

# INTER-UNION COMMISSION ON SOLAR AND TERRESTRIAL RELATIONSHIPS

The Commission held its final meetings in the House of Youth, Belgrade, on 25–26 August 1966, prior to the Inter-Union Symposium on Solar-Terrestrial Physics.

The meetings to be reported are:

- (i) Business meeting of the Commission.
- (ii) Open discussion on 'Suitability of Solar Data for Terrestrial Correlations'.
- (iii) Individual contributions on solar-terrestrial relations.

At the time of the meetings, the membership was as follows:

## *Members*

IAU	IUGG	URSI
C. W. Allen (U.K.), <i>President</i>	Mrs N. P. Benkova (U.S.S.R.)	G. M. Allcock (N.Z.)
R. Giovanelli (Australia)	T. Obayashi (Japan)	D. K. Bailey (U.S.A.),
E. R. Mustel (U.S.S.R.)	W. O. Roberts (U.S.A.)	<i>Secretary</i>
M. Waldmeier (Switzerland)	E. J. Vassy (France)	R. Coutrez (Belgium)
		A. H. Shapley (U.S.A.)

## *Corresponding Members*

E. K. Bigg (Australia)	R. Michard (France)
Mrs. H. Dodson-Prince (U.S.A.)	M. Nicolet (Belgium)
F. Link (Czechoslovakia)	

There were 155 names on the Roster of Active Workers.

## *Business Meeting of the Commission (IUCSTR)*

After some informal discussion the meeting began at 10<sup>h</sup> 20<sup>m</sup>, 25 August 1966. It was attended by the following Members or Corresponding Members:

C. W. Allen, *President* (in the Chair), D. K. Bailey, *Secretary*, E. R. Mustel (represented by N. W. Pushkov), T. Obayashi, W. O. Roberts, A. H. Shapley, M. Waldmeier.

The President of the newly formed Inter-Union Commission on Solar-Terrestrial Physics (IUCSTP), Dr H. Friedman, attended by invitation.

It was accepted that since the IUCSTR is to terminate in 1966 by ICSU resolution the present meetings would be the last held by the present Commission.

The report of the previous meeting at Hamburg, 24 August, 1964 (Trans. IAU, 12B, 651, 1966) was adopted.

The President reported briefly on the use of available funds for travel and subsistence allowances. The funds are from ICSU sources and accounting is in the hands of the IAU Secretariat.

## *Future organization of solar terrestrial relations*

The main concern of the meeting was to consider the situation occasioned by various efforts to coordinate the science of solar-terrestrial relations (STR) with the wider science now using the title solar-terrestrial physics (STP). These activities were briefly reviewed and will be recorded. The Working Group on Solar-Terrestrial Physics, mentioned in the report on the Hamburg Meeting (p. 652), had met in September 1964 and recommended the formation of a Symposium Committee on STP to coordinate symposia in this field. This was considered by



the IUCSTR through the medium of circulars in November 1964 and February 1965. The IUCSTR approved the Working Groups recommendation but considered it was *not* necessary to form a *new* Symposium Committee. In February 1965 the IUCSTR reported its willingness to modify itself with the view to accepting the responsibility of coordinating STP. This proposal was considered by ICSU at its meeting in Munich, April 1965 and resulted in Resolution 5 (ICSU Executive Committee 3rd Meeting, Summary Record, p. ii, 1965) which stated:

The Executive Committee resolves that the Inter-Union Commission on Solar and Terrestrial Relationships (IUCSTR) be urged to make appropriate additions to its membership, and modify its terms of reference so as to provide representation for all interested Unions, Commissions of ICSU; and that the Unions and Commissions concerned be likewise urged to coordinate the arranging of symposia through this Commission.

In accordance with this resolution the IUCSTR submitted in July 1965 Draft Proposals for its own modification in order to undertake coordination of STP symposia. Several discussions with interested parties were held and in November 1965 the 'Proposals for an International Solar-Terrestrial Commission (ISTC)' was submitted to ICSU in time for consideration at the ICSU Bombay Meeting in January 1966. However, these proposals were not actually used as basis for the discussions in Bombay. The future of STP research and STP symposia was conjoined with the future of IQSY and led to the Resolution VII (ICSU Eleventh General Assembly, Summary Record, p. 37, 1966) which might be stated in a reduced form as follows:

- (1) That the IUCI and IUCSTR be terminated in 1966,
- (2) That an Inter-Union Commission on Solar-Terrestrial Physics (IUCSTP) be set up in 1966:
  - (i) to promote, organize and coordinate international research in solar-controlled disciplines of geophysics,
  - (ii) to coordinate all ICSU symposia in the field of solar-terrestrial physics, and
  - (iii) to provide certain advisory services on operational activities arising out of IQSY.

The ICSU resolution was discussed and was considered to be a satisfactory basis for the future promotion of STR. It was noted that no Parent Union had been proposed and satisfaction was expressed that the IUCSTP would be directly responsible to ICSU.

