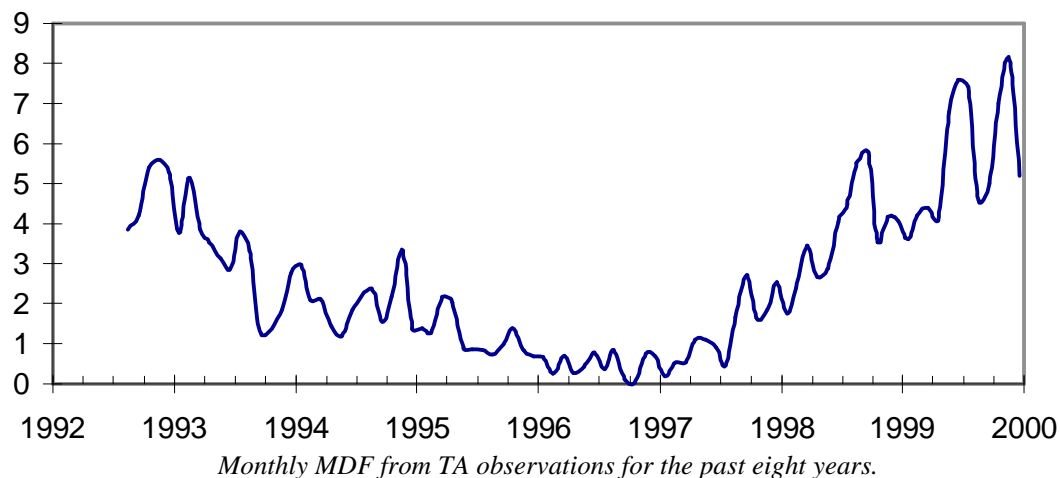


### White light MDF, 1999 December

Observer	MDF				R		Q	
	North	South	Total	Days	Total	Days	Total	Days
G. Johnstone	-	-	5.3	7	-	-	-	-
J. Shanklin	2.7	2.1	4.8	20	71.0	20	-	-
E. Strach	3.0	2.0	4.9	21	86.3	21	16.0	21
A. Ibrahim	-	-	6.1	29	88.5	29	-	-
D. Storey	2.0	1.5	3.5	2	-	-	-	-
G. North	2.6	1.6	4.2	5	67.4	5	-	-
K. Medway	2.7	1.5	4.2	13	-	-	-	-
P. Meadows	3.7	2.1	5.8	11	91.8	11	18.5	11
MEANS	2.9	1.9	5.2	108	83.1	86	16.9	32

MDF = Mean Daily Frequency of active areas, R = sunspot number, Q = mean quality estimate (JBAA 98,6,pp282-286)



### White light activity, 1999 December

Sunspot activity has remained at disappointingly modest levels throughout December and there is no sign of any surge towards the expected maximum.

Strach reports that December had a significant preponderance of spots in the N hemisphere and, as in the previous month, there have been a number of high latitude spot groups. On the 1st there was a short lived Cao group at N30/26 and more significantly a Dso group was seen between the 24th and 29th. This had a leader at N35/22 and a penumbral follower at N38/14.5. Strach was able to observe this group for five consecutive days and he found marked retrograding in the longitude of the follower due to differential rotation. The leader's longitude was 23° on the 24th and 26° on the 29th; the follower was 14° on the 25th and 6° on the 29th. The group had expanded in longitude whilst the follower developed into an important penumbral spot containing three umbrae.

The largest of the six groups seen by Meadows on the 1st was a Dac group at S12/61 with an estimated area of 230 millionths. There were several bipolar groups in December. Strach comments that three of them developed into Fko types spanning more than 15° in longitude. The first one rotated onto the disc on the 3rd and by the 4th the leader was at N9/315 and the

follower at N11/300. On the 4th Meadows classified this as an Fhc group at N10/309. On the following day intermediate penumbral spots had decayed to leave penumbral spots at each end of the group and a small number of spots between. The area of this group was an estimated 580 millionths. By the 7th Strach reported that there was a further longitudinal spread (N9/316 to N10/292) and subsequently the small spots disappeared, effectively converting the bipolar group into two spot groups. On the 9th Meadows comments that the group looked larger as it had just passed the CM even though its area had slightly reduced and the following spot appeared to be in the process of splitting into two. The follower spot crossed the W limb on the 15th.

On the 5th, Meadows reports that an Axx spot was seen at N8/289 close to the E limb. By the 9th, a collection of small penumbral spots and other spots had developed within an area of approximately 5° square. On the 10th, the penumbral spots had all disappeared to leave a collection of 14 spots with no organised distribution.

