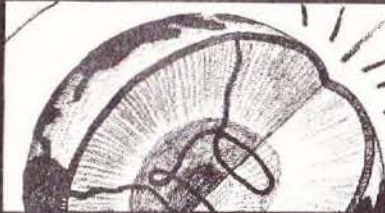


F. J. Lewis

IAGA



News

JULY 1968

NO. 7

INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS

ASSOCIATION OF GEOMAGNETISM AND AERONOMY

- President: Professor T. Nagata
Geophysical Institute
The University of Tokyo
Bunkyo-ku, Tokyo, Japan
- Vice Presidents: Dr. V. A. Troitskaya
Professor E. Thellier
- General Secretary and Editor of IAGA News:
Dr. Leroy R. Alldredge
ESSA Research Laboratories
Boulder, Colorado 80302, USA

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GENERAL INFORMATION

PRESIDENT'S PAGE

The dates and the place for the General Scientific Assembly of IAGA in 1969 have been decided based on the invitation from Father Romaña of the Spanish Organizing Committee. Because "The IAGA General Scientific Assembly-Madrid, 1969" will be held in Madrid, Spain, during the period 1-12 September 1969, where and when IASPEI also will hold its assembly, we shall have three Inter-Association symposia on scientific topics which are common interests of the two Association, as announced in this issue of IAGA News.

As you are well aware, geomagnetic methods have been extensively used in exploring the earth's upper parts and their movements. The results have lead, for example, to the revolutionary hypotheses of ocean floor spreading and continental drift. The physical properties and behaviours of the earth's core and deep mantle have been revealed not only by studying seismic wave propagation but also by extensive studies on the main geomagnetic field and its secular variation. One of the worst disasters over the earth is a destructive earthquake. Seismologists are urgently inviting geoelectromagneticians to study jointly with them the physical mechanism of earthquakes and the prediction of earthquake occurrence. One of the general policies of IAGA is to extend its friendly cooperation with any group of scientific researchers under ICSU to promote jointly our scientific knowledge on important subjects. In this regard, I hope that scheduled IAGA/IASPEI Symposia in Madrid will give rise to significant benefits for both associations which could be achieved only by a really close coordination between two groups of different specialities.

IAGA is planning to hold a symposium in Madrid on "Comparison of the Magnetospheric Behavior with Ground Observations and New Indices of Geophysical Activities". Various phenomena observable in space and on the ground, such as geomagnetic and ionospheric disturbances, aurorae, airglows, ULD, ULF emissions, density and temperature of ionospheric and magnetospheric plasmas, etc., should be involved in this subject. In this regard, IAGA has invited URSI to cosponsor this Symposium. The spirit of planning this IAGA/URSI symposium is exactly the same as in the case of IAGA/IASPEI symposia.

In addition to the above-mentioned four symposia, we shall have, in Madrid, our own IAGA symposia on several selected topics as well as each Commission's scientific sessions.

I sincerely hope that our first General Scientific Assembly will achieve real success by all means.

President Takesi Nagata

PUBLICATIONS

IAGA Bulletin No. 24 which was distributed at the St. Gall assembly contains abstracts of papers presented at that assembly. IAGA Bulletin No. 25 "Transactions of the XIV General Assembly, St. Gall, Switzerland, 1967" was distributed to contributors of the volume in mid-June of 1968. These two bulletins constitute a complete record of the IAGA proceedings during the XIV General Assembly. The proceedings of the Birkeland Symposium held in Sandjford, Norway, on 18-21 September 1967, has been published as IAGA Symposium No. 6, and the proceedings of the Joint IAGA-URSI Symposium on Upper Atmospheric Winds, Waves and Ionospheric Drifts, which was held in St. Gall on 3 and 4 October 1967, has been published as IAGA Symposium No. 7. Copies of these bulletins can be purchased at the IUGG Publications Office, 39 ter, Rue Gay-Lussac, Paris (Ve), France as indicated below:

IAGA Bulletin No. 24, Program and Abstracts, St Gall Meeting, 1967 -----	\$ 7.50
IAGA Bulletin No. 25, Transactions of the XIV General Assembly, St Gall, Switzerland, 1967---	\$ 6.00
IAGA Symposium No. 6, Birkeland, Aurora and Magnetic Storms, 1967 (in preparation)	
IAGA Symposium No. 7, Upper Atmospheric Winds, Waves and Ionospheric Drifts, 1967-----	\$ 9.00

The General Secretary would like to thank all of the Commission Chairmen, Working Group Reporters and Symposium Convenors and Reporters who helped complete these publications in a timely manner.

Dr. R. Schlich reports that since only 8 papers were submitted for publication in the Annals de Geophysique regarding the Conjugate Point Symposium held in St. Gall, it has been decided not to publish a separate symposium publication covering this symposium.

The IAGA Commission membership given in IAGA News No. 6 was admittedly tentative since there had not been time to receive acceptance answers from all of the candidates. Since the St. Gall meeting a serious attempt has been made to finalize these memberships. The results are listed in this publication although it is still acknowledged that some additions and changes will undoubtedly still be made.

The list of addresses are given in the back as an aid to communication among scientists with common interests.

IN MEMORY

Dr. A. D. Powsner, secretary of the Soviet Geophysical Committee, notified IAGA of the following particulars regarding the untimely death of Professor B. M. Yanovsky, who had been active in work of IAGA assemblies.

Professor B. M. Yanovsky, an outstanding Soviet geophysicist, died on the 12th of December 1967. He was an Honored Scientist of the RSFSR, the Head of the Chair of Physics of the Earth at the Leningrad State University.

B. M. Yanovsky was born in 1894. In 1916 he graduated from the Physical and Mathematical Faculty at the Petersburg University. B. M. Yanovsky began his scientific work at the time when geophysics began to gain its position as a special branch of science. In the 20's he took an active part in the exploration of the Kursk Magnetic Anomaly and later on in geophysical search of the oil deposits. Professor Yanovsky became a leading authority in the field of geomagnetism. His scientific interests involved both the problems of nature, history and morphology of the main geomagnetic field and various aspects of the variable magnetic field.

Professor B. M. Yanovsky has written more than 80 scientific works, including 7 text-books. His recently published monograph "Geomagnetism" is well-known in the Soviet Union and abroad.

Professor Yanovsky helped with the establishment of the standards of magnetic and electric units. During his last years he sponsored scientific research related to the paramagnetic constants of the proton.

Professor Yanovsky was a gifted teacher. He attached great importance to training geophysicists and took an active part in organization of the Chair of Physics of the Earth at the Physical Faculty at the Leningrad University. Since 1944 Professor Yanovsky has been the head of this Chair.

Professor Yanovsky headed the Commission on the Main Geomagnetic Field and Paleomagnetism at the Department of Earth Sciences of the USSR Academy of Sciences for nearly ten years. He took an active part in the work of different commissions on the problems of Structure of the Earth and the Upper Mantle at the USSR Academy of Sciences and was one of the editors of the magazine "Izvestia Akademii Nauk".

Professor Yanovsky was an outstanding scientist, considerate towards his pupils, and a man of charming personality.

Dr. Ernest Harry Vestine suffered a heart attack July 13, 1968. He was immediately rushed to the Santa Monica General Hospital, Santa Monica, California, where he passed away on July 18, 1968.

Dr. Vestine will be greatly missed in the scientific world and particularly in the geomagnetic field. Dr. Vestine served as Chairman of IAGA Commission II, Magnetic Charts, for four years between the Berkeley and St. Gall Assemblies. He served as Secretary of the World Magnetic Survey Board from its inception.

Most of the information given below was taken from the citation written by Dr. Sydney Chapman (a long time friend and teacher of Dr. Vestine) when the deceased was given the John Adam Fleming Award on April 19, 1967 by the American Geophysical Union.

Dr. Vestine, though Minneapolis born, spent part of his youth in Canada and studied there as an undergraduate and graduate. From there came his first contributions to geomagnetism and aeronomy as leader of the Canadian expedition to Meenook during the Second International Polar Year, 1932-1933. There he set up and operated a new magnetic observatory, which has since provided important magnetic data from the auroral cap of the Earth, above 60° dipole latitude. While at Meenook he observed noctilucent clouds and made one of the earliest reliable reports of them from this continent. In 1934 he wrote an important review article on this remarkable and beautiful phenomenon.

A year later he renewed his graduate studies at the Imperial College of Science and Technology, London, and gained the London Ph.D. degree in 1937.

Returning to the United States, he was appointed in 1938 to Dr. Fleming's Department, and during almost two decades there he established himself as one of the world's leaders in geomagnetism and auroral science. His interest and activity have covered practically all their aspects.

Besides producing numerous important original works under his name alone, he has directed many large projects involving the aid of colleagues and assistants, who became devoted to him. In 1947 the Department of Terrestrial Magnetism published two great collections of modern geomagnetic data prepared under his guidance. They include brief but cogent discussions of the data. They are: "Description of the Earth's Main Magnetic Field and Its Secular Change, 1905-1945" and "The Geomagnetic Field, Its Description and Analysis."

Another large and successful enterprise was his revision and extension of the Fritz auroral frequency map (1944). In

this he was the first to attempt to take proper account of cloud cover and the duration of darkness. He considered, in addition to the basic auroral records, the data for the closely associated phenomena of polar magnetic disturbance. A year later, with Snyder, he published a similar study for the southern hemisphere. The form and location of the southern auroral zone are still somewhat uncertain; but Dr. Vestine with Sibley brought new light on the question, based on space studies of the magnetosphere. They calculated the geomagnetic field lines passing from one to the other hemisphere and found the southern curve conjugate to the rather well-determined northern auroral zone. Thus they provided a partly "theoretical" southern auroral zone, which is probably our best present guide to its form and location.

This example well illustrates how Dr. Vestine stayed abreast of the surging progress in the knowledge of geomagnetism and the solar influences on it, linked with the developments of space science.

In 1957 Dr. Vestine moved to the Rand Corporation, which in consequence has become an important new center of research in these fields. There he worked very effectively with younger scientists on mathematical and interpretative studies of the complex, externally produced geomagnetic and auroral phenomena, and also on the main internally caused field of the Earth. Happily, his guidance and leadership became available to a wider circle of younger scientists through his association with the University of California at Los Angeles as visiting professor.

Besides his personal researches he has furthered geophysics by participation in many national and international scientific organizations. He has given outstanding leadership and guidance in the World Magnetic Survey.

Finally, throughout his active, purposeful, and highly successful scientific career, he remained his modest, kind, balanced, helpful, unassertive self. It is a welcome warming thought that in the community of science such a man, absolutely avoiding self-advertisement, should be so valued and honored for his true worth, as shown by his election to the National Academy of Sciences.

ORGANIZATION MEMBERS

IAGA COMMISSION I

Title: Observatories and Instruments

Chairman: A. P. De Vuyst
Centre de Physique du Globe Dourbes
Nismes-Prov. de Namur, Belgium

Responsibility: Deals with all problems relating to the operation of magnetic observatories and to the carrying out of magnetic measurements. This may include instrumental equipment for observatory and field use, and for use in rockets and satellites, international comparison of geomagnetic standards, form and contents of observatory publications, etc.

Working Groups

Magnetic Observatories I₁ Reporter: J. H. Nelson (USA)

V. Bobrov (USSR)	L. Prior (Australia)
J. Cain (USA)	R. Schlich (France)
M. Casaverde (Peru)	O. Sipahioglu (Turkey)
O. Fambitakoye (C. Africa Rep.)	R. Turajlic (Yugoslavia)
V. Laursen (Denmark)	K. Wienert (W. Germany)
E. Loomer (Canada)	K. Yanagihara (Japan)

Geomagnetic and Telluric Instrumentation I₂

Reporter: P. Serson (Canada)

M. Fahim (Egypt)	J. H. Nelson (USA)
M. Giorgi (Italy)	T. Oguti (Japan)
J. Heppner (USA)	O. Raspopov (USSR)
E. Lauridsen (Denmark)	G. Scheepers (So. Africa)
J. Meunier (France)	V. Shelting (USSR)
O. Meyer (W. Germany)	W. Stuart (Great Britain)

Comparison of Magnetic Standards I₃

Reporter: V. Laursen (Denmark)

G. Fanselau (E. Germany)	J. H. Nelson (USA)
B. R. Leaton (Great Britain)	L. Prior (Australia)
E. Le Borgne (France)	V. Shelting (USSR)
O. Meyer (W. Germany)	K. Yanagihara (Japan)

Additional Commission Members not Assigned to Working Groups

G. Barta (Hungary)	P. Sarma (India)
B. Bhargava (India)	E. Selzer (France)
B. Caner (Canada)	L. Sucksdorff (Finland)

W. Campbell (USA)	K. Svendsen (USA)
L. Constantinescu (Rumania)	J. Veldkamp (Netherlands)
L. de Miguel (Spain)	S. Ward (USA)
F. Eleman (Sweden)	S. Williams (Ireland)
W. Hannaford (Canada)	J. Worthy (Great Britain)
J. Kalinin (USSR)	D. Voppel (W. Germany)
R. Riddibough (Ireland)	

IAGA COMMISSION II

Title: Representation of Main Magnetic Fields

Chairman: B. R. Leaton
 Royal Greenwich Observatory
 Herstmonceux Castle
 Hailsham, (Sussex), Great Britain

Responsibility: Works as an advisory group to the WMS Board. Prepares reports and recommendations on methodology, equipment and other technical matters pertaining to land, sea, air, and space surveys. Treats the analysis and presentation of the data both in chart form and in analytic form. Devises data interchange ideas for IAGA disciplines.

Working Groups

Land and Airborne Surveys II₁ Reporter: P.H. Serson (Canada)

N. Ambolt (Sweden)	J. McWilliams (Ireland)
H. G. Barszczus (France)	J. H. Nelson (USA)
A. P. De Vuyst (Belgium)	V. P. Orlov (USSR)
L. Gama (Brazil)	L. S. Prior (Australia)
H. Kautzleben (Germany)	H. P. Stockard (USA)
J. Le Mouell (France)	Y. Harada (Japan)

Ocean Shipborne Surveys II₂ Reporter: M.M. Ivanov (USSR)

J. R. Heirtzler (USA)	V. P. Orlov (USSR)
D. H. Matthews (Great Britain)	R. Turajlic (Yugoslavia)
R. O. Meyer (Germany)	S. Utashiro (Japan)

Rockets and Satellites II₃ Reporter: J.C. Cain (USA)

H. Alfven (Sweden)	J. P. Heppner (USA)
A. J. Dessler (USA)	J. D. Kalinin (USSR)
S. H. Hall (Great Britain)	

Analysis of Geomagnetic Fields II₄

Reporter: A.J. Zmuda (USA)

N. P. Benkova (USSR)	J. D. Kalinin (USSR)
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J. C. Cain (USA)
P. F. Fougere (USA)
N. Fukushima (Japan)
L. R. Hurwitz (USA)
A. B. Kahle (USA)

H. Kautzleben (German)
S. R. Malin (Great Britain)
J. F. McClay (USA)
D. E. Winch (Australia)
F. T. Heuring (USA)

Planetary Magnetic Fields II₅ Reporter: R. Hide (Great Britain)

A. J. Dessler (USA)

G.R.A. Ellis (Australia)

Data Interchange II₆

Reporter: M. Ota (Japan)

V. Laursen (Denmark)
S. R. Malin (Great Britain)
V. P. Orlov (USSR)

K. Svendsen (USA)
R. Schlich (France)

Additional Commission Members not Assigned to Working Groups

B. C. Byrnes (USA)
L. J. Cahill (USA)
W. H. Campbell (USA)
L. de Miguel (Spain)
M. Giorgi (Italy)
G. F. Hinton (USA)
Y. Harada (Japan)
Y. Kato (Japan)
J. Le Mouel (France)

T. Olczak (Poland)
P. Patriat (France)
S. K. Runcorn (Great Britain)
E. Selzer (France)
L. Slauitzjs (USA)
S. P. Srivastava (Canada)
C. Sucksdorff (Finland)
H. Takeuchi (Japan)
C. Traversi (Italy)

IAGA COMMISSION III

Title: Magnetism of the Earth's Interior

Chairman: T. Rikitake
Earthquake Research Institute
The University of Tokyo
Tokyo, Japan

Responsibility: Deals with observations, analyses and theoretical interpretations of all phenomena relating to the magnetism of the earth's interior, including the main geomagnetic field and its secular variation, magnetic induction within the earth, archeomagnetism and paleomagnetism, etc.

Working Groups

Electro-Dynamics III₁

Reporter: F. M. Lowes (U.K.)

R. Hide (U. K.)
J. D. Kalinin (USSR)

T. Rikitake (Japan)
P. H. Roberts (U. K.)
E. H. Vestine (USA)

E. Falicoro (USA)
P. Remiot (France)

Secular Variation III₂

L. R. Alldredge (USA)
G. Barta (Hungary)
H. Kautzleben (Germany DR)
B. R. Leaton (U. K.)

Electromagnetic Induction III₃

C. S. Cox (USA)
H. G. Fournier (France)
I. Gough (Canada)
W. G. Kertz (W. Germany)
W. D. Parkinson (Australia)
A. T. Price (U. K.)

