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1990年1月

说　明

(1990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。
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。黑子照相面积由北台提供。“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。(See) 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，日面中心的日面经度 (L_o) 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—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 λ5324.19Å谱线观测资料（光球）

4—使用H_β λ4861.34Å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. 太阳耀斑表列出北台、紫台、乌站、云台等单位用色球望远镜（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。其中极大（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：

校正面积Sq	耀斑级别 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：

日心距r/R	耀斑级别 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。

6. 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。

7. 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；乌站、云台在 0500 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。

8. 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 1S，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）。

9. 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。图中左上角给出日期、频率，右上角给出观测台站，横坐标为时间（UT），纵坐标为爆发流量。

10. 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。

11. 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。

12. 突然电离层扰动（D层）（简称SID）表给出了对罗兰C100 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：

$$\Delta\varphi_0=\left(\frac{5.0}{1.6+3.4\cos Z(h_m)}\right)\times\Delta\varphi'+\begin{cases}7.3\times[\cos Z(h_m)-\cos Z(h_s)], & \text{当 } h_m\leqslant 12 \text{ 和 } Z(h_m)\leqslant 80^\circ\\ 0, & \text{当 } 12<h_m<13\\ 7.3\times[\cos Z(h_m-1)-\cos Z(h_s-1)], & \text{当 } h_m\geqslant 13 \text{ 和 } Z(h_m)\leqslant 80^\circ\end{cases}$$

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＋

13. 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5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)

14. 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(东径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。

15. 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。

对“太阳地球物理资料”的意见，请寄北京100080 (邮政编码) 中国科学院北京天文台“太阳地球物理资料”编辑组。电话：2567194，电报挂号：9053，电传：22040 BAOAS CN。

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 Zurich 分型，第二个字母为黑子群中最大黑子的半影情况，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 Zurich 分型

A　无半影单极群。B 型长度无限制。

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 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　对称和近于园形半影，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(不园)，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：Zurich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。

Zurich 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。

Zurich 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＝有高速暗条伴随的耀斑。

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 CaII 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。

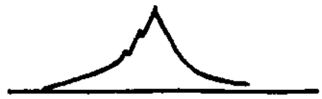
X＝耀斑的 H_α 线很宽。

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	图形
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分钟（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 形
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	图形
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

(1990)

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. H-Alpha Solar Flares and Time Intervals of H-Alpha Flare Patrol Observations
5. Solar Radio Emission Fluxes and Solar Radio Emission Outstanding Occurrences, Intervals of Solar Radio Emission Patrol Observations and Time Profiles Solar Radio Emission Bursts
6. Cosmic Ray Meson and Neutron Intensity compiled by Center for Space Science and Applied Research
7. Sudden Ionospheric Disturbances (D-Region) (SID)
8. Geomagnetic Indices K and A_k
9. Magnetic Storms compiled by Beijing Geomagnetic Observatory
10. Nonperiodically Published Special Issues for the Data Corresponding Solar-Terrestrial Effects and Preliminary Analyses of Some Selected Events

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 while photographic results of spot areas are supplied by Beijing Astronomical 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. Heliocentric 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 occupied 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 (L_0), the number (under Huairou Region) 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 λ 5324.19$\AA$ and/or H_β λ 4861.34 $\AA$ at Huairou Station of Beijng Astronomical Observatory are given. Meanings of letters in the table are as follows:

S (or T) — monochromatic image
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 5324.19$\AA$
4 — observation at H_β λ 4861.34 $\AA$

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. The table of " H-Alpha Solar Flares " gives H-Alpha flare (including subflares (by S)) patrol observations done at Beijing Astronomical Observatory,Purple Mountain Observatory, Urumqi Astronomical Station, and Yunnan Observatory. 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 apparent area Sd and 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 to 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 where each observatory uses its experience to decide if a flare is rather faint (F), normal (N), or rather bright(B). For flares within 65° from the centre of the disk, i.e., the heliocentric distance is less than 0.906, the first figure assigned to the flare importance is defined by the corrected area Sq according to the following table where areas are given in millionths of a 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 heliocentric distance is equal to or greater than 0.906, the first figure assigned to 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 ≥ 600
.940 - .984	75	75 - 239	240 - 499	500
.985 - .999	50	50 - 179	180 - 349	350
1	45	45 - 169	170 - 299	300

The letters C, P, and V in the column marked " 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 are obtained due to an incomplete time coverage

V — the development of the flare was visually observed

The meaning of one or more letters of A to Z in the column marked " 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.

6. 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 flare patrol observations are less than five minutes.

7. 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; URUM, YUNN: around 0500 UT) every day at different fixed radio frequencies. All flux values are adjusted to mean sun-earth distance: 1 AU.

8. 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 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.

9. 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.

10. 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 half hour are not listed.

11. 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 and 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 variation 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.

12. 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 the 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 following expression resulted from the analyses and calculation:

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

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

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. As for the importance rating, based on a scale of 1–, the least, to 3+, the most important, is derived from the values of $\Delta\phi_0$, shown as 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+

13. 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 and a_k is as follows :

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

14. 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 the rating of geomagnetic storms, 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, for a flare observed at 2230–2400 UT, the equivalent Beijing Standard Time is 0630–0800 next day.

15. 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.

Address your inquires to our Editorial Group, please: CSGD Editorial Group, Beijing Astronomical Observatory, Beijing 100080 China . Telephone Number : 2567194, Telegram code : 9053, Telex : 22040 BAOAS CN.

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

Classification 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 fluctuations 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 FAL 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.

DAILY RELATIVE SUNSPOT NUMBERS AND SUNSPOT AREAS

JANUARY 1990

		Relative-Numbers			Sunspot Areas					
					Drawing			Photographic		
Day	Gro.	N.H.	S.H.	Sum	N.H.	S.H.	Sum	N.H.	S.H.	Sum
1	16	99	97	196	1259	1418	2677	1479	2028	3507
2	16	97	90	187	1075	1138	2213	1417	1767	3184
3	17	106	91	197	1078	568	1646	1380	544	1924
4	16	87	92	179	630	278	908	649	477	1126
5	15	96	81	177	548	205	753	830	246	1076
6	13	81	63	144	626	218	844	968	550	1518
7	11	61	63	124	835	439	1274	1093	554	1647
8	11	44	68	112	724	655	1379	1122	652	1774
9	10	34	71	105	671	744	1415	483	382	865
10	11	31	91	122	551	798	1349			
11	12	23	125	148	443	889	1332	527	699	1226
12	15	32	138	170	570	1146	1716	453	1265	1718
13	13	43	103	146	481	905	1386	209	1366	1575
14	12	50	81	131	412	668	1080	469	739	1208
15	11	65	54	119	672	379	1051	639	373	1012
16	13	96	59	155	522	353	875	426	250	676
17	14	96	70	166	517	385	902	802	543	1345
18	15	86	80	166	641	564	1205	686	518	1204
19	11	83	109	192	481	775	1256	560	997	1557
20	15	99	130	229	795	801	1596	678	623	1301
21	16	90	127	217	483	1482	1965	678	1272	1950
22	12	59	104	163	591	1729	2320	596	1365	1961
23	12	56	112	168	340	1809	2149	452	1458	1910
24	17	58	174	232	229	1425	1654	327	1944	2271
25	23	66	235	301	301	1623	1924	333	1931	2264
26	20	57	203	260	375	1527	1902	369	1753	2122
27	24	93	196	289	705	1225	1930			
28	18	108	124	232	897	1346	2243			
29	17	117	94	211	937	1544	2481	680	1478	2158
30	15	121	94	215	787	1285	2072	480	1108	1588
31	12	93	69	162	799	1291	2090	516	770	1286
Mean		75.1	106.1	181.1	644.4	955.2	1599.6	689.3	987.6	1676.9

DAILY SUNSPOT OBSERVATIONS

JANUARY 1990

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Whole	Area Max	See Remarks
1.08	665	12-27.6	-27	28	59W	EKC	0.86	1030	1017	830	3
	666	12-28.3	-10	19	51W	AXX	0.77	8	7	7	3
	669	12-29.0	23	10	42W	DKC	0.75	866	652	484	3
	670	12-29.5	-9	3	35W	CSI	0.56	282	170	148	3
	672	12-30.9	-19	344	18W	DSI	0.39	248	135	117	3
	677	1- 2.7	13	308	22E	EKI	0.45	707	395	327	3
	678	1- 2.9	18	305	24E	DSI	0.53	202	119	102	3
	680	12-31.9	-17	331	2W	AXX	0.24	4	2	2	3
	681	1- 4.0	14	291	40E	CAI	0.68	109	74	63	3
	682	1- 5.8	-37	266	58E	HSX	0.89	63	68	68	3
	1	12-30.3	-16	353	24W	BXO	0.46	8	5	2	3
	2	12-30.9	14	344	15W	AXX	0.39	8	5	2	3
	3	12-31.1	23	342	13W	AXX	0.49	8	5	2	3
	4	1- 2.1	13	316	13E	AXX	0.34	8	4	2	3
	5	1- 2.6	24	309	20E	AXX	0.54	8	5	2	3
	6	1- 7.0	-37	251	70E	BXO	0.95	8	14	7	3
2.10	665				72W	EKC	0.95	475	793	568	2
	669				56W	DKC	0.86	475	469	423	2
	670				48W	CSI	0.74	193	143	124	2
	672				31W	DSI	0.55	189	113	91	2
	677				8E	EHI	0.31	736	387	327	2
	678				11E	CSI	0.40	236	129	108	2
	680				17W	AXX	0.38	4	2	2	2
	681				25E	CSI	0.51	135	78	62	2
	682				45E	HSX	0.80	80	67	64	2
	2				30W	AXX	0.55	4	3	3	2
	3				25W	AXX	0.54	4	2	2	2
	5				7E	BXI	0.46	8	5	2	2
	6				58E	AXX	0.89	8	9	5	2
	7	12-29.7	-25	1	45W	BXO	0.75	8	6	3	2
	8	1- 1.4	-28	325	10W	BxO	0.45	8	5	2	2
	9	1- 1.4	17	325	9W	AXX	0.37	4	2	2	2
3.06	665				83W	DSC	0.99	59	195	83	3
	669				68W	DKI	0.94	336	503	447	3
	670				60W	CSI	0.86	114	112	100	3
	672				43W	CAI	0.70	168	118	83	3
	677				5W	EHI	0.29	723	378	310	3
	678				2W	CSO	0.37	198	106	99	3
	681				12E	CSI	0.38	135	73	59	3

DAILY SUNSPOT OBSERVATIONS

JANUARY 1990

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Area Whole	Max	See Remarks
	682				34E	HSX	0.71	114	81	78	3
	3				38W	AXX	0.68	4	3	3	3
	5				12W	BXO	0.48	8	5	2	3
	6				47E	CRO	0.82	21	18	15	3
	7				47W	AXX	0.85	8	8	4	3
	8				21W	BXI	0.53	25	15	5	3
	9				20W	BXI	0.46	8	5	2	3
	10	1- 3.0	26	303	1W	BXO	0.49	8	5	2	3
	11	1- 8.5	-23	231	73E	AXX	0.95	4	7	7	3
	12	1- 8.4	-13	232	75E	BXO	0.95	8	14	7	3
4.08	669				82W	DRI	0.99	38	125	42	4
	670				74W	HSX	0.95	25	42	42	4
	672				57W	CAI	0.84	63	58	39	4
	677				19W	EHI	0.43	559	309	286	4
	678				15W	CSI	0.43	172	95	91	4
	681				1W	CSI	0.31	151	80	73	4
	682				21E	HSX	0.62	143	91	91	4
	6				34E	BXI	0.71	13	9	3	4
	7				71W	BXO	0.95	17	28	14	4
	8				35W	CRI	0.66	38	25	11	4
	11				60E	BXO	0.87	8	9	4	4
	12				60E	AXX	0.86	4	4	4	4
	13	1- 2.9	-25	305	16W	BXO	0.44	21	12	5	4
	14	1- 4.9	20	279	9E	SXI	0.41	8	5	2	4
	15	1- 4.9	8	278	11E	AXX	0.29	4	2	2	4
	16	1- 6.6	24	257	34E	BXI	0.68	21	14	9	4
5.05	672				67W	BXO	0.92	8	11	5	3
	677				33W	CHI	0.59	475	293	285	3
	678				27W	CSO	0.55	147	88	86	3
	681				13W	DSI	0.37	261	140	61	3
	682				10E	CSO	0.57	143	87	85	3
	6				24E	BXO	0.64	13	8	5	3
	7				85W	AXX	0.99	4	14	14	3
	8				48W	BXI	0.78	17	13	3	3
	11				46E	AXX	0.74	4	3	3	3
	13				29W	CRO	0.57	25	15	10	3
	14				3W	BXI	0.40	8	5	2	3
	15				2W	AXX	0.20	4	2	2	3
	16				21E	BXI	0.55	34	20	5	3
	17	1-10.1	-13	210	69E	BXO	0.93	8	12	6	3

