

David Kenilge



IAGA NEWS

July 1994

No: 33

XXIst General Assembly
Boulder [USA]

2-14 July 1995



Et in Arcadia agu

**XXI IUGG General Assembly
Boulder, Colorado
July 2-14, 1995**



To be placed on the mailing list to receive future information on the IUGG XXI General Assembly, complete the information below and mail it to the address listed at the bottom of this form.

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Address _____
City _____ State/Province _____
Zip/Postal _____ Country _____
Phone _____ Fax _____
E-mail Network _____
(i.e., Bitnet, Internet, etc. _____)

Please check all that apply:

- I am a member of the American Geophysical Union.
 I am not a member of the American Geophysical Union
 I am interested in receiving future Circulars on the Assembly.
 I am interested in receiving information on exhibiting at the Assembly.
*(For exhibits information, contact Karol B. Snyder, Exhibits
Coordinator at the address below, call 202-939-3205, or e-mail
ksnyder@kosmos.agu.org).*

I plan to participate in the Assembly by:

- attending only submitting an abstract

If I submit an abstract, my topic matter is likely to be: _____

I am interested in symposia in the following areas (check all that apply).

- IAG IAGA IAHS IAMAS
 IAPSO IASPEI IAVCEI

Please return this form to:

IUGG XXI General Assembly
c/o American Geophysical Union
2000 Florida Avenue, NW
Washington, DC 20009 USA

If you have already requested to be placed on the mailing list, please do not submit this form.

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Foreword

This issue of IAGA News is published four months earlier than is usual. The big event of next year is the General Assembly of the Union, in which IAGA will be playing its regular large part. We have planned over seventy separate scientific sessions, a number of them in cooperation with other Associations. In addition, the Union will be putting on a number of one-day symposia and lectures of wide interest.

I wrote "we have planned" and this must be understood to be the Leaders of the five Divisions and the two Interdivisional Commissions of IAGA. These seven principals work with the scientific communities that their Divisions or Commissions represent to evolve and organize the scientific sessions for the Assemblies, both the Scientific Assemblies [such as took place in Buenos Aires last year] and the General Assemblies. Each leader works with ten to twenty convenors of the separate sessions. So where do I fit in? I simply act as gatherer of the sessions and try to keep the seven groups of sessions mutually compatible and to warn of overlaps and other conflicts.

"We" have been working on next year's programme since last year and the listing in this issue of IAGA News represents our best attempt to produce an up-to-date, attractive, and practical schedule of sessions for you. Now it is up to you, individually, to look through the lists and (I hope) decide to come to Boulder and meet your peers and scientific colleagues from around the world, to discuss, to plan, to exchange ideas, and perhaps also to socialise and sightsee in the gaps in your schedule.

Our next Scientific Assembly is scheduled for 3-15 August 1997 in Uppsala [Sweden]. If current plans evolve successfully, the quadrennial solar-terrestrial physics meeting of SCOSTEP will take place at the Assembly, during the second week. It is hoped also that the higher parts of IAMAS will meet with us. It looks to me as though Uppsala 1997 will definitely be a meeting to be at ...

With all best wishes in your research and your other endeavours, whatever they be and wherever they take you.

M Gadsden

This issue of IAGA News is published in the English language. The purpose of the journal is to provide a forum for the exchange of information and ideas among geologists and geophysicists. The journal is published quarterly and is available to all members of the International Association of Geologists and Geophysicists (IAGA). The journal is published by the International Association of Geologists and Geophysicists (IAGA) and is available to all members of the International Association of Geologists and Geophysicists (IAGA).

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INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS
XXI GENERAL ASSEMBLY
2-14 July 1995
Boulder, Colorado [USA]

The Assembly will be held on the pleasant campus of the University of Colorado, which is a grassy, tree-lined area right in the middle of Boulder. Approximately 25 [40 km] miles northwest of Denver, the capital of the state of Colorado, Boulder City is a little over a mile above mean sea level [altitude just under 1700 m] and is tucked in under an eastern flank of the Rocky Mountains.

Boulder is well-known as a centre of high-quality scientific work; the University includes the High Altitude Observatory [HAO], the Joint Institute for Laboratory Astrophysics [JILA], the Cooperative Institute for Research in Environmental Sciences [CIRES], as well as other academic departments of renown. The Environmental Science Services Administration [ESSA] has one of its major research laboratories just half-a-mile up (or down) the road, and the National Center for Atmospheric Research [NCAR] is a short car ride away on a neighbouring mesa. IBM and Ball Brothers are among the high-tech industries close by. Scott Carpenter who orbited in the spacecraft Aurora 7 is from Boulder [in his boyhood, he lived on the corner of Aurora Avenue and Seventh Street].

There is an outdoor theatre, and easy access to the delights of rock climbing [at all levels of difficulty and danger], riding, fishing, walking, touring. The local terrain is dominated by the rock formations called the Flatirons [when you see them, you will understand why] just to the southwest of Boulder, in front of Green Mountain.

Boulder has always had a special place in the regard of IAGA scientists. Sydney Chapman used to spend the summers there [he spent the winters in Alaska]. Franklin Roach set up the Fritz Peak airglow observatory in the mountains some forty minutes' car ride up Boulder Canyon. Sadami Matsushita was a familiar figure for many years at HAO. Many of the other great names associated with Boulder are still living and it would be foolish to try to list them ... someone might be left out by accident!

To receive information on the General Assembly, contact the national organizers:

The American Geophysical Union
2000 Florida Avenue NW
Washington DC 20009
U.S.A.
Telephone: +1 202 462 6900
Fax: +1 202 328 0566
E-mail: iugg_xxiga@kosmos.agu.org

Submission of Abstracts

The instructions for submission of abstracts have been published in the American Geophysical Union [AGU] "EOS", volume 75, page 174 [issue dated April 5, 1994]. There have been some subsequent alterations in these instructions, the most important of which are

1. **NO FEE** or payment is required with the abstract.
2. **EITHER A4 OR US 8½x11 INCH PAPER** may be used for submission of the abstract.
3. **THE SUBMITTAL INFORMATION** may be typed at the foot of the page OR to the right of the abstract area.

NOTE THAT THE OUTLINE OF THE PAGE SHOWN IN EOS IS NOT CORRECTLY PROPORTIONED. [An 11-inch page, as marked, is 279 mm high; the abstract is to be 180 mm high with a 40 mm head-space; it follows, therefore, that there should be a 59 mm space shown below the abstract.]

I show on the opposite page what is a convenient and acceptable format, displayed on an A4 page, 210 x 297 mm [reduced, for printing here in **IAGA News** to 71 percent of the original size].

Copy must be in "letter-quality" type and you must not send the abstracts to AGU by telex or 'fax. Abstracts will be reduced 50% in size for reproduction in the abstracts volume. You must use print no smaller than 6 lines per inch [2.4 lines per centimetre] with a pitch of ten characters to the inch [2.5 mm characters].

The submittal information should include (2) your AGU number [if you are a member of AGU], (3) the postal and e-mail addresses, plus telephone and fax numbers, for all correspondence. Then (5) put the IAGA session number in the following code:

GAxyaaa/bbb/ccc/ddd/eee/

where x = I or J, y = S or W, as given in the following listing of sessions. aaa, bbb, ccc, et cetera, are the session number(s) for the session to which you wish to submit your paper.

The Second Circular will include "GAP index terms" and you should write in the number and description of the GAP index term(s) that best fit the topic of your paper.

You should indicate (6) whether you wish to make a poster video presentation (PV) or a poster computer presentation (PC).

The AGU wish you to say (7) what percentage of your material has been presented previously, and where.

More on p.6 >>>>

allow 40 mm

118 mm

The Title of Your Paper Should be in Upper and Lower Case Bold Type With all Words of Four or More Letters Beginning With a Capital Letter.

M Gadsden (IAGA Office, 12 Keir Street, Perth PH2 7HJ, Scotland, Not Western Australia; +44 738 440 358; e-mail: mgadsden@UK.AC.ABERDEEN)

My other authors, who wish to remain anonymous (plus their addresses, their telephone numbers and their e-mail numbers)

Note that the title (above) has been indented two spaces after the first line (the example in EOS is indented but one space, however two spaces are correct). Use no full stops in typing the names of the authors and underline the one who will actually present the paper in Boulder.

One line should be left blank between paragraphs. Drawn-in symbols are acceptable (preferably not in the title) and you may include drawings in the abstract area [118 mm ↔ by 180 mm ↑↓]. If you do, stick the drawings to the page with adhesive, NOT with sticky tape, even two-sided tape.

Note that this abstract format is not in the usual Procrustean IAGA format and therefore rejoice in the freedom given you for this Assembly! For the next IAGA Scientific Assembly, you may well be back to the old "14 lines of 60-characters per line"

This area may be used for Submittal Information

allow 5 mm

180 mm (maximum)

Submittal information:

- 1 1995 IUGG Meeting
- 2 00589096
- 3 12 Keir Street
Perth PH2 7HJ
Scotland (UK)
Tel: +44 738 440 358
Fax: +44 738 440 450
E-mail: mgadsden@UK.AC.ABERDEEN
- 4 IAGA
- 5 GAJW801
- 6
- 7 131% at AGU 1882 Fall meeting
- 8 C
- 9
- 10 No

The box outline is for indicating dimensions only. Do **NOT** box your abstract!

You should say (8) whether your paper is a contributed paper (C) or an invited paper (I). IAGA protocol leaves it up to the session convenor to invite papers so unless you have specifically been invited to present a paper in a session, your paper is a contributed paper (write C).

The "Call for Papers" published in EOS 75(14), page 174: 5 April 1994 asks for "9. Special requests" such as scheduling of your paper and if you are willing to chair a session. The IAGA session convenors will be taking care of these matters.

Finally (10), if you are a student author presenting your own paper, write "Yes".

THE ORIGINAL AND TWO COPIES of your abstract should be sent to IUGG XXI General Assembly, c/o American Geophysical Union, 2000 Florida Avenue, NW, Washington, DC 20009, USA. At the same time, send ANOTHER COPY to the convenor of the session, whose name and address is given in the sessions listing. This is important otherwise the convenor may just not know that your abstract is being submitted for his or her session.

**THE ABSTRACT DEADLINE IS
FEBRUARY 1, 1995**

RECEIVED AT THE AGU OFFICES IN WASHINGTON, D.C., U.S.A

"Abstracts will be returned without consideration if they:
are not in the proper format
are received by fax or telecopier
are not received at AGU headquarters by the
February 1, 1995 deadline

AGU staff will acknowledge receipt of all abstracts by the end of March 1995. Acceptance letters will be mailed in May 1995. **If a corresponding author has not received an acknowledgment or an acceptance letter within three week[s] after these dates, please contact AGU immediately at [+1] 202-462-6900."**

DO NOT 'fax or telex your abstract to AGU: it will be rejected. You MAY e-mail it to AGU.

DO NOT send cover letters, DO NOT clip two or more abstracts together, or send more than one set of same abstract to AGU.

To summarize:

1. Make sure your format is correct
2. Original and two copies to AGU [address below]
3. One copy to the session convenor
4. Do this in good time for 1 February 1995
5. Do not send multiples of the one abstract.

Fax or e-mail is acceptable to the session convenor; his or her address is given in the session listing in pages 9 to 31.

**IUGG XXI General Assembly
c/o American Geophysical Union
2000 Florida Avenue, N.W.
Washington DC 20009
U.S.A.**

Registration Fees

At the time of this issue of IAGA News going to the printers [early July, 1994], there was no firm information about the registration fees that will be charged. "After removal of an adjustment for inflation between 1991 and 1995 and the allowance for the new surcharge proposed by the IUGG Executive Committee of \$20 per registrant, registration fees will be close to the fees for the Vienna Assembly. ... There will be a reduced fee for students and doctoral candidates under the age of thirty. There will also be a one-week fee."

Local arrangements

Lecture theatre accommodation.

The availability of lecture theatres across the campus at Boulder is such that it will not be possible for the IAGA parallel scientific sessions to take place in the one building. Shuttle buses will be available to get participants around the campus, including to and from dormitory and hotel accommodation.

Poster sessions.

All posters [that is, posters from all the Associations' sessions and from the Union's sessions] will be shown in the one location on campus, the Coors Events Conference Center.

Hotels and dormitories.

There are 939 hotel rooms block-booked for Assembly participants and the current room rates are shown as in the range \$59 to \$151 per day. AGU staff will handle all hotel reservations. There are 3000 dormitory style beds for use by Assembly participants on campus. The current rates for room, breakfast, and evening meal, are \$42 (single) and \$32 (double) per person per day. A basic package will be offered for one week's stay or two weeks' stay, check-in Sunday, check-out Saturday. There is also a three-day (minimum) package. The University's Office of Conference Services is handling the on-campus accommodation.

Social events

There is a local Host Committee [Chairman: Dr Carl Kisslinger, CIRES, Campus Box 216; members: Stan Rутtenberg, George Reid, Wally Campbell, Mike Chinnery] which has arranged the opening ceremony for Sunday, July 2, early evening and (it is rumoured) have plans for a drinkies-and-nibbles party on the evening of Tuesday, July 4th, with Assembly participants later joining most of the Boulder citizenry in Folsom football stadium for fireworks. There will also be trips to local laboratories. Excursions and visits arranged by spouses of local geophysicists will form the backbone of an accompanying persons' programme.

The Colorado Music Festival, the Colorado Shakespeare Festival, Colorado Rockies baseball [a kind of cricket played in a hot, dry, climate], and concerts at Red Rocks and Fiddler's Green are all taking place during the Assembly.

