10. COMMISSION DE L'ACTIVITÉ SOLAIRE

Report of Meetings

PRESIDENT: A. B. Severny.

SECRETARY: A. D. Fokker.

Business Meeting, 26 August 1964

The President began by referring to the death of the Commission members M. S. Eigenson, M. A. Ellison and R. McMath.

1. CO-OPERATIVE STUDY OF SOLAR ACTIVE REGIONS

Dr R. Michard, reporter on Solar Activity for the IQSY, presented the second draft programme on this subject. The programme reads as follows:

In an effort to bring into effect a resolution passed by the IQSY General Assembly (Rome, 1963), a first draft programme was circulated on 16 March, 1964, which dealt with the plans for a Co-operative Study of Solar Active Regions (CSSAR) to be performed during the International Years of the Quiet Sun.

The proposal attracted the attention of many colleagues. Some 60 answers were received, most of them bringing agreement to take part in the programme. Also valuable criticisms and suggestions were received.

The following draft programme is a revision of the preliminary one of March 1964, taking into account the ideas and informations gathered.

1. *Purpose of the programme*

We wish to collect detailed information on the behaviour and the history of a *small number* of solar active regions (AR), using all possible means of studying their wave and corpuscular emissions.

International world-wide co-operation is deemed necessary to obtain a complete and precise time history of the selected AR.

Rather low solar activity will give an opportunity to study *relatively isolated* AR: this will be useful to follow in detail the birth and decay of their magnetic fields and to distinguish their individual radio emission and, still more, their corpuscular effects.

Most of the data of interest here are routinely obtained by solar observatories; the essential point in the project lies therefore in an effort to make all of them available for scientific discussions in the most efficient way.

2. *Choice of AR for study and the question of alerts*

Active regions of interest for CSSAR will be such as are isolated, not too small and well observed. Of particular significance to the programme is the slow decay of AR after the disappearance of spots, when unipolar magnetic regions persist and stable geo-active corpuscular streams (M-regions) are possibly formed; low general activity will be helpful in studying this phase. On the other hand, the 'youth phenomena' (spots and flares) of AR are of obvious interest, and world-wide co-operation is particularly useful in their observation.

In the previous circular it was suggested to select a basic period of 3 months for CSSAR, to call the attention of observers upon AR 'of particular interest' during the period, and finally

to select the AR for the effort on data collection and publication after the end of CSSAR. Taking into account the reactions of many colleagues, I now propose the following revised procedures:

(*a*) The basic period for CSSAR will be 1965 April 1–September 30. This period is only indicative: if a suitable AR is born somewhat before or dies after these 6 months, it may be retained for study. In the future, other AR or periods of time may be considered for co-operative study, using the system of 'World Retrospective Intervals' as in the geophysical disciplines.

(*b*) No *special* alerts will be issued in connection with CSSAR. However, the observatories are invited to make the best use of the existing system of alerts and fast information (International Ursigram and World Days Service) in the following ways:

The Geoalert SOLACTIVITY issued by the World Warning Agency, Fort Belvoir, U.S.A., which is distributed throughout the world by numerous channels, points out the birth of new AR of some importance and refers to marked flare activity of any AR.

The Adalerts (Advance Alerts) issued by the Regional Warning Centres and some observatories serve similar purposes.

Information which enables one to be aware of the state of solar activity is distributed daily in 'ursigram'-messages from Regional Warning Centres.

Predictions of solar activity 1 month in advance are distributed weekly by air letter from the World Warning Agency. During the CSSAR period the authors of these predictions will try to include in them notes on the *returns* of regions of special interest.

(*c*) The final designation of AR to be selected for data collection and distribution will be made after the end of CSSAR (as previously suggested).

3. *Publications and analysis*

In the CSSAR project we may try to reach two goals:

to make available to the scientific community information that is generally scattered in many observatories and never fully collected and published;

to ensure that this information is used for a better understanding of solar active regions.