DAILY SUNSPOT OBSERVATIONS

JANUARY 1990

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Area Whole	Max	See Remarks
	18	1-11.4	-23	192	85E	HSX	0.99	13	42	42	3
6.06	677				46W	CHO	0.75	378	285	282	3
	678				40W	HSX	0.70	126	88	88	3
	681				26W	EAI	0.52	391	228	123	3
	682				3W	HSX	0.54	130	77	77	3
	5				44W	AXX	0.76	4	3	3	3
	6				10E	BXO	0.56	21	13	5	3
	8				61W	BXO	0.89	8	9	5	3
	11				31E	AXX	0.57	4	3	3	3
	13				42W	BXI	0.70	13	9	6	3
	16				7E	CRI	0.47	34	19	7	3
	17				57E	CRI	0.84	55	50	23	3
	18				71E	HSX	0.94	38	57	57	3
	19	1- 8.7	26	229	39E	AXX	0.76	4	3	3	3
7.07	677				59W	HHX	0.87	320	328	328	3
	678				52W	HSX	0.83	84	75	75	3
	681				37W	EKC	0.66	631	417	195	3
	682				15W	HSX	0.57	168	103	103	3
	6				1W	BXI	0.54	13	7	2	3
	13				57W	AXX	0.85	8	8	4	3
	16				9W	BXI	0.48	17	10	5	3
	17				45E	EAI	0.71	236	168	111	3
	18				57E	HSX	0.85	109	104	104	3
	19				21E	BXO	0.59	8	5	3	3
	20	1-13.1	-11	170	79E	CSO	0.98	21	49	39	3
8.07	677				72W	HHX	0.95	181	302	302	2
	678				66W	HSX	0.93	46	63	63	2
	681				52W	EKI	0.82	404	349	218	2
	682				27W	HSX	0.66	114	75	75	2
	6				14W	CRO	0.59	59	36	29	2
	11				6E	DRI	0.32	63	33	9	2
	16				22W	AXX	0.57	8	5	3	2
	17				29E	ESC	0.49	513	295	123	2
	18				44E	HSX	0.72	147	107	107	2
	19				8E	BXO	0.52	8	5	2	2
	20				65E	DSO	0.90	97	109	85	2
9.09	677				86W	HHX	0.99	42	139	139	2
	678				79W	HSX	0.98	21	49	49	2

DAILY SUNSPOT OBSERVATIONS

JANUARY 1990

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Area Whole	Corre. Area Max	See Remarks
	681	1-29.2	8	319	65W	EKI	0.92	349	444	358	2
	10682				38W	HSX	0.75	76	57	57	2
	6				26W	BXO	0.64	8	5	3	2
	11				9W	DAI	0.36	265	142	108	2
	17				14E	EAC	0.29	521	272	136	2
	18				30E	CSO	0.57	223	136	134	2
	20				50E	DSO	0.77	168	132	112	2
	21	1-15.0	12	146	77E	HSX	0.98	17	39	39	2
10.06	681				79W	EKI	0.99	126	417	334	3
	682				50W	HSX	0.83	42	37	37	3
	6				38W	BXI	0.75	8	6	3	3
	11				24W	DKI	0.49	450	259	232	3
	16				43W	DAI	0.78	105	84	71	3
	17				1E	EAI	0.16	534	271	153	3
	18				18E	CSO	0.43	219	121	118	3
	20				37E	CAO	0.60	143	89	84	3
	21				64E	HSX	0.91	42	50	50	3
	22	1-16.2	-35	130	74E	AXX	0.97	4	8	8	3
	23	1-15.7	-23	136	74E	AXX	0.95	4	7	7	3
11.07	682				63W	AXX	0.91	17	20	10	3
	6				53W	BXO	0.85	8	8	4	3
	11				36W	DSI	0.63	357	231	125	3
	12				35W	DRI	0.57	181	110	28	3
	16				56W	DKI	0.89	374	402	307	3
	17				12W	FSI	0.26	505	262	155	3
	18				5E	HSX	0.33	223	118	116	3
	20				24E	CSO	0.41	97	53	46	3
	21				50E	HSX	0.79	50	41	41	3
	22				63E	DRI	0.91	34	40	15	3
	23				61E	AXX	0.89	4	5	5	3
	24	1-17.7	-30	110	85E	HSX	0.99	13	42	42	3
12.07	682				75W	AXX	0.97	4	8	8	3
	11				49W	DSI	0.78	151	121	71	3
	12				48W	DKC	0.75	631	475	237	3
	16				68W	DKI	0.95	214	358	260	3
	17				29W	FSO	0.47	286	162	134	3
	18				8W	HSX	0.33	236	125	125	3
	20				13E	DRI	0.23	63	32	11	3
	21				38E	HSX	0.66	46	31	31	3

DAILY SUNSPOT OBSERVATIONS

JANUARY 1990

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Area Whole	Corre. Area Max	See Remarks
	22				51E	DSO	0.84	130	120	104	3
	23				48E	AXX	0.77	4	3	3	3
	24				71E	HSX	0.95	25	42	42	3
	25	1- 9.9	-33	212	28W	BXO	0.63	8	5	3	3
	26	1-11.5	-8	191	7W	BXO	0.14	8	4	2	3
	27	1-18.0	21	106	78E	CSI	0.99	55	181	139	3
	28	1-18.1	-20	105	79E	HSX	0.98	21	49	49	3
13.06	11				62W	DSI	0.90	71	81	47	3
	12				62W	DAI	0.89	328	352	167	3
	16				80W	HHX	0.99	59	195	167	3
	17				41W	FSO	0.66	261	173	156	3
	18				20W	HSX	0.45	177	99	99	3
	20				1E	DRI	0.11	67	34	130	3
	21				24E	HSX	0.48	59	34	34	3
	22				41E	CAO	0.75	93	70	66	3
	24				59E	HSX	0.87	38	39	39	3
	26				21W	BXO	0.36	13	7	5	3
	27				63E	DAI	0.92	164	209	144	3
	28				66E	CSO	0.91	42	50	40	3
	29	1-17.4	33	114	58E	CRI	0.92	34	43	21	3
14.10	11				77W	CRO	0.98	17	39	30	3
	12				75W	DAO	0.97	114	218	121	3
	17				57W	CSO	0.84	164	151	147	3
	18				33W	HSX	0.60	122	76	76	3
	20				12W	BXI	0.23	29	15	4	3
	21				12E	HSX	0.34	46	25	25	3
	22				28E	CRO	0.63	63	41	38	3
	24				46E	HSX	0.76	67	52	52	3
	27				49E	DKI	0.80	273	230	188	3
	28				52E	CSO	0.79	93	76	72	3
	29				44E	ERI	0.83	168	150	45	3
	30	1-16.8	41	123	33E	BXO	0.82	8	7	4	3
15.06	17				70W	CSO	0.93	126	173	167	3
	18				46W	HSX	0.74	84	62	62	3
	20				25W	BXI	0.43	17	9	5	3
	21				1W	HSX	0.29	42	22	22	3
	22				15E	CSO	0.55	71	43	40	3
	24				34E	HSX	0.64	55	36	36	3
	27				38E	EAI	0.70	446	313	68	3

DAILY SUNSPOT OBSERVATIONS

JANUARY 1990

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Whole	Area Max	See Remarks
	28				39E	HSX	0.66	84	56	56	3
	29				31E	EAI	0.75	307	231	85	3
	30				20E	BXO	0.78	8	7	3	3
	31	1-20.8	25	69	77E	HSX	0.98	42	99	99	3
16.23	17				81W	HSX	0.98	25	59	59	3
	18				61W	HSX	0.87	71	73	73	3
	21				15W	BXO	0.36	21	11	5	3
	22				1W	BXO	0.52	17	10	5	3
	24				19E	HSX	0.51	67	39	39	3
	27				24E	ESI	0.60	236	147	37	3
	28				25E	DSI	0.48	93	53	24	3
	29				16E	EKI	0.64	450	294	157	3
	30				6E	BXI	0.72	13	9	3	3
	31				61E	HSX	0.91	46	55	45	3
	32	1-18.2	-7	104	24E	BXO	0.41	13	7	5	3
	33	1-19.0	18	93	38E	AXX	0.69	8	6	3	3
	34	1-21.9	-9	55	73E	HSX	0.95	67	112	112	3
17.06	18				72W	HSX	0.94	59	88	88	3
	21				23W	BXI	0.46	17	9	5	3
	22				10W	BXO	0.53	8	5	2	3
	24				7E	CSO	0.43	67	37	35	3
	27				13E	EAI	0.51	345	200	66	3
	28				13E	CSI	0.33	71	38	22	3
	29				5E	EKI	0.62	408	260	150	3
	30				4W	BXO	0.71	8	6	3	3
	31				49E	HSX	0.83	42	37	34	3
	32				13E	BXI	0.24	8	4	2	3
	33				26E	AXX	0.51	8	5	2	3
	34				63E	HKX	0.89	181	194	190	3
	35	1-18.8	-30	96	24E	BXO	0.56	8	5	3	3
	36	1-22.7	-11	44	73E	BXO	0.95	8	14	7	3
18.08	21				35W	CRI	0.61	17	11	8	3
	23				31W	BXI	0.57	8	5	3	3
	24				5W	CSI	0.43	63	35	30	3
	27				1W	EKI	0.45	568	318	174	3
	28				1E	CSO	0.26	55	28	24	3
	29				8W	EAI	0.61	412	260	119	3
	30				15W	BXO	0.74	8	6	3	3
	31				35E	CRO	0.71	25	18	15	3

DAILY SUNSPOT OBSERVATIONS

JANUARY 1990

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Whole	Area Max	See	Remarks
	32				1E	AXX	0.03	8	4	2	3	
	34				51E	DSI	0.78	185	148	74	3	
	35				9E	BXI	0.45	21	12	7	3	
	36				61E	DSI	0.87	126	130	48	3	
	37	1-22.2	14	51	54E	AXX	0.83	8	7	4	3	
	38	1-23.6	22	32	69E	AXX	0.95	13	21	21	3	
	39	1-24.2	-26	25	79E	DSI	0.97	105	202	105	3	
19.07	24				14W	CAO	0.46	67	38	28	4	PLAT
	27				12W	EAC	0.47	500	284	107	4	PLAT
	28				11W	BXO	0.30	17	9	2	4	PLAT
	29				20W	EAI	0.67	282	189	90	4	PLAT
	31				23E	AXX	0.59	4	3	3	4	PLAT
	34				40E	CAI	0.62	210	134	105	4	PLAT
	35				4W	BXO	0.40	34	18	2	4	PLAT
	36				49E	DAI	0.74	303	224	106	4	PLAT
	38				56E	AXX	0.89	4	5	5	4	PLAT
	39				70E	DAI	0.94	206	308	170	4	PLAT
	40	1-24.3	-11	23	73E	BXI	0.94	29	44	6	4	PLAT
20.06	24				30W	CSO	0.60	55	34	31	4	
	27				27W	FSI	0.61	488	308	64	4	
	28				26W	BXO	0.48	13	7	5	4	
	29				32W	EAI	0.75	290	218	108	4	
	31				10E	AXX	0.52	13	7	7	4	
	34				25E	DSI	0.43	231	128	88	4	
	35				18W	BXI	0.51	21	12	5	4	
	36				36E	DKI	0.61	425	268	133	4	
	38				43E	BXO	0.77	21	16	10	4	
	39				56E	EAI	0.85	362	344	144	4	
	40				56E	CSI	0.83	67	60	52	4	
	41	1-23.8	13	30	46E	AXX	0.76	8	6	3	4	
	42	1-24.2	30	25	56E	AXX	0.87	4	4	4	4	
	43	1-25.7	-10	5	72E	CRI	0.94	50	76	57	4	
	44	1-25.8	24	3	74E	HSX	0.98	46	108	108	4	
21.08	24				41W	CSO	0.71	46	33	30	3	
	27				41W	FSI	0.76	324	249	97	3	
	28				38W	AXX	0.63	8	5	3	3	
	29				46W	ESI	0.84	143	131	43	3	
	31				4W	BXI	0.49	13	7	5	3	
	34				11E	DSI	0.21	244	125	92	3	