The Commission then discussed what recommendations, arising out of the work of the IUCSTR, should be sent forward to the IUCSTP. The following recommendations were made:

- (a) That the IUCSTP be asked to accept advisory responsibilities with respect to the *Quarterly Bulletin of Solar Activity* and other relevant Services.
- (b) That the IUCSTP might at times be expected to promote operational planning, associated working group activities, and timely assessments of particular subjects such as problems arising from overlapping areas of interest in various scientific Unions under ICSU.
- (c) That the IUCSTP give attention to maintenance of continuity in STP programmes and data.
- (d) That the Roster of Active Workers maintained by the IUCSTR (containing 155 names) be sent to the IUCSTP Executive. This represents a useful list of scientists actively interested in STR.
- (e) That, although the Reports 1 to 10 on Solar-Terrestrial Relations constitute an important part of the IUCSTR (and previous JCSTR) output, it is *not* recommended that the IUCSTP necessarily continue such reports.



- (f) That archive material relating to the IUCSTR (and previous JCSTP) be retained for the present by C. W. Allen at the University of London Observatory. The following spares of the Reports on STR still exist 8 of 2, 55 of 4, 15 of 5, 14 of 6, 34 of 7, 29 of 8, 10 of 9, and 13 of 10.

It was recommended that the Report of the Belgrade meetings of IUCSTR should be prepared for presentation to the ICSU Executive Committee meeting in Monte Carlo (October 7–8, 1966), and that the points relevant to the IUCSTP should be sent to its President (Dr H. Friedman) as soon as possible in order that the points may be considered in the planning of future activities.

As a conclusion to the Meeting the Commission noted with satisfaction the creation of the new IUCSTP and commended the President (IUCSTR) for his leadership in the Commission's activities and for his participation in the arrangements for specification of terms of reference for the new Commission which should serve as an excellent basis for future international activities not only in the field of solar-terrestrial physics but also for the continuation and extension of activities of the character that have in the past occupied our Commission.

The activities and responsibilities of the IUCSTR *will close* when the various reports and recommendations have been prepared, circulated and submitted. A statement is to be circulated to the Roster of Active Workers. The President is to report to ICSU in October. He will also arrange with the IAU to close the accounts after the ICSU meeting in October.

#### *Open Discussion on Suitability of Solar Data for Terrestrial Correlations*

Meeting held at 2 p.m. 25 August 1966.

Attended by Allen, Bailey, Bernard, Buzchanov, Campbell, Cardús, Davies, Dieminger, Dinulescu, Djurkovič, Ehmert, Fortini, Friedman, Jacchia, Karabin, Knuth, Kundu, Landstreet, Lauter, Lincoln, Lüst, Matsushita, Milogradov, Minnis, Mustel, Obayashi, Parepeanu, Piccardi, Pick, Popovici, Przeuijervic, Pushkov, Ramanathan, Righini, Roberts, Roederer, Sawyer, Senatre, Shapley, Svestka, Tandberg-Hanssen, Valniček, van Zandt, Waldmeier, White, Zhulin.

The President introduced the discussion by saying that the solar data to be discussed related to the extended routine data intended for use rather than exploration or speculation. The purposes of such data could be summarized: (i) for studying effects on the Earth and surrounding Earth-space, (ii) for coordinating specialized observations and researches, and (iii) for studying the Sun itself. The discussion would take this order of priorities.

Points that might be considered in discussing the data were, (i) the measurement often was no more than an *indication* of the physical quality required, (ii) measurements were frequently subjective and required standardization and comparability, (iii) data were often applied through correlations and secondary correlations may require elimination, (iv) it was often necessary to segregate a total solar effect into individual activity contributions, (v) there is need for numerical indices for descriptively complex phenomena.

The discussion was subdivided into (i) generalities, such as the points mentioned above, (ii) slowly varying phenomena, active areas, (iii) rapidly varying phenomena, flares, and (iv) phenomena not associated with active areas including the quiet Sun.

#### *Discussion points*

*Shapley*: Difficulty of dealing with very extensive and almost continuous data. There may be need for more analysis before publishing.

*Waldmeier*: Filament should be reported in a numerical form suitable for correlation with *M* regions.



*Mustel*: More whole-disk magnetic field measurements should be undertaken (recommendation A made). Early magnetic storm data should be sorted into recurrent and sporadic.

*Lincoln*: The CRPL are preparing to publish the Mount Wilson magnetic data.

*Pushkov*: Introduced the question of solar terrestrial services (recommendation C made).

*Valniček*: Introduced the question of computer processing of data.

*Jacchia*: Suggested that steps be taken to segregate the active and quiet Sun components of 10.7 cm radiation (recommendation B made).

*Friedman*: Referred to the variations in 2 to 10 Å solar emissions and their relations to ionosphere responses. These variations challenge solar observers to detect analogous variations in spectroheliographic material.

*Kundu*: Suggested 3 cm solar-radio recordings might give indication of similar variations.

