COMMISSION 10: SOLAR ACTIVITY (ACTIVITÉ SOLAIRE)

PRESIDENT: G. Newkirk, Jr. SECRETARY: A. Bruzek

Scientific Sessions

I. COLLOQUIA AND SYMPOSIA

The following colloquia and symposia of specific interest to Commission 10 were held in association with the 17th General Assembly:

- IAU Colloquium No. 51, "Convection and Turbulence in Stellar Atmospheres," London, Ontario, 27-30 August 1979.
- IAU Symposium No. 86, "Radio Physics of the Sun," College Park, Maryland, 7-10 August 1979.
- IAU Symposium No. 91, "Solar Interplanetary Dynamics," Cambridge, Massachusetts, 27-31 August 1979 (co-sponsored by SCOSTEP and COSPAR).

II. JOINT DISCUSSIONS

The Commission co-sponsored the following Joint Discussions, the texts of which will appear in Highlights of Astronomy:

- Large Scale Velocity Fields on the Sun - Co-chairmen, M. Stix and P. Gilman, 21 August 1979.
- Very Hot Plasmas in Circumstellar, Interstellar, and Intergalactic Space - Chairman, W.I. Axford, 22 August 1979.
- Physics of the Chromosphere-Corona-Wind Complex and Mass Loss in Stellar Atmospheres - Chairman, D. Mihalas and Co-Chairman, R. Bonnet, 16 August 1979.

III. JOINT MEETINGS

A. "The MHD of Sunspots," Joint Meeting of Commissions 10, 12, and 44, 20 August 1979 (C. Zwaan, Reporter)

The joint meeting, organized by J.-C. Hénoux, E.N. Parker and C. Zwaan (chairman), concentrated on sunspots as the best observed magnetic features with emphasis on the dynamical phenomena present in spots. Three review papers of 25 minutes each were prepared with input sent to the reviewers at the invitation of the organizing committee. Each of the reviews was followed by a discussion of 25 minutes with a few brief and informal contributions included in the discussions.

In the first review, "Dynamic Phenomena in the Visible Layers of Sunspots," R.L. Moore summarized the observational data on non-oscillatory, oscillatory, and running-wave phenomena in the photospheric and chromospheric structure of spots. The reviewer illustrated the relations between such dynamic features as umbral flashes and penumbral waves by means of two movies, one prepared by Big Bear Observatory and one by Lites, White, Athay, Chipman, and Packman from Sacramento Peak data. During the discussion, R.J. Bray showed recent observations of umbral dots, and V. Gaizauskas drew attention to the existence of very intense umbral flashes of very short duration.

In the second review, "The Transition Region and the Corona Above Sunspots," F.Q. Orrall discussed the properties of the non-flaring corona in active regions, quasi-static and dynamic coronal loop models, and mechanisms for driving mass flow. This review brought into perspective the wealth of new information revealed by observatories in space. Special emphasis was given to the results of the Skylab Workshop on Active Regions, which will publish its proceedings in 1980. During the discussion, C. Jordan mentioned red shifts in the Si I lines near the series limit which were observed over a small area in a spot. She interpreted the shifts as resulting from the quadratic Stark effect probably caused by the V x B field in a very dense ($N \sim 10^{14}$ to 10^{15} cm^{-3}) strong field ($B \sim 3000$ gauss) region.

The third review, by H.C. Spruit, "MHD of Sunspots, Theoretical Aspects," dealt with:

(1) Problems concerning the equilibrium structure of spots--recent numerical results for the field configuration by Schmidt and Wegmann were mentioned. The problem of maintaining pressure equilibrium in a spot where blocking of the heat flux occurs is still largely unsolved.

(2) Stability problems--the conditions for stability against fluting (division) and for occurrence of overstable oscillations were reviewed. It was pointed out that no calculations of a compressible stratified spot for overstability are available except for the work by Syrovatskii and Zhugzhda.

(3) Energy transport in the spot--the problem is to explain the brightness of the umbra (20% bolometric). Non-radiative energy transport is indicated by empirical umbral models. Overstable "turbulence" was considered the best candidate for the transport mechanism.

(4) Fine-structure--such as dots, flashes, running waves--emphasis was placed on the explanation of running umbral and penumbral waves as trapped (surface) magnetoacoustic gravity waves as has been described by Nye and Thomas.

