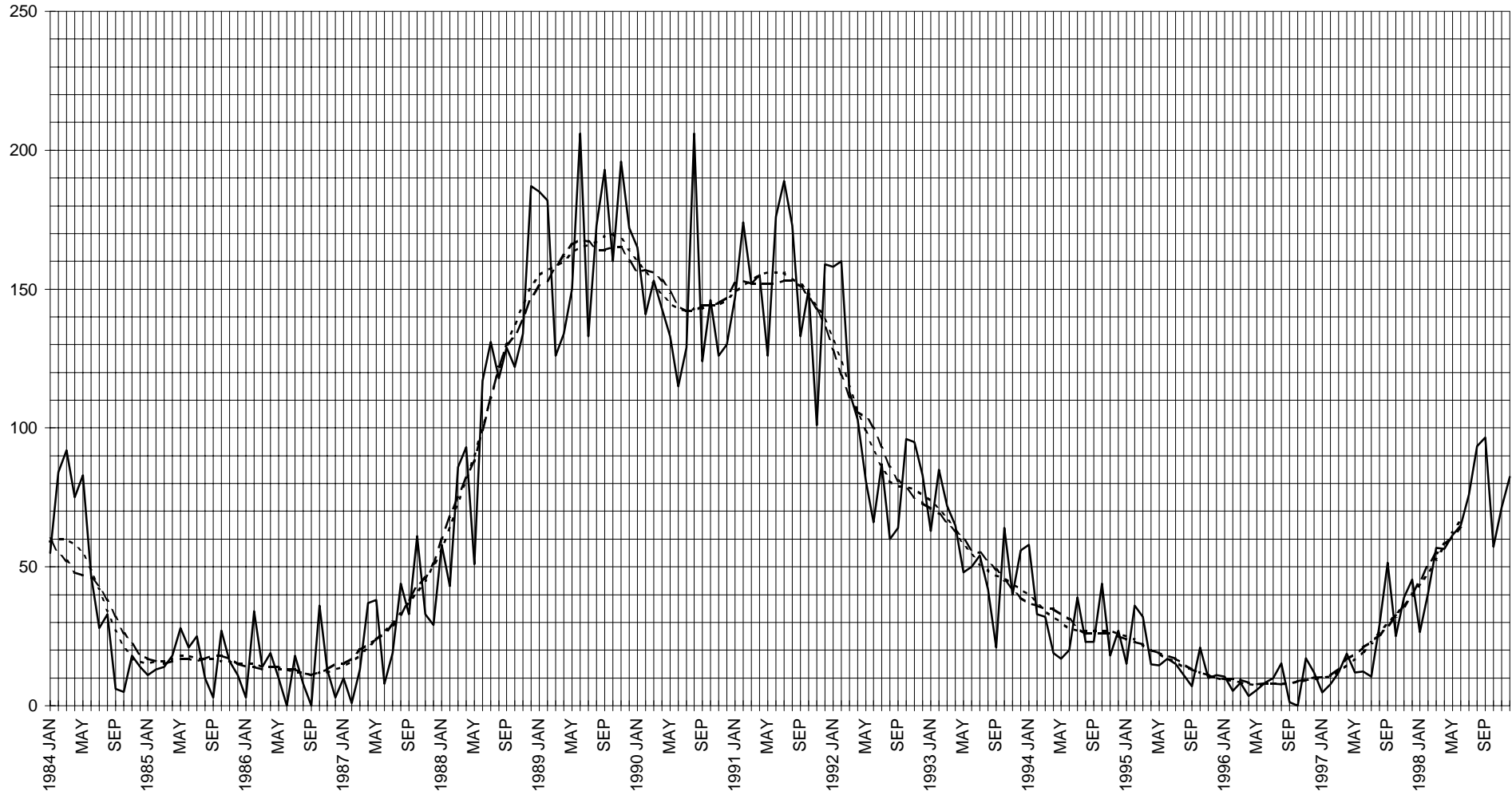




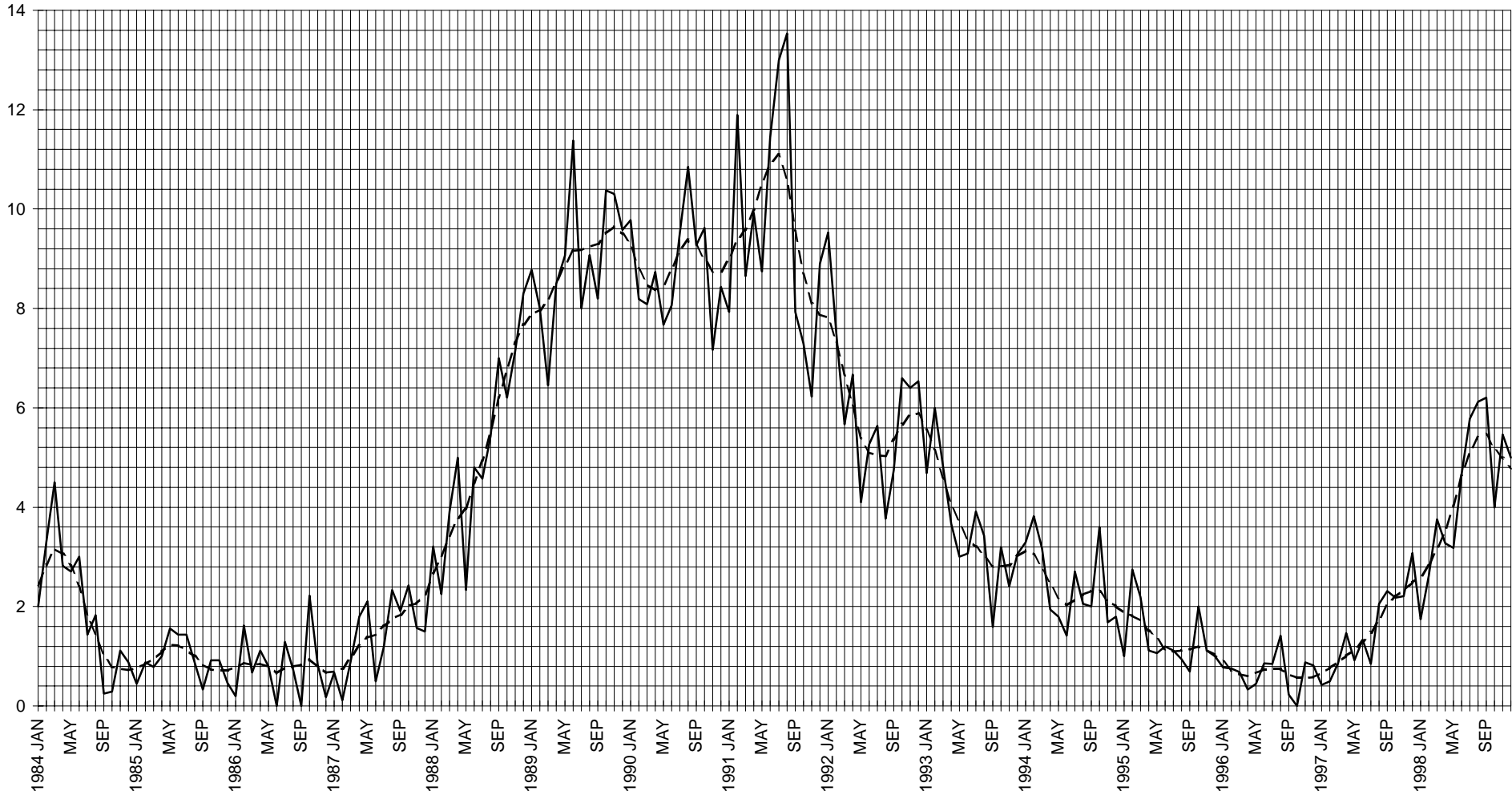
**CORRECTED and SMOOTHED GDSO WOLF NUMBERS ( $R_{GD}$ ,  $R_{GD}[SW]$  and  $R_{GD}[SB13]$ ) 1984-1998**

**SOLID = CORRECTED, DASHED = SW, DOTTED = SB13**

**FOR EXACT VALUES, SEE TABLE W5 (IN THIS AND PREVIOUS REPORTS)**



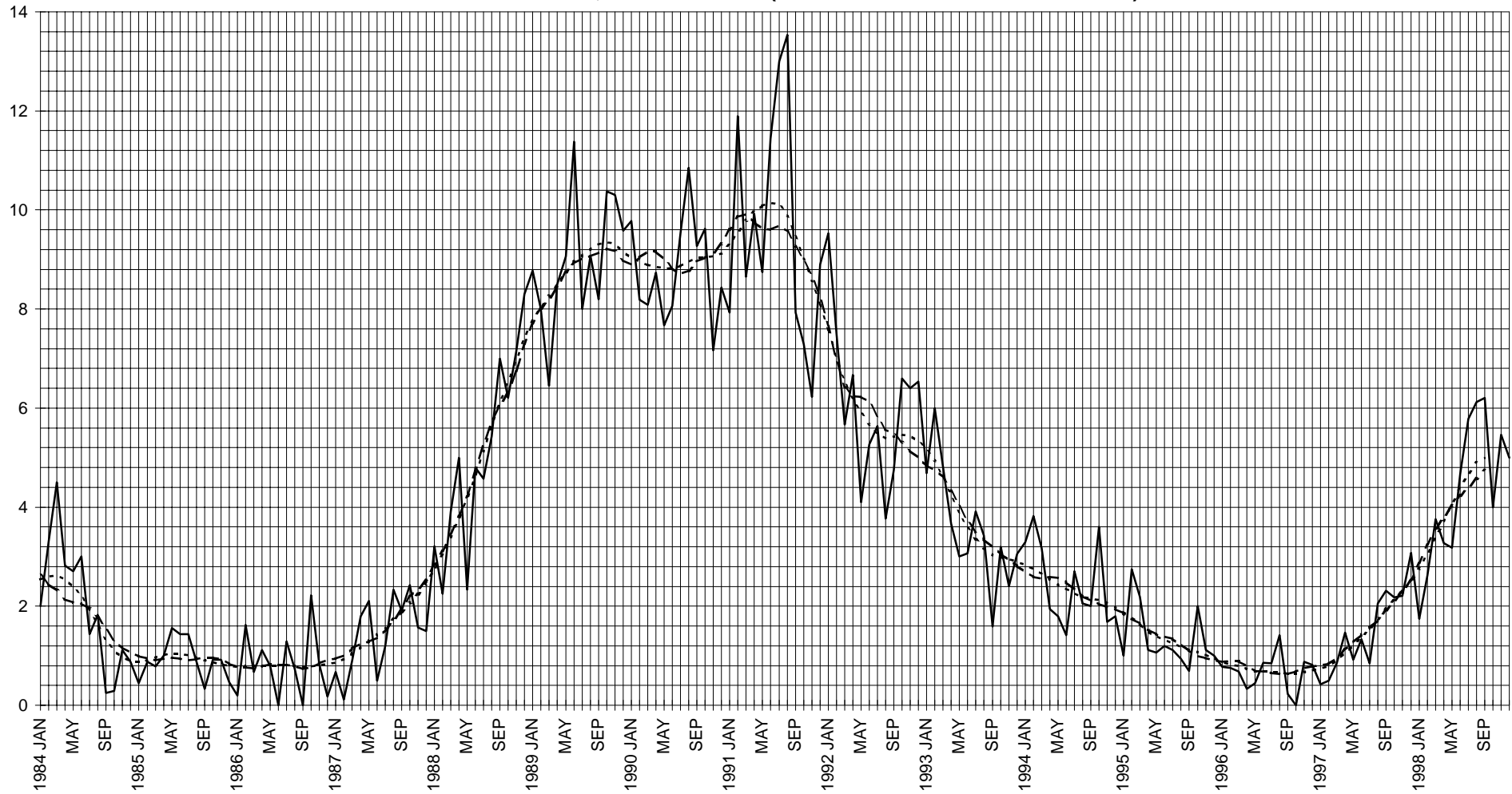
**OBSERVED and SMOOTHED GDSO ACTIVE AREA (g and g[SHBm]) 1984-1998**  
**SOLID = OBSERVED, DASHED = SHBm**  
**FOR EXACT VALUES, SEE TABLE G5 (IN THIS AND PREVIOUS REPORTS)**