1995 ASSEMBLY
PROVISIONAL TIMETABLE

[As at 6 July 1994]

Monday	am	104	410	209/308	213/303	501	701			207(M3)	
3 July	pm	104	410	209/308	213/303	501	701			207(M3)	
	eve	-----First Conference of Delegates-----									
Tuesday	am	106	113	209/308	213/303	410	521(AW1)			207(M3)	
4 July	pm	106	113	209/308	213/303	402	521(AW1)			207(M3)	
	eve	II-D	III-2	V-1	V-3						
Wednesday	am	110	212/302/404	205/703	310	401	515	502		207(M3)	
5 July	pm	110	212/302/404		310	401	518(AS18)			207(M3)	206(M2)
	eve	I-1	III-3	II-F/III-4	V-2	V-9					
Thursday	am	109(AS12)	212/302/404	506	105/513(AS2)					207(M3)	206(M2)
6 July	pm	109(AS12)	212/302/404	507	105/513(AS2)	702				207(M3)	206(M2)
	eve	I-3/I-4	II-A	ICDC-BM	II-6/III-5	III-1	V-7	ad hoc V			
Friday	am	116	214/304	215/311	510					207(M3)	103(AS1)
7 July	pm	116	214/304	211/309	510	409				207(M3)	103(AS1)
	eve	I-2	II-C	III-BM	V-8	V-5					
Saturday	am	107(AS16)	114	214/304	211/309	315/403	516			207(M3)	
8 July	pm	107(AS16)	114	312	211/309	315/403	517			207(M3)	
	eve	I-BM	II-B	II-E	IV-BM						
Monday	am	112	202	203	301	406	512	601		207(M3)	
10 July	pm	112	202	203	301	406	512	601		218(MW5)	
	eve	II-BM	V-BM	HIST-BM							
Tuesday	am	108(AS17)	120	210/305	217	307	407			218(MW5)	
11 July	pm	108(AS17)	121	210/305	201	307	407			218(MW5)	
	eve	-----Second Conference of Delegates-----									
Wednesday	am	115	117	210/305	201	307	408	514		219(MW4)	
12 July	pm	115	117	317/504	201	306	408	111/216/508		219(MW4)	
	eve	Databases									
Thursday	am	522	102(AS15)	201	314	306	503			511(AW5)	
13 July	pm	119	102(AS15)	201	314	306	509			511(AW5)	
	eve										
Friday	am	101/208/	118	201	204	313	519				
14 July	pm	316/405/505	118	201		313	520				
	eve										

**DIVISION I
INTERNAL MAGNETIC FIELDS**

Chairman: Sven-Erik Hjelt
 Department of Geophysics
 Institute of Geosciences
 and Astronomy
 University of Oulu
 PO Box 333
 FIN-90571 Oulu 57
 FINLAND
 Telephone: +358 81 553 1401
 Fax: +358 81 553 1414
 Telex: 32375/OYLIN SF

- IS
 101 **Solar wind structures, energetic solar particles,**
 208 **geomagnetic activity and associated phenomena**
 316 J T Gosling, MS D466, Los Alamos National Laboratory,
 405 Los Alamos NM 87545 [USA].
 505 E-mail: jgosling@lanl.gov Fax: +1 505 665 7395
 D H Tarling [UK]; J Lastovicka [CZECH REP]; A Berthelier
 [FRANCE]
 The physical linkages between structures and events in
 the solar atmosphere and those in the solar wind near
 1 AU, examining how the resulting interplanetary
 structures and particle events perturb the
 magnetosphere, the ionosphere, and the atmosphere;
 interdisciplinary emphasis.
- JS
 102 **Relating geophysical measurements to lithospheric**
processes through continental drilling (also listed with
 IASPEI: AS15)
 Volker Haak, GeoForschungsZentrum Potsdam,
 Telegrafenberg, D-14407 Potsdam [GERMANY].
 E-mail: vhaak@gfz.potsdam.de Fax: +49 331 288 1235
 J Erzinger [GERMANY]; J Mutter [USA]; D R Schmitt
 [CANADA]
 Multidisciplinary experiments in the vicinity of and
 within deep boreholes, and laboratory studies of fresh
 core samples, can provide insights of local problems
 useful in a more general understanding of the formation
 of the continental crust.
- JS
 103 **Structure, evolution and dynamics of the core-mantle**
boundary region (also listed with IASPEI: AS1)
 R Jeanloz, Department of Geology and Geophysics,
 University of California, Berkeley CA 94720, [USA].
 E-mail: jeanloz@uclink.berkeley.edu
 Fax: +1 415 643 9980
 Kathy Whaler [UK]; B Buffet [CANADA]
 All aspects of the core-mantle boundary region and
 associated interactions. Geomagnetic, seismological.
 geodynamic and high-pressure studies giving
 complementary information on the nature, thickness,
 composition and influence of the D" layer.

- S
104 **Core dynamics and the dynamo**
C A Jones, Mathematics Department, University of Exeter,
Exeter EX4 4QE [UK].
E-mail: cajones@maths.exeter.ac.uk
Fax: +44 392 263 997
Numerical and theoretical models; reversal mechanisms;
convective processes; magnetic instabilities; core-
mantle coupling; lateral inhomogeneities; mantle
precession. Contributions on non-magnetic aspects of
core dynamics will be welcome also.
- JS
105 **Geomagnetic secular variation and core flow near the**
513 **core-mantle boundary** (also listed with IASPEI: AS2)
G Hulot, IPGP, Laboratoire de Geomagnetisme et
Palaeomagnetisme, CNRS UA279, 4 Place Jussieu, B89 Tour
24, 75252 Paris Cedex 05 [FRANCE].
E-mail: ghulot@ipgp.jussieu.fr Fax: +33 1 44 27 3373
R A Langel [USA]
Time variations of the main geomagnetic field on all
timescales from very short (magnetic jerks) to secular,
especially with interpretations relating to flow near
the core-mantle boundary and global studies at all
timescales and using other (e.g. astronomical or
seismological) data.
- S
106 **Reversals: observations and theory**
D Gubbins, Department of Earth Sciences, University of
Leeds, Leeds LS2 9JT [UK].
E-mail: gubbins@earth.leeds.ac.uk
B M Clement [USA]
Analysis of observatory annual means, geomagnetic
impulses and jerks, global secular variation. Fluid flow
near the core-mantle boundary, flux diffusion and
magnetic diffusion in the mantle. Secular variation and
studies of the Earth's deep interior. Preferred paths of
transitional VGPs.
- JS
107 **Lithospheric anisotropy: observations and interpretation**
(also listed with IASPEI: AS16)
Marianne Mareschal, Genie mineral, CP6079, succ Centre
Ville, Montreal H3C 3A7 [CANADA].
E-mail: marianne@geo.polymtl.ca Fax: +1 514 340 4191
Michael Bostock [CANADA]
Electrical or seismic upper mantle anisotropy, and also
crustal anisotropy. Interpretation of data and possible
constraints on the source or sources of anisotropy.
- JS
108 **Geophysical signatures of modern and ancient continental**
margins (also listed with IASPEI: AS17)
John R Booker, Geophysics AK50, University of
Washington, Seattle WA 98195 [USA].
E-mail: booker@geophys.washington.edu
Fax: +1 206 543 0489
M Christina Pomposiello [ARGENTINA]

Focus on modern and ancient continental margins with spectrum of techniques (seismology, electromagnetic induction, palaeomagnetism, geodesy, geochemistry, geology, etc). Emphasis on the synergistic value of multiple approaches to a problem.

JS

109

Patterns in the Earth's structure and dynamics: Observations, Earth models, and laboratory measurements (also listed with IASPEI: AS12)

Steven Constable, Institute of geophysics and Planetary Physics, La Jolla CA 92093-0225 [USA]

E-mail: sconstable@ucsd.edu

Fax: +1 619 534 8090

Alfred G Duba [USA]; J P Poirier [FRANCE]; I Jackson [AUSTRALIA]

Modelling field observations relevant to the Earth's internal physical structure which are also compatible with current laboratory measurements. Also papers showing contradictions between current models, data, and laboratory studies, which therefore indicate a need for further work.

S

110

Multidimensional mathematical advances in electromagnetic induction: decomposition, modelling and inversion

E Gomez-Trevino, CICESE, Geofisica, POB 434 843, San Diego CA 92143-4843 [USA].

E-mail: egomez@cicese.mx Fax: +1 706 674 4502

T Smith [UK]

All aspects of theoretical and practical development in electromagnetic modelling and inversion, especially the application of new methods to real data sets.

IS

111

Multidimensional currents over multidimensional Earth structures: theory and observations

216

508

A G Jones, Geological Survey of Canada, 1 Observatory Crescent, Ottawa, Ontario K1A 0Y3 [CANADA].

E-mail: jones@cg.emr.ca Fax: +1 613 992 8836

A D Richmond [USA]; E W Mbipom [NIGERIA]

Theoretical and observational studies treating both external currents and Earth conductivity as spatially structured; the influence on the characteristics of geomagnetic variations at diurnal periods and less.

S

112

Electromagnetic studies of the solid Earth

Steven Constable, Scripps Institute of Oceanography, La Jolla CA 92093-0225 [USA].

E-mail: sconstable@ucsd.edu

S I Fontes [BRAZIL]; X R Kong [CHINA]

Papers on electromagnetic studies which do not fit in with other sessions, specially those on field, laboratory and theoretical studies of EM induction and electrical conductivity in the Earth and in earth materials.

- S
113 **Magnetic signature of environmental change**
Subir Banerjee, Institute for Rock Magnetism, School of Earth Sciences, University of Minnesota, 310 Pillsbury Drive SE, Minneapolis MN 55455-0219 [USA].
E-mail: banerjee@maroon.tc.umn.edu
Fax: +1 612 625 3819
Jan Bloemendal [UK]
Basic and applied rock magnetic studies quantifying the influences of temperature, humidity, mineralogy, microstructure and chemistry on the magnetic proxy records of environmental change, past and recent, as well as studies of those records themselves.
- S
114 **Archaeosecular and palaeosecular variations**
Charles E Barton, Australian Geological Survey Organizaion, GPO Box 378, Canberra ACT 2601 [AUSTRALIA].
E-mail: cbarton@bmr.gov.au Fax: +61 6 249 9986
Q Y Wei [CHINA]
Results and anlayses of sequences of sediments, lava flows and cave deposits. Particularly high resolution extension of the observational record at the historical end of the timescale, palaeointensity records from sediments, palaeosecular variation, and global approaches to the long secular variation records.
- S
115 **Innovations in palaeointensity studies**
Lisa Tauxe, Fort Hoofddijk, Budapestlaan 17, 3508 TA Utrecht [THE NETHERLANDS].
E-mail: ltauxe@magician.geof.ruu.nl
Fax: +31 30 53 5030
J-P Valet [FRANCE]
New approaches to the problem of acquiring palaeointensity data from archaeological and geological material, with also the implication of data sets that have been obtained recently or analysed in a new way.
- S
116 **High-resolution magnetostratigraphy**
C G Langereis, Paleomagnetic Laboratory, Utrecht University, Fort Hoofddijk, Budapestlaan 17, 3584 CD Utrecht [THE NETHERLANDS].
E-mail: langer@geof.ruu.nl Fax: +31 30 53 5030
John Shaw [UK]
Studies with accurate time control of short events and excursions to determine their global significance, comparisons with cryptochrons ("tiny wiggles") derived from the ocean floor, and time constants of the geodynamo. Links to the GPTS and marine-continental correlations.
- S
117 **Nature of remagnetizations**
R Douglas Elmore, School of Geology and Geophysics, University of Oklahoma, Norman OK 73019-0628 [USA].
E-mail: delmore@geoadm.gcn.uoknor.edu
Fax: +1 405 325 3140

Trond H Torsvik [NORWAY]
 Rock-magnetic, geochemical, etc characteristics and identification of chemical, thermoviscous and strain-related secondary magnetizations. Also the origin of late Palaeozoic secondary magnetizations, dating of diagenetic events and distinction of secondary from primary magnetizations.

S

118 **Palaeomagnetism and tectonics**

Jean Besse, IPGP Laboratoire de Geomagnetisme et Paleomagnetisme, 4 Place Jussieu, F-75252 Paris cedex 5 [FRANCE].

E-mail: besse@ipgp.jussieu.fr Fax: +33 1 4427 3373

Augusto Rapalini [ARGENTINA]; Jim Channel [USA]

Palaeographic and tectonic implications of the database of the Tethys Ocean: motion of continents since Palaeozoic times, dispersion and accretion of blocks in the Caribbean and Tethyan area, continental deformation of the Eurasian margin.

S

119 **Applications of magnetic anisotropy**

D A Clark, CSIRO Division of Exploration and Mining, PO Box 136, North Ryde, New South Wales 2113 [AUSTRALIA].

E-mail: d.clark@dem.csiro.au Fax: +61 2 887 8874

G Borradaile [CANADA]; A Kapicka [CZECH REPUBLIC]

Discussion of new experimental approaches, theoretical modelling of magnetic anisotropy in rocks, interpretation methodologies, and case histories of geological applications.

S

120 **Properties of minor magnetic materials**

Mark J Dekkers, Palaeomagnetic Laboratory, Fort Hoofddijk, Budapestlaan 17, 3584 CD Utrecht [THE NETHERLANDS].

E-mail: dekkers@geof.ruu.nl Fax: +31 30 53 5030

Buffy McClelland [UK]

Fundamental rock magnetic properties (hysteresis, thermal, magnetic transition) as well as spectroscopic and other non-magnetic means of identifying minerals of palaeomagnetic interest (greigite, pyrrhotite, maghemite, ilmeno-hematite, goethite, and other rarer natural magnetic minerals).

S

121 **New approaches in rock magnetism**

Susan L Halgedahl, Department of Geology and Geophysics, University of Utah, Salt Lake City UT 84112-1183 [USA].

E-mail: sue@westlog.utah.edu Fax: +1 801 581 7065

Franz Heider [GERMANY]

Domain structures associated with different types of remanence; domain imaging; comparison of observed and theoretical domain structure; PSD versus MD behaviour; new techniques for magnetic carriers and domain state, for discriminating between different species of NRM and the time/temperature stability of NRMs.

**DIVISION II
AERONOMIC PHENOMENA**

Chairman: Arthur D Richmond
NCAR-HAO
P.O.Box 3000
Boulder, CO 80307-3000
USA
Telephone: +1 303 497 1570
Fax: +1 303 497 1589

S
201 **Upper atmosphere structure, dynamics, and electrodynamics**

Sheila Kirkwood, Swedish Institute of Space Physics, PO Box 812, 98128 Kiruna [SWEDEN].

E-mail: sheila@irf.se Fax: +46 980 79050

G Price [AUSTRALIA]; C Lathuillere [FRANCE]; A Manson [CANADA]; J Forbes [USA]; R Goldberg [USA]

The thermosphere-ionosphere system, including its coupling with the mesosphere. Four principal aspects: structure and composition; gravity waves, tides and long-term variations; effects of planetary wave normal modes; electrodynamic phenomena.

S
202 **Aeronomy of aurora and airglow emissions and related laboratory measurements**

Ian McDade, Department of Earth and Atmospheric Science, York University, 4700 Keele Street, North York, Ontario M3J 1P3 [CANADA].

E-mail: mcdade@windic.yorku.ca Fax: +1 416 736 2100

D Murtagh [SWEDEN]

Observational studies from the ground, from balloons, from rockets and from satellites; remote sensing based on airglow and or auroral observations. Analytical and modelling studies on excitation processes, laboratory studies of cross sections and reaction rates.

S
203 **Ionospheric irregularities and instabilities**

Raymond Greenwald, Applied Physics Laboratory, Johns Hopkins University, Johns Hopkins Road, Laurel MD 20723-6099 [USA].

E-mail: greenwald@aplsp.dnet.nasa.gov

Fax: +1 301 953 6670

E Blanc [FRANCE]

Observations of ionospheric irregularities by ground-based or in situ techniques and theories of their generating mechanism, in particular plasma instabilities.

S
204 **Developments in instrumentation and absolute calibration**

S Chakrabarti, Department of Astronomy, Boston University, 725 Commonwealth Avenue, Boston MA 02215 [USA].

