目　　录

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说　明

(1997)年

《太阳地球物理资料》(简称CSGD) 刊登来自北京天文台 (简称北台或BEIJ)、空间科学与应用研究中心、北京地磁台 (BGMO)、北京天文馆 (北馆或PLAT)、陕西天文台 (陕台或LINT)、紫金山天文台 (紫台或PURP)、乌鲁木齐天文工作站 (乌站或URUM) 和云南天文台 (云台或YUNN) 等八个单位的有关观测结果。内容包括下列十个部分：

1. 太阳黑子相对数与面积数值表、太阳黑子观测表 (由紫金山天文台编辑)
2. 太阳黑子相对数的平滑值预报
3. 怀柔站太阳活动区磁场与速度场观测表及全日面光球磁场图
4. 太阳耀斑表、耀斑巡视时间表
5. 太阳射电辐射流量表、太阳射电辐射显著事件表、太阳射电辐射巡视时间表和太阳射电辐射显著事件图
6. 宇宙线强度表 (由空间科学与应用研究中心编辑)
7. 突然电离层扰动 (D 层) 表
8. 地磁活动指数 K 和 A_K表
9. 磁暴表 (由北京地磁台编辑)
10. 不定期刊登有关论文

以上各种数据表均利用计算机 (VAX　11/780) 存取、作必要的计算和检验以及提供照相印刷的正本。

内容简介

1. 与黑子有关的表格中所列的由目视观测 (手描) 获得的数据，以云台的观测为主。云台缺测时，则用其它台站的结果，并在备注栏内注明台站简称。“太阳黑子观测”表中的群号为综合各台站观测记录后的统一编号。“Seeing”栏给出观测时大气视宁静度的优劣评分，“5”为最佳；“1”为最差。

2. 黑子相对数的平滑值预报给出近一年的预报值 R′和置信度为 90%的预报误差 E′。预报方法参见 1989 年 1 月 CSGD 的论文部分。

3. 黑子表和耀斑表中的日面位置指卡林顿 (Carrington) 坐标。中经距 (CMD) 指黑子或耀斑所在经圈与日面中心经圈之经度差，以度表示。 E、W 分别表示在日面中心经圈之东、西。日心距 (r/R) 指太阳圆面上的黑子或耀斑相对于日面中心之距离，以太阳半径为单位。视面积 (Sd) 指其在太阳圆面上的表观面积，以太阳圆面积的 10^{-6}为单位。校正面积 (Sp 或 Sq) 指经过投影改正后，黑子或耀斑在太阳球面上的真正面积，分别以太阳半球面积的 10^{-6} 或平方度为单位。黑子型别 (Type) 按 McIntosh 分型。详见附录 1。

4. 在怀柔站太阳磁场、速度场观测表中，发表怀柔太阳观测站的观测日期，世界时 0 时的日面中心的日面经度 (L_0)，所观测的太阳活动区的怀柔站编号 (Huairou Region)、卡林顿坐标 (L 表示经度，Lat 表示纬度，括号内的数字是参考值) 及所获得的以英文字母表示的观测资料类型。所用字母的含义是：

S（或T）—纵向（或横向）磁场观测波长上的单色像

D—多卜勒（Doppler）速度场观测波长上的单色像

L—纵向磁场观测资料

Q及U—横向磁场观测资料

V—多卜勒（Doppler）速度场观测资料

5—使用 Fe I λ5324.19 Å 谱线观测资料（光球）

4—使用 H_β λ4861.34 Å 谱线观测资料（色球）

在表的最后给出太阳极区（NPL 表示北极区，SPL 表示南极区）纵向磁场观测日期。

5. 在光球磁场图中，每天给出一幅全日面的活动区磁场等强度图。观测时间示于图的下方；右侧给出日面方向（W 表示西，N 表示北）及强度等级。其中 80.0 表示最外层的磁场强度，越往里强度越大；图中的实线表示磁场的 N 极，虚线表示 S 极；Lev 表示磁场等强度线等级，其单位用高斯表示。

6. 太阳耀斑表列出乌站用色球望远镜（通过 H_α 单色光）观测到的耀斑和亚耀斑（用 S 表示）。表中列出耀斑发生的时刻，极大（Max）表示耀斑亮度极大时刻，面积（Area）为极大时刻的面积。视面积（Sd）和校正面积（Sq）按下列关系换算：

$$Sq = Sd \times \frac{1}{\sqrt{1-(r/R)^2}} \times 0.020626$$

耀斑级别（Imp）以两个字符表示，第一个字符由耀斑在极大时刻的面积决定，第二个字符表示耀斑亮度，由各观测台站根据经验确定。其中 B 表示“亮”、N 表示“中等”、F 表示“弱”。当耀斑日心距 r/R ＜0.906 时，即耀斑日心角 θ（指耀斑和观测者在日心处的张角）＜65° 时，其级别按“校正面积 Sq”定级，如下表所示：

	耀斑级别		
校正面积 Sq	弱(F)	中等(N)	亮(B)
≤2.0	SF	SN	SB
2.1—5.1	1F	1N	1B
5.2—12.4	2F	2N	2B
12.5—24.7	3F	3N	3B
＞24.7	4F	4N	4B

当耀斑日心距 r/R ≥0.906 时，即耀斑日心角≥65° 时，其级别按“视面积 Sd”定级，如下表所示：

	耀斑级别			
日心距 r/R	S	1	2	3
.906—.939	Sd＜90	90—279	280—599	Sd≥600
.940—.984	75	75—239	240—499	500
.985—.999	50	50—179	180—349	350
1.000	45	45—169	170—299	300

耀斑表中资料栏内各字母分别表示：

C：全部或绝大部分过程有照相观测。

P：部分或很少部分过程有照相观测。

V：目视观测。

备注栏内的各字母的意义详见附录 2。

7. 耀斑巡视时间表仅包括照相巡视，目视和照相间隔小于 5 分钟时，看作连续巡视时段，用（From－To）表示。

8. 太阳射电辐射流量表，给出在各固定单频上每天太阳辐射总流量在当地太阳中天前后(一般北台、紫台在 0400 UT 左右)的以 10^{-22} · 瓦 · 米$^{-2}$ · 赫$^{-1}$(s. f. u.)为单位的实测值，并均已归算到日－地平均距离 1 AU 处的数值。

9. 在太阳射电显著事件表中列出的各栏参数有国内外约定的意义。在流量密度（Flux Density）栏内，峰值（Peak）表示峰时流量的增值；相对值（Rel）表示峰值流量与爆发前流量之比值，平均值（Mean）表示流量密度的增值对时间求积分，除以爆发持续时间，频率单位为兆赫（MHz），持续时间（Duration）单位为分，峰值及平均值单位为 s. f. u.。

太阳射电爆发的分型详见附录 3。分型中 1 S，2 S/F，3 S，4 S/F，5 S，20 GRF，21 GRF，22 GRF，23 GRF，41 F，45 C，46 C，47 GB 型爆发只适用于频率 f＞600 MHz 的射电爆发；而 6 S，7 C，27 RF，42 SER，43 NS，44 NS，48 C，49 GB 型爆发只适用于 f＜600 MHz 的爆发；28 PRE，29 PBI，30 PBI，31 ABS 不能单独存在。

请使用者注意，为了描述简单起见，在附录 3 "太阳射电爆发分型" 的定义中，取了流量密度的绝对值（原始值以 s. f. u. 为单位）与持续时间的绝对值（原始值以分为单位）进行大小比较（两个量进行比较时均为无量纲量）。

10. 对于峰值流量较大，而且记录质量较好的爆发，在太阳射电显著事件图中给出爆发曲线。图中右上方给出日期、频率、观测台站，横坐标为时间（UT），纵坐标为爆发流量（FLUX）。

11. 太阳射电巡视时间表为各单频射电望远镜实际巡视时间（不计入小于半小时的停顿）。连续巡视时段用（From－To）表示。

12. 宇宙线强度表中分别给出 18－NM－64 超中子堆（SUPER NEUTRON MONITOR）记录的中子数和 ACK－1 大游离室（ION CHAMBER）记录的 μ 介子（MESON）相对强度以及 μ 介子多方向望远镜（MESON MULTI－DIRECTIONAL TELESCOPE）垂直分量的记数。每小时的数据都已作了气压校正。中子堆数据表内给出的值是记数率与 1500 的差，求实际值时还需乘以定标因子 256 。μ 介子垂直分量（VERTICAL COMPONENT）表内给出的值是记数率与 3000 的差，求实际值时还需乘以定标因子 128 。μ 介子数据表列出的是相对强度与 1000 的差，单位是 0.1% 。表中的空格" "和"……"表示没有数据。表中最后两列分别给出日均值(Mean)和有记录的小时数（N）。还给出了月均值（Monthly Mean）。最后四行是仪器全天工作天数的月平均日变化（Monthly Mean Daily Variation）与相应的月均值的差，以及按世界时（U. T.）和北京时（B. T.）的调和分量（Harmonic Components）。从第一阶取到第四阶。表中给出各阶(Order) 的正弦(SIN)、余弦（COS）、幅值(Amplitude) 和极大值的时间(Max. －Hr)。

宇宙线强度图是以 Bartels 太阳旋转周 (Solar Rotation) 为周期，分别给出北京宇宙线台

的中子和μ介子以及广州宇宙线台μ介子多方向望远镜的垂直分量（V）、南北（S－N）和东西（E－W）各向异性每小时强度变化曲线。两条横线之间的距离表示强度变化为5%，垂直线表示世界时0^h。

北京宇宙线台中子堆的地理坐标：40.08° N、116.26° E；海拔高度：47米。游离室的地理坐标：40.0° N、116.2° E；海拔高度：43米。广州宇宙线台的地理坐标：23.1° N、113.29° E；海拔高度：21米。

13. 突然电离层扰动（D层）（简称SID）表给出了对罗兰C 100 kHz低频信号和奥米加10.2 kHz甚低频信号传播的观测所得到的相位突然异常（SPA）和场强突然异常（SFA）的数据。SPA和SFA属突然电离层扰动中的两种表现形式，是电离层D层状态突然改变所导致的。这里，低频相位突然异常（LF－SPA）数据由陕台和云台提供，而甚低频相位突然异常（VLF－SPA）数据和低频场强突然异常（LF－SFA）数据则仅由陕台提供。（VLF－SPA）一般为奥米加导航系统E台10.2 kHz信号的结果。若接受其它台站信号时，将在相应的数据后面用括号内的字母表明。

表中所列的LF－SPA数值（以微秒为单位）是对实测值进行了太阳天顶角改正后的结果，所用的分析和计算表达式如下：

$$\Delta\varphi_0 = \left(\frac{5.0}{1.6 + 3.4\,cosZ(h_m)}\right) \times \Delta\varphi$$

$$+ \begin{cases} 7.3 \times [cosZ(h_m - cosZ(h_s)], & \text{当 } h_m \leqslant 12 \text{ 和 } Z(h_m) \leqslant 80° \\ 0, & \text{当 } 12 < h_m < 13 \\ 7.3 \times [cosZ(h_m - 1) - cosZ(h_s - 1)], & \text{当 } h_m \geqslant 13 \text{ 和 } Z(h_m) \leqslant 80° \end{cases}$$

