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DIVISION II SUN and HELIOSPHERE
SOLEIL et HELIOSPHERE

PRESIDENT	**Donald B. Melrose**
VICE-PRESIDENT	**Valentin Martinez Pillet**
PAST PRESIDENT	**David F. Webb**
BOARD	**Jean-Louis Bougeret, James A. Klimchuk, Alexander Kosovichev, Lidia van Driel-Gesztelyi and Rudolf von Steiger**

PARTICIPATING COMMISSIONS

Commission 10	**Solar Activity**
Commission 12	**Solar Radiation & Structure**
Commission 49	**Interplanetary Plasma & Heliosphere**

DIVISION WORKING GROUPS

Solar Eclipses
Solar and Interplanetary Nomenclature
International Solar Data Access
International Collaboration on Space Weather

PROCEEDINGS BUSINESS SESSION

1. Introduction

This report is on activities of the Division at the General Assembly in Rio de Janeiro. Summaries of scientific activities over the past triennium have been published in Transactions A, see Melrose *et al.* (2008), Klimchuk *et al.* (2008), Martinez Pillet *et al.* (2008) and Bougeret *et al.* (2008). The business meeting of the three Commissions were incorporated into the business meeting of the Division. This report is based in part on minutes of the business meeting, provided by the Secretary of the Division, Lidia van Driel-Gesztelyi, and it also includes reports provided by the Presidents of the Commissions (C10, C12, C49) and of the Working Groups (WGs) in the Division.

2. Report on the Business Meeting held on 7 August 2009

The Division II Business Meeting at the General Assembly in Rio de Janeiro was held on Friday 7 August 2009, chaired by the outgoing President of Division II, Don Melrose. An agenda, containing draft motions to be discussed at the meeting had been circulated electronically to all members of the Division prior to the General Assembly.

The meeting was in two parts due to a conflict with Symposium 264. The first part started at 9am, when it was agreed to defer some agenda items to later in the day, after the last talk at the Symposium. These items included the Business Meetings for C10 and C12.

2.1. *Items from the Business meeting in Prague*

The Chair reported on the following items:
1. Outcomes following the business meeting at the last General Assembly in Prague in 2006. The minutes of the Prague meeting were shown and briefly discussed. Members were advised that links to reports published by the IAU on the activities of the Division, its Commissions and WGs are available on the Division website.

2. The chair reported briefly on the three IAU Executive meetings to which the Division Presidents were invited during the triennium. Recommendations concerning the scientific sessions at the General Assembly were delegated to the Division Presidents at the Executive meeting in Oslo in May 2008. At the Executive Meeting on 2 August (EC86-1) the Secretary, Lidia van Driel-Gesztelyi, represented the Division.

2.2. *Future of Commissions and WGs*

The IAU requires that the Division make recommendations on the continuation of existing Commissions and WGs, and on the creation of new Commissions and WGs.

An explanatory note on the structure of the Division had been distributed to all members of the Division prior to the General Assembly. The Chair summarized the status quo by remarking that the Division operates as a federation of the three Commissions. The following motion was moved from the Chair:

Motion 1: Division II recommends that its three Commissions continue: C10 Solar Activity, C12 Solar Radiation & Structure, and C49 Interplanetary Plasma & Heliosphere.

After a brief discussion, this motion was carried unanimously.

The Chair reported that the Presidents of three of the four WGs had recommended that their respective WGs continue, and one President recommended that his WG not continue. The following motion was moved from the Chair:

Motion 2: Division II recommends that three of its four WGs continue: WG Solar Eclipses, WG International Solar Data Access, and WG International Collaboration on Space Weather; and that the fourth WG not continue: WG Solar & Interplanetary Nomenclature.

It was agreed that Division II WG Solar Eclipses, and Division II WG International Collaboration on Space Weather continue, and that WG Solar & Interplanetary Nomenclature not continue. After a vigorous discussion it was recommended that WG International Solar Data Access formally expire and that discussions begin on replacing it by a new WG after consideration of possible overlap and synergy with the IAU Virtual Observatory group.

With this change, Motion 2 was carried unanimously.