**OBSERVED and SMOOTHED GDSO ACTIVE AREAS (g and g[SW] and g[SB13]) 1984-1998**

**SOLID = OBSERVED, DASHED = SW, DOTTED = SB13**

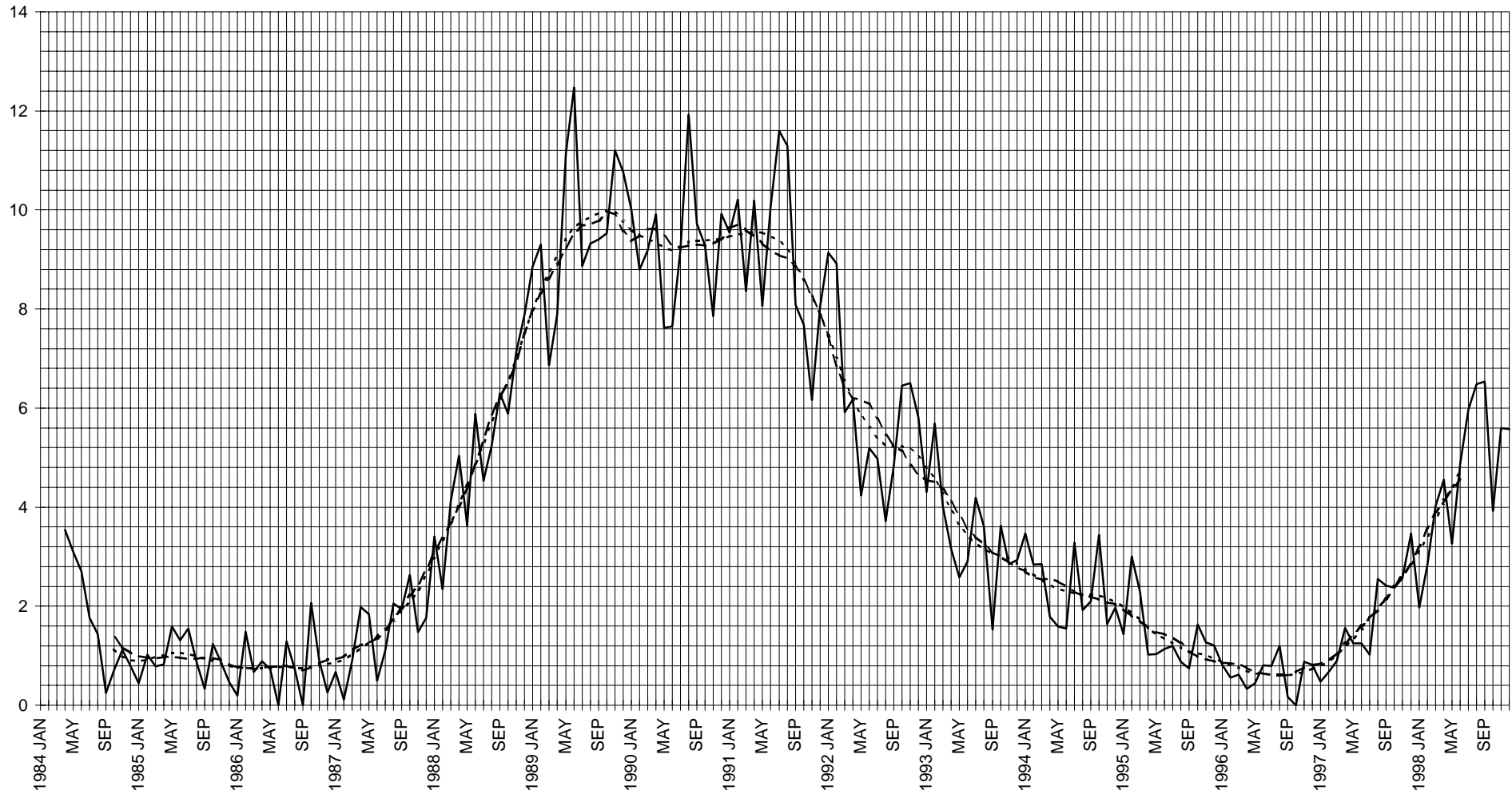
**FOR EXACT VALUE, SEE TABLE G5 (IN THIS AND PREVIOUS REPORTS)**