这里$\Delta\varphi'$（以微秒为单位）是LF－SPA的实测值，而$\Delta\varphi_0$（以微秒为单位）是将$\Delta\varphi'$统一归算到太阳天顶角为零的改正结果。式中，h_s和h_m是SPA传播路径中点的开始和极大时间，用地方平太阳时表示；Z是相应的太阳天顶角。VLF－SPA（以微秒为单位）是未经任何改正的实测值。LF－SFA给出以分贝为单位的幅度变化，其中，正、负号分别表示幅度的增加和减少。如果对同一LF－SFA事件给出一负一正两个值，则表示幅度先减少，后增加；符号"0"表示幅度无变化。另外，所列值后面的字母E表示真实值小于所列值；字母D表示真实值大于所列值；字母U则代表观测结果不太确定。SID的级别是根据$\Delta\varphi_0$值所确定的（最小1－级，最大3+级），其对应关系如下表所示：

$\Delta\varphi_0$	(0,-1]	(-1,-2]	(-2,-3]	(-3,-4]	(-4,-5]	(-5,-6]	(-6,-7]	(-7,-8]	(<-8)
级别	1－	1	1+	2－	2	2+	3－	3	3+

14. 地磁活动指数K和A_K表中日期后有Q者表示当月五天地磁最平静日；有D者表示当月五天地磁最扰动日。三小时时段的K指数由各时段地磁水平强度H的时均值消去正常日

变化后的变化磁场值决定。就中、低纬度地区而言，其对应关系如下：

H=	3	6	12	24	40	70	120	200	300	（单位为 nT）
K=0	1	2	3	4	5	6	7	8	9	

每日等效幅度 A_k 是当日 8 个三小时时段等效幅度 a_K 的平均。K 指数与 a_K 的对应关系如下：

K=0	1	2	3	4	5	6	7	8	9	
a_k=0	3	7	15	27	48	80	140	240	400	（单位为 1.2 nT）

15. 在磁暴表中，SC 表示急始磁暴；SC*表示先有一小负脉冲然后继以主要脉冲的急始磁暴，在量 SC*的急始幅度时，仅量取主要脉冲幅度；GC 表示缓始磁暴。活动程度栏中以 m、ms、s 分别表示中常、中烈和强烈磁暴。即分别对应于 K=5，6—7，8—9 的磁暴。

北京地磁台的地理坐标：40.0° N、 116.2° E； 地磁坐标：28.9° N、 186.1° E； 海拔高度：43 米。

以上所有图表中的时间一律采用世界时（UT）。由世界时转换到北京时间（东经 120° 标准时）应加上八小时。例如 2300—2400（UT）即相当于北京时间次日上午 0700—0800。

16. 为鼓励观测和资料处理人员尽快发表他们的较有价值的新的观测资料和反应他们的资料及技术工作的成果，为尽快交流研究工作的新进展，本刊不定期刊登短文，内容包括观测报告、附有说明的照片或图像、资料处理和技术报告以及研究方法和新成果的介绍等。短文限在 1000 字以内，包括图表不得超过 4 页，来稿须有英文译文，文责自负。

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附录 1　　McIntosh 黑子分型法

黑子的分型由三个字母组成。第一个字母为修正的 Zürich 分型，第二个字母为黑子群中最大的半影情况，第三个字母为黑子群中黑子的分布情况，现将各型分述如下：

(1)　修正的 Zürich 分型

A　无半影单极群。长度上与 B 型群无明确界线。

B　无半影双极群。大多数长度<10°，在老的群中长度可达 20°。黑子间距>3° 者视为双极群。

C　一个极性中有半影的双极群，当半影径向跨度>5° 时，则划为 D 型。C 型长度无限制。

D　二个极性中均有半影的双极群，其径向跨度<10°。

E　二个极性中均有半影的双极群，其径向跨度达 10°－15°。

F　二个极性中均有半影的双极群，其径向跨度>15°。

H　有半影的单极群，伴随黑子距主黑子半影<3°。其主要黑子几乎总是原双极群中的前导黑子。当半影径向跨度>5° 时，则划为密集 D 型。

(2)　最大黑子的半影情况

x　无半影（黑子周围灰区宽度>3″ 时才能视为半影）。

r　不成熟和不规则半影，其宽度～3″，比正常半影亮，半影结构为颗粒状而非纤维状。

s　对称和近于圆型半影，其结构为纤维状，黑子直径<2.5°，本影密集于半影中央。这种黑子变化缓慢。

a　不对称或复杂的半影，其结构为纤维状，黑子直径<2.5°，不对称半影的轮廓不规则或明显变长（不圆），半影中有二个以上本影。这种黑子往往逐日变化。

h　大的对称半影，其直径>2.5°。除了尺度较大外，其余特征与 s 相同。

k　大的不对称半影，其直径>2.5°。除了尺度较大外，其余特征与 a 相同。当半影的径向跨度>5° 时，几乎可肯定半影中有二种极性，从而黑子群成为 Dkc 或 Ekc 或 Fkc 型。

(3)　群中的黑子分布

x　单个黑子。

o　开放型分布。前导与后随黑子之间无黑子，黑子群可明确划分为二部分相反极性。开放型分布暗示极性变换线附近的磁场梯度较小。

i　中间型分布。前导与后随黑子之间有一些黑子，但它们均无半影。

c　密集型分布。前导与后随黑子之间有很多黑子，其中至少一个有半影。密集型分布的极端情况是整群黑子处在连续的半影区中。密集型分布暗示极性变换线附近的磁场梯度很大。

注：Zürich 分型中的 G 型与 J 型，在 McIntosh 分型法的第一个字母中已不再出现。

Zürich 分型中的 G 型现对应 McIntosh 分型法中的 Ero、Eso、Eao、Eho、Eko 和 Fro、Fso、Fao、Fho、Fko。

Zürich 分型中的 J 型现对应 McIntosh 分型法中的：Hrx、Hsx、Hax。

附录 2

耀斑表中备注栏内各字母的意义（IAU 系统）

A＝底部位于中经距小于 90°区域的爆发日珥

B＝可能是一个比较大的耀斑的尾声

C＝十分钟以前还看不见

D＝一个亮点

E＝两个或多个亮点

F＝有几个爆发中心

G＝在邻近区域无可见黑子

H＝有高速暗条半随的耀斑

I＝活动区的范围很大

J＝耀斑前或后谱斑亮度有明显变化

K＝有好几个亮度极大

L＝现存暗条有突然活动的迹象

M＝白光耀斑

N＝耀斑连续光谱出现各种偏振效应

O＝用 Ca II 的 H 或 K 线对耀斑进行了观测

P＝耀斑有 HeD_3发射

Q＝耀斑的巴尔麦连续区呈现发射

R＝耀斑的 H_α线显著不对称表明有高速物质抛射

S＝暗条消失以后在同一位置有增亮现象发生

T＝整天活动的区域

U＝平行型（//）或会聚型（Y）的双亮带耀斑

V＝有爆发相的事件：在大约一分钟内，耀斑面积扩展有伴随或不伴随亮度的急剧增大。

W＝强度极大后，耀斑面积突增。

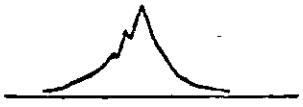
X＝耀斑的 H_α线很宽

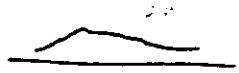
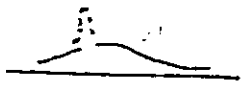
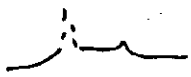
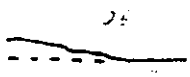
Y＝环形日珥系统

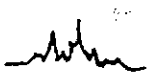
Z＝大的黑子本影为耀斑所掩盖

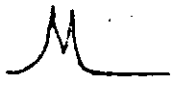
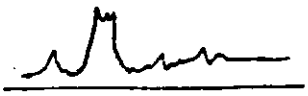
附录 3

太 阳 射 电 爆 发 分 型

类 型	定 义	图 形
1 S	持续时间和峰值流量均小于 10。	
2 S/F	1 S 型爆发上叠有起伏。	
3 S	峰值流量的绝对值大于持续时间的绝对值，且峰值流量大于 10。	
4 S/F	3 S 爆发上叠有起伏。	
5 S	不符合其它简单型爆发定义，且峰值流量的绝对值大于持续时间的绝对值的爆发。	
6 S	持续时间为 1 或 2 分钟的简单上升和下降的爆发。	
7 C	持续时间为几秒，峰值流量小于 10 的复杂型爆发。	
8 S	迅速上升又迅速下降、持续时间接近或小于 1 分钟，且峰值流量大于 10 的简单爆发。	

类 型		定 义	图 型
20	GRF	持续时间从 10 分钟到几小时，峰值流量的绝对值小于持续时间的绝对值，且流量值不超过 50。	
21	GRF	20 GRF 型爆发上叠加有清晰的可分别列出的爆发。	
22	GRF	20 GRF 型爆发上有可分别列出的起伏。	
23	GRF	20 GRF 型爆发上有可分别列出的起伏及爆发。	
24	R	持续时间为 5 到 30 分钟流量持续上升，且在上升后数小时内不伴随下降。“持续时间”附有字母 D。	
25	R	24 R 型爆发上叠加有爆发。	
26	FAL	持续时间为 5 到 30 分种（指图中斜的部分）中等强度的流量下降，下降前数小时无流量上升。	
27	RF	有或多或少规律的连续谱上升和下降，持续时间为分到小时。	

类 型	定 义	图 型
28 PRE	在主爆发之前，流量逐渐上升地（时间大于10分钟）增强，先兆的结束取在斜率突变的时刻。	
29 PBI	爆发后，流量在逐渐下降时（时间大于10分钟）仍有明显的增强，增强的开始取在斜率突变的时刻。	
30 PBI	在29 PBI型爆发上叠加有爆发。	
31 ABS	爆发后流量密度逐渐下降后又回到事件前水平。	
32 ABS	流量密度逐渐下降后又回到事件前水平。	
40 F	流量密度有一系列迅速又无规则的变化，各峰无法明显区别，各次峰强度小于主峰的15%。	
41 F	彼此接近的一群小爆发，每个小爆发均下降至爆发前水平，每两个爆发的时间间隔小于或等于5分钟。	

类 型		定 义	图 型
42	SER	具有显著时间间隔的一系列爆发，每个爆发均降至爆发前水平。	
43	NS	噪爆开始。“持续时间”带有字母 D。	
44	NS	进行中的噪爆。“开始时间”带有字母 E，“持续时间”带有字母 D。	
45	C	几个或多个简单爆发的合成。	
46	C	45 C 型爆发上有起伏。	
47	GB	峰值流量密度＞500 的爆发。	
48	C	有大振幅、复杂变化的复杂型爆发。	
49	GB	持续时间大于 10 分钟、流量有较大增强的爆发。	