Rock Magnetism III₄

V. Bucha (Czech.)
D. W. Collinson (U. K.)
F. Frölich (Germany DR)
T. Nagata (Japan)
N. Petersen (W. Germany)
G. N. Petrova (USSR)

Archeomagnetism III₅

M. J. Aitken (U. K.)
R. N. Athavale (India)
A. Bammer (Austria)
V. Bucha (Czech.)
K. M. Creer (U. K.)
R. L. du Bois (USA)

Palaeomagnetism III₆

A. S. Boljshakov (USSR)
V. Bucha (Czech.)
F. Frölich (Germany DR)
P. Goecii (Kenya)
A. N. Khramov (USSR)
A. Laroche (Canada)

Geomagnetic Anomalies III₇

W. Bullerwell (U. K.)
A. F. De Vuyt (Belgium)
R. Giret (France)
M. M. Ivanov (USSR)
J. Le Mouel (France)
L. W. Morley (Canada)

G. L. M. Scheepers (S. Africa)

Reporter: V. P. Orlov (USSR)

O. Lucke (Germany DR)
~~E. H. Vestine (USA)~~
T. Yukutake (Japan)

Reporter: K. Whitham (Canada)

T. Rikitake (Japan)
U. Schmucker (W. Germany)
T. C. Tozer (U. K.)
S. H. Ward (USA)
H. Wiese (Germany DR)

Reporter: C. M. Carmichael (Canada)

C. Radharkrishnamurty (India)
F. D. Stacey (Australia)
D. Stefanovic (Yugoslavia)
D. W. Strangway (USA)
E. Thellier (France)

Reporter: E. Thellier (France)

N. Kawai (Japan)
K. Kobayashi (Japan)
G. N. Petrova (USSR)
E. Rachidi (UAR)
E. J. Schwarz (Canada)

Reporter: R. R. Doell (USA)

M. W. McElhinny (Australia)
M. Ozima (Japan)
A. Roche (France)
S. K. Runcorn (U. K.)
J. Veldkamp (Netherlands)
R. L. Wilson (U.K.)

Reporter: A. Hahn (W. Germany)

T. Rikitake (Japan)
B. Ruman
T. N. Simonenko (USSR)
V. Vacquire (USA)
I. Zietz (USA)
W. Mundt (GDR)

Additional Commission Members not Assigned to Working Groups

D. Biquand (France)	C. Plessard (France)
M. Bossalasco (Italy)	J. P. Pozzi (France)
W. H. Campbell (USA)	G. Porstendorfer (W. Germany)
B. Caner (Canada)	M. Prevot (France)
G. F. Hinton (USA)	H. Soffel (Germany)
J. Keranen (Finland)	A. Sposito (Italy)
W. G. Kertz (Germany)	J. C. Tanguy (France)
M. F. Kozlowski (Poland)	J. Untiedt (W. Germany)
P. Bernard (France)	S. A. Vincenz (USA)

IAGA COMMISSION IV

Title: Magnetic Variations and Disturbances

Chairman: J. A. Jacobs
Killam Memorial
University of Alberta
Edmonton, Alberta, Canada

Responsibility: Commission IV is concerned with promoting the study of transient magnetic variations and developing our knowledge of the sources of these variations. These include both the regularly recurring variations such as the daily variations and the several types of variations associated with magnetic disturbance. It is also concerned with the development and precise definition of the various indices introduced to characterize certain features of magnetic activity. It acts as the advisory board to the Permanent Services on the routine collection of the necessary data, and the calculation and publication of these indices, together with the records of certain rapid variation events.

Working Groups

Morphology and Indices IV₁ Reporter: D. Van Sabben (Neth.)

E. J. Chernosky (USA)	V. M. Mishin (USSR)
G. Fanselau (DDR)	A. Romaña (Spain)
N. Fukushima (Japan)	M. Siebert (DGR)
E. I. Loomer (Canada)	M. Sugiura (USA)
P. N. Mayaud (France)	A. M. vanWijk (So. Africa)
P. M. McGregor (Australia)	

Daily Variations IV₂ Reporter: D. J. Stone (U. K.)

E. J. Chernosky (USA)	D. G. Osborne (E. Africa)
G. Fanselau (GDR)	W. P. Parkinson (Australia)
H. Maeda (Japan)	A. T. Price (U. K.)
P. N. Mayaud (France)	D. Van Sabben (Netherlands)
V. M. Mishin (USSR)	M. Sugiura (USA)
C. A. Onwumehilli (Nigeria)	C. U. Wagner (GDR)

Equatorial Electrojet IV₃

Reporter: D. G. Osborne (E.A.)

R. M. Casaverde (Peru)
O. Fambitakoye (C. Africa)
F. N. Glover (Phillipines)
A. Onwumechilli (Nigeria)
D. M. Raspopov (USSR)
R. G. Rastogi (India)

J. Roquet (France)
D. J. Stone (U.K.)
M. Sugiura (USA)
J. Untiedt (FDR)
G. Weill (Rance)

Special Disturbance Events IV₄

Reporter: S. I. Akasofu (USA)

C. Falthammer (Sweden)
Y. I. Feldstein (USSR)
N. Fukushima (Japan)
J. C. Gupta (India)

D. G. Knapp (USA)
M. I. Pudovkin (USSR)
C. U. Wagner (GDR)
J. K. Walker (Canada)

Micropulsations IV₅

Reporter: V. Troitskaya (USSR)

J. A. Jacobs (Canada)
Y. K. Kato (Japan)
E. Maple (USA)
P.V. Sauker Narayan (India)
D. Ott (England)
A. Romaña (Spain)

M. Saito (USA)
E. Selzer (France)
W. F. Stuart (U. K.)
H. Voelker (W. Germany)
C. V. Wagner (GDR)
H. G. Webster (Australia)

Magnetospheric Field Variations IV₆

Reporter: M. Sugiura (USA)

T. L. Aggson (USA)
L. J. Cahill (USA)
A. Hruska (Czech.)
B. Hultquist (Sweden)
W. G. Kertz (Germany)
H. B. Liemohn (USA)

R.W.E. McNicol (Australia)
A. Nishida (Japan)
R. Schlich (France)
T. Watanabe (Canada)
I. A. Zhulin (USSR)

Conjugate Points IV₇

Reporter: R. Schlich (France)

W. H. Campbell (USA)
H. C. Carlson (Puerto Rico)
N. D. Clarence (So. Africa)
R. Gendrin (France)
J. A. Jacobs (Canada)

K. N. Mather (USA)
T. Nagata (Japan)
J. G. Roederer (USA)
V. A. Troitskaya (USSR)

Additional Commission Members not Assigned to Working Groups

H. G. Barszczus (Senegal)	M. F. Kozlouski (Poland)
B. N. Bhargava (India)	J. V. Lincoln (USA)
M. Bossolasco (Italy)	H. Maeda (Japan)
W. H. Campbell (USA)	K. Maeda (Japan)
B. Caner (Canada)	S. Matsushita (USA)
R. Cohen (USA)	T. Oguti (Japan)
N. Fukushima (Japan)	T. Olczak (Poland)
M. Georgi (Italy)	K. Sinno
P. L. Gouin (Ethiopia)	S. P. Srivastava (Canada)
V. R. S. Hutton (Nigeria)	J. Tauer (Czech.)
W. G. Kertz (Germany)	D. Voppel (W. Germany)
S. Kokubun (Japan)	

IAGA COMMISSION V

Title: Solar-Magnetosphere Relations

Chairman: J. G. Roederer
Physics Department
University of Denver
P. O. Box 10127
Denver, Colorado 80310 USA

General Responsibilities: To deal with the physical processes occurring in planetary magnetospheres involving charged particles and magnetic and electric fields, the solar control of these processes and their effects on the general configuration of the planetary environment.

Working Groups

Solar Wind Interaction with the Earth, Moon and Planets V₁

Reporter: N. F. Ness (USA)

P. J. Coleman (USA)	J. H. Piddington (Australia)
A. Hundhausen (USA)	G. L. Siscoe (USA)
Morgenroth (GDR)	J. R. Spreiter (USA)
A. Nishida (Japan)	C. Snyder (USA)
T. Obayashi (Japan)	

Morphology of Radiation Belts V₂

Reporter: D. J. Williams (USA)

L. J. Lanzerotti (USA)	J. Vette (USA)
T. Murayama (Japan)	

Particle - Field Interactions V₃

Reporter: _____

C. Anger (Canada)
J. K. Hargreaves (USA)

I. Kimura (Japan)
G. Pfozter (GFR)

Cold Plasma and Low Energy Particles V₄

Reporter: K. I. Gringauz
(USSR)

S. Bauer (USA)

Solar Energetic Particles and Cosmic Rays V₅

Reporter: T. Obayashi (Japan)

A. Ehmert (GFR)
Y. Hakura (Japan)
E. A. Lauter (GDR)
A. Masley (USA)

K. Nagashima (Japan)
K. Rinnert (GFR)
D. Venkatesan (Canada)

Additional Members of Commission not attached to Working Groups

J. Aarons (USA)
M. C. Ballario (Italy)
S. J. Bauer (USA)
M. Bossolasco (Italy)
C. O. Bostrom (USA)
J. Bouska (Czech.)
W. H. Campbell (USA)
J. P. Castelli (USA)
R. W. Fillius (USA)
M. George (Italy)
F. Glangeaud (France)
H. E. Hagge (USA)
R. A. Langel (USA)

J. P. Legrand (France)
J. V. Lincoln (USA)
A. Ludbak (Denmark)
A. J. Masley (USA)
S. Matsushita (USA)
G. D. Mead (USA)
J. Ortner (Netherland)
T. A. Potemra (USA)
G. C. Reid (USA)
P. Rothwell (England)
L. A. Sandrucci (Italy)
E. Selzer (France)
P. H. Stoker (So. Africa)

IAGA COMMISSION VI

Title: Aurora

Chairman: A. Omholt
Institute of Physics
University of Oslo
Postboks 1048
Blindern, Oslo 3
Norway

Responsibility: The scope of scientific endeavors which Commission VI represents includes those studies of the atmosphere, ionosphere and magnetosphere which bear on the problems of the aurora. Relevant areas include studies of energetic particles and fields which elucidate on the excitation of the aurora, radio studies, and morphological studies. The modes of investigation range from ground based photography of auroral forms to satellite based experiments of charged particles, fields, and the auroral spectrum, (with intermediates such as airplane-based and rocket-based experiments.)

Working Groups

Morphology VI₁

S. I. Akasofu (USA)
Y. I. Feldstein (USSR)
F. Jacka (Australia)
K. Lassen (Denmark)
P. M. Millman (Canada)

Reporter: B. Hultquist (Sweden)

J. Paton (U.K.)
B. P. Sandford (N. Zealand)
O. Schneider (Argentina)
W. Stoffregen (Sweden)
A. Vallance-Jones (Canada)

Spectroscopy and Excitation VI₂

A. Dalgarno (USA)
R. H. Eather (USA)

Reporter: G. G. Shepherd (Canada)

Radio Aurora VI₃

H. F. Bates (USA)
P. A. Forsyth (Canada)
M. Gadsden (USA)
P. Glöde (GDR)
A. Kavadas

Reporter: R. S. Unwin (N. Zealand)

T. R. Kaiser (U.K.)
G. Lange-Hesse (W. Germany)
R. Leadbrand (USA)
A. McNamara (Canada)
E. Ponomarev (USSR)
G. L. Sverdlov (USSR)

Particles and Fields Effects VI₄

Reporter: D. S. Evans (USA)

M. H. Rees (USA)
W. Riedler (Sweden)

Additional Members of Commission not attached to Working Groups

K. A. Anderson (USA)	M. Huruwata (Japan)
E. B. Armstrong (Australia)	S. I. Isaev (USSR)
A. E. Belon (USA)	E. Kaneda (Japan)
J. Black (Canada)	P. Kellogg (USA)
F. R. Bond (Australia)	J. G. Keyes (New Zealand)
B. J. O'Brien (USA)	S. P. Khare (India)
A. L. Broadfoot (USA)	V. I. Krassovsky (USSR)
J. W. Chamberlain (USA)	G. F. Lyon (Canada)
P. Czechovsky (W. Germany)	D. F. Martyn (Australia)
S. Chapman (USA)	L. H. Meredith (USA)
B. W. Currie (Canada)	D. R. Moorcroft (Canada)
K. D. Cole (Australia)	T. Nagata (Japan)
L. Davis (USA)	T. Oguti (Japan)
T. N. Davis (USA)	N. J. Oliver (USA)
A. J. Dessler (USA)	A. Omholt (Norway)
A. Egeland (Norway)	J. Ortner (Holland)
C. D. Ellyett (Australia)	J. Paton (U.K.)
C. T. Elvey (USA)	G. J. Romick (USA)
D. S. Evans (USA)	H. N. Rundle (Canada)
R. F. Fellows (USA)	P. V. Shcheglov (USSR)
Yu. I. Galperin (USSR)	N. N. Shefov (USSR)
G. J. Gassmann (USA)	G. G. Shepherd (Canada)
J. B. Gregory (Canada)	J. R. Spreiter (USA)
G. Gustafsson (Sweden)	Yu L. Truttse (USSR)
L. Harang (Norway)	R. S. Unwin (New Zealand)
O. Harang (Norway)	N. Wakai (Japan)
J. P. Heppner (USA)	L. V. Wallace (USA)
C. O. Hines (Canada)	J. C. G. Walker (USA)
B. Hultqvist (Sweden)	G. M. Weill (France)
D. M. Hunten (USA)	

IAGA COMMISSION VII

Title: Airglow

Chairman: G. M. Weill
Institut d'Astrophysique
98 bis Boulevard Arago
Paris 14e, France

Responsibility: To foster and coordinate studies of the upper atmospheres of the earth and other planets by the observation and theoretical interpretation of optical emissions, excluding the aurora. The scope includes emissions arising under day, twilight and night conditions, observed by a range of photometric and spectroscopic techniques from the ground and from space.

Working Groups

Instruments and Observations VII₁

Reporter: M. Gadsden (USA)

J. E. Blamont (France)	J. Noxon (USA)
A. L. Broadfoot (USA)	D. M. Packer (USA)
W. G. Fastie (USA)	P. C. Shcheglov (USSR)
G. J. Hernandez (USA)	G. G. Sheperd (Canada)
A. H. Jarrett (U. K.)	Yu. L. Truttse (USSR)
E. E. Llewellyn (Canada)	

Spectroscopy and Excitation Processes VII₂

Reporter: Yu. I. Galperin (USSR)

K. D. Cole (Australia)	M. B. McElroy (USA)
A. Dalgarno (USA)	V. L. Peterson (USA)
T. M. Donahue (USA)	A. T. Stair (USA)
V. I. Krassovsky (USSR)	Stewart (U. K.)
	T. Tohmatsu (Japan)

Photometry VII₃

Reporter: M. Huruwata (Japan)

M. W. Chiplonkar (India)	B. T. O'Brien (USA)
J. Christophe (France)	K. R. Ramanathan (India)
I. S. Gullledge (USA)	F. E. Roach (USA)
G. Lange-Hesse (W. Germany)	D. G. Taranova (USSR)
E. Marovich (USA)	J. L. Weinberg (USA)

Laboratory Data VII₄

M. A. Biondi (USA)
L. Branscomb (USA)
T. M. Donahue (USA)
M. Dufay (France)
E. E. Ferguson (USA)
F. R. Gilmore (USA)

Reporter: H. I. Schiff (Canada)

D. M. Hunten (USA)
F. Kaufman (USA)
R. W. Nicholls (Canada)
A. V. Phelps (USA)
B. A. Thrush (U. K.)
R. A. Young (USA)

Additional Members of Commission not Attached to Working Groups

W. N. Abbott (Greece)
D. R. Bates (U.K.)
H. C. Carlson (USA)
E. H. Carman (Lesotho)
R. Casaverde (Peru)
S. Chapman (USA)
K. C. Clark (USA)
N. H. Doan (France)
M. L. Duboin (France)
L. Dunkelmann (USA)
R. Gall (Mexico)
F. Gregory (Italy)
J. Greenspan (USA)
D. F. Heath (USA)
J. P. Hennes (USA)
D. F. Ingham (U.K.)
I. L. Kofsky (USA)
G. Kvifte (Norway)

F. Link (Tchec)
M. L. Lory (France)
T. P. Markham (USA)
M. Nicolet (Belgium)
R. Pastiels (Belgium)
E. Reed (USA)
M. H. Rees (USA)
R. Robley (France)
N. N. Shefov (USSR)
S. M. Silverman (USA)
L. L. Smith (USA)
R. W. Smith (U.K.)
W. R. Steiger (USA)
R. Tousey (USA)
A. Vallance-Jones (Canada)
T. E. Van Zandt (USA)
A. Vassy (France)
G. Weill (France)
V. I. Yarin (USSR)

IAGA COMMISSION VIII

Title: Upper Atmospheres

Chairman: A. Dessler
Space Science Department
Rice University
Houston, Texas 77001

Responsibility: Deals with the electro-dynamics involving the aeronomic processes on neutral and ionized particles.

Working Groups

Composition and Density Variations VIII₁

Reporter: M. Marov (USSR)

J. E. Blamont (France)
K. S. W. Champion (USA)
V. G. Istomin (USSR)
M. N. Izakov (USSR)
L. G. Jacchia (USA)

G. Kockarts (Belgium)
E. A. Lauter (GDR)
A. O. Nier (USA)
A. A. Pokhunkov (USSR)
W. Priester (FRD)

Winds, Gravity and Infrasonic Waves VIII₂

Reporter: G. V. Groves (U. K.)

P. D. Bhavsar (India)
J. E. Blamont (France)
B. Bolin (Sweden)
W. G. Elford (Australia)
H. Faust (W. Germany)
R. Frith (England)

S. Kato (Japan)
R. Lindzen (USA)
M. Rahmatullah (Pakistan)
E. G. Shvidkovsky (USSR)
T. M. Tabanera (Argentina)

Exospheric Problems VIII₃

Reporter: B. Tinsley (USA)

E. B. Armstrong (Australia)
M. A. Clark (USA)
T. M. Donahue (USA)
G. Kockarts (Belgium)

M. Liwshitz (USA)
T. N. L. Patterson (USA)
P. V. Shcheglov (USSR)
N. N. Shefov (USSR)
T. Tohmatsu (Japan)

Ionization Processes VIII₄

Reporter: M. Nicolet (Belgium)

T. M. Donahue (USA)
E. E. Ferguson (USA)
Yu. I. Galperin (USSR)
H. E. Hinteregger (USA)
B. Hultqvist (Sweden)
T. Yonezawa (Japan)

G. S. Ivanov-Kholodny (USSR)
H. Kamiyama (Japan)
E. A. Lauter (GDR)
B. J. O'Brien (USA)
K. A. Pounds (England)
B. P. Sandford (New Zealand)

Electromagnetic Interactions VIII₅

Reporter: G. Haerenderl (GFR)

Meteors VIII₆

Reporter: T. R. Kaiser (U.K.)