**CORRECTED and SMOOTHED GDSO ACTIVE AREAS ( $g_{GD}$ ,  $g_{GD}[SW]$  and  $g_{GD}[SB13]$ ) 1984-1998**

**SOLID = CORRECTED, DASHED = SW, DOTTED = SB13**

**FOR EXACT VALUES, SEE TABLE G5 (IN THIS AND PREVIOUS REPORTS)**

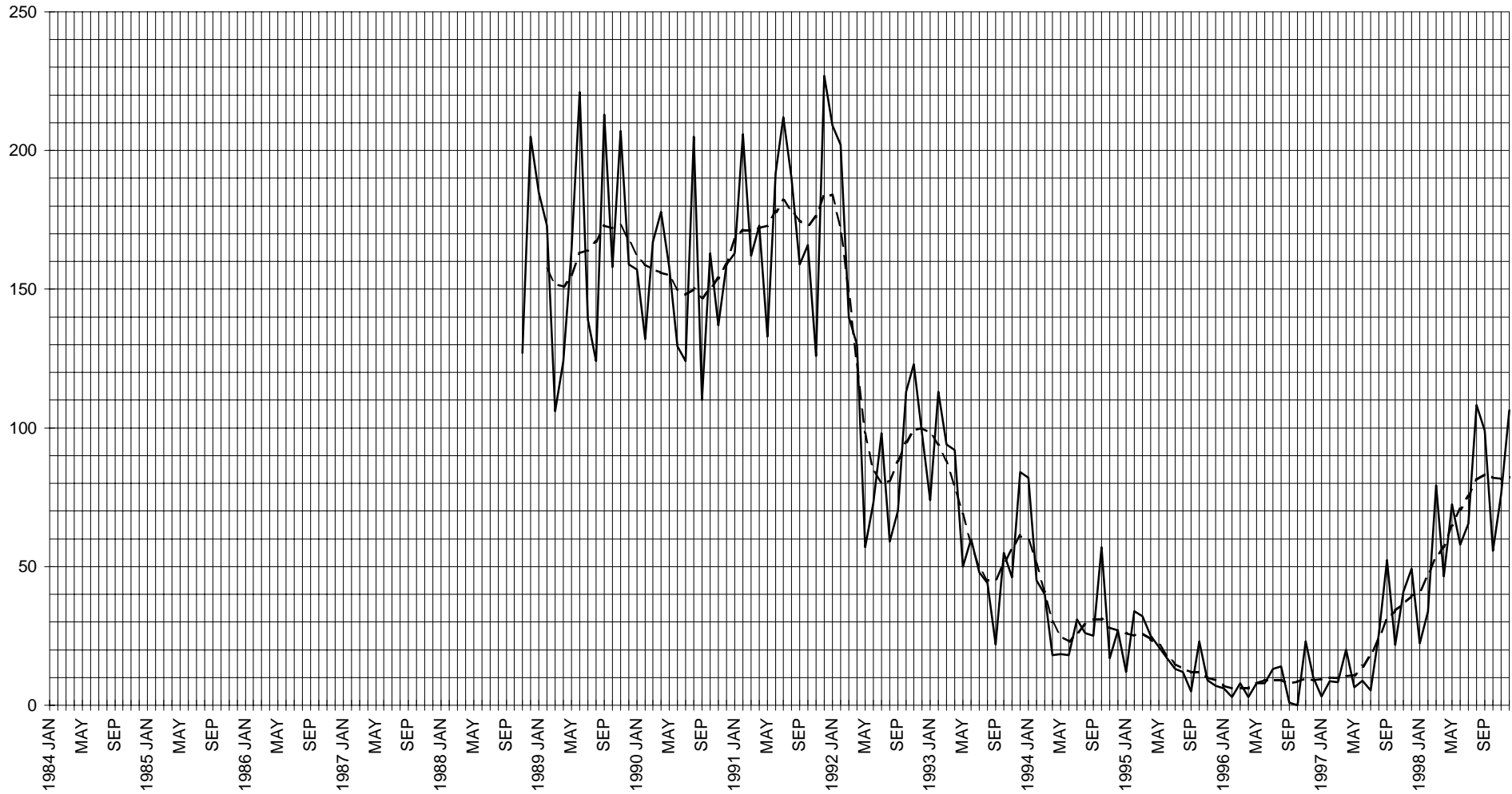


**DATA START AT APRIL 1984**

**OBSERVED and SMOOTHED GDSO PETTISINDICES (SN and SN[S<sup>HBm</sup>]) 1988-1998**

**SOLID = OBSERVED, DASHED = S<sup>HBm</sup>**

**FOR EXACT VALUES, SEE TABLE P5 (IN THIS AND PREVIOUS REPORTS)**

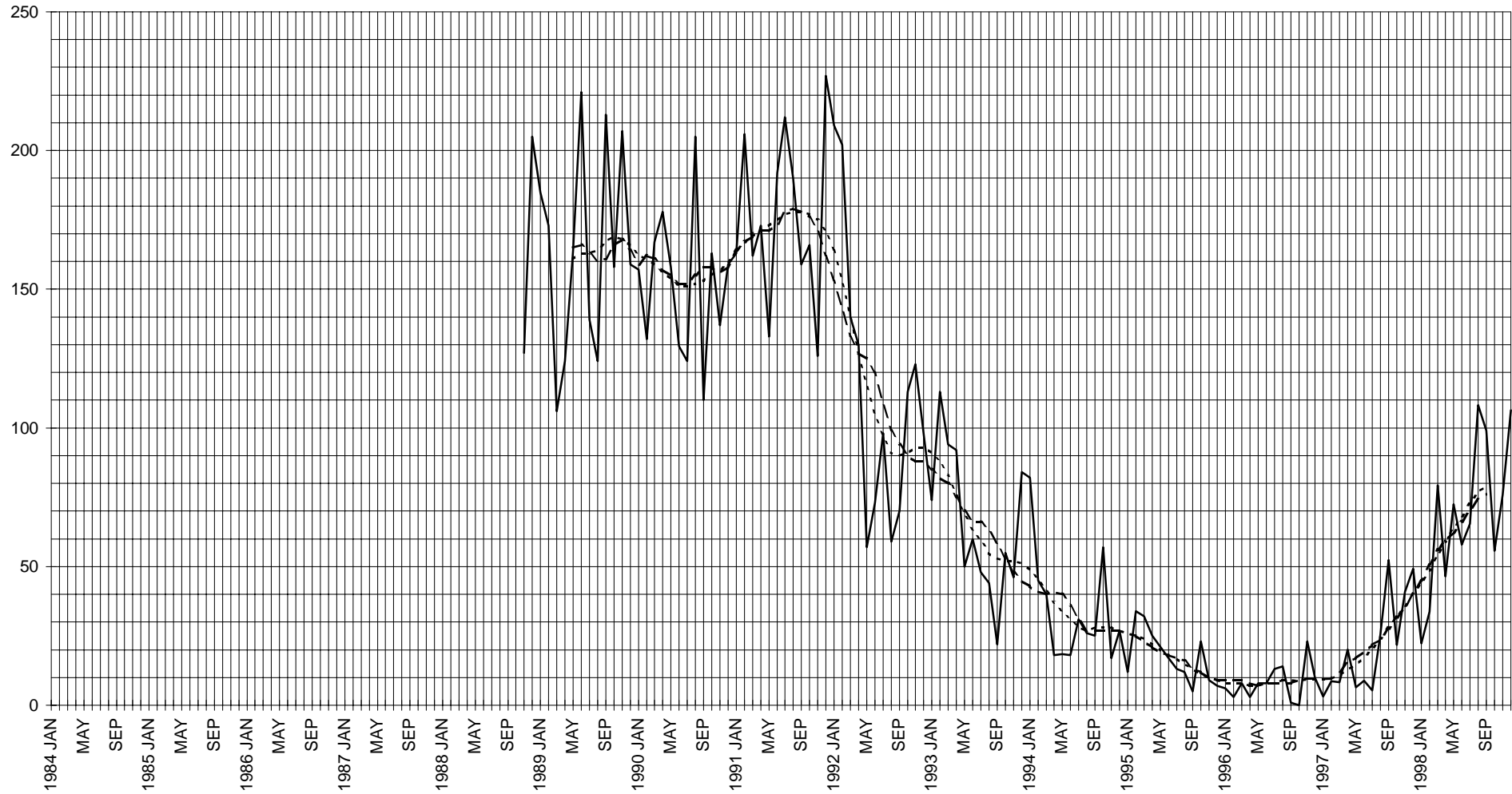


**DATA START AT NOVEMBER 1988**

**OBSERVED and SMOOTHED GDSO PETTISINDICES (SN, SN[S<sup>W</sup>] and SN[S<sup>B13</sup>]) 1988-1998**

**SOLID = OBSERVED, DASHED = S<sup>W</sup>, DOTTED = S<sup>B13</sup>**

**FOR EXACT VALUES, SEE TABLE P5 (IN THIS AND PREVIOUS REPORTS)**

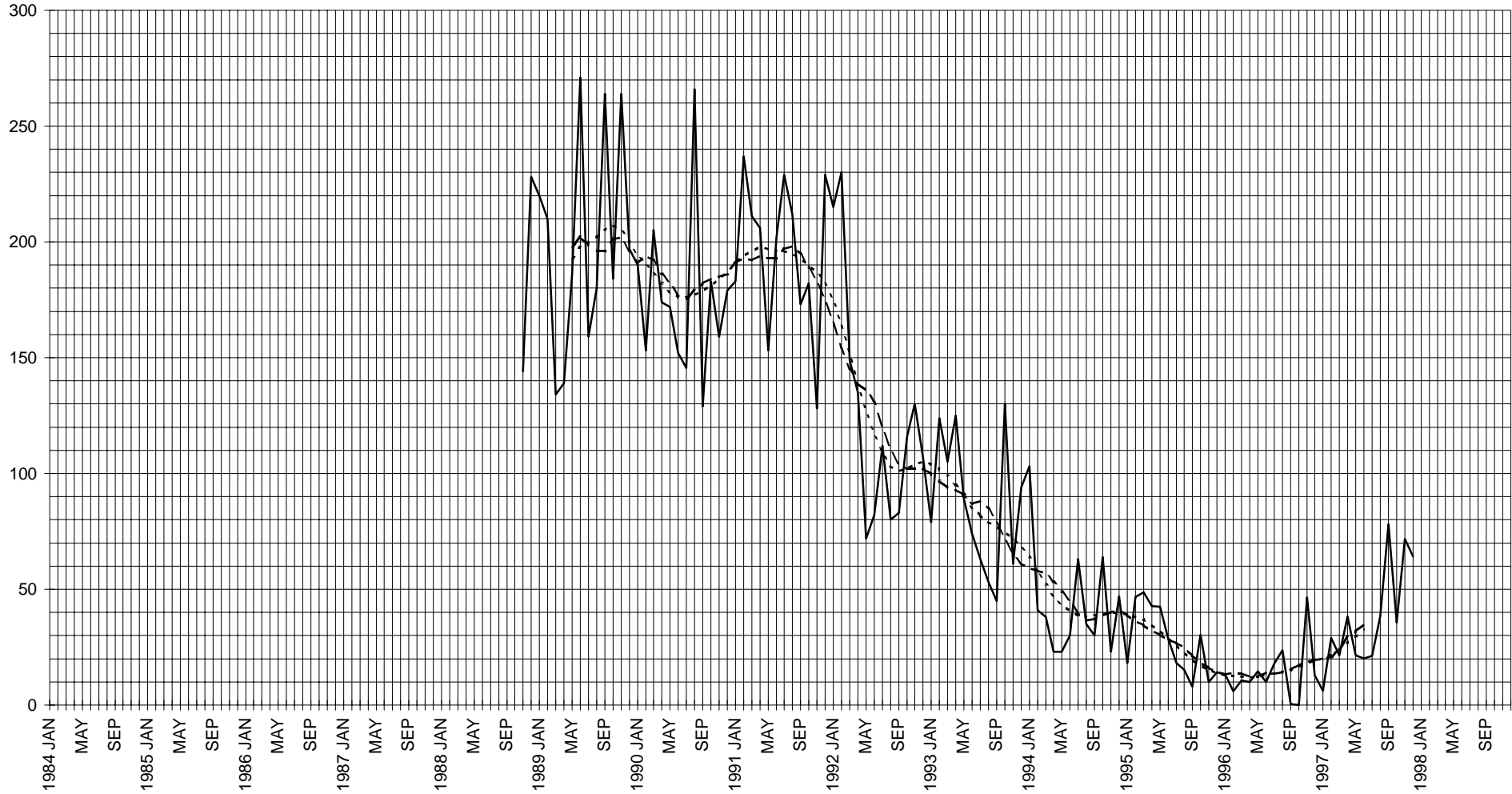


**DATA START AT NOVEMBER 1988**

**CORRECTED and SMOOTHED GDSO PETTISINDICES ( $PX_{GD}$ ,  $PX_{GD}[SW]$  and  $PX_{GD}[SB13]$ ) 1988-1998**

**SOLID = CORRECTED, DASHED = SW, DOTTED = SB13**

**FOR EXACT VALUES, SEE TABLE P5 (IN THIS AND PREVIOUS REPORTS)**

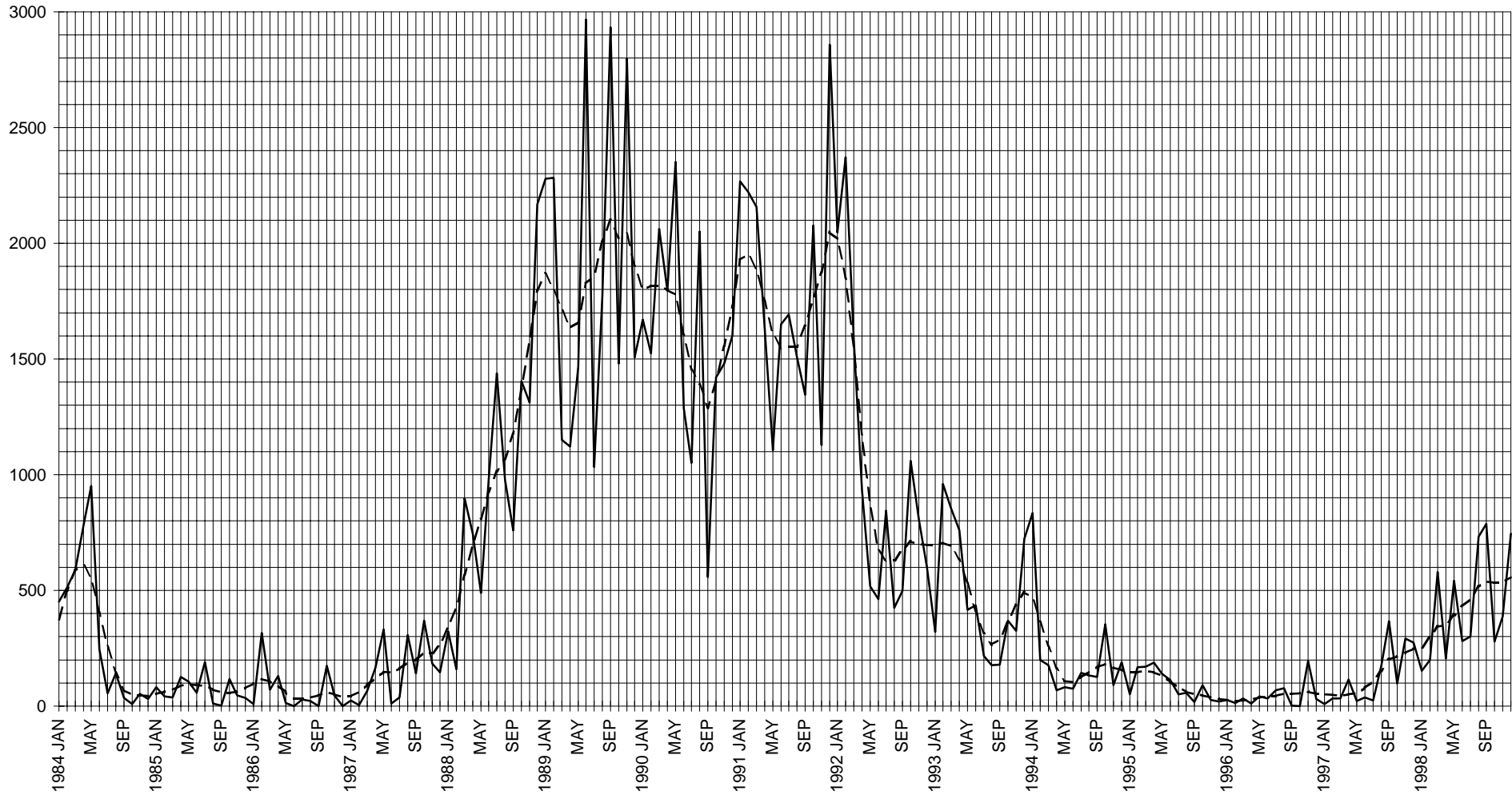