During the general discussion, the relations between umbral oscillations, flashes, and penumbral waves were considered. Apparently, umbral resonant oscillations may excite running penumbral waves, however; it is clear that a satisfactory explanation of these phenomena requires the development of a dynamical model of the deep structure of a sunspot. The question of the presence or absence of umbral oscillations during the evolution of a typical sunspot has yet to be answered as is that of the detailed relationship between specific features in the fields of sunspots and the feet of coronal loops. In many cases, the sunspot field appears to open into interplanetary space. F. Albregtsen showed evidence for two new parameters which vary with the solar cycle--umbral brightness and the occurrence rate of X-ray bright points.

Publication of the three review papers is planned for an issue of Solar Physics.

B. The Solar Maximum Year, 1 August 1979 to 28 February 1981
Joint Meeting of Commissions 10, 12, 14, and 44, 15 August 1979
(Z. Svestka, reporter)

After opening by the chairman, Monique Pick, the Project Leaders described the aims and organization of the three components of SMY: Flare Build-up Study (FBS, presented by Zdenek Svestka), Sudden Energy Release from Flares (SERF, presented by David M. Rust), and Study of Travelling Interplanetary Phenomena (STIP, presented by S.T. Wu on behalf of the project leader, Murray Dryer).

1. Flare Build-up Study (Z. Svestka, Chairman). One of the three components of the SMY is the FBS, whose objective is to carry out a comprehensive array of observations before and during the eruption of a flare in order to delineate and understand the processes which lead to the storage of energy and its ultimate release in the flare. The array of instruments which will be involved in the FBS through the cooperation of institutions and individuals around the world include too many items of both ground and space instrumentation for us to discuss here. Many of the strategies attacking the major scientific problems and for coordinating the use of these many instruments were formulated at the Falmouth Workshop in May 1979.

A key element of this strategy is that all participating experiments, on the ground as well as in space, will focus all their efforts on the detailed observation of a particular active region. Clearly, such intense observing cannot be sustained continuously but must be restricted to specific periods, designated FBS-ALERTS. The ALERT periods currently designated are:

May-June 1980
1-15 September 1980
16-31 October 1980

The selection of the particular active region(s) to be observed during the ALERT is the responsibility of the coordinating center established at Meudon under the direction of P. Simon. The information that a particular region has been selected is transmitted to all participants in the form of a telex FBS-ACTION and intense observing will continue until the region ceases to be of interest and the ACTION is discontinued. During the May-June 1980 period 4 to 6 ACTION intervals are to be expected.

In order to be fully prepared and to test the procedures and communication systems, a trial ALERT period was scheduled for 1-15 May 1979 and an evaluation meeting was held in Montreal on 12 August 1979. Of course, the trial revealed some areas requiring improvement; but it was considered generally successful.

To assist the individuals and institutions participating in the FBS the organizing committee has prepared an FBS-Manual containing information on scientific programs, communications, participants, Cooperative Observing Sequences, etc. We plan to distribute this manual to participants in October 1979.

2. Study of the Energy Release in Flares (D.M. Rust, Chairman). From 26 February to 1 March 1979, a workshop was held in Cambridge, Massachusetts, U.S.A., to devise the scientific program and objectives for the Study of Energy Release in Flares (SERF). Three teams of scientists dealt with the theoretical problems of (1) thermalization of energy, (2) acceleration of particles, and (3) origin and effects of mass motions. As a result of this workshop, a set of Solar Maximum Year (SMY) Collaborative Observing Sequences (COS's), to be followed by both ground-based and spacecraft-borne observatories, was established. The full proceedings of the workshop are to be found in UAG-72 published by the World Data Center A (WDCA) for Solar-Terrestrial Physics, NOAA, Boulder, Colorado.

One of the major problems to be solved is to determine where is the primary energy release site and what are its characteristic dimensions. Most flare models (cf. Svestka, 1976 and Sturrock, 1979, for a review) place the energy release site in the corona, although there is growing evidence for substantial local energy release at photospheric depths (Machado et al., 1978; Emslie and Machado, 1979; Canfield et al., 1979). It is possible that outward moving material ejections trigger the energy release with the energy release site above the photosphere. However, Colgate (1978) has adduced evidence for an energy release site below the photosphere. While the characteristic dimensions of Hα bright points and magnetic reconnection theories of energy release (e.g., Sturrock, 1968; Spicer, 1977a,b) point to flare dimensions of order arc seconds or less, it is extremely difficult to release the total amount of observed flare energy in such a small volume; this empirically suggests a much larger or denser energy release site.