P. B. Babadjanov (USSR)
Z. Ceplecha (Czech.)
M. Dubin (USA)
W. G. Elford (Australia)
C. D. Ellyett (New Zealand)
V. V. Fedynsky (USSR)

L. Jacchia (USA)
P. M. Millman (Canada)
A. P. Savroukhin (USSR)
R. B. Southworth (USA)
A. Spizzichino (France)

Planetary Atmospheres VIII₇

Reporter: D. Hunten (USA)

P. Connes (France)
A. Kliore (USA)
M. B. McElroy (USA)
V. I. Moroz (USSR)

T. Owen (USA)
C. Sagan (USA)
W. M. Sinton (USA)
K. Takayanagi (Japan)

Additional Commission Members not Assigned to Working Groups

K. D. Cole (Australia)	S. F. Singer (USA)
H. Kamiyama (Japan)	K. Sprenger (GDR)
S. Kato (Japan)	T. Tohmatsu (Japan)
N. Matuura (Japan)	T. E. Van Zandt (USA)

IAGA COMMISSION IX

Title: History

Chairman: N. V. Pushkov
IZMIRAN
Vatutenki
Moscow, USSR

Responsibility: Deals with the history of geomagnetism and aeronomy involving reports on progress in geomagnetism and aeronomy, obtained from national reports and other sources.

Working Groups

<u>History of Geomagnetism</u>	Reporter:
<u>History of Aeronomy</u>	Reporter:

Additional Commission Members not Assigned to Working Groups

M. G. Alvarez (USA)	J. Keranen (Finland)
G. Atanasiu (Rumania)	A. Kimpara (Finland)
G. Barta (Hungary)	L. Koenigsfeld (Belgium)
J. W. Beagley (New Zealand)	H. G. Körber (Germany DR)
E. J. Chernosky (USA)	A. Lundbak (Denmark)
H. Constantinescu (Rumania)	N. E. Malinina (USSR)
A. H. Cullington (New Zealand)	S. Matsushita (USA)
G. Fanselau (Germany DR)	N. Z. Nodia (USSR)
E. Florian (Hungary)	E. S. Staus (USA)
N. C. Gerson (USA)	A. Tarczy-Hornoch (Hungary)
J. Jacobs (U.K.)	N. Fukushima (Japan)

JOINT COMMITTEE IAGA-IAMAP

Title: Lunar Variations
Honorary Pres.: S. Chapman
Chairman: O. Schneider
Institut Antartico Argentino
Cerrito 1248
Buenos Aires, Argentina

Working Groups

Procedures

Reporter: B. Haurwitz (USA)

S. Chapman (U. K.)
G. Fanselau (GDR)

O. Schneider (Argentina)
S. R. Malin (U. K.)

Additional Members not Assigned to Working Group

M. Bossolasco (Italy)
O. M. Burkard (Austria)
J. C. Cain (USA)
J. O. Cardus (Spain)
E. J. Chernosky (USA)
M. Fatkullin (USSR)
J. C. Gupta (India)
W. G. Kertz (West Germany)
H. Maeda (Japan)

D. F. Martyn (Australia)
S. Matsushita (USA)
A. T. Price (U. K.)
R. G. Rastogi (India)
P. Rougerie (France)
R. Sawada (Japan)
J. Thomas (Australia)
A. M. van Wijk (So. Africa)
D. E. Winch (Australia)

JOINT COMMITTEE IAGA-IAMAP

Title: Atmospheric Electricity

Honorary Chairman: H. Norinder

Chairman: L. Koenigsfeld
rue de l'Etat-Tiers 17
Liege, Belgium

Secretary: H. Dolezalek
1812 Drury Lane
Alexandria, Virginia 22307 (USA)

Working Groups

International Cooperation Chairman: H. Dolezalek (USA)

Bhartendu (Canada)	E. A. Lauter (Germany DR)
R. Bostrom (Sweden)	A. Mani (India)
G. Freier (USA)	D. E. Olson (USA)
L. Jacobs (U. K.)	J. Podzimek (CSR)
V. P. Kolokolov (USSR)	G. Stout (USA)
G. Kondo (Japan)	J. A. Thomas (USA)
K. Kreielsheimer (New Zealand)	

Surface Measurements at Land and Sea

Chairman: H. Israel (W. Germany)

D. Blanchard (USA)	R. Janiselli (Italy)
P. M. Buis (Netherland)	S. Michnowski (Poland)
W. E. Cobb (USA)	M. Misaki (Japan)
W. D. Crozier (USA)	L. Saxer (Switzerland)
A. I. I. Ette (Nigeria)	M. V. Sivaramakrishnan (India)
W. C. A. Hutchinson (U. K.)	

Measurements in the Free Atmosphere

Chairman: R. Muhleisen (W. Ger.)

R. V. Anderson (USA)	G. W. Paltridge (U. K.)
V. D. Hopper (Australia)	G. P. Srivastava (India)
H. Ishikawa (Japan)	E. Ungethum (Sweden)
M. V. Krasnogorskaya (USSR)	

Ions, Aerosols, Radioactivity Chairman: J. Bricard (France)

A. Junod (Switzerland)	G. Schumann (W. Germany)
M. Kawano (Japan)	R. Siksna (Sweden)
G. McGreevy (Ireland)	B. I. Styro (USSR)
W. J. Megaw (U. K.)	K. G. Vohra (India)
P. J. Nolan (Ireland)	K. T. Whitby (USA)
J. Pradel (France)	M. H. Wilkening (USA)

Thunderstorm- and Precipitation- Electricity

Chairman: J. Latham (U. K.)

M. Brook (USA)
D. Fitzgerald (USA)
P. V. Hobbs (USA)
C. Magon (Japan)
B. J. Mason (U. K.)

C. B. Moore (USA)
J. D. Sartor (USA)
N. S. Shishkin (USSR)
Y. Tamura (Japan)

Lightning and Sferics

Chairman: K. Berger (Switz.)

F. W. Chapman (U. K.)
F. Horner (U. K.)
N. Kitagawa (Japan)
H. König (W. Germany)
L. B. Loeb (USA)
D. J. Malan (So. Africa)
M. M. Newman (USA)

E. T. Pierce (USA)
C. Polk (USA)
S. A. Prentice (Australia)
L. Salanave (USA)
V. A. Solov'yev (USSR)
M. A. Uman (USA)
T. W. Wormell (U. K.)

Global Circuit

Chairman: H. W. Kasemir (USA)

H. J. Aufm Kampe (W. Germany)
M. F. Figueira (Portugal)
E. Gherzi (Canada)
B. B. Huddar (India)
D. R. Lane-Smith (Sierra Leone)

R. Reiter (W. Germany)
J. R. Storey (New Zealand)
K. Uchikawa (Japan)
K. Zonga (USA)

Units, Methods, Instruments

Chairman: B. Vonnegut (USA)

K. J. Heffernan (Australia)
J. Hughes (USA)
I. M. Imianitov (USSR)
T. Ogawa (Japan)

L. H. Ruhnke (USA)
T. Takahashi (Japan)
S. P. Venkiteshvaran (India)

Free Space

Chairman: R. Lüst (W. Germany)

S. C. Coroniti (USA)
C. G. Fälthammar (Sweden)
V. Gringauz (USSR)
R. E. Holzer (USA)

T. Obayashi (Japan)
R. C. Sagalyn (USA)
L. R. O. Storey (France)
A. Kimpara (Japan)

MINUTES OF ADMINISTRATIVE COMMITTEE MEETING TOKYO - MAY 1968

In accordance with a decision made by the IAGA Executive Committee in St. Gall During the XIV General Assembly, 1967, members of the Executive Committee attending the COSPAR meeting in Tokyo met to decide questions related to the Assembly in Spain in 1969 and a few other related items. Those attending were: T. Nagata (Pres.), M. Nicolet, J. Roederer, F. S. Johnson, L. R. Alldredge (Sec.), and I. Zhulin (for V. A. Troitskaya by invitation of Pres. Nagata).

Scientific Assembly in Spain

A letter was received from Dr. J. M. Munuera in the name of Rev. P. Antonio Romana, S.J., President of the Spanish National Organizing Committee for the forthcoming IAGA and IASPEI Assemblies. The letter stated that the Assemblies would be held in Madrid and suggested 1-12 September 1969 for the dates (joint Symposia between IAGA and IASPEI to be held during the second week) and that a registration fee of \$20.00 be charged for active participants and \$10.00 for accompanying members. These suggestions were all accepted with the provision that the General Secretary should ascertain what services would be provided by the local committee.

Dr. Munuera further inquired about rooms, personnel and equipment that would be required. The committee gave helpful suggestions, but left the details of these questions for the General Secretary to take care of.

The committee strongly recommended that the General Secretary travel to Madrid as soon as the local committee is ready to discuss details. This proved to be very worthwhile for the St. Gall meeting in helping to provide good communications between IAGA and the local committee and in insuring a smoothly operated Assembly.

The general rules about submitting papers and reporting the results of the Assembly will be the same as for the XIV General Assembly.

It was agreed that the official title of the Assembly would be "International Association of Geomagnetism and Aeronomy-General Scientific Assembly-Madrid, 1969".

It was decided by the committee and later approved by Dr. Wadati, President of IASPEI, that it would be desirable to have IAGA and IASPEI meet together for joint plenary

ceremonies on Monday morning 1 September and then divide into separate Association plenary sessions.

Note was taken of the many symposia which had been suggested for the Spain Assembly. The decision was made that scientific sessions of primary interest to a single commission would not be called a symposium. If a topic was being developed of interest to two or more commissions it might be called a symposium with agreement of the Executive Commission. The following symposia and scientific sessions were agreed upon: (The joint symposia with IASPEI were later agreed to by Pres. Wadati with the provision that they must be reviewed by the IASPEI Executive Committee. The program committee members were tentatively approved by the Presidents of both Associations.)

1. IAGA/IASPEI Symp. on "Multidisciplinary Studies of unusual Regions of the Upper Mantle".

Program Committee

<u>IAGA</u>	<u>IASPEI</u>
T. Rikitake (Chairman)	J. Rothe
K. Whitham	I. P. Kosminskaya
J. Heirtzler	J. Oliver
A. Hahn	F. F. Evison
J. O. Cardus	M. A. Tuve

4 sessions: 8 September, Monday, a.m. and p.m.
9 September, Tuesday, a.m. and p.m.

2. IAGA/IASPEI Symp. on "Geophysical Studies on the Evolution of the Earth's Deep Interior".

Program Committee

<u>IAGA</u>	<u>IASPEI</u>
T. Nagata	E. A. Lubimova (Chairman)
V. P. Orlov	K. E. Bullin
F. J. Lowes	E. C. Bullard
E. Thellier	V. A. Magnitsky
	R. J. Uffen

3 sessions: 10 September, Wednesday, a.m. and p.m.
11 September, Thursday, a.m.

3. IAGA/IASPEI Symp. on "Earthquake Mechanics"

Program Committee

T. Hagiwara (Chairman)
T. Rikitake (Sec), and IAGA Representative)
Members of IASPEI Earthquake Prediction Working Group
R. Kovach (IAGA Representative)
R. Turajlic (IAGA Representative)

2 sessions: 11 September, Thursday, p.m.
12 September, Friday, a.m.

4. IAGA Symp. on "Geomagnetic Secular Change" (to include archeomagnetic secular change and reversals).

Program Committee

E. Thellier (Chairman)
R. Doell
V.P. Orlov
T. Rikitake
R. M. Casaverde

5. IAGA Symp. on "Aeronommic Ionization Processes Including Aurora and Airglow"

Program Committee

M. Nicolet (Chairman)
G. M. Weill
A. Omholt
A. Dessler
F. S. Johnson

6. IAGA Symp. on "Comparison of the Magnetospheric Behavior with Ground Observations and New Indices of Geophysical Activities".

Program Committee

V. A. Troitskaya (Chairman)
J. Roederer (Co-chairman)
J. A. Jacobs
N. Ness
R. Schlich
(Because of the importance of the VLF and ELF trans-
missions in this problem, T. Nagata will approach URSI
as a possible cosponsor).

7. Commission I. Scientific Session on "Digitization Techniques and Spectral Analysis of Geomagnetic Observations".
8. Commission III. Scientific Session on "Measurement of Extremely Weak Magnetization of Sedimentary Rocks".
9. Commission VIII. Scientific Session on "Global Composition Structure of the Thermosphere" (This session is needed to support Item 5).
10. Commission V. Scientific Session on "Electric Fields in the Magnetosphere", convenor will be J. Roederer, G. Haerendel, or R. Lust.
11. Commission V. Scientific Session on "Models of the Earth's Radiation Environment", convenor will be J. Vette.
12. Commission v. Scientific Session on "Interaction of the Moon and Planets with the Solar Wind", convenor will be N. Ness.

It is not intended that the above list of scientific sessions is complete. All Commissions are expected to have full programs. Those listed are those that came to the attention of the Committee in Tokyo.

Other Items

It was noted that the internal IAGA program committee as set up in St. Gall for the Inter-Union Symposium on Solar-Terrestrial Relationships to be held in the USSR in 1970 consists of:

J. Roederer (Chairman)
J. A. Jacobs
A. Omholt
G. M. Weill
A. Dessler

The committee added the names of

V. Troitskaya
F. S. Johnson

and agreed that these last two named should be nominated as the IUGG representatives of the Inter-Union Program Committee.

It was decided that IAGA would not sponsor "Atmospheric Luminescence" for a COSPAR topic in 1969.

IAGA has been invited to co-sponsor a symposium on "Dynamics of Ionized Gas" with IUTAM in Tokyo in 1970. It was noted that such a symposium might conflict with the Solar-Terrestrial Relationships Symposium in the USSR in 1970 so no action was taken.

IAGA Publication No. 25, "Transactions of the St. Gall Assembly" has been sent to the printer.

Chairman A. Dessler (Comm. VIII) had sent in a realignment of Working Groups within Comm. VIII, which differed from that reported in St. Gall (See IAGA News No. 6, p. 13). Past Pres. M. Nicolet acknowledged that Dessler's change was in keeping with that actually submitted by Dessler in St. Gall so it was approved as follows:

<u>Working Groups</u>	<u>Reporters</u>
1. Composition and Density Variations	M. Marov (USSR)
2. Winds. Gravity and Infrasonic Waves	G. V. Groves (UK)
3. Exospheric Problems	B. Tinsley (USA)
4. Ionization Processes	M. Nicolet (Bel)
5. Electromagnetic Interaction	G. Haerender (W.Ger)
6. Meteors	T. R. Kaiser (UK)
7. Planetary Atmospheres	D. Hunton (USA)

The date for the Third Equatorial Aeronomy Symposium has been changed to 3-10 February 1969. The Symposium will be held in Ahmedabad, India.

In general IAGA will not sponsor (or co-sponsor) symposia where the attendance is strictly limited to invited guests.

ACTIVITIES OF IAGA UNITS

COMMISSION I

Observatories and Instruments, A. P. De Vuyst, Chairman

and

COMMISSION II

Representation of Main Magnetic Fields, B. R. Leaton, Chairman

At the XIV General Assembly in St. Gall five resolutions were passed related to digitization of magnetic data (see resolutions 2, 4, 6, 8 and 24 in IAGA News No. 6 or in IAGA Bulletin No. 25). Much of the discussion and correspondence within Commissions I and II since the assembly relate to this problem.

Firm decisions on how to implement the resolutions have not yet been made, but it is felt that real progress has been made in exchanging ideas. The best that can be done here is to reproduce and annotate some of the correspondence related to the digitization problem. Readers are invited to send helpful criticisms to the appropriate Commission Chairmen.

World Magnetic Archive (WMA)

Dr. Sydney Chapman in a High Altitude Observatory memorandum, dated 8 December 1967, stated the problem very clearly on geomagnetic hourly records; availability for study as given below:

There is a great mass of geomagnetic records, covering periods that at a few stations extend over about a century, or even more. Much effort has been expended in their accumulation, and some effort has been given to their study. But their study has until now been limited by the cost and time required to cope with large masses of data. Even where the data have been studied most intensively, there is need to use the same data further in new ways. Current data are of great significance for studies associated with the observations made by rocket and satellites, in the magnetosphere and in interplanetary space. But some important geophysical and solar researches require very long series of data, and in this field the geomagnetic data are among the most extensive and valuable resource we have.

These hourly geomagnetic data are at present mostly enshrined in volumes of observatory annals, if published; many are unpublished, and exist only in the files of observatories, in the form of handwritten or typed sheets.

Where they are needed for comprehensive synoptic and time-series studies, many of them are for practical purposes almost inaccessible to workers desiring to use them, because of the cost and difficulty of putting the data on cards or tape in a form usable with the great computing facilities available today.

The development of World Data Centers, as part of the IGY enterprise, represents a most valuable step toward the collection of current and recent data of this kind at centers from which researchers can obtain them in copy. Some progress is being made in putting such data on cards or tape, but the rate of progress is slow, and quite unequal to the need.

The situation calls for a determined and concerted effort to make the rich store of past data available. Obviously there will be some national or other stations that cannot take a share in such work, but it would be highly helpful if the nations that have long maintained magnetic observatories, and have one or more long series of data in printed or other form in their publications or files, would each deal with their own records. It would be still better if some of them would undertake to share in a cooperative plan to make available the records of stations outside their own borders.

In this connection I may make a suggestion that might possibly be fruitful, at least in some countries. Decades ago, when I was a young member of the staff of Greenwich Observatory, I learned that the famous Netherlands astronomer Kapteyn, in connection with his stellar studies, had had extensive routine work done by prisoners (long-term--a year or more). Years later I followed his example in connection with my studies of lunar tidal effects on the barometric pressure. I found the Prison Commissioners in England very sympathetic to the proposal. I had to make a few visits personally to the prison where the two men who did the work were confined. At that time, the task was the hand copying of the hourly values from unpublished records; in the copying, they were being rearranged in lunar time; the men were given lists of hours of lunar transit, in order to know at which hour each lunar day began.

