

COMMISSION 10: SOLAR ACTIVITY (ACTIVITÉ SOLAIRE)

Report of Meetings, 19, 20 and 25 August 1970

PRESIDENT: Z. Švestka.

SECRETARY: A. D. Fokker.

Business Meeting

The President opened the meeting by referring to the death of the Commission members L. d'Azambuja and O. F. W. Mathias. Dr d'Azambuja was a former president of Commission 10. It was decided to write a condolence, on behalf of Commission 10, to Mme d'Azambuja.

I. ORGANIZING COMMITTEE

The President announces the proposed composition of the Organizing Committee of Commission 10: Jefferies (President), Kiepenheuer (Vice-President), Hyder (Secretary), de Feiter, Giovanelli, Krat, Michard, Nagasawa, Newkirk, Švestka.

The proposal is approved.

II. REPORT OF THE WORKING GROUP ON THE PRESENTATION OF SOLAR DATA

M. Waldmeier reports on the present status of the Quarterly Bulletin on Solar Activity. The system of reporting on solar flares and on radio emission remained the same. The reportings of coronal data from High Altitude Observatory and Sacramento Peak Observatory came to an end. Although the data from different coronal stations continue to show up discrepancies, it is possible to derive from them heliographic maps which picture coronal intensities in a qualitative way. An important and valuable addition to the Quarterly Bulletin's content has been the introduction of synoptic charts of solar magnetic fields, supplied by the Mount Wilson Observatory. Reports on X-ray observations are still not contained in the Bulletin; so far no centre has been found for collecting the data and preparing them for publication. Suggestions as to a possible X-ray data centre will be welcome.

III. DISCUSSION ON FLARE DATA

(a) P. Simon reads a report prepared by R. Michard. Notwithstanding the prescriptions given for rating the importance of a flare, notable discrepancies continue to exist between different patrol stations. Although the H α patrol is continuous, there is a marked diurnal variation in numbers of reported flares. A new method of processing the reported data is now being developed by which known systematic discrepancies are accounted for. By this procedure the diurnal variation will be largely eliminated.

(b) C. Sawyer reports on efforts made to define indices of reliability of flare reportings and flare patrols. For a given observatory one can derive an index u = number of unconfirmed reports/total number of reports, and an index m = number of confirmed flares that were missed/number of confirmed flares during patrol.

From these two indices a 'confidence index' C between 0 and 1 can be derived for different observatories.

(c) H. W. Dodson-Prince reports on attempts to define a comprehensive major flare index. Such an index was defined as the sum of the five indices that characterize different aspects of the flare event:

1. importance of H α flare

2. importance of SWF
3. magnitude (logarithmic) of $\lambda \approx 10$ cm flux
4. dynamic spectrum (type II, continuum or type IV)
5. magnitude (logarithmic) of ≈ 200 MHz flux

IV. PROPOSED SPRAY PATROL

Upon Y. Öhman's proposal, the following recommendation has been adopted: "*Considering the fact that many Doppler-shifted sprays are not recorded with ordinary H α -filters, it is recommended that a small Working Group be formed in order to improve the optical methods of observation*".

Institutes participating in the Working Group should be prepared to cooperate in a test patrol during a few months in the course of next year. Öhman will settle the composition of the Working Group by himself after consulting the interested observatories and individuals.

V. SPECTRAL CLASSIFICATION OF MICROWAVE BURSTS

J. P. Castelli reports on attempts of finding a simple classification of microwave outbursts by which the overall spectral characteristics and the intensity level of a burst are summarized in a compact way. A few letters serve to symbolize the spectral shape and a quantitative index is given for the spectral index or the relative bandwidth. The suggested classification is related to physical mechanisms. It might serve to sort out the observed bursts in a physically relevant way.