To my mind the ultimate purpose of CSSAR is to lead to a symposium and to the publication of papers where results of the observations will be described and discussed. I believe we must make definite efforts in this direction and not just wait and see! I propose the following steps (which need not be successive):

Step 1: A catalogue will be assembled and published that contains the data as they are obtained by all stations on the AR selected for CSSAR.

Step 2: Several World Data Centres, Observatories or individual workers will collect duplicates or original data from all stations, separately for each topic or technique, arrange these in a standard convenient form and eventually make a preliminary study of the material. (For instance, Meudon may collect flare films and photographs, select the frames needed for a full description of each event, copy them at a standard size, orientation and contrast.)

Step 3: An editor will collect the processed data resulting from step 2 and assemble them on 35 mm films; these will be reproduced and distributed according to the usual practice of World Data Centres.

I emphasize that these films are not intended for cinematographic projection! They should reproduce as far as possible the original observations without loss of information content, but the frames should be only as numerous as is necessary to show the evolution of the phenomena. For instance, an Hα flare may be described by some 10 frames (at unequally spaced intervals).

I guess that the data for each selected AR could be contained in about 1000 frames of size

24 × 36 mm; film strips of a few meters could be cut by users and classified as ordinary microfilms for easier consultation.

Step 4: A list of astronomers willing to study seriously and rapidly some parts of the CSSAR should be constituted, while their work should be facilitated; these persons could be the same as those involved in step 2 above.

Step 5: A symposium should be held (in 1967?) to discuss the results of analysis of CSSAR data and of specialized work about AR which not necessarily requires international co-operation.

4. *List of data to be collected for CSSAR*

A. *Primary data:* classical techniques, patrol operation.

Reference	*Nature*	*Presentation in publication*	*Collector*
A1a	White-light photographs (spots and faculae)	Photographs	Zürich
A1b	Spot evolution and motions	Corrected graphs	Zürich
A2	Calcium spectroheliograms (plages)	Photographs	Arcetri
A3a	Hα spectroheliograms and filtergrams (Hα faculae and filaments)	Photographs	Meudon
A3b	Hα limb prominences, photographs	Photographs	Ondřejov
A4a	Longitudinal magnetic fields	Graphs and isogausses	Crimea
A4b	Sunspot fields	Graphs	Crimea
A5	Transverse magnetic fields	Graphs	Crimea
A6a	White light corona, polarimeters	Graphs	HAO, Boulder
A6b	White light corona, eclipses	Photographs and isophotes	HAO, Boulder
A7	Photometry of coronal lines	Graphs	Zürich
A8	Interferometric measurements at radio frequencies	Graphs and maps	Utrecht
A9	Flux at radio frequencies	Graphs and maps	Utrecht
A10a	Flares, Hα photographs	Photographs	Meudon
A10b	Flares, Hα light curves	Graphs	Meudon
A10c	Flares, Hα line-widths	Graphs	Ondřejov
A12	Single-frequency records of radio bursts	Graphs	Utrecht
A13	Dynamic spectra of radio bursts	Photographs	Utrecht
A14	Ionospheric effects and SID	Graphs and tables	CRPL, Boulder
A15	Satellite X-ray flux and events	Graphs and tables	?
A16	Cosmic rays (modulation and solar events)	Graphs and tables	WDC, Minneapolis
A17	Geomagnetic data	Graphs and tables	Göttingen

B. *Secondary data*: secondary data result from specialized observations, generally parts of research programmes. The extensive publication of these data will not always be possible, but they should be included in the CSSAR film compilation where practical. It is hoped that, if a CSSAR Symposium can be held, it will include many reports of analysis of special observations of AR in the CSSAR period. A tentative list of such observations is reproduced here from our previous circular.

(1) Photometry of AR at various wavelengths in the continuum.
(2) Observations of photometric and kinematic *fine-structure* in AR.
(3) Spectroheliograms in other lines than usual.
(4) Measurements of the three components of magnetic fields by detailed methods.

(5) Spectrophotometry of line spectrum of AR.
(6) Detailed study of chromospheric structure at the limb above AR as compared with normal atmosphere.
(7) Coronal line profiles above AR and elsewhere.
(8) Eclipse study of outermost corona above AR.
(9) Direct measurements of AR corpuscular emission in space and in the atmosphere.
This list is not exhaustive.