2.3. *Election Procedure*

The IAU requires that the Executive (President, Vice President, Secretary) and other members of the Organizing Committee (OC) of the Division for the following triennium be elected at the General Assembly. The Division decided on guidelines for the election process at the General Assembly in Sydney in 2003. The following explanatory note was distributed electronically by the Chair prior to the General Assembly.

Election Procedure for Division II

The current policy for election of the OC for Division II was decided at the Business Meeting at the General Assembly in Sydney 2003. The policy is that the OC consist of the Presidents and Vice Presidents of C10, C12 & C49. The Vice President is regarded as the President-elect. There was no decision to appoint a Secretary at the General Assembly in Sydney; in Prague it was decided to appoint a Secretary from within the OC, and one was chosen from amongst the Vice President of the Commissions. The Chair reported that there has been no move within the Division to change these arrangements.

The important choice that needs to be made at this General Assembly is the election of the Vice President, to take over as President at the following General Assembly. In Sydney, it was decided that the Vice President of the Division should be chosen from among the incoming Commission Presidents. David Webb took over as President of the Division at the Sydney General Assembly, after being President of C49 in the previous triennium, Don Melrose took over as President of the Division at the Prague General Assembly, after being President of C10 in the previous triennium, and Valentin Martinez Pillet takes over as President of the Division 2009–2012 after being President of C12 for 2006–2009. Strict rotation suggests that the Vice President of the Division for 2009–2012 should be from C49.

This scheme is too restrictive, as the situation now facing us shows.† It is important that the Vice President of the Division have appropriate experience, either as the current or immediate

† The VP of C49, who would have been the VP of the Division under this procedure, declined to accept the appointment.

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past President of one of the Commissions. This year the OC of the Division decided to broaden the group from whom the incoming Vice President of the Division could be chosen, specifically to include the current Presidents and Vice Presidents of the Commissions. A proviso was that the President and Vice President of the Division should not be from the same Commission. This left four possible candidates, and the OC chose from those of these who were willing to be nominated. The nominee is James Klimchuk, the outgoing President of C10.

The following motion was moved from the Chair.

Motion 3: The incoming Vice President of the Division is to be chosen from amongst the current members of the OC of the Division, subject to the proviso that the President and Vice President are from different Commissions.

After a brief discussion, this motion was carried unanimously.

The position of Secretary of the Division was discussed, and it was agreed that the Secretary be chosen by the incoming OC from amongst its members. It was agreed that it is desirable (but not necessary) that the Secretary be from the Commission not represented by the President or Vice President of the Division.

2.4. *Incoming OC for the Division*

The membership of the incoming OC was noted:
President: Valentin Martinez Pillet (Spain)
Vice President: James A. Klimchuk (USA)
Secretary: to be decided
Past President: Donald B. Melrose (Australia)
Board: Gianna Cauzzi (Italy), Natchimuthuk Gopalswamy (USA), Alexander Kosovichev (USA), Ingrid Mann (Japan), Carolus J. Schrijver (USA) and Lidia van Driel-Gesztelyi (France, UK, Hungary).
None of the VPs of the Commissions was present, and the appointment of the Secretary, from amongst them, was deferred until they could be consulted.

2.5. *Electronic contact with Division members*

An e-mail list <iaudivii@iac.es> of all members of the Division is available, allowing effective electronic communication between the OC and members of the Division. There was discussion on how this new possibility should be used. Valentin Martinez-Pillet, who has oversight of the list, emphasized that we need to restrict the number of emails, avoiding any that could be regarded as SPAM. At present only a few messages have been sent to this list, and the Division President is the only person who has permission to send messages. Nevertheless, a few people have asked to be removed from the list.

The use of the list for news was discussed. The consensus was that any news items should be specifically IAU-related. There is no intention that this will replace Solar News and a source of more general news for the solar community. Jean-Louis Bougeret pointed out that many heliosphere/magnetosphere people do not read Solar News.

One specific use of the list is for election of the OCs for the three Commissions. For this purpose, it is desirable to have separate lists for the three Commissions. As most of the work is done through the Commissions, such lists would be useful for other purposes.