*Godoli* (Submitted): The peculiarities of long-term correlations can be ascribed to the behaviour of solar indices.

### *IUCSTR Recommendations arising out of Discussion on Solar Data*

#### *A. Solar Disk Magnetic Observations*

In view of the importance of relating the whole picture of the Sun's magnetic field to the magnetic field in the neighbourhood of the Earth and in interplanetary space

It is *recommended*:

That observatories with facilities for high spectroscopic resolution consider the possibility of making magnetic observations of the whole solar disk on a regular basis.

#### *B. Quiet and Active Radio Observations*

In view of the great use made of solar radio observations at various wavelengths for correlation with solar XUV flux measurements at all stages of the sunspot cycle

It is *recommended*:

That radio observatories offering suitable data be asked to endeavour to express the results quantitatively in such a way that the two components, quiet and active, can be segregated.

#### *C. International Solar-Terrestrial Services*

Considering:

- (1) That the collection and publishing of solar-terrestrial data is prepared by many different organizations in several countries,
- (2) That this work has received some coordination in the past, but that this coordination needs to be maintained and improved with particular reference to such questions as standards and definitions,
- (3) That it is by no means certain that all data thus published are of sufficient use to the scientific and operating communities to justify their publication,
- (4) That it is possible that additional observations could usefully be made,
- (5) That in the field of meteorology the WMO provides services for all user purposes,

The IUCSTR *recommended*:

- (1) That a clear need now exists for a more closely coordinated *international solar-terrestrial services* such that the needs of both the scientific and operational communities requiring solar-terrestrial information will be effectively served.
- (2) That the IUCSTP be asked to consider how the need for such services can be met.



*Individual Contributions on Solar-Terrestrial Relations*

Meeting held at 9.30 a.m. 26 August 1966.

It was an open meeting attended by about 45 persons. The papers submitted were reported very briefly since it may be expected that many of them will be published elsewhere.

*T. Obayashi* dealt with the identification of *M*-regions from their influence on the diurnal variations of cosmic rays. The phasing of the various disturbances was illustrated on a 'floral' diagram.

*S. Matsushita* gave an analysis showing the detailed effects on the geomagnetic  $S_q$  and  $L$  variations that could be associated with solar activity.

*M. Pick* described a study of the slowly varying component of solar radio emission in relation to the structure of associated centres of solar activity. The distribution in the radio spectrum is found to be related to a factor measuring certain geometric properties of sunspots and their magnetic fields.

*E. Tandberg-Hanssen* gave results on the magnetic fields of prominences obtained from the High Altitude Observatory magnetograph at Climax.

*B. Valniček* illustrated the features of an active flare prominence event observed with high spectroscopic resolution in  $H\alpha$ .

*G. Piccardi* questioned the causality of correlating phenomena. Previously his F-test had been related to flares and he now finds a good relation between the P-tests and proton flares.

*P. Bernard* discussed a 2-year period in geomagnetic variations but could not ascribe it to a solar activity effect; he finds the magnetic field of ionospheric winds quantitatively sufficient to account for it.

*Constance Sawyer* described the preference for certain heliographic longitudes of 45 proton-flare regions of cycle 19. With 15 famous flares of the last century they define a rotation period of 27.2135 days. The rigid rotation and long lifetime of this pattern suggest a deep-seated magnetic field of large scale.

*T. E. van Zandt* had studied the variations in the upper atmospheric ratios  $O^+/He^+/H^+$  throughout the minimum of the solar cycle. The interpretation of these variations led to the suggestion that the coronal variations lagged a year behind those of the chromosphere. Support for this suggestion was found in the E and F layer critical frequency variations.

*C. Popovici, A. Parepeanu and V. Dinulescu* considered the major flares during 1958-61 which did not give rise to geomagnetic storms. Certain aspects and morphology regularities were detected.

*K. Davies* studied the sudden ionosphere frequency deviations resulting from flares and showed that the characteristic electron increase occurred mostly above 100 km. Time variation studies suggest that the D and E-F effects originate from separate parts of the solar ionizing spectrum. The relaxation time of the E region is found to be about one minute.

*M. L. White* described how the mechanism of rotation and drift in the solar photosphere should give rise to a 3-leaf Rossby wave pattern such as occurs in 'dishpan' experiments. Many solar phenomena, including the equatorial drift, can be explained on this basis.

*D. H. Menzel* submitted (in his absence) a paper on the nature of sunspots and solar activity.

*Invited Address*

An invited address by Dr E. G. Bowen, Chief of Division of Radiophysics, CSIRO, Sydney, entitled 'Solar and Planetary Interactions' had been planned for the afternoon of 26 August.

Unfortunately this address had to be cancelled as Dr Bowen was unable to make the trip from Australia.

*Closure of IUCSTR Meetings*

The Belgrade final Meetings of the IUCSTR closed at the end of the Individual Contributions meeting on the morning of 26 August 1966.