In answer to my first inquiry, about 20 observatories and colleagues mentioned that they are planning part of the above types of observation and that they would consider to include results in any CSSAR compilation or publication.

5. *Conclusion*

I am extremely grateful for the very co-operative spirit shown in the many answers which I received on my first inquiry and I am confident that CSSAR can be a success, leading to some genuine progress in the understanding of solar phenomena. Further careful planning is needed, particularly in connection with the compilation and analysis of data. Here the IQSY Reporter for Solar Activity will seek the advice and help of the Working Group of Commission 10 which has been formed in 1961 to advise the Reporter.

Finally I wish to say that I take it for granted that those colleagues who did not answer my previous circular are ready to participate anyway. They will soon receive more and more circulars and questionaries!

Discussion on Dr Michard's report

Part of the discussion centred on the question, how many AR can be expected for the half year envisaged. There was good confidence that at least one, and possibly several, AR will be worthy of a study. Also discussed was the question of observing programmes and standardization. According to Dr Michard no changes in observing techniques need be recommended. It is to be recommended that observers use all the possibilities they have. For instance, high spatial and time resolution are desired (Moreton) and photographs taken outside Hα will be valuable (Öhman, Evans). The emphasis should be not so much on individual flares as on the development of the AR as a whole (Michard).

The working group for CSSAR consisted of the Organizing Committee of Commission 10. It now seems desirable to enlarge this group with some representatives of WDC's.

Note

A meeting of the Working Group for CSSAR was held on 31 August. The group is constituted as follows: Dodson-Prince, Fokker, Giovanelli, Jefferies, Kiepenheuer, Michard, Righini, W. O. Roberts, Rösch, Severny, H. J. Smith, Švestka, Waldmeier.

II. IQSY RESOLUTIONS

Dr Z. Švestka gave the following report:

The Solar Activity Working Group of IQSY, at its meeting in Rome, recently accepted 18 resolutions regarding solar observations during IQSY. This report deals only with those resolutions which are of particular interest to the members of Commission 10.

Resolution 3 of the Rome meeting reads as follows:

'Sudden changes in the magnetic flux of sunspots or sudden changes in the configuration of the magnetic fields outside sunspots should be reported. Rapid publication of all disk magnetograms (even if preliminary) would be of great value to solar and space workers.'

Up to the present this resolution does not seem to have had any effect. Yet, a rapid publication of observations of magnetic fields would seem very desirable. Already several years ago the idea was expressed that magnetograms might be published in the form of maps in the *Quarterly Bulletin on Solar Activity*.

Resolution 8 reads as follows:

'It is recommended that data on solar radiation, such as UV, X-rays and solar cosmic rays be collected by three WDC's and be published in a suitable form in the *Quarterly Bulletin on Solar Activity*'.

Resolution 14 gave the following recommendation:

"For the benefit of COSPAR we would ask three experts to furnish the World Warning Agency with weekly forecasts of solar activity, forecasting 3 to 4 weeks in advance. The forecasts should be qualitative estimates, like: "The Sun will be active, moderately active, moderately quiet, or quiet".'

Such forecasts have actually been made by Drs Michard, Dodson-Prince and Giovanelli for a period of about 1 year. The individual forecasts differ very much and they are controversary in many cases. I wonder whether such controversary forecasts have any great value for those who need them. It would seem better that in the future one centre collects the individual forecasts and takes the ultimate responsibility for giving only one forecast.

Discussion on Dr Švestka's report

Prof. Kiepenheuer states that the Mount Wilson Observatory was asked to supply magnetograms for publication, but that the Observatory, probably for good reasons, was somewhat reluctant to do so. It would seem appropriate to inquire once more after the Mount Wilson magnetograms.

Prof. Waldmeier suggests to consult the Advisory Committee for the *Quarterly Bulletin* (Chairman Prof. Allen) about the desirability of publishing magnetic data, such as they are nowadays available, in the *Quarterly Bulletin*.