DAILY SUNSPOT OBSERVATIONS

JANUARY 1990

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Area Whole	Max	See	Remarks
	35				32W	SXO	0.63	17	11	5	3	
	36				22E	EKI	0.38	412	223	93	3	
	38				30E	BXI	0.64	13	8	3	3	
	39				42E	ESI	0.72	421	305	49	3	
	40				43E	CSO	0.68	55	37	31	3	
	42				41E	AXX	0.76	4	3	3	3	
	43				59E	CRI	0.86	34	33	21	3	
	44				60E	HSX	0.91	59	70	70	3	
	45	1-20.8	9	70	4W	SXI	0.24	29	15	7	3	
	46	1-27.4	-9	343	78E	CKO	0.98	303	710	700	3	
22.08	24				53W	AXX	0.83	8	7	4	3	PLAT
	27				57W	EAC	0.89	416	447	158	3	PLAT
	29				60W	CAO	0.94	50	76	63	3	PLAT
	34				0W	CAO	0.08	135	68	63	3	PLAT
	36				9E	EAC	0.17	265	134	81	3	PLAT
	38				16E	BXI	0.52	25	15	2	3	PLAT
	39				32E	DAI	0.63	40	261	87	3	PLAT
	40				29E	HSX	0.49	40084	48	48	3	PLAT
	43				48E	CSI	0.74	80	59	37	3	PLAT
	44				49E	HAX	0.82	50	44	44	3	PLAT
	45				15W	BXO	0.34	17	9	2	3	PLAT
	46				70E	FKC	0.93	841	1152	928	3	PLAT
23.09	24				66W	AXX	0.92	4	5	5	3	PLAT
	27				72W	DAO	0.95	177	295	168	3	PLAT
	34				13W	HSX	0.24	97	50	50	3	PLAT
	36				5W	DAI	0.13	185	93	49	3	PLAT
	38				6E	BXO	0.45	8	5	2	3	PLAT
	39				14E	CAI	0.41	236	129	83	3	PLAT
	42				18E	BXO	0.31	17	9	2	3	PLAT
	43				35E	BXO	0.56	13	8	3	3	PLAT
	44				33E	BXO	0.70	13	9	3	3	PLAT
	45				29W	BXO	0.52	38	22	2	3	PLAT
	46				58E	FKC	0.86	1539	1519	1100	3	PLAT
	47	1-27.7	-19	339	63E	AXX	0.89	4	5	5	3	PLAT
24.22	27				81W	AXX	0.99	8	28	28	3	
	34				28W	HSX	0.47	88	50	50	3	
	36				22W	CSI	0.38	126	68	52	3	
	38				8W	BXI	0.47	8	5	2	3	
	39				1W	EAI	0.36	290	155	104	3	

DAILY SUNSPOT OBSERVATIONS

JANUARY 1990

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Area Whole	Max	See Remarks
	40				2E	BXO	0.10	13	6	2	3
	42				1W	AXX	0.57	4	3	3	3
	43				19E	CRO	0.32	29	16	11	3
	44				22E	AXX	0.57	4	3	3	3
	45				46W	BXO	0.74	13	9	3	3
	46				41E	FKI	0.64	1682	1099	879	3
	48	1-19.8	-16	83	59W	BXI	0.86	8	8	4	3
	49	1-21.0	15	66	42W	AXX	0.72	4	3	3	3
	50	1-24.0	-15	28	4W	BXO	0.18	25	13	4	3
	51	1-25.5	-28	8	16E	AXX	0.44	8	5	2	3
	52	1-25.8	-5	4	25E	AXX	0.39	8	5	2	3
	53	1-30.0	11	308	77E	HSX	0.98	76	178	178	3
25.28	34				42W	HSX	0.67	97	65	65	3
	36				36W	ESI	0.59	143	88	55	3
	39				14W	CKI	0.41	349	192	164	3
	40				10W	BXI	0.17	17	9	2	3
	41				20W	BXO	0.45	8	5	2	3
	43				7E	BXO	0.14	25	13	4	3
	44				7E	BXI	0.51	21	12	2	3
	45				64W	AXX	0.91	4	5	5	3
	46				28E	FKC	0.47	2103	1192	772	3
	47				33E	AXX	0.56	4	3	3	3
	48				75W	BXI	0.95	13	21	7	3
	50				18W	BXI	0.34	17	9	2	3
	51				3E	BXO	0.39	8	5	2	3
	52				7E	BXI	0.13	8	4	2	3
	53				62E	HHX	0.90	223	252	252	3
	54	1-23.4	-16	35	25W	AXX	0.45	8	5	2	3
	55	1-24.7	-22	18	8W	AXX	0.30	4	2	2	3
	56	1-24.7	-4	17	7W	AXX	0.13	4	2	2	3
	57	1-25.7	-21	4	10E	AXX	0.33	4	2	2	3
	58	1-26.3	13	356	15E	BXI	0.40	25	14	7	3
	59	1-28.7	-12	325	44E	AXX	0.70	4	3	3	3
	60	1-28.7	24	325	45E	BXI	0.78	17	13	3	3
	61	1-29.2	-15	319	57E	BXO	0.84	8	8	4	3
26.05	34				53W	HSX	0.79	25	21	21	4
	36				48W	CSI	0.72	84	61	34	4
	39				24W	CAI	0.51	244	141	119	4
	40				19W	BXI	0.33	8	4	2	4
	41				31W	BXI	0.60	8	5	3	4

DAILY SUNSPOT OBSERVATIONS

JANUARY 1990

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Whole	Area Max	See Remarks
	43				5W	BXO	0.13	17	8	2	4
	44				3W	AXX	0.51	8	5	2	4
	46				18E	FKC	0.31	2380	1252	951	4
	47				22E	BXC	0.43	8	5	2	4
	50				28W	BXI	0.47	13	7	2	4
	51				6W	BXO	0.38	8	5	2	4
	52				4W	BXO	0.07	8	4	2	4
	53				52E	HHX	0.80	362	305	305	4
	55				18W	AXX	0.40	4	2	2	4
	56				16W	BXO	0.25	8	4	2	4
	57				4W	BXI	0.26	8	4	2	4
	58				4E	BXO	0.33	13	7	2	4
	59				35E	AXX	0.57	4	3	3	4
	60				35E	DRI	0.70	76	53	12	4
	61				45E	BXO	0.70	8	6	3	4
27.06	34				67W	HRX	0.91	17	20	10	4
	36				61W	CSI	0.86	38	37	21	4
	38				46W	AXX	0.80	8	7	7	4
	39				38W	CAI	0.67	80	54	28	4
	40				35W	BXO	0.57	8	5	3	4
	41				45W	BXI	0.75	21	1	6	4
	43				18W	BXI	0.31	17	60009	2	4
	46				4E	FKI	0.10	2120	1065	774	4
	47				8E	AXX	0.26	8	4	2	4
	50				42W	BXI	0.68	8	6	3	4
	52				17W	BXI	0.29	8	4	2	4
	53				38E	HHX	0.67	395	265	262	4
	55				31W	AXX	0.55	4	3	3	4
	57				14W	BXI	0.37	8	5	2	4
	58				9W	BXI	0.36	25	14	2	4
	59				20E	AXX	0.38	4	2	2	4
	60				21E	DKI	0.57	622	380	236	4
	61				30E	BXI	0.51	8	5	2	4
	62	1-24.9	20	15	28W	BXO	0.61	8	5	3	4
	63	1-26.4	-5	356	9W	AXX	0.15	4	2	2	4
	64	1-27.5	19	341	6E	AXX	0.44	4	2	2	4
	65	1-28.4	-8	329	18E	BXO	0.31	8	4	2	4
	66	1-30.6	13	301	50E	AXX	0.80	4	4	4	4
	67	2- 1.0	30	281	61E	BXO	0.93	8	12	6	4
28.07	34				80W	AXX	0.98	4	10	10	3

DAILY SUNSPOT OBSERVATIONS

JANUARY 1990

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Area Whole	Max	See Remarks
	36				75W	BXI	0.95	13	21	14	3
	38				59W	BXO	0.90	8	9	5	3
	39				51W	CSI	0.79	76	62	45	3
	41				58W	CRO	0.87	17	17	13	3
	43				30W	AXX	0.51	8	5	2	3
	46				9W	FKC	0.17	2355	1195	811	3
	50				55W	AXX	0.82	4	4	4	3
	53				25E	HHX	0.49	454	261	261	3
	57				30W	BXO	0.57	8	5	3	3
	58				23W	DRI	0.51	50	29	10	3
	60				7E	EKI	0.51	576	334	171	3
	61				15E	DRI	0.30	84	44	26	3
	64				8W	BXO	0.45	8	5	2	3
	66				33E	CRI	0.62	25	16	8	3
	67				48E	BXI	0.85	13	12	4	3
	68				14E	BXO	0.34	8	4	2	3
	69	1- 2.2	23	266	70E	HSX	0.97	109	210	210	3
29.10	38				74W	AXX	0.98	4	10	10	3
	39				64W	CRO	0.90	25	28	24	3
	41				69W	AXX	0.94	8	13	6	3
	46				20W	FKC	0.34	2624	1398	683	3
	50				72W	AXX	0.94	4	6	6	3
	53				11E	CHO	0.34	454	242	240	3
	58				39W	DSI	0.68	118	80	63	3
	59				5W	BXI	0.14	21	11	4	3
	60				5W	EAI	0.51	589	341	163	3
	61				1E	CSO	0.16	55	28	23	3
	64				25W	AXX	0.55	4	3	3	3
	66				20E	DRI	0.46	101	57	19	3
	67				34E	BXI	0.74	17	12	3	3
	68				1E	BXO	0.25	8	4	2	3
	69				55E	HSX	0.87	164	168	164	3
	70	1-26.7	40	352	32W	BXO	0.82	8	7	4	3
	71	1- 4.1	-13	241	77E	HSX	0.97	38	73	73	3
30.06	39				76W	AXX	0.97	8	16	8	3
	46				33W	FKC	0.53	1993	1174	342	3
	53				1W	CHO	0.28	433	225	221	3
	58				52W	CAI	0.82	114	98	87	3
	59				18W	BXO	0.31	21	11	4	3
	60				18W	EAI	0.56	471	285	145	3

DAILY SUNSPOT OBSERVATIONS

JANUARY 1990

Day	Group	CMP Mo-Day	Lat	L	CMD	Type	r/R	Sd	Corre. Whole	Area Max	See	Remarks
	61				13W	CSI	0.28	97	50	44	3	
	66				7E	CRI	0.34	55	29	13	3	
	67				22E	BXI	0.66	21	14	3	3	
	68				12W	BXO	0.30	8	4	2	3	
	69				42E	CSO	0.77	139	109	105	3	
	70				47W	BXI	0.90	13	14	9	3	
	71				66E	HSX	0.91	25	30	25	3	
	72	1-29.7	-21	312	5W	BXI	0.26	8	4	2	3	
	73	2- 3.4	8	251	63E	AXX	0.90	8	9	5	3	
31.07	46				44W	FKC	0.67	1800	1207	584	3	PLAT
	53				13W	CAO	0.34	416	222	220	3	PLAT
	58				66W	HSX	0.93	21	29	29	3	PLAT
	59				31W	CAI	0.52	55	32	27	3	PLAT
	60				30W	DAO	0.67	500	336	200	3	PLAT
	61				24W	CAO	0.43	76	42	26	3	PLAT
	66				6W	BXI	0.34	29	16	2	3	PLAT
	67				10E	BXO	0.57	21	13	3	3	PLAT
	69				28E	CAO	0.64	198	129	124	3	PLAT
	70				59W	CRO	0.94	25	38	25	3	PLAT
	71				51E	AXX	0.77	13	10	3	3	PLAT
	73				46E	BXO	0.75	21	16	3	3	PLAT