**DATA START AT NOVEMBER 1988**

**OBSERVED and SMOOTHED GDSO BECKINDICES (BX and BX[SHBm]) 1984-1998**

**SOLID = OBSERVED, DASHED = SHBm**

**FOR EXACT VALUES, SEE TABLE B5 (IN THIS AND PREVIOUS REPORTS)**

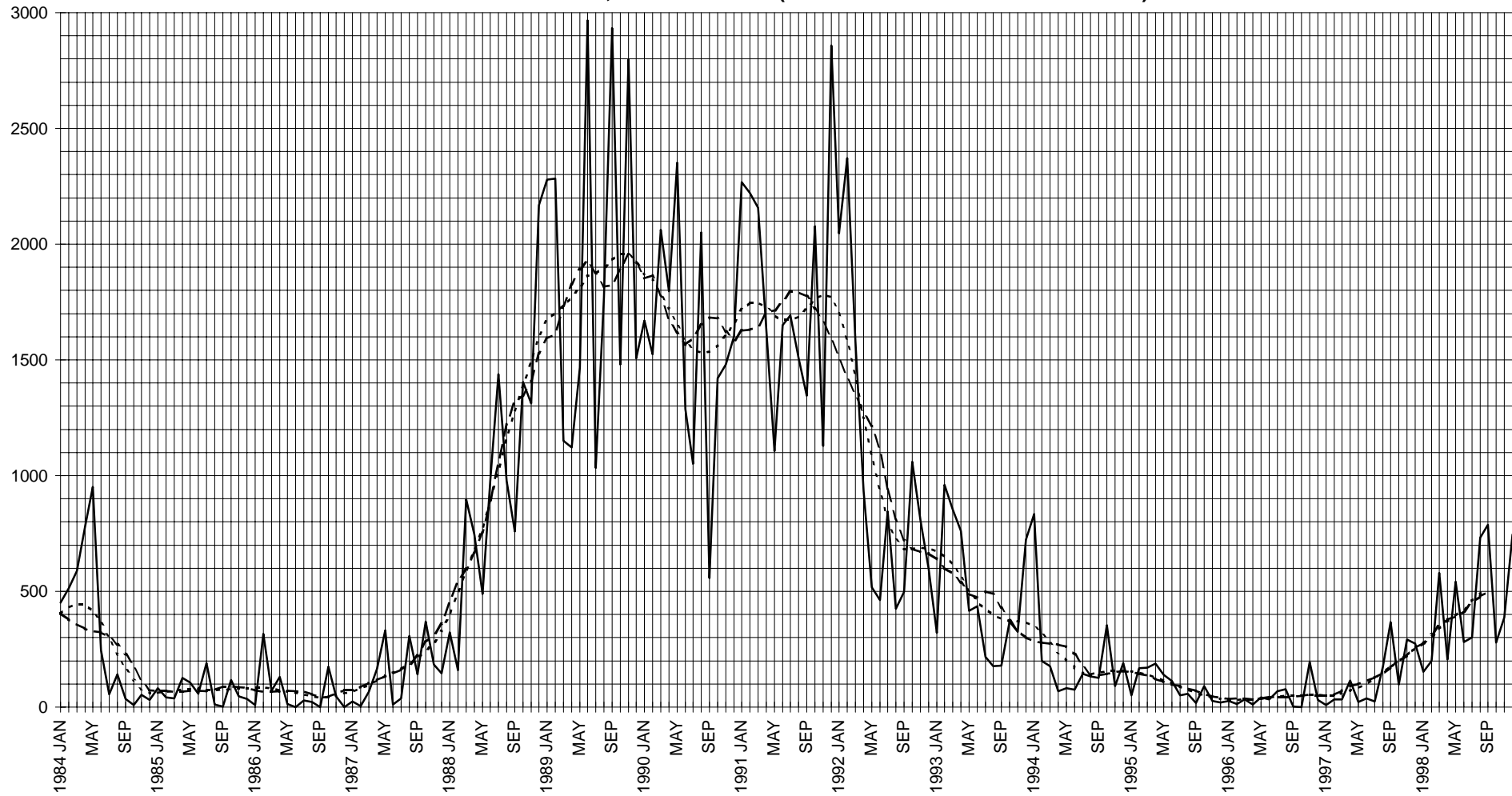




**OBSERVED and SMOOTHED GDSO BECKINDICES (BX, BX[SW] and BX[SB13]) 1984-1998**

**SOLID = OBSERVED, DASHED = SW, DOTTED = SB13**

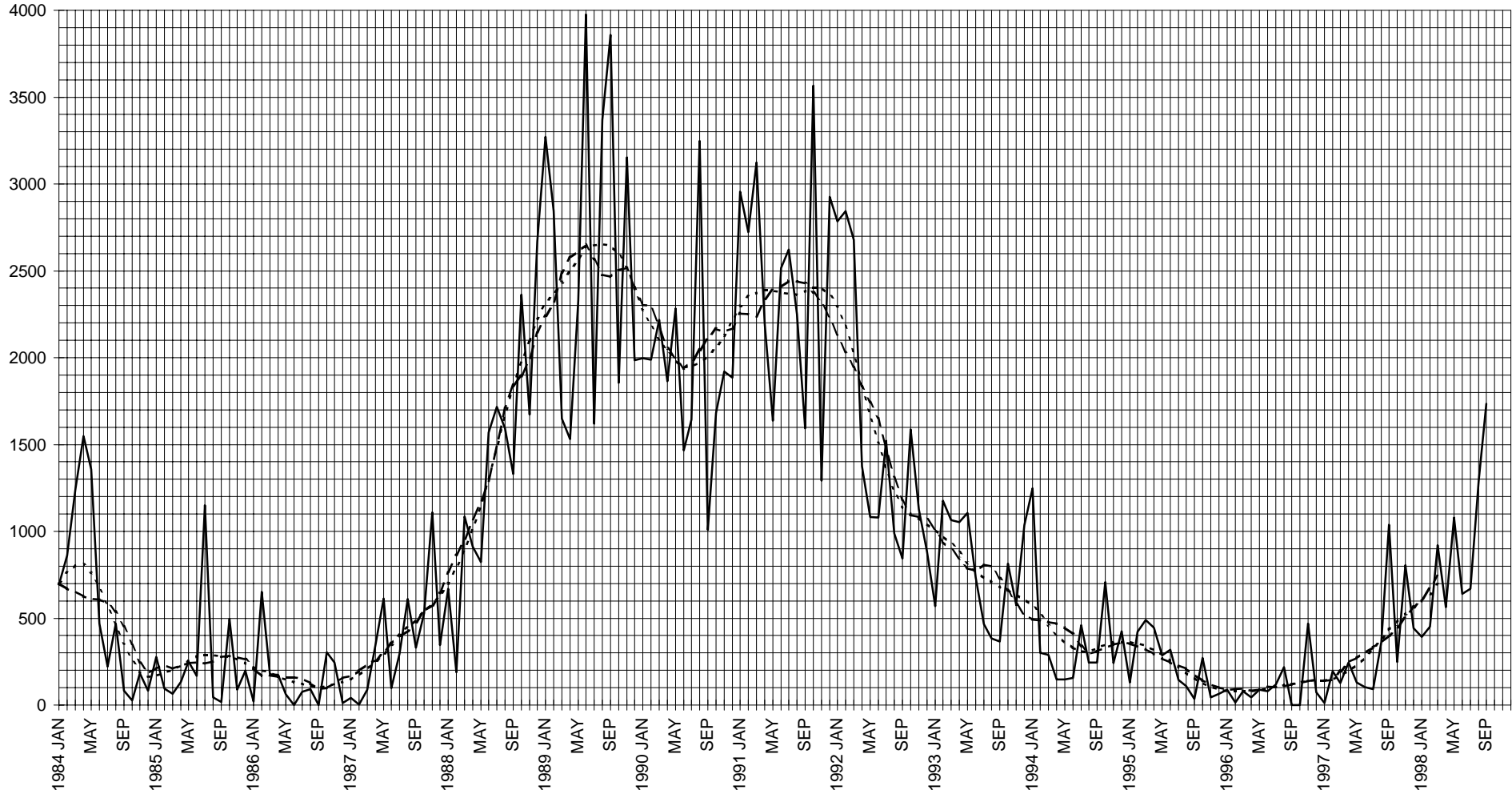
**FOR EXACT VALUES, SEE TABLE B5 (IN THIS AND PREVIOUS REPORTS)**



**CORRECTED and SMOOTHED GDSO BECKINDICES ( $BX_{GD}$ ,  $BX_{GD}[SW]$  and  $BX_{GD}[SB13]$ ) 1984-1998**

**SOLID = CORRECTED, DASHED = SW, DOTTED = SB13**

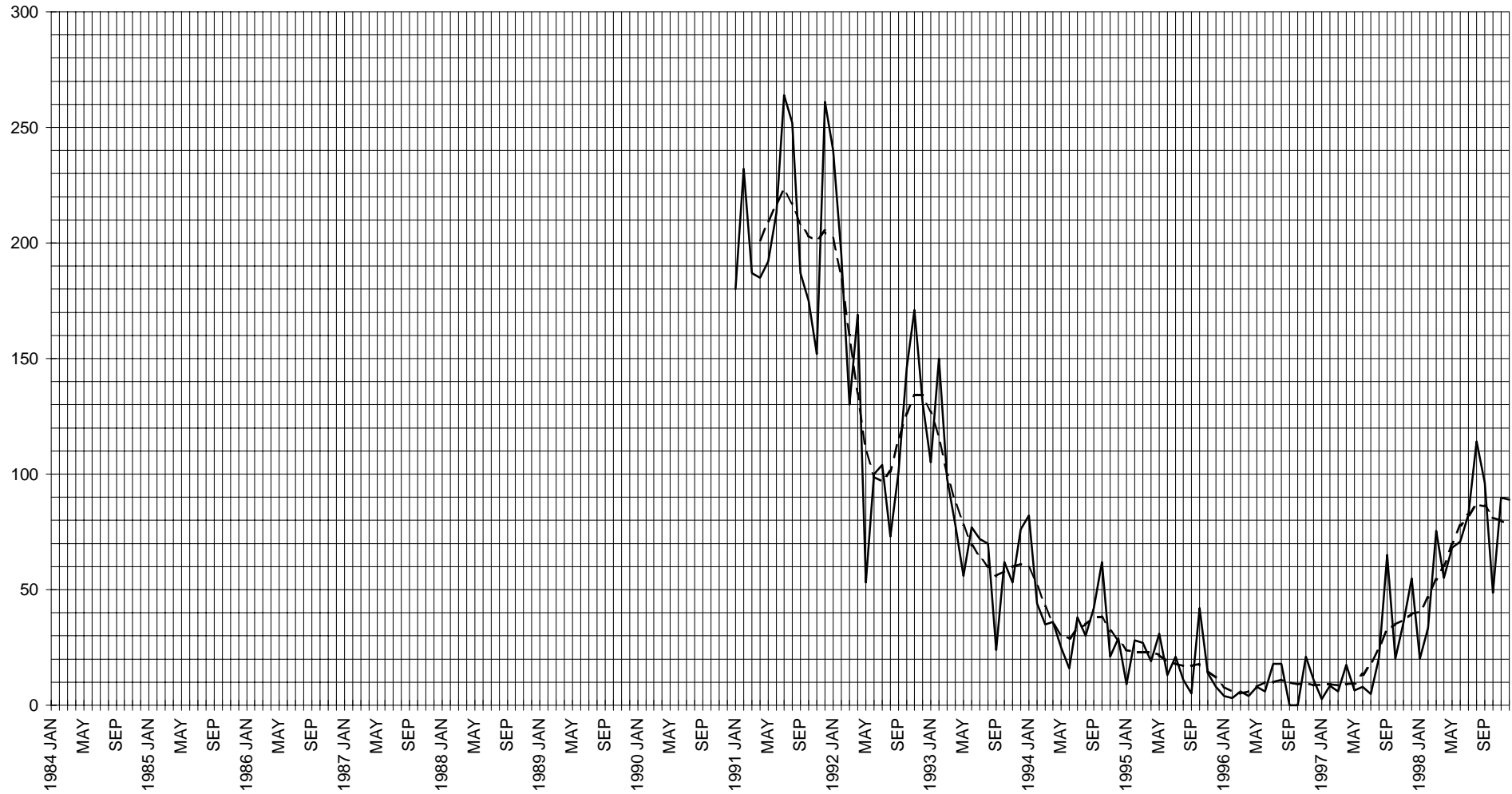
**FOR EXACT VALUES, SEE TABLE B5 (IN THIS AND PREVIOUS REPORTS)**



**OBSERVED and SMOOTHED GDSO CLASSIFICATION VALUES (CV and CV[SHBm]) 1991-1998**

**SOLID = OBSERVED, DASHED = SHBm**

**FOR EXACT VALUES, SEE TABLE C5 (IN THIS AND PREVIOUS REPORTS)**



**DATA START AT JANUARY 1991**

**OBSERVED and SMOOTHED GDSO CLASSIFICATION VALUES (CV, CV[S<sup>W</sup>] and CV[S<sup>B13</sup>]) 1991-1998**  
**SOLID = OBSERVED, DASHED = SW, DOTTED = SB13**  
**FOR EXACT VALUES, SEE TABLE C5 (IN THIS AND PREVIOUS REPORTS)**