CHINESE SOLAR GEOPHYSICAL DATA (CSGD)
EXPLANATION OF DATA REPORTS
(1997)

Introduction

The solar geophysical data contained in " Chinese Solar Geophysical Data " (CSGD) are collected by Beijing Astronomical Observatory (BEIJ), Center for Space Science and Applied Research, Beijing Geomagnetic Observatory (BGMO), Beijing Planetarium (PLAT), Purple Mountain Observatory (PURP), Shaanxi Observatory (LINT), Urumqi Astronomical Station (URUM) and Yunnan Observatory (YUNN). The data in CSGD consist of the following ten parts:

1. Daily Relative Sunspot Numbers and Sunspot Areas, Daily Sunspot Observations compiled by Purple Mountain Observatory
2. Predicted Smoothed Sunspot Numbers
3. Observations of Magnetic and Velocity Fields of Solar Active Regions at Huairou Station, Beijing Astronomical Observatory
4. Longitudinal Photospheric Magnetograms of Full Solar Disk
5. H-Alpha Solar Flares and Time Intervals of H-Alpha Flare Patrol Observations
6. Solar Radio Emission Fluxes Solar Radio Emission Outstanding Occurrences, Intervals of Solar Radio Emission Patrol Observations and Time Profiles of Solar Radio Bursts
7. Cosmic Ray Meson and Neutron Intensity compiled by Center for Space Science and Applied Research
8. Sudden Ionospheric Disturbances (D-Region) (SID)
9. Geomagnetic Indices K and A_k
10. Magnetic Storms compiled by Beijing Geomagnetic Observatory
11. Short Articles on Observations, Data Analyses and Researches of Solar- Terrestrial Phenomena

All the data mentioned above are stored in a VAX 11/780 computer.

Brief Explanation of the Main Contents

1. There are two kinds of sunspot tables in which the visual data mainly come from the observations of Yunnan Observatory. When there are gaps in these observations the table will be filled by observations made on the same day by other observatories whose names will appear in the column of remarks. Sunspot group numbers in the table of " Daily Sunspot Observations " are standardized after collecting all sunspot observations from different observatories. The estimated Seeing Conditions are given in the column " See " on a 5-level scale from best (5) to worst (1).

2. The predicted values of R' with the errors E' referred to the confidance 90 % are given for a year in the table of " Predicted Smoothed Sunspot Numbers ". The method of prediction may be found in the CSGD January 1989, P.27 .

3. In the table of " Daily Sunspot Observations " and the table of " H-Alpha Solar Flares ", Carrington coordinates are used for the position measurement of sunspot groups

or flares. Central Meridian Distance shows the distance in degrees between the central meridian and the meridian where a sunspot group or flare is located. E and W indicate that the sunspot group or flare lies to the east or to the west of the central meridian, respectively. Disk-Centric Distance measured in units of disk radius represents the distance from the centre of gravity of the sunspot group or flare on the disk to the centre of the disk. Apparent Areas, Sd, is the area projected on the disk in millionths of the disk and the Corrected Area, Sp, is the real area of the sunspot group or flare on the solar surface in millionths of the hemisphere after the projecting correction. McIntosh classification is used for the classification of sunspot groups.

4. In the table of observations of solar magnetic and velocity fields, the date, the Carrington longitude of the solar disk center at 00^h UT(L_0) , the number (numberd by Huairou Station) and Carrington coordinates (L: Longitude, Lat: Latitude; in bracket is the reference position from sunspot measurement) of an observed active region and data types obtained at Fe I λ5324.19Å and/or $H_\beta\lambda$ 4861.34 Å at Huairou Station of Beijng Astronomical Observatory are given. Meanings of letters in the table are as follows:

S (or T) — monochromatic image at the wavelength used for the longitudinal(or transverse) field observation.

D — monochromatic image at the wave length used in a Doppler field observation

L — data of longitudinal fields

Q and U — data of transverse fields

V — data of Doppler velocity fields

5 — observation at Fe I λ 5324.19Å

4 — observation at $H_\beta\lambda$ 4861.34 Å

In the last part of the table the observation date of the longitudinal fields of solar poles (NPL: +90.0, 0.0; SPL: -90.0, 0.0) is given.

5. A full disk photospheric line-of-sight magnetogram daily obtained at Huairo Solar Observing Station, Beijing is published in the Chinese Solar-Geophysical Data from now, the issue No.253, 1995, on. In the map, the line-of-sight magnetic fields of active regions are shown in contours. The observing time in UT, directions in the map (N-north, W-west) and strength levels are given, respectively, at the bottom and top of the plot. The outer contour represents 80.0 gauss and the inner the strouger is the magnetic intensity. Solid lines indicate N polarity while dashed lines S polarity. Levels indicate intensities of the magnetic fields in units of gausses.

6. The table of " H-Alpha Solar Flares " gives H-Alpha flare (including subflares (by S)) patrol observations at Urumqi Astronomical Station. For each flare, the start time, end time, the time at which the flare shows its maximum brightness (Maxtime) and the area measured at the time of maximum brightness are given. For flares within 65° from the centre of the disk, the formula relating the apparent area Sd with the corrected area Sq is as follows:

$$S_q = S_d \times \frac{1}{\sqrt{1-(r/R)^2}} \times 0.020626$$

Two figures are assigned for each flare to show the importance of the flare. The first figure is defined by the area of the flare at the maximum phase and the second one is only a qualitative scale which is decided by the observatory according to the flare is faint (F),

normal (N), or rather bright(B). For flares within 65° from the centre of the disk, i.e., the disk-centric distance is less than 0.906, the first figure assigned for the flare importance is defined by the corrected area Sq according to the following table where areas are given in millionths of the solar hemisphere.

Corrected Area Sq in Square Degrees	Relative Intensity Evaluation		
	Faint (F)	Normal(N)	Brilliant(B)
≤ 2.0	SF	SN	SB
2.1 — 5.1	1F	1N	1B
5.2 — 12.4	2F	2N	2B
12.5 - 24.7	3F	3N	3B
> 24.7	4F	4N	4B

For flares which are at a distance equal to or greater than 65° from the centre of the disk, i. e., the diskcentric distance is equal to or greater than 0.906, the first figure assigned for the flare importance can be estimated by the apparent area Sd according to the following table where the areas are given in millionths of the disk.

Heliocentric Distance r/R	Importance			
	S	1	2	3
.906 - .939	Sd < 90	90 - 279	280 - 599	Sd $\geq$ 600
.940 - .984	<75	75 - 239	240 - 499	500
.985 - .999	<50	50 - 179	180 - 349	350
1.000	<45	45 - 169	170 - 299	300

The letters C, P, and V in the column of " Observation Type " represent the nature and completeness of the observations, i.e.:

C — a complete or quasi-complete sequence of photographs is obtained

P — only one or a few photographs of the event is/are obtained due to an incomplete time coverage

V — the development of the flare is visually observed

The meaning of one or more letters of A to Z in the column of " Remarks " follow the International Astronomical Union notation, in which each letter of the alphabet stands for a particular noteworthy condition, as shown in Appendix 1.

7. In the table of " Intervals of H-Alpha Flare Patrol Observations ", the Intervals of H-Alpha Flare Patrol Observations are given by " from to ". Flare patrol observations are considered to be continuous if the intervals of no patrol observations are less than five minutes.

8. The table of " Daily Solar Radio Emission Flux " gives the flux values of the sun calibrated in units of $10^{-22} \cdot W \cdot M^{-2} \cdot Hz^{-1}$ (s.f.u.) at the time around meridian transit (BEIJ, PURP : around 0400 UT) every day at different fixed radio frequencies. All flux values are adjusted to the mean sun-earth distance: 1 AU.

9. Each column in the table of " Solar Radio Emission Outstanding Occurrences " has its centain implication following an international implied consent. In the column of Flux

Density, " Peak " represents the peak value of flux density of the event; " Rel " represents the relative value $\Delta S/S$, i.e., the ratio of the flux increment ΔS and the flux S before the burst; " Mean " represents the mean flux increment which is an integral of flux increment over the time of the duration and divided by the duration. Both the peak flux density and the mean flux density are measured in " s.f.u. ", frequency in MHz and duration in minutes.

For the classification of bursts see Appendix 2. Among the types, 1 S, 2 S/F, 3 S, 4 S/F, 5 S, 20 GRF, 21 GRF, 22 GRF, 23 GRF, 41 F, 45 C, 46 C and 47 GB are used in the frequency range greater than 600 MHz, 6 S, 7 C, 27 RF, 42 SER, 43 NS, 44 NS, 48 C and 49 GB are used in the frequency range less than 600 MHz, and on the other hand, 28 PRE, 29 PBI, 30 PBI and 31 ABS are not independent types at all.

Finally, one must notice that, for simplicity, we use the absolute value of flux density (with original value in s.f.u.) and duration (with original value in minute) for the definition of classification in Appendix 2.

10. In the " Profiles Figure of Solar Radio Emission Outstanding Occurrences ", the date, peak fluxes, and frequencies of events are given on the right corner. The time is denoted on the abscissa axis and the amplitude in units of s.f.u. is denoted on the ordinate axis.

11. The table of " Intervals of Solar Radio Emission Patrol Observations " gives the time coverage of the patrol observations made with those radio telescopes that contribute the data. The data gaps less than a half hour are not listed.

12. The intensities of cosmic ray neutrons, mesons and meson vertical component, which are respectively recorded with 18-NM-64 super neutron monitor (NM), ACK-1 large ion chamber (IC), and meson multi-directional telescope are monthly tabulated. The hourly mean values in the table are corrected for the atmospheric pressure. To get the real counting rates of cosmic ray neutrons one should add 1500 to the counting rates given in the table and multiplies by the scaling factor 256. The real counting rates of the vertical component of cosmic ray mesons are that the counting rates in the table plus 3000 and multiplies with the scaling factor 128. The relative intensity of cosmic ray mesons is that the tabulated values plus 1000 and in the units of 0.1 %. The space " " and the dash " — " mean no data.

The gragh expresses the variations of cosmic ray intensity monitored with the NM and IC at the Beijing Cosmic Ray Observatory and the variations of the vertical component (V) and north-south (N-S) and east-west (E-W) anisotropies of cosmic ray mesons measured at the Guangzhou Cosmic Ray Observatory hourly. The abscissa is the cycle of the Bartels Solar Rotation. The intensity difference between two horizontal lines corresponds to 5%. The vertical lines indicate 0^h UT.

The neutron monitor is located at 40.08° N, 116.26° E geographic coordinates and elevation is 47 meters and 40.0° N, 116.2° E and 43 m for the ion chamber. The Guangzhou Cosmic Ray Observatory is located at 23.1° N, 113.29° E and has an elevation of 21 m.