E-mail: supc@veebs.bu.edu Fax: +1 617 353 6463

E Hilsenrath [USA]

Recent developments in detector, optical, radiometric

- techniques; data collection and processing technologies used in aeronomical research; techniques of absolute calibration.
- IS
205 **Equatorial ionosphere-thermosphere system**
703 Mangalathayil A Abdu, INPE, CP 515, Sao Jose dos Campos - SP 12200 [BRAZIL].
E-mail: inpedae@brfapesp.bitnet Fax: +55 123 218 743
K D Cole [AUSTRALIA]; C Amory-Mazaudier [FRANCE]; J H Sastri [INDIA]
Studies of equatorial plasma, neutral dynamics, and electric fields relating to spread F, ionization anomaly and electrojet phenomena, under quiet and disturbed conditions. Results from coordinated campaigns including especially the Equatorial Ionosphere-Thermosphere Study [EITS].
- JS
206 **Equatorial atmosphere and ionosphere interactions** (also listed with IAMAS-ICMA: M2)
Robert A Vincent, Department of Physics, University of Adelaide, Adelaide SA 5005 [AUSTRALIA].
E-mail: rvincent@physics.adelaide.edu.au
Fax: +61 8 303 4380
A D Richmond [USA]; S Kato [JAPAN]
Results of coordinated studies of the equatorial region (eg TOGA-COARE, CADRE, ALOHA, IEEY, MISETA) as they are used to understand better the coupling between phenomena at different altitudes as well as that between phenomena at equatorial and those at higher latitudes.
- JS
207 **Middle atmosphere sciences** (also listed with IAMAS-ICMA: M3)
Rolando Garcia, NCAR, PO Box 3000, Boulder CO 80307-3000 [USA].
E-mail: rgarcia@ncar.ucar.edu Fax: +1 303 497 1400
B A Boville [USA]; D Fritts [USA]; M Shiotani [JAPAN]; S Solomon [USA]; J Russell [USA]; L Gray [UK]; G Thomas [USA]; G Witt [Sweden]; R Goldberg [USA]; L Hood [USA]; J Lastovicka [CZECH REPUBLIC]
This heading covers four individual symposia:
(1). **Dynamics of the middle atmosphere**
(2). **Chemistry, radiation and transport in the middle atmosphere**
(3). **The polar mesosphere**
(4). **Solar-terrestrial interactions**
- IS
101 **Solar wind structures, energetic solar particles,**
208 **geomagnetic activity and associated phenomena**
316 J T Gosling, MS D466, Los Alamos National Laboratory,
405 Los Alamos NM 87545 [USA].
505 E-mail: jgosling@lanl.gov Fax: +1 505 665 7395
D H Tarling [UK]; J Lastovicka [CZECH REP]; A Berthelier [FRANCE]
The physical linkages between structures and events in the solar atmosphere and those in the solar wind near

1 AU, examining how the resulting interplanetary structures and particle events perturb the magnetosphere, the ionosphere, and the atmosphere; interdisciplinary emphasis.

IS

209 **Planetary atmospheres and magnetospheres**

308 Michel Blanc, Observatoire Midi-Pyrenees, 14 ave Edouard Belin, 31400 Toulouse [FRANCE].

E-mail: blanc@srvdec.obs-mip.fr Fax: +33 61 53 6722

T E Cravens [USA]; K K Khurana [USA]

Observations, theories and models of planetary upper atmospheres, ionospheres and magnetospheres, and mutual coupling. Interactions with rings, solid surfaces, and satellite tori.

IS

210 **Large-scale electrodynamics in the coupled magnetosphere**
305 **- ionosphere - thermosphere system**

D J Knipp, Department of Physics, Fairchild Hall Suite 2A6, US Air Force Academy, Colorado 80840-6254 [USA].

E-mail: knipp@ncar.ucar.edu Fax: +1 719 472 2947

R J Walker [USA]

Studies of the response of the coupled magnetosphere-ionosphere-thermosphere system to variations in the solar wind, including patterns of convection, electric currents, auroral forms, and conductance.

IS

211 **High-latitude aurorae: formation, morphology, dynamics,**
309 **and use as a diagnostic tool**

H J Opgenoorth, Swedish Institute of Space Physics, Uppsala Division, S-755 91 Uppsala [SWEDEN].

E-mail: opg@irfu.se Fax: +46 18 40 3100

R D Elphinstone [CANADA]; C W Carlson [USA]

Formation and dynamics of the visual aurora and associated ionospheric plasma and electric and magnetic fields, in particular multi-instrument studies that address the relation between magnetospheric and ionospheric phenomena.

IS

212 **Magnetosheath, magnetopause, boundary layers, and cusp:**
302 **a coupled system**

404 P Song, High Altitude Observatory, National Center for Atmospheric Research, PO Box 3000, Boulder CO 80307-3000 [USA].

E-mail: psong@hao.ucar.edu Fax: +1 303 497 1589

C T Russell [USA]; A Egeland [NORWAY]; D J Southwood [UK]

Observational, theoretical, and numerical studies of phenomena and processes in the magnetosheath, magnetopause, boundary layers and cusps, with emphasis on interrelationships and interactions through particles, fields, waves and currents, and their ionospheric signatures.

- IS
213 **Dynamics of the magnetotail and high-latitude nightside**
303 **ionosphere**
A Nishida, Institute of Space and Astronautical Science,
Yoshinodai 3-chome 1-1, Sagamihari, Kanagawa 229,
[JAPAN].
E-mail: nishida@gt1.isas.ac.jp
Fax: +81 427 59 4236
H C Carlson [USA]; V Angelopoulos [USA]
Tail configuration, B_y control, tailward extension of
the LLBL, plasma heating and acceleration, plasma and
flux rope formation, polar convection, continuity of
transpolar features.
- IS
214 **Inner magnetosphere: ring current, radiation belts, and**
304 **plasmasphere**
J U Kozyra, 1411-C Space Research Building, University
of Michigan, 2455 Hayward Street, Ann Arbor MI 48109-
2143 [USA].
E-mail: kozyra@sprlc.sprl.umich.edu
Fax: +1 313 747 3083
D C Hamilton [USA]; Y Kamide [JAPAN]
Coupling between the energetic and the thermal
populations; wave generation, particle diffusion and
collisional scattering, the effects of large-scale
currents and electric fields, and feedback from the
underlying ionosphere.
- IS
215 **Interhemispheric contrasts in substorm signatures**
311 John R Dudeney, British Antarctic Survey, Madingley
Road, Cambridge CB3 0ET [UK].
E-mail: u_jrd@vc.nbs.ac.uk Fax: +44 223 62616
J C Samson [CANADA]
Experimental and theoretical evaluation of significant
interhemispherical contrasts in the signatures of
substorms to provide critical tests of competing
theories.
- IS
111 **Multidimensional currents over multidimensional Earth**
216 **structures: theory and observations**
508 A G Jones, Geological Survey of Canada, 1 Observatory
Crescent, Ottawa, Ontario K1A 0Y3 [CANADA].
E-mail: jones@cg.emr.ca Fax: +1 613 992 8836
A D Richmond [USA]; E W Mbipom [NIGERIA]
Theoretical and observational studies treating both
external currents and Earth conductivity as spatially
structured; the influence on the characteristics of
geomagnetic variations at diurnal periods and less.
- W
217 **The use of imaging riometers in studies of the**
ionosphere and middle atmosphere
Hilka Ranta, Geophysical Observatory, Sodankyla SF-
99600 [FINLAND].
E-mail: hranta@convex.csc.fi Fax: +358 693 61 0375
Several imaging riometers have been installed in recent

years and this workshop will concentrate on the use of an imaging riometer network to study the ionosphere and the middle atmosphere.

JW

218 **Intercomparison of middle atmosphere models** (also listed with IAMAS-ICMA: MW5)

S Pawson, Institut fuer Meteorologie, Dietrich-Schaefer Weg, W-1000 Berlin 41 [GERMANY].

E-mail: pawson@strat01.met.fu-berlin.de

Fax: +49 307 93 1785

R Rood [USA]

JW

219 **Gravity-wave sources and parameterizations** (also listed with IAMAS-ICMA: MW4)

David C Fritts, Department of Electrical and Computer Engineering, Campus Box 425, University of Colorado, Boulder CO 80309 [USA].

E-mail: dave@leonardo.colorado.edu

Fax: +1 303 492 2758

**DIVISION III
MAGNETOSPHERIC PHENOMENA**

Chairman: S W H Cowley
Space & Atmospheric Physics
Imperial College of Science,
Technology and Medicine
The Blackett Laboratory
Imperial College
London SW7 2BZ
UK
Telephone: +44 71 594 7773
Fax: +44 71 594 7772
Telex: 929484 IMPCOL G

S

301 **Reporter Reviews**

S W H Cowley, Blackett Laboratory, Imperial College, London SW7 2BZ [UK].

E-mail: cowley@spva.ph.ic.ac.uk Fax: +44 71 594 7772

Invited reviews on the magnetopause boundary; the geomagnetic tail; the inner magnetosphere; large-scale magnetospheric fields and flows; large-scale structure of magnetospheric plasma; planetary magnetospheres; wave-particle interactions; ULF waves; active and laboratory experiments.

IS

212 **Magnetosheath, magnetopause, boundary layers, and cusp:
302 a coupled system**

404 P Song, High Altitude Observatory, National Center for Atmospheric Research, PO Box 3000, Boulder CO 80307-3000 [USA].

E-mail: psonq@hao.ucar.edu Fax: +1 303 497 1589
 C T Russell [USA]; A Egeland [NORWAY]; D J Southwood [UK]

Observational, theoretical, and numerical studies of phenomena and processes in the magnetosheath, magnetopause, boundary layers and cusps, with emphasis on interrelationships and interactions through particles, fields, waves and currents, and their ionospheric signatures.

IS
 213
 303

Dynamics of the magnetotail and high-latitude nightside ionosphere

A Nishida, Institute of Space and Astronautical Science, Yoshinodai 3-chome 1-1, Sagamihari, Kanagawa 229, [JAPAN].

E-mail: nishida@gtl.isas.ac.jp
 Fax: +81 427 59 4236

H C Carlson [USA]; V Angelopoulos [USA]

Tail configuration, B_y control, tailward extension of the LLBL, plasma heating and acceleration, plasma and flux rope formation, polar convection, continuity of transpolar features.

IS
 214
 304

Inner magnetosphere: ring current, radiation belts, and plasmasphere

J U Kozyra, 1411-C Space Research Building, University of Michigan, 2455 Hayward Street, Ann Arbor MI 48109-2143 [USA].

E-mail: kozyra@sprlc.sprl.umich.edu
 Fax: +1 313 747 3083

D C Hamilton [USA]; Y Kamide [JAPAN]

Coupling between the energetic and the thermal populations; wave generation, particle diffusion and collisional scattering, the effects of large-scale currents and electric fields, and feedback from the underlying ionosphere.

IS
 210
 305

Large-scale electrodynamics in the coupled magnetosphere - ionosphere - thermosphere system

D J Knipp, Department of Physics, Fairchild Hall Suite 2A6, US Air Force Academy, Colorado 80840-6254 [USA].

E-mail: knipp@ncar.ucar.edu Fax: +1 719 472 2947

R J Walker [USA]

Studies of the response of the coupled magnetosphere-ionosphere-thermosphere system to variations in the solar wind, including patterns of convection, electric currents, auroral forms, and conductance.

S
 306

ULF wave response of the magnetosphere to solar wind energy input

D J Southwood, Blackett Laboratory, Imperial College, London SW7 2BZ [UK].

E-mail: southwood@spva.ph.ic.ac.uk

Fax: +44 71 823 8250

C T Russell [USA]; F W Menk [AUSTRALIA]

All aspects of solar wind influence, control and modification of the magnetospheric ULF spectrum, including allied magnetosheath and polar cusp phenomena.

S

307 **Nonlinear and kinetic effects in ULF waves**

J C Samson, Department of Physics, University of Alberta, Edmonton, Alberta T6G 2J1 [CANADA]. SPAN: canedm::samson

Fax: +1 403 492 4256

R L Lysak [USA]

Nonlinear evolution of ULF plasma waves and kinetic effects in their interaction with the plasma population. Studies of the lowest frequency MHD waves (including ULF pulsations) and extension to waves at or near the ion cyclotron frequency.

IS

209 **Planetary atmospheres and magnetospheres**

308 Michel Blanc, Observatoire Midi-Pyrenees, 14 ave Edouard Belin, 31400 Toulouse [FRANCE].

E-mail: blanc@srvdec.obs-mip.fr Fax: +33 61 53 6722

T E Cravens [USA]; K K Khurana [USA]

Observations, theories and models of planetary upper atmospheres, ionospheres and magnetospheres, and mutual coupling. Interactions with rings, solid surfaces, and satellite tori.

IS

211 **High-latitude aurorae: formation, morphology, dynamics,**
309 **and use as a diagnostic tool**

H J Opgenoorth, Swedish Institute of Space Physics, Uppsala Division, S-755 91 Uppsala [SWEDEN].

E-mail: opg@irfu.se Fax: +46 18 40 3100

R D Elphinstone [CANADA]; C W Carlson [USA]

Formation and dynamics of the visual aurora and associated ionospheric plasma and electric and magnetic fields, in particular multi-instrument studies that address the relation between magnetospheric and ionospheric phenomena.

S

310 **Active and laboratory experiments in space plasma physics**

W Gekelman, Department of Physics, UCLA, 405 Hilgard Avenue, Los Angeles CA 90024 [USA].

E-mail: gekelman@physics.ucla.edu Fax: +1 310 206 5484

V N Oraevsky [RUSSIA]; S Robertson [USA]

A central focus will be to foster contact between scientists engaged in laboratory and active experiments and the rest of the space plasma community with the aim of inspiring future research.

IS

215 **Interhemispheric contrasts in substorm signatures**

311 John R Dudeney, British Antarctic Survey, Madingley Road, Cambridge CB3 0ET [UK].

E-mail: u_jrd@vc.nbs.ac.uk Fax: +44 223 62616

J C Samson [CANADA]

Experimental and theoretical evaluation of significant

interhemispherical contrasts in the signatures of substorms to provide critical tests of competing theories.

- S
312 **Whistler-mode waves and particle precipitation**
A J Smith, British Antarctic Survey, Madingley Road, Cambridge CB3 0ET [UK].
E-mail: uajs@vc.nbs.ac.uk Fax: +44 223 62616
U S Inan [USA]
Precipitation into the ionosphere of energetic electrons by natural and artificial whistler-mode waves; observations and modelling of these interactions and associated ionospheric effects.
- S
313 **Modelling and theory for mission design and data interpretation**
P J Tanskanen, Department of Physics, University of Oulu, Linnanmaa, FIN-9057 Oulu [FINLAND].
E-mail: fys-pjt@finou.oulu.fi Fax: +358 81 553 1287
A Roux [FRANCE]
Modelling of the global magnetospheric system and of critical interface regions with the solar wind as required to aid space mission planning and subsequent data interpretation; design and testing of new diagnostic tools.
- S
314 **Magnetospheric models and their critical evaluation**
T I Pulkkinen, Finnish Meteorological Institute, PO Box 503, SF-00101 Helsinki [FINLAND].
E-mail: tuija.pulkkinen@fmi.fi Fax: +358 0 192 9539
G D Reeves [USA]
Theoretical, computational and empirical models of the magnetosphere and their intercomparison; model evaluation and comparison with observations.
- IS
315 **Pick-up and seed ions in space plasmas and their acceleration processes**
403 M A Lee, SSC-Morse Hall, University of New Hampshire, Durham NH 03824 [USA].
E-mail: m_lee@unhh.unh.edu Fax: +1 603 862 1915
A J Coates [UK]
Interstellar, cometary and magnetospheric pick-up ions (or similar suprathermal ions) in the solar wind and planetary magnetospheres: behaviour, spatial distribution, scattering and energization, wave excitation, and role as seed ions for subsequent acceleration, for example at shocks.
- IS
101 **Solar wind structures, energetic solar particles,**
208 **geomagnetic activity and associated phenomena**
316 J T Gosling, MS D466, Los Alamos National Laboratory,
405 Los Alamos NM 87545 [USA].
505 E-mail: jgosling@lanl.gov Fax: +1 505 665 7395
D H Tarling [UK]; J Lastovicka [CZECH REP]; A Berthelier [FRANCE]

The physical linkages between structures and events in the solar atmosphere and those in the solar wind near 1 AU, examining how the resulting interplanetary structures and particle events perturb the magnetosphere, the ionosphere, and the atmosphere; interdisciplinary emphasis.