A second major problem to be solved is to decide whether the bulk of released energy manifests itself as macroscopic ejecta or as the acceleration of particles and thermalization of solar plasma. The results of Canfield et al. (1979), Ramaty et al. (1979), and Rust et al. (1979) seem to suggest the former. The mode of thermalization of the lower atmosphere is still uncertain; the accepted choice here is between the collisional (and ohmic) heating produced by the injection of a beam of nonthermal particles (e.g., electrons) (Brown, 1973; Emslie, 1978) and the heating produced by macroscopic phenomena such as thermal conduction (Svestka, 1973) and shock fronts (Craig and McClymont, 1976). Two related questions are whether hard X-ray bursts in large events (e.g., Hoyng et al., 1976) are thermal or non-thermal in origin and what is the mechanism responsible for white-light flares.

A third problem of major concern is that of the acceleration of energetic particles. Very few theoretical models (e.g., Sturrock, 1968) of the acceleration process exist; and, as a result, the questions still unanswered at this time are necessarily very general. General features requiring definition are:

(i) The accelerated particle population: its composition, energy spectrum, and temporal behavior;

(ii) The characteristics of the acceleration region: its size, temperatures (both ion and electron), density, magnetic configuration, etc.;

(iii) The responsible accelerating agent, e.g., shocks, plasma turbulence, direct electric fields, etc.;

(iv) The effect of the interplanetary medium on ejected particle streams.

Finally, the true volume, shape, and energy contained in mass motions needs to be determined in order to discriminate between self-driven expanding magnetic flux tubes and motions induced by gasdynamic forces such as shocks. Due to the rather poor time resolution hitherto available (a limitation which we believe to be largely overcome during SMY), it is not clear whether mass ejection begins before or after the flare impulsive phase.

In summary, there are fundamental questions to be confronted in the three principal study topics of the SERF: thermalization, particle acceleration, and mass motion. The instruments available in the 1979-1981 period will provide the data for substantial progress in these areas.

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3. Study of Travelling Interplanetary Phenomena (M. Dryer, Chairman). The Study of Travelling Interplanetary Phenomena project (STIP) was established in 1973 under SCOSTEP auspices. Since that time, with the cooperation of IAU and COSPAR, it has proceeded in its mission of encouraging informal cooperation on an inter-disciplinary and international scale on the study of various aspects of the quiet and disturbed solar wind. The participants include spacecraft experimenters, ground-based observers and theoreticians concerned with solar physics, inter-planetary scintillations, solar radio astronomy (both passive and active, as in the cases of direct solar magnetic fields and plasma waves), cosmic ray particles (solar and galactic), solar wind interactions with celestial obstacles, and solar wind plasma interaction with interstellar gases.

STIP is currently participating as one of the subprograms of the Solar Maximum Year which will extend from 1 August 1979 to 28 February 1981. STIP Interval VI (15 April-15 June 1979), declared in 1978 as a Trial Period for the SMY, has proved valuable in that a white-light coronal transient was observed by the satel-lite P78-1 on 8 May 1979 with its shock wave observed (based on preliminary study) at 0.78 AU by the plasma probe on Pioneer-Venus Orbiter. A search for the tran-sient's "signature" at 0.3 A.U. is presently being made by Helios 2 experimenters.

The period of August through September 1979 was declared one year in advance as STIP Interval VII. The long advance notice was necessary in order to give national agencies sufficient time to consider advance planning for the deep space tracking of Pioneer II, Voyager I, Voyager 2, Helios 1, Helios 2, and Pioneer-Venus Orbiter.

A number of other activities have been carried out as part of STIP. First, a special issue of Space Science Reviews was published in 1976 devoted to review articles on the exceptionally well-observed series of solar flares and their interplanetary consequences during August 1972. Secondly, a STIP Symposium was cosponsored by SCOSTEP, IAU and COSPAR in Varna, Bulgaria, in June 1975. Thirdly, another STIP Symposium (again sponsored by these organizations and dedicated to the memory of the Dutch astronomer L.D. de Feiter) was held in Tel-Aviv, Israel, in June 1977, with subsequent publication of invited papers by D. Reidel (The Netherlands) and contributed papers by AFGL. Some of the impetus for papers at these symposia was provided by the declaration of a series of special two-month "STIP Intervals" during which tracking facilities of the various national agencies were requested for coordinated studies. Contributions based on one of these Intervals were published by World Data Center A for Solar-Terrestrial Physics