SMOOTHED (PREDICTED) SUNSPOT NUMBERS

OCTOBER 1989 – SEPTEMBER 1990

Time	89,10	89,11	89,12	90,01	90,02	90,03	90,04	90,05	90,06	90,07	90,08	90,09
R′	158.0	160.9	163.8	165.9	167.0	166.9	165.8	163.9	161.5	158.7	155.9	153.1
E′	3.2	3.2	6.6	13.3	15.0	20.0	26.5	26.2	30.7	30.2	32.7	30.6

H-ALPHA SOLAR FLARES

JANUARY 1990

Day	Sta	Time Start (UT)	Time Max (UT)	Time End (UT)	Lat	L	CMD	Cen Dist	Area Measurement Appar (Sd)	Area Measurement Corr (Sq)	Imp	Obs Type	A.R.	Rem
1	YUNN	0131E	0131U	0140	S20	341	W12	.349	63	0.7	SN	P	672	
2	BEIJ	0220	0226	0242	N21	13	W57	.862	126	2.6	1B	C	669	E
2	PURP	0226E	0228	0239	N22	12	W56	.862	185	3.8	1N	C	669	
2	YUNN	0235	0307	0348	N25	13	W58	.894	94	2.2	1N	C	669	
2	YUNN	0249	0303	0323	S16	345	W30	.537	79	1.0	SN	C	672	
2	PURP	0304	0308	0324	N23	12	W57	.868	159	3.3	1N	C	669	
2	YUNN	0409E	0409U	0414D	N15	287	E28	.549	47	0.6	SN	P	681	E
3	PURP	0103E	0105	0117	N13	283	E20	.425	66	0.8	SN	C	681	
3	BEIJ	0617E	0617U	0630	N21	13	W73	.988	63		1N	P	669	D
3	PURP	0620	0625	0632	N22	17	W77	.971	66		SB	C	669	
5	BEIJ	0338	0340	0347	N13	287	W12	.356	189	2.1	1F	C	681	D
6	YUNN	0223E	0236U	0242	N14	295	W32	.587	24	0.3	SN	P	681	
6	YUNN	0256	0323	0400D	S12	206	E56	.830	79	1.5	SB	P	17	
6	BEIJ	0522	0525	0528	N12	289	W28	.529	105	1.3	SF	C	681	D
7	BEIJ	0335	0336	0345	S14	206	E43				1N	V	17	E
7	YUNN	0337E	0341U	0351D	S12	203	E46	.728	31	0.5	SN	P	17	
8	YUNN	0315E	0326U	0337	N12	288	W52	.812	31	0.6	SN	P	681	E
9	YUNN	0122	0126	0127D	S12	200	E24	.422	236	2.7	1B	P	17	F
9	YUNN	0618E	0620U	0620D	S24	234	W13	.398	157	1.8	SN	P	11	
9	URUM	0700	0704	0710	S24	235	W15	.424	193	2.2	1N	C	11	D
9	YUNN	0706E	0706U	0713	S24	234	W13	.408	31	0.4	SN	P	11	
10	BEIJ	0243	0246	0307	S25	235	W25	.529	294	3.6	1B	P	11	D
10	YUNN	0243E	0243U	0309	S22	235	W25	.504	314	3.8	1B	P	11	
10	URUM	0255E	0255U	0309	S25	235	W26	.540	177	2.2	1F	C	11	D
13	PURP	0541	0613	0619D	N27	259	W90	1.			B	C	16	Y
13	YUNN	0559	0610	0634	N25	257	W88	1.				P	16	A
13	YUNN	0805E	0808U	0812	S11	172	W 4	.124	173	1.8	SB	P	20	
14	YUNN	0105E	0107U	0134	N20	114	E44	.765	110	1.8	SN	P	27	
15	YUNN	0643	0650	0700E	N20	100	E42	.747	393	6.1	2N	P	27	F

H-ALPHA SOLAR FLARES

JANUARY 1990

Day	Sta	Time Start (UT)	Max (UT)	End (UT)	Lat	L	CMD	Cen Dist	Area Measurement Appar (Sd)	Corr (Sq)	Imp	Obs Type	A.R.	Rem
15	YUNN	0830E	0841U	0901	S35	130	E11	.528	47	0.6	SB	P	22	
16	YUNN	0611	0619	0648	N15	108	E21	.472	79	0.9	SN	C	27	
16	YUNN	0717E	0717U	0734	S35	133	W 5	.512	47	0.6	SN	P	22	E
16	YUNN	0740	0755	0820	S20	40	E88	1.				C		A
17	YUNN	0722E	0724U	0729	S10	36	E79	.980	31		SB	P	36	
17	YUNN	0842E	0843U	0843D	N21	106	E 9	.458	79	0.9	SN	P	27	E
18	YUNN	0221	0225	0229	S11	42	E63	.891	79	1.8	SN	C	36	
19	URUM	0913	0915	0930	N22	112	W25	.596	64	0.8	SF	C	27	D
20	YUNN	0121E	0128U	0144D	N18	104	W25	.556	189	2.4	1B	P	27	
20	BEIJ	0123	0124	0125	N17	104	W25	.540	252	3.1	1F	P	27	E
20	YUNN	0128E	0128U	0144	S31	24	E55	.845	31	0.6	SN	P	39	
21	BEIJ	0245	0250	0305	S12	41	E24				1N	V	36	E
21	PURP	0245E	0250	0301	S12	41	E24	.414	132	1.5	SB	C	36	
21	BEIJ	0430	0450	0509	S12	41	E23	.391	631	7.1	2B	C	36	E
21	BEIJ	0435	0436	0439	N19	106	W42				SF	V	27	D
21	YUNN	0440E	0440U	0603	S12	44	E20	.366	472	5.2	2B	P	36	F
22	BEIJ	0235	0240	0300	S12	40	E12	.161	168	1.8	SN	P	36	E
22	BEIJ	0520	0523	0540	S29	16	E34	.644	105	1.4	SF	P	39	E
22	URUM	0545	0555	0630	S12	40	E10	.201	370	3.9	1N	C	36	E
22	BEIJ	0545	0550	0645	S12	40	E10	.161	463	4.8	1N	C	36	E
23	BEIJ	0503	0505	0518	S 9	338	E60	.851	168	3.3	1B	C	46	E
24	BEIJ	0644	0710	0720	S30	17	E 6	.402	147	1.7	SN	P	39	E
24	YUNN	0705E	0708U	0716	S28	14	E 9	.408	157	1.8	SB	P	39	
27	YUNN	0145E	0149U	0219	S13	50	W63	.887	24	0.5	SB	P	36	
29	YUNN	0631	0638	0645	S31	16	W58	.864	63	1.3	SB	C	39	

INTERVALS OF H-ALPHA FLARE PATROL OBSERVATION

JANUARY 1990

Day	From	To	From	To	From	To	From	To	From	To	From	To	From	To
1	40	645												
2	50	535	544	550	604	815	835	840	954	1006				
3	54	836												
4	44	147	223	801										
5	44	740												
6	49	754												
7	31	420	428	442										
8	256	315	326	450	653	847								
9	109	127	210	233	315	327	500	929						
10	55	730												
11	53	100	131	328	430	515	653	705	713	733	759	845		
12	135	835												
13	107	644	656	755	805	822								
14	100	736												
15	40	600	630	700	740	748	755	814	830	910				
16	155	308	333	343	358	455	502	825						
17	35	42	54	245	407	527	549	558	608	852				
18	200	229	534	545	602	608	622	708	722	735	748	820		
19	104	935												
20	100	310	340	700										
21	115	805												
22	50	910	925	935										
23	38	755												
24	35	821	829	900										
25	120	600	610	745	803	820								
26	140	750	800	840										
27	135	218	300	328										
28	238	358	430	440	450	510	535	925						
29	150	410	440	446	520	750								
30	140	415	610	620	635	640								
31	100	735												

Combined reports from the observatories listed below:

BEIJ PURP URUM YUNN

OBSERVATION OF MAGNETIC AND VELOCITY FIELDS OF SOLAR ACTIVE REGIONS

JANUARY 1990 HUAIROU ST. BEIJING OBS.

Day	L0	Huairou Region	Lat	L	Data
1	330.0	311	(-27)	24	S5, L5
		313	25	10	S5, L5
		317	-10	(3)	S5, L5
		318	-14	339	S5, L5
		319	18	(305)	S5, L5
		1	15	(291)	S5, L5
		2	-35	264	S5, L5
2	316.9	317			S5, L5, D4, V4
		318			V4, D4, S5, L5
		319			S5, L5, D4, V4
		1			S5, L5
		2			S5, L5
3	303.7	317			S5, L5
		318			S5, L5, D4, V4
		319			S5, L5, D4, V4
		1			S5, L5
		2			S5, L5
		3	-28	323	S5, L5
4	290.5	319			S5, L5
		1			S5, L5
		2			S5, L5
		3			S5, L5
5	277.4	319			S5, L5, D4, V4
		1			S5, L5, D4, V4
		2			S5, L5
		3			S5, L5
		4	23	(257)	S5, L5
		5	-28	303	S5, L5
6	264.2	319			S5, L5, D4, V4
		1			S5, L5, D4, V4
7	251.0	319			S5, L5
		1			S5, L5
		6	-16	(210)	S5, L5
		7	-25	(192)	S5, L5
11	198.3	4			S5, L5

OBSERVATION OF MAGNETIC AND VELOCITY FIELDS OF SOLAR ACTIVE REGIONS

JANUARY 1990 HUAIROU ST. BEIJING OBS.

Day	LO	Huairou Region	Lat	L	Data
		6			S5, L5
		7			S5, L5
		8	(-13)	169	S5, L5
		9	16	(146)	S5, L5
		10	-34	(130)	S5, L5
13	172.0	6			S5, L5, D4, V4
		8			S5, L5, V5, D4, V4
14	158.8	13	23	102	S5, L5, D4, V4
		16	34	(114)	S5, L5, D4, V4
16	132.5	13			S5, L5, D4, V4
		16			S5, L5, D4, V4
17	119.3	13			S5, L5
		16			S5, L5
18	106.2	13			S5, L5, D4, V4
		16			S5, L5, V4
		17	-8	49	S5, L5
		20	24	(32)	S5, L5, D4, V4
19	93.0	13			S5, L5, D4, V4
		16			S5, L5, D4, V4
		17			S5, L5, D4, V4
		19	-24	22	S5, L5, D4, V4
20	79.8	13			S5, L5, D4, V4
		16			S5, L5, D4, V4
		17			S5, L5, D4, V4
		19			S5, L5, D4, V4
21	66.7	13			S5, L5, D4, V4
		16			S5, L5, D4, V4
		17			S5, L5, D4, V4
		19			S5, L5, D4, V4
		23	-9	346	S5, L5, D4, V4
22	53.5	17			S5, L5, D4, V4
		23			S5, L5, D4, V4

OBSERVATION OF MAGNETIC AND VELOCITY FIELDS OF SOLAR ACTIVE REGIONS

JANUARY 1990 HUAIROU ST. BEIJING OBS.