13. The table of " Sudden Ionosphereic Disturbances (D-Region) " (SID) presents the information of the Sudden Phase Anomalies (SPA) and the Sudden Field Anomalies (SFA) based on the observations of the propagations of the Loran-C signals at 100 kHz (LF) and the Omega signals at 10.2 kHz (VLF), which are the particular types of a

SID resulted from the sudden changes of the condition in the D-Region of the ionosphere. Here, the Sudden Phase Anomalies at low frequency (LF-SPA) are reported by both Shaanxi Observatory and Yunnan Observatory while the Sudden Phase Anomalies at very low frequency (VLF-SPA) and the Sudden Field Anomalies at low frequency (LF-SFA) are reported by Shaanxi Observatory only. (VLF-SPA) is generally obtained from the signal received at 10.2 kHz from Omega-E Station. Letter(s) will be given in the bracket if other signal is used.

The values of the (LF-SPA) in μs listed in this table are the corrected results of the measurements for the solar zenith correction with the following expression:

$$\Delta\phi_0 = \frac{5.0}{1.6 + 3.4\cos Z(h_m)} \times \Delta\phi' +$$

$$+ \begin{cases} 7.3 \times [cosZ(h_m) - cosZ(h_s)], & when\ h_m \le 12\ and\ Z(h_m) \le 80°; \\ 0, & when\ 12 < h_m < 13; \\ 7.3 \times [cosZ(h_m - 1) - cosZ(h_s - 1)], & when\ h_m \ge 13\ and\ Z(h_m) \le 80°; \end{cases}$$

where $\Delta\phi'$ in μs is a measured value of (LF-SPA) , $\Delta\phi_0$ in μs is a corrected result of $\Delta\phi'$, i.e. a value normalized to the solar zenith angle of zero. h_s and h_m in local mean solar time for the middle point of the propagation path are the SPA start time and the SPA maximum time, respectively, and Z is the corresponding solar zenith angle. The values of the (VLF-SPA) in μs are the measurement results without any correction and the listed values of (LF-SFA), in db, give the information of amplitude variation, where the signs " + " and " − " prefixed to the values indicate the increase and decrease of the amplitude, respectively. In case there are two values listed for the same (LF-SFA) event, one negative and the other positive, it means the amplitude decrease at first and increase afterwards. Sign " 0 " indicates that there is no amplitude change. Besides, " E " after the listed value means that the real value is less than the listed one; the letter " D " after the listed value indicates that the real value is greater than the listed one ; letter " U " denotes an uncertainty in measurement. The importance rating of a SID, based on a scale of 1−, the least, to 3+, the most important, can be derived from the values of $\Delta\phi_0$, by using the following table:

$\Delta\phi_0$	(0,-1]	(-1,-2]	(-2,-3]	(-3,-4]	(-4,-5]	(-5,-6]	(-6.-7]	(-7,-8]	(< -8)
IMP.	1−	1	1+	2−	2	2+	3−	3	3+

14. The data included in the table of " The Geomagnetic Activity Indices K and A_k " are: three-hourly K index, five quietest days of the month (Q) and five most disturbed days of the month (D). Three-hourly K index is determined by the H components measured in nT in each corresponding three-hourly period and subtracted by the diurnal normal changes of geomagnetic field. For mid and low latitude areas, the corresponding relation of H and K is as follows :

H = 3 6 12 24 40 70 120 200 300 (in nT)

K = 0 1 2 3 4 5 6 7 8 9

Daily effective A_k is the average of eight values of three-hourly index a_k , the corresponding relation of K with a_k is as follows :

K =	0	1	2	3	4	5	6	7	8	9	
ak=	0	3	7	15	27	48	80	140	240	400	(in 1.2 nT)

15. Three kinds of geomagnetic storm are listed in the table of " The Magnetic Storms " : sudden commencement (SC), a small negative initial impulse followed by a main impulse (SC*) and gradual commencement (GC). Three degrees are used for classifying a geomagnetic storm, i.e.: moderate (m), moderate severe (ms) and severe (s) corresponding to K=5, K=6–7, and K=8–9, respectively.

Beijing Geomagnetic Observatory is located at 40.0°N, 116.2°E in geographic coordinates or 28.9°N, 186.1°E in geomagnetic coordinates, and 43 meters above sea level.

The time used in all these data reports is Universal Time (UT). To transform UT to Beijing Standard Time (120°E) one can simply add 8 hours to Universal Time. For instance, a flare observed at 2230–2400 UT is observed at 0630–0800 in Beijing Time next day.

16. To encourage a fast exchange of information about solar observations and studies, short articles including reports of observations, data treatments, observational technology and research work and photographs with a explanation are accepted and published in this data journal nonperiodically. Articles are limited within 1000 words and 4 pages including tables and figures.

Numbering of CSGD :

From the first issue of 1991 on, Issues of the Chinese Solar-Geophysical Data (CSGD) have been numbered. The first issue of 1991 of CSGD has a number of 213.

Address your inquires to our Editorial Group, please: CSGD Editorial Group, Beijing Astronomical Observatory, Beijing 100080 China . Telephone Number : 62567194, Telegram code : 9053, Fax : 62561085.

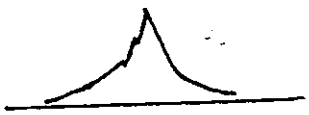
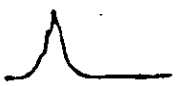
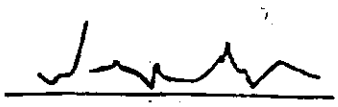
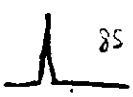
Appendix 1

The International Astronomical Union Notation for H-Alpha Solar Flares

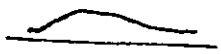
A = Eruptive prominence whose base is less than 90° from the central meridian.
B = Probably the end of a more important flare.
C = Invisible 10 minutes before.
D = Brilliant Point.
E = Two or more brilliant points.
F = Several eruptive centers.
G = No visible spots in the neighborhood.
H = Flare accompanied by a high speed dark filament.
I = Active region very extended.
J = Distinct variations of plage intensity before or after the flare.
K = Several intensity maxima.
L = Existing filaments show signs of sudden activity.
M = White-light flare.
N = Continuous spectrum shows effects of polarization.
O = Observations have been made in the calcium II lines H or K.
P = Flare shows helium D_3 in emission.
Q = Flare shows the Balmer continuum in emission.
R = Marked asymmetry in H-alpha line suggests ejection of high velocity material.
S = Brightness follows disappearance of filament (same position).
T = Region active all day.
U = Two bright branches, parallel (||) or converging (Y).
V = Occurrence of an explosive phase: important and abrupt expansion in about a minute with or without important intensity increase.
W = Great increase in area after time of maximum intensity.
X = Unusually wide H-alpha line.
Y = System of loop-type prominences.
Z = Major sunspot umbra covered by flare.

Appendix 2

Classificatiom of Solar Radio Bursts

Type	Definition	Figure
1 S	Peak flux density (sfu) and duration (min) both less than 10.0.	
2 S/F	1 S with fluctuations.	
3 S	Peak flux density (sfu) greater than both the duration (min) and 10.0.	
4 S/F	3 S with fluctuations.	
5 S	Different from the simple events defined above, also peak flux density (sfu) greater than duration (min) of the burst.	
6 S	Simple rise and fall of minor burst with duration 1 or 2 min.	
7 C	Complex events with duration of several seconds and flux density (sfu) less than 10.0.	
8 S	An event which shows a rapid rise to a single peak, followed by a rapid fall to the pre-event level with a duration about one minute or less and flux density (sfu) greater than 10.0.	

20 GRF Bursts have duration in the range from 10 minutes to several hours and flux density (sfu) less than both the duration (min) and 50.0.

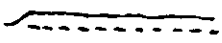


21 GRF 20 GRF type burst with superimposed distinct bursts to be able to list separately.

22 GRF 20 GRF type burst with fluctuations to be able to list separately.

23 GRF 20 GRF type burst with fluctuation and superimposed bursts both to be able to list separately.

24 R A moderate rise of flux from 5 to 30 minutes duration with no accompanying decline during the following hours and with symbol D.



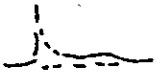
25 R 24 R type bursts with superimposed bursts.

26 FA1 A moderate decline of flux from 5 to 30 minutes duration with no rise of flux during the foregoing hours and with symbol D.

27 RF The rise and fall of continuous spectrum *more or less regularly* with duration in the range from minutes to hours.

28 PRE A precursive enhancement of the flux density level with duration greater than 10 min preceding the main burst if it is a gradual rise; the end of the precursor is taken at the time when the slope suddenly changes.

29 PBI A post-burst enhancement of flux density level with duration greater than 10 min if it decreases gradually; the start of the enhancement is taken at the time when the slope suddenly changes.

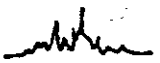


30 PBI 29 PBI type events with superimposed bursts.

31 ABS After the burst a gradual decrease of the flux density with a subsequent return to the pre-event level.

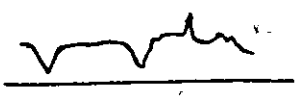
32 ABS A gradual decrease of the flux density with a subsequent return to the pre-event level.

40 F A series of rapid irregular changes in the flux density level, with no distinct peak grouping into individual events; the intensity of each component is less than 15 of the main peak.



41 F A number of single bursts occur in succession and the flux level returns to the pre-event level; the interval between each two bursts is equal to or less than 5 min.

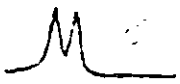
42 SER A series of bursts occur with considerable time intervals between bursts; the flux level of each burst returns to the pre-burst.



43 NS Onset of noise storm. Duration of events with symbol D.

44 NS Noise storm in progress. Starting time with symbol E, and duration with symbol D.

45 C Combination of a few or many simple bursts.



46 C 45 C burst with fluctuations.

47 GB Peak flux density of 500 sfu or more

48 C A complex event with complex and large variation of amplitude.

49 GB Major increase of flux density, duration greater than 10 min.

《太阳地球物理资料》各表表头内容说明

注：各表按目录顺序依次说明，若各表内容有相同的则只作一次说明。

太阳黑子相对数与面积数表

Day：	每天观测日期
Gro：	每天在日面上的黑子群总数
Relative—Numbers：	每天的黑子相对数值
N.H.：	每天北半球的黑子相对数
S.H.：	每天南半球的黑子相对数
Sum：	南、北半球黑子相对数的总和
Sunspot Areas：	太阳黑子面积数值
Drawing：	手描的
Photographic：	照相的
N.H.：	每天北半球黑子面积
S.H.：	每天南半球黑子面积
Sum：	南、北半球黑子面积的总和

太阳黑子观测表

Group：	在日面上的黑子群号
CMP	黑子群过日面中心经圈日期，用月—日表示。
Mo—Day：	
Lat：	黑子群在日面上的纬度
L：	黑子群在日面上的卡林顿经度
CMD：	黑子群在日面上的中经距
Type：	黑子群的 McIntosh 类型
r/R：	黑子群在日面上的日心距(以太阳半径为 1)
Corre. Area Sd whole Max：	黑子群在日面上所占的面积(Sd 为视面积，Whole 为校正后的全群面积，Max 为校正后的最大黑子的面积。)
See：	观测时大气视宁静度
Remarks：	备注(空白表示云南天文台的观测资料，注明 PLAT 的为北京天文馆资料，PURP 为南京紫金山天文台资料。)

