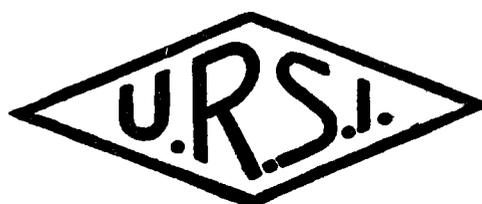


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**UNION RADIO-SCIENTIFIQUE INTERNATIONALE**  
**INTERNATIONAL UNION OF RADIO SCIENCE**



**Comptes Rendus des Assemblées Générales de l'URSI**  
**Proceedings of URSI General Assemblies**

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**XVI<sup>e</sup> Assemblée Générale**  
**XVI General Assembly**

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**Subvention de l'UNESCO - 1969 - DG/2.1/414/28**

The group agreed to support the nomenclature proposed by the IAGA Working Group but recommended the following additions and changes to the document as printed in *URSI Information Bulletin* No 168, pp. 24-30.

1. A further category, B<sub>4</sub>, should be added with the characteristics outlined below which are expressed in the form of Table I of the IAGA document

*Suggested Backscatter Type B<sub>4</sub>*

Basic characteristics of scattered radio waves :

Duration : Up to hours

Fading rate : Slow.

Typical properties of radio aurora :

Extent in range : —

Mean height : 110 km;

Vertical extent : —

Magnetic aspect sensitivity : None,

Association with magnetic disturbance . Strong.

Observations before 1968 :

Frequency : HF, VHF;

Name . 2 × E ground scatter;

Reference : Kaiser, T R *Abhandlungen Geomag. Inst Potsdam.* 19, 290 (1962).

2 Page 27, line 15 Substitute : “should be used either alone or with as many subscripts as are appropriate (e. g. B<sub>2</sub>, <sub>3</sub>)”.

3 Page 27, line 24. Delete the word “backscatter” and insert the word “scatter”.

COMMISSION IV — THE MAGNETOSPHERE

*Business Meetings of Commission IV*

1. The following names were submitted to the Executive Committee as candidates for Vice-Chairman of Commission IV : F. Scarf (USA); L R O. Storey (UK) On the recommendation of the Coordinating Committee, Dr Scarf was subsequently elected

2. Following discussions on the undesirably large number of international meetings on magnetospheric physics, the views expressed in Opinion IV 1 were approved.

COMMISSION V. — RADIO ASTRONOMY

Rapport du *Président*, E J Blum

Les progrès de la radioastronomie ont été spectaculaires durant les trois dernières années : un nouveau type d'objet céleste, le pulsar, a été découvert; l'interférométrie intercontinentale est devenue une réalité; plusieurs nouvelles raies ont été observées

La découverte des pulsars a naturellement eu des répercussions astrophysiques considérables : l'existence de tels objets n'a pas été une surprise totale s'il s'agit bien d'étoiles à neutrons, mais personne n'avait imaginé les propriétés extraordinaires de leur rayonnement Ces propriétés, et la nature physique même des pulsars, ne sont pas encore comprises d'une manière complètement satisfaisante Les pulsars sont intéressants à un point de vue très différent qui mérite d'être signalé dans le cadre de notre Union : l'exploitation de la découverte a été menée à une allure extrêmement rapide, et ceci dans un nombre considérable d'observatoires. Des techniques d'observation particulières ont été mises au point dans des délais très brefs Enfin des utilisations variées des propriétés temporelles des impulsions ont été envisagées Il faut rappeler que la découverte des pulsars a été fortuite et s'est faite grâce à un instrument fort simple, ce qui ne retire rien, bien au contraire, aux mérites de ceux qui ont fait la découverte à Cambridge.

La situation est tout autre pour la mise au point des procédés d'interférométrie à très grande base faite par des équipes canadiennes et américaines. Il s'agit au contraire de développements techniques remarquables permettant la mise en œuvre d'un instrument dont le principe était bien connu : que le procédé d'enregistrement soit analogique ou digital, le pouvoir séparateur des interféromètres n'a plus de limite ! Attendre le pouvoir séparateur des télescopes optiques semblait il y a quelques années un rêve pour les radio-astronomes Ce pouvoir séparateur a été largement dépassé par les expériences intercontinentales récentes La plupart des objets observés ont été résolus en un certain nombre de composants, certains de ces composants, en général variables, ont des diamètres inférieurs à 10<sup>-3</sup> secondes d'arc.