IS

317 **Artificial intelligence applications in magnetospheric**
504 **modelling and forecasting**

R L McPherron, IGPP, UCLA, 405 Hilgard Avenue, Los Angeles CA 90024-1567 [USA].

E-mail: rmcpherron@igpp.ucla.edu Fax: +1 310 206 8042

A N Zaitzev [RUSSIA]

AI techniques for capturing into computer programmes human expertise on geomagnetic effects of the Sun and the solar wind; application of neural networks, expert systems, genetic algorithms and fuzzy logic.

DIVISION IV

SOLAR WIND AND INTERPLANETARY FIELD

Chairman: Stanislaw Grzedzielski

COSPAR

51 Bd de Montmorency

75016 Paris

FRANCE

Telephone: +33 1 4525 0679

Fax: +33 1 4050 9827

Telex: 645554 /ICSU F

S

401 **Results of Ulysses latitude survey and comparison with models**

E J Smith, Jet Propulsion Laboratory, MS 169-506, 4800 Oak Grove Drive, Pasadena CA 91109-8099 [USA].

E-mail: JPLSP::ESMITH/SPAN Fax: +1 818 354 8895

Main experimental results, relevant theoretical analysis and modelling, on the high heliolatitude solar wind plasma, magnetic field and energetic particle populations.

S

402 **Observations of the Sun by Ulysses**

K Hurley, Space Science Laboratory, University of California, Berkeley CA 94720 [USA].

E-mail: khurley@sunspot.ssl.berkeley.edu

Solar X-ray and gamma-ray measurements by spacecraft such as Ulysses, GRANAT, Yohkoh, with relevant radio and particle measurements. Primarily a session of invited review papers but some contributions will be accepted.

IS

315 **Pick-up and seed ions in space plasmas and their**
403 **acceleration processes**

M A Lee, Institute for the Study of Earth, Oceans and Space, University of New Hampshire, Morse Hall, Durham

NH 03824-3525 [USA].

E-mail: m_lee@unhh.unh.edu Fax: +1 603 862 1915

A J Coates [UK]

Interstellar, cometary and magnetospheric pick-up ions (or similar superthermal ions) in the solar wind and planetary magnetospheres: behaviour, spatial distribution, scattering and energization, wave excitation, and role as seed ions for subsequent acceleration, for example at shocks.

IS

213 **Magnetosheath, magnetopause, boundary layers, and cusp:**
302 **a coupled system**

404 P Song, High Altitude Observatory, National Center for Atmospheric Research, PO Box 3000, Boulder CO 80307-3000 [USA].

E-mail: psong@hao.ucar.edu Fax: +1 303 497 1589

C T Russell [USA]; A Egeland [NORWAY]; D J Southwood [UK]

Observational, theoretical, and numerical studies of phenomena and processes in the magnetosheath, magnetopause, boundary layers and cusps, with emphasis on interrelationships and interactions through particles, fields, waves and currents, and their ionospheric signatures.

IS

101 **Solar wind structures, energetic solar particles,**
208 **geomagnetic activity and associated phenomena**

316 J T Gosling, MS D466, Los Alamos National Laboratory,
405 Los Alamos NM 87545 [USA].

505 E-mail: jgosling@lanl.gov Fax: +1 505 665 7395

D H Tarling [UK]; J Lastovicka [CZECH REP]; A Berthelier [FRANCE]

The physical linkages between structures and events in the solar atmosphere and those in the solar wind near 1 AU, examining how the resulting interplanetary structures and particle events perturb the magnetosphere, the ionosphere, and the atmosphere; interdisciplinary emphasis.

S

406 **Solar/planetary/interstellar origin of interplanetary plasma composition**

J G Luhmann, Room 6877 Slichter Hall, UCLA/IGPP, Los Angeles CA 90024-1567 [USA].

E-mail: BRUNET::JGLUHMANN/Spain Fax: +1 310 206 3051

The relative importance in the interplanetary medium of the various sources of solar wind and energetic particles, planetary and cometary neutrals and pick-up ions, and interstellar gas.

S

407 **Structural approach to heliospheric plasmas: turbulence, fractals, chaos**

M L Goldstein, Goddard Space Flight Center MS 6920, Bldg 2 Room 128, Greenbelt MD 20771 [USA].

Fax: +1 301 286 1683

Latest advances in understanding the solar wind both in

its astrophysical context and as an example of a nonlinear dynamical system.

S
408 **Local interstellar cloud and the boundary of the heliosphere**

R Lallement, Service d'Aeronomie du CNRS, BP 3, F-91371 Verrières-le-Buisson [FRANCE].

Fax: +33 1 6920 2999

The solar interstellar environment (with particular attention to the ionization state, the magnetic field and the energetic particles) and the resultant constraints on solar wind expansion.

S
409 **Planetary bowshocks**

I S Veselovsky, Institute of Nuclear Physics, Moscow State University, Moscow 119899 [RUSSIA].

E-mail: veselov@compnet.msu.su Fax: +7 095 939 5034

Large-scale phenomena and the microstructure of the shock transition: reviews of the experimental data and the most promising theoretical descriptions. Contributions on significant new results are welcome.

S
410 **Reporter reviews**

S Grzedzielski, COSPAR, 51 Bd de Montmorency, 75016 Paris [FRANCE].

E-mail: 29531::COSPAR/Spain Omnet: COSPAR.PARIS/Omnet

Fax: +33 1 4050 9827

Review papers of the physics of the solar corona, short- and long-term variability of the solar wind (including effects of energetic particles and cosmic ray moderated shocks), heliospheric VLF emissions, solar wind interaction with nonmagnetic bodies, and physics of interplanetary dust grains.

DIVISION V

OBSERVATORIES, INSTRUMENTS, SURVEYS AND ANALYSES

Chairman: David John Kerridge
British Geological Survey
Murchison House
West Mains Road
Edinburgh EH9 3LA
Scotland UK

Telephone: +44 31 667 1000 x234

Fax: +44 31 668 4368

S
501 **Modern observatory and repeat station instruments and practice**

O Rasmussen, Division of Solar-Terrestrial Physics, Danish Meteorological Institute, Lyngbyvej 100, DK 2100 Copenhagen [DENMARK].

E-mail: or@dmi.min.dk Fax: +45 3915 7460

L Hegymegi [HUNGARY]

Developments in instruments for use in magnetic observatories and for field work. New methods in absolute measurements and developments in data-collection and data-processing.

S

502

Ocean bottom geomagnetic observatories

A W Green Jr, US Geological Survey, Denver Federal Center, MS 968, PO Box 25046, Denver CO 80225-0046 [USA].

E-mail: awgreen@gldfs.cr.usgs.gov Fax: +1 303 273 8450

L Law [CANADA]; J Rasson [BELGIUM]

Distribution, construction, and deployment of ocean bottom observatories and methods for automatically making absolute measurements on the ocean bottom, providing data for studying secular variation at the core-mantle boundary, for spherical harmonic modelling and control of satellite surveys.

S

503

Instruments and data acquisition systems for high time- and amplitude-resolution geomagnetic data

E W Worthington, National Geomagnetic Information Center, US Geological Survey, Denver Federal Center, MS 968, PO Box 25046, Denver CO 80225-0046 [USA].

E-mail: eworthin@gldfs.cr.usgs.gov

Fax: +1 303 273 8450

K Yumoto [JAPAN]

Instruments, techniques, and data acquisition systems required to obtain the high resolution data (better than 1-minute) that is needed for space physics research, for analysis of geomagnetic storm effects on power grids and pipelines, and for induction studies.

IS

317

Artificial intelligence applications in magnetospheric

504

modelling and forecasting

R L McPherron, IGPP, UCLA, 405 Hilgard Avenue, Los Angeles CA 90024-1567 [USA].

E-mail: rmcpherron@igpp.ucla.edu Fax: +1 310 206 8042

A N Zaitzev [RUSSIA]

AI techniques for capturing into computer programmes the human expertise on geomagnetic effects of the Sun and the solar wind: application of neural networks, expert systems, genetic algorithms and fuzzy logic.

IS

101

Solar wind structures, energetic solar particles,

208

geomagnetic activity and associated phenomena

316

J T Gosling, MS D466, Los Alamos National Laboratory,

405

Los Alamos NM 87545 [USA].

505

E-mail: jgosling@lanl.gov Fax: +1 505 665 7395

D H Tarling [UK]; J Lastovicka [CZECH REP]; A Berthelier [FRANCE]

The physical linkages between structures and events in the solar atmosphere and those in the solar wind near 1 AU, examining how the resulting interplanetary structures and particle events perturb the

magnetosphere, the ionosphere, and the atmosphere; interdisciplinary emphasis.

S

506 **Geomagnetic applications**

D H Boteler, Geological Survey of Canada, 1 Observatory Crescent, Ottawa K1A 0Y3 [CANADA].

E-mail: boteler@geolab.emr.ca Fax: +1 613 824 9803

M E Shea [USA]

Examination of the different environmental factors affecting technological systems and determination of critical levels for geophysical phenomena. In particular, interdisciplinary studies that examine both the geophysical and the engineering aspects.

S

507 **Application data systems: real-time, on-line and on disc**

J H Allen, WDC-A for Solar-Terrestrial Physics, NOAA code E/GC2, 325 Broadway, Boulder CO 80303 [USA].

E-mail: jallen@ngdc.noaa.gov Fax: +1 303 497 6513

R Clauer [USA]

Presentation of the latest and the best ways of providing database access and other services. Hands-on demonstrations of systems on computers, provided or supplied, will be welcomed.

IS

111 **Multidimensional currents over multidimensional Earth**
216 **structures: theory and observations**

508 A G Jones, Geological Survey of Canada, 1 Observatory Crescent, Ottawa, Ontario K1A 0Y3 [CANADA].

E-mail: jones@cg.emr.ca Fax: +1 613 992 8836

A D Richmond [USA]; E W Mbipom [NIGERIA]

Theoretical and observational studies treating both external currents and Earth conductivity as spatially structured; the influence on the characteristics of geomagnetic variations at diurnal periods and less.

S

509 **Field behaviour on non-active days at world locations**

W H Campbell, US Geological Survey, Denver Federal Center, MS 968, PO Box 25046, Denver CO 80225-0046 [USA].

H Deebes [EGYPT]

Behaviour of the quiet time field changes, their relationship to other geophysical processes in the thermosphere and magnetosphere, and their application to the understanding of external sources and internal earth structure.

S

510 **Geomagnetic indices**

M Menvielle, Laboratoire de Physique de la Terre et des Planetes, Bat 504, Université Paris Sud, F-91405 Orsay cedex [FRANCE].

E-mail: michel@planeto.lps.u-psud.fr

Fax: +33 1 6941 8369

T Iyemori [JAPAN]; R L Coles [CANADA]

We welcome papers that demonstrate the value of indices in characterising the state of the magnetosphere, papers

showing the limitations of indices that are currently available, proposals for new indices, papers on the production of indices in real-time from digital data and applications.

JS

511 **Data challenges in the 21st century** (also listed with IASPEI: AW5)

M A Chinnery, National Geophysical Data Center, 325 Broadway, Boulder CO 80303 [USA]

E-mail: mchinnery@ngdc.noaa.gov Fax: +1 303 497 6513

G A Sobolev [RUSSIA]

Changing requirements for access to scientific data including high bandwidth networks, distributed data archive and dissemination facilities, network search and retrieval systems. Software developments such as hierarchical data systems, neural networks, GIS and optical character recognition.

S

512 **Analysis and modelling of low Earth orbit magnetic survey satellite data with respect to the core, crust, ionosphere and induction**

J M Quinn, Code N342, US Naval Oceanographic Office, Stennis Space Center, MS 39522-5001 [USA]

E-mail: quinn@pops.navy.mil Fax: +1 601 688 5605

Y Cohen [FRANCE]

Analyses and modelling of satellite geomagnetic data with respect to the spatial and temporal behaviour of magnetic fields associated with the Earth's core, crust and ionosphere and with respect to induction fields associated with the crust and mantle are solicited.

JS

105 **Geomagnetic secular variation and core flow near the**
513 **core-mantle boundary** (also listed as IASPEI: AS2)

G Hulot, IPGP, Laboratoire de Geomagnetisme et Palaeomagnetisme, CNRS UA279, 4 Place Jussieu, B89 Tour 24, 75252 Paris Cedex 05 [FRANCE].

E-mail: ghulot@ipgp.jussieu.fr Fax: +33 1 44 27 3373

R A Langel [USA]

Time variations of the main geomagnetic field on all timescales from very short (magnetic jerks) to secular, especially with interpretations relating to flow near the core-mantle boundary and global studies at all timescales and using other (e.g. astronomical or seismological) data.

S

514 **Global and regional magnetic field models and charts**

C Barton, Australian Geological Survey Organisation, GPO Box 378, Canberra ACT 2601 [AUSTRALIA].

E-mail: cbarton@bmr.gov.au Fax: +61 62 49 9986

D R Barraclough [UK]

Data acquisition and data processing, modelling and charting methods, the IGRF, and accuracy requirements of reference fields for various applications of models and charts. The need for geomagnetic reference field data for compass navigation now that cheap satellite

positioning systems are available.

- S
515 **Novel techniques in acquisition, processing, presentation and integrated interpretation of magnetic anomaly data**

C Reeves, ITC International Institute for Aerospace Survey and Earth Sciences, Department of Earth Resources Surveys, Kanaalweg 3, 2628 EB Delft [THE NETHERLANDS].
Fax: +31 15 623 961

K A Whaler [UK]; D Teskey [CANADA]

Global positioning systems have spearheaded the quest for higher data quality; data are often presented as images, often using satellite image processing techniques with or without Laplacian processing. Papers addressing this general area of development are sought.

- S
516 **Magnetic anomalies in the North Atlantic and Arctic Oceans and surrounding regions**

S Mashchenkov, All-Union Institute for Geological and Mineral Resources of the World Ocean, Maklina Pr 1, St Petersburg 190121 [RUSSIA].

E-mail: ocean@sovamsu.sovusa.com Fax: +7 812 114 1470

J Verhoef [CANADA]; P Taylor [USA]

Recent compilations of magnetic surveys for tectonic interpretation; structure of the magnetic layer of the crust formed under slow spreading, anomaly patterns of the fracture zones, anomalies of passive continental margins. Application of detailed aero and marine surveys for oil and gas geology in the North Eurasian shelves.

- S
517 **Antarctic magnetic anomalies**

R von Frese, Department of Geological Sciences, Ohio State University, Columbus OH 433210 [USA].

E-mail: vonfrese@geols.mps.ohio-state.edu

Fax: +1 614 292 7688

A Johnson [UK]; A Meloni [ITALY]

Progress and problems of mapping, processing, and interpreting magnetic anomalies of Antarctica and adjacent marine areas.

- JS
518 **Architecture of the continents: interpretation of their main structural elements from magnetic anomalies and other geophysical data (also listed with IASPEI: AS18)**

V Shapiro, Institute of Geophysics, Amundsen str 100, Ekaterinberg 620219 [RUSSIA]

J Broome [CANADA]; L Antoine [SOUTH AFRICA]

The latest achievements in magnetometry used for study of the deep structure of large-scale geological features such as global orogenic belts - the Urals, for example - within continents. Data analysis, integration with other geophysical data, geophysical and geological modelling.