(Boulder) in a UAG-61 Report entitled "Collected Data Reports for STIP Interval II: 20 March-5 May 1976." Another UAG Report for STIP Interval IV (15 October-15 December 1977) is currently in press. Most recently, IAU Symposium 91 on Solar and Interplanetary Dynamics was convened at Harvard University in August 1979 with the active participation of STIP participants among the 145 registrants from more than 15 countries. Preparation of the Proceedings is currently in progress for publication by D. Reidel. SCOSTEP and COSPAR co-sponsored this Symposium. STIP participants have also planned a Symposium (on Solar Radio Astronomy, Interplanetary Scintillations and Coordination with Spacecraft) which will be held in Culgoora, Australia, in November 1979, under the sponsorship of the same organizations. Tentative plans for a STIP Symposium on Shock Waves in the Solar Corona and Interplanetary Space in Smolenice, Czechoslovakia, in June 1980, are currently under consideration by the Slovak Academy of Sciences.

Following these introductory talks, Ernest Hildner described the experiments aboard the Solar Maximum Mission Satellite (SMM) and their scientific aims. This spacecraft has been developed as the main source of data from space during the SMY, and great efforts are being made to provide good coordination between observations aboard the SMM and on the ground. A detailed description of the SMM experiments will appear in a future issue of "Solar Physics."

Peter Landecker described the P-78 solar X-ray and white-light experiments and showed examples of the data. The P-78 satellite was launched on 24 February 1979 and has been recording solar data since that time.

The second part of the meeting was devoted to a discussion of the scientific objectives of the three projects. After a review of current observational and computational knowledge of the global structure and energy storage of sheared preflare magnetic fields, which are one principal concern of FBS, Van Hoven described the local coronal conditions necessary to initiate energy release in the short time scales observed to occur in solar flares. Three basic mechanisms, which can reduce the reconnection time for magnetic fields in a flare orders of magnitude below the classical resistive diffusion time, exist: spontaneous reduction of the spatial scale by such phenomena as the magnetic tearing instability, the inclusion of cool plasma within the reconnection region, and the induction of kinetic turbulence by field aligned electric fields. Dan Spicer emphasized that, due to the rapid profileration of flare models, the need for classification of these models has arisen and presented a classification scheme distinguishing two main categories: those driven by currents flowing parallel to $\underline{B}$ and those driven by currents flowing perpendicular to $\underline{B}$, where $\underline{B}$ represents the magnetic induction. This delineation of drivers allows a further specification in terms of the type of plasma instability which is operating and the overall geometry of the magnetic field.

Next two talks by Max Kuperus and Peter Hoyng were concerned predominantly with the SERF project. Kuperus emphasized that the energy release in a solar flare is the result of a sequence of MHD and plasma instabilities triggered when the electric current densities surpass a given threshold value. If the energy storage in the active corona occurs through a "slow" build-up phase, the magnetic field can remain to a large extent force-free because of the low value of the plasma parameter $\beta = 8\pi p/B^2$ in the corona. If the build-up occurs rapidly and once the large-scale MHD instabilities set in, deviations from a force-free field can be very large with the consequence that a tremendous amount of energy is released in the form of large scale motions. The latter condition appears to occur in the largest solar flares. Hoyng limited himself to reviewing recent reinterpretations of hard X-ray emission from flares. The "classical" picture ascribes the bursty hard X-ray emission to a beam impinging on the chromosphere or the corona. The observed X-ray fluxes demand that such a beam of energetic ejections carry in excess of 10% of the total flare energy--a situation which is difficult to explain theoretically as well as to bring into agreement with the fluxes of energetic flare particles observed in space. With the emergence of these difficulties, the thermal bremsstrahlung interpretation, with its much greater efficiency of energy into X-rays, has been revived.

Two additional talks concentrated on the problems of STIP. Robert Lin reviewed current knowledge on energetic particles within the solar system covering the range from ∿1keV (solar wind plasma) to many GeV (Galactic Cosmic Rays). Such suprathermal particles arise from a variety of sources--the galaxy, the nearby interstellar medium, solar flares, the quiet sun, planetary magnetospheres, and planetary bow shocks--and care must be exercised to distinguish these many sources. Recent analyses have shown that the interplanetary medium itself is a major source of low energy ions ($\lesssim$ 100 MeV). D. Intrilligator reviewed current information concerning interplanetary disturbances particularly those which accompany solar flares. Particular emphasis was given to the evolution of shocks in the outer solar system and the role such shocks play in accelerating particles *in situ*.