In connection with solar X-ray data, Dr H. J. Smith states that significant data have so far been obtained from the satellite OSO 1. The data are fragmentary only, not synoptic. At NASA exists a rule that observational data are at the disposal of the principle investigator during 1 year. This regulation might preclude a rapid publication.

In connection with the solar activity forecasts it is emphasized that these are still in an experimental stage. A unified forecast might give the illusion of certainty. The President recommends to continue the forecasts and to consider any change of them, if necessary, only after the end of the IQSY period.

Prof. Waldmeier calls attention to the fact that the IQSY recommendations do not mention the observations of polar faculae, which can only be studied while the Sun is quiet. A study of polar faculae is certainly recommendable.

III. PUBLICATIONS

The Commission resolved to recommend that the annual subvention of 2700 gold francs, agreed since 1925 by the Union for the publication of the *Cartes synoptiques de la chromosphère solaire* should be renewed to the Meudon Observatory until the next General Assembly. The Commission also agreed to recommend the annual subvention of 1000 gold francs to Prof. Waldmeier for the publication of the *Heliographische Karten der Photosphäre*. (Both these recommendations were approved and incorporated in the report of the Finance Committee.)

Report of Meeting, 28 August 1964

SCIENTIFIC CONTRIBUTIONS

The following papers were presented to the meeting.

1. *Z. Švestka:* The filamentary structure of flares

The method of half-widths, corrected according to Griem's theory of electron damping, has been applied to several flare spectra obtained in Japan and Czechoslovakia. The values of the electron density deduced in this way have permitted a detailed analysis of these flares to be made. This investigation confirms the conclusion, that the resulting linear thickness of flares is very small, of the order of 10 to 100 km. This fact clearly shows that flares must be regarded as conglomerates of bright excited flare elements and colder interflare matter. The non-existence of any visible emission behind the Balmer limit in spectra of flares on the solar disk allows to estimate the maximum size of the flare elements.

Because of the fine structure of flares, many methods which were used up to the present to analyse flare spectra must be considered incorrect. On the other hand, some methods exist which yield information about the real physical conditions in flares, even if the filamentary structure is taken into consideration. A discussion of these appropriate methods and of their results is presented in a preliminary form.

2. *R. J. Bray:* The helium D3 absorption line in the spectra of chromospheric flares

Time-sequence spectrograms showing D3, Hα and Hβ were obtained for two flares, D3 was observed in absorption. The distribution and the variation in time of the helium line is markedly different from the hydrogen lines. The differences are ascribed to different modes of excitation, D3 being excited by streams of electrons.

3. *Y. Öhman:* Simultaneous observations of red-shifted and violet-shifted Hα images

The method of double image photography for the study of Doppler shifts is being tried systematically at the Swedish Solar Observatory in Anacapri. Initially, a Halle filter with pass-band of 0·7Å was used in combination with a calcite plate. In a later experiment a Wollaston prism was used in combination with a 1·4Å passband filter. The double image device replaces the polaroid film in the second line shifter of the filter. The two images correspond with wavelength displacements of ± 0·5Å or ± 1·0Å.

4. *W. Gleissberg:* Densitography of Hα photographs

Densitography has been applied to Hα photographs at the Astronomical Institute of Frankfurt University. The device permits of obtaining isophotes in a short time.

5. *G. E. Moreton:* Cinematography of the solar active region in September 1963

A film made at the Lockheed Observatory shows several interesting features connected with the active region with CMP on 20 September 1963. Among the phenomena observed are a large surge, blob-like structures, explosive phases of flares and remarkable changes in filaments which seem to be in antiphase when observed in the blue and the red wings of Hα.

6. *H. Zirin* (presented by E. Tandberg-Hanssen): Cinematography of the solar active region in September 1963.

The film shows fine structural details of flares. A close correlation exists between the occurrence of radio type III bursts and the brightenings in a part of the active region.