Today the transfer of such data to cards would be a much simpler process. There is no need for lunar data to be considered; the records for each solar day would be entered on two cards, with the date and a reference number for the identification of the station and magnetic element concerned. The job would involve the provision of the published or unpublished records, a supply of the punched cards, and punching machines for the entry and verification of the data. The process can be easily and quickly

learned; inexperienced prisoners with a high school education would be slow at first, but after a time those who showed aptitude for the work would increase in speed, and it would be possible to lay down, after an initial period, a reasonable rate of production of cards to be expected each day. There should be independent verification of the punching. The work can be easily learned by either men or women. If the work was being done by a small group of prisoners, one might prove capable of being their leader and supervisor; and in some cases a prisoner might be able to see to the servicing of the machines. When a set of data for a given station had been completed, the cards could be recorded on tape, at some outside computing center, greatly reducing the bulk and making the record available in a form that can be readily copied and transmitted to and from a data center, for the use of any researcher desiring to study them.

My own use of this means of getting the data I needed for my work was made before World War II. After it was over I took up the question again, while I was a professor at Oxford. I found the Chief Prison Commissioner again very sympathetic to the renewal of the plan. But I did not pursue the matter, as I was without office and secretarial facilities.

The original Prison Commissioner with whom I made contact (Mr. Alec Paterson) was a man very much concerned with the welfare and rehabilitation of the prisoners under his charge. He welcomed the possibility of giving to some of the better educated of the prisoners a task that, although routine, was more suitable to them than were other tasks then set in prisons. I was the better able to enter into friendly relations with him because we had at different periods both been voluntary social workers and residents in a poor district in South London.

1968 Dr. Chapman wrote to the General Secretary on 9 February describing his desire to have the Executive Committee of IAGA take up the matter of the WMA as a matter of interest to IAGA as a whole as follows:

Syun Akasofu has rightly urged me to look into the IAGA News, October 1967, and try to form an opinion as to how the project of the World Magnetic Archive can best be fitted into the IAGA framework.

Resolution 8, page 27, deals with magnetic data in machine-readable form, and seems tacitly to have reference to current or recent data.

Resolution 24, page 35, initiated by the IAGA-IAMAP

Joint Lunar Committee, deals with past and present atmospheric, aeronomic and magnetic data, and makes special reference to their use in studies of lunar variations in these data.

Resolution 24 is of very wide scope, but somewhat limited in its objective, though, of course, if carried out, the data could be used for other purposes also.

It seems to me that it may be wise for the Executive Committee of IAGA to take up the project of the World magnetic archive as a matter of interest to IAGA as a whole, not only to the Lunar Joint Committee. The project could be limited to: past magnetic data in the form of hourly measurements already available in print or in observatory archives, and of the magnetograms, up to some specified date such as 1960, leaving the collection of data in other IAGA fields (atmospheric and aeronomic) and of later date to committees already in being.

This is a task of definite and workable though considerable magnitude, which has a unity and simplicity and clarity that can be generally appreciated. By giving it the simple name proposed these features of it are emphasized.

If executed, the results would be of value for many kinds of study, including lunar studies, but also on relations between solar data (chiefly sunspots until recent decades) and regular and disturbance variations of the geomagnetic field.

IAGA should, I suggest, use its influence to get each country having such data to contribute them to the Archive in the desired form; but where this was for any reason difficult, help might be had by the use of US aid funds in certain countries such as India.

The General Secretary wrote to Dr. A. Zmuda, reporter for Working Group II₄, Analysis of Geomagnetic Fields, on 19 February 1968, suggesting that his Ad Hoc Subcommittee on World Digital Data Centers (WDDC) (see IAGA News No. 5, pp 28-32 and 61) should continue to work on this problem. They were encouraged to specify a proper detailed format for the exchange of digital data. It was further suggested that they might try to get agencies in the various countries to begin to digitize their own data, if at all possible. Dr. Zmuda indicated by mail, on 13 March 1968, that Dr. J. C. Cain would ask his Ad Hoc Committee on WDDC to assist in this project. The Subcommittees will advise on the taping of past hourly values and on the best way of making copies of past magnetograms.

Dr. Chapman suggested that the Subcommittee should advise

on the best format of taping the past hourly values and the most effective method of making copies of the past magnetograms as indicated above, but stated that it seemed inadequate to leave the entire matter in the hands of a working group whose origin and main objective was the provision of current data in machine-readable form, not only hourly but also at much shorter intervals. He felt it was psychologically important to treat the making available of the treasure of past observations, up to date such as 1960, as a distinct project in itself with the name World Magnetic Archive (MWA). He suggested that the Executive Committee of IAGA adopt the WMA project between assemblies as a special project.

Dr. Chapman took a personal interest in getting the project started by writing to personal friends in various countries. On 25 March 1968 he wrote to Dr. K. Anderson in Charlottenlund, Denmark, inviting his cooperation in the project as follows:

It has as its main aim the availability, to present and future workers in geomagnetism and associated fields, of the rich treasures of magnetic records gathered in past decades by the many magnetic observatories distributed over the world, from the time when such observatories were first set up (when they took readings by eye, later replaced by photographic registration). I am sure that this project would have greatly appealed to my late friend your predecessor, Dr. Dan la Cour, who did just this for the magnetic records gathered under his fine leadership during the 2nd International Polar Year.

Nowadays, for this purpose, it is necessary to have the hourly values of the magnetic elements, read from the magnetograms, put on cards or tape. This in my opinion is the most important and urgent task. Secondary to this is the reproduction of the magnetograms in reduced form, as Dr. la Cour had done for the Polar Year records. This is important for the past records, but I regard it as of second priority.

Recently I wrote two memoranda on this project, one of them addressed to Dr. W. O. Roberts, Director of the National Center for Atmospheric Research, Boulder, Colorado. This memorandum discussed the possibility of getting funds for the work from some American Foundation, or alternatively from aid funds in such countries as India, where the U. S. Government has funds in the currency of the country, not exchangeable for dollars; these might be used in part for this purpose.

But undoubtedly the most appropriate and promising way of achieving the objective is by the action of the countries that have maintained the observatories. On

this point I wrote the second memorandum, of which I enclose a copy, making a suggestion that might be helpful as regards costs. I am glad to say that this suggestion is being actively followed up in England, first of all in connection with the long series (over 100 years) of Greenwich records.

May I ask for your help in this matter as regards the magnetic records that have been made under the auspices of your country, in Denmark and Greenland?

I may mention that the Meteorological Office of Finland has recently provided me with a copy of all the past hourly magnetic values gathered at the observatories in that country. Though furnished to me personally for study at the High Altitude Observatory, Boulder, Colorado, they will be made available by that Observatory to the World Data Center at Washington, and I hope will be duplicated also for deposit at the other World Data Centers. The project of the World Magnetic Archive is to have all the records on card or tape and microfilm deposited at these Centers.

The International Association for Geomagnetism and Aeronomy has a Committee of which Dr. A. J. Zmuda is chairman, which will be glad to advise on the best method of taping the hourly values, and on the best way of making the magnetogram copies. In the latter matter, however, your Institute may have more experience than any other, in view of the work done there under Dr. la Cour's supervision, during the 2nd International Polar Year.

This is a project to be executed once for all, and though considerable, it is definitely limited; once achieved, it may be hoped that current records will be provided year by year to the World Data Centers in the same way.

Mr. S. R. Malin, on 6 May 1968, circulated a very helpful memorandum which discussed particular formats that might be used for various digital recording media as follows:

At the XIV General Assembly of IUGG in St. Gall, 1967, a number of resolutions were passed recommending that observatory data should be converted into machine-readable form (IAGA resolutions 2, 4, 6 and 8) and that World Digital Data Centers should be established to collect and distribute this data. More recently Prof. Chapman has suggested the organization of a World Magnetic Archive whose main object is the conversion of observatory hourly mean values from before 1960 into machine-readable form.

In order to pursue these projects it will be necessary to reach agreement on the medium and format of the machine-readable data. This note makes some suggestions along these lines.

For exchange between WDDCs and for long term storage of the data, seven channel magnetic tape should be used. This is the most compact medium acceptable by the majority of medium or large computers. The storage space required and the cost of postage is smaller than for other media. The United States Coast and Geodetic Survey already have much of their observatory hourly mean data on magnetic tape, and it would seem sensible to adopt a format similar to theirs, since this has already been found to be convenient.

The USC&GS format is as follows:

Position	Description
1-3	Observatory mnemonic code
4-5	Year, last two digits
6-7	Month, 01 to 12
8	Element; D, H, Z, X, or Y
9-10	Day, 01 to 31
11-12	arbitrary
13-16	Daily character data (if any)
17-20	Tabular base in degrees for D, hundreds of gamma for intensity
21-116	24 hourly values (4 digits each)
117-120	Daily mean

The data is in order of observatory, year, month, day and element. The hourly values lie in the range -999 to 9998. 9999 indicates a missing value. If any hourly mean values are missing, the mean for the day is written 9999. Declination is in 0.1' units and intensity elements are in gammas.

Since a number of observatories were operating before 1900, it will be necessary to modify the method of indicating the date to include at least one more digit. Also, it would make sorting simpler if the data were all numerical. The following modification of positions 1 to 16 is therefore suggested:

1-6	Observatory numbercode (as in IAGA Bulletin 20)
7-10	Year
11-12	Month, 01 to 12
13	Element; 1 = D, 2 = H, 3 = Z, 4 = X, 5 = Y, 6 = I, 7 = T

14-15 Day, 01 to 31
 16 5 International selected days,
 1 = quiet; 2 = disturbed

It is further suggested that days should be measured from 0^h U.T. to 24^h U.T. rather than in local time.

For checking purposes it would be more useful if the daily mean were replaced by the last four digits of the daily sum.

Although the medium for storage and exchange between WDDCs will be magnetic tape; with the exception of a few automatic observatories, there will have to be an intermediate medium for the initial punching of data. This may be either 80 column punched cards, or punched paper tape. The choice should be left to the individual workers and the WDDCs should be prepared to form standard magnetic tapes from either cards or paper tape. This task would be facilitated if the data were punched according to a recommended format. Paper tape has the advantage of variable record length, but is difficult to edit or sort. Cards may be easily sorted and edited, but are limited to 80 characters per record. For the same quantity of data, paper tape is rather less bulky and much lighter than cards, so may be mailed more cheaply.

For punched paper tape the format should closely follow that already suggested. However, it is not necessary to repeat the observatory number code, year, month and element for every day. It is suggested that the data should be punched in blocks of one element month, with an 'end of line' character at the end of each day and a gap between element months. The format should be as follows:

Position	Description
1-6	Observatory number code
7-10	Year
11-12	Month
13	Element
14	End of line character
15-16	Day
17	International selected day
18-21	Tabular base
22-117	24 hourly values (4 digits each)
118-121	Daily sum (last four digits), or Daily mean
122	End of line character

Repeat from position 15 until the end of one element month.

Some flexowriters will punch only 80 characters per record. In this case an additional end of line character should be inserted after the 12th hourly value.

Since punched cards are limited to 80 characters per card, each element day will have to occupy two cards. The following format is suggested:

Column	Card 1	Card 2
1-6	Observatory numbercode	Observatory numbercode
7-10	Year	Year
11-12	Month	Month
13	Element	Element
14-15	Day	Day
16	International selected day	Blank
17-20	Tabular base	Blank
21-68	12 hourly values (0 ^h to 12 ^h)	12 hourly values (12 ^h to 24 ^h)
69-72	Blank	Daily sum (or mean)
80	1	2

As an additional means of differentiation, it is suggested that a colour code is used to distinguish the elements. That used at IGS is Orange for D, Grey for H and Blue for Z. This is not, however, important.

Columns 14 to 16 and 21 to 80 will have to be punched by hand, but columns 1 to 13 and 17 to 20 may be gang punched on a monthly basis (so long as the tabular base does not change during the month).

For both cards and paper tape, negative values will be indicated by the sign of the tabular base, but not by the sign of the hourly value, e.g. -17358γ would have a tabular base of -170 and an hourly value of 358.

Responsibility for checking the accuracy of the punching will lie with the authority organizing the punching. However, it would be desirable for the WDDCs to carry out any additional checks which they can manage (e.g. check the daily sum, look for wild first differences). Errors thus found should be referred to the originator.

Ideally, cards or paper tape should be checked by double punching and comparison of results (either punching the data twice, or using a comparing punch if one is available). The punching and check-punching should preferably be done by different operators. If double punching is not possible, the punched data should be compared with the manuscript data. Before the punched data are sent to the WDDC they should be corrected.

Data sent to a WDDC should be accompanied by a note specifying the observatory, period covered, elements and format used. Also the method used in checking the data should be indicated.

If there are any difficulties, it would be advisable to consult the WDDC to which the data will be transmitted, before the punching is started.

On May 7, 1968, Chairman B. R. Leaton wrote to Dr. J. C. Cain recommending that his Ad Hoc Committee on WWDCs continue to function and that it be transferred from Working Group II₄ to Working Group II₆, Data Interchange. This move seems very appropriate and should be considered as accomplished. Chairman Leaton recommended the adoption of S. R. Malin's memorandum reproduced above as a basis for discussion.

Excerpts of a letter from Dr. Leaton to Dr. Zmuda, which pretty well summarize the present state of affairs is given below.

I want to pursue at some length, the question of producing digital data, particularly with reference to observatory data. I suppose one can say that the present surge of correspondence started with Professor Chapman's letter to Dr. Alldredge on the 9th of February. We should certainly thank Professor Chapman for the interest he shows and the impetus which his support can give to this project. We should also thank him for and, I think, adopt his suggestion of the name "World Magnetic Archive". This is something that may catch people's imagination. He is very good at coining words and phrases.

The question of digital data acquisition, management and retrieval, is being actively pursued, particularly in regard to WDDCs. I feel that all reasonable progress is already being made within available resources and that there is really no point in setting up yet another committee for this specific purpose.

Another of Professor Chapman's suggestions, which is a good idea, is the use of Prison labour. Following his suggestion, I have pursued this locally with some success and the joyful acquiescence of the Prison authorities. We have not physically started yet, but expect to any time now, concentrating at first on published data, of which we have a good library here, plus some from WDC microfilms. Professor Chapman is probably well aware (and I hope other people can be educated too) of the many difficulties which exist in trying to process some of the older data. For example, systematic errors are rife; there may be large spurious diurnal variations, unexplain-

ed jump discontinuities and if one goes back far enough, quaint units.

An archive of magnetograms, which he also suggests, is much more difficult. For one thing, I think it is a far larger task. Digitization can be done by anyone with suitable resources. They need not necessarily be the same people who produced the data in the first place. This needs only the transmittal of printed or written tabular matter. To do the same with magnetograms becomes a much larger problem, even if the owners would be prepared to let them out of their sight. I presume that microfilming is the only practical way, but the job will certainly take some organizing. Microfilms are more or less complete since the beginning of the IGY. One problem is, who should hold these? A natural solution would be the existing WDCs., but this would well strain their resources, going, as it does, well beyond their initial purpose.

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Finally in late June, Dr. Chapman reiterates his feeling to B. R. Leaton and S. R. Malin that although the Joint Lunar Committee and Commission II should be helpful in expediting the program, the IAGA Executive Committee should take it under their wing as a special Project. Dr. Chapman plans to attend the Symposium on Description of the Earth's Magnetic Field in Washington, D. C., 22-25 October 1968. It is hoped that those interested in the WMA Project, including the Executive Committee, will meet together on that occasion to discuss progress and plans for this project.

Proposed Symposium on Digitization

Early in January 1968, Dr. A. P. DeVuyt proposed that a Joint IAGA-IASPEI Symposium on Digitization Techniques and Spectral Analysis of Geomagnetic and Earthquake Observations be held during the next assembly in Madrid in 1969. His proposal included four sessions and was generally endorsed by B. R. Leaton and others.

This matter was discussed at the IAGA Administrative meeting in Tokyo, in May of this year, and with Dr. Wadati, President of IASPEI. Dr. Wadati indicated that IASPEI was not interested in a Joint Symposium on this topic so it was decided that the topic would be covered within the technical sessions planned for Commission I during the next assembly.

In a letter of 30 April 1968 to the General Secretary Dr. DeVuyt states that:

Since the St. Gall symposium, I have been sure it

would be necessary, within a short time, to publish brochures dealing with digitalization of geomagnetic data and giving technical information concerning:

1. Automatic observations with digital recording (ASMO + processing of the data by means of a computer).
2. Classical observations (normal magnetograms) and conversion of analog records into digital ones (NASA Type + treatment of data through computer).
3. Classical observations (normal magnetograms) with manual analysis and treatment by computer (method already in use in several magnetic observatories).
4. Presentation and preservation of the digital data.
5. Worldwide centers receiving and treating data in digital data.

At Dourbes, we have gathered much experience already as regards points 1 and 3. We have also built a simple equipment which allows the realization of point 2. As soon as we have gained sufficient experience with this equipment, I will publish a technical article about points 1, 2 and 3.

COMMISSION IV

Magnetic Variations and Disturbances, J. A. Jacobs, Chairman

Working Group IV₁, Morphology and Indices, Reporter:
D. Van Sabben

Under the date of July 1968, Reporter Van Sabben has written to his colleagues regarding the International Service of Geomagnetic Indices (ISGI), which is a part of the Federation of Astronomical and Geophysical Services (FAGS). His letter is reproduced in part below:

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At the IAGA meeting at St. Gall, last year, a resolution was adopted concerning the introduction of new planetary indices K_n , K_s and K_m , as proposed by Dr. Mayaud's work on this project is progressing well. About 20 observatories have been asked to send their K-data for 1968 monthly to Paris and the data for 1964-1967 of these key stations have been gathered. After adjusting the routine of the computations, Dr. Mayaud hopes to start a monthly diffusion of the new indices in 1969.

Professor Fanselau informed me that he has sent to all of you a reprint of his paper on the X-index, measuring the variability of disturbance during the day. Dr. Van Wijk sent me a copy of his letter to Dr. Fanselau, containing some critical remarks on this index, for instance that the good correlation of X with the index A_p of the same day is not an advantage and that it would be better to have a more independent index. As an alternative he suggests the difference between the highest and lowest K-index of the day. Professor Fanselau would appreciate to receive further comments on X, which he hopes to supplement by other indices on ionospheric and solar activity.