VI. RECOMMENDATION ON THE SOLAR FLUX MEASUREMENTS

A. E. Covington draws the attention to the importance of the solar radio flux at centimetre and decimetre wavelengths as an index of solar activity. Efforts to maintain homogeneous and standardized series of daily observations should therefore be encouraged. The following recommendation has been proposed and adopted:

"Commission 10 of the IAU *continues* to be aware of the value of solar flux observations in the decimetre portion of the radio spectrum as an index of the slowly varying component of solar activity in research studies of the Sun and in solar-terrestrial relationships, as well as for predictions of radio propagation characteristics of the ionosphere for practical telecommunications; and *notes* that the generally adopted international standard endorsed by CCIR and other groups is the series of measurements made on a frequency of 2800 MHz by the National Research Council of Canada for more than two solar cycles; and further *notes* that a Working Group on Absolute Solar Calibration in URSI has removed major discrepancies at specific frequencies in the band 536 MHz to 9400 MHz to derive a smooth solar spectrum for the epoch 1968 and *expresses* the strong hope that this series of measurements be carried on indefinitely as a contribution to international and technical knowledge and that the reliability of the measurements be monitored and improved as needed. Commission 10 of the IAU therefore *urges* the appropriate national agencies to undertake the operation of facilities which will ensure the provision of these services".

VII. PROPOSAL TO ESTABLISH A WORKING GROUP ON MAGNETOGRAPH CALIBRATION

D. Rust, speaking also on behalf of J. M. Beckers, explains why it is desirable to make a coordinated effort to improve the calibration procedures of magnetic field measurements. He introduces the following proposal.

"*Because* of the fundamental importance of solar magnetic field measurements for the understanding of diverse phenomena in all observable levels of the solar atmosphere and *because* of the difficulties and controversies encountered in calibrating the signals of solar magnetographs in terms of magnetic field intensities, Commission 10 of IAU

establishes a Working Group to make a comparative study of the solar magnetic field measurements obtained at the many observatories where a magnetograph is available. Commission 10 recommends that all these observatories map the magnetic field in an active region to be designated by the Working Group. The Working Group should consult with the researchers operating magnetographs to determine the most convenient and appropriate operating parameters (i.e. entrance aperture, spectral line etc.) to be used with all the magnetographs during the study period. The resulting observations and the detailed descriptions of the techniques used to deduce the values of both the longitudinal and transverse components (when available) should be collected, compared and compiled for distribution to all interested researchers. In this way it should be possible to estimate the reliability of the magnetic field measurements and to recommend improved calibration procedures."

A. Severny comments upon this proposal that work of this kind has been done already in the past. For instance, comparisons have been made between the measurements made at the Crimea and Mount Wilson observatories. He recommends that the Working Group takes advantage of the existing correspondence on this subject.

The president proposes the following persons as members of the Working Group: Beckers (chairman), Bumba, Cacciani, Deubner, Giovanelli, Howard, Ioshpa, Krat, Livingston, Orrall, Rayrole, Rust, Schröter, Severny, Stepanov, Tandberg-Hanssen, von Klüber, Vrabec. Of course others may join the Working Group if desired.

The proposal to establish the Working Group and its proposed composition is adopted.

VIII. THE INTERNATIONAL PROGRAMME FOR SUN-EARTH MONITORING

A. H. Shapley reports on the programme for international monitoring of the Sun-Earth environment (MONSEE) and related matters. At the Leningrad meeting, May 1970, the IUCSTP Bureau has taken a resolution in which the IUCSTP Group 1 on monitoring of the Solar-Terrestrial Environment was requested to act as a steering committee to organize the international MONSEE, in consultation with all other IUCSTP working groups and other appropriate bodies and to make periodic reports and recommendations to IUCSTP concerning the current and future operation of MONSEE. IUCSTP Working Group 1 is contemplating an organizing or planning meeting at the time of the 1971 IUGG general assembly. Any comments from IAU Commission 10 in the area of solar activity monitoring will be welcome. The IUCSTP Working Group 1 naturally considers Commission 10 the authoritative group as solar activity is concerned.