Le nombre de raies observé par les radioastronomes a considérablement augmenté . après les raies de recombinaison, d'autres raies ont été détectées

dans notre Galaxie, souvent avec des températures de brillance surprenantes, ainsi en microondes les raies de l'eau et du formaldéhyde. L'exploitation de la spectroscopie a été très fructueuse, nous connaissons mieux la structure de la Galaxie, les régions HII dont certaines très compactes ont été mises en évidence grâce à des observations mixtes raie-continuum. Une séance scientifique de notre Commission a été consacrée à chacun des trois sujets précédents.

Mais bien d'autres points marquants dans les domaines de l'astrophysique ou des instruments méritent d'être signalés.

Depuis notre dernière réunion à Munich, quelques grands instruments nouveaux ont été mis en service : en particulier un grand radiohéliographe et une croix en Australie, un radiotélescope de 46 m de précision au Canada, un radiotélescope de 12 m aux Etats-Unis et un radiotélescope de 21 m en URSS, tous deux utilisables sur ondes millimétriques, d'intéressants interféromètres solaires au Japon. Deux instruments encore plus importants sont près d'être achevés en Hollande (Westerbork) et en Allemagne (radiotélescope de 100 m à Bonn), d'autres sont en cours d'exécution, ainsi en Angleterre l'interféromètre à synthèse d'ouverture de 5 km.

Ce rythme rapide dans l'apparition de nouveaux instruments ne sera sans doute pas maintenu. Une évolution de la politique scientifique s'est produite dans plusieurs pays et le développement de nouveaux appareils, qui paraissait souhaitable au point de vue scientifique et possible au point de vue humain, sera probablement ralenti.

Certains des radiotélescopes récents ont été très rapidement productifs : ainsi le radiohéliographe de Culgoora a fourni des résultats solaires étonnants, qui constitueront une grande partie de la matière traitée dans une de nos séances. Des études en cours ont été fructueuses, nous ne les citerons pas toutes. L'exploitation de la découverte de la radiation du fond continu à 3° K se poursuit aussi bien du point de vue théorique que pour mesurer d'éventuelles anisotropies. La mesure de l'effet Zeeman sur la raie 21 cm, donnant accès au champ magnétique galactique, déjà tentée plusieurs fois, a été réalisée avec succès. Enfin il faut mentionner l'important travail d'exploitation qui se continue sur les radio sources : identification, spectre, variations, polarisation, recherche de critères de classification.

Vous avez remarqué sans doute quelques changements dans l'organisation de notre programme scientifique, j'ai introduit, avec l'approbation des comités nationaux, deux variantes par rapport à nos réunions antérieures. D'une part une séance est consacrée à l'activité des divers observatoires de radioastronomie. J'espère que l'on aura ainsi, en dehors des communications consacrées à des sujets bien précis, une vue d'ensemble de l'activité de chaque

groupe, et un aperçu des projets. Ceci, je l'espère, permettra de mieux rendre compte de l'activité des groupes nouveaux, ou commençant à utiliser un nouvel instrument, et d'avoir des informations brèves sur des recherches intéressantes, mais ne rentrant pas dans le cadre du programme prévu. J'ai aussi demandé à ce que les auteurs de communications éventuelles pour une des séances scientifiques se mettent en rapport directement avec la personne présidant la séance avec quelque avance, de façon à préparer un peu le programme détaillé de la séance. L'expérience nous dira s'il vaut la peine de maintenir ces variantes.

*Minutes of Business Meetings of Commission V*

*18 August 1969*

*Chairman* Dr E J Blum (France)

*Secretary* : Dr John W Findlay (USA).