Day	LO	Huairou Region	Lat	L	Data
23	40.3	17			S5, L5, D4, V4
		23			S5, L5, D4, V4
24	27.2	17			S5, L5
		23			S5, L5, D4, V4
25	14.9	17			S5, L5
		23			S5, L5
26	0.8	19			S5, L5
		23			S5,L5,T5,Q5,U5,D4,V4
		27	25	330	S5, L5
29	321.3	23			S5,L5,D4,V4,T5,Q5,U5
		26	14	291	S5, L5, D4, V4
		27			S5, L5, D4, V4
30	308.2	23			S5, L5
		26			S5, L5
		27			S5, L5
31	295.0	23			D4, V4, S5, L5
		26			S5, L5, D4, V4
		27			D4, V4, S5, L5
		28	21	(266)	S5, L5
		30	28	276	S5, L5
		31	10	(251)	S5, L5

NPL SPL

1 2 3 4 5 6 7 11 13 14 16 17 18 19 20 21
22 23 24 25 26 29 30 31

SOLAR RADIO EMISSION FLUX

JANUARY 1990

Day	BEIJ 2840	PURP 2700	URUM 9375	YUNN 2840
1	238		365	223
2	230		361	198
3	209		339	195
4	198		339	182
5	192		335	182
6	196		328	173
7	183		320	164
8	181		321	164
9	175		323	160
10	173		317	150
11	173		324	153
12	177		323	158
13	179		317	160
14	178		316	161
15	176		304	
16	192		322	168
17	203		324	176
18	211		334	181
19	227		344	202
20	266		351	211
21	264		362	219
22	268		378	214
23	254		363	207
24	253		356	212
25	248		366	215
26	262		359	224
27	257		352	214
28	221		355	209
29	239		358	209
30	238		361	206
31	223		354	193
Mean	215.6		341.0	189.4

SOLAR RADIO EMISSION OUTSTANDING OCCURRENCES

JANUARY 1990

Day	Freq	Sta	Type	Start (UT)	Time of Maximum (UT)	Duration (Min)	Flux Peak	Density Rel	Density Mean
02	2840	BEIJ	3 S	0300.0	0306.5	11.0	22.0	9.4	
02	2840	YUNN	45 C	0302	0306.8	6.8	22		
09	2840	BEIJ	1 S	0658.0	0700.5	10.0	50.7	28.9	
10	2840	BEIJ	45 C	0237.0E	0242.9	13.0D	225.1	130.1	
10	2840	YUNN	6 S	0239.8	0243.5	11.1	171		
11	2840	BEIJ	45 C	0347.0	0348.0	3.0	28.1	16.2	
12	2840	BEIJ	45 C	0514.0	0516.4	18.0	70.7	39.9	
15	2840	BEIJ	20 GRF	0642.0	0654.2	34.0	15.9	9.0	
17	2840	BEIJ	1 S	0543.0	0544.5	5.0	8.3	4.2	
17	2840	YUNN	3 S	0544	0544.3	0.9	11.7		
17	2840	BEIJ	21 GRF	0624.0	0637.6	86.0	17.7	8.7	
17	2840	YUNN	4 S/F	0720	0721.5	5.3	19		
17	2840	BEIJ	1 S	0720.0	0721.6	9.0	16.1	7.9	
18	2840	BEIJ	45 C	0222.0	0215.5	10.0	39.1	18.5	
19	2840	BEIJ	45 C	0420.0	0426.8	26.0	45.8	20.2	
19	2840	YUNN	45 C	0425.3	0426.8	6.3	37		
19	9375	URUM	4 S/F	0428.6	0432.6	10.4	46.5	13.5	4.5
20	2840	YUNN	3 S	0316.3	0317	2.7	17.7		
21	2840	BEIJ	45 C	0147.0	0148.2	10.0	7.6	2.9	
21	2840	BEIJ	21 GRF	0230.0	0303.4	63.0	6.2	2.4	
21	2840	BEIJ	5 S	0243.0	0249.6	14.0	15.6	5.9	
21	2840	BEIJ	46 C	0419.0	0448.4	64.0	44.1	16.7	
21	2840	YUNN	23 GRF	0429	0435.2	31	23.5		
21	9375	URUM	23 GRF	0432.0	0447.2	16.0	146.2	40.4	9.1
22	2840	BEIJ	21 GRF	0024.0	0121.0	72.0	5.4	2.0	
22	2840	BEIJ	46 C	0029.0	0033.4	6.0	43.4	16.2	
22	2840	BEIJ	45 C	0112.0	0121.0	24.0	25.2	9.1	
23	2840	BEIJ	1 S	0502.0	0503.9	4.0	9.4	3.7	
24	2840	BEIJ	45 C	0356.0	0406.7	21.0	7.8	3.1	
24	2840	BEIJ	1 S	0629.0	0630.5	4.0	5.1	2.0	
24	2840	YUNN	1 S	0817.2	0817.7	0.8	10		
26	2840	BEIJ	45 C	0115.0	0127.7	17.0	7.8	3.1	
26	9375	URUM	4 S/F	0522.0	0522.6	16.0	89.4	25.0	5.6
26	9375	URUM	3 S	0624.0	0625.6	13.0	22.5	6.3	1.7
31	2840	YUNN	1 S	0901.5	0903.7	5.3	14		

INTERVALS OF SOLAR RADIO EMISSION PATROL OBSERVATION

JANUARY 1990

Day	BEIJ From To 2840		PURP From To 2700		URUM From To 9375		YUNN Form To 2840	
1	0028	0715					0200	0800
2	0032	0503					0100	0900
3	0047	0741					0100	0900
4	0045	0740					0100	0900
5	0045	0742					0100	0900
6	0200	0715					0030	0800
7	0035	0620					0200	0830
8	0043	0720					0030	0910
9	0045	0750					0030	0920
10	0042	0745					0030	0910
11	0045	0700					0030	0910
12	0045	0749					0115	0915
13	0044	0720					0045	0805
14	0028	0620					0145	0845
15	0120	0750						
16	0046	0750					0224	0920
17	0048	0750					0025	0910
18	0046	0753			0410	1000	0030	0915
19	0044	0710			0210	0900	0020	0915
20	0050	0718			0210	0930	0020	0920
21	0027	0617			0215	0930	0020	0915
22	0004	0420			0215	1000	0020	0920
23	0050	0746			0205	1000		
24	0225	0745			0205	1000	0040	0920
25	0047	0450			0200	1000	0020	0920
26	0038	0507			0205	0920	0030	0400
27	0043	0743			0215	1000	0110	0845
28	0030	0630			0210	1000	0220	0430
29	0036	0640			0230	0950	0200	0800
30	0044	0820			0230	0950	0130	0810
31	0033	0754			0200	1000	0030	0930

COSMIC RAY NEUTRON INTENSITY

Real Counts: 256 Times (Tabulated Counts Plus 1500)

JAN 1990 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	396	395	401	391	392	391	402	400	396	393	400	392	398	399	385	397	400	400	400	390	393	407	395	414	397.0	24
2	412	405	405	405	407	403	407	397	407	403	402	401	401	403	406	402	382	392	387	396	396	401	405	395	400.8	24
3	409	407	407	405	411	403	391	400	397	386	394	396	394	398	393	392	393	399	399	403	407	401	396	391	398.8	24
4	398	404	402	397	410	405	396	405	403	398	397	404	399	408	405	399	412	387	397	404	410	399	408	406	402.2	24
5	406	409	410	403	410	402	409	401	411	405	402	405	393	396	399	399	402	404	405	409	403	408	401	414	404.4	24
6	408	410	404	408	408	403	406	419	393	401	404	405	413	407	410	403	397	408	410	406	404	410	408	417	406.8	24
7	397	394	410	407	411	407	420	414	413	413	402	412	416	409	405	406	410	407	400	401	405	409	403	405	407.3	24
8	411	406	409	414	405	412	411	403	398	410	407	395	397	394	393	397	399	397	402	400	406	408	408	410	403.8	24
9	401	406	410	402	407	410	405	403	403	411	403	407	406	397	416	398	400	401	402	396	401	402	406	410	404.3	24
10	406	418	415	401	405	405	407	416	407	399	410	406	404	415	404	420	408	406	423	414	413	423	420	426	411.3	24
11	406	419	420	414	411	414	421	415	421	427	419	421	425	420	412	420	426	433	434	417	432	418	425	417	420.3	24
12	432	424	428	435	421	436	441	434	422	426	428	419	425	419	434	423	421	423	423	432	428	425	436	436	428.0	24
13	439	435	434	425	437	431	428	424	418	420	422	432	421	418	424	418	429	423	429	421	430	450	433	435	428.2	24
14	432	440	431	441	439	433	440	430	432	420	429	418	424	418	427	416	429	431	424	435	430	427	429	431	429.4	24
15	425	428	429	428	421	434	420	418	420	410	414	413	422	419	418	421	416	416	425	432	426	431	424	428	422.4	24
16	425	427	428	424	427	423	418	413	414	421	419	413	411	413	414	418	416	423	426	414	422	421	425	427	420.1	24
17	426	433	410	428	418	416	415	404	418	409	407	418	420	414	403	412	395	406	430	414	428	431	439	420	417.3	24
18	425	429	431	428	429	437	422	425	423	435	442	435	435	424	430	426	419	437	436	436	429	442	439	446	431.7	24
19	440	445	445	445	440	447	439	440	443	435	441	442	435	440	439	443	440	433	431	437	444	438	434	428	439.3	24
20	431	431	427	429	423	429	420	425	420	427	423	434	438	435	440	428	444	439	435	443	440	436	441	448	432.8	24
21	442	443	440	445	461	453	467	450	455	447	459	448	461	443	456	447	447	448	456	451	448	446	458	451	450.9	24
22	428	448	435	446	444	454	456	453	449	448	453	451	452	449	446	456	446	440	449	451	450	453	460	448	448.5	24
23	441	456	444	438	448	445	457	444	432	428	428	440	458	466	453	450	434	436	438	443	442	447	453	443	444.3	24
24	442	440	451	452	441	439	434	441	431	446	432	439	437	431	440	436	435	443	446	445	432	445	450	442	440.4	24
25	440	447	452	448	444	454	445	438	438	445	438	441	450	440	459	436	446	449	447	444	434	437	443	430	443.5	24
26	441	439	437	450	447	440	450	446	445	438	448	441	438	438	439	439	438	438	443	440	434	429	429	432	440.0	24
27	428	429	430	436	438	438	441	445	436	433	438	443	430	432	435	429	432	434	428	436	437	427	432	436	434.3	24
28	443	438	437	436	433	426	431	416	422	418	406	397	420	412	408	403	403	407	406	409	416	417	418	421	418.5	24
29	422	425	424	431	432	433	447	446	435	442	446	434	442	439	429	422	433	432	431	432	426	432	439	444	434.1	24
30	434	443	442	446	446	451	444	444	447	437	442	431	430	434	428	441	432	432	437	446	440	442	431	442	439.3	24
31	438	446	431	434	443	424	430	418	431	421	426	422	424	430	432	430	432	435	433	430	444	435	437	435	431.7	24

MONTHLY MEAN=423.599

MONTHLY MEAN DAILY VARIATION FOR 31 COMPLETE DAYS DEVIATIONS FROM AVERAGE:423.599

(1-12)	-0.24	2.82	1.53	1.95	2.50	2.14	2.85	-0.15	-1.66	-2.57	-1.63	-2.47
(13-24)	-0.41	-2.31	-1.60	-3.37	-3.73	-2.34	0.01	-0.15	0.59	2.11	3.01	3.11

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

U.T.=(1 2.34 1.16 2.62 1.76) (2 0.03 -0.20 0.20 9.27) (3 -0.61 -0.92 1.10 5.25) (4 0.41 0.11 0.42 0.25)

L.T.=(1 -2.18 1.45 2.62 9.76) (2 -0.19 0.07 0.20 5.27) (3 -0.61 -0.92 1.10 5.25) (4 -0.30 0.30 0.42 2.25)