- S
519 **Magnetic petrology and magnetic signatures of ore deposits and ore environments**

D Clark, CSIRO Division of Exploration and Mining, PO

Box 136, North Ryde, New South Wales 2113 [AUSTRALIA].
 E-mail: d.clark@dem.csiro.au Fax: +61 2 887 8874
 S Zhakherov [RUSSIA]

Magnetic properties and magnetic expressions of mineralised environments, particularly integrated magnetic/petrological studies (including properties and signatures of magnetite, pyrrhotite; sedimentary basins; magmatic, metamorphic and hydrothermal processes.)

S
 520

Advances in magnetic modelling and efficient interpretations of large magnetic data sets

M Purucker, Geodynamics Branch, Hughes-STX Corporation, Code 921, Goddard Space Flight Center, Greenbelt MD 20771 [USA].

E-mail: purucker@geomag.gsfc.nasa.gov

Fax: +1 301 286 1616

J Arkani-Hamed [CANADA]

Established methods for inverse solutions and forward models suffer under the sheer size of data sets now available; Euler's homogeneity relation and analytic signal methods are new techniques. Discussion of the strengths and weaknesses of the different approaches, plus visualization of the results.

JS
 521

Geophysical networks: possibilities for and problems with co-location of instruments (also listed with IASPEI: AW1)

D W Simpson, Incorporated Research Institutes for Seismology, 1616 N Fort Myer Drive, Suite 1050, Arlington VA 22209 [USA]

E-mail: simpson@iris.edu Fax: +1 703 527 7256

G Beulter [SWITZERLAND]; D J Kerridge [UK]; G Roullet [FRANCE]

There appear to be logistical and cost benefits in greater cooperation and coordination between the disciplines of geomagnetism, seismology, and geodesy at common observatories. Discussion of existing sites, experience of multidisciplinary coordination, and basic requirements for each discipline.

S
 522

Local time changes of the Earth's magnetic field caused by recent tectonic processes (tectonomagnetic method)

J Podskalan, Research Institute for Geodesy, Topography and Cartography, 250 66 Zdiby 98 (CZECH REPUBLIC)

E-mail: vugt@earn.cvut.cz Fax: +42 2 685 7056

V Kuznetsova (UKRAINE)

Methods of investigation, studies of the physical processes that cause local variations in the geomagnetic field (eg piezomagnetism, electrokinetic effects) and modelling. Results of the application of the tectonomagnetic method in studies of tectonic processes and earthquake precursors in combination with other geodynamical methods.

HISTORY COMMISSION

Chairman: Michele Colacino
Istituto di Fisica dell'Atmosfera
Consiglio Nazionale delle
Ricerche
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S
601

History of geophysics and of global change

Michele Colacino, Istituto di Fisica dell'Atmosfera, P. le Luigi Sturzo 31, 00144 Roma, ITALY. Fax: +39 6 591 5790.

L M Barreto (BRAZIL); Deborah C Day (USA); Wilfried Schroeder (GERMANY)

The historical investigations have to be grouped into three main classes: I. History of the development of scientific ideas. II. History of the environment, of global change, and of the anthropic action on climate. III. History of the impact of climate, environment, and natural catastrophes on mankind. All three are relevant to this session and contributions are invited.

DEVELOPING COUNTRIES COMMISSION

Chairman: C Agodi Onwumechili
69 Lansdowne Drive
Hackney
London E8 3EP
UK

S
701

Activities and results of the International Equatorial Electrojet Year [IEEY]

Christine Amory Mazaudier, CNET/CNRS/CRPE, 4 avenue de Neptune, 94107 Saint Maur-des-Fosses, FRANCE.

Fax: +33 1 4889 4433

C Agodi Onwumechili (UK)

Presentation and review of results and data acquired during the IEEY and other equatorial electrojet studies.

S
702

Priorities in geomagnetism and aeronomy in developing countries

Attia A Ashour, Department of Mathematics, Faculty of Science, University of Cairo, Giza, Cairo, EGYPT.

L M Barreto (BRAZIL)

Research areas, training, instrumentation and technology in geomagnetism and aeronomy most suitable for developing countries.

IS

205

Equatorial ionosphere-thermosphere system

703

Mangalathayil A Abdu, INPE, CP 515, Sao Jose dos Campos - SP 12200 [BRAZIL].

E-mail: inpedae@brfapesp.bitnet Fax: +55 123 218 743

K D Cole [AUSTRALIA]; C Amory-Mazaudier [FRANCE]; J H Sastri [INDIA]

Studies of equatorial plasma, neutral dynamics, and electric fields relating to spread F, ionization anomaly and electrojet phenomena, under quiet and disturbed conditions. Results from coordinated campaigns including especially the Equatorial Ionosphere-Thermosphere Study [EITS].

**GLOBAL DATABASE OF PALEO- AND ROCK-MAGNETIC
LABORATORIES, PROJECTS AND RESEARCHERS**

As reported by Barton (1991, 1993), international efforts to establish several relational databases of palaeomagnetic and rock-magnetic data are being coordinated by the Association. The last summary of the status of IAGA databases was outlined by Barton in 1993. The last, but not least, of the databases is the Database of Laboratories, Researchers and Current Projects.

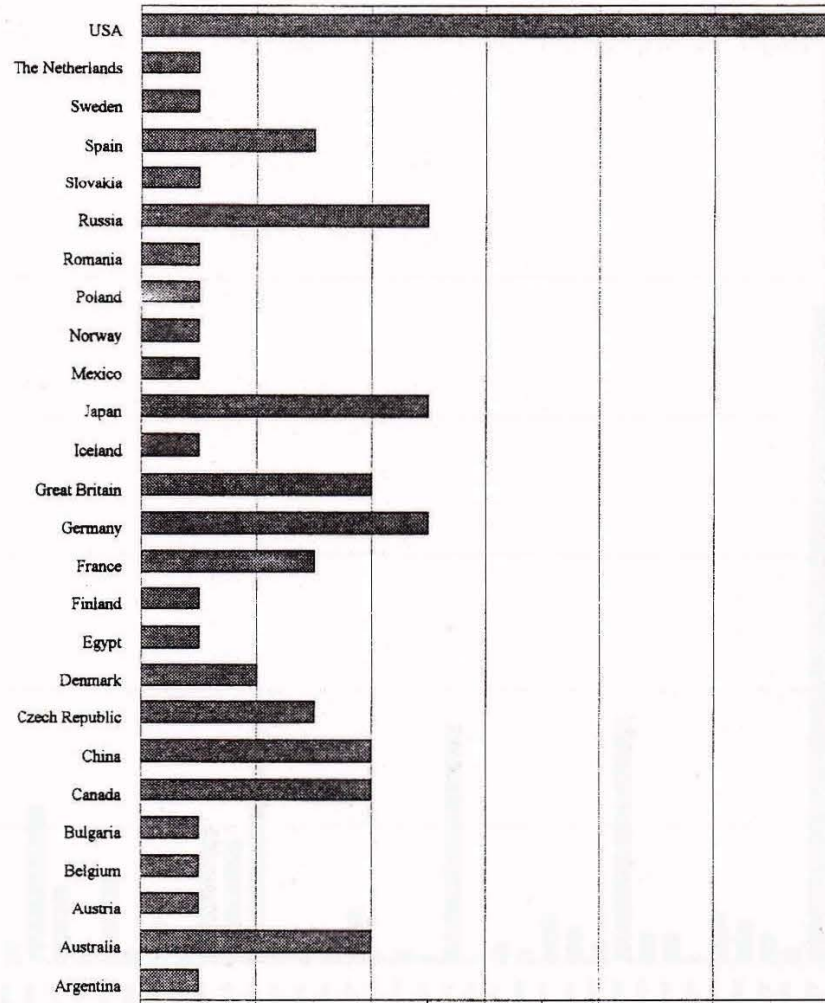
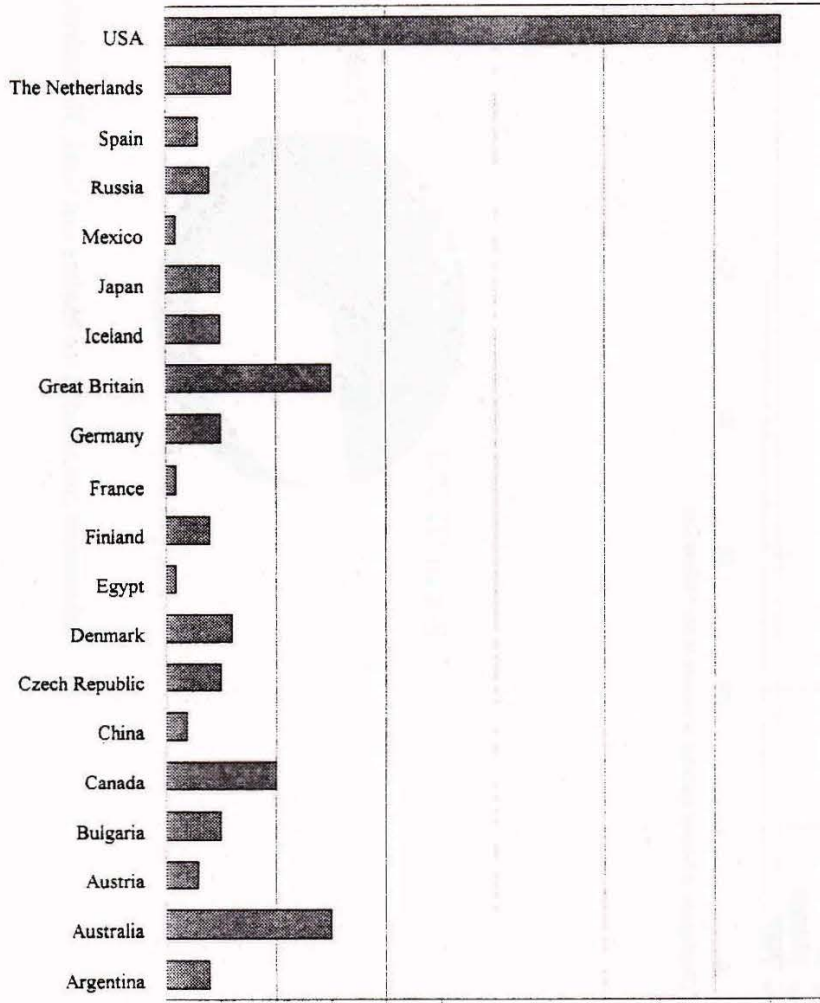
Development of the database was begun in the late 1980s when the first questionnaire was distributed to several laboratories with a call for data on projects conducted by individual laboratories. By 1990, a collection of about 110 projects was available. During a palaeomagnetic and rock-magnetic meeting in 1992 at Bechnye Castle [Czech Republic: see Petrovsky, 1992), Eduard Petrovsky from the Geophysical Institute in Prague gathered data about some 35 laboratories. The two collections were merged and the first version of the Global Palaeomagnetic Projects and Laboratories [GPPL] Database was developed, using Oracle [version 5.1c] relational database management software. This version was not very user-friendly and several errors and omissions were found.

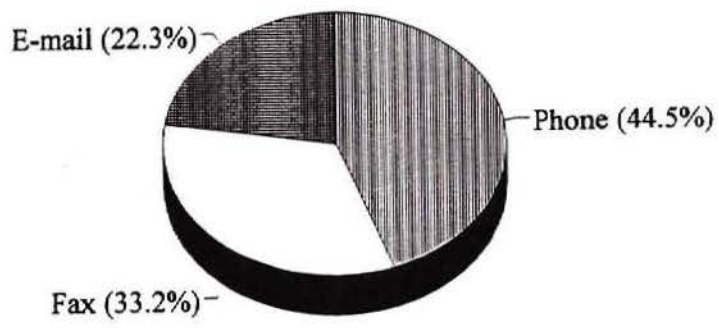
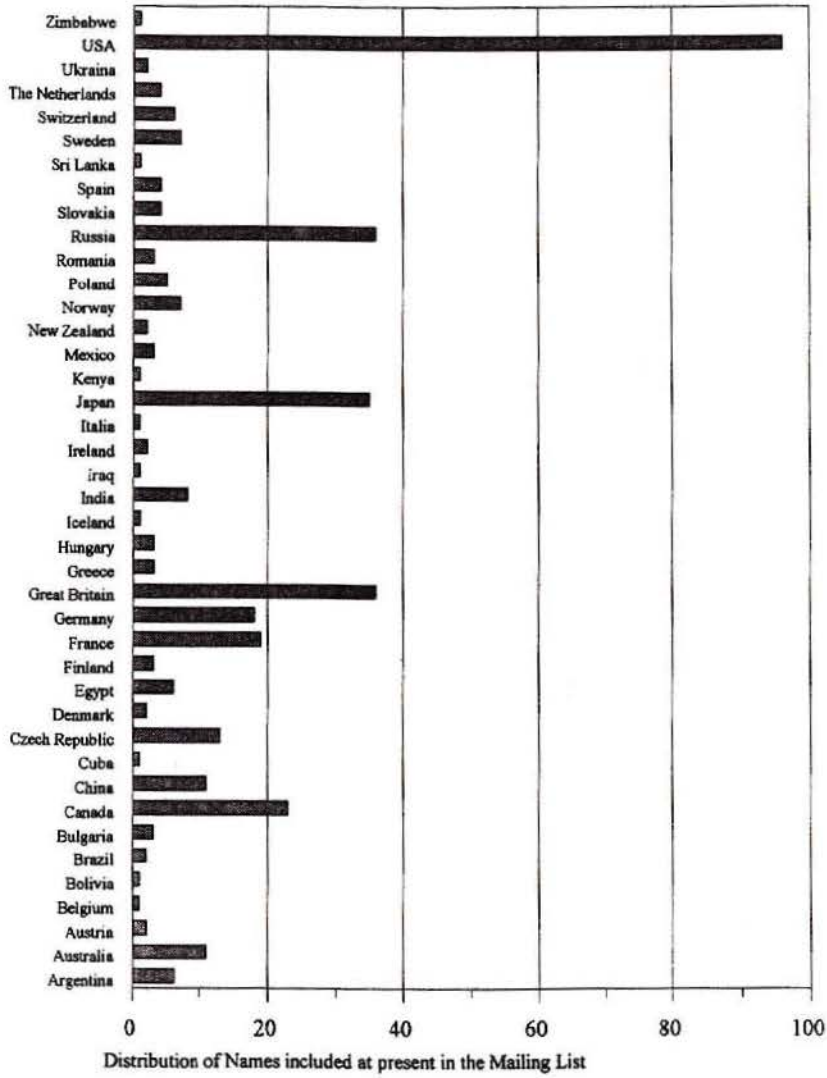
Despite the fact that McElhinny and Lock (1991) successfully established Oracle as the IAGA Database standard software, a second version has been developed for use with Windows, following partly the intention of McElhinny and Lock (1993) to create a Windows version of their Global Palaeomagnetic Database. To maximize compatibility with Windows, the Microsoft Access relational Database System (version 1.0) has been used although this release is not yet free of error and some inconvenience. After a short development period, the new 2.0 version of Windows GPPL Database is now available.

In the near future, there will be a release of the database as a Windows application (developed using Visual Basic) so that a user will not be restricted, as now, to using the maternal database system under which the database was developed.

The GPPL Database currently contains information about 68 laboratories (36 of which are complete: information on personnel, instruments, and interests) and 156 projects. A mailing list of approximately 400 scientists is available as a special part of the database which is principally the mailing directory maintained by Petrovsky with additional material from Hidetoshi Tanaka of Tokyo. Some of the records were updated using the latest AGU Directory and also after searches on Internet.