JOINT DISCUSSION WITH COMMISSION 43

1. *H. Alfvén:* The discharge theory of solar flares

The flare volume is supposed to have a filamentary structure. The filaments are thought to delineate the course of electric currents. The normally very small voltage drop along the filament will increase to large values if for some reason the current is interrupted. Part of the stored magnetic energy will be transferred to the space charge region where an electrostatic double layer is formed. Here also particle acceleration will take place. Estimates of the total initial current which would match the flare energy and of the voltage drop are made. Details of the theory are contained in the paper by C. Jacobsen and P. Carlquist, 'Solar flares caused by voltage surges from inductive circuit interruptions', *Icarus*, **3**, 270, 1964.

2. *A. B. Severny:* On the position of flares relative to electric currents as derived from magnetographic records

The magnetographic records of longitudinal and transverse magnetic fields in active regions have permitted to obtain besides the usual combined maps of the magnetic field distribution also a map of the vertical electric currents j_z which can be calculated from the relation

$$(\text{rot } H)_z = \frac{\partial H_y}{\partial x} - \frac{\partial H_x}{\partial y}$$

if the transverse field is known from measurements (this procedure was suggested by Dr Schlüter at the IAU Symposium no. 22 at Rottach-Egern, 1963).

Such a map was derived for a centre of activity on the day of its meridian passage, 22 June 1962. This map represents the distribution of positive (upward) and negative (downward) electric currents. In addition to a flare of importance 2, which appeared at 09·05 U.T., some more flares of minor importance occurred in this region.

The preliminary conclusion which can be drawn from this and from some other examples is that flares appear at the places where oppositely directed electric currents j_z are strongest. However, although this situation seems to be a necessary condition, it is by no means a sufficient one, because there are many cases in which no flares appear in such places. We should look for some additional characteristics of the magnetic field and of the physical conditions in the places where flares appear.

3. *P. A. Sturrock:* Theory of flares

Homologous flares are accounted for by invoking a mechanism by which a configuration is built up in which the magnetic field is compressed by an overlying layer of cool gas. Once the magnetic field lines form a trough, gas will condense in that region and the field lines will provide an increasingly effective 'cold trap'. The process, representing storage of both magnetic and gravitational energy, finally becomes unstable. Only a small fraction of the non-thermal energy flux into the chromosphere need be stored in the pre-flare configuration. The growth time of the instability is the time of propagation of Alfvén waves across the layer, about 100 sec. The bulk of the gas would be heated by a few thousand degrees. The upper gas layer will be swept along with the magnetic field, streaming down in the later stages of the flare process.

4. *D. G. Wentzel:* Solar flares caused by the skin effect in twisted magnetic fields

The theory aims at an explanation of: (1) the filamentary structure of flares, (2) the relatively great frequency of smaller flares and (3) the gradual release of optical energy at a roughly constant temperature. It is investigated how electrically conducting gas collapses towards a region of minimum magnetic pressure. Dissipation of currents in thin skin layers between opposing twisted fields explains the emission from thin surfaces and the duration of the flare

emission. The same kind of collapse in the upper chromosphere or corona results in heating and energetic-particle events.

5. *E. Chvojková:* Production of plasma bunches in the magnetic field of prominences

Charged particles that spiral along magnetic field lines get frozen in a given point of the magnetic field whenever they are reflected at a critical velocity, which is about half the velocity of escape. This could perhaps explain suspending clouds, stationary filaments, plasma bunches in eruptive prominences as well as their extremely high velocities.

Business Meeting, 31 August 1964

1. REPORT OF THE WORKING COMMITTEE ON THE ASSIGNMENT OF Hα FLARE IMPORTANCE

Dr H. W. Dodson-Prince, Chairman of the Working Committee, presented the report which was prepared by the Committee for consideration by Commission 10. The full report will be distributed to the members of Commission 10, other interested persons and observatories participating in the IQSY as a separate publication. The following is an abbreviated version of the report.

Introduction

At the Eleventh General Assembly of the IAU, Commission 10 appointed a Working Committee to study problems related to the designation of the *importance* of Hα flares. The Committee was requested to make recommendations at the Twelfth General Assembly 'for improvement' in the assignment of the Hα flare importance. The following persons were asked to serve on the Committee: Prof. M. C. Ballario, Dr A. Bruzek, Dr E. E. Dubov, Dr M. A. Ellison (deceased, 1963), Miss E. Ruth Hedeman, Miss Virginia Lincoln, Dr R. Michard, Dr Yngve Öhman, Dr Henry J. Smith, Dr C. S. Warwick, Dr H. Dodson-Prince (Chairman).