A detailed report of the meeting is planned for a future issue of "Solar Physics."

The addresses of some key persons in the operation of SMY appear below:

C. de Jager, Chairman SMY Steering Committee, Space Research Laboratory, Beneluxlaan 21, Utrecht, The Netherlands

P. Simon, Secretary SMY Steering Committee, DASOP, Observatoire, 92190 Meudon, France; Telephone 534.75.30; Telex 200590.

Z. Svestka, Chairman FBS, Astronomical Inst., Space Research Lab, Beneluxlaan 21, Utrecht, The Netherlands; Telephone (030)937145; Telex 47224.

D. Rust, SMY Science Coordinator and Chairman SERF, Code 409, Goddard Space Flight Center, Greenbelt, MD 20771, U.S.A.; Telephone (301) 344-7951; Telex 89-2554 GSFC EOF GBLT.

M. Dryer, Chairman STIP, Space Environment Laboratory, NOAA/ERL, Boulder, CO 80303, U.S.A.; Telephone (303) 499-1000; Texex 45897.

IV. GENERAL SCIENTIFIC MEETING, 20 AUGUST 1979

The following brief communications were presented:

A. A. Kattenberg, High Time-Resolution Solar Observations

A description of the new Westerbork microwave facilities with examples of high time-resolution (1/10s) heliograms of active regions and bursts obtained since 19 June 1979.

B. R.A. Munroe and G. Withbroe, Lyα and White Light Rocket Coronagraph Observations

Coronal Lyα profiles were measured in a coronal hole and in quiet coronal regions at 1.5-3.5 R_o in order to determine temperature, densities, and mass flow.

C. Gelfreich, Konovich, Peterova et al., First RATAN Results

Report on the work with the 575 m Radio Astronomy Telescope of the USSR Academy of Science (RATAN) operated at λ = 1.35-4.0 cm. First results are:

- At 1.35 cm a "radio granulation" was detected which correlates with the chromospheric network.

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- At 2.0-4.0 cm enhanced intensities coincide with active Hα prominences.
- Flocculi-like structures with 20-50% contrast and <1% circular polarization (corresponding to several 10's of Gauss) appear.

D. Gergely, Kundu, and Golub, Detection of Type III Bursts Associated with Flaring of X-ray Bright Points

Results obtained with Skylab data. Type III bursts were found associated with flaring X-ray bright points which occurred inside and outside coronal holes.

E. D.A. Guidice, Radio Solar Telescope Network

A report on the Air Weather Service (U.S.A.) Radio Solar Telescope Network which measures global solar flux. Observations of some special events were presented. The data are available in the NOAA SGD.

Administrative Sessions

Business meetings were held on 14, 17, and 20 August 1979.

I. ELECTION OF OFFICERS AND NEW ORGANIZING COMMITTEE FOR 1979-1982

The President noted the tradition that the Vice President automatically succeeds the President at each General Assembly. A slate of candidates for other Offices and members of the Organizing Committee, containing all candidates proposed to date, was presented by the President and nominations from the floor were accepted. It was brought to the attention of the Commission that one major task of the Organizing Committee is the preparation of the Commission Section of Reports on Astronomy and thus disciplinary as well as geographical breadth is desired. The following were selected by ballot:

President:	V. Bumba	
Vice-President:	E. Tandberg-Hanssen	
Secretary:	R. Howard	
Past President:	G. Newkirk	
Organizing Committee:		
	H. Yoshimura	(Theory of Solar Cycle)
	R. Howard	(Empirical Aspects of the Solar Cycle)
	H. Zirin	(Active Regions)
	J. Harvey	(Non-Sunspot Magnetic Fields and Sunspots)
	O. Engvold	(Prominences)
	D. Rust	(Flares and Energetic Particles)
	M. Pick	(Radio Physics of the Sun)
	V. Stepanov	(Corona)
	M. Dryer	(Solar Wind and Solar-Terrestrial Relationships)
	R. Bray	(Ground-Based Instrumentation)

II. MEMBERSHIP IN THE COMMISSION

The President noted with regret the deaths of D.H. Menzel, C. Popovici, and S.F. Smerd. The names of Sixty newly elected and current members of the IAU who have expressed the desire to join the Commission were read and their membership in Commission 10 unanimously accepted.