The IAGA bulletins 12s and 12t-1 have almost been finished and will be distributed shortly. The same can be said of the last quarterly report of 1967 and a supplement on the quarterly reports of 1964, containing the data from rapid run records which were received too late to be included in these quarterly reports. It was agreed at St. Gallen that these supplements will be prepared yearly by Dr. Romãna.

To begin with the IAGA bulletin 12u-1 (1966), I hope to realize the proposal of Mayaud and Fukushima to add a few pages with information regarding indices not published in the IAGA bulletins (like Q, R, Dst, AE), namely their definitions, the periods over which the data

are available and how they can be obtained. Would you please provide me with the necessary information, if one of these indices is your speciality.

Although the excerpts below were taken from a draft circulated by Dr. Van Sabben to his colleagues, and is therefore subject to some changes in form, the General Secretary takes the liberty of using the material here in the interest of timely dissemination:

The amount of data, published by the ISGI in its quarterly reports and yearly IAGA bulletins 12.1 and 12.2 has been steadily increasing in the course of the years, because of the appearance of new reporting stations and the introduction of new sorts of data. Recently new planetary and semi-planetary indices have been devised and their regular publication must be considered. This process is going on.

On the other hand it has been suggested that the publication of certain other data might be no longer necessary.

For instance, one can ask whether it is still justified to continue the publication of K- and C-indices of individual stations. It might be sufficient to have these data available at World Data Centers and to indicate in the IAGA bulletins only what data are available and how they can be obtained.

Further, the amount of some of the data on rapid variations seems to have grown out of proportion (bays and pulsations) and it is time to reconsider whether it is necessary to publish all these data. This is also important in connection with the limited financial resources of the ISGI.

The appropriate decisions in this respect can only be made if the needs of the scientific community today are known. Therefore it was decided to make an inquiry into these needs by means of the attached questionnaire, which is sent to all persons who are possibly interested in the publication of magnetic disturbance data.

You are kindly asked to answer the questions and to return the questionnaire to the ISGI. It is requested that you give all possible information on the use which you or your co-workers make of the published data at this moment or will make probably in the future, and to indicate what other data are important enough to be regularly published.

Draft Questionnaire

You are kindly requested to answer the following questions by yes, no or other statements. If an answer is affirmative, please write the following information on the back of this sheet:

- a. whether the data are used (or will be used) regularly or occasionally and to what extent,
- b. whether you are interested in the outstanding cases only, or also in the ordinary, but unmistakable cases or even in the poor or doubtful cases (if possible indicate a lower limit of interest for the amplitude of the phenomenon in gammas. This limit may be dependent on the position of the station),
- c. whether it is necessary to have the data at hand within one month, three months, one year, etc., after the end of a month, a quarter or a year,
- d. other remarks which might be of value in deciding what data have to be published regularly and into what detail this should be done (for instance accuracy of time indication of SC, etc.).

This information is wanted in connection with the restricted financial means of the ISGI and the consequent necessity of publishing only the most useful data in the most economic way.

Do you consider it necessary that the following data will be published regularly:

- Planetary magnetic indices; for 3-hour periods, K_p , a_p ; for whole days, A_p , C_p (derived from a number of key-stations).
- Indices for northern - and southern hemispheres separately
- K indices for individual stations
 - If yes, do you prefer:
 - a. listing of K by date (as in table I of IAGA bulletin 12.1)
 - b. listing of K by station (as for supplementary indices in bulletin 12.1)
- International daily characterfigures C_i (mean of many stations)
- C for individual stations
- Q indices (quarter-hourly)
- R indices (hourly-ranges)
- AE-index (auroral electrojet activity)
- Dst-index (ring current intensity); hourly, 3 hourly, daily
- Other disturbance indices

- Magnetically selected days (as published now)
 - Internat. 5 quiet days per month
 - " 10 quiet days per month
 - " 5 disturbed days per month
- Selected days; selection based on other principles
- If yes, what are these principles.

Times of occurrence of

- sudden commencements of magnetic storms (sc)
- other sudden impulses (si)

Bay disturbances

- with sharp beginning (bs)
- accompanied by pulsations (bp)
- with sharp beginning and accompanied by pulsations (bps)
- other bay disturbances (b)

Pulsational disturbances from normal records (speed ~ 15 mm/hour)

- irregular pulsations, with periods up to 2½ minutes (pi 2)
- regular continuous pulsations (see below) (pc-4) (pc-5)
- giant pulsations (very great period and regularity) (pg)

Pulsational disturbances from rapid run records (speed \geq 180 mm/hour)

- irregular pulsations with periods 1-40 sec (pi 1)
- irregular pulsations with periods 40-150 sec (pi 2)

Regular continuous pulsations, with periods

- 0,2 - 5 sec (pc 1)
- 5,1 - 10 sec (pc 2)
- 10,1 - 45 sec (pc 3)
- 45,1 - 150 sec (pc 4)
- 150,1 - 600 sec (pc 5)
- If yes, is it sufficient when the times of occurrence of pi and pc are given in full hours only
- Minor disturbances, reported by one station only
- Solar flare effects: Clear cases only
Uncertain cases also
- Other disturbances, not published yet in IAGA bulletins

Working Group IV₄, Special Disturbances Events, Reporter:
S. I. Akasofu

In the process of inviting colleagues to become members of Working Group IV₄, Special Disturbances Events, Reporter S. I. Akasofu circulated a description of what his working group might do during the next four years. A copy of this

information is given below.

1. Introduction

Until several years ago, the major advances in geomagnetism had been based on the use of hourly mean values. The Kp index (three hourly index) has also been extensively used in many fields of geophysics. However, during the last few years, there has been an increasing demand for more detailed geomagnetic data. For example, although the Kp index has been a valuable index of geomagnetic activity, the Dst and AE indices have later been devised to obtain quantities which could make more meaningful correlative studies with other geophysical quantities; they are roughly proportional to the intensity of the storm-time radiation belt field and the polar electrojet field, respectively. Both the Dst and AE indices are computed at present by using hourly mean values.

Unfortunately, however, it has recently become apparent that the Dst is not necessarily a very suitable index for the storm-time belt, since the storm-time belt can be greatly asymmetric with respect to the dipole axis (Akasofu and Chapman 1964; Cahill 1966; Cummings 1966) and since the low latitude Dst gives only the longitudinally independent component of the field of the storm-time belt; $D = \alpha_0 + \sum_n \alpha_n \sin(n\lambda + \epsilon_n) = Dst(\theta, t) + DS(\theta, \lambda, t)$ where θ and λ denote the dipole latitude and longitude, respectively, and t the storm time. Furthermore, it has become clear that this asymmetry of the belt may provide a vital clue in understanding the formation of the belt.

We know also that the intensity of the polar electrojet varies considerably in one hour, so that the AE index should be computed by using every 10 minute (instantaneous) scaling values, rather than hourly mean values. Such a time accuracy is indeed needed in understanding one of the major problems, the relationship between the formation of the storm-time belt and the growth of the polar electrojet. We have long relied on the concept of the average magnetic storm and the Kp index in studies of geomagnetic storms and of related phenomena. We believe, however, that further progress in geomagnetism depends in part on a detailed analysis of individual storms on the basis of records collected from all over the world. This is because the development of storms varies considerably for individual cases and because any correlative studies of geomagnetic disturbance fields with quantities in related fields require precise knowledge

of the characteristics of the storm fields (rather than the Kp index). In the past, Vestine (1940), Fukushima (1953) and others made detailed studies of individual storms, but their records were mostly obtained during the Second Polar Year.

The Kp index has been very useful to our scientific community, and it will be so in the future. On the other hand, it has become evident that we need additional and much more accurate knowledge of geomagnetic activity in terms of the storm field components, such as the field of the storm-time belt (DR), the field caused by the compression or decompression of the magnetospheric boundary (DCF), the field of the polar electrojet (DP). Unfortunately, the Kp index (or Ap index) is not obviously related to the above storm field components by a simple mathematical formula. Therefore, even if a good correlation between the Kp index and some measured quantity is discovered, we can do little further without more precise knowledge of the storm fields. A good example is an extremely interesting correlation between the Kp index and the solar wind velocity (Snyder, Neugebauer and Rao 1963). Another example is a good correlation between the increase of the upper atmospheric temperature (ΔT) and Ap index (Jacchia 1964).

Thus a demand for accurate analysis is a natural consequence of the rapid progress in geomagnetism and also in related fields in geophysics. We feel that it is of extreme importance to provide accurately processed geomagnetic data to our scientific community, in addition to the Kp index. This is not, however, merely a service to the community, since its feed-back would be most valuable in understanding geomagnetic storms. For example, if a definite relation between the growth and decay of the asymmetric field of the storm-time belt and other geophysical phenomena (say, a large-scale variation of the electron density distribution in the ionosphere) could be established, the relation might provide a clue in better understanding complicated coupling processes between the ionosphere and the magnetosphere, as well as the nature of the asymmetry of the belt itself. The comparison of the records taken by satellite-borne instruments with accurately processed geomagnetic data is another example. This is because satellites can provide a single quantity (say the magnetic field intensity B) at a point in space at a particular time, but a network of ground-based stations can provide a kind of two dimensional pattern of the B field at a given time.

It is expected that the sun will be quite active during the next several years and a number of intense geomagnetic storms will occur. It is also expected that there will be a great demand of accurately processed geomagnetic storm field data by workers in the field of solar-terrestrial relationships.

During geomagnetic storms with a great main phase, we expect a considerable deformation of the magnetosphere and also a significant change of the upper atmosphere structure. The deformation of the magnetosphere is manifested by unusual phenomena, such as the abnormal entry of sub-solar cosmic rays into subauroral regions and the equatorward expansion of the auroral oval to as low as dipole latitude 50° on some extreme occasions. Such unusual phenomena are most likely to be associated with the growth of the storm-time radiation belt (or the so-called 'ring current'). In fact, the equatorward shift of the auroral oval is closely related to the intensity of the storm-time belt (Akasofu and Chapman 1963). The intensity of mid-latitude red arc also has a close relationship with the intensity of the storm-time belt (Rees and Akasofu 1963). A particular type of nighttime E layer is also closely related to the growth of the storm-time belt.

2. Proposed Work

For these reasons, I would like to propose that Working Group "Special Disturbance Events" of Commission IV in IAGA undertakes the work of publishing the analysis of geomagnetic storm fields for major geomagnetic storms during the forthcoming active sun years. The Group consists, at present, of eight members from various countries who are actively working in the analysis of geomagnetic storm fields.

During the last several years, we have analyzed a number of individual geomagnetic storms and obtained the distribution of disturbance fields on an instantaneous basis (cf. Akasofu 1966). Indeed, it is this type of study which has established definitely that the storm-time belt is asymmetric (Akasofu and Chapman 1964). We have also made an extensive analysis of the geomagnetic storm of April 17/18, 1965 in order to learn not only about the variation of the storm fields as a function of θ , λ , t , but also the way in which a vast amount of data can be efficiently analyzed (records from 88 stations) and how the results can clearly be presented.

3. Procedure for the Publication of the Processed Records

(a) Selection of the events

It is planned that on the average one event (or at most two) will be chosen every month. The selection of the event will be made by examining various types of records taken at the Geophysical Institute, University of Alaska and College Magnetic Observatory, USCGS. Mr. H. Nelson has already kindly made arrangements to send copies of Honolulu magnetic records directly from Honolulu Magnetic Observatory to us, so that they will serve also as a guide for the selection. We also have a close connection with the solar flare forecasting section, ESSA, Boulder, Colorado.

Any member of the Group or other commissions of IAGA may propose or suggest particular events for a cooperative study. It is also possible to select the events in accordance with the schedule of satellite experiments. It is planned, however, to start out with a modest program (one event per month).

We shall choose further the period of 36 to 48 hours for the analysis of each event, from shortly before the commencement of the event. The period will primarily be selected on the basis of the College and Honolulu records, but we will be willing to cooperate with workers in related fields in the selection of period for study.

(b) Collection of magnetic records

We have asked about 90 observatories for their participation and cooperation in this enterprise. The observatories will send us copies of their records for the requested period. In general, the selected period will be stormy, and thus both normal-run and insensitive records are needed. Further, each observatory is asked to do their best in identifying three component traces when they cross in the records. We hope to obtain full cooperation from the World Data Center at USC&GS and the Centers B and C.

(c) Analysis of the records

All the data collected here at the Geophysical Institute will be scaled at the Data Processing Section. It is planned to install a Calma Model 303 Digitizer for reducing the analog magnetic records to digital form for computer processing. The tapes from the Digitizer will be processed by an IBM 360, Model 40, at the Computer

Center, University of Alaska. It is planned to use every 5 minute scaling values for further processings, although the Digitizer can automatically register scaling values at one minute intervals or less. It is possible to produce magnetic tapes or punched cards for the outputs. They are available for the members. It is also possible to microfilm the records for the use of the members.

The outputs will be plotted (see (d)) by a Calplotter and will also be printed in tabular forms (see (d)). The solar daily variation will be taken out in the manner described by C.-I. Meng and S.-I. Akasofu (1967).

(d) Presentation and publication of the processed data

The processed data will be arranged in the following way and will be published as a Geophysical Institute Report, entitled "Catalog of Geomagnetic Storms",

- (i) The horizontal component of the disturbance field, $D(H)$, at stations between dp lat $\pm 45^\circ$
- (ii) The horizontal component of the disturbance field, $D(H)$, at stations between dp lat ($45^\circ - 60^\circ$)
- (iii) The iso-intensity contours of $D(H)$ at each UT hour.
- (iv) The storm-time variation of $a_0 + a_1 \sin(\lambda + \epsilon_1) + a_2 \sin(2\lambda + \epsilon_2)$ along dp lat circle 20° ; a_0 gives the Dst component.
- (v) The horizontal component of the disturbance field, $D(H)$, at stations above dp lat 60° .
- (vi) The declination component of the disturbance field, $D(D)$, at stations above dp lat 60° .
- (vii) The combined horizontal component records from stations above 60° . The lower envelope gives approximately the variation of the magnetic field intensity of the polar electrojet in the midnight sector.
- (viii) The AE index; this is essentially the vertical distance between the upper and lower envelope in (vii).
- (ix) Tables; In addition to the above diagramatical representations of the results, all the values used in the above will also be tabulated at 10 minute intervals.

- (x) Discussions; The same data will be also analyzed by other members of the Working Group. We hope to include as much as possible discussions of the storm field components and points of agreements and disagreements among the members. They will enable the reader to be aware of the nature of the problems we face and in particular the difficulty of identifying the storm field components.

In this connection, it should be noted that what we observe on the ground is the total disturbance vector at a number of points on the earth's surface, namely $DCF = DR + DP + \dots$ and that there is no unique way to distinguish each component field. However, each field component is a different function of θ , λ , and r , so that an extensive analysis of magnetic records, such as that proposed here, is necessary to infer as accurately as possible the contribution of each component to the total vector. Satellite observations could provide the dependence of total disturbance vector on r .

- (xi) All participating observatories will receive a copy of the report for each event. Any groups or individuals may also request copies.

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COMMISSION VI

Aurora, A. Omholt, Chairman

and

COMMISSION VII

Airglow, G. M. Weill, Chairman

Radio Auroral Nomenclature

At the St. Gall assembly, Commission VI adopted a recommendation to the effect that Working Group VI_a should recommend a radio auroral nomenclature scheme within 6 months and the scheme should be published in IAGA News (see IAGA Bulletin No. 25, page 115). Reporter R. S. Unwin has submitted the following report for publication.

Recommendation of Working Group on Radio Auroral Nomenclature

The following individuals took part in formulating these recommendations:

Reporter	R. S. Unwin (New Zealand)
Members	P. A. Forsyth, A. Kavadas, A. G. McNamara(Can.) P. Glöde (German Democratic Republic) G. Lange-Hesse (German Federal Republic) T. R. Kaiser (United Kingdom) H. F. Bates, M. Gadsden, R. L. Leadabrand(USA) E. A. Pomonarev, Y. U. Sverdlov (USSR)
Consultants	D. Brooks, C. Collins, G. F. Lyon, C. W. Waite (Can.) K. Sprenger (German Democratic Republic) J. Oksman (Finland) L. Liszka (Sweden) K. Bullough, D. Shipstone (United Kingdom) R. Cohen (USA)

The general term "radio aurora" has been applied to a variety of plasma phenomena occurring in the high latitude ionosphere, usually under conditions of magnetic disturbance. At auroral latitudes magnetic disturbance at night time is usually accompanied to some degree by visual aurora, so the radio aurora is often present at the time of a visual auroral display. However, many independent observations have shown that they are not necessarily in the same place. The term "radio aurora" applies to the ionization irregularities observed in the vicinity of the auroral zones and polar caps which give rise to scattering of radio waves from a ground-based transmitter in the HF, VHF and UHF bands. The

amplitude of the scattered radio waves invariably exhibits a degree of sensitivity to the angle between the incident wave normal and the direction of the earth's magnetic field, and this aspect sensitivity has been interpreted as indicating that the irregularities are elongated in the local field direction. Ionization irregularities of a similar nature have been observed at middle latitudes unconnected with magnetic disturbance, and from the region of the equatorial electrojet but are not included in the term "radio aurora", which is essentially a high latitude phenomenon. Backscatter echoes from the radio aurora are usually Doppler shifted, indicating line of sight velocities of the order of hundreds of meters per second. The term "radio aurora" was introduced by Collins and Forsyth (5).

Whatever the frequency or method of observation, all workers agree that the character of the scattered radio waves varies considerably from time to time and place to place, and a number of different classifications with different definitions have been used. At the XIVth General Assembly of the IUGG held in September-October 1967, Commission VI of the IAGA formed a Working Group specifically to deal with the subject of nomenclature, with the aim of bringing some standardization to the situation. It is hoped that future authors will use the nomenclature recommended here, which will remove some of the confusion that has existed up till now.