The recommendations that accompany this report refer to circumstances or situations in which it was generally agreed by all Committee members that change was desirable. The specific changes here recommended constitute a melding of many different points of view and are sometimes a compromise between envisioned perfection and practical circumstances.

Recommendations

1. *New dual form for importance classification*

It is recommended that information about the relative intensity of a flare as well as its area be indicated as unambiguously as possible in the assigned importance. The importance evaluation for each flare will consist of two elements, a number and a letter. For flares within 65° of the centre of the solar disk, the first element will describe the area of the flare essentially in accord with the area-guides to flare importance which have been in use since the IGY. For flares $> 65°$ from the centre of the solar disk, the numerical portion of the importance designation may reflect circumstances other than area in an effort to evaluate the magnitude of the flare-event that occurred on the Sun. The second element of the importance designation will indicate whether the intensity of the flare was faint (*f*), normal (*n*) or brilliant (*b*) for its respective class. At the present time, the observer's experience rather than detailed photometric guides must provide the basis for the intensity evaluation.

It is also recommended that subflares be identified by the letter *S* rather than 1− and that the number 4 replace 3+ in the areal importance classification. The recommended system of flare designation is summarized below.

Summary of recommended dual importance classification

'Corrected' area in square degrees	Relative intensity evaluation		
	Faint (*f*)	Normal (*n*)	Brilliant (*b*)
⩽ 2·0	*Sf*	*Sn*	*Sb*
2·1 — 5·1	1*f*	1*n*	1*b*
5·2 — 12·4	2*f*	2*n*	2*b*
12·5 — 24·7	3*f*	3*n*	3*b*
> 24·7	4*f*	4*n*	4*b*

2. *Apparent area*

It is recommended that measured apparent area at the time of maximum intensity constitute the primary measurement of the area of the flare. It should be expressed in millionths of the solar disk (not hemisphere).

3. *Corrected area*

It is recommended that the apparent area of flares not more than 65° from the centre of the solar disk be corrected for foreshortening, as in the past, by multiplication by the secant of the angular distance of the flare from the centre of the solar disk. 'Corrected' area should be expressed in square degrees.

$$\begin{pmatrix}\text{'Corrected' area}\\ \text{in square degrees}\end{pmatrix} = \frac{\text{Apparent area in millionths of disk}}{97} \times \sec\theta\Bigg)$$

For flares more than 65° from the centre of the solar disk, no value of 'corrected' area should be given in the *Quarterly Bulletin*, but great effort should be made to assign meaningful importance ratings to these flares on the basis of the special guides to importance evaluation for flares near the solar limb which are described in the next section of this report.

4. *Importance rating of flares close to limb of Sun*

For flares more than 65° from the centre of the solar disk it is recommended that the numerical member of the dual importance evaluation be based on a number of different 'guides' and not solely on considerations of area. In addition to *measured area*, the observer should give weight to *duration*, extent in *latitude* and *spectral characteristics* such as the width of the Hα flare emission and the type of associated *prominence activity*. These various guides to importance for flares near the limb will not always yield consistent evaluations. If the observer's judgement cannot resolve the inconsistencies, he is urged to use a question mark and to explain his uncertainty by comments or remarks.

5. *'Area at time of maximum intensity' or 'maximum area' as guide to importance*

It is recommended that corrected area at time of maximum intensity continue to be used as the general basis for the assignment of the first member of the dual importance designation. If a flare increases greatly in area after the time of maximum intensity, the observer should measure and report the time and value of maximum area as well as the area at time of maximum intensity. Both sets of area measurements should be included in the flare report and, if possible, in the *Quarterly Bulletin*. The importance rating of the flare should be based on the area at the time of maximum intensity, as for all other flares.