III. CANDIDATES FOR REPRESENTATIVES TO OTHER ORGANIZATIONS

Z. Svestka proposed that two additional members be appointed by IAU to the SCOSTEP Steering Committee for the Solar Maximum Year. J. Harvey and M. Pick were elected by the Commission and the President was instructed to inform the IAU General Secretary of this choice.

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IV. WORKING GROUPS OF COMMISSION 10 (1979-1982)

A. Working Group on the Solar Maximum Year

M. Dryer
Z. Svestka
D. Rust

B. Working Group on International Programs

Chairman: P. Simon
Co-Chairman: F. Moriyama
Members: H. Coffey, L. Dezsö, M. Dryer, S. Enome, R.S. Grevishev, J. Harvey, R. Howard, S. Kane, R.P. Lin, V. Obridko, and E. Tandberg-Hanssen.

V. REPORTS OF WORKING GROUPS (1976-1979)

A. Sunspot Numbers and Indices of Solar Activity

Chairman J. Eddy reported on the analyses which the Working Group had carried out to compare the Zürich Relative Sunspot Number R_Z with such quantitative indices of solar activity as the 2800 MHz flux and other qualitative indices such as the Sunspot Number R_A, compiled by the American Association of Variable Star Observers. He noted that the study had received some urgency with the possibility that Zürich may discontinue its issuance of the parameter R_Z after Waldmeier's retirement. Based upon their comparison of monthly means of these parameters for the last 28 years, the Working Group reported:

The two qualitative indices R_Z and R_A are related linearly with a correlation coefficient of 0.99.

Systematic Departures of about 10% between the two qualitative indices R_Z and R_A appear to occur preferentially at high solar activity. The origin of this effect is unknown.

The relation between R_Z (or R_a) and S_a is linear for $R_Z \gtrsim 45$; below $R_Z \approx 45$ it is non-linear but highly reproducible.

The Commission engaged in intense discussion concerning the advisability of adopting the quantitative index S_a as the index of solar activity, the proposal that R_Z be continued to be determined at Zürich to preserve its uniqueness, and the possibility of introducing other indices of solar activity. The consensus was that the Relative Sunspot Number is a unique link with the past course of solar activity and that the 10 cm flux provides a quantitative dimension which should be preserved for future analysis.

These convictions were embodied in Resolutions I. and II. below. The full text of the Working Group Report is planned to be published in NOAA Solar Geophysical Data and the Quarterly Bulletin of Solar Activity.

B. International Programs

The President informed the Commission that the Federation of Astronomical and Geophysical Services (FAGS), which sponsors a variety of services of which those of direct interest to the Commission are the International URSIGRAM and World Day Service (IUWDS) and the Quarterly Bulletin of Solar Activity, had requested that the Commission express an opinion concerning the continued value of these services. P. Simon, Chairman of the Working Group, reported on the history, objectives, and

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publications of IUWDS. In the discussion it was pointed out that the contribution which might be requested of the IAU is justified in view of the extreme usefulness of the service to such Commissions as 10, 12, and 44 and such special activities as the Solar Maximum Year. At the conclusion of the discussion the Commission passed Recommendation III.

The Commission then discussed the continued value of the Quarterly Bulletin with considerable attention directed toward possible duplication of the material which is available in the NOAA-Solar-Geophysical Data. Simon noted that the Quarterly Bulletin is considered by many as the "final" report on basic phenomena of solar activity. The consensus was that both publications will continue to be of intense value to the scientific community. Moriyama reminded the Commission that his institution (Mitaka) will continue publication of the Quarterly Bulletin until at least the end of the current solar cycle if it is given assurance from the Commission that the service is of value. At the conclusion of this discussion the Commission passed Recommendation IV.

The President reported that the editors of the Quarterly Bulletin had expressed the desire to have a formal point of contact with the scientific community to give advice concerning the scope, content, format, etc. of the Bulletin and that the Working Group on International Programs should be assigned this task with the Chairman designated as the liaison official.

V. Lincoln distributed a brochure on the activities and publications of NOAA Solar Terrestrial Physics Services and Publications and informed the Commission that Gnevishev (Kislovodsk) had agreed to prepare the coronal isophotes which had been prepared so far by Boulder. A motion was adopted to thank V. Lincoln for the past work and Gnevishev for accepting the new responsibility.