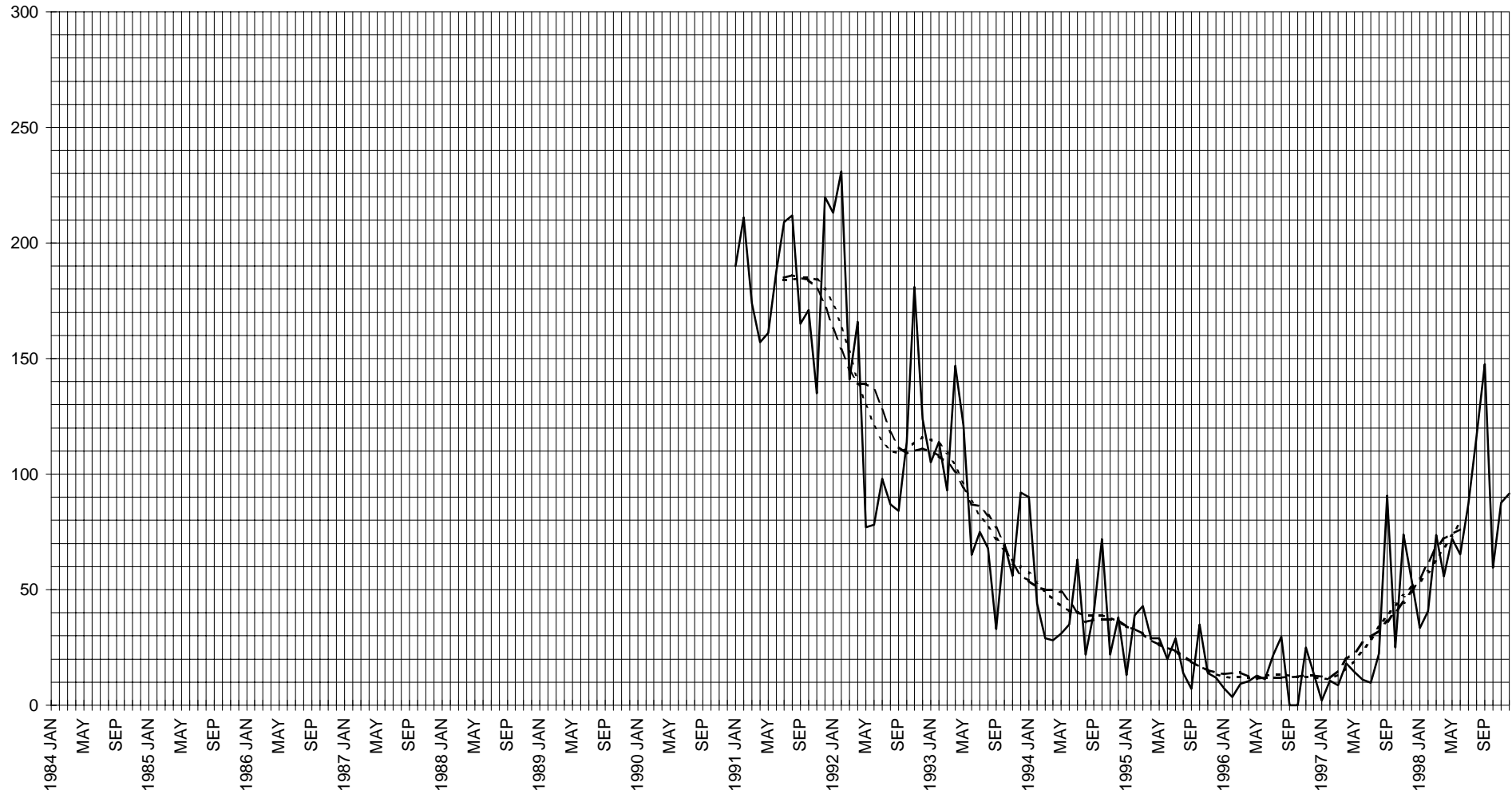


**DATA START AT JANUARY 1991**

**CORRECTED and SMOOTHED GDSO CLASSIFICATION VALUES ( $CV_{GD}$ ,  $CV_{GD}[SW]$  and  $CV_{GD}[SB13]$ ) 1991-1998**

**SOLID = CORRECTED, DASHED = SW, DOTTED = SB13**

**FOR EXACT VALUES, SEE TABLE C5 (IN THIS AND PREVIOUS REPORTS)**

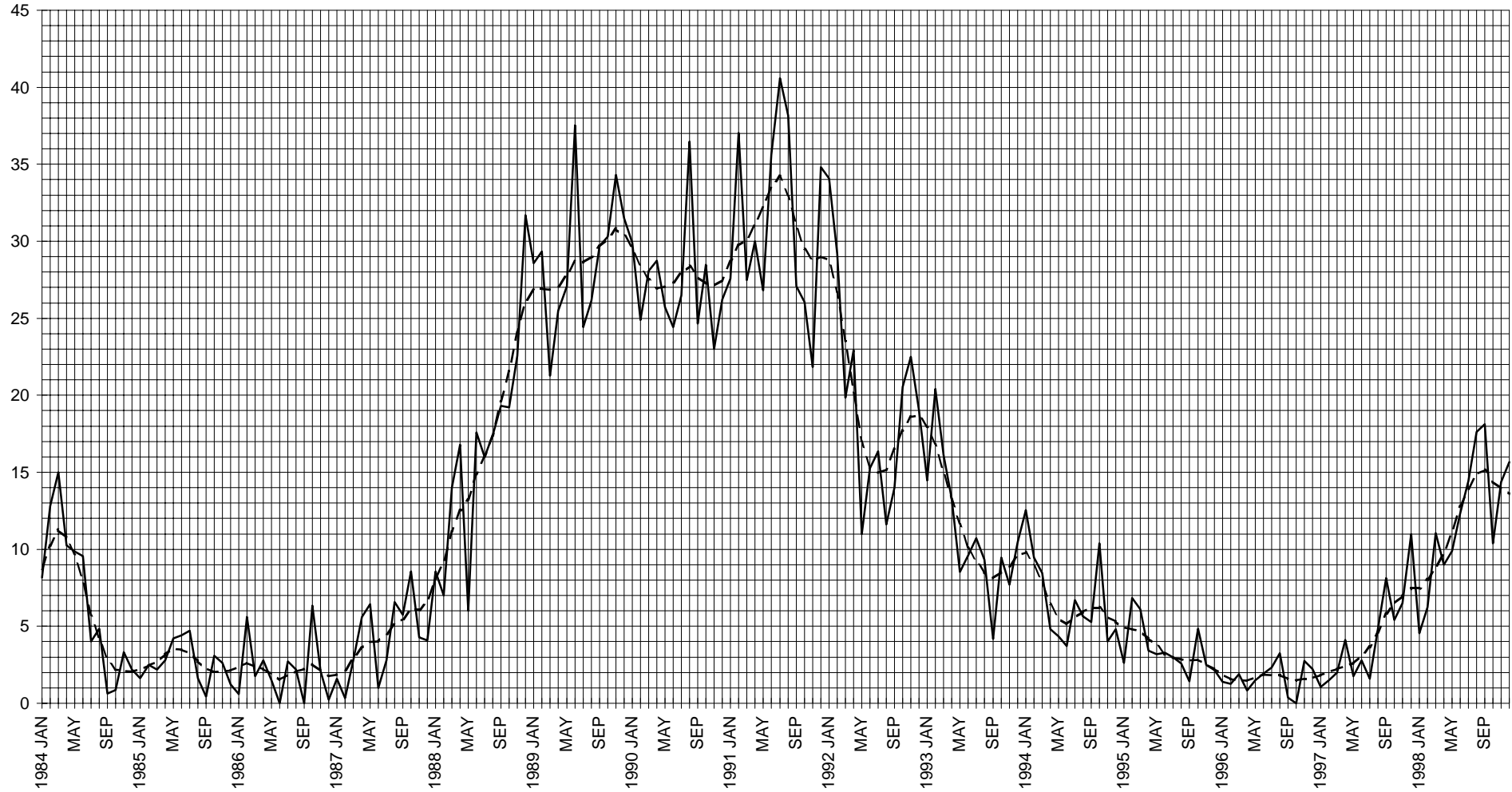


**DATA START AT JANUARY 1991**

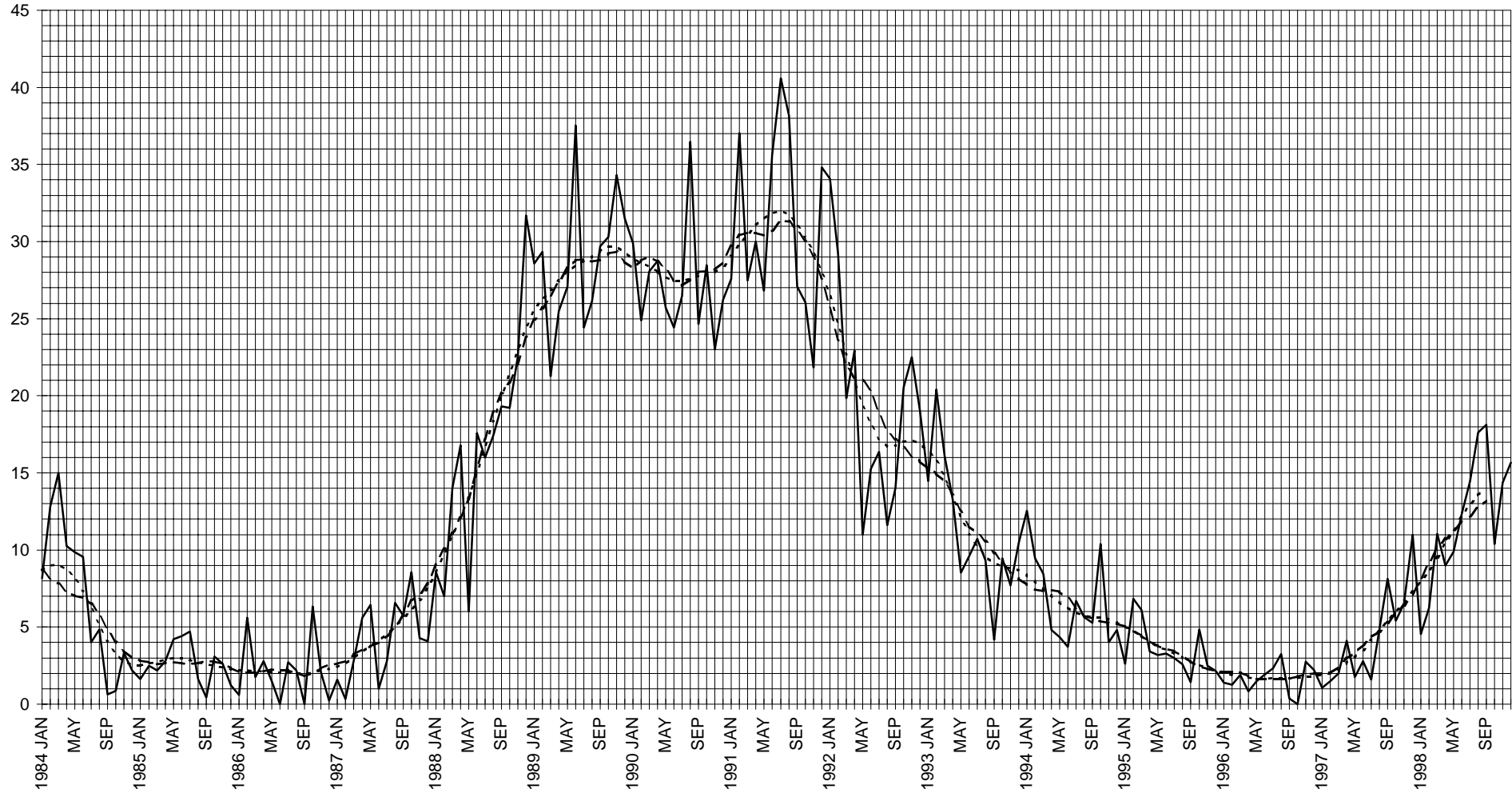
**OBSERVED and SMOOTHED GDSO QUALITY COUNTS (QC and QC[S<sup>HBm</sup>]) 1984-1998**