1 — *Chairman's Report*

The meeting, at which about 65 members of Commission V were present, was called to order by the Chairman. After welcoming the delegates and outlining the agenda for the meeting, he gave a brief report on his three years as Chairman. Despite a general slow-down in most countries in building new large radio telescopes, the three years had shown major new discoveries in radio astronomy, as the scientific sessions would demonstrate. In planning for the XVI General Assembly, he had made two changes : first, to introduce a session on "Current Activities", second, to try to get contributors to write in advance to their session chairmen. The first of these was more successful than the second.

2. — *Reporting at the Assembly*

Blum announced the decisions of the Executive Committee on reporting : (a) Texts of main papers, where available, were to be given to Findlay for minor editorial checking and transmission to URSI. (b) That a working group of editors/reporters be formed to prepare a brief status report on the sessions. (c) That the various National Reports would not be published by URSI.

Acting on (b), Blum asked the various session chairmen to appoint their reporters and Findlay to coordinate their activities.

### 3. — *Nominations for Vice President*

Prof Muller (Netherlands) follows Blum as President. A list of names for Vice President was discussed, and it was agreed that further informal discussions should take place and that the final recommendations would be made at the 2nd Business Meeting (August 22)

### 4. — *Possible Union Reorganization*

To introduce this subject, which President Silver had referred to at the first Plenary session, the letters of Dr Minnis (URSI-N18 of July 4, 1969) and of Dr. Silver (July 17, 1969) were read Blum commented that there was no general agreement in France on what was referred to as "the French proposal" Several people expressed the fear that a reorganization might result in Commission V losing its identity, or even perhaps its membership in the URSI structure Reference was made to President Silver's address at the opening plenary meeting as demonstrating the contributions of Commission V to URSI The value of this association with URSI was recognized; as also was the value of Commission 40 of the IAU But the IAU was more oriented towards the astronomical results of radio astronomy and was not so able as URSI to provide the forum where the instrument designer, the experimenter, and the astronomer could meet

Similarly, the presence at URSI of members of other Commissions (I, III, IV, and VII, for example) was of great value to radio astronomers So also was the close association of URSI with IUCAF However, the greater ease with which scientists could attend IAU meetings as compared with URSI meetings (where the limitations of delegation size are more strict) was stressed This discussion had as contributors Baars, Van Der Laan, Hagen, Findlay, Swenson, Erickson, Christiansen, Moffet, and Blum No conclusion was reached Blum agreed to pass on the views of Commission V to President Silver, making the point that the members of Commission V would not be happy with any reorganization which seriously reduced the values which at present followed from their association in URSI

### 5. — *Report on IUCAF*

Dr. R L Smith-Rose, Secretary-General of the Inter-Union Commission on Frequency Allocations for Space Science and Radio Astronomy, gave a report on the work of the Commission since the last General Assembly He described the growth of IUCAF, its relations with the CCIR, the IFRB and the ITU, and outlined the work done at the Brussels meeting held on February 18-19, 1969. He emphasized the need for radio astronomers to

keep in close relation with the agencies in their own countries that were responsible for allocating frequencies

In discussion, Swenson and Van Der Laan emphasized the importance of careful preparation for the next ITU Administrative Radio Conference, planned for 1971 IUCAF will be represented, but work with national administrations is essential. Moffet hoped that IUCAF was kept up to date on the growth of spectral line work Swenson suggested that it was time to prepare for radio allocations in cislunar space and behind the moon

The next meeting was set for 3:30p m. on August 22nd, and Blum closed the meeting at 5 : 00 p m.

22 August, 1969

Chairman : Dr E. J. Blum.

Secretary : Dr. John W. Findlay

### 1. — *Reorganization.*

Blum called the meeting to order and asked President Silver to discuss the present position on URSI and Union reorganization Silver reminded the meeting that there could well be good reasons for considering Union reorganization, the question had been under discussion since 1963. He thought that his own statements might have been misunderstood, and he welcomed the chance to speak directly with Commission V with the intent to remove misunderstanding. He stressed the fact that membership in URSI, and the acceptance of an official position in URSI, carried responsibility for work and effort for URSI. He had some doubts whether some radio astronomers were strongly interested in URSI, although in his opinion there was not now, nor had there ever been, any desire on the part of URSI to lose Commission V from the Union Nor, in his opinion, was this in the least likely to occur in any reorganization

Nevertheless, a study of reorganization seemed essential, lest the situation grow to be more and more expensive in delegates' time and in the cost of meetings A way to reduce the overlap between different organizers running meetings on the same subject close together in time could be one result of reorganizing

In Dr Silver's view, Commission V should properly continue to work in URSI, discussing both the instrumentation and the results of radio astronomy Its existence within URSI was valuable to URSI, and its members

and office-holders both nationally and internationally should remember their direct responsibilities to work for and support the work of the Union.