太阳黑子相对数的平滑值预报表

Time：	预报的时间
R'：	月平滑黑子相对数的预报值
E'：	预报误差

Hα 太阳耀斑表

Sta：	台站
Start (UT)：	耀斑开始时间(UT 为世界时，其中"E"为小于此时间。)
Max (UT)：	耀斑的极大时间("U"为接近此时间，不确定。)
End (UT)：	耀斑的结束时间("D"为大于此时间。)
Cen Dist：	日心距，即 r/R。
Area Measurement Appar Corr (sd) (sq)：	耀斑极大时的面积(Sd 为视面积，单位为太阳圆面积的 10^{-6}；Sq 为校正面积，以平方度为单位。)
Imp：	耀斑的级别
Obs Type：	耀斑资料类型
A.R.：	耀斑所在活动区的黑子群号
Rem：	备注(记录耀斑发生时的形态)

Hα 耀斑巡视时间表

From：	耀斑照相巡视开始时间
To：	耀斑照相巡视的结束时间

太阳活动区磁场和速度场的观测表

L_0：	每天的日面中心经度
Huairou	北京天文台怀柔观测站的
Region：	活动区编号
Data：	取得的磁场资料类型

太阳射电辐射流量表

BEIJ 2840：	每天的太阳在 2840 MHz 的流量密度(北台 0400 UT 量，以 10^{-22} · 瓦 · 米$^{-2}$ · 赫$^{-1}$(s.f.u.)为单位。)
PURP 2700：	每天的太阳在 2700 MHz 流量密度(紫台 0400 UT

URUM	每天的太阳在 9375 MHz 的
9375：	流量密度(乌站 0500 UT 测)
YUNN	每天的太阳在 2840 MHz 的
2840：	流量密度(云台 0500 UT 测)

太阳射电辐射显著事件表

Freq：	观测频率
Type：	射电爆发的型别
Duration：	射电爆发的持续时间(以分钟为单位)
Flux Density：	射电爆发的流量密度
Peak：	射电爆发流量的峰值增值
Rel：	射电爆发峰值流量与爆发前流量之比值
Mean：	流量密度的增值对时间求积分再除以爆发持续时间

太阳射电辐射巡视时间表

BEIJ	北京天文台 2840 MHz 频率
From To	巡视时间
2840：	
PURP	紫金山天文台 2700 MHz 频率
From To	巡视时间
2700：	
URUM	新疆乌鲁木齐天文站频率为
From To	9375 MHz 巡视时间
9375：	
YUNN	云南天文台 2840 MHz 频率
From To	巡视时间
2840：	

宇宙线强度表

这部分共有三个表和宇宙线强度图。其中第 1 个表是“中子堆数据表”,它给出的值是记数率与 1500 的差;第 2 个表是“μ 介子垂直分量表”它给出的值是记数率与 3000 的差;第 3 个表是“μ 介子数据表”,它列出的是相对强度与 3000 的差。这三个表的第一行数据是 1—24 小时。

详细说明请见每年第一期。

For detailed explanation of data reports can be found in the first issue of the year.

Mean：	日均值
N：	记录的小时数
Day：	日期

最后四行是仪器全天工作天数的月平均日变化与相应的月均值的差。宇宙线强度图说明请参见每年第 1 期说明。

突然电离层扰动(D 层)表

Imp：	级别(最小为 1—级,最大为 3+级。)
SPA：	相位突然异常
LF—SPA：	低频相位突然异常
VLF—SPA：	甚低频相位突然异常
LF—SFA：	低频场强突然异常

地磁活动指数 K 和 A_K 表

第一行：	以三小时为时段的 K 指数
Sum：	总和
A_K：	A_K 指数

磁暴表

Time of Magnetic：	磁暴时间
Begining：	开始时间
Ending：	终止时间
h：	小时
m：	分钟
Type：	类型
Sudden Com. Amplitude	急始变幅
D′ HnT ZnT：	
Deg. of Acti.：	活动程度
Maximum Acti. on K-scale：	最大活动程度
3 hour Int.：	三小时时段
K Index：	K 指数
Maximum Range	最大幅度
D′ HnT ZnT：	

DAILY RELATIVE SUNSPOT NUMBERS AND SUNSPOT AREAS

JANUARY 1997

		Relative-Numbers			Sunspot Areas					
					Drawing			Photographic		
Day	Gro.	N.H.	S.H.	Sum	N.H.	S.H.	Sum	N.H.	S.H.	Sum
1	0	0	0	0	0	0	0			
2	0	0	0	0	0	0	0			
3	0	0	0	0	0	0	0			
4	0	0	0	0	0	0	0			
5	1	0	11	11	0	6	6			
6	1	0	11	11	0	7	7			
7	1	0	8	8	0	5	5			
8	0	0	0	0	0	0	0			
9	0	0	0	0	0	0	0			
10	1	9	0	9	9	0	9			
11	1	8	0	8	13	0	13			
12	1	9	0	9	6	0	6			
13	1	0	7	7	0	4	4			
14	0	0	0	0	0	0	0			
15	2	0	16	25	0	13	13			
16	2	0	21	21	0	18	18			
17	2	0	15	15	0	7	7			
18	2	9	8	17	5	4	9			
19	1	0	8	8	0	4	4			
20	0	0	0	0	0	0	0			
21	1	0	7	7	0	2	2			
22	0	0	0	0	0	0	0			
23	0	0	0	0	0	0	0			
24	1	0	7	7	0	5	5			
25	1	0	7	7	0	4	4			
26	1	0	7	7	0	3	3			
27	1	0	7	7	0	3	3			
28	0	0	0	0	0	0	0			
29	1	0	8	8	0	4	4			
30	2	13	8	21	12	4	16			
31	1	10	0	10	7	0	7			
Mean		1.9	5.0	7.2	1.7	3.0	4.7			

DAILY SUNSPOT OBSERVATIONS

JANUARY 1997

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Whole	Area Max.	Area See.	Remarks
1.09	0											
2.05	0											
3.06	0											
4.08	0											
5.09	1	1- 4.6	-3	14	7W	BXI	0.13	13	6	2	0	
6.04	1				19W	BXI	0.32	13	7	2	0	
7.06	1				33W	BXO	0.54	8	5	2	0	
8.06	0											
9.06	0											
10.10	2	1- 6.3	39	351	50W	BXO	0.89	8	9	5	0	
11.16	2				63W	BXO	0.94	8	13	6	0	
12.15	3	1-10.7	37	293	19W	BXO	0.71	8	6	3	0	
13.06	4	1- 8.9	-2	317	55W	AXX	0.82	4	4	4	0	
14.06	0											
15.06	5	1-17.5	-6	203	35E	BXO	0.56	8	5	3	0	
	6	1-20.8	-23	160	77E	AXX	0.97	4	8	8	0	
16.07	5				20E	BXO	0.36	17	9	2	0	
	6				62E	BXO	0.87	8	9	4	0	
17.06	5				6E	BXO	0.10	8	4	2	0	
	6				49E	AXX	0.76	4	3	3	0	
18.06	5				7W	AXX	0.13	8	4	2	0	
	7	1-19.7	28	174	21E	BXO	0.62	8	5	3	0	PURP

DAILY SUNSPOT OBSERVATIONS

JANUARY 1997

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Whole	Area Max.	See.	Remarks
19.08	5				20W	AXX	0.34	8	4	2	0	
20.06	0											
21.06	8	1-21.5	-9	151	6E	AXX	0.13	4	2	2	0	
22.12	0											PURP
23.08	0											
24.16	9	1-29.4	-12	47	67E	AXX	0.92	4	5	5	0	
25.10	9				54E	AXX	0.80	4	4	4	0	
26.19	9				40E	AXX	0.64	4	3	3	0	
27.19	10	1-29.8	-16	42	34E	AXX	0.56	4	3	3	0	
28.15	0											
29.06	9				4E	AXX	0.13	8	4	2	0	
30.06	9				10W	BXO	0.20	8	4	2	0	
	11	2- 1.4	4	7	32E	BXI	0.54	21	12	5	0	
31.04	11				19E	BXO	0.36	13	7	2	0	

OBSERVATION OF MAGNETIC AND VELOCITY FIELDS OF SOLAR ACTIVE REGIONS

JANUARY 1997 HUAIROU ST. BEIJING OBS.

Day	L0	Huairou Region	Lat	L	Data
5	8.1	0			
6	354.9	1	-4	14	D4 V4 S5 L5 D5 V5
7	341.7	1			S5 L5
8	328.5	1			S5 L5
10	302.2	1			
		2	35	(351)	S5 L5
11	289.0	2			S5 L5
13	262.7	0			
14	249.5	0			
15	236.4	3	-9	200	S5 L5
16	223.2	3			S5 L5
		4	26	172	S5 L5
17	210.0	3			S5 L5
		4			S5 L5
18	196.9	3			S5 L5
		4			S5 L5
19	183.7	3			L5
		4			L5
21	157.4	3			L5
		4			L5
23	131.0	0			
24	117.9	5	-14	43	S5 L5
25	104.7	5			S5 L5

OBSERVATION OF MAGNETIC AND VELOCITY FIELDS OF SOLAR ACTIVE REGIONS

JANUARY 1997 HUAIROU ST. BEIJING OBS.

Day	L0	Huairou Region	Lat	L	Data
26	91.5	5			S5 L5
27	78.4	5			S5 L5
28	65.2	5			S5 L5
29	52.0	5			S5 L5
30	38.9	5			S5 L5
		6	(4)	4	S5 L5
31	25.7	5			L5
		6			S4 L4 D4 V4 S5 L5 D5 V5 T5 Q5 U5

NPL SPL:

5 6 7 8 11 13 18 19 21 23 24 25 26

PREDICTED SMOOTHED SUNSPOT NUMBERS

AUGUST 1996 — JULY 1997

Date	Aug 96	Sep 96	Oct 96	Nov 96	Dec 96	Jan 97
R′	8.4	9.0	9.5	9.9	10.4	10.9
E′	0.4	0.7	0.9	1.5	2.2	2.4
Date	Feb 97	Mar 97	Apr 97	May 97	Jun 97	Jul 97
R′	11.4	12.2	13.5	14.8	15.6	16.6
E′	2.5	3.2	4.9	5.6	6.6	6.5

R′: The predicted value of monthly smoothed sunspot numbers.
E′: The error of the predicted value.