**SOLID = OBSERVED, DASHED = S<sup>HBm</sup>**

**FOR EXACT VALUES, SEE TABLE Q5 (IN THIS AND PREVIOUS REPORTS)**



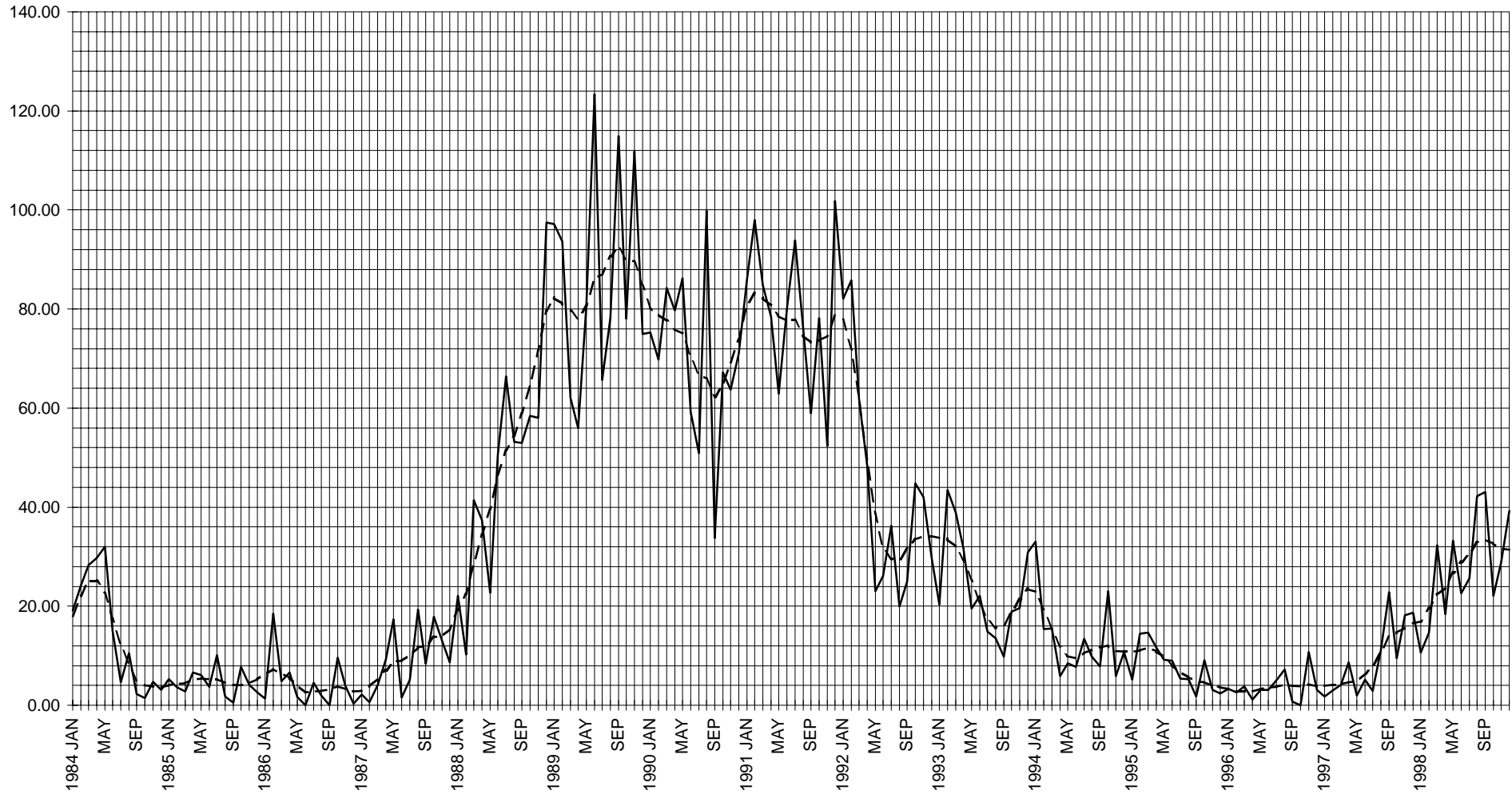
**OBSERVED and SMOOTHED GDSO QUALITY COUNTS (QC, QC[SW] and QC[SB13]) 1984-1998**  
**SOLID = OBSERVED, DASHED = SW, DOTTED = SB13**  
**FOR EXACT VALUES, SEE TABLE Q5 (IN THIS AND PREVIOUS REPORTS)**



**OBSERVED and SMOOTHED GDSO INTER-SOL INDICES (IS and IS[S<sup>HBm</sup>]) 1984-1998**

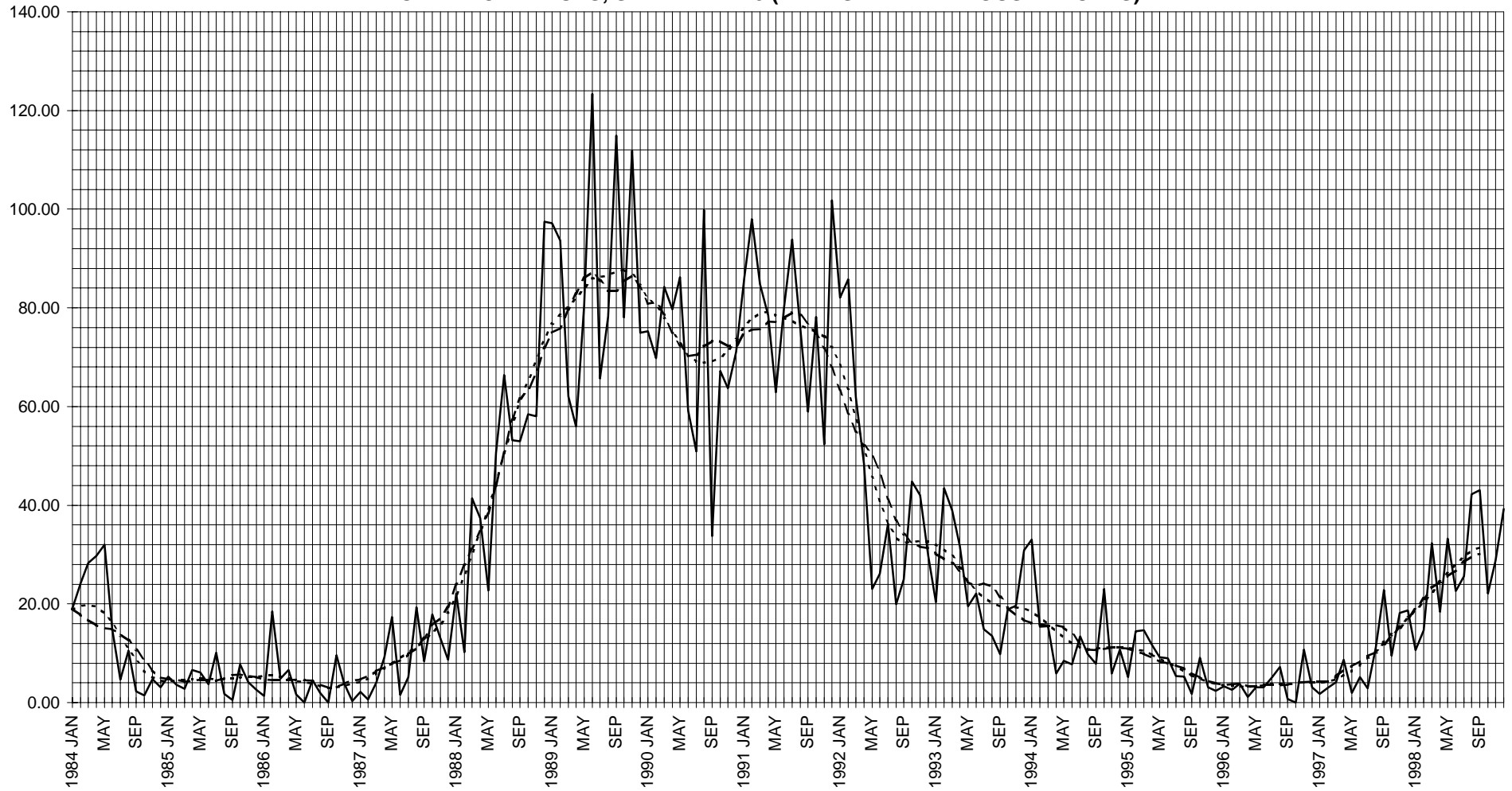
**SOLID = OBSERVED, DASHED = S<sup>HBm</sup>**

**FOR EXACT VALUES, SEE TABLE I-5 (IN THIS AND PREVIOUS REPORTS)**





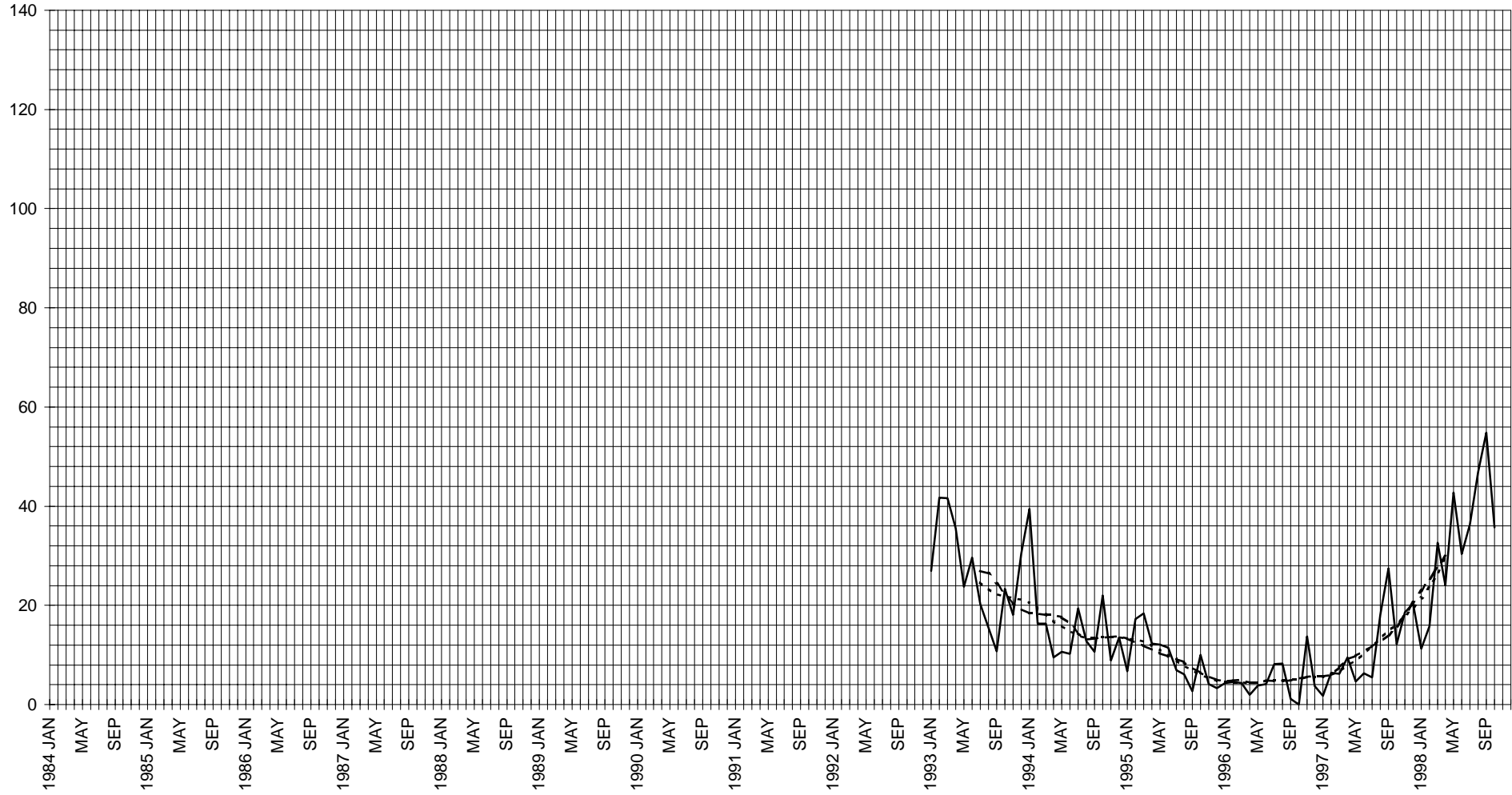
**OBSERVED and SMOOTHED GDSO INTER-SOL INDICES (IS, IS[SW] and IS[SB13]) 1984-1998**  
**SOLID = OBSERVED, DASHED = SW, DOTTED = SB13**  
**FOR EXACT VALUES, SEE TABLE I-5 (IN THIS AND PREVIOUS REPORTS)**