Until the physics of the situation giving rise to the radio aurora is understood, the nomenclature must rest to some extent on the technique of observation. If the scattering angle is defined as the angle between the vector direction of propagation of the incident and scattered radiation, we define cases where the scattering angle $>90^\circ$ as backscatter and where $<90^\circ$ as forward-scatter. While there are very few pulse forward-scatter measurements, there is enough experience with pulse backscatter to suggest that a meaningful division can be made between forward- and backscatter, and hence two systems of nomenclature are recommended, one for backscatter and one for forward-scatter. It is not thought that there is any fundamentally different phenomenon introduced by variation of the pulse length, though the loss of range discrimination with long pulse lengths must be taken into consideration in the interpretation. It seems that backscatter echoes obtained with long pulse lengths and with CW transmissions are essentially similar, and can be compared with backscatter echoes obtained with short pulse lengths. The same should hold true for forward-scatter, but further work is required. Ultimately it should be possible to relate forward and backscatter observations, at which time a unified nomenclature can be devised.

The radio aurora occurring in the E region has received a great deal of study over the last twenty years, but much

less work has been done on the F region phenomenon which has been observed only at HF. It is considered that too little is known about the latter for any system of nomenclature to be recommended at the present time, so the recommendations below are confined to the E region radio aurora.

Although descriptive terms are desirable, they must be uniquely defined, but this has not been the case in the past. Hence it is recommended that the use of terms such as "diffuse" and "discrete", which have been defined in at least four different ways (4,7,8,10) be discontinued. For backscatter observations the code B followed by a numerical subscript is recommended. For forward-scatter observations the code A is used (following partly the nomenclature of Collins and Forsyth (5)). The definitions are given in the Tables under two headings, basic characteristics of the scattered radio waves, and typical properties of the radio aurora giving rise to the radio wave scattering. The references included are ones that contain illustrations, and in most cases precise definitions, and should be consulted before the new nomenclature is used in published work. The classifications have specifically been made without reference to local time or latitude, as it is known that the occurrence of the different types varies with both.

It is considered that the definitions are such that future workers will be able to recognize the type of radio aurora observed, though without good height discrimination it will not be possible to measure the height and thickness of the radio aurora, and with CW or very long pulse lengths it may be difficult to distinguish between types B_1 and B_3 . It is important that the recommended subdivisions be used in published work only when they can be certainly recognized; if this is not possible the coding B or A should be used with a description and, if possible, illustration.

In order to increase our understanding of the radio aurora it is essential that equipment parameters and location of observations be precisely stated in published work. It is recommended that, where possible, there should be sufficient recording of appropriate type to enable the different categories of the radio aurora to be recognized. This applies particularly to pulse radars with continuously rotating antennas where it is difficult to recognize types which are easily distinguished on a range-time display.

There has been considerable variation in the past in the terminology used to describe the polarization of backscatter signals from the radio aurora. The following definitions are recommended:

Unpolarized wave - a wave whose direction of polarization varies randomly with time.

- Depolarized wave - a wave whose degree of polarization is less than the degree of polarization of the transmitted wave.
- Cross-polarized wave - if the transmitted wave is polarized in a given (complex) direction which may be identified with one (complex) axis in an orthogonal frame of reference, the scattered wave is cross-polarized if it has a coherent component along another axis.

The recommended nomenclature should be regarded as provisional only. The subject will be reviewed at the IAGA meeting of the next IUGG General Assembly.

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TABLE I

ECHOESCATTER (Scattering angle $> 90^\circ$)

Type	Basic Characteristics of Scattered Radio Waves		Typical Properties of Radio Aurora					Observations before 1968		
	Duration	Fading Rate*	Extent in Range	Mean Height [†]	Vertical Extent ^{††}	Magnetic Aspect Sensitivity ^{††}	Association with Magnetic Disturbance	Freqn.	Name	Ref.
B ₁	Minutes to Hours	Fast	Tens to hundreds of km	112 km	≤ 5 km to ~ 15 km	Strong	Very strong	HF VHF UHF	Diffuse Diffuse Diffuse with structure Diffuse	2 1,4,10 10 8
B ₂	$\lesssim 1$ min	Fast	Usually up to 40 km, occasionally to 100 km	120 km	10 to 25 km	Strong	Very strong	HF VHF UHF	Discrete Discrete Short discrete Discrete	2 1,3,4 10 8
B ₃	1 - 30 min	Fast	Up to 20 km	~ 100 km	≥ 15 km	Strong	Strong	HF VHF UHF	Discrete Discrete Long discrete Discrete	2 1,4 10 8

* Characteristic value at 50 mc/s 100 to 200 Hz, and at least for B₁ fading rate approximately proportional to frequency, but see (9)

[†] Quoted values for subauroral latitudes (10), in polar cap heights for B₂ about 105 km (3)

^{††} Applies to group as a whole, extent of individual irregularities unknown.

^{†††} For recent experimental results on aspect sensitivity see (6) and (7)

TABLE II

FORWARD SCATTER (Scattering Angle $< 90^\circ$)

Basic Characteristics of Scattered Radio Waves		Typical Properties of Radio Aurora			Observations before 1968		
Duration	Fading Rate	Height	Magnetic Aspect Sensitivity	Association with Mag. Disturbance	Freqn.	Name	Ref.
1-15 min	Fast 1 to 250 Hz	> 100 km but < 150 km	Strong	Yes	HF VHF	A ₁	5
5-30 min	Slow 0.1 to 0.01 Hz	> 100 km but < 150 km	Moderate	Yes	HF VHF	A ₂	5
10-200 min	Slow, deep 1 to 0.05 Hz	< 100 km	Weak	Yes	(HF) VHF	A ₃	5
10-200 min	Slow, deep 1 to 0.05 Hz	< 100 km	Weak	No (Daytime)	(HF) VHF	S	5

Aurora and Airglow Program Committee (AAPC) for Active Sun
Years (ASY)

At St. Gall an AAPC was appointed to draw up a program for active sun years (see page 6 of IAGA Bulletin No. 25). Drs. A. Omholt and G. Weill were appointed cochairmen; and Dr. M. H. Rees was appointed as reporter.

This committee has been very active in formulating a program for the ASY. On 8 May 1968 a report of their plans was sent to all members of IAGA Commissions VI and VII, to IUCSTP Officers and a long list of other interested scientists. A copy of the main body of this report follows. The appendices which consist mainly of descriptive letters from interested scientists are not included here because of their length and the fact that the entire report has had a very wide distribution. Scientists wishing to have full copies are encouraged to write to the reporter, Dr. M. H. Rees, University of Colorado, LASP, Space Science Building, Boulder, Colorado 80302, USA.

You will recall that IAGA decided in St. Gallen (September 1967) that an Aurora and Airglow Program Committee be formed to promote, organize and coordinate international scientific projects during the period of Active Sun Years. The way the Committee plans to fulfill the task was outlined in the first letter (7 November 1967).

The Committee appreciates the wide response given by many scientists to the first circular. Many project ideas and information on current programs were thus exchanged, and we feel that this correspondence will serve the purpose of bringing scientists in closer contact.

Among the project ideas, the Committee has selected 3 investigations as particularly suitable for international cooperation. They are of such a nature that many groups throughout the world can contribute to solving important scientific problems for which wide geographical coverage is particularly important, and a degree of organization is required to obtain full value from the observations.

1. High latitude aurora, positive ion precipitation and spectral characteristics as a function of latitude.

The morphology of the proton aurora has become one of the more interesting problems. A study of hydrogen emissions has important relevance to basic problems of the aurora in mapping the impact zones of protons. Photometry of infrared helium emissions, where possible, would

also be of great interest. Variations in the spectral characteristics of aurora reflect changes in the properties of the primary particles and the basic excitation mechanisms. Hence, it is also of great importance to auroral theories.

It is felt that a comprehensive study of aurora by four colour photometers, scanning the meridional plane, covering the oxygen 5577 and 6300 emission, the N_2^+ first negative bands and the hydrogen lines would be a feasible and useful tool. Observations may be undertaken independently by many observers, and it might be possible to cover a north-south chain in northern Europe and in northern America. Other geographical coverage is welcomed.

Focal scientists: Akasofu (for proton aurora),
B. Hultqvist and the IAGA Commission
VI working group on auroral morphology.

2. Low latitude aurora, middle latitude red arc.*

These rare phenomena have been little observed, and their understanding is essential to verify the behaviour of the magnetosphere during magnetic storms. Advantage must be taken of the Active Sun Years.

Focal scientists: S. I. Akasofu, G. Weill

3. Photoelectron effects on airglow.

Photoelectron excitation of the oxygen red lines has been recognized for some time, but yet little exploited. Ground based observations can contribute significantly to the understanding of upper atmospheric structure and its variations, and of interaction of low energy electrons with the exospheric medium.

Focal scientists: H. C. Carlson, K. D. Cole

*Project 2 is also one of the International Projects sponsored by the Inter Union Committee for Solar Terrestrial Physics. Coordination between IAGA and IUCSTP is obtained by the identity of projects and that of its steering committee.

The effectiveness of projects 1 and 2 will be greatly increased by setting up an alert system capable of warning individual observers before the occurrence of exceptional auroral events. Project 3 will benefit from comprehensive measurements at various locations on occasions specified in advance. All projects may require extensive reduction of observational data for times of special events.

Dr. M. H. Rees has accepted to work on this coordination and on the establishment of the urgently needed alert system, assisted by project focal scientists and by regional representatives for America (M. H. Rees), Europe (P. Simon), USSR (Ya. Truttsee), India (), Japan (T. Tohmatsu), Australia (J. Thomas).

Many valuable project ideas have been expressed and deserve some extension and interest by the scientific community. In Appendix 1, we call attention to some project ideas which we think to be of particularly high value, although the establishment of efficient international projects did not seem to be feasible at this time.

Electric field measurements are very important, but at present not suitable for global cooperation.

Please note that the scientists mentioned, the focal scientists of recommended projects as well as the Program Committee are willing to facilitate project development by providing, on request, information on scientific objectives and instrumental technique. All interested to cooperate in projects 1-3 should contact the AAPC reporter Dr. M. H. Rees. Scientists interested in cooperation on the other projects mentioned are urged to communicate directly with the originator.

A Symposium on Aurora and Airglow is being considered. It might take place at the General Assembly of IAGA in 1971, at which date the projects will normally be closed. It is proposed to devote a special session of the Symposium to review progress in each of the recommended projects and describe recent scientific results.

While the focal scientists are being asked to present further information on the projects, the present plan is still tentative. We shall therefore like to hear any comments or suggestions which you care to make in order to further improve project effectiveness.

The Committee thanks you in advance for the impetus which you may add to the proposed program, which is hoped to improve substantially our understanding of Aurora and Airglow phenomena.

WORLD MAGNETIC SURVEY (WMS)

V. Laursen, Chairman

E. H. Vestine, General Secretary

WMS Meeting in South America

In pursuance of a suggestion that came out of the WMS Mission to South America, and implementing a resolution that was passed by the IAGA General Assembly at St. Gall (Resolution No. 25, IAGA News No. 6, page 36, or IAGA Bulletin No. 25, page 167), a meeting of South American specialists within the domains of magnetic survey and magnetic charting is being planned for the summer of 1968. The meeting will be held in Rio de Janeiro, with Dr. L. I. Gama, Principal Investigator in Geomagnetism, at the Observatorio Nacional, Rio de Janeiro, Brazil, acting as convenor.

WMS Reporting

The following memorandum was issued to World Magnetic Survey Correspondents by Dr. E. H. Vestine on 22 December 1967:

At its most recent meeting (October 4, 1967 at St. Gallen, Switzerland), the World Magnetic Survey Board laid plans to bring the World Magnetic Survey to an orderly conclusion. As part of this plan, the Board agreed to prepare a summary volume covering the analysis of the worldwide results of the World Magnetic Survey. The proposed volume would include invited contributions, presenting various aspects of the analysis, and also a world chart. In this enterprise, the Board hopes to have the assistance of experts in the field. The Board intends to publish this volume during 1969, at the end of which the Board will go out of existence.

Accordingly, the Board has set a cut-off date of March 31, 1968 for WMS data; in order to be included in the analysis, all survey data from whatever source--land, sea, air, or satellite survey -- should be placed in World Data Centers or made available to the WMS Secretariat (care of Office of the Assistant Secretary, E. R. Dyer, National Academy of Sciences, 2101 Constitution Ave., N.W. Washington, D. C. 20418) by that date. This does not mean that magnetic surveys should be discontinued or even reduced in scope; it means only that about a year and a half must be allowed for a thorough analysis and consolidation of the wide variety of survey data, the writing of papers, and the publication of the summary volume.

The proposed volume will also include a comprehensive and detailed bibliography covering work on local and regional surveys, charts, and other contributions during the period of the World Magnetic Survey. The compilation of this bibliography will begin within the next few months; WMS correspondents will be asked to assist in collecting titles.

JOINT IAGA-IAMAP COMMITTEE
ON ATMOSPHERIC ELECTRICITY

L. Koenigsfeld, Chairman

H. Dolezalek, Secretary

Fourth International Conference on the Universal
Aspects of Atmospheric Electricity
Tokyo, Japan, 12-18 May 1968

S. C. Corniti, Convenor

H. Dolezalek, Reporter

Of all the intervals between the periodic atmospheric electricity conferences (Holzer, R. E. and W. E. Smith, 1954; Smith, L. G., 1958; Corniti, S. C., 1963), the last one probably has shown the greatest relative progress, and much of it had been sparked by the Third Conference in Montreux in 1963. The Fourth Conference, in Tokyo, consisted of eight symposia, dealing with (1) theoretical consideration, substitute circuits, simulations and models for atmospheric electric phenomena (chairman J. Latham), (2) thunderstorm charging mechanisms (M. Brook), (3) physics of lightning (M. Uman), (4) monitoring of the global lightning activity (E. T. Pierce), (5) and (6) planetary atmospheric electricity (T. Obayashi and C. G. Falthammar), (7) tropospheric ions (J. Bricard), and (8) fair and disturbed weather electricity (R. Reiter).

The rather vivid debate on thunderstorm electrification, well remembered from the days on the Third Conference, did not repeat itself in Tokyo. Some of the most outspoken antagonists were not present, but it also seems that there are even more "camps" now with the limits between them less rigid than before. Electro-hydrodynamic considerations were more pronounced than at earlier discussions. Many of the papers presented in sessions (1), (4) and (8) had an essential relationship to the problems on which the Ten-Year-Program in Atmospheric Electricity is based, and a simultaneous application of some methods discussed in the papers is certainly a

most promising possibility. Especially if seen in this light the progress since 1963 becomes visible. The monitoring of lightning activity, in particular, seems to be on a more solid basis now. Statics, VLF, ELF, -in particular Schumann resonances- and satellites are some keywords in this domain.

A remarkable increase in our knowledge or even a change in our concepts is to be reported from three more areas: (a) the "classical picture" of atmospheric ions as consisting of one charged molecule surrounded by ten or twenty neutrals bound to it by Coulomb forces is replaced by a more realistic concept - at least for positive ions - in which the H_3O or oxonium ion plays a central role; (b) spectroscopy of lightning in ultra violet, visible and infrared, and the time resolution of such spectra, now permits one to derive much more information on the lightning than five years ago; and, (c) the electrical phenomena in the ionosphere, magnetosphere, free space and at or close to celestial bodies have been studied much more, some first measurements of electric fields in these spheres have been carried out. The close relationship between atmospheric electric phenomena and methods in the lower terrestrial atmosphere and in space surfaced several times during the two sessions dedicated to these domains. The participation of colleagues attending the COSPAR meeting (taking place at about the same time in the same city) in these sessions demonstrated that the awareness of these relations is more common now than five years ago.

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Atmospheric Electricity Ten-Year Program First Intensification Period

The ten-year program in Atmospheric Electricity being planned by this Joint Committee was discussed at the XIV General Assembly (IAGA Bulletin No. 25, page 130). The following information related to this program was provided by Mr. H. Dolezalek.

The ten-year program is conceived as consisting of some continuous basic effort plus a number of intensification periods of relatively short duration.

Even before the Joint Committee on Atmospheric Electricity has issued a widespread call for participation in the Ten Year Program as such - which is intended for later this year - an occasion appears to establish a first Intensification Period. It is hoped that this will not only succeed in giving scientific results directly but also serve as a source of experience for later periods.

The motive for this Intensification Period is given by the preparation of a kind of international atlantic expedition in the first months of 1969.

This international atlantic expedition is prepared by several bilateral efforts with the main participation of:

Meteorological Institute, University of Hamburg,
Germany, Dr. Brocks
Meteorological Office, Bracknell, England, Dr. Woods
and Ministry of Defense, London, Cpt. Booth
Air-Sea Interaction Laboratory, ESSA, Miami, Florida
Dr. Ostapoff

The expedition is planned to consist of the following ships:

METEOR and PLANET (German Federal Republic)
HYDRA (United Kingdom)
DISCOVERER (United States)

these ships will be sent to the mid-Atlantic on or around the 15 January 1969, and then drift together southwestward toward the equator (for this reason, the program often is called also the "Drift Program"). A period of common calibration is scheduled for the beginning.

The following atmospheric electricity experiments are planned as of now:

METEOR: January and February 1969, investigator-Riekert: recording of atmospheric electric field strength, measurements of conductivities and ion number densities, possibly captive balloons with field radiosondes; March 1969, investigator-Muhleisen: the same plus atmospheric electric radiosondes.

DISCOVERER: January and February 1969, investigator - Kasemir: recording of atmospheric electric field strength, air-earth current density, and conductivities, possibly kites flown for prolonged periods in the Passat winds and equipped with atmospheric electric radiosondes.

HYDRA and no atmospheric electricity measuring programs known up to now.
PLANET:

The quoted investigators have had recent experiences with the execution of atmospheric electricity measurements aboard the same ships or aboard a ship of exactly the same construction. This, and the reputation of these colleagues, assures a high degree of probability that useful results will be obtained.

These efforts will provide a set of globally representative stations for a period of several weeks. It is reasonable to hope that sufficient fair-weather days will be encountered to make the effort worthwhile.

JOINT IAGA-IAMAP COMMITTEE
ON LUNAR VARIATIONS

O. Schneider, Chairman

Dr. O. Schneider, chairman of the joint committee, calls attention to the fact that the six recommendations near the top of page 143 of IAGA Bulletin No. 25 have not been recommended by the Subcommittee on Standardization (now called Working Group on Procedures) contrary to what is reported there.