C. Mass Ejections

The charge and membership of the Working Group appear in IAU Transactions, XVI B, 1976. Chairman Tandberg-Hanssen reported that:

(1) A system of reporting mass ejection events has been established through World Data Center A (Boulder, Colorado, U.S.A.). Such phenomena will appear in a "Table of Solar Transients" in Solar Geophysical Data, Comprehensive Report published by NOAA. The tabulation will include such information as location, time, height, classification, information on the wavelengths (X-ray, EUV, Hα, white light, forbidden coronal emission line, radio, etc.) at which the event was detected, as well as remarks concerning the presence of associated activity. For details, contact J.V. Lincoln, NOAA.

(2) The Working Group has contacted a number of individual scientists and institutions capable of making observations of mass ejections by a variety of techniques at a wide variety of wavelengths and has secured their cooperation in reporting such events to the World Data Centers. These activities are expected to be particularly intense during the Solar Maximum Year.

(3) The Working Group recommends the following nomenclature for the reporting of mass ejections:

- Prominences - S, flare surge; SP, flare spray; A, eruptive active region; Q, eruptive quiescent.
- Coronal - D, depletion; C, cloud; B, bubble; EL, expanding loop; R, streamer or ray; IV_m, moving type IV radio burst.

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Detailed descriptions of these classifications appear in "An Illustrated Glossary for Solar and Solar Terrestrial Physics," A. Bruzek and C.J. Durant, eds., 1977, Reidel, Dordrecht.

D. Solar Maximum Year

Scientific and organizational details appear in the report of the joint meeting. Resolutions V. and VI., pertaining directly to the SMY, were passed unanimously by the Commission.

VI. MISCELLANEOUS REPORTS

Greenwich - Debrecen Photoheliographic Results - At the General Assembly in Grenoble, the Commission was informed that the Royal Greenwich Observatory would discontinue its photoheliographic program and that Debrecen Observatory might be able to continue this work. The Commission offerred strong encouragement to Debrecen in this endeavor.

L. Deszö reported that Debrecen formally assumed responsibility for this program in January 1977 and has established collaborative arrangements with Pulkovo, Kislovadsk, Royal Greenwich, and Kodaikanal to assure a continuous daily record of high quality. To assure homogeneity in the RGO and Debrecen data, an intense comparison between data from the two stations is being carried out covering several years prior to 1977. It is planned to publish the Photoheliographic results from Debrecen and Gyula, supplemented by observations from the other cooperating stations, annually with the first volume (1977) available late in 1979. The President called for a vote of thanks to L. Deszö, Debrecen Observatory, and the Hungarian Academy of Sciences for their assumption of this responsibility: the proposal carried unanimously.

Recommendations and Resolutions

I. Commission 10, recognizing that the long series of relative sunspot numbers is a unique link with the course of solar activity in the past,

Recommends that all institutions that have demonstrated interest and competence in the work of obtaining sunspot numbers should continue the series.

II. Commission 10, recognizing that the 2800 MHz solar flux provides a standard quantitative index of solar activity for use in solar and solar-terrestrial studies,

Recommends that those institutions making such measurements should continue to do so.

III. Commission 10, recognizing that the International Ursigram and World Days Service (IUWDS) has rendered valuable service to the scientific community during the coordination of such international programs as the IGY, the IQSY, and the IMS; that the services provided by the IUWDS are not provided by any other agency and are relevant to the work of several commissions of the IAU; that these services will be particularly important for such programs as the Solar Maximum Year; and that the IUWDS included the prompt reporting of geophysical and solar events which will be occurring with increased frequency in the next few years;

Recommends that the IAU continue to support the activities of the IUWDS to assure continuance of this valuable service.

IV. Commission 10, recognizing that the Quarterly Bulletin of Solar Activity has for many years provided a valuable reporting service to the international scientific community; that this service continues to be relevant to the activities of

Commissions 10, 12, 40, 44, and 49 of the IAU; that the continuation of this service will be of particular value during the coming Solar Maximum Year;

Recommends that the IAU support the Quarterly Bulletin of Solar Activity to assure that this service continues into the future.

V. Commissions 10, 12, and 44 draw attention to the coming of Solar Maximum and recommend a sustained and coordinated effort in its study during the next three years.

VI. Commission 10, recognizing the important contribution made to solar physics by very high frequency (greater than 9 GHz) radio flux observations of the sun,

Recommends that such observations should continue to be strongly supported during the coming solar maximum.