**CORRECTED and SMOOTHED GDSO INTER-SOL INDICES ( $IS_{GD}$ ,  $IS_{GD}[SW]$  and  $IS_{GD}[SB13]$  1993-1998**

**SOLID = CORRECTED, DASHED = SW, DOTTED = SB13**

**FOR EXACT VALUES, SEE TABLE I-5 (IN THIS AND PREVIOUS REPORTS)**

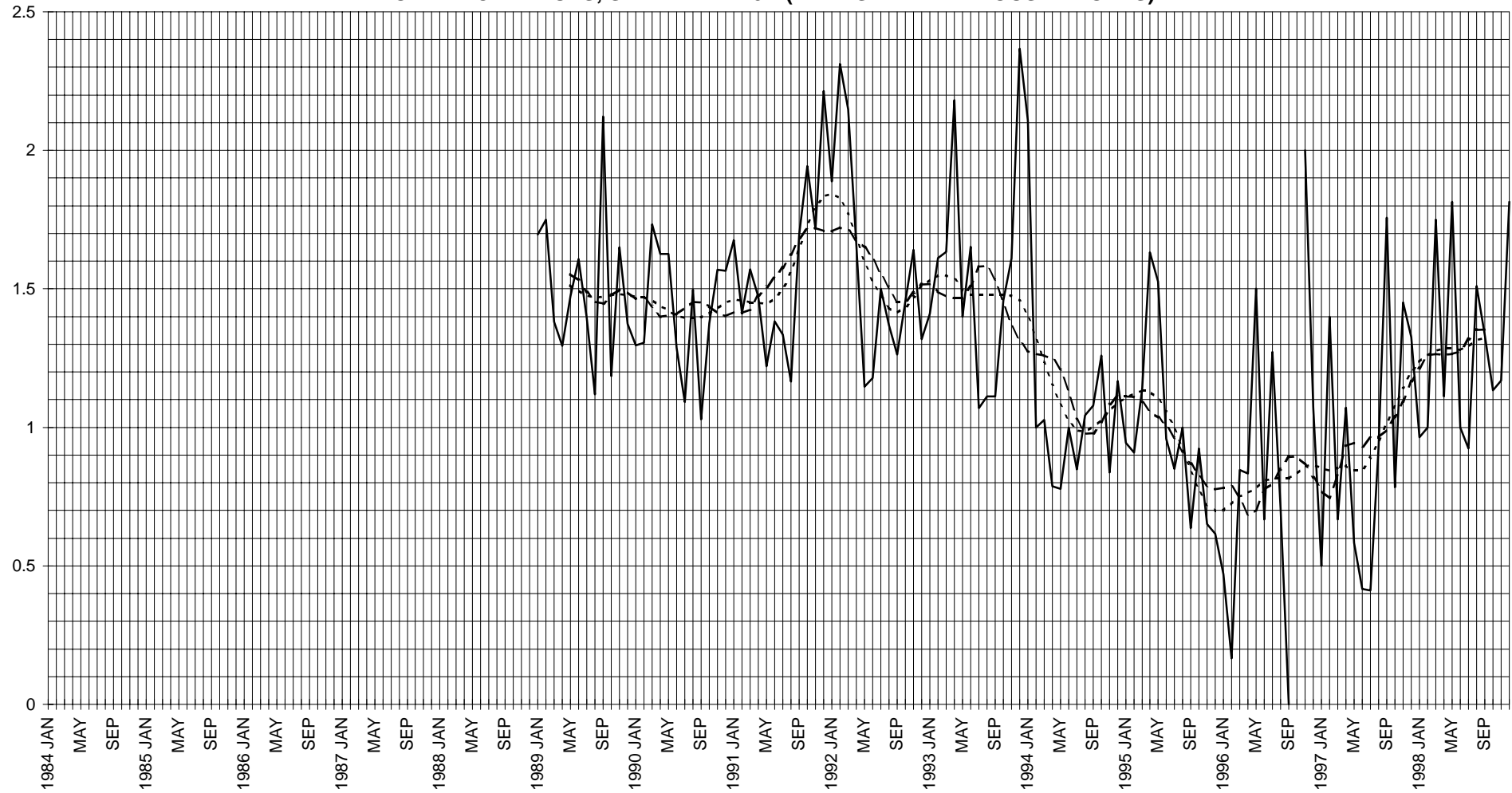


**DATA START AT JANUARY 1993**

**OBSERVED and SMOOTHED GDSO PENUMBRAE PER SUNSPOT GROUP (p/g, p/g[SW] and p/g[SB13] 1989-1998**

**SOLID = OBSERVED, DASHED = SW, DOTTED = SB13**

**FOR EXACT VALUES, SEE TABLE M9A (IN THIS AND PREVIOUS REPORTS)**



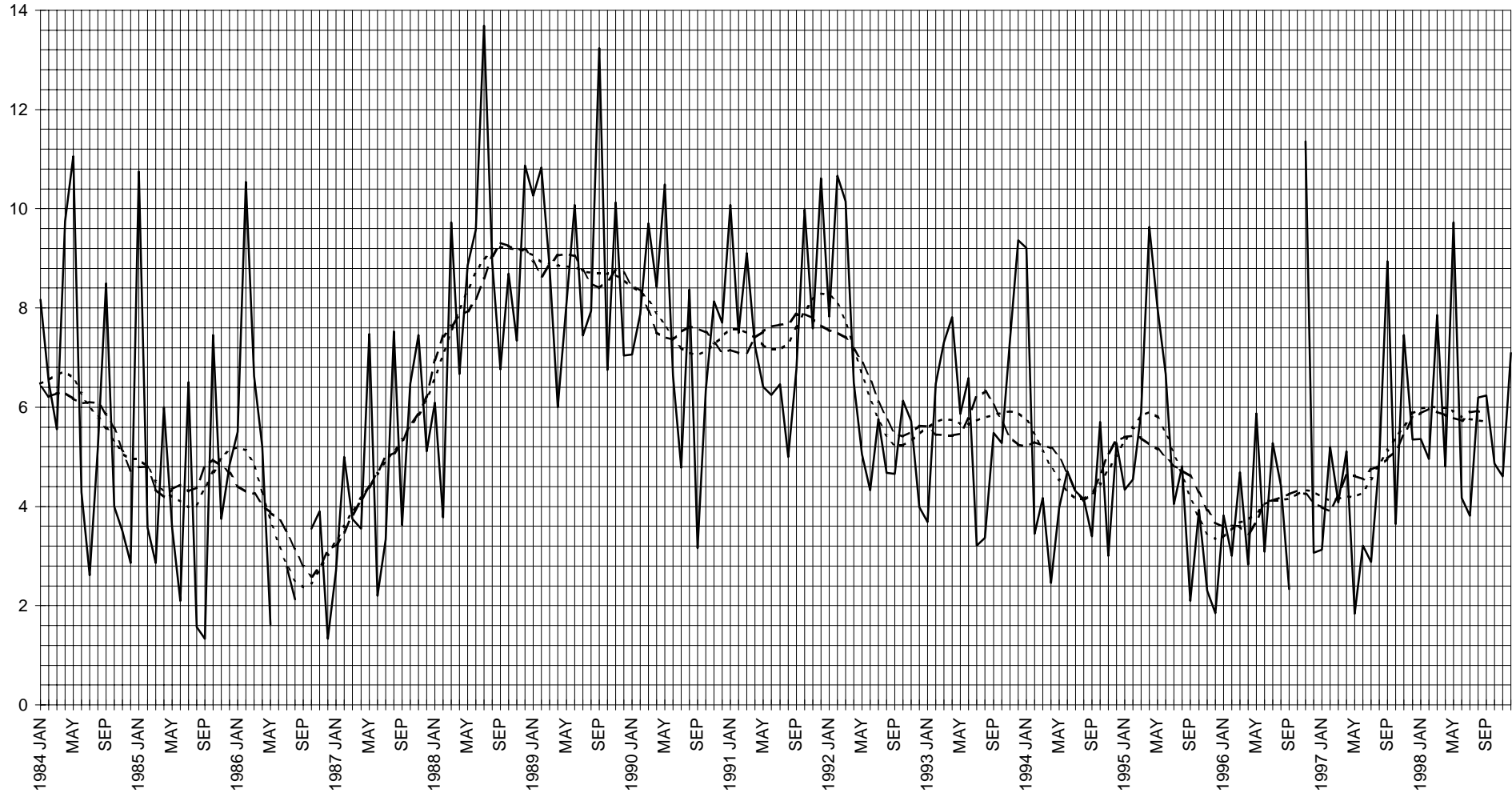
**DATA START AT JANUARY 1989**

**AS THERE WERE NO GROUPS IN OCTOBER 1996, p/g IS NON-EXISTENT FOR THAT MONTH**

**OBSERVED and SMOOTHED GDSO SPOTS PER SUNSPOT GROUP (f/g, f/g[SW] and f/g[SB13]) 1984-1998**

**SOLID = OBSERVED, DASHED = SW, DOTTED = SB13**

**FOR EXACT VALUES, SEE TABLE M9B (IN THIS AND PREVIOUS REPORTS)**

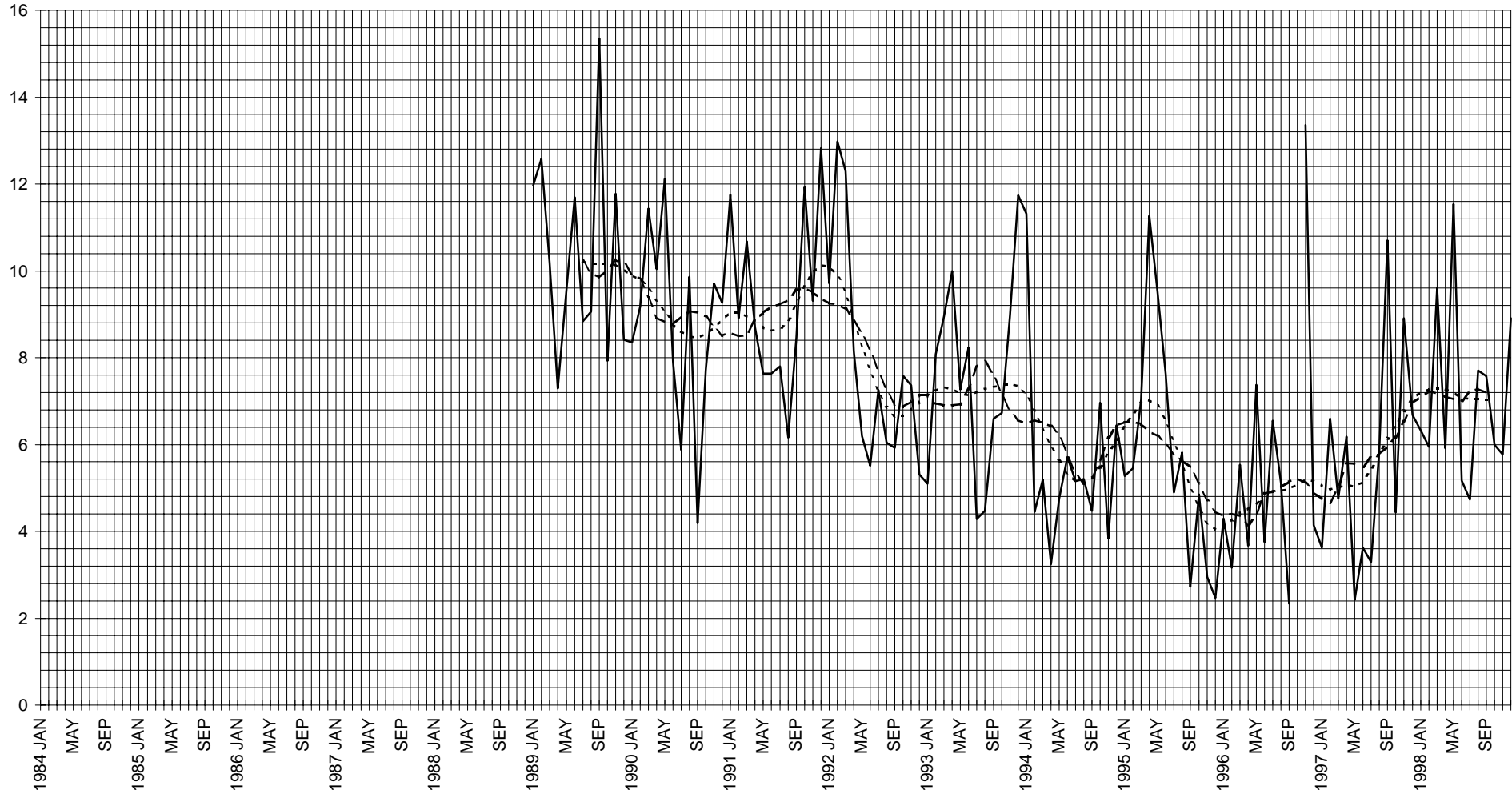