SOLAR RADIO EMISSION FLUX

JANUARY 1997

Day	BEIJ 2840	PURP 2700	URUM 9375	YUNN 2840
1	71	75		
2	70	70		
3	71	73		
4	71	70		
5		80		
6	73	75		
7	71	77		
8	71	75		
9	72	76		
10	72	79		
11	70	77		
12	71	76		
13	71	77		
14	72	76		
15	71	76		
16	71	76		
17	70	75		
18	73	78		
19	72	77		
20	72	79		
21	70	77		
22	69	76		
23	69			
24	69	77		
25	68	76		
26	69	76		
27	69	76		
28	68	75		
29	69	75		
30	70	75		
31	69	75		
Mean	70.5	75.8		

INTERVALS OF SOLAR RADIO EMISSION PATROL OBSERVATION

JANUARY 1997

Day	BEIJ From To 2840	PURP From To 2700	URUM From To 9375	YUNN From To 2840
1	0015 0810	0041 0810		
2	0007 0805	0031 0620 0727 0808		
3	0000 0810	0053 0314		
4	0017 0807			
5		0027 0815		
6	0100 0750	0039 0800		
7	0016 0745	0044 0800		
8	0055 0745	0045 0800		
9	0045 0745	0042 0800		
10	0015 0720	0042 0800		
11	0040 0640	0040 0800		
12	0155 0650	0043 0800		
13	0039 0828	0042 0745		
14	0042 0747	0040 0810		
15	0041 0746	0053 0810		
16	0028 0744	0040 0810		
17	0039 0815	0040 0810		
18	0005 0821	0031 0806		
19	0000 0846 2355 2400	0112 0806		
20	0000 0825	0031 0240 0251 0807		

INTERVALS OF SOLAR RADIO EMISSION PATROL OBSERVATION

JANUARY 1997

Day	BEIJ From To 2840	PURP From To 2700	URUM From To 9375	YUNN From To 2840
21	0011 0835	0040 0812		
22	0028 0823	0050 0805		
23	0023 0807			
24	0016 0750	0115 0808		
25	0044 0836	0052 0800		
26	0025 0827	0031 0803		
27	0004 0752	0250 0805		
28	0051 0802 2358 2400	0054 0815		
29	0000 0744	0051 0805		
30	0030 0814	0115 0805		
31	0020 0754	0045 0805		

COSMIC RAY NEUTRON INTENSITY
Real Counts: 256 Times (Tabulated Counts Plus 1500)

JAN 1997 — **U.T. Hours at End of Interval**

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	N
1	533	540	533	531	528	528	534	524	532	530	537	528	531	525	523	526	532	518	534	542	532	537	540	535	531.4	24
2	547	536	526	523	521	524	519	518	525	527	525	532	524	526	537	526	533	531	537	534	536	535	544	540	530.3	24
3	544	542	539	535	535	534	536	533	532	542	532	541	539	535	540	538	540	534	532	535	537	544	543	542	537.7	24
4	551	543	531	536	533	529	534	529	530	531	541	538	540	538	541	537	536	535	542	555	548	536	538	542	538.1	24
5	543	541	542	533	536	522	523	529	531	527	538	532	550	532	533	538	530	549	533	548	554	554	547	539	537.7	24
6	545	543	537	538	536	533	526	539	536	536	544	536	535	536	546	542	541	538	547	547	552	551	548	553	541.0	24
7	545	544	540	542	547	543	539	542	538	543	550	549	544	551	544	542	548	542	542	554	547	539	552	552	545.0	24
8	546	550	547	535	544	534	540	535	537	535	524	539	534	529	522	530	530	534	528	541	542	551	550	560	538.2	24
9	551	552	537	542	541	539	534	537	543	528	541	527	538	530	525	537	534	535	544	547	555	552	561	557	541.1	24
10	562	552	540	545	540	544	535																		545.4	7
11	539	546	543	545	540	535	539	539	534	529	540	539	544	530	534	546	527	548	544	551	553	552	546	553	541.5	24
12	555	555	554	541	544	527	529	533	536	528	535	539	538	528	538	540	543	534	541	539	539	551	539	544	539.6	24
13	550	550	540	547	541	548	534	542	542	533	548	540	551	549	538	547	544	547	547	551	545	562	561	552	546.2	24
14	563	563	549	546	548	551	530																		548.6	7
15					554	544	539	535	533	533	538	541	543	539	535	543	533	543	543	551	543	555	545	560	542.5	20
16	559	544	548	540	543	541	536	536	537	533	532	537	529	538	544	531	528	538	544	540	538	559	567	545	541.1	24
17	540	534	542	544	558	544	532	533	528	539	541	547	540	537	537	543	543	543	541	547	553	559	551	567	543.5	24
18	566	564	558	548	549	546	541	541	547	544	546	541	538	536	544	532	551	545	557	552	549	556	556	560	548.6	24
19	559	549	558	555	550	543	539	536	543	546	551	556	552	548	545	553	551	553	562	556	553	558	558	561	551.5	24
20	556	555	554	550	546	539	538	529	539	539	540	540	534	546	533	531	543	548	548	552	554	565	559	562	545.8	24
21	558	549	550	548	544	550	532	542	539	541	549	539	536	538	542	534	538	546	543	557	548	541	549	549	544.3	24
22						540	540	536	539	538	544	555	543	543	548	549	548	542	539	549	558	546	552	550	545.2	19
23	547	542	544	543	529	539	535	539	535	542	538	539	544	545	534	555	535	551	542	546	550	553	558	558	543.5	24
24	542	535	530	530	532	532	531	533	551	542	547	546	552	538	547	551	549	543	541	547	548	550	543	553	542.2	24
25	549	535	536	553	545	547	539	535	538	536	533	538	542	542	542	538	547	549	534	546	536	538	548	542	541.2	24
26	546	546	540	534	538	538	539	538	531	516	531	523	514	528	537	525	525	525	536	531	544	545	544	551	534.4	24
27	555	539	526	530	535	541	527	531	526	533	529	524	526	531	526	520	532	530	548	539	544	542	548	548	534.6	24
28	542	545	539	544	546	535	525	526																	537.8	8
29	535	533	532	523	526	524	523	520	526	523	521	519	527	528	529	529	526	530	533	535	533	534	536	536	528.4	24
30	540	529	524	526	526	513	521	519	519	528	522	532	531	535	534	530	539	532	525	535	529	540	538	539	529.4	24
31	536	531	531	526	525	526	535	530	530	527	531	533	539	535	540	537	533	541	536	540	541	545	542	543	534.7	24

MONTHLY MEAN=540.009

MONTHLY MEAN DAILY VARIATION FOR 26 COMPLETE DAYS DEVIATIONS FROM AVERAGE:539.643

(1-12)	7.93	3.70	0.43	-1.26	-1.49	-4.30	-6.76	-6.49	-4.83	-5.87	-2.49	-2.95
(13-24)	-2.26	-3.72	-2.91	-2.80	-2.03	-0.45	1.17	5.24	4.97	8.40	9.05	9.70

HARMONIC COMPONENTS (ORDER, COS, SIN, AMPLITUDE, MAX.-HR)

U.T.=(1 5.52 -3.09 6.33 22.05) (2 2.58 -1.27 2.88 11.13) (3 -0.15 -0.24 0.28 5.30) (4 0.43 -0.47 0.64 5.21)

L.T.=(1 -0.08 6.33 6.33 6.05) (2 -2.39 -1.61 2.88 7.13) (3 -0.15 -0.24 0.28 5.30) (4 0.19 0.61 0.64 1.21)

COSMIC RAY MESON INTENSITY
VERTICAL COMPONENT
Real Counts: 128 Times (Tabulated Counts Plus 3000)

JAN 1997

U.T. Hours at End of Interval

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	N
1	163	171	176	174	163	167	170	170	175	165	168	153	162	157	159	159	156	158	165	157	154	163	166	167	164.1	24
2	163	169	176	153	166	164	163	163	171	166	168	161	169	158	154	166	166	167	178	181	166	159	163	175	166.0	24
3	155	178	173	174	169	170	165	166	168	173	180	172	186	168	175	178	181	175	170	165	183	183	184	172	173.5	24
4	184	170	179	188	192	170	169	183	187	176	180	179	180	173	171	160	183	164	171	155	170	164	175	176	175.0	24
5	178	188	177	186	187	194	174	184	189	180	179	175	185	187	175	180	179	194	192	190	181	184	195	186	184.1	24
6	182	188	198	187	192	203	196	182	190	179	179	180	195	180	181	189	183	203	183	200	193	185	184	194	188.6	24
7	182	187	192	195	196	202	191	200	188	195	189	187	185	194	181	198	194	202	183	191	187	190	186	198	191.4	24
8	192	193	211	189	205	187	193	186	192	192	189	191	185	195	177	188	193	178	187	198	197	201	198	197	192.3	24
9	213	205	202	208	192	205	215	201	201	199	175	190	182	177	186	193	192	210	186	203	193	215	202	205	197.9	24
10	218	206	208	200	218	208	202	199	208	204	192	206	197	181	193	217	201	193	207	211	215	219	221	211	205.6	24
11	216	216	218	208	222	205	200	193	184	198	197	202	187	199	181	197	181	183	193	196	199	207	204	200	199.4	24
12	186	203	190	213	197	200	195	194	192	175	193	191	180	189	178	192	187	189	191	192	191	194	199	204	192.3	24
13	211	186	197	188	189	180	191	185	178	185	187	176	184	178	178	178	175	183	189	204	185	197	204	180	187.0	24
14	190	190	190	188	199	173	184	180	179	183	185	179	183	190	183	183	194	185	195	186	192	190	182	179	185.9	24
15	185	201	190	184	197	188	179	184	181	166	168	172	173	155	162	181	174	157	179	181	172	169	182	192	178.0	24
16	172	174	187	182	184	186	191	189	163	149	171	150	168	170	150	150	162	172	169	166	168	160	174	160	169.5	24
17	178	184	178	184	179	188	183	178	184	172	167	174	167	171	164	169	169	169	174	178	173	180	172	172	175.3	24
18	168	175	191	198	194	197	181	194	189	185	187	183	177	181	178	178	177	180	185	199	186	196	181	204	186.0	24
19	199	197	194	180	202	202	202	179	190	190	192	185	181	188	188	196	192	192	195	199	195	197	188	198	192.5	24
20	203	210	215	201	185	191	182	179	192	171	172	173	174	189	176	186	189	183	184	177	174	197	188	192	186.8	24
21	182	185	186	188	180	176	162	182	166	172	171	170	169	157	159	167	167	184	176	173	166	161	172	170	172.5	24
22	162	175	162	147	168	184	173	168	185	174	168	175	169	163	177	182	168	184	170	175	176	159	173	169	171.1	24
23	177	158	168	163	181	180	170	180	177	184	182	157	176	180	166	173	171	182	184	192	193	195	199	191	178.3	24
24	196	186	208	197	189	189	184	199	184	195	187	185	193	202	195	202	198	213	195	191	198	210	203	194	195.5	24
25	191	201	195	192	210	189	197	207	205	194	185	198	190	190	201	196	200	189	198	193	205	199	184	193	195.9	24
26	195	208	204	203	200	209	193	194	195	188	186	176	179	175	185	198	180	187	187	191	192	195	202	190	192.2	24
27	208	193	193	199	210	196	203	184	199	180	187	185	193	184	190	181	193	201	189	193	193	207	186	190	193.2	24
28	195	198	203	199	198	196	190	196	179	174	180	192	179	181	175	183	185	184	171	174	207	192	183	181	187.3	24
29	203	193	201	189	196	185	177	181	158	169	169	178	176	161	167	172	179	185	166	172	177	161	166	183	177.7	24
30	174	187	187	191	181	173	181	185	180	171	157	181	173	164	187	192	187	172	184	191	178	174	179	189	179.9	24
31	183	166	178	177	168	166	181	166	153	172	171	179	171	187	177	177	174	179	158	187	180	184	178	170	174.3	24