The editor of the Bulletin apologizes for this error which apparently arose from misinterpreting a suggestion from a committee member as being approved by the larger body.

GENERAL SCIENTIFIC ASSEMBLY - MADRID - 1969

On 20 April 1968, the IAGA General Secretary received a letter from Dr. J. M. Munuera, secretary general of the National Commission of Geodesy and Geophysics of Spain, in the name of Rev. P. Antonio Romána, S. J., president of the Spanish National Organizing Committee of the forthcoming Scientific meetings of IAGA and IASPEI to be held in Madrid. This letter suggested 1-12 September 1969 as the meeting date with joint meetings of the two Associations being held during the second week. A registration fee of \$20. for active participants and \$10. for accompanying members was suggested. Many questions were asked regarding the IAGA requirements for the meeting.

Many decisions regarding the Madrid Assembly were made by the IAGA Administrative Committee meeting and by the Presidents of IAGA and IASPEI during May in Tokyo. Several of these decisions are given in the Minutes of the Administrative Committee Meeting, in Tokyo, May 1968, given earlier in this News.

Excerpts of a letter from the General Secretary to Dr. Munuera, dated 21 May 1968, are given below:

I received your letter of April 20, 1968, and have discussed it with Dr. T. Nagata, president of IAGA, and Dr. K. Wadati, president of IASPEI, and several members of the IAGA Executive Committee, in Tokyo last week.

We are grateful to be invited to Madrid for this Assembly. It is my privilege to be assigned by IAGA to work with your committee to help assure a successful Assembly in Madrid. President Nagata has asked me to travel to Spain at an appropriate time, after the Local Committee has made some preliminary plans, to work out remaining details with the Local Committee. I will work with you to obtain the best timing for this visit.

The proposed dates of 1-12 September 1969 are agreeable to IAGA. (Note in second letter from Dr. Munuera that the meeting may extend to 13 September - Editor)

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The IAGA Committee has decided that the official title of their Assembly would be "International Association of Geomagnetism and Aeronomy - General Scientific Assembly - Madrid, 1969".

The IAGA Committee agrees to the \$20. registration fee for active participants and \$10. for accompanying members.

It is assumed that this money will be collected by the Local Committee to defray Assembly costs. I would, of course, like to know what services, facilities, and entertainment will be provided in return by the Local Committee so I can notify our Executive Committee and members.

It is suggested that IAGA and IASPEI meet jointly on the morning of 1 September for opening ceremonies and then move apart for separate Plenary Sessions. It is estimated that seating for 400 will be required for the IAGA Plenary Session. IAGA and IASPEI are planning three joint Symposia lasting for nine sessions extending from 8-12 September. As many as 500 may attend these joint sessions.

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Details of how the program and abstract book will be published must be discussed in detail. The 1 June deadline (see further discussion later - Editor) assumes that the program will be published by me in Boulder and shipped to Madrid or that the Spanish Local Committee can complete the publication in time if provided final photo-ready copy by 15 July. (A list of rooms needed for the Scientific meetings and by the administrative staff as well as stenographic and photographic equipment was given.)

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It is estimated there will be about 400 IAGA participants.

Four or five local typists will be needed plus operators for the duplicating equipment. Receptionists and people to register participants, take care of postal service, exchange, travel information and snacks.

In the letter referred to above a rather detailed proposed program was included patterned after the St. Gall meeting. Just as this IAGA News was being completed the General Secretary received a second most informative letter dated 27 June 1968 from Dr. Munuera. The reader must realize that all of the plans are still tentative. In spite of the tentative nature of the plans his entire letter is reproduced here because of the depth of planning it reveals on the part of the Local Organizing Committee and the interest it might engender in the forthcoming Scientific Assembly:

I have received with thanks your kind letter of 21 May with the detailed programme of the IAGA sessions. Due to some special circumstances, such as climate and customs as well as some other ones related to the rooms,

we may dispose of, it will be necessary to introduce some slight modifications.

a) Our purpose is that the sessions of both the Associations be held in separate rooms but in the same building in the Faculty of Sciences, University of Madrid (Ciudad Universitaria). Notwithstanding, for the Opening Session we have chosen a place that seems more adequate to the solemnity of the act. This place is a little distant from the University District. We count upon the probable presence of some Cabinet Minister. Right after the Opening Session we wish to offer a cocktail to all the participants of the Joint Assembly IAGA/IASPEI as well as to the accompanying members. We suggest that the Opening Session should not begin any earlier than 11 a.m. Thus the plenary sessions of each Association could be held in the afternoon of 1 September. All the participants who have not registered nor picked up their papers the day before (Sunday 31 August) may do so early in the morning, before 11 o'clock. Bus transportation will be provided by the Local Committee to take the full and accompanying members at 10:30 a.m. from the University District to the place where the Opening Session will be held.

b) The working sessions in the morning may last from 9 a.m. to 12 o'clock. Atmospheric conditions at the time the Assembly takes place and the normal lunching times in Spanish hotels and restaurants do not allow the sessions to begin at 2 p.m. We therefore suggest that the sessions begin at 4 p.m. in the afternoon. In order not to delay the other sessions, the business meetings of the working groups might be held in the morning after 12 o'clock.

c) As all the morning of the first day (1 September) will be occupied by the Opening Session the time may be short for some sessions foreseen in the IAGA programme. In this case the latter might be held on Friday 12th September in the afternoon and the Final Plenary Session IAGA/IASPEI could be held on Saturday 13th in the morning.

We have prepared, introducing some slight modifications, the joint preliminary programme (enclosure 1) which you might complete with data concerning IAGA.

d) Upon invitation of the Local Committee some excursions to Toledo will be arranged during the first week: a visit to the Geographical Observatory in the morning and sightseeing in the afternoon. Delegates and accompanying members may choose the day they prefer. Thus the number of participants every day will not be very great and the visit to the Observatory will be most fructiferous.

e) In agreement with local Authorities some receptions and social events will be arranged, which would take place in the evenings after 8 o'clock. Later on I shall send you a detailed programme of them. If the Assembly lasts until Saturday 13th September, a farewell dinner might be arranged, as it is usual in all assemblies, on Friday 12th, paid for by the participants.

f) A ladies' programme is being prepared with visits to Museums, Palaces, Centers of interest, fashion show, etc. Further details will also be sent later on.

g) We have already got into touch with the Spanish Tourists' Bureau "Viajes Melia" with branches in the most important capitals and well connected with international tourists' agencies. "Viajes Melia" will take care of hotel reservations, organization of excursions and will act, at any moment, as mediator between the members of the congress and the Local Committee. See Enclosure 2.

h) No official programme will be made for Sunday 7th. "Viajes Melia" will organize for this day, as well as for those before and after the Assembly, some touristic trips for all the members who wish to profit by this occasion to get to know our country.

i) Besides the hotels there will be some residential colleges for accomodation to a lower price. These residential colleges are normally inhabited by students during the academical course.

j) Facilities will be provided to participants to have lunch at reduced prices, at the snack-bar in the same building where the working sessions are held. Refreshments will be served, free of charge, during the traditional "coffee breaks" in the morning and afternoon.

Once we receive your and IASPEI's consent, we shall send our First Circular Letter to possible participants. Please do send us the mailing list you kindly offered in your letter of 21st May. In the first circular we shall make known the general ideas and give a brief information on Madrid. Later on, when exact official and social data are available as well as the programme of the Assembly, a Second Circular will be issued together with the Registration Form.

As to the publication of the "abstracts" all the copies should be in Madrid before 15 July 1969 if you intend to publish them in Boulder. If the Local Committee has to attend to their publication in Madrid, thus saving time and postage and avoiding customs clearances the abstracts, on a sheet of paper, the form and size of which

has previously agreed on, must be received in Madrid by 1 June 1969.

The general estimate of expenses to be paid by the Local Committee has not yet been worked out. Anyhow, the following expenses will be included:

- a) Adaptation of meeting, reception and office rooms, equipment, such as counters, furniture, etc.
- b) Paper and stationary material for both the offices IAGA and IASPEI.
- c) Portfolios for Delegates and Identification cards.
- d) Reception and some Social Events.
- e) Ladies' programme.
- f) Refreshments during the coffee breaks in the morning and afternoon.
- g) Busses for the Opening Session (1 September)
- h) Excursion to Toledo (in different groups and on several days of the first week.
- i) Fees and tips for the personnel:
 - Secretaries
 - Typists
 - Interpreters
 - People in charge of the projectors, duplicating machines etc.
 - Office boys, etc.

In order not to delay the issuing of our First Circular I would be much obliged to you for an early reply with comments and suggestions.

Preliminary Program. Suggested by the Local Committee

Joint IAGA/IASPEI Meetings

IAGA Meetings (1)

Monday Sept. 1	11:00 Opening Session	9:00 Registration (2) 10:30 Bus to Opening Session 16:00 Plenary Session 17:30 Science Session or Symposium
Tuesday Sept. 2 to Friday Sept. 5 (4)(5)(6)		9:00 Science Session or Symposium 16:00 Science Session or Symposium
Saturday Sept. 6		9:00 Science Session or Symposium
Monday Sept. 8 (7)	9:00 IASPEI/IAGA Symposium U. M. (1st) 16:00 IASPEI/IAGA Symposium U. M. (2nd)	9:00 Science Session or Symposium 16:00 Science Session or Symposium
Tuesday Sept. 9	9:00 IASPEI/IAGA Symposium U. M. (3rd) 16:00 IASPEI/IAGA Symposium U. M. (4th)	9:00 Science Session or Symposium 16:00 Joint Committee on Atmospheric Electricity
Wednesday Sept. 10	9:00 IASPEI/IAGA Symposium "Evolution of the Earth's Deep Interior" (1st) 16:00 IASPEI/IAGA Symposium "Evolution of the Earth's Deep Interior" (2nd)	9:00 Joint Committee on Atmospheric Electricity 16:00 Joint Committee on Atmospheric Electricity

Joint IAGA/IASPEI Meetings

IAGA Meetings (1)

Thursday Sept. 11	9:00 IASPEI/IAGA Symposium on "Evolution of the Earth's Deep Interior" (3rd)	9:00 Business Meeting
	16:00 IASPEI/IAGA Symposium on Earthquake Mechanics (1st)	16:00 Science Session
Friday Sept. 12 (8)	9:00 IASPEI/IAGA Symposium on Earthquake Mechanics (2nd)	9:00 Science Session 16:00 Executive Committee Meeting and IAGA Plenary Session
Saturday Sept. 13 (9)	10:00 Final Joint Plenary Session	

Remarks:

- (1) IAGA meetings according to the program proposed by IAGA
- (2) Registration Office will be open on Sunday from 10 a.m. to 1 p.m. also.
- (4) Scientific sessions or Symposia for each Association in accordance with the following schedule: 9 a.m.-12 noon: 4 p.m.-7 p.m. Business meetings possibly beginning at 12p.m.
- (5) During these days (2 Sept.-5 Sept.) different trips to Toledo will be arranged, on invitation, by the Local Committee
- (6) A special program for ladies is foreseen from 2nd to 5th. Sept. and again from the 8th to 11th Sept.
- (7) Schedule according to IAGA proposals.
- (8) Social events and a dinner for Friday evening at 21 p.m. will be arranged.
- (9) Final Joint Plenary Session might take place on Friday evening at 18:30 p.m. if by this time the Meetings of both Associations have finished.

Enclosure (1)

Official Travel Agency

VIAJES MELIA
Paseo del Rey, 12
Madrid, Spain

Approximate Hotel prices (only for your guidance)

All rooms with bath or shower.

Prices for one person (pesetas)
(Present exchange rate is 71 pesetas = 1 U.S. Dollar)

	Double Room		Single Room		
	Maximum	Minimum	Maximum	Minimum	
Deluxe	950	500	Deluxe	1,500	600
1st. A	400	300	1st. A	600	350
1st. B	300	200	1st. B	350	250

The above mentioned prices are approximate and they include service charge and taxes but not meals.

"Colegios Mayores" (Students residences)

Prices of rooms include meals:

Maximum	Minimum
300	200

Limited number of places.

Enclosure (2)

Dr. Munuera has been informed that all of his suggestions related to local custom of time are certainly acceptable, and that we should plan to include 13 September as a part of the Assembly.

The only important part of the proposals made in Dr. Munuera's letter which require further discussion is the implied due date for abstracts. The usual problem of the scientific committee wanting a late due date and the arrangements committee wanting an early due date is still with us. Until this problem is solved we can only say that authors should plan to have their titles and abstracts in the hands of the General Secretary by 1 May 1969. An effort will be made to relax that date but there is no assurance this can be done.

Abstracts should be limited to one single spaced page (8½ x 11") with one inch left-hand margin and ¾ inch on right-hand side and bottom. The title in underlined capital letters should start one inch from the top of the page, with the author, institution and country in normal letters directly underneath. Do not use word "abstract" or "summary" since the entire booklet will be so labeled.

A copy of the abstract received by the General Secretary before the deadline will be forwarded to the appropriate Commission Chairman. The Commission Chairmen have the responsibility, with the help of their Reporters, to accept or reject a paper and to organize the business and scientific sessions for their Commissions. Completed Commission programs must be returned to the General Secretary within 15 days after the abstract deadline.

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Dr. Elena Lubimova under date of 24 June writes as chairman of the International Heat Flow Committee, IHFC, that the IHFC Bureau will meet in Madrid to talk over the preparation of a Symposium in Moscow (1971) on possible correlations between thermic and geomagnetic parameters.

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Dr. Hans Dolezalek on 28 June indicated that the IAGA-IAMAP Joint Committee on Atmospheric Electricity has decided to hold a one day symposium on "Electrical Processes and Problems of Measurement in the Upper Atmosphere of the Earth and Other Planetary Atmospheres." This symposium will be a discussion type meeting on problems of the transition layer which lies between the relatively accessible domain of troposphere and the extensively studied ionosphere.

SYMPOSIA

SYMPOSIUM ON THE SOLAR ECLIPSE OF NOVEMBER 1966 SAO JOSE DOS CAMPOS, BRAZIL, 5-11 FEBRUARY 1968

IAGA did not cosponsor this symposium because the invitation came too late for an IAGA representative to be effective on the program committee. Dr. R. M. Casaverde, a member of the IAGA Executive Committee, did attend and reports on two phases of the work given below which will be of interest to other IAGA members.

Summary of the Session on Geomagnetic Observations

From the measurements observed at Peru, Bolivia and Argentina, the results of which have been presented at this symposium, we can say that we were able to make a good contribution to the study of the geomagnetic effects of a solar eclipse.

H. Bomke et al presented a new method to determine, from magnetic eclipse observations ionospheric parameters such as the recombination coefficient ($5.5 \times 10^{-8} \text{ cm}^3 \text{ sec}^{-1}$) of the E layer, and a solar parameter as the residual ionizing radiation from the corona - (15%). They also found a very strong correlation between the fine structure of the geomagnetic eclipse effect and the covering and uncovering of four actual x-ray centers in the sun.

A Giesecke, Y. Kato, M. Casaverde and their colleagues in Bolivia and Argentina have presented a set of geomagnetic observations which shows a definite effect of the solar eclipse on the magnetic field of the earth. The distribution of the stations, from the dip equator toward the south in Argentina, has contributed a great deal to the identification of the geomagnetic events during the total solar eclipse of November 12, 1966.

Y. Kato and Y. Mori presented a theoretical study of the changes of the conductivity in the E layer across the magnetic equator, showing a slow recovery after the maximum effect in close correlation with the geomagnetic effects. So far, no direct comparisons of geomagnetic variations and the currents flowing in the E region, where the primary mechanism takes place, can be made. The main reason is the lack of good information on some of the atmospheric parameters. Only correlation of variabilities has been well established.

The maximum electrojet strength in terms of the horizontal component of the geomagnetic field, decreases in the order of 50 per cent at the time of maximum occurrence of the eclipse, was shown by Casaverde and his colleagues.

It has been demonstrated that the use of conventional magnetographs during a solar eclipse is very limited. Instruments of higher sensitivity and with a good time resolution, complemented by ionospheric observations, should be recommended as more appropriate for any future experiment.

Resolution Approved at Symposium

Whereas since cooperation among host countries, their scientists, and visiting foreign scientists is essential for successful observations of phenomena connected with solar eclipses, the participants in the Symposium on the Solar Eclipse of November 12, 1966 which is being held at Sao Jose dos Campos, Brazil, resolve

- (1) to urge each of the countries in the path of the eclipse of March 7, 1970 (Mexico, the United States, and Canada) to establish a national focal points for coordination of foreign participation.
- (2) to urge all foreign scientists interested in entering these countries for their own observations, or for observations in cooperation with scientists living in these countries, to coordinate their plans through these national focal points, and
- (3) to urge that several national focal points cooperate to provide coordination and encouragement of cooperative experiments for the 1970 eclipse in a fashion similar to what was done in connection with the 1966 exlipse.

SYMPOSIUM ON LABORATORY MEASUREMENTS OF AERONOMIC INTEREST, TORONTO, CANADA, 3 - 4 SEPTEMBER 1968

H. I. Schiff and E. E. Ferguson, Cochairmen

The following information is taken from the final announcement brochure.

The International Association of Geomagnetism and Aeronomy will sponsor a symposium on "Laboratory Measurements of Aeronomic Interest" to be held at York University, in Toronto, Canada, Tuesday, September 3rd, and Wednesday, September 4th, 1968. A very successful symposium was held on this topic at Berkeley in August

1963. Many significant advances have been made since. It is therefore the purpose of this symposium to review critically the present state of knowledge of those fundamental atomic and molecular processes which are of major importance in aeronomy.

Following the Berkeley model a number of outstanding authorities have been asked to provide critical reviews. However, at the Toronto meetings these reviews will not actually be presented. Instead, preprints will be circulated to the symposium attendees about a month before the meeting, and the papers will be taken as read. Only a brief time will be allotted to each reviewer to up-date or to alter his views. Participants may then present new data, offer comments or ask questions, but any one individual will be limited to 7 minutes. The discussion will be moderated by a chairman who will also sum up the discussion. We are indeed fortunate in securing chairmen who are experts in the application of laboratory data to aeronomic problems.