COSMIC RAY MESON INTENSITY

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

JAN 1990 — 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	33	34	35	35	34	34	35	34	35	35	36	37	35	34	36	36	38	39	39	38	38	37	37	38	35.9	24
2	38	40	38	37	37	35	36	35	36	36	35	37	36	35	37	33	36	37	35	34	33	34	31	33	35.6	24
3	34	33	34	34	36	33	32	31	32	31	30	30	31	30	31	33	29	30	32	32	29	28	29	30	31.4	24
4	29	33	31	29	31	27	27	27	27	25	27	28	28	28	29	29	30	31	31	30	30	29	32	32	29.2	24
5	33	33	36	36	35	34	34	34	32	35	34	33	33	33	34	34	34	33	35	35	35	35	36	36	34.3	24
6	37	35	36	35	34	35	32	31	29	31	29	31	31	32	31	32	31	33	29	30	31	30	32	31	32.0	24
7	32	30	33	34	32	34	35	33	34	31	35	34	34	34	33	31	31	31	33	33	32	29	30	34	32.6	24
8	33	32	33	33	33	33	31	30	31	30	30	30	32	32	30	30	31	29	30	27	28	30	30	31	30.8	24
9	29	32	32	32	30	32	31	30	29	33	32	31	34	32	35	31	33	33	33	33	33	33	34	34	32.1	24
10	35	37	36	37	35	35	35	34	35	32	33	34	33	35	34	35	35	34	35	32	31	33	33	33	34.2	24
11	35	35	37	36	35	36	34	32	35	36	34	34	36	37	36	35	39	38	38	34	36	36	38	38	35.8	24
12	41	41	43	43	42	42	40	40	38	38	37	38	38	37	38	38	36	37	37	36	35	34	34	35	38.3	24
13	35	36	37	34	34	35	34	35	34	31	33	31	32	33	34	33	34	33	34	33	35	35	33	36	33.9	24
14	38	37	38	39	37	38	37	35	37	40	35	36	34	36	35	34	36	36	35	36	35	35	34	36	36.2	24
15	37	37	36	34	35	33	33	33	30	31	32	32	32	31	32	33	32	34	31	32	32	33	33	36	33.1	24
16	35	36	34	33	33	29	30	28	29	29	27	29	30	29	26	32	27	30	28	29	28	27	28	29	29.8	24
17	32	31	30	31	34	31	28	28	30	29	29	30	30	32	31	30	32	32	32	34	34	36	35	39	31.7	24
18	39	39	40	39	41	37	37	40	35	37	38	36	40	39	41	40	41	40	40	39	41	43	43	42	39.5	24
19	46	46	48	48	50	46	46	46	47	46	45	45	46	46	44	45	46	44	44	41	41	42	42	41	45.0	24
20	39	41	42	41	39	40	39	40	39	39	36	39	39	38	38	39	37	38	38	37	36	35	38	36	38.5	24
21	43	45	43	43	44	44	42	43	47	44	45	44	46	45	45	48	46	46	46	47	44	44	44	47	44.8	24
22	44	48	48	48	48	48	49	46	43	44	43	44	44	47	44	44	44	45	44	46	45	44	46	43	45.4	24
23	49	49	47	45	45	48	46	48	44	44	44	44	46	45	46	46	47	45	47	44	44	44	44	43	45.6	24
24	46	46	46	47	49	47	45	44	42	43	44	45	47	45	46	46	48	47	46	46	47	45	45	46	45.8	24
25	48	46	47	46	46	45	47	45	45	45	45	47	46	45	46	47	45	45	44	44	44	45	44	44	45.5	24
26	43	48	48	45	45	44	45	44	44	43	45	43	45	45	43	45	46	42	42	41	40	40	40	40	43.6	24
27	42	43	43	43	43	43	42	40	41	40	40	38	39	39	37	39	36	39	38	38	37	34	37	37	39.5	24
28	38	38	38	38	39	37	38	39	38	35	34	35	36	35	36	34	38	36	38	36	38	38	38	39	37.0	24
29	42	43	44	48	47	47	45	46	43	44	46	44	46	46	43	41	42	43	46	44	43	43	42	45	44.3	24
30	47	48	49	47	47	46	45	42	45	45	40	43	43	42	44	44	45	45	42	43	44	42	41	46	44.4	24
31	46	45	45	44	45	42	41	38	38	37	37	39	38	39	39	39	39	39	39	39	38	38	38	38	40.0	24

MONTHLY MEAN= 37.597

MONTHLY MEAN DAILY VARIATION FOR 31 COMPLETE DAYS DEVIATIONS FROM AVERAGE: 37.597

(1-12)	1.05	1.66	1.98	1.56	1.60	0.79	0.18	-0.47	-0.69	-0.85	-1.15	-0.79
(13-24)	-0.18	-0.31	-0.37	-0.31	-0.05	-0.05	-0.15	-0.73	-0.92	-1.11	-0.79	0.08

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

U.T.=(1 0.62 0.57 0.84 2.82) (2 -0.10 0.92 0.93 3.21) (3 -0.08 0.25 0.27 2.40) (4 0.12 0.11 0.16 0.72)

L.T.=(1 -0.80 0.26 0.84 10.82) (2 0.85 -0.37 0.93 11.21) (3 -0.08 0.25 0.27 2.40) (4 -0.16 0.05 0.16 2.72)

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

JAN 1990

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	97	100	99	103	98	88	114	96	102	92	101	107	112	96	85	80	97	85	76	96	95	96	100	104	96.6	24
2	90	93	112	103	108	107	113	108	97	89	93	101	103	98	83	97	91	96	99	106	92	98	94	98	98.7	24
3	108	105	122	116	120	104	121	101	97	109	98	101	102	94	88	94	105	111	92	93	98	99	109	104	103.8	24
4	101	109	104	115	110	122	127	117	102	99	102	95	87	106	91	93	101	111	98	108	102	112	92	98	104.3	24
5	105	102	102	121	114	113	118	109	114	112	117	103	101	105	109	96	83	107	108	100	103	103	101	118	106.8	24
6	99	109	100	114	111	110	112	120	103	99	106	105	97	90	118	92	113	111	105	101	110	108	112	110	106.5	24
7	105	103	106	109	112	108	110	109	114	119	114	92	95	91	96	97	94	105	98	92	86	98	95	97	101.9	24
8	104	95	89	115	120	120	125	123	105	112	115	101	99	95	91	99	84	99	102	108	104	95	101	98	104.1	24
9	90	97	106	107	110	124	112	122	118	118	111	107	95	98	99	93	87	88	96	92	104	98	85	105	102.6	24
10	98	92	102	113	128	93	119	109	95	101	106	106	94	103	98	97	98	94	96	94	90	80	80	96	99.3	24
11	86	89	106	95	107	108	101	128	111	113	112	104	108	105	88	95	103	91	80	81	74	87	80	91	97.6	24
12	92	105	87	96	125	117	105	119	103	98	89	98	112	90	93	97	103	89	106	95	99	102	93	95	100.3	24
13	101	99	107	113	114	121	116	124	102	89	90	101	91	83	86	75	86	91	102	98	96	99	88	95	98.6	24
14	97	113	103	105	104	127	104	104	96	87	83	98	69	77	90	75	88	98	81	87	92	92	82	95	93.6	24
15	92	117	105	116	124	114	101	93	102	105	99	95	90	85	97	89	114	104	75	95	117	105	117	103	102.3	24
16	110	131	135	121	116	123	131	107	111	96	101	97	103	95	100	102	86	103	105	114	115	115	116	122	110.6	24
17	121	136	119	111	109	143	129	115	98	114	106	98	97	93	94	95	91	93	106	93	102	99	109	112	107.6	24
18	110	111	115	116	122	123	125	119	116	101	107	111	114	108	103	97	91	107	99	97	115	112	110	115	110.2	24
19	116	121	122	116	110	136	130	127	124	132	133	119	124	123	116	132	116	116	109	115	125	104	108	105	120.0	24
20	103	124	114	123	127	139	131	135	116	135	136	132	120	116	107	139	120	128	136	129	141	115	110	124	125.0	24
21	132	122	126	130	127	150	135	149	134	125	125	144	142	116	108	131	106	116	124	101	127	125	131	116	126.8	24
22	121	121	124	139	140	149	159	164	149	157	148	116	139	124	138	118	143	136	128	138	130	135	132	147	137.3	24
23	157	137	132	156	146	150	153	142	149	149	149	154	133	120	135	131	137	115	141	146	134	146	142	146	141.7	24
24	139	147	137	148	145	135	134	135	149	143	144	130	134	137	128	117	127	135	122	130	129	124	122	123	133.9	24
25	131	131	120	122	138	120	128	127	140	127	128	125	129	118	124	122	119	130	114	125	118	125	119	127	125.3	24
26	111	127	117	120	116	138	146	139	123	146	131	143	131	120	133	124	112	125	127	119	112	119	120	115	125.6	24
27	100	105	116	127	139	125	150	137	131	133	119	117	130	112	125	123	121	121	119	118	122	114	120	122	122.8	24
28	127	129	133	137	142	132	141	137	139	114	106	108	115	93	102	87	80	93	77	98	102	110	111	101	113.1	24
29	103	111	105	127	106	121	133	129	130	107	108	108	100	95	96	88	88	95	97	96	104	107	112	119	107.7	24
30	123	97	123	131	111	121	116	125	115	108	105	85	96	79	89	99	102	112	112	115	97	120	116	127	109.3	24
31	115	130	142	129	139	142	132	128	127	126	115	120	116	115	120	114	134	118	122	122	119	130	134	125	125.6	24

MONTHLY MEAN=111.590

MONTHLY MEAN DAILY VARIATION FOR 31 COMPLETE DAYS DEVIATIONS FROM AVERAGE:111.590

(1-12)	-2.43	1.57	2.28	7.57	8.99	11.73	13.28	10.89	4.93	3.09	1.22	-1.24
(13-24)	-2.62	-9.01	-7.40	-8.75	-7.72	-4.40	-6.69	-5.07	-3.40	-2.82	-3.82	-0.20

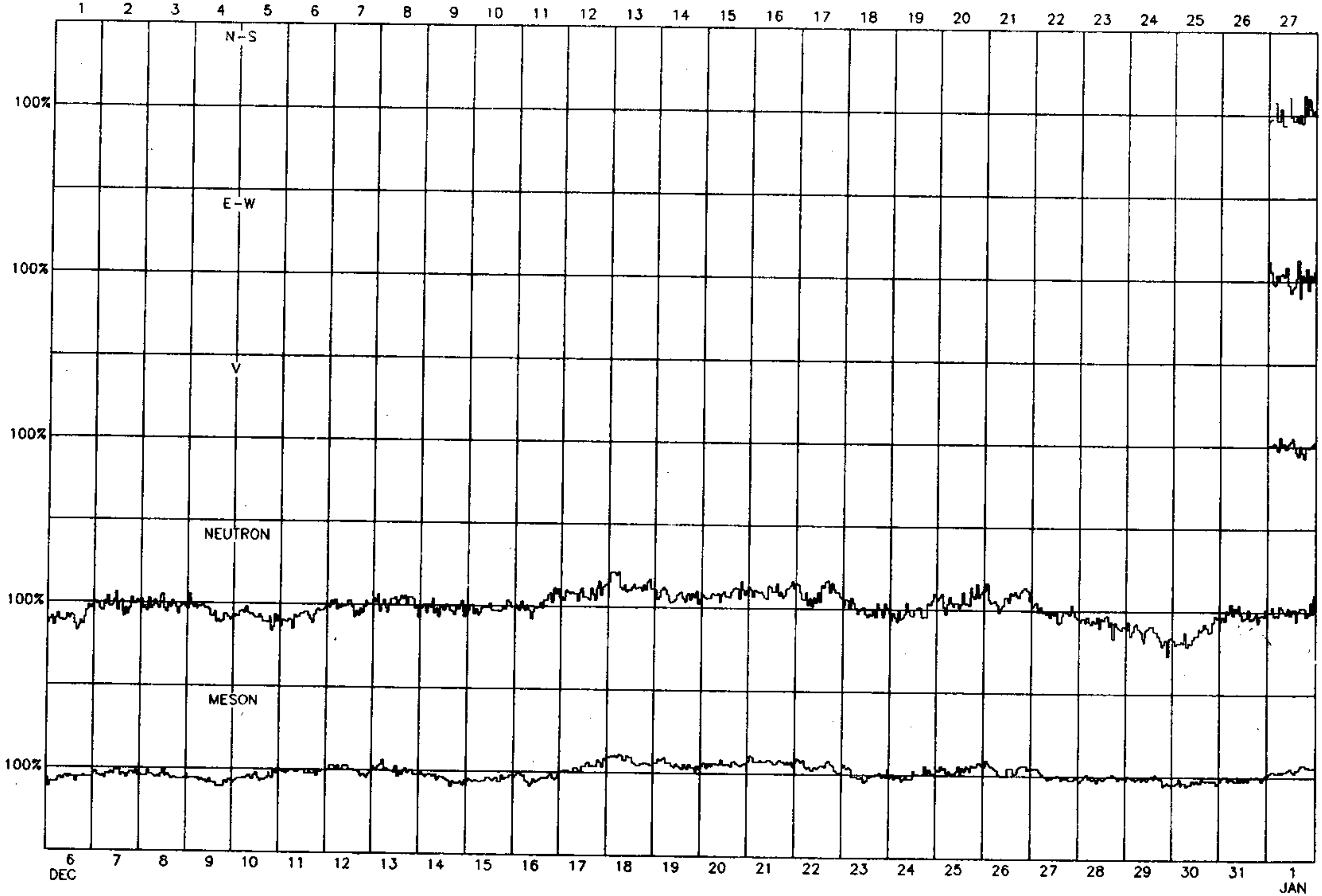
HARMONIC COMPONENTS (ORDER, COS, SIN, AMPLITUDE, MAX.-HR)

U.T.=(1 1.17 8.41 8.49 5.47) (2 -2.76 -1.27 3.04 6.82) (3 -0.40 -0.66 0.77 5.31) (4 0.86 -0.32 0.92 5.66)