MONTHLY MEAN=184.161

MONTHLY MEAN DAILY VARIATION FOR 31 COMPLETE DAYS DEVIATIONS FROM AVERAGE:184.161

(1-12) 3.06 4.26 7.03 3.74 6.45 3.68 0.90 0.71 -0.87 -4.29 -4.77 -4.97

(13-24) -4.55 -5.97 -7.74 -1.55 -2.55 -0.39 -1.77 1.68 0.97 2.52 2.06 2.35

HARMONIC COMPONENTS (ORDER, COS, SIN, AMPLITUDE, MAX.-HR)

U.T.=(1 4.67 1.92 5.05 1.49) (2 -1.26 0.52 1.36 5.26) (3 -0.35 0.22 0.42 3.30) (4 -0.11 -0.21 0.24 4.05)

L.T.=(1 -4.00 3.08 5.05 9.49) (2 1.08 0.83 1.36 1.26) (3 -0.35 0.22 0.42 3.30) (4 0.24 0.01 0.24 0.05)

COSMIC RAY MESON INTENSITY

Real Relative Intensity: 0.1% Times (Tabulated Value Plus 1000)

JAN 1997

U.T. Hours at End of Interval

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	N
1	51	50	52	53	52	52	48	48	47	46	47	48	47	48	48	48	47	47	46	46	46	46	44	45	48.0	24
2	46	44	44	45	44	43	44	38	43	43	42	46	47	44	44	47	46	47	46	48	47	46	45	48	44.9	24
3	50	51	49	48	50	48	46	48	50	48	50	50	50	48	45	48	48	46	45	48	47	47	47	51	48.3	24
4	52	52	51	50	51	52	54	52	52	57	57	56	56	59	57	57	56	56	58	56	55	55	54	57	54.7	24
5	56	60	57	58	56	54	55	51	52	51	51	53	55	56	57	56	54	56	54	54	52	53	56	53	54.6	24
6	59	58	60	57	58	53	54	54	54	51	53	53	52	55	55	54	57	54	57	56	55	56	55	55	55.2	24
7	58	58	59	56	56	56	56	55	54	55	57	57	55	55	55	54	56	54	54	53	52	51	53	52	55.0	24
8	55	53	53	55	51	51	48	49	46	48	49	52	51	50	46	45	47	48	49	48	48	46	46	48	49.3	24
9	55	52	51	51	47	50	46	49	47	46	45	48	47	48	48	48	48	49	51	50	47	50	51	52	49.0	24
10	55	51	50	51	50	51	48	46	47	49	48	49	51	53	51	54	54	50	49	48	49	50	51	51	50.3	24
11	52	52	51	50	51	51	47	45	47	44	45	44	46	45	45	45	48	46	45	46	44	45	43	46	46.8	24
12	46	48	47	46	47	44	45	42	40	39	41	43	42	41	42	43	44	44	43	45	46	46	52	51	44.5	24
13	52	53	54	55	51	51	50	47	49	51	52	52	52	52	51	52	52	52	53	51	52	50	51	52	51.5	24
14	51	53	55	53	54	51	52	49	49	47	47	49	46	48	45	46	48	47	47	45	45	44	45	45	48.4	24
15	42	46	46	50	53	50	46	45	46	46	47	45	46	46	47	45	47	46	43	46	43	43	42	43	45.7	24
16	44	43	43	46	47	45	45	44	42	44	42	43	43	45	44	44	44	45	47	47	47	49	51	51	45.2	24
17	51	53	51	51	50	50	48	47	48	46	47	48	49	50	49	47	47	46	48	51	48	48	49	50	48.8	24
18	50	52	52	51	47	47	45	45	43	42	45	45	43	48	46	48	46	46	46	45	43	46	47	43	46.3	24
19	46	47	49	45	47	46	47	44	42	41	45	44	47	45	46	45	47	47	49	47	44	47	45	47	45.8	24
20	51	48	48	47	47	47	45	44	43	47	44	46	47	44	48	49	49	49	51	51	50	49	50	49	47.6	24
21	52	53	52	52	51	50	46	46	45	46	47	47	47	47	48	48	47	50	48	46	45	45	48	46	48.0	24
22	49	47	46	48	46	47	45	45	44	45	50	45	49	46	45	49	47	47	49	47	47	47	45	47	46.8	24
23	48	46	49	50	46	46	44	43	44	45	48	47	48	48	46	47	45	46	48	44	45	45	45	48	46.3	24
24	47	46	45	46	47	45	46	45	43	44	44	45	41	45	44	44	42	43	45	44	42	43	46	45	44.5	24
25	46	44	43	44	44	42	44	43	40	42	39	39	41	42	43	42	42	43	42	43	43	45	46	47	42.9	24
26	45	46	45	44	43	42	42	37	38	40	39	38	36	40	40	39	40	40	41	41	42	43	44	46	41.3	24
27	44	45	43	42	43	43	43	42	41	43	42	43	46	45	44	42	40	41	42	43	44	45	46	48	43.3	24
28	47	45	48	50	45	46	43	42	39	38	37	38	38	41	41	40	39	38	40	43	44	44	42	45	43	41.2	24
29	44	42	45	39	42	42	41	40	39	38	39	39	39	41	40	39	38	40	43	44	44	42	45	43	41.2	24
30	44	42	41	45	43	43	40	41	40	39	39	41	41	46	44	43	44	44	44	47	46	46	48	44	43.1	24
31	47	47	47	47	46	46	47	44	46	45	45	46	48	48	46	48	48	49	51	48	48	48	48	47	47.1	24

MONTHLY MEAN= 47.319

MONTHLY MEAN DAILY VARIATION FOR 31 COMPLETE DAYS DEVIATIONS FROM AVERAGE: 47.319

(1-12)	2.20	1.94	1.91	1.88	1.13	0.55	-0.54	-1.83	-2.16	-1.96	-1.42	-0.90
(13-24)	-0.67	0.07	-0.54	-0.35	-0.32	-0.25	0.36	0.20	-0.51	-0.19	0.49	0.94

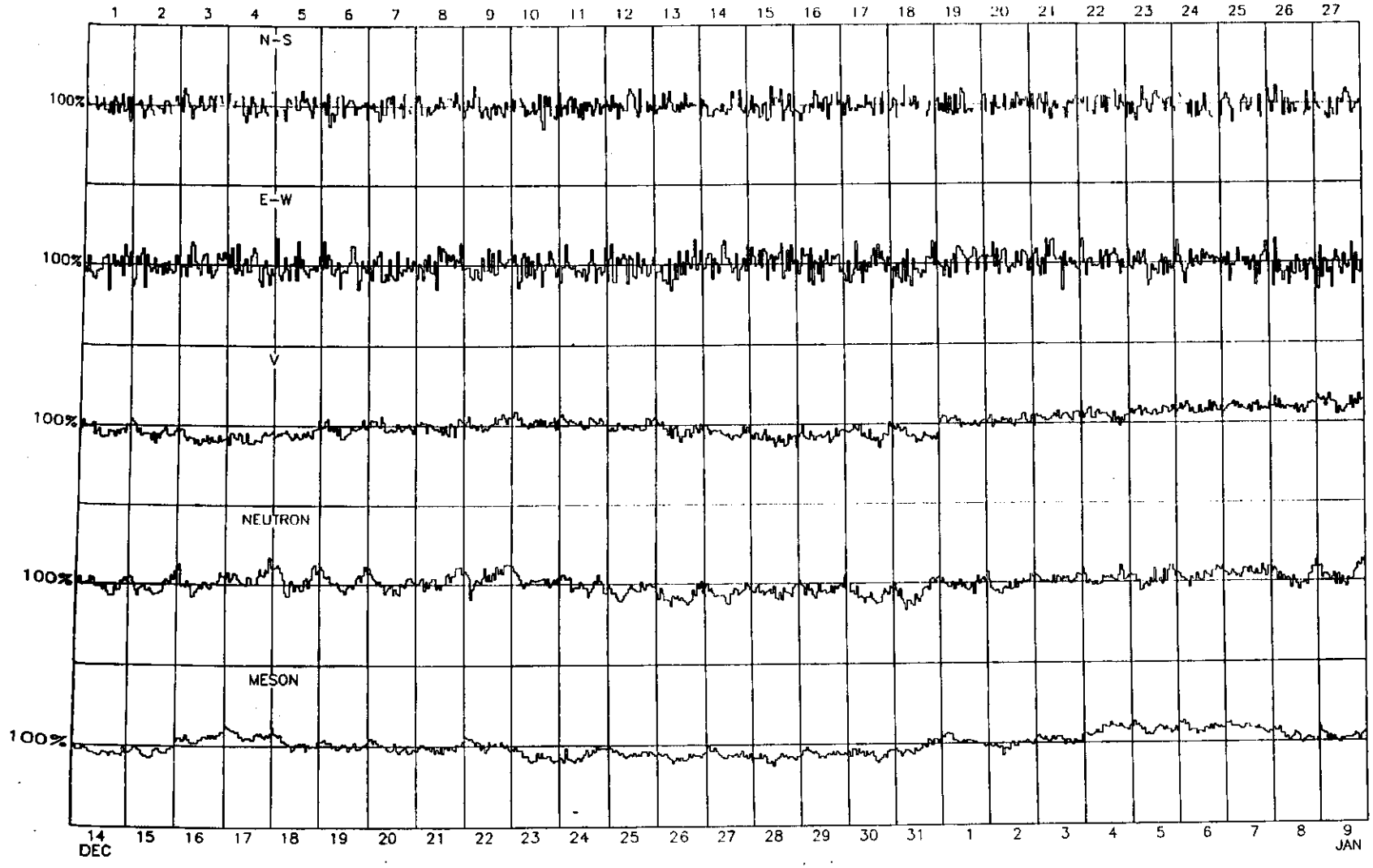
HARMONIC COMPONENTS (ORDER, COS, SIN, AMPLITUDE, MAX.-HR)

U.T.=(1 1.29 0.03 1.29 0.09) (2 0.24 0.98 1.01 2.55) (3 -0.27 0.13 0.30 3.44) (4 0.26 0.05 0.27 0.19)

L.T.=(1 -0.67 1.10 1.29 8.09) (2 0.73 -0.70 1.01 10.55) (3 -0.27 0.13 0.30 3.44) (4 -0.18 0.20 0.27 2.19)

COSMIC RAY INDICES

Bartels Rotation 2231 (DEC 1996–JAN 1997)