The data are arranged in three tables: (a) Laboratories; (b) Projects; and (c) Mailing List/Phone Book. Viewing and filtering the data are available using four forms with each of





Information contained in the Mailing List (total: 394 addresses)

the forms providing the user with a convenient system of command buttons and menu commands. A context-sensitive help is available. The records are linked through use of a laboratory's reference number: displaying projects carried out by a specific laboratory (and vice versa) uses a simple mouse-click. Search is available on (i) a laboratory's country and city, personnel, instrument(s) and interest(s); (ii) project characteristics with basic terms appearing in the project name, its aims, or in keywords; (iii) rock type, age and area of concern.

No edits are allowed in the record and the user is required to observe this policy. There is one exception to this: the user may edit, delete, or add new records to the Mailing List and can thus create his or her own mailing directory. Creating a customized database is possible by using the original tables of data which can be exported in several formats (MS Excel, Paradox, Lotus 1-2-3, dBase, and text).

We follow Barton (1991) in pointing out that the database should not become the subject of territorial claims and controversies and that it is intended only to provide information about current activities and carries with it no implication about an individual's rights.

To get more information or to get the database itself (either as a Microsoft Access file or as an export file containing the data tables only) please contact either of the database authors whose names and addresses are given below.

Acknowledgements We would like to express our thanks to H Tanaka for providing us with his Mailing Directory and S Beske-Diehl for e-mail-forwarding the call for new data. Development of the database was possible due to support by Aarhus University and the Geophysical Institute in Prague. Microsoft [MS] is a registered trademark of the Microsoft Corporation.

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- Barton, C E **New IAGA databases established**, EOS 72, page 332 (1991)
Barton, C E **IAGA databases for palaeomagnetism and rock magnetism**, EOS 74, page 273 (1993)
McElhinny, M W and J Lock
Global database complete, EOS 72, page 579 (1991)
McElhinny, M W and J Lock
Global database updated, EOS 74, page 180 (1991)
Petrovsky, E **IIIrd biennial meeting on new trends in geomagnetism**, IAGA News No.31, page 51, 1992

BELAS - LUANDA GEOMAGNETIC OBSERVATORY

ANNUAL MEANS

YEAR	D	H	I	X	Y	Z	F
1958	-11 25.5	24310	-41 37.0	23828	-4818	-21596	32517
1959	-11 24.5	24287	-41 38.3	23807	-4806	-21595	32499
1960	-11 20.4	24250	-41 42.3	23776	-4770	-21613	32484
1961	-11 18.1	24226	-41 49.4	23756	-4748	-21682	32512
1962	-11 14.5	24180	-41 56.1	23717	-4717	-21724	32505
1963	-11 11.4	24125	-42 04.1	23666	-4684	-21775	32499
1964	-11 08.4	24078	-42 11.1	23624	-4654	-21822	32495
1965	-11 04.4	24056	-42 20.0	23608	-4622	-21916	32542
1966	-11 00.6	24006	-42 30.2	23564	-4587	-22003	32564
1967	-10 55.4	23951	-42 39.0	23517	-4540	-22063	32564
1968	-10 50.2	23895	-42 46.0	23468	-4493	-22103	32550
1969	-10 45.4	23831	-42 57.0	23412	-4449	-22185	32559
1970	-10 40.4	23762	-43 03.5	23349	-4402	-22209	32524
1971	-10 34.3	23714	-43 12.5	23311	-4352	-22280	32538
1972	-10 27.5	23652	-43 19.3	23258	-4296	-22309	32513
1973	-10 20.3	23586	-43 31.0	23203	-4234	-22397	32526
1974	-10 13.2	23518	-43 41.4	23145	-4174	-22470	32527
1975	-10 05.5	23476	-43 50.1	23112	-4115	-22541	32545
1976	-9 55.3	23424	-43 58.3	23073	-4037	-22601	32550
1977	-9 46.1	23377	-44 06.0	23037	-3967	-22654	32553
1978	-9 37.1	23304	-44 16.0	22976	-3895	-22715	32543
1979	-9 28.2	23261	-44 22.3	22944	-3828	-22761	32544
1980	-9 20.6	23227	-44 27.5	22919	-3771	-22792	32542
1981	-9 10.3	23088	-44 49.6	22793	-3680	-22949	32553
1982	-9 01.3	23028	-44 57.6	22743	-3611	-22996	32544
1983	-8 52.1	22986	-45 02.3	22711	-3543	-23017	32529
1984	-8 40.4	22937	-45 08.0	22675	-3459	-23044	32514
1985	-8 31.5	22917	-45 11.7	22664	-3397	-23073	32520
1986	-8 25.4	22899	-45 14.2	22652	-3354	-23089	32519
1987	-8 19.0	22832	-45 20.4	22592	-3303	-23104	32482
1988	-8 09.6	22748	-45 29.1	22518	-3229	-23136	32446
1989	-8 06.0	22714	-45 33.7	22487	-3200	-23164	32442
1990	-7 57.0	22660	-45 37.5	22442	-3134	-23164	32404
1991	-7 52.0	22622	-45 41.4	22410	-3097	-23178	32387
1992	-	-	-	-	-	-	-
1993	-7 31.3	22540	-45 52.1	22345	-2951	-23237	32373

LUANDA [ANGOLA] GEOMAGNETIC OBSERVATORY

Instituto Nacional de Hidrometeorologia e Geofisica
 Department de Geofisica
 Engo Vieira Dimbu Lukunga
 Caixa Postal 1228 Luanda
 ANGOLA

A copy of the annual publication of geomagnetic measurements carried out at Luanda Geomagnetic Observatory (BELAS) in Angola for the year 1993 has been received at the IAGA office. In spite of the current political and military conditions, the scientific institutions of Angola continue to support measurements and research into geophysics. There is a ever-present risk of interruption to the geomagnetic work at the BELAS observatory but every effort is being made in spite of understandably difficult conditions to carry forward the work.

The observatory Luanda Capelo operated from 1881 to 1919, and then Luanda Golf began observations in 1954 until 1956, when Luanda Belas observatory took over in 1957. On the opposite page are the annal mean values for 1993.

The observatory is situated at

Geographic:	Latitude 08 deg 55 min south
	Longitude 13 deg 10 min east
Geomagnetic:	Latitude 07 deg 11 min south
	Longitude 80 deg 33 min east

The observatory operates an Askania variograph for continuous recording of D, H, and Z with a chart speed of 20 mm/hour. For absolute observations, there are a QHM, an Askania declinometer, a BMZ, and a Geometrics proton magnetometer for the continuous recording of F. (Calibration of the absolute instruments was last done in 1982.)

The 1993 publication contains scale values, base-line values, monthly and annual means of magnetic elements for all days and for the five international quiet and disturbed days. There are also daily mean values of D, H, and Z, the three-hour range indices and the daily sum of K-index. Finally, there is a graph of total force F and its variations from 1958 to 1993.

Engr. Lukunga writes that he has the valued and appreciated help of Mr Irkin Mahkamdjanov in carrying out the measurement programme.

The pages of data are not held at the IAGA office but have been sent to the Chairman of Division V: Dr D J Kerridge, Geomagnetism Unit, British Geological Survey, Murchison House, West Mains Road, Edinburgh EH9 3LA [UK]. Dr Kerridge will be happy to provide photocopies of the data upon request.

**OPPORTUNITIES FOR ASSISTANCE TO MAGNETIC OBSERVATORIES IN
DEVELOPING COUNTRIES - A RESPONSE FROM JAPAN TO PROGRAM
OUTREACH**

In the fields of geomagnetism and related sciences, universities and government agencies in Japan have extended assistance to developing countries. The resource for the assistance and the form in which the assistance is given vary from one case to the next. In most cases, however, a direct personal contact between the recipient of assistance and the sponsoring agency was the starting point and the objectives were achieved through subsequent efforts made on both sides. Such courses of development need no further explanation; we simply encourage these processes.

The purpose of this communication is to make it known that opportunities exist for technical development assistance offered by an agency called the Japan International Cooperation Agency (JICA). Of this Agency's diverse programs we only refer here to those areas that appear to us to be relevant to the matter of assisting magnetic observatories in developing countries.

There are essentially two categories of JICA programs that are of interest to us. One is the category of training programs and the other concerns provision of equipment in technical cooperation. The training programs consist of group training and individual training. In the former, the curriculum and study period are preset and registration materials are sent to interested countries, which recruit participants. In the latter, individual programs are prepared to meet the specific requirements of a specific country that are not or cannot be covered by group training programs. In our case, only individual training programs would seem to satisfy our needs.

The second category pertains to provision of equipment. Some of JICA's programs contain a provision of providing, upon request of a developing country, equipment needed in the technical development assistance. Equipment may be offered in connection with project-type technical cooperation or in connection with training programs, when, for instance, needed by participants after their return to the home country to use the technology they have acquired in Japan.

These explanations are given in general terms to illustrate the basic ideas of JICA programs relevant to us. To prepare a program best suited to each specific case, JICA would have to work closely together with the individuals and institutions involved.

The first step toward seeking technical development assistance through JICA is to contact one of its Overseas Offices if one exists in the country of the applicant, or a representative office of Japan such as the Embassy or a Consulate and obtain detailed information and the application forms. It is our understanding that each developing country interested in

submitting applications to JICA sets priorities within the country. Therefore it is important to obtain a high priority for the desired program within the originating country.

An example of JICA support is the technical assistance given to the Muntinlupa Magnetic Observatory in the Philippines by the Hydrographic Department of the Japan Maritime Safety Agency (MSA). The technical assistance included providing magnetometers with support from JICA. It may be noted that this specific technical and financial assistance stems from a long term cooperative program between MSA in Japan and the Coast and Geodetic Survey Department of the Philippines. Another example is the Ancon Observatory of Institute of Geophysics of Peru, which recently acquired magnetometers with a JICA grant aid. Again, it is noteworthy that IGP scientists have actively participated for a long time in cooperative research projects with Japanese scientists, both from universities and from government laboratories.

Numerous training programs have been arranged by universities and government agencies such as MSA and Japan Meteorological Agency which operates the Kakioka Magnetic Observatory, with support from JICA, JSPS (Japan Society for Promotion of Science), and other agencies.

Thus, opportunities for technical and other assistance are open in Japan to magnetic observatories in developing countries, awaiting initiatives to be taken by those who desire such assistance.

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INTERNATIONAL WORKSHOP

on Nature of Crustal Conductivity
(Moscow, March 14 - 17, 1994)

Monday, March 14

(Chairmen A.Zhamaletdinov and M.Berdichevskii)

- 10.00. - Registration.
 11.00. - Opening ceremony.
 11.30. - M.Berdichevskii. "Geoelectrical models of the Northern Tien-Shan and Armenian highlands".
 12.00. LUNCH
 13.30. - V.Belyavsky. "Nature of conductors of the Central Asia tectonosphere".
 14.00. - N.Baglaenko, I.Varentsov, N.Golubev, V.Gordienko, S.Kulik and I.Logvinov. "Deep structure of the Kirovograd anomaly by MV data".
 14.30. COFFEE
 15.00. - A.Popov. "Crustal electrical conductivity of the Baikal Rift zone".
 15.30. - A.Zhamaletdinov and D.Tokarev. "Crustal electrical conductivity of the Eastern Transbaikalia".
 16.00. - Discussion.

Tuesday, March 15

(Chairmen S.Kulik and I.S.Saks)

- 10.30. - I.Varentsov, N.Golubev and E.Sokolova. "Resolution of deep geoelectrical structure in EMSLAB data".
 11.00. - I.Feldman and B.Okuleskii. "Crustal conductivity of the Caucasus area".
 11.30. - B.Klabukov. "Crustal conductivity in Karelia".
 12.00. LUNCH
 13.00. - A.Kovtun, S.Vagin, I.Vardaniants, E.Kokvina and N.Uspenskii. "The resistivity of the crust at different blocks of the Baltic shield according to AMT-MT data".
 13.30. - V.Gordienko. "Geothermal conditions in the crust of continents".
 14.00. COFFEE
 14.30. - N.Pavlenkova. "Role of fluids in seismic data interpretations".

15.00. - J.Kasahara, K.Mochizuki and N.Hirata. "Crustal structure of Japan basin revealed by ocean bottom seismometer".

15.30. - Discussion.

Wednesday, March 16

(Chairmen I.Kissin and V.Morozov)

- 10.30. - V.Nikolaevskii. "Pseudoplastic (semi-brittle) behavior of rocks and geophysical anomalies".
 11.00. - V.Morozov. "Geomechanical aspects of the crustal conductor nature".
 11.30. - Yu.Kuznetsov. "Pores structure in deep crust (by the Kola superdeep borehole data)".
 12.00. LUNCH
 13.00. - O.Rosen. "Tectonic stratification of the ancient shields of the Earth's crust".
 13.30. - I.S.Saks. "Seismic velocity and anelasticity, water content and temperature in the lower crust and upper mantle".
 14.00. COFFEE
 14.30. - I.Banshikova. "Fluid inclusions types (by Kola superdeep borehole data)".
 15.00. - I.Kissin. "Crustal fluids and conductivity anomalies".
 15.30. - Discussion.

Thursday, March 17

(Chairmen A.Kovtun and L.Vanyan)

- 10.30. - L.Vanyan. "Crustal fluids by geoelectrical data".
 11.00. - I.Ivankin and N.Nazarova. "Endogenetic carbon and fluids as conductivity anomalies sources".
 11.30. - A.Zhamaletdinov. "Crustal graphite and EM anomalies".
 12.00. LUNCH
 13.00. - M.Rodkin. "Deep shear zones model with application to interpretation of earthquakes".
 13.30. - T.Burakovich, V.Gordienko, O.Zavgorodnaja, S.Kulik and I.Logvinov. "Nature of crustal conductivity anomalies of Ukrainian activation zones".
 14.00. COFFEE
 14.30. - T.Burakovich, V.Gordienko, S.Kulik and I.Logvinov. "Nature of the Voyn conductivity anomalies".
 15.00. - I.Feldman. "Nature and structure of the Earth's crustal conductivity".
 15.30. - Discussion. Closing ceremony.

**INTERNATIONAL WORKSHOP ON
NATURE OF CRUSTAL CONDUCTIVITY**
14-17 March 1994
Moscow [Russia]

L L Vanyan and I S Sacks
Cochairmen, IAGA/IASPEI Working Group for Studies of the
Electrical Conductivity of the Asthenosphere [ELAS]

The workshop was sponsored by IUGG and held by the Geophysical and the Seismological Centres of the Russian Academy of Science. The listing of the programme of the workshop is reproduced on the opposite page. Twenty-five papers were presented in four topics:

Geoelectric information on crustal conductivity

Results of deep magnetotelluric studies were presented for Central Asia, Armenia, Northern Caucasus, Ukrainian Shield, Baltic Shield, Karelia, Baikal Rift zone, Eastern Transbaikalia and Cascadia Basin. Both conducting anomalies and wide conducting layers were considered.

Seismics and geothermics

In this section, there was a summary of refraction and reflection seismics which show a clear difference between the upper and lower crust. Geothermal conditions in the continental crust can influence electrical conductivity and the crustal structure of the Japan sea basin is revealed by ocean bottom seismometers. One of the geological structures where the role of fluids is more clear is a subduction zone and Sacks presented a model of the fluids in the subduction zone beneath Japan.

Petrological and geochemical evidence for fluids, cracks, and porosity in the consolidated crust (especially by the Kola deep borehole data) were discussed in the third section.