Strach noted a new bipolar group near the E limb on the 14th at S9/172. During the next few days it developed rapidly and on the 17th it had spread out longitudinally over 14° with the follower having become the larger penumbral spot at S11/170. It subdivided into three penumbral spots on the next day and crossed the CM on the 19th as a Fhi group. On that date Meadows

classified it as Fkc with position S13/176 and area 460 millionths. By the next day, the size of the main spot had decreased as had the number of other penumbral spots. By the 23rd he estimated that the group had become type Ekc and the largest spot was the following one. Strach last saw the group near the W limb on the 25th. He notes that it is likely that this group was a return of a similar group of the last rotation which was seen on the CM on November 22 at an average position of S15/174.

Meadows counted five groups on the 19th. In addition to the group already described above there was an Hho spot at S16/126 which had an area of 270 millionths. This group reduced in size slightly as it progressed across the disk and it was near the W limb on the 28th. The third major group on the 19th was classified by Meadows to be of type Fhc at position N20/115 and had an area of 910 millionths. It comprised a symmetrical leading spot followed by an irregular penumbral spot and a couple of smaller symmetrical penumbral spots. Strach estimated that the group had a longitudinal span of 24° and he noted that the leader was the largest spot with an area of 550 millionths. On the 19th the whole group comprised 33 spots and no less than six of them were penumbral. This group had first been seen by Strach as it came around the E limb on the 17th at N17.5/123. The leader crossed the CM on the 23rd when Meadows estimated that the extent of the group was some 18° in longitude and that it had a latitude spread of some 8° with the leading spot being closer to the equator. On the 25th and 26th Medway could easily see the group with the naked eye. When seen on the 26th this group had decayed slightly and by the 28th, just three penumbral spots were seen. The last traces of the group were seen on the 29th near the W limb.

On the 26th and 28th Meadows reported an Fkc spot close to the E limb at the high latitude location of N38/18. This group also had a larger following penumbral spot but the total area was only 370 millionths.

### Hα activity, 1999 December

Medway made Hα observations on six days in December. He notes that prominences were less impressive than in previous months. The most notable event being a small loop prominence seen on the SW limb on the 19th.

Strach reported an intricately structured prominence on the W limb at N22 to N32 on the 10th; it was of the hedgerow type and had interlacing features. On the 14th He saw a low arch with fine detail at N13 to N17 on the W limb.

An impressive prominence was seen on the 15th. Strach writes: “At 1120 UT I noted a very bright but otherwise insignificant low prominence at N3 on the W limb. My attention was diverted for the next 25 minutes and when I had the opportunity to inspect the area again at 1145 UT, I was surprised to see a huge C shaped eruption. I was able to observe it for 12 minutes during which it changed very little except for some brightening knots occurring in various positions of the C. At 1156 some fine hairy extensions occurred at the convex side and at the upper end of the C. I measured the size of the eruption on three occasions and it varied between 15 and 16 arcsec (some 155,000km) At 1210 UT it had disappeared without any trace of it. It was evidently associated with the spot group N10 which was about to clear the W limb”.

A dark filament was seen even under very poor conditions in the N hemisphere running NE from N18 to N25. Strach followed it from the 1st to the 4th when it crossed the CM. When it reached the W quadrant on the 7th it became flattened and very dense. Strach was unable to observe in Hα until the 10th and there was no sign of the filament on that date but the interlacing prominence described above is very likely the result of the filament having crossed the W limb.

Good observing conditions allowed Strach to see many other filaments on the 19th and 21st Dec. On the 28th filaments were almost totally confined to the W quadrants of the solar disc.

### Flares, 1999 December

Date	Time	Lat	CMD	Type	Obs.
5	1125	N5	E67	Sf	KJM
14	1115	N10	E73	Sf	EHS
14	1145	N10	E72	Sf	EHS
19	1135	N24	E55	1n	KJM
19	1120	N18	E60	Sf	EHS
23	1005	N22	E16	Sf	EHS
25	1325	N21	W35	Sn	KJM
27	1200	N22	W26	1n	EHS
28	1040	N26	W62	Sn	KJM
28	1215	N22	W48	1B	EHS

### Prominence MDF, 1999 December

Observer	All Latitudes				0-40°			40-90°		
	North	South	Total	Days	North	South	Total	North	South	Total
K. Medway	3.7	4.8	8.5	6	1.8	2.7	4.5	1.8	2.2	4
E. Strach	3.4	6.5	9.9	13	1.7	3.5	5.2	1.7	3.0	4.7