GEOMAGNETIC ACTIVITY INDICES K AND A_K

JANUARY 1997 BGMO

Day	Three-Hourly Indices K								Sum	A_K
	0-3	3-6	6-9	9-12	12-15	15-18	18-21	21-24		
1	1	2	1	2	2	1	1	2	12	5
2	1	1	2	2	2	3	1	0	12	6
3 Q	2	1	1	2	1	1	1	1	10	4
4 Q	0	0	0	2	1	0	1	1	5	2
5	1	2	1	2	1	2	1	1	11	5
6 Q	1	1	1	2	2	1	1	2	11	5
7	3	3	2	3	3	3	4	2	23	15
8	2	2	1	0	3	3	2	2	15	8
9	1	1	2	2	1	1	2	1	11	5
10 D	3	4	6	5	5	3	5	3	34	37
11 D	6	6	4	5	5	2	2	1	31	38
12	1	2	5	3	2	3	3	1	20	14
13	1	2	1	2	3	3	2	1	15	8
14	1	1	1	1	2	1	2	1	10	4
15	1	1	1	1	2	2	1	1	10	4
16 Q	0	1	1	1	1	0	0	1	5	2
17 Q	0	0	0	1	2	2	1	2	8	3
18	2	1	2	2	1	1	1	1	11	5
19	1	1	1	2	2	3	1	0	11	5
20	1	2	2	2	2	3	2	2	16	8
21	2	1	2	2	5	5	2	2	21	17
22	2	2	0	2	2	2	2	2	14	6
23	2	1	1	1	2	1	1	0	9	4
24	1	2	2	1	1	2	1	3	13	6
25	2	2	0	1	2	1	3	2	13	6
26 D	1	2	2	3	5	5	5	4	27	25
27 D	2	3	1	4	2	4	4	3	23	16
28 D	2	3	2	3	5	5	3	2	25	20
29	1	2	2	2	3	2	2	2	16	8
30	2	1	2	1	4	4	4	3	21	15
31	2	1	0	1	1	2	1	0	8	9
									Sum	315
									Mean	10.2

MAGNETIC STORMS

JANUARY 1997 BGMO

Time of Magnetic						Sudden Com. Amplitude			Deg. of	Maximum Acti. on K-scale			Maximum Range		
Begining			Ending								3hour	k			
Day	h	m	Day	h	Type	D′	HnT	ZnT	Acti.	Day	Int.	Index	D′	HnT	ZnT
10	01		C		GC				ms	10	3	6	8.3	150	20
11	01	16	11	21	SC	0.8	37	1	ms	11	1	6	5.3	189	15

1996年11月NOAA AR 7999的太阳活动*

中国科学院北京天文台
朱翠莲

在太阳活动22周极小年的1996年11月份，NOAA AR 7999的出现，使得宁静的日面上又活跃起来了。它产生了14个C级X射线耀斑，1个M级X射线耀斑，26个光学S级耀斑，5个1级光学耀斑，和一个m级的中长磁暴。

一个M1.0/1F的太阳耀斑出现在1996年11月29日，开始时间2016 UT，极大时间2044 UT，结束时间2032 UT。紧接着11月30日又出现了一个C8.6/1N的太阳耀斑，它开始于2032UT，2103 UT达到极大，而结束于2130 UT，持续时间长达58分钟。

北京天文台2840 MHz波段分别在11月21日，24日，25日记录到了3次射电爆发。11月21日2840 MHz波段的射电爆发开始于0641 UT，0651 UT达到极大。11月24日该波段的射电爆发开始于0442 UT，0444 UT达到极大。11月25日该波段的射电爆发开始于0513 UT，0514 UT达到极大。3次爆发的持续时间分别是11分，3分和2分钟，而它们的流量峰值分别是6.3，5.4和8.7(s.f.u.)。

从图1和表1中，我们可以看到：一次M级的X射线耀斑和5次1级光学耀斑都发生在射电流量和黑子面积凸起区域的25—30日之间，而3次射电爆发事件均发生在射电流量和太阳黑子面积的上升阶段。25日McIntosh分类为EKC，26—30日均为EKI，其磁分类为β，这种黑子磁场的型态与结构通常属于耀斑的发生区。

文中2840 MHz波段的射电流量和射电爆发由北京天文台观测，黑子面积由北京区域警报中心提供，其他资料均由SWO PRF 1108和1109中得到。

图1中○表示射电爆发，□表示1级光学耀斑，而△表示X射线M级耀斑。图1中的虚线和实线分别表示1996年11月AR 7999活动区每日的射电流量和太阳黑子群面积。

感谢王家龙研究员的有益讨论。

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SOLAR ACTIVITY IN NOVEMBER 1996 IN NOAA REGION 7999

ZHU Cui-lian

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In 1996 November, during the minimum phase of Solar Cycle 22, the quiet sun livened again. NOAA Region 7999 appearred on the sun and produced 14 C-class X-ray flares, 1 M-class X-ray flare, 26 S-importance optical flares, 5 1- importance optical flares, and 1 m-class geomagnetic storm.

In Table 1 parameters of the daily solar X-ray background, the region and associated flares are bited, briefly. The data used are taken from CSGD[1,2], SGD [3,4] and RWC-Beijing, respectively.

We use Figure 1 to describe the solar condition in the period from November 21 to December 2 1996. In the figure the dottedline indicates the vaviation of the daily solar radio flux measured at 2840 MHz at Beijing Astronomical Observatory, and the solid line represents the variation of the area of the sunspot group in the region, issued by RWC-Beijing. The abscissa and ordinates represent respectively the data radio flux and area. And marks, square, triangle and circle, indicate the occurrence of class 1 optical flare, class M X-ray flare and radio bursts respectively, produced in AR 7999.

From Figure 1 and Table 1 we can see that the 3 recorded 2840 MHz bursts and 3 class 1 H_α flares occurred in the growing phase of the region, while the class M X-ray burst and 2 class 1 H_α flares occurred in the decay phase of the region, and that the daily variation of the area of the sunspot group coincides with that of the daily solar radio flux at 2840 MHz.

Table 1. NOAA AR 7999 Region Summary

Data	Lat	L	Radio (2840 MHz)				Sunspot	Flares		Spot	Mag
			Flux	burst			Area	X-ray	Optical	Class.	class.
				Max	Duration	Peak Flux	(10^{-6}hemi.)				
1996.11.21	S04	167	71	0651 UT	11 Min	6.3(s.f.u.)	7		2(s)	BXO	B
22	S04	168	75				52			DSO	B
23	S04	169	81				99		1(s)	DAO	B
24	S04	169	91	0444 UT	3Min	5.4(s.f.u.)	322	4(c)	4(s)	DAI	B
25	S04	169	101	0514 UT	2Min	8.7(s.f.u.)	915	4(c)	3(1),3(s)	EKC	B
26	S04	170	102					1(c)	1(s)	EKI	B
27	S05	171	99				858		2(s)	EKI	B
28	S05	171	92				754	1(c)	1(s)	EKI	B
29	S04	171	92				807	1(M)	1(1),3(s)	EKI	B
30	S04	170	87					2(c)	1(1),6(s)	EKI	B
12.1	S03	171	81				494	2(c)	3(s)	EKI	B
2			77				4				

Acknowledgements

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References

[1] CSGD: No.273, 1996
[2] CSGD: No.274, 1996
[3] SWO PRF 1108
[4] SWO PRF 1109

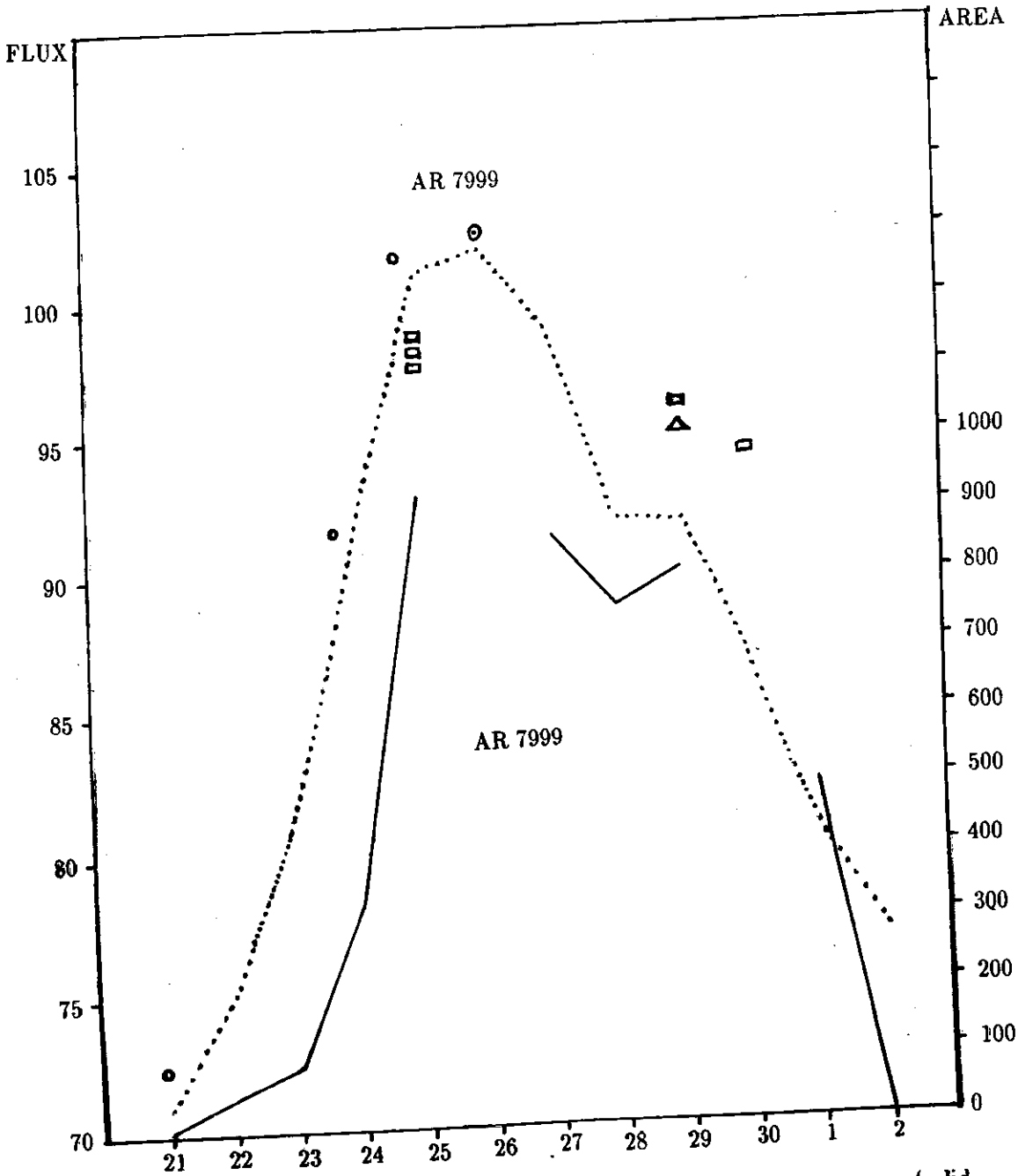

Fig.1 Daily solar radio flux (dotted line) and daily area of the sunspot group (solid line) of AR 7999

Remark: ○–solar radio burst; □–class 1 H_α optical flare; △–class M X–ray flare; ⊙–class m geomagnetic storm.