Several members, Maxwell, Hagen, and Swenson, for example, questioned whether Commission V was losing interest in URSI. There had been instances in the past which gave some support to this view, but they might not be a safe guide to the future. Shakeshaft noted the relative ease with which IAU Assemblies could be attended by radio astronomers and the greater difficulties with URSI, despite the fact that basically the two Unions are of a similar kind. Findlay outlined the advantages to radio astronomy of URSI meetings: the presentation of papers on instrumentation and results, the value of meetings with other Commissions, and the importance of the URSI relationships with IUCAF, CCIR, and ITU.

Blum asked Muller and Findlay to join with him in drafting a resolution on the whole subject. This would consider the earlier statements of Commission V, and be presented to Commission V before the end of the XVI Assembly (See Recommendation V 3).

President Silver left the meeting after the discussion of this subject.

2 — *Recommendations for Vice-Chairman.*

A slate of seven candidates was considered by the meeting and, after an "informatory" vote by those present, the Official Members agreed to recommend, in the order of preference given, the following names:

- W. Erickson (USA);
- J. Locke (Canada),
- F. G. Smith (UK)

3. — *Symposium on Very Long Baseline Interferometry.*

Findlay asked advice from the meeting on this symposium, which the National Radio Astronomy Observatory (USA) proposed to organize in 1970. It was generally agreed that URSI might wish to be a sponsor of such a symposium and Findlay agreed to discuss the matter with the Secretary-General (See Recommendation V 4).

4 — *Working Group on Absolute Solar Flux Calibrations.*

Tanaka reported briefly on the successful progress made by the group in the last three years. He asked that the group should continue, and Recommendation V 1 proposed by Tanaka and seconded by Christiansen was unanimously approved. Tanaka suggested some changes in group membership, which would become: Tanaka (*Chairman*), Castelli (USA),

Covington (Canada), Croom (UK), Daene (East Germany), Fokker (Netherlands), Hagen (USA), Moltchanov (USSR), Mullaly (Australia), Tlamicha (Czechoslovakia)

This new composition of the group was approved.

5 — *Sub-Commission V (c).*

Prof. Waldmeier has asked that this Sub-Commission be dissolved, since it is no longer needed. Bracewell proposed, and Findlay seconded, this, which was agreed.

7. — *Radio Astronomy on and near the Moon*

Hagen considered that it was now time to consider the need for frequency protection for radio astronomy in the space between the outer edge of the ionosphere and the moon, and on the far side of the moon. Both locations are or soon will be accessible for radio astronomical observations. Swenson supported this view, and after some discussion he proposed Recommendation V 2 and Hagen seconded. The Recommendation was approved unanimously.

8. Blum closed the meeting at 5.00 p.m. with the announcement that only a brief business session would be needed before the end of the Assembly.

26 August 1969

*Chairman* Dr. E. J. Blum.

*Secretary* Dr. John W. Findlay

Blum called the meeting to order.

The minutes of Business Meetings 1 and 2 held on August 18 and 22 were approved.

Recommendation V.3, expressing the views of Commission V towards a possible reorganization of URSI, was proposed and unanimously approved.

Recommendation V.4, asking for sponsorship of URSI for a Symposium on Very Long Baseline Interferometry, to be organized by the National Radio Astronomy Observatory at Charlottesville, Virginia, USA, was unanimously approved.

Blum closed the meeting at 11.55 a.m. with the announcement that no other business meeting would be needed during this General Assembly.

E. J. Blum (*Chairman*),  
John W. Findlay (*Secretary*).