Sources of EM anomalies (fluids and graphite)

The TM-mode of the magnetotelluric field is important and DC soundings are sensitive to the resistivity of the upper crust; the observed specific resistivities correspond to a brine content of 0.1% in the upper crust, in agreement with Kola borehole data. Graphite precipitation takes place at depths of 5-15 km.

The four days of the workshop were enlivened by fruitful discussion and it was clear that there is great interest among scientists from the former Soviet Union in the problems of the Earth's crust. Enthusiasm among the workshop participants provided a challenge to present-day economic problems!

Working Group V-9

Magnetic Anomalies on Land and Sea

This working group publishes a newsletter to maintain contact between members of the Working Group and to keep them informed of developments in their area of interest. Contributions are sought for the next issue which will be published before the General Assembly in Boulder (July 1995). These contributions should be sent to the Editor of the Newsletter:

David Clark
CSIRO Division of Exploration and Mining
PO Box 136
North Ryde NSW 2113
AUSTRALIA

Tel: +61 2 887 8872 Fax: +61 2 887 8874 E-mail: d.clark@dem.csiro.au

Copies of the Newsletter can be obtained from the above on request. The 6th edition was published in March 1994 and includes

- * The Chairman's report - including discussions on new efforts to compile magnetic anomaly data for Antarctica and on issues of data confidentiality
- * A report on the Working Group's Business Meeting in Buenos Aires (August 1993)
- * A report on the meeting of the subcommittee on Anomaly Mapping in the Arctic
- * Descriptions of the symposia proposed by the Working Group for the General Assembly in 1995
- * An article on German-Italian aeromagnetic research in Antarctica
- * A note on the AGSO 1:5000 000 magnetic anomaly map of Australia

GIFS

GIFS is the acronym for **Geomagnetism Information and Forecast Service** of the Geomagnetism group of the British Geological Survey. The service has recently been updated; major changes are the inclusion of 3-hourly aa indices from 1868 to the present, an implementation of the 6th-generation International Geomagnetic Reference Field, and the provision of a 27-day forecast of Ap, F10.7 and UK observatory DRX indices. Users need to register for access to GIFS but registration is free to academic researchers.

For further information contact:

The Manager
Geomagnetism Group
British Geological Survey
Murchison House
West Mains Road
Edinburgh EH9 3LA
Unite Kingdom

Tel: +44 31 667 1000 Fax: +44 31 668 4368 Telex: 727343 SEISED G

INTERMAGNET

This is a project which promotes the real-time exchange of geomagnetic observatory data around the world. If you are involved in running campaigns in solar-terrestrial physics, you may find that access to world-wide magnetic data in nearly real-time is of use in planning your experiments. A by-product of INTERMAGNET is a CD-ROM published annually which contains one-minute values of the geomagnetic field at all participating observatories. Access to INTERMAGNET data held in Edinburgh is free to academic researchers although a charge (US\$150) has to be made for the CD-ROM.

To access the Edinburgh "Geomagnetic Information Node", try the following e-mail sequence on JANET:

```
SEND
E GIN@UK.AC.NMH.UB
SENDINFORMATION
```

[The third line is one of a number of commands [SEND FORMAT, SEND BULLETIN, SEND OBSERVATORIES, SEND MINUTE-MEANS, SEND DATA-DIRECTORY, SEND PLOT] that provide access to subject fields.]

NATIONAL GEOPHYSICAL DATA CENTER [NGDC]

Sun, sunspots and geomagnetism [STP-94-1]: Historical and recent data from the Sun are in the digital data bases of the NGDC, arranged into easily-readable formats. Data packages available on floppy disc include

- Fe XIV Coronal Index
- Zurich and International Sunspot Numbers (Wolf)
- 2800 MHz Solar Flux (formerly Ottawa 10.7 cm)
- Geomagnetic Indices (yearly file of Kp, Kp-sum, ap, Ap, Cp, C9, Rz (January 1932 to present) and adjusted solar flux (February 1947 to present)
- Sunspot Region Histories (compressed monthly and yearly files, each from a single observatory)

Space Environment Data from NOAA's GOES satellites [STP-94-4] are available as five-minute average data on floppy discs for each month of the year. Subscriptions are available by calendar year or (at rather greater total price) by individual months.

Information and orders from
 National Geophysical Data Center
 Code E/GC2
 325 Broadway
 Boulder CO 80303-3328
 USA

Tel: +1 303 497 6761 Fax: +1 303 497 6513 Telex: 592811 NOAA MASC BDR
 E-mail (Internet): info@ngdc.noaa.gov /or/ info@mail.ngdc.noaa.gov

Special Subscription Offer to IAGA Members

JOURNAL OF ATMOSPHERIC AND TERRESTRIAL PHYSICS

The *Journal of Atmospheric and Terrestrial Physics* is an international journal concerned with the interdisciplinary science of the Earth's atmospheric and space environment. Papers are published on the results of experiments and their interpretations, and on theoretical or modelling studies. Papers dealing with remote sensing carried out from the ground or with *in situ* studies made from rockets or from satellites orbiting the Earth are particularly suitable. Plans for future research, often carried out as an international programme, are also discussed. Besides original research papers, discussion papers and short reports, the journal includes commissioned review papers on topical subjects and special issues arising from chosen scientific symposia or workshops.


The journal covers the physical processes operating in the troposphere, stratosphere, mesosphere, thermosphere, ionosphere, magnetosphere and heliosphere. Phenomena occurring in other 'spheres' and supporting laboratory measurements are also considered. The journal deals especially with the coupling between the different regions. Regarding the upper atmosphere, the subjects of aeronomy, geomagnetism, auroral phenomena, radio wave propagation and plasma instabilities are examples within the broad field of solar-terrestrial physics which emphasise the energy exchange between the solar wind, the magnetospheric and ionospheric plasmas, and the neutral gas. In the middle and lower atmosphere, the topics covered include dynamics, radiation and chemistry, atmospheric electricity and electrodynamic effects, including lightning and its effects, and anthropogenic changes. Helpful, novel schematic diagrams are encouraged as is the use of colour.

Editor-in-Chief: **MICHAEL J. RYCROFT**,
College of Aeronautics, Cranfield Institute of Technology, Cranfield, Bedford MK43 0AL, UK

Editor Emeritus: **SIR GRANVILLE BEYNON, FRS**

A Selection of Papers

- W.J. BURKE (USA)**, Early Trimpf events from lightning-induced electric fields in the ionosphere: an alternative explanation.
 - F.S. KUO, K.E.LEE, H.Y. LUE & C.H. LIU (Taiwan)**, Measurement of vertical phase and group velocities of atmospheric gravity waves by VHF radar.
 - J.S. MURPHREE, R.D. ELPHINSTONE, M.G. HENDERSON, L.L. COGGER & D.G. HEARN (Canada)**, Interpretation of optical substorm onset observations.
 - R.A. VINCENT (Australia)**, Long-period motions in the equatorial mesosphere.
 - M. LOCKWOOD, I.W. McCREA, G.H. MILLWARD, R.J. MOFFETT & H. RISHBETH (UK)**, EISCAT observations of ion composition and temperature anisotropy in the high-latitude F-region.
 - B.V. KRISHNA MURTHY, K. PARAMESWARAN, K.O. ROSE & M. SATYANARAYANA (India)**, Temperature dependences of stratospheric aerosol extinction at a tropical station.
 - V.I. FOMICHEV, A.A. KUTEPOV, R.A. AKMAEV & G.M. SCHVED (Russia)**, Parameterization of the 15 μmCO_2 band cooling in the middle atmosphere (15-115 km).
 - R. FURRER, W. DÖHLER, H.-J. KIRSCH, P. PLESSING & U. GÖRSDORF (Germany)**, Evidence for vertical ozone redistribution since 1967.
 - R.P. KANE (Brazil)**, Long-term variation of stratospheric temperature at the North Pole.
 - S.E. PRYSE & L. KERSLEY (UK)**, A preliminary experimental test of ionospheric tomography.
- Indexed/Abstracted in:** *Curr Cont, ASCA, Cam Sci Abstr, Curr Cont/Phy Chem & Earth Sci, INSPEC Data, Curr Cont Sci Cit Ind, Curr Cont SCISEARCH Data, Meteorol & Geostrophys Abstr*

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UK & all other countries: Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, UK		

**12TH WORKSHOP ON
ELECTROMAGNETIC INDUCTION IN THE EARTH**

1994 August 8-14
Brest [FRANCE]

This workshop will be held at l'Université de Bretagne Occidentale and will continue the very successful series of biennial workshops under the sponsorship of IAGA and largely organized by working group I.2. Papers will be accepted on all aspects of electromagnetic induction in the Earth and oceans. Details of specific sessions and call for papers will be in the 2nd circular [posted in December 1993 to all who have requested]. Final registration date will be in April 1994. Registration fee will be approximately 700 FF full, 350 FF for students. Address for correspondence:

12th Workshop on EM induction
c/o Pr P Tarits
Département des Sciences de la Terre
Université de Bretagne Occidentale
6 Avenue le Gorgeu, BP 452
F-29275 Brest cedex
FRANCE

**SCAR XXIII MEETING
Working Groups on
Solar Terrestrial and Astrophysical Research [STAR]
Physics and Chemistry of the Atmosphere [PACA]**

29 August - 2 September 1994
Rome [ITALY]

The twenty-third meeting of SCAR takes place from 29 August through 9 September. The two working groups, STAR and PACA, meet during the first week of the SCAR meeting. The STAR working group has scheduled workshops on antarctic astronomy, on AGONET, and on coordination of research at King George Island; the outcome of the Arrival heights SSSI group; a symposium on electrodynamic coupling of the upper atmosphere; and a business session. The PACA working group will have workshops on atmospheric chemistry and the First Regional Observing Study of the Troposphere.

Those wishing more information should contact, without delay, the Secretary of the two working groups:

Professor H Fukunishi
Department of Astrophysics & Geophysics
Faculty of Science, Tohoku University
Aramaki-Aoba, Sendai 980-77
JAPAN

Telephone: +81 22 222 1800 Fax: +81 22 262 3357
E-mail: fukunishi@stpp.geophys.tohoku.ac.jp

**WORKSHOP ON GEOMAGNETIC OBSERVATORY INSTRUMENTS,
DATA ACQUISITION AND PROCESSING**

1994 September 18-24
Dourbes [Belgium]

Organized by Working Group V.1, the workshop will include the results of one-month comparison runs of magnetometers and lectures/discussions:

Observatory practice
Diflux: theodolite supply, automatic measurements
Absolute procedures and standardisation
New scalar magnetometer design
Real time indices and special events detection

For further information:

Magda Francotte
Centre de Physique du Globe
B-5670 Dourbes
BELGIUM

Telephone: +32 60 399311 Fax: +32 60 399421 Telex: 51239 GEOPHY B
E-mail: jr@meteo.oma.be

2ND REGIONAL GEODESY & GEOPHYSICS ASSEMBLY IN AFRICA

1994 November 14-25
Ibadan [Nigeria]

The Assembly will start with a plenary session with five keynote speakers on

Energy resources of the African continent for the 21st Century
Geophysical data and information systems
Environmental sciences in Africa
Groundwater resources of the African continent
Meteorology in Africa

This will be followed by 14 parallel scientific sessions and a scientific exhibition.

For further information, please write to

LOC of ICESA Scientific Assembly
ICESA International Secretariat
PO Box 22383
University of Ibadan Post Office
Ibadan
NIGERIA

**Workshop on
Low and Equatorial Latitudes in the
International Reference Ionosphere [IRI]**

9-13 January 1995

National Physical Laboratory, New Delhi [INDIA]

The meeting continues the series of annual workshops: IRI is the international standard representation of ionospheric densities, temperatures, and drifts. Contributions dealing with empirical and theoretical potential improvements and extensions of the IRI model with are welcomed. One day will be devoted to the verification of ionospheric models. The workshop is to be part of the Diamond Jubilee celebrations of the Indian National Science Academy. Abstracts to

D Bilitza, HSTX, NSSDC
7701 Greenbelt Road MD 20770
USA

Telephone: +1 301 441 4193 Fax: +1 301 441 9486

E-mail: BILITZA@NSSDCA.GSFC.NASA.GOV, NCF::BILITZA

Local information from

A P Mitra
National Physical Laboratory
Dr K S Krishnan Road
New Delhi-110012
INDIA

Telephone: +91 11 578 8220 Fax: +91 11 575 2678

**9th International Symposium on
Equatorial Aeronomy [ISEA]**

20-24 March 1995

Bali [INDONESIA]

The symposium is planned to discuss recent progress and future perspectives on a wide range of issues concerning equatorial aeronomy, including the middle atmosphere. Abstracts dealing with a wide range of topics in plasma, ionospheric, solar-terrestrial, dynamical, lidar, airglow (et cetera) studies are solicited; the deadline for receipt of abstracts is 1 November 1994.

Please address all enquiries to

Dr T Tsuda
Radio Atmospheric Science Center
Kyoto University
Uji Kyoto 611
JAPAN

Telephone: +81 774 32 3111 Fax: +81 774 31 8463

E-mail: tsuda@kurasc.kyoto-u.ac.jp

EXPLANATIONS

This Calendar continues the series begun for the IGY years 1957-58, and is issued annually to recommend dates for solar and geophysical observations which cannot be carried out continuously. Thus, the amount of observational data in existence tends to be larger on Calendar days. The recommendations on data reduction and especially the flow of data to World Data Centers (WDCs) in many instances emphasize Calendar days. The Calendar is prepared by the International Ursigram and World Days Service (IUWDS) with the advice of spokesmen for the various scientific disciplines.

The Solar Eclipses are:

a.) **29 April 1995** (annular) crosses northern Peru, southern Colombia, and northern Brazil. Maximum annularity 6 min 37 s in Peru with sun alt. 70 degrees. Path of annularity 195 miles across. Partial phases as far north as Mexico City, most of Florida, and all S. America except s. tip. Moon's diameter = 95% of sun.

b.) **24 October 1995** (total) crosses Iran, Afghanistan, Pakistan, India, Bangladesh, Myanmar, Thailand, Cambodia, Vietnam. Max duration 2 min 10 s in ocean north of Borneo. Most favorable weather region is northwestern India. Path of totality crosses s. of Agra and includes Varanasi and Calcutta. Totality only 1 min and lengthens east though weather forecast worsens. Totality path only 78 km wide. (Description by Dr. Jay Pasachoff.)

Meteor Showers (selected by R. Hawkes, Canada) include important visual showers and also unusual showers observable mainly by radio and radar techniques. These can be studied for their own geophysical effects or may be "geophysical noise" to other experiments. The dates are given in Note 1 under the Calendar.

Definitions:

- Time = Universal Time (UT);
 Regular Geophysical Days (RGD) = each Wednesday;
 Regular World Days (RWD) = Tuesday, Wednesday and Thursday near the middle of the month (see calendar);
 Priority Regular World Days (PRWD) = the Wednesday RWD;
 Quarterly World Days (QWD) = PRWD in the WGI;
 World Geophysical Intervals (WGI) = 14 consecutive days each season (see calendar);
ALERTS = occurrence of unusual solar or geophysical conditions, broadcast once daily soon after 0400 UT;
STRATWARM = stratospheric warmings;
 Retrospective World Intervals (RWI) = intervals selected by MONSEE for study.