L.T.=(1 -7.86 -3.19 8.49 13.47) (2 0.29 3.03 3.04 2.82) (3 -0.40 -0.66 0.77 5.31) (4 -0.16 0.90 0.92 1.66)

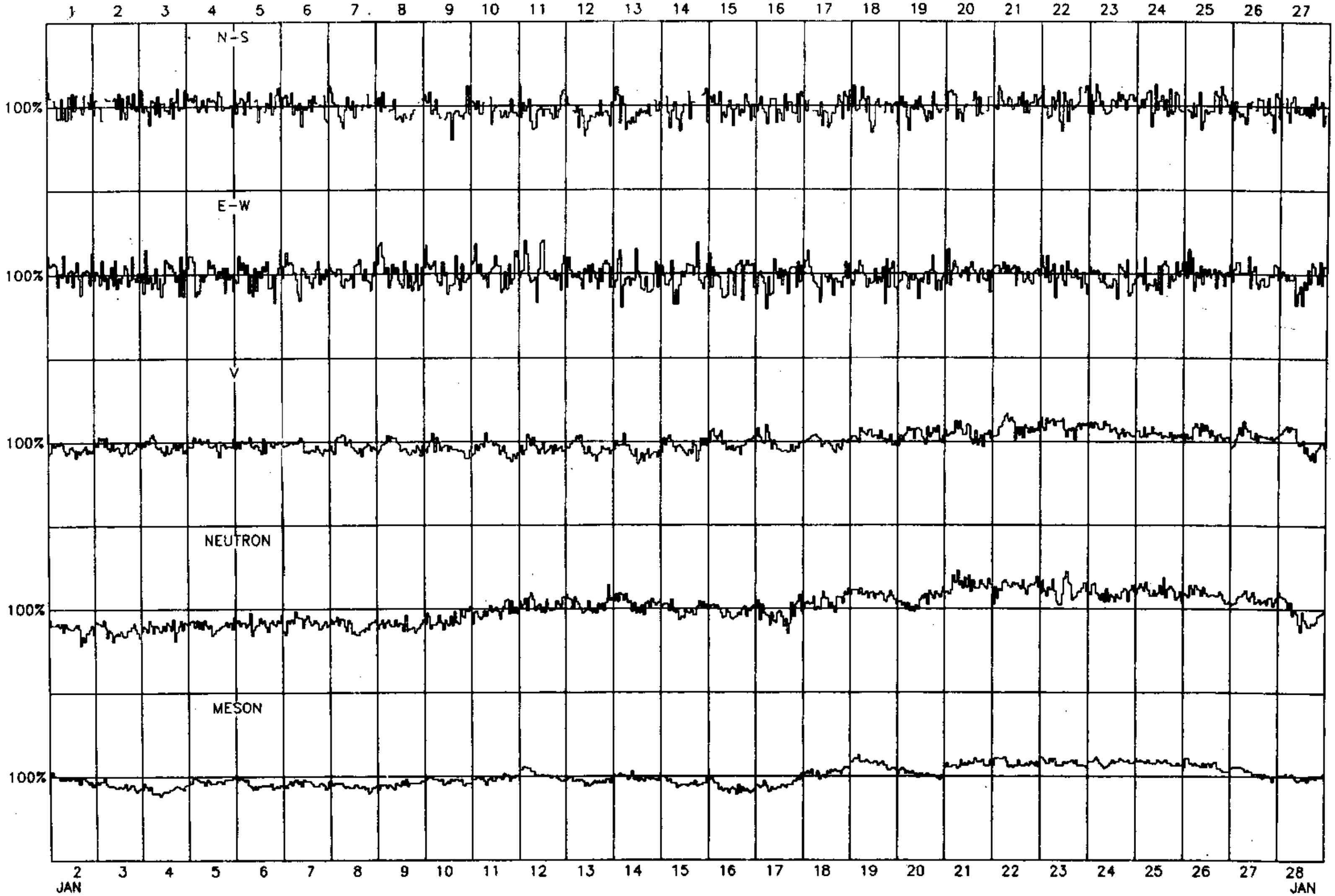
COSMIC RAY INDICES

Bartels Rotation 2136 (DEC 1989–JAN 1990)



COSMIC RAY INDICES

Bartels Rotation 2137 (JAN 1990)



SUDDEN IONOSPHERIC DISTURBANCES (D REGION)

JANUARY 1990

Day	Sta	Start (UT)	Max (UT)	End (UT)	Imp	SPA LF	SPA VLF	SFA LF
01	YUNN	0035	0037	0039	2	- 4.7		
01	YUNN	0039	0042	0107	2-	- 3.7		
01	YUNN	0350	0353	0443	1	- 1.1		
01	LINT	0344	0400	0435	1	- 1.8	- 6	- 1.4,+ 0.4
02	YUNN	0224	0230	0255	2-	- 3.7		
02	LINT	0223	0234	0250D	2-	- 3.5	-15	+ 1.5
02	LINT	0250	0253	0300D	1-	- 0.4	- 4	- 0.4
02	LINT	0309	0320	0355	1-	- 0.8	-10	+ 1.3
02	LINT	0441	0448	0510	1-	- 0.9	- 4	- 0.2
03	LINT	0420	0431	0500	1-	- 0.5	- 3	- 0.5
03	YUNN	0621	0624	0724	2-	- 3.3		
03	LINT	0621	0626	0705	2	- 4.1	-24	- 1.6,+ 1.2
04	YUNN	0340	0354	0449	1+	- 2.8		
04	LINT	0337	0400	0450	1+	- 2.8	-14	- 0.5
04	LINT	0522	0530	0604	1	- 1.5	-10	+ 1.2
04	YUNN	0525	0530	0601	1-	- 0.9		
04	YUNN	0752	0753	0808	1	- 1.9		
05	LINT	0329	0335	0400	1-	- 0.8	- 3	+ 0.5
06	LINT	0257	0311	0350	1	- 1.6	- 9	- 0.7
06	YUNN	1042	1043	1100	1+	- 2.4		
07	LINT	0152	0210	0218	1-	- 0.9	0	+ 0.6
08	LINT	0317	0320	0339	1	- 1.4	- 4	- 1.9
09	YUNN	0317	0321	0336	1	- 1.2		
10	LINT	0224	0230	0239U	1-	- 0.3	0	- 0.3
10	LINT	0241	0247	0355	3	- 7.8	-32	- 9.2,+ 2.1
11	LINT	0024	0030	0035	2+	- 5.2	- 2	+ 7.8
11	LINT	0557	0604	0630	1-	- 1.0	- 4	- 2.1
12	LINT	0052	0106	0140	3+	- 9.7	-19	+ 2.2
12	LINT	0750	0755	0803D	2	- 4.1	- 9	- 8.1
12	LINT	0803	0808	0830U	2	- 4.6	-11	+11.1
13	LINT	0350	0410	0440	1	- 1.2	- 6	- 2.6
13	LINT	0610	0616	0624D	1-	- 0.7	- 2	- 0.7
13	LINT	0624	0630	0648	1-	- 0.6	- 3	+ 6.5
14	LINT	0212	0221	0230	1-	- 0.9	- 3	- 0.4
15	LINT	0448	0451	0508	1-	- 0.3	- 3	+ 0.9
15	LINT	0646	0700	0728	2-	- 3.7	-17	- 0.8
16	LINT	0204	0220	0250U	1-	- 1.0		- 2.4
16	LINT	0748	0810	0950	3+	-10.7	-33	- 3.8,+ 0.8
17	LINT	0028	0035	0050	1+	- 2.4	- 3	- 1.7
17	LINT	0222	0228	0250	1-	- 0.6	- 2	- 0.7
17	LINT	0348	0359	0420	1-	- 0.4	- 4	- 3.9
17	LINT	0544	0548	0610	1+	- 2.2	- 9	- 8.1

SUDDEN IONOSPHERIC DISTURBANCES (D REGION)

JANUARY 1990

Day	Sta	Start (UT)	Max (UT)	End (UT)	Imp	SPA LF	SPA VLF	SFA LF
17	LINT	0721	0725	0800	2-	- 3.6	-15	- 8.4
17	LINT	0900	0936	1030	3+	-11.9U	- 8	- 4.7,+ 7.6
18	LINT	0223	0229	0350	3	- 7.6	-27	-10.0,+ 3.5
18	LINT	0413	0325	0600	3-	- 6.4	-32	- 5.0,+ 6.0
19	LINT	0128	0133	0143U	1-	- 0.8	- 4	0
19	LINT	0148	0153	0220	1	- 1.6	- 7	- 3.0
19	LINT	0346	0350	0414	1-	- 0.5	- 3	- 2.1
19	LINT	0427	0431	0510	2-	- 3.1	-16	-10.1
20	LINT	0108	0118	0148	1	- 1.8	0	+ 1.1
20	LINT	0306	0328	0400	1	- 1.2	0	- 3.3
21	LINT	0130	0138	0150U	1-	- 1.0	- 4	+ 1.0
21	LINT	0244	0254	0406	2	- 4.8	-21	- 8.0
21	LINT	0430	0450	0600D	3+	-10.5	-40	-14.0,+16.1
22	LINT	0100	0110	0120U		- 0.9	- 3	
22	LINT	0240	0248	0258	1-	- 0.5	- 3	- 2.1
22	LINT	0419	0426	0458	1	- 1.5	- 8	- 9.2
22	LINT	0520	0528	0543	1	- 1.1	- 4	- 5.2
22	LINT	0548	0555	0700		- 4.5	-28	
22	LINT	0825	0828	0847	1-	- 0.8	- 5	- 1.6
23	LINT	0305	0322	0350	1-	- 0.4	- 2	- 0.3
23	LINT	0503	0507	0700	3	- 7.9	-38	-10.4,+ 8.4
24	LINT	0408	0418	0437	1-	- 0.5		- 0.7
25	YUNN	0551	0553	0618	1	- 1.2		
25	YUNN	0725	0727	0752	1	- 1.8		
25	LINT	0720	0727	0750	1	- 1.4	- 6	- 0.4
26	LINT	0519	0526	0600	1	- 1.5	- 8	- 2.9
28	LINT	0310	0316	0328		- 0.5		
28	YUNN	1013	1016	1031	1+	- 2.3		
29	LINT	0044	0054	0118D	2+	- 5.8		- 4.1,+ 3.9
29	LINT	0118	0128	0138U		- 0.4		
29	YUNN	0918	0920	0945	3	- 7.4		

GEOMAGNETIC ACTIVITY INDICES K AND A_K

JANUARY 1990 BGMO

Day	0–3	3–6	6–9	9–12	12–15	15–18	18–21	21–24	Sum	A_K
1	1	1	2	3	3	3	4	3	20	13
2	3	3	2	3	2	3	3	3	22	13
3	3	2	2	0	3	4	2	1	17	10
4	1	1	0	3	3	2	2	2	14	7
5	2	2	3	2	2	4	3	3	21	13
6 Q	1	1	1	0	2	1	3	0	9	4
7 Q	2	2	3	1	2	0	0	0	10	5
8	0	1	1	2	4	5	3	3	19	15
9	2	2	2	1	3	2	1	2	15	7
10	2	1	3	3	2	4	3	2	20	12
11	2	2	4	3	5	3	2	2	23	17
12	2	3	2	4	2	3	3	2	21	13
13	1	1	2	3	1	3	2	1	14	7
14	0	1	0	2	3	3	0	1	10	5
15	2	2	1	0	3	4	0	0	12	7
16	3	2	1	2	1	4	4	3	20	13
17	1	2	2	1	1	2	2	2	13	6
18	3	1	1	2	3	3	1	2	16	9
19 Q	1	0	0	0	0	0	3	3	7	4
20	4	3	4	2	3	4	4	3	27	20
21	3	3	3	4	4	3	3	2	25	17
22 D	2	3	1	3	2	3	4	1	19	12
23 D	2	3	3	3	4	2	3	3	23	15
24 D	3	3	3	3	3	3	4	3	25	17
25	3	2	2	2	4	3	1	1	18	11
26	0	1	0	3	2	3	0	0	9	5
27 Q	0	1	1	0	1	2	2	0	7	3
28 Q	1	1	2	2	3	3	3	3	18	10
29 D	3	3	5	3	4	3	3	3	27	21
30 D	3	4	3	3	3	5	5	2	28	24
31	4	3	2	3	4	3	3	0	22	30

Sum 365
Mean 11.8

MAGNETIC STORMS

JANUARY 1990

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
8	14	32	8	24	SC	0.9	27	1	m	8	6	5	4.7	80	5