A maximum of three contributed papers will be accepted on each topic, each limited to 7 minutes. Abstracts of 300 words should be submitted by August 1st to the chairman designated for that topic (see program) who will make a selection on the basis of the relevance of the topic under discussion.

The proceedings will be published in the Canadian Journal of Chemistry. Revised review papers, contributed papers, and discussions (but only if submitted in writing) and the chairmen's summaries will appear in one issue of the Journal. Authors will be asked to submit their revised manuscripts by October 1st to ensure early publication.

York University is located about 10 miles from the airport and about 14 miles from downtown Toronto. We believe that most attendees will prefer to stay on Campus and have therefore made arrangements in our new university residences. Wives and families can also be accommodated and charge will be \$7.50 per day per person, including meals. If, however, you would like us to arrange for hotel or motel accommodation in the city or near the airport please indicate on the registration form. A ladies program can be arranged if the numbers warrant. You may pay for your accommodation with your preregistration or when you arrive.

There will be a cocktail hour followed by a banquet on Tuesday evening, September 3rd in Vanier College. The price for the banquet will be \$7.00 per person and \$3.00 for children under 12. There will be no speeches!

Following the banquet there will be a concert at the Burton Auditorium which will be complimentary.

You are asked to fill out and return the registration form along with your remittance as soon as possible, and certainly before July 31st., if you wish to receive the preprints. If you are unable to attend the meeting but would like the preprints you may return the forms with a cheque for \$7.50.

Program

Time	<u>Tuesday Morning, 3 September</u>	Author
9:00	1. Electron Recombination and Ion Recombination	M. A. Biondi Uni. of Pittsburgh
10:00	2. Inelastic Electron Collisions at Low Energies	A. Dalgarno Harvard University
11:00	3. Inelastic Electron Collisions at High Energies	E. N. Lassette Mellon Institute
	<u>Tuesday Afternoon, 3 September</u>	
2:00	4. Electron Attachment and Detachment	A. V. Phelps Westinghouse
3:00	5. Positive Ion-Molecule Reactions	W. Fite Uni. of Pittsburgh
4:00	6. Negative Ion-Molecule Reactions	E. E. Ferguson ESSA Research Labs.
	<u>Wednesday Morning, 4 September</u>	
8:30	7. Absorption Co-efficients	R. Huffman Air Force Cambridge Research Labs.
9:30	8. Transition Probabilities and Lifetimes	R. W. Nicholls York University
10:30	9. Deactivation of Excited States	E. Zipf Uni. of Pittsburgh
11:30	10. Photoionization, Photodetachment & Photoexcitation	R. E. Schoen Boeing Research Labs.
	<u>Wednesday Afternoon, 4 September</u>	
2:00	11. Neutral Reactions Involving N and O	H. I. Schiff York University

Time	<u>Wednesday Afternoon, 4 September</u>	Author
3:00	12. Neutral Reactions Involving H and other minor constituents	F. Kaufman Uni. of Pittsburgh
4:00	13. Chemiluminescent Reactions	R. A. Young Stanford Research Inst.

SYMPOSIUM ON PHYSICS OF THE MAGNETOSPHERE
WASHINGTON, D. C., 3 - 13 SEPTEMBER 1968

The following information is taken from the Second Announcement. The program committee was listed on page 21 of IAGA News No. 6, so it is not repeated here. This symposium is cosponsored by COSPAR, IAU, IUGG-IAGA, IUPAP and URSI. Attendance at the meeting is by invitation of the Program Committee.

Preliminary Program Sessions and Invited Review Papers

1. Solar wind-magnetosphere interactions

Solar Wind Interaction with the Geomagnetic Field	E. N. Parker Uni. of Chicago
Plasma Flow Around the Magnetosphere	J. R. Spreiter NASA Ames Res. Center

2. Magnetosphere Models

Hydromagnetic Phenomena in the Magnetosphere	W. I. Axford Uni. of California, San Diego
Quantitative Models of the Magnetosphere	J. G. Roederer Uni. of Denver

3. Laboratory Experiments

Laboratory Studies Related to the Solar Wind and the Magnetosphere	K. Schindler ESRIN, Frascati, Rome
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4. Trapped Radiation

Charged Particles in the Magnetosphere	J. A. VanAllen Uni. of Iowa
Particle Fluxes in the Outer Geomagnetic Field	S. N. Vernov Moscow State Uni.

5. Geomagnetic Tail

The Geomagnetic Tail

N. F. Ness
NASA Goddard Space
Flight Center

6. Auroras and Polar Substorms

Auroras and Polar Substorms:
Observations and Theory

B. Hultqvist
Kiruna Geophysical
Observatory

Auroras and Polar Substorms
and Their Relation to the
Dynamics of the Magnetosphere

Y. I. Feldstein
IZMIRAN, USSR Academy
of Sciences

7. Low-Energy Plasma in the Magnetosphere

Low-energy Plasma in the
Magnetosphere

K. I. Gringauz
Radiotechnical Inst.
USSR Academy of Scs.

Consequences of a Magneto-
spheric Plasma

C. F. Kennel
Uni. of California,
Los Angeles

8. Wave-Particle Interactions

Low Frequency Waves in the
Magnetosphere

R. A. Helliwell
Stanford Uni.

Wave-Particle Interactions
in the Magnetosphere

C. S. Roberts
Bell Telephone Labs.

9. Acceleration Processes

Acceleration Mechanisms in
the Magnetosphere

C.-G. Fälthammer
Royal Inst. of Tech.

Interaction of Trapped
Particles with Forced and
Free Oscillations of the
Magnetosphere Plasma

B. A. Tverskoy
Moscow State Uni.

10. Summary Panel

C. E. McIlwain, Uni. of California, San Diego, chairman
A. J. Dessler, Rice University, Houston, Texas
J. W. Dungey, Imperial College, London
R. Z. Sagdeev, Institute of Nuclear Physics, Novosibirsk

Sessions will be held in the Main Conference Room of the
U.S. Department of State. Two or three invited review papers

plus five to ten contributed papers will be presented each day in the approximate order shown above. The contributed papers, to be selected by the Program Committee on the basis of abstracts submitted, will be limited to 20 minutes or less. Papers may be given in either English or Russian and preparations are being made for simultaneous translation.

Proceedings

The invited review papers will be published in a group as the February, 1969 issue of the Reviews of Geophysics. Copies of this issue will be automatically distributed to all Symposium registrants.

SYMPOSIUM ON THE DESCRIPTION OF THE EARTH'S MAGNETIC FIELD, WASHINGTON, D. C. 22 - 23 OCTOBER, 1968

V. Laursen and E. H. Vestine, Cochairmen of Scientific Program

J. H. Nelson and G. A. Young, Local Arrangements Committee

The following information is taken from the latest circular.

This Symposium is being arranged by the World Magnetic Survey Board of IAGA, with assistance from United Nations Educational Scientific, and Cultural Organization, Coast and Geodetic Survey, Environmental Science Services Administration, U.S. Department of Commerce, U.S. Naval Oceanographic Office and the American Geophysical Union.

The 1968 symposium on Description of the Earth's Magnetic Field will be held at the National Academy of Sciences, 2100 Constitution Avenue, N.W., Washington, D. C. It is open to all interested scientists. The eight sessions of the Symposium will be spread over four days, with no concurrent sessions. Topics will be: Ocean and Airborne Surveys, Satellite Surveys, Magnetic Charts (Regional and Worldwide), Secular Change, and Broad-scale regional anomalies. There should be ample time for discussion within the sessions and for informal exchanges of information among the delegates outside the sessions.

The deadline for receipt of abstracts of contributed papers is August 1, 1968. Papers must be relevant to the title of the symposium--that is, to an analytical description of the earth's magnetic field in a broad form at the surface of the earth, below the surface, or in near space within the magnetosphere. Fine-scale anomalies depicting details of crustal variations are considered outside the scope of the symposium, but major geophysical features of land or ocean areas are included in the area of interest.

The abstracts, limited to 500 words, should be mailed to Mr. J. H. Nelson, Geomagnetism Division, ESSA, Coast and Geodetic Survey, Rockville, Maryland 20852, USA.

Full texts of papers presented at the symposium may be distributed by the speakers, but sufficient number of copies must be supplied by speakers for this purpose. There will not be a publication of the proceedings of the symposium. A selection of papers from those presented will be made by the World Magnetic Survey Board and will be included in the final report of the WMS Board to be published in 1969.

Countries or organizations which have prepared magnetic charts as a contribution to the World Magnetic Survey charting program may present such charts for display in the hallways of the National Academy of Sciences during the symposium. However, information as to the number of such charts and their size must be given to the Arrangements Committee not later than August 1, 1968, in order that space for display may be provided.

A symposium dinner will be held on the evening of Tuesday, October 22. It will be the only scheduled social event. Cost of the dinner including refreshments will be \$7.50. To assure that sufficient space is available participants are asked to register for the dinner and send the fee with their symposium registration fee.

No special program is planned for family members accompanying the delegates. Commercial sight-seeing tours of Washington, D. C. are available to those interested. The Coast and Geodetic Survey and the Goddard Space Flight Center of NASA will welcome visitors on Monday, October 21, or at any time during the conference. A post-symposium tour to the Fredericksburg Geomagnetic Center (about 60 miles from Washington), and to visit one of the aircraft of the U.S. Naval Oceanographic Office's PROJECT MAGNET, is tentatively planned for Saturday, October 26; the extra cost of the tour, including lunch, will probably be less than \$6.00 per person.

The Arrangements Committee (J. H. Nelson, chairman) will attempt to make hotel reservations for delegates and families in Washington if they so request. Hotel rates cannot be guaranteed but will probably range from \$9 to \$20 per night for single rooms with bath, \$13 to \$25 per night for room with two beds and bath, depending on quality of the hotel. Meals are not included.

Registration fee of \$10 will apply if payment is received on or before September 1, 1968; after that date the fee will be \$15. Payment should be made by check, in U.S. dollars, to "IAGA Symposium Arrangements Committee".

THIRD EQUATORIAL AERONOMY SYMPOSIUM
AMMEDABAD, INDIA, 3-10 FEBRUARY 1969

IAGA has agreed to cosponsor this Symposium under the same terms that applied to the Second Equatorial Aeronomy Symposium held in San Jose, Brazil in 1965 (see IAGA Symposia No. 5).

Dr. J. A. Jacobs, chairman of IAGA Commission IV, has been designated as the IAGA representative on the Scientific Program Committee.

This Symposium was originally scheduled for 3-10 November 1968, but unexpected delays caused its postponement until the later date given in the heading. Professor R. W. H. Wright, who is the convenor of this Symposium, has indicated that the first circular is now being prepared in India.

Discussion during the recent COSPAR Meeting in Tokyo with Drs. K. R. Ramanatham and A. P. Mitra of India indicate that all facilities required to make this meeting successful will be made readily available.

RELATIONS WITH OTHER ORGANIZATIONS

SCAR

President Nagata, the IAGA representative to SCAR, made the following report to SCAR regarding the last General Assembly.

The International Association of Geomagnetism and Aeronomy (IAGA) held its XIV General Assembly in St. Gallen, Switzerland from 25 September to 7 October 1967.

As usual in its every assembly, results of researches of aurorae and polar magnetic disturbances were reported in this assembly also. A symposium on conjugate point research was attached particularly to this assembly. Conjugate phenomena between Antarctic and Arctic conjugate pairs in regard to aurora, geomagnetic disturbances particularly geomagnetic micropulsations, polar cap absorption and electron precipitations were discussed in this symposium.

All of the nine IAGA Commissions were reorganized in this assembly. Many of the Commission Chairmen were replaced by younger scientists and the structure of each Commission was almost completely reorganized. The new names and the new chairmen of the Commissions are listed on page 4 of IAGA Bulletin No. 25. SCAR has scientific connections with all these Commissions, specifically with IV, V, VI and VIII. It seems desirable that SCAR should be well represented in these IAGA Commissions.

IAGA sponsored two international symposia whose main subjects are directly related to the polar regions: One was "Conjugate Point Symposium," held in Boulder, USA, from 13 to 16 June 1967, and another was the "Birkeland Symposium on Aurora and Magnetic Storms," held in Sandefjord, Norway, from 18 to 21 September 1967. Results of upper atmospheric physics research over Antarctica are naturally involved in these two Symposia.

In the future, IAGA will hold "IAGA Symposium on the Description of the Earth's Magnetic Field," in Washington, D. C., USA, for four days from 22 to 25 October 1968. Further IAGA will hold its "General Scientific Assembly" in Madrid, Spain, from 1 to 12 September 1969.

Any requests or comments on these meetings from the SCAR view point should be sent to T. Nagata, Geophysical Institute, University of Tokyo, Tokyo.

Dr. V. Troitskaya who also participated in the X SCAR meeting in Tokyo, as a representative of IUGG, reports that the following recommendations of interest to IAGA were passed:

Geomagnetism

Fifteen manned magnetic observatories are in operation at present. These provide control for ground, sea and air surveys and may be used for determination of secular variation. Several other stations are periodically occupied for the observation of secular variation, but more observations in Antarctica are needed to complete world coverage

Recommendation - X SEG 5

Considering the lack of stations in the Antarctic area at which secular variation may be determined more temporary magnetic stations should be reoccupied, annually if possible, for the determination of this variation.

The Soviet member reported that her country was prepared to cover up to 25% of the continental area with aeromagnetic surveys at a height of 6-8 km, and hoped that other countries would be able to cooperate in such a survey. The British member expressed interest in this proposal, and stated that, given adequate notice, logistic support might be available from Halley Bay.

Aeromagnetic Surveys

Recommendation X G/SEG 2

In view of the proposals of several member countries to carry out extensive regional aeromagnetic surveys over Antarctica, it is desirable that, in order to establish maximum collaborative effort of all member countries, plans for such surveys and plans for ground support and base magnetic information be circulated to member countries as soon as possible and be available for final discussion at the joint Working Group meeting at XI SCAR in 1970.

Palaeomagnetic Studies

Recommendation X G/SEG 4

- (a) The Working Groups on Geology and Solid Earth

Geophysics draw to the attention of member countries the importance and great potential value of palaeomagnetic studies, and urge member countries to continue this work. It is recommended that those countries with adequate facilities for palaeomagnetic work offer the use of these to member countries lacking such facilities. The Working Groups strongly recommend that any rock samples for palaeomagnetic studies be completely documented and clearly orientated, and be from rocks of known age. If the age is at the time of collection unknown, then duplicate samples should be collected for dating and this dating be done as soon as possible. Basic igneous rocks are most suitable for palaeomagnetic determinations.

(b) The Working Groups on Geology and Solid Earth Geophysics would welcome the preparation by IAGA of a manual on the collection of specimens from Antarctica for palaeomagnetic investigations.

ICSU

Actions taken by the Executive Committee of ICSU, Rome, October 9 - 10, 1967

President Coulomb attended this meeting as representative of IUGG. Action was taken on three important questions of interest to this Union: the Constitution of IUCSTP, GARP, and the replacement of CIG. The Constitution of IUCSTP, as adopted is attached to this letter; it is still marked "Provisional", as it awaits ratification by the next General Assembly of ICSU (Paris, June 1968). It should be noted that changes have been made in Sections 4, 6, 7, 8, which are in the direction of the proposals made by IUGG. (See IAGA News No. 5, page 56, for an earlier version of this Constitution). Dr. E. R. Dyer, National Academy of Sciences, USA, has been appointed as Scientific Secretary of the IUCSTP.

The following resolution on GARP was passed: "The Executive Committee approves the project for a Global Atmospheric Research Program (GARP) as described to the Executive Committee on 10 October 1967 and authorizes all appropriate action by the Officers for eventual ratification by the General Assembly." "The Executive Committee resolves that the Committee on Atmospheric Sciences be dissolved as soon as the ICSU-WMO Joint Advisory Committee on GARP and the ICSU Panel on GARP are functioning."

CIG was disbanded, and it was decided that the responsibility for the WDC's be divided between IUCSTP for the Data Centers in the solar-terrestrial disciplines, and IUGG for the others.

Symposium at the General Assembly of ICSU

It has been decided to hold a one-day symposium on 25 June 1968, in Paris, on Scientific Information and Documentation, with about six invited papers, devoted to:

- (a) How to increase the interest of working scientists in the problems of collection, storage and retrieval of scientific information.
- (b) A survey of the existing systems and methods.
- (c) A consideration of new developments, and forecasts of possible new methods and techniques, as yet unrealized.

SPARMO

Directing Board of SPARMO

SPARMO (Solar Particles and Radiation Monitoring Organization) is one of the Permanent Services of FAGS; it is responsible to both IAU and IUGG. At a meeting held in Toulouse, October 10-13, a new Directing Board was elected, as follows:

President:	G. Pfozter (German Fed. Rep.)
Vice-Presidents:	F. Cambou (France)
	W. Riedler (Sweden)
	P. H. Stokes (South Africa)
Director:	J. P. Legrand (France)
(Ex officio) Representative of IUGG:	J. G. Roederer (USA)

The last position is an appointment by IUGG on the advice of IAGA. According to the agreement by which SPARMO became a member of FAGS, there must be a representative of IUGG on the Board.

COSPAR

The following scientists have been appointed as IAGA (IUGG) representatives on COSPAR Working Groups and Panels:

Working Group II - J. G. Roederer
Working Group IV - F. S. Johnson

Panel on the dynamics and structure of the neutral atmosphere, Working Group II, M. Nicolet

Panel on the dynamics of the geomagnetic trap,
Working Group II, N. F. Ness
Panel on the interaction of the neutral and ionized
atmosphere, Working Group II, F. S. Johnson
Panel for polar cap experiments, Working Group II,
B. Hultqvist
Panel on solar flares, Working Group II, T. Obayashi
Panel on conjugate points, Working Group II,
J. G. Roederer

IUCSTP

The Inter-union Commission on Solar-Terrestrial Physics has published STP Notes dated April 1968. This is a 145 page document which is very informative regarding anticipated activities of this Agency and how it will relate to the Unions of ICSU. It contains a program for the solar maximum 1968-70 period but indicates that it is not complete and will continue to evolve. It is anticipated that STP Notes will be published several times a year.

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