6. *Intensity of flare*

It is recommended that all observers with facilities for photometric measurements report the maximum intensity of as many flares and subflares as staff time permits. The intensity should be expressed in units of the continuous spectrum near Hα and for the distance of the flare from the centre of the solar disk (local continuum).

7. *Other flare characteristics*

In order to provide additional information about flares it is recommended that observers indicate in their reports to World Data Centres the following special aspects of flares, if they have been observed:

Formation of two relatively close and somewhat parallel bright filaments.
Occurrence of an explosive phase.
Great increase in area after time of maximum intensity.
Onset of system of loop-type prominences.
Unusually wide Hα emission.
Major sunspot umbra covered by flare.

It is further recommended that the 'remarks' included in the flare tables of the *Quarterly Bulletin* be revised to include the above categories and to provide as much information as possible about the development and morphology of flares.

8. *Systematic inhomogeneities in world-wide flare data*

In the interest of reducing inhomogeneities in the world-wide flare data, it is recommended that the editors of the flare tables for the *Quarterly Bulletin* at Meudon call to the attention of the individual reporting stations apparent systematic differences in reporting techniques or evaluation. Individual observers are urged to welcome such comments with goodwill, and to supplement them by continuing studies of their own observations of flares versus world-wide norms. It is also recommended that the solar editors at Meudon ask individual stations to review and perhaps re-evaluate their observations with respect to starting times, maximum, position or importance of a flare when these quantities are in extreme discordance with the majority of stations reporting the event.

9. *Reports of subflares*

It is recommended that observers report for subflares all of the data normally reported for flares. All subflares on the records should be reported down to apparent area 50 millionths of the solar disk. Smaller subflares should be reported if staff time and observational circumstances permit.

10. *Publication of individual observations of flares*

It is recommended that the Central Radio Propagation Laboratory of the U.S. National Bureau of Standards be encouraged and supported in its publication of the individual reports from each observing station of all flares and subflares.

Discussion on the report of Dr Dodson-Prince

The question is raised as to when the new flare importance rating system will become operative. Introduction of the new system while the IQSY are still in progress seems to be less desirable. Dr Dodson-Prince recommends that the new flare classification will be introduced as from 1 January 1966. A pertinent instruction manual will be distributed far in advance of this date.

The report of the Working Committee and the recommendation to effectuate the new system of flare importance classification as from 1 January 1966 are accepted.

II. FLARE LISTS IN THE QUARTERLY BULLETIN ON SOLAR ACTIVITY

Dr R. Michard recalls that a new system of flare listing has been introduced in the *Quarterly Bulletin* as from 1 January 1963. Each flare is now represented by one entry only; the figures listed are representative for the whole of data contributed by the various observatories. If *some*

(but *not all*) of the contributing observatories have rated the flare as a subflare, the importance is listed as 1−. Flares that are unanimously rated as a subflare are not entered.

There is some discussion about the subflares. Many relationships of subflares with other phenomena have been noted (Giovanelli). These might be entered in a separate list (Evans), but their number is too large for including them all in the regular flare list.

At Meudon a punched chart system is being used for handling the data. Dr Michard recommends that other observatories that will start punching adopt the Meudon system.

III. CALCIUM PLAGE INDEX

Prof. Righini reports on the conclusion reached by a Working Group which has considered the possibility to define a suitable calcium plage index. Members of this Working Group are M. K. Bappu, H. W. Dodson-Prince, K. O. Kiepenheuer and G. Righini. The conclusion is that it is not desirable to introduce a calcium plage index. The Working Group is of the opinion that such an index would add confusion and that it is more practicable to employ flux values of solar radio emission at a frequency of, say, 2800 Mc/s.

IV. RESOLUTION

The secretary reads a resolution formulated by Dr Michard.

'Commission 10 of the International Astronomical Union has been informed of the plan for a Co-operative Study of Solar Active Regions during IQSY, proposed by the IQSY General Assembly, Rome 1963, and of the preliminary programme established by the Reporter for Solar Activity in the IQSY Committee. The Commission expresses its 'approval of this programme and requests interested astronomers and geophysicists to participate in it as far as possible.'

This resolution is accepted.