IX. THE JOSO PROJECT

K. O. Kiepenheuer reports on the activities of the Joint Organization for Solar Observations. Site testing has been conducted at various places in southern Europe: Sicily, the isle of Lampedusa, Isola della Corrente, Faro and Pesqueira on the southern and west coasts of Portugal. Participating countries in the project are France, Germany (D.B.R.), Italy, The Netherlands, Norway, Sweden and Switzerland.

Joint Meeting with Commissions 40 and 44 on Solar Mapping

Prior to starting with the scientific programme the President called attention to a proposal of V. Bumba to have an IAU Symposium organized on Solar Activity to be held in the course of 1972 in Czechoslovakia. The question arises whether there might be an overlap in content of this proposed symposium with the one which is planned to take place in Australia in 1973. R. G. Giovanelli gives some information: this symposium will be devoted to the Sun's outer layers. Provided care is taken to avoid overlap between the two symposia, the proposal of Dr Bumba is adopted. The following Organizing Committee for the Symposium on Solar Activity has been approved: Bumba (chairman), Dodson-Prince, Gnevyshev, Kiepenheuer, Kopecký, Leighton, Martres, Nakagawa, Vitinsky and Wilson.

The meeting on solar mapping was organized by C. W. Allen and A. D. Fokker who acted as chairman for respectively the XUV aspect and the radio aspect of solar mapping. The following papers were given:

C. W. Allen: Solar Mapping and Its Use.

J. P. Wild: Review of Culgoora Radio Heliographic Results. Dr Wild presented a movie of dynamic solar radio phenomena observed with the Culgoora heliograph at the frequency 80 MHz. This movie, the first in its type, demonstrates impressively the potentialities of the Culgoora instrument.

J. L. Bougeret: Results of Nancay Multilobe Interferometer Observations.

M. Simon (also on behalf of D. Buhl and A. Tlamicha): Mapping of the Sun at Millimetre Wavelengths.

W. N. Christiansen: New Facilities at Fleurs.

R. W. Noyes: X-Ray Studies of Active Regions by the Harvard Observatory.

L. W. Acton: A Mapping X-Ray Heliumeter for OSO.

T. Takakura (also on behalf of several others): A Balloon Observation of the Position and Size of a Hard X-Ray Burst.

A. Title: New Observational Techniques in Harvard for Solar Mapping.

An additional paper, not fitting in the subject of solar mapping, was presented by Z. Suemoto on behalf of

H. Yoshimura: Differential Rotation and Solid Body Rotation of the Active Regions.

Joint Meeting with Commission 40 on Radio Studies of the Sun and the Interplanetary Medium

The meeting was organized by M. R. Kundu; its report is to be found in the proceedings of Commission 40.

Meeting of the Organizing Committees of Commissions 10 and 12

The Organizing Committees, together with some invited guests, discussed on a possible reorganization of the solar commissions of IAU. The president of Commission 10 had distributed in advance a number of opinions on this matter received from members of Commission 10. He pointed out that there are three reasons for reconsidering the organization of Commission 10:

1. the great number of members;
2. the overlap between Commissions 10, 12, 40, 44;
3. the fact that the agenda contains too many non-scientific topics. As to the third point the President suggested that a sub-commission of Commission 10 might be formed which would deal with all matters concerning the reporting of solar data and international cooperation in the data acquisition.

The president asked J. T. Jefferies, as President of Commission 10 for the coming three years, to take the chair.

Apart from the three issues mentioned by Švestka, two more were raised: the content of meetings during the General Assemblies (Jefferies) and the question whether there should be only one commission for the Sun (Newkirk). As to the number of members, nobody saw a possibility of reducing it. Sub-commissions might be created for such subjects as sunspots, flares etc., but this would tend towards increasing the overall number of meetings during a General Assembly. As to the overlap with other commissions, Jefferies suggested that in the draft report Commission 10 deals only with ground based optical research. Space observations and radio work on the Sun then should exclusively be covered by resp. Commissions 44 and 40. There is also the question of the overlap of membership. Membership of solar radio astronomers eventually may be restricted to Commission 10 (Wild). As to the programme of meetings, the system of joint meetings is perhaps liable to still more perfection; there should be much more consultation between Presidents of Commissions.