**AS THERE WERE NO GROUPS IN JUNE 1986, SEPTEMBER 1986 AND OCTOBER 1996, f/g IS NON-EXISTENT FOR THOSE MONTHS**

**OBSERVED and SMOOTHED QDSO GROUP COMPLEXITY INDICES (GCI, GCI[SW] and GCI[SB13]) 1989-1998**

**SOLID = OBSERVED, DASHED = SW, DOTTED = SB13**

**FOR EXACT VALUES, SEE TABLE M9C (IN THIS AND PREVIOUS REPORTS)**



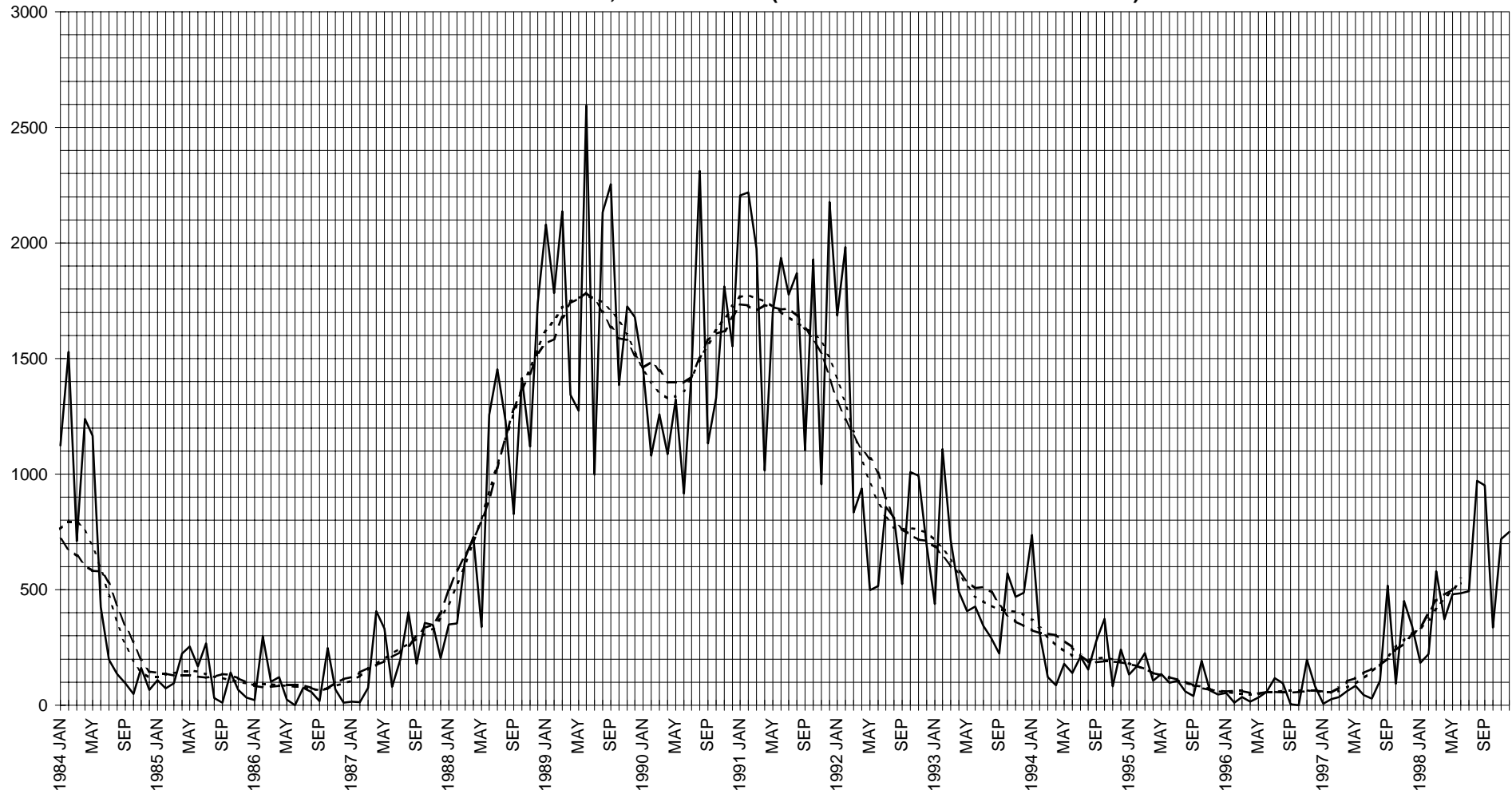
**DATA START AT JANUARY 1989.**

**AS THERE WERE NO GROUPS IN OCTOBER 1996, GCI IS NON-EXISTENT FOR THAT MONTH**

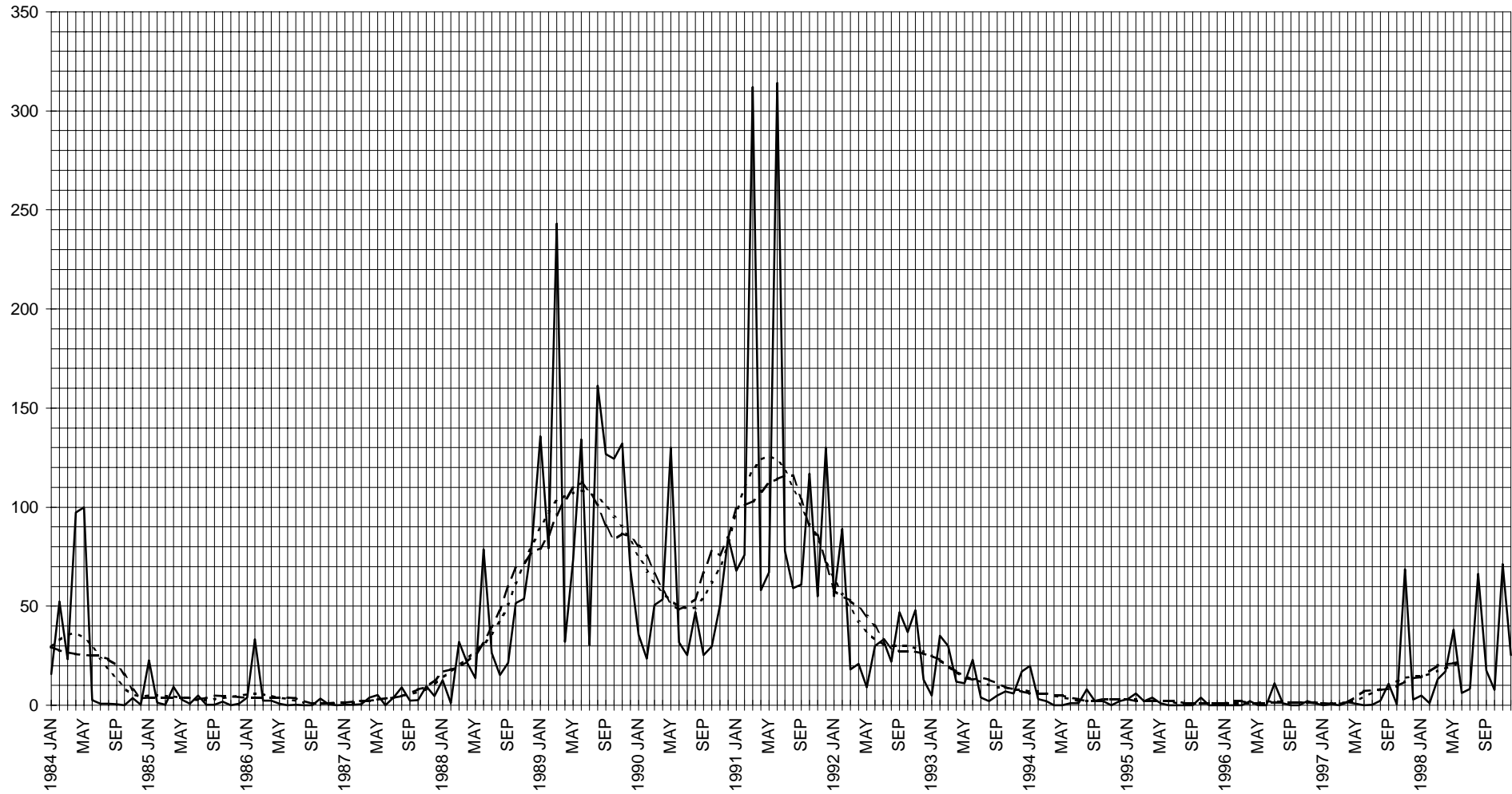
**OBSERVED and SMOOTHED NOAA SUNSPOT AREA VALUES (in MICRO-HEMISPHERES) 1984-1998**

**SOLID = OBSERVED, DASHED =  $S^W$ , DOTTED =  $S^{B13}$**

**FOR EXACT VALUES, SEE PAGE C2 (IN THIS AND PREVIOUS REPORTS)**



**OBSERVED and SMOOTHED NOAA X-RAY FLARE MEAN DAILY OUTPUT VALUES (IN MICROWATTS PER SQUARE METRE) 1984-1998**  
**SOLID = OBSERVED, DASHED = SW, DOTTED = SB13**  
**FOR EXACT VALUES, SEE PAGE D12**



**ADJUSTED and SMOOTHED NRCC 2800 MHz SOLAR FLUX (IN  $10^{-22}$  WATTS/SQUARE METRE/HERTZ) 1984-1998**  
**SOLID = ADJUSTED, DASHED = SW, DOTTED = SB13**  
**FOR EXACT VALUES, SEE PAGE E4 (IN THIS AND PREVIOUS REPORTS)**