耀斑出现的周期性和大耀斑峰期的迟至

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近年来不少工作讨论太阳耀斑产率的 154 天左右的周期性问题（如 Rieger 等 1984[1]；Bai 和 Sturrock，1987[2]　）。最近，Bai[3]　又指出，峰值计数率大于 1000 c/s 的硬 X 射线耀斑的 154 天周期在 1984 年 1 月到 1989 年 6 月间不存在。表 1 中我们列出了关于 154 天周期的一些分析结果。由表 1 可见，这个周期也适用于硬 X 射线爆发之外的某些种太阳活动。我们根据 SMM 卫星 HXRBS 的观测资料[4]，对 1980 年 2 月至 1985 年 12 月的硬 X 射线爆发分级做产率的功率谱分析，发现硬 X 射线耀斑产率的周期与耀斑的级别有关。我们是以爆发的峰值计数率来分级的。图 1 给出了分析的结果。由图 1 可以看出，除接近频率为零的峰之外，对于 2000 c/s $\leqslant$ 峰计数率 $<$ 5000 c/s 的爆发（136 个），最显著的峰对应于 148 $\pm$ 5 天的周期（图 1 (a)）。　对于峰计数率 $>$ 5000 c/s 的爆发（143 个），除 150 天左右的周期外，还有一个显著的谱峰（相当于 150 天峰的 0.67），对应于 80 $\pm$ 2 天的周期（图 1 (b)）。　对于峰计数率 $>$ 10000 c/s 的爆发（80 个），80 天左右的周期更加明显（相当于 150 天峰的 0.70）（图 1 (c)）。因此，大的硬 X 射线爆发的出现还有 80 天左右的周期。这与用时间叠加法对质子耀斑得到结论一致[5]。图 2 画出了 1980 年 2 月—1984 年 12 月的峰计数率在 2000—5000 c/s 和峰计数率大于 5000 c/s 的硬 X 射线爆发的数目的时间分布。横坐标以 140 天为单位，原点对应 1980 年 2 月 19 日。纵坐标表示爆发的数目。图 2 表明，第 21 周大的爆发（$>$ 5000 c/s）的数目峰（在 1981 年 2 月中到 6 月末）比中等爆发（2000 c/s 至 5000 c/s）的数目峰（在 1980 年 5 月初到 1980 年 9 月中）有半年至 1 年的迟至。这类统计工作有助于我们对太阳活动总体性质的了解。本工作得到国家自然科学基金及科学院日地空整体行为项目的资助。

（参考文献内容请参看下页英文稿）

本文 1990 年 6 月收到

PERIODICITY AND PEAK DELAY OF LARGE SOLAR BURST OCCURRENCE RATE

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Over the past years a number of papers have been devoted to the investigation of the 154-day periodicity of the solar burst occurrence rate (e.g. Rieger et al. 1984 [1], and Bai and Sturrock, 1987 [2]). Recently, Bai [3] pointed out that the periodicity was not present in the interval from January 1984 to June 1989.

In table 1 results of some researches in this field are listed . One can see in Table 1 that this 154-day occurrence rate periodicity fits various kinds of solar activities. Using the HXRBS events [4] from 1980 February to 1985 December, we make Fourier power spectra for major hard X-ray bursts (peak rate $\geq$ 2000 c/s) and find that the periodicity of the hard X-ray burst occurrence rate depends on the importance of the bursts studied, as shown in Figure 1. One can find that for 136 bursts whose peak rates are $\geq$2000 c/s and <5000 c/s, a 148 $\pm$5 day periodicity is significant (Fig 1(a)); for 143 bursts with peak rates> 5000 c/s, besides the 150-day period an 80-day period is significant (Fig. 1 (b));and for 80 bursts with peak rates> 10000 c/s , the 80-day period is more significant (Fig. 1 (c)). In 1974 Ai et al. [5] found an 80-day periodicity of occurrence rate for solar proton events.

In Figure 2 the time distribution of HXRBS event occurrence rate for 1980 February to 1985 December is given. Figure 2 shows that the medium bursts (2000$\leq$ peak rate < 5000 c/s) has its rate peak in the interval from 1980 May to 1980 September while the large bursts (peak rate >5000 c/s)in the interval from 1981 February to 1981 June. So, the large burst rate peak is 0.5-1 year delay with respect to the medium bursts studied.

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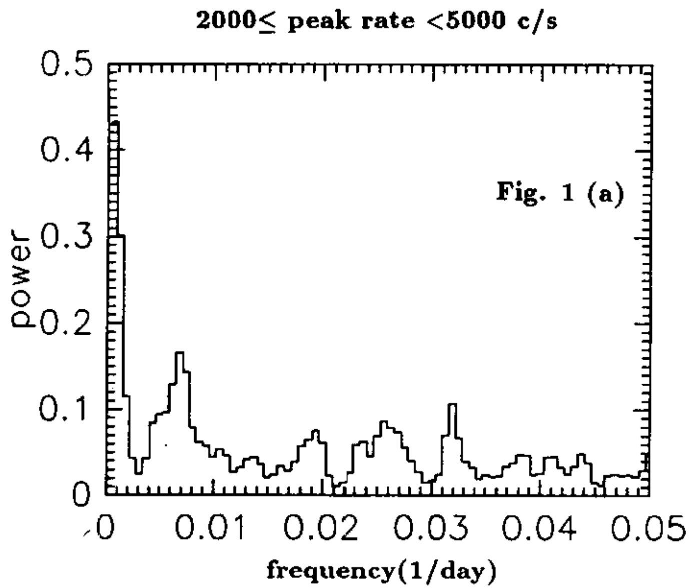
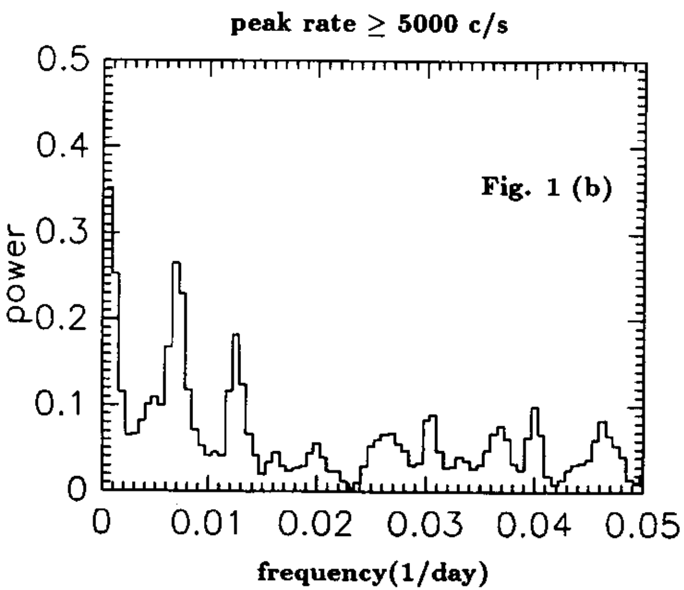
TABLE 1

154-day Periodicity of Solar Activities

Authors	Period (Days)	Data Type	Time Interval
Rieger et al. Nature, 1984, 312,623.	154 152	139 γ-ray flares, $\geq$ 300kev 532($\geq M2.5$) flares, 1-8 Å	1980 Feb.– –1983 Sep.
Kiplinger et al., Bull. A.A.S.,1984 16,891.	158	6775 hard X-ray burst, 25-33 kev	1980 Feb.- -1984 July
Bogart and Bai, Ap.J.(letters)1985 299 L51.	151.8±1.8	21847 microwave events, flux >10 s.f.u. duration.<30 min. $\geq$1GHz	1966 Apr.– -1983 Dec. (20,21 Cycles)
Ichimoto et al., Nature, 1985, 316,422.	155	8821 H_α flares	1965 Jan.- -1984 Feb. (20,21 Cycles)
Bai and Sturrock, Nature,1987,327,6123.	152	hard X-ray bursts, peak rate >1000 c/s	1980 Feb.- -1983 Dec.
Lean and Brueckner, Ap.J. 1989,337,568.	155	radio fluxes at 10.7 cm and sunspot numbers	1954-1986 (19,20,21 Solar Cycles)
Bai, in Proc. Max'91 Workshop 2,R.M.Wingle and B.R.Dennis(eds.), 1989,P.46.	No	hard X-ray bursts, peak rate >1000 c	1984 Jan.- -1989 June
Liu, publ.Yunnan Obs. 1990 (in press).	No	5447 microwave events, >1 GHz	1986 Jan.- -1988 Dec.
Wang and Qiu, in this Issue, 1990.	150 150 80	hard X-ray bursts, peak rate $\geq$2000 c/s hard X-ray bursts, peak rate $\geq$5000 c/s	1980 Feb.- -1985 Dec. 1980 Feb- -1985 Dec.





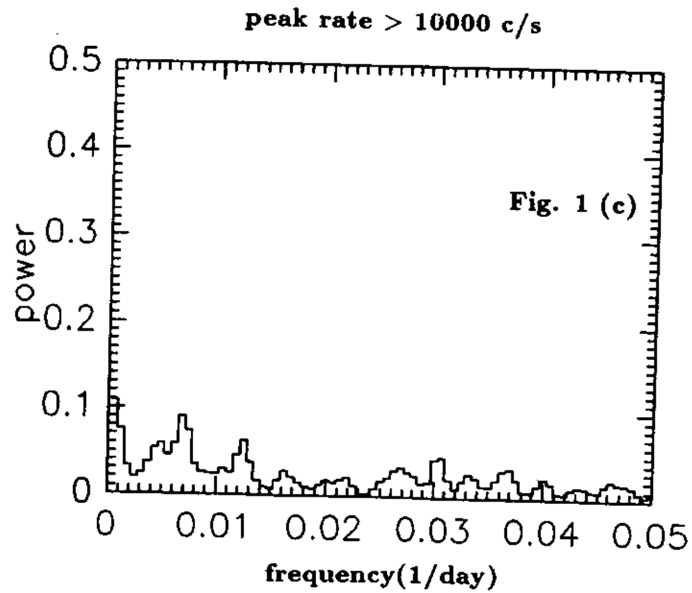


Fig. 1 Fourier power spectra for major flares observed with HXRBS from 1980 February to 1985 December:
(a) flares with peak rate 2000 c/s and 5000 c/s
(b) flares with peak rate 5000 c/s
(c) flares with peak rate 10000 c/s

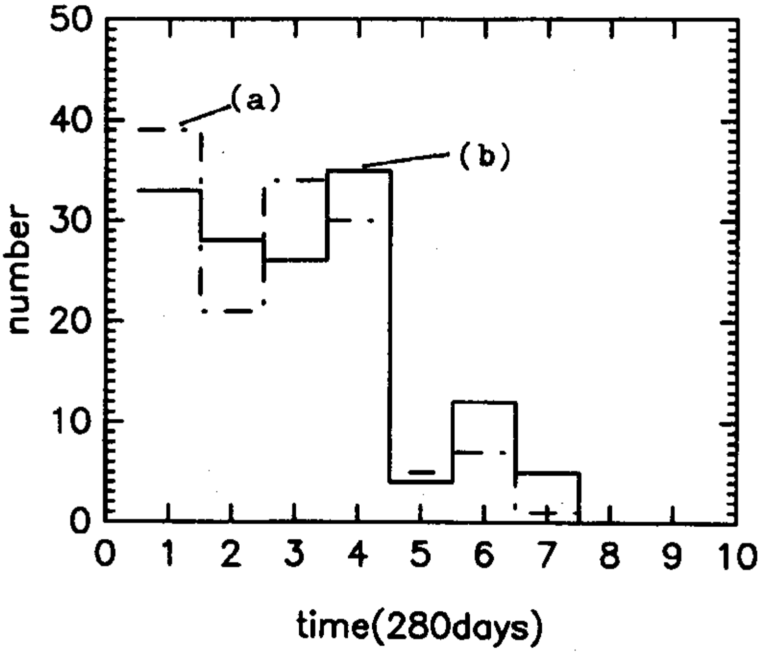


Fig. 2 Time distributions of major bursts observed with HXRBS from 1980 Feb. to 1985 Dec.. The origin of the abscissa corresponds 19 Feb. 1980.
-·-·-2000 c/s≤ peak rate <5000 c/s
——peak rate ≥5000 c/s

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