For more detailed explanations of the definitions, please see one of the following or contact H. Coffey (address below): *Solar-Geophysical Data*, November issue; *URSI Information Bulletin*; *COSPAR Information Bulletin*; *IAGA News*; *IUGG Chronicle*; *WMO Bulletin*; *IAU Information Bulletin*; *Journal of the Radio Research Laboratories (Japan)*; *Geomagnetism and Aeronomy (USSR)*; *Journal of Atmospheric and Terrestrial Physics (UK)*; *EOS Magazine (AGU/USA)*.

Priority recommended programs for measurements **not made continuously** (in addition to unusual ALERT periods):
Aurora and Airglow — Observation periods are New Moon periods, especially the 7 day intervals on the calendar;

Atmospheric Electricity — Observation periods are the RGD each Wednesday, beginning on 4 January 1995 at 0000 UT, 11 January at 0600 UT, 18 January at 1200 UT, 25 January at 1800 UT, etc. Minimum program is PRWDs.

Geomagnetic Phenomena — At minimum, need observation periods and data reduction on RWDs and during **MAGSTORM Alerts**.

Ionospheric Phenomena — Quarter-hourly ionograms; more frequently on RWDs, particularly at high latitude sites; f-plots on RWDs; hourly ionograms to WDCs on QWDs; continuous observations for solar eclipse in the eclipse zone. See **Airglow and Aurora**.

Incoherent Scatter — Observations on Incoherent Scatter Coordinated Days; also intensive series on WGIs or Airglow and Aurora periods. **Special programs:** Dr. J. Holt, M.I.T. Haystack Observatory, Route 40, Westford, MA 01886 U.S.A., URSI Working Group G.5 (617)981-5625; e-mail AMES::"jmh@chaos.haystack.edu".

Ionospheric Drifts — During weeks with RWDs.

Traveling Ionosphere Disturbances — special periods, probably PRWD or RWDs.

Ionospheric Absorption — Half-hourly on RWDs; continuous on solar eclipse days for stations in eclipse zone and conjugate area. Daily measurements during Absorption Winter Anomaly at temperate latitude stations (Oct-Mar Northern Hemisphere; Apr-Sep Southern Hemisphere).

Backscatter and Forward Scatter — RWDs at least.

Mesospheric D region electron densities — RGD around noon.

ELF Noise Measurements of earth-ionosphere cavity resonances — WGIs.

All Programs — Appropriate intensive observations during unusual meteor activity.

Meteorology — Especially on RGDs. On WGIs and STRATWARM Alert Intervals, please monitor on Mondays and Fridays as well as Wednesdays.

Solar Phenomena — Solar eclipse days, RWDs, and during **PROTON/FLARE ALERTS**.

FLARES22 (FLARE RESEARCH at the maximum of solar cycle 22) — observations of basic physical processes of transient solar activity and its coupling with the solar-terrestrial environment, including times of the various solar ALERTS. Coordinate satellite and ground-based observations. Contact Dr. M. Machado, Dept of Physics, Univ of Alabama, Huntsville, AL 35899 USA. (205)895-6676; SPAN SSL::MACHADO; FAX (205)895-6790.

SOLTIP (SOLAR connection with Transient Interplanetary Processes) — 1990-95 observations and analyses of solar-generated phenomena propagating through heliosphere, including times following the various solar ALERTS. Includes interplanetary Scintillation observations of radio galaxies and telemetry signals to/from interplanetary spacecraft. Also coordination of spacecraft IMP8, ICE, Giotto, Sakigake, Voyager 1/2, Pioneer 10/11, Ulysses, Relict, Wind, SOHO, Galileo and ACE. Contact Dr. M. Dryer, NOAA R/E/SE, 325 Broadway, Boulder, CO 80303 USA. (303)497-3978; SPAN SELVAX::MDRYER; FAX (303)497-3645.

Space Research, Interplanetary Phenomena, Cosmic Rays, Aeronomy — QWDs, RWD, and Airglow & Aurora periods.

International Geophysical Calendar 1995 (Draft)

(See other side for information on use of this calendar)

	S	M	T	W	T	F	S	S	M	T	W	T	F	S	
JANUARY	1	2	3*	4*	5	6	7	2	3	4	5	6	7	8	JULY
	8	9	10	11	12	13	14	9	10	11	12	13	14	15	
	15	16	17	18	19	20	21	16	17	18	19*	20*	21	22	
	22	23+	24+	25+	26+	27+	28	23	24	25	26	27	28	29	
FEBRUARY	29	30	31	1	2	3	4	30	31	1	2	3	4	5	AUGUST
	5	6	7	8	9	10	11	6	7	8	9	10	11	12	
	12	13	14	15	16	17	18	13	14	15	16	17	18	19	
	19	20	21	22*	23*	24	25	20	21	22	23*	24*	25	26	
MARCH	26	27	28	1	2	3	4	27	28	29	30	31	1	2	
	5	6	7	8	9	10	11	3	4	5	6	7	8	9	SEPTEMBER
	12	13	14	15	16	17	18	10	11	12	13	14	15	16	
	19	20	21	22*	23*	24	25	17	18	19	20*	21*	22	23	
APRIL	26	27	28	29	30	31	1	24	25	26	27	28	29	30	
	2	3	4	5	6	7	8	1	2	3	4	5	6	7	OCTOBER
	9	10	11	12	13	14	15	8	9	10	11	12	13	14	
	16	17	18	19*	20*	21	22	15	16	17	18*	19*	20	21	
	23	24	25	26	27	28	29	22	23	24	25	26	27	28	
MAY	30	1	2	3	4	5	6	29	30	31	1	2	3	4	NOVEMBER
	7	8	9	10	11	12	13	5	6	7	8	9	10	11	
	14	15	16	17	18	19	20	12	13	14	15	16	17	18	
	21	22	23	24*	25*	26	27	19	20	21	22*	23*	24	25	
JUNE	28	29	30	31	1	2	3	26	27	28	29	30	1	2	
	4	5	6	7	8	9	10	3	4	5	6	7	8	9	DECEMBER
	11	12	13	14	15	16	17	10	11	12	13	14	15	16	
	18	19	20	21*	22*	23	24	17	18	19	20*	21*	22	23	
	25	26	27	28	29	30		24	25	26	27	28	29	30	
	S	M	T	W	T	F	S	S	M	T	W	T	F	S	
								31	1	2	3	4	5	6	1996
								7	8	9	10	11	12	13	JANUARY
								14	15	16	17*	18*	19	20	
								21	22	23	24	25	26	27	
								28	29	30	31				

10 Regular World Day (RWD)

11 Priority Regular World Day (PRWD)

15 Quarterly World Day (QWD)
also a PRWD and RWD

4 Regular Geophysical Day (RGD)

13 14 World Geophysical Interval (WGI)

23+ Incoherent Scatter Coordinated Observation Day

29 Day of Solar Eclipse

26 27 Airglow and Aurora Period

3* Dark Moon Geophysical Day (DMGD)

1. Days with significant meteor shower activity are: Northern Hemisphere 3-4 Jan; 21-23 Apr; 4-5 May; 6-11, 27-29 Jun; 10-15 Aug; 20-23 Oct; 17-18 Nov; 12-14, 22-23 Dec 1995; 3-4 Jan 1996. Southern Hemisphere 23 Apr; 4-5 May; 6-11, 27-29 Jun; 28-29 Jul; 20-23 Oct; 17-18 Nov; 12-14 Dec 1995.

Abstracts of the 19th International Conference on Archaeology and Ethnology

DAVID ROBERT BATES
1916 - 1994

David Bates, gentleman of science, died on 5 January, aged 77. Born in the country town of Omagh, Northern Ireland, he was educated in Belfast, first at 'Inst' and then at the Queen's University where he graduated BSc in 1937 under the tutelage of Sir Harrie Massey. In 1939 Bates, already a brilliant young research student, accompanied Massey when he returned to the Mathematics Chair at University College London and there developed his interests in applications of quantum mechanical and semiclassical methods which were to be at the heart of his lifelong research. During the Second World War he worked at the Admiralty Research Laboratories on counter measures to protect allied ships from magnetic mines and also found time to extend his research interests into atomic and molecular aspects of atmospheric science. After the war he returned to University College where his continued collaboration with Massey soon resulted in major papers which transformed the study of the ionosphere into a quantitative discipline of inquiry.

In 1951 Bates returned to his beloved Ulster, - to the Queen's University of Belfast as Professor and Head of the Department of Applied Mathematics. There he remained, despite numerous invitations to positions elsewhere, and reigned with distinction for the rest of his life. His impact at Queen's was immense. He believed that science was international and he led by example. With Marcel Nicolet, Bates wrote seminal papers on methane and water vapour in the atmosphere which demonstrated the importance of catalytic reactions and of dynamical processes to the abundance of ozone and other constituents. He pointed out the role of microbiological sources and sinks and effectively set the stage for the current investigations of human activities on the global atmospheric environment. He also predicted that sodium vapour, if released at high altitude, would glow visibly at twilight, - a suggestion which spectacularly proved to be correct and which precipitated, internationally, a spate of important and productive experiments on atmospheric dynamics. To Bates's renowned School of Theoretical Atomic and Molecular Physics post-doctoral fellows and distinguished scientists came from all over the world for extended visits. His own graduate students have had a major impact on science and many now occupy prominent and influential scientific positions, especially in the UK and the USA. All who had the privilege of working with or under David Bates are united, as a family, by their respect for, and their affectionate memories of, a unique man.

Social problems in Northern Ireland caused Bates great personal distress and, for a brief period, he found time to be active in local politics by helping to create the then new non-sectarian Alliance Party. However, science was his life-blood and, in respect of this, his devotion, creativity and originality were sustained throughout his life. His productivity, which continued even after retirement in 1982, was awesome: he left several papers unfinished. His immense contributions to research brought him notable recognition which included, election to the Royal Society in 1955 at the age of 39, membership of the Royal Irish Academy, honorary foreign member of the American Academy of Arts and Science, foreign associate of the American National Academy of Science, nine honorary degrees, the Hughes medal of the Royal Society and a nomination for the Nobel Prize for Physics in 1990. In 1978, for his services to science and education, he was created Knight Bachelor by royal assent.

Sir David is survived by his wife Barbara, whom he married in 1956, his daughter Katherine and his son Adam.

RGHG

PETER NOZHAROV

1934 - 1992

Born in Sofia [Bulgaria], Nozharov graduated in 1954 from the High Marine Military School in Varna. He received his degree in geophysics from Sofia University in 1961.

From 1961 until his death, he worked in the Geophysical Institute of the Bulgarian Academy of Sciences. In 1964, he had a four-month specialization course on problems in palaeomagnetism, supervised by G Petrova, in Moscow at the Institute of Physics of the Earth. He was awarded a PhD in 1968.

Nozharov's principal interests were in the field of theoretical studies on the origin of the natural remanent magnetization of sedimentary rocks, the palaeomagnetic characteristics of Bulgarian volcanic rocks, and in palaeotectonics et cetera. He has more than 80 publications in the field of geomagnetism.

He was organizer of the palaeomagnetic laboratory at the Geophysical Institute. He was particularly concerned with estimating the reliability of measurements of remanent magnetization. He became chief of the Institute's Department of Geomagnetism and from 1975 has been the IAGA National Correspondent for Bulgaria. He was admitted to membership of the General Assembly of the Bulgarian Academy of Sciences in 1990.

He leaves a wife, two children, and a grandson. Let us honour his memory!

IB

DIMITER ZIDAROV**1921 - 1993**

Zidarov died of a myocardial infarction on December 19, 1993. Born at Obzor (on the Black Sea), he was a graduate of the University of Sofia.

From 1947 to 1951, he was employed at the Enterprise for Geophysical Prospectings in Sofia. After the creation of the Geophysical Institute of the Bulgarian Academy of Sciences in 1961, Zidarov organized and was first departmental head of Earth Magnetism and Gravimetry, a post which he held until 1975. He was awarded his doctor's degree in 1967, and in 1969-1970, he was at the Moscow Institute of Physics of the Earth at the USSR Academy of Sciences. He was IAGA's National Correspondent until 1975, when Nozharov [see previous page] took over.

Zidarov's work was mainly concerned with the theory of the Newton potential fields and the corresponding inverse problems. His method of approximation of gravitating or magnetized bodies with elementary point gravitating sources or point magnetic dipoles and subsequently their "ballayage" was an important contribution to research. To obtain optimal approximation, Zidarov worked out for these cases a specific strategy to minimize the functions of many variables. In his later years, Zidarov was concerned with global earth tectonics. On the basis of an analysis of palaeomagnetic data, he produced an hypothesis about the the movement of the core of the Earth since the formation of the planet.

The literary scientific heritage of Zidharov is enormous: there are more than 200 research articles, 3 monographs, 2 popular science books, and many popular articles.

Married, with four daughters and three grand-daughters, Zidarov was a highly-ranked scholar and teacher. In spite of his professional distinction, he remained a straightforward and approachable person and received the respect and affection of his many colleagues who were proud to be his friends.

IB

SIXTY TWO YEARS ON



James Paton (1903 - 1973) with a Krogness camera, a replica of the design used by Carl Stormer for much of his parallactic photography of the aurora from 1932. Paton is shown in the observatory built into the roof of his house in Abernethy, Perthshire [Scotland]. The date of the photograph is uncertain but it was probably taken before or during the IGY [1957-1958].

The Krogness camera is described by Stormer in his book "The Polar Aurora" [Clarendon Press, Oxford: 1955] on page 38. In this camera, 90 x 120 mm glass plates were used and by moving the lens to three (vertically) and two (horizontally) click stops, six photographs could be taken on the one plate.

The Auroral Section of the British Astronomical Association has one of these cameras (but not now in regular use for auroral observation) and Aberdeen University, the Natural Philosophy Museum, holds the one shown in this photograph.

**INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY
(IAGA)**

IAGA is one of the seven Associations in the International Union of Geodesy and Geophysics (IUGG). The objectives of IAGA are:

- a) To promote studies of magnetism and aeronomy of the Earth and other bodies of the solar system, and of the interplanetary medium and its interaction with these bodies, where such studies have international interest;
- b) to encourage research in these subjects by individual countries, institutions or persons and to facilitate its international coordination;
- c) to provide an opportunity on an international basis for discussion and publication of the results of the researches; and
- d) to promote appropriate standardisations of observational programmes, data acquisition systems, data analysis and publication.

IAGA holds an Ordinary General Assembly every four years in conjunction with each Ordinary General Assembly of IUGG. Between the Ordinary General Assemblies, IAGA holds a Scientific Assembly, often meeting with one of the other Associations of IUGG. IAGA therefore meets every other year. The next Assembly is the XXIst General Assembly, scheduled for Boulder, Colorado [USA] in July 1995.

IAGA has two types of publications:

(i) **IAGA Bulletins**, which include the Programme and Abstracts of the Assemblies; Geomagnetic Data and Indices, published annually; and special Data Summaries or Information Booklets, published occasionally.

(ii) **IAGA News**, which contains items and announcements of general interest to the IAGA community and which is published annually.

The IAGA Bulletins are available at low cost from the Secretary-General of IAGA. The IAGA News is sent free of charge to all addresses on the IAGA Mailing List (which at present contains nearly 2500 addresses of individual scientists in some 79 countries) and is available on request from the Secretary-General.

IAGA welcomes all scientists throughout the world to join in research in "Geomagnetism and Aeronomy". IAGA is subdivided into a number of Divisions and Commissions, many of which have working groups for the study of particular subjects in their general areas of interest. On occasion, these internal IAGA groups issue their own newsletters or circulars. At the IAGA Assemblies, the groups organize specialist symposia, invite scholarly reviews and receive contributed papers which present up-to-the-minute results of current research.