The suggestion to create a sub-commission for all matters relating to solar data found a favourable

response. Such a sub-commission could naturally act as advising body for the IUCSTP and also for the Quarterly Bulletin. In the meetings of Commission 10 more time will thus become available for scientific matters. Jefferies proposed to have only a few review papers on respectively ground-based optical research, radio work (with Commission 40) and solar observations from space (with Commission 44). Moreover, one or two topics might be dealt with more specifically, largely by invited papers followed by discussions on short communications.

As to the question of one or more solar commissions, no clear opinion emerged from the discussions.

Meeting of the Full Commission (the Vice-President in the chair)

I. Highlights from the Symposium on Solar-Terrestrial Physics held in May 1970 in Leningrad.

C. de Jager gave an account of some of the main topics dealt with on this Symposium.

II. Report on the previous meeting.

Before reporting on the outcome of the discussions in the previous (restricted) meeting, J. T. Jefferies, as the new President, requests to send titles and abstracts of forthcoming papers to him. He intends to prepare each year a list of titles and to send this to members of Commission 10. The question of unifying the solar commissions will have to be considered by the Organizing Committee which may be expected to prepare a report on this topic.

The proposal to establish a Sub-Commission 10a for reporting of solar data and for international cooperation in data acquisition is adopted and P. Simon is approved as its chairman for the coming three years. Within a few months he will submit his proposal for the sub-commission's membership to the President for approval.

L. W. Acton suggests that the work of the Working Groups and the evaluation of homogeneity and reliability of data be supervised by the sub-commission.

The other proposals, regarding the organization of meetings during General Assemblies, do not meet any opposition. The proposals imply that the Presidents of Commissions 10, 12, 36, 40, 43, 44 act as a programme committee for joint meetings.

III. Report of the Working Group on the normalization of intensity measurements of the solar corona.

J. Rösch reports on the activities of the Working Group. Although no second meeting was held after the one in 1967, much work was done which concentrated mainly on the definition of a suitable altitude above the limb and on the establishment of an empirically derived standard scale which, though being not an absolute scale, brings a reasonable uniformity in the various series of measurements. The work will be continued by correspondence.

IV. Report on IUCSTP activities.

H. Friedman, reporting on IUCSTP, refers to the International Active Sun Years and to the Leningrad Symposium. A Symposium on results of the 1970 eclipse will be organized jointly with COSPAR in Seattle, U.S.A. Furthermore, IUCSTP stimulates the coordination of efforts during the next minimum of solar activity. The emphasis should from now on be in the gathering of simultaneous information from satellites at a variety of suitable positions in space. Data on the existence of gradients in interplanetary space may thus be acquired. Moreover, IUCSTP recommends to place probes in heliocentric orbits and to send probes out of the plane of the ecliptic.

V. Report on activities of the IUCSTP Working Group 2.

Z. Švestka reports on IUCSTP Working Group 2 which is concerned with proton flares. The Working Group made preparations for a second Proton Flare Project after the one successfully carried through in 1966. Unfortunately no proton event showed up in the designated period May–July 1969. A third PFP period is not envisaged, but the study of selected retrospective intervals is

fairly encouraging. Extensive compilations for a few proton flare events have been made by J. Virginia Lincoln, by ESLAB in Noordwijk and two more of such studies are in preparation. The Working Group has decided to prepare a detailed catalogue of all particle events before the end of 1969 which will include the particle data, X-ray, radio and optical data on the responsible flares and on the active regions concerned. Comments on the problems of a future Proton Flare Project, on retrospective intervals and on possible forms of international cooperation will be welcome.