2.6. *Divisional website*

The Division has a website at
http://www.iac.es/proyecto/iau_divii/IAU-DivII/main/index.php
Suggestions relating to the website and how it might be used will be welcome.

2.7. *C49 Business Meeting*

The President of C49, Jean-Louis Bougeret took the chair for the business meeting of C49. He reviewed the broad scope of C49 and proposed that it cover the solar wind and heliosphere, including the magnetospheres. It was questioned up to what point the Earth's magnetospheric community (that has strong links with C49) is involved in IAU matters such as Symposia. While it is acknowledged that this community is more linked with other international organizations, it is recommended that the Commission OC take measures to encourage this community to participate more actively in the IAU. Their input can be very relevant for important astronomical topics such as exo-planet magnetospheres.

The President thanked the outgoing OC for their work. The outgoing OC comprised 13 members including P and VP, covering most topics in the field of C49. (P: J.-L. Bougeret, VP: R. von Steiger, Board: S. Ananthakrishnan, H. Cane, N. Gopalswamy, S. Kahler, K. Shibata, R. Lallement, B. Sanahuja, M. Vanda, F. Verheest, D. Webb). During the last triennium, OC members have been much involved in special activities in the context of the International Heliophysical Year (IHY 2007-2008). He expressed the view that C49 is the best context to pursue these efforts of international coordination.

The President referred to the Triennial Report by C49, cf. Bougeret *et al.* (2008). A big effort was made by contributors who produced a very nice summary of progress made in the last three years. In particular, Richard Marsden, the *Ulysses* Project Scientist, wrote a very nice review of the main results of the *Ulysses* mission –a landmark in this field– that was recently terminated after 18 years (five IAU triennia!) of successful operation.

The election for the new OC was discussed and conducted within the OC. It was expected that a C49 e-mail list will be available in the future, so that all regular members can participate in the election. The OC acknowledged that the outgoing VP, R. von Steiger declined to continue as President, being already much involved in COSPAR and ISSI activities. J.-L. Bougeret proposed as new President Nat Gopalswamy, who has been much involved in the organization of the IHY as "International Coordinator", and as Vice-President Ingrid Mann, who is much involved in the hot topics of interplanetary dust and nano-particles. For the Board, it was agreed to enforce the IAU bye-laws for the maximum duration of OC membership (6 years), and 7–8 members maximum. The President reported the result of the election of the new OC,
President: Natchimuthuk Gopalswamy (USA)
Vice-President: Ingrid Mann (Japan)
Past President: Jean-Louis Bougeret (France)
Board: Carine Briand (France), Rosine Lallement (France), David Lario (USA), P.K. Manoharan (India), Kazunari Shibata (Japan), and David F. Webb (USA),
and he thanked them and wished C49 an excellent triennium.

2.8. *Afternoon session*

The meeting adjourned and reconvened after the conclusion of Symposium 264. The Chair reported on the items of business discussed before the adjournment. In response to a comment from Jean-Claude Pecker, the meeting was advised that triennial Commission science reviews are available on the IAU website.

2.9. *C10 Business Meeting*

The President of C10, James Klimchuk, took the chair for the business meeting of C10. He summarized the election of the incoming OC, and the activities of the C10 over the triennium.

Election: Because an e-mail distribution list for the 656 regular members of C10 is not yet available, the election was conducted within the OC. OC members were asked if they wished to serve another term, and they were reminded that serving more than two terms is discouraged. Nominations were also solicited for entirely new members. This produced a slate of candidates from which the incoming OC members were elected by anonymous ballot. Following tradition and with unanimous approval, the current Vice-President became the incoming President. A subsequent vote was taken to elect the incoming V-P from a list of returning OC members who wished to be considered. The outcome of the election is as follows:
President: Lidia van Driel-Gesztelyi (France, UK, Hungary)
Vice-President: Carolus J. Schrijver (USA)
Past President: James A. Klimchuk (USA)
Board: Paul Charbonneau (Canada), Lyndsay Fletcher (UK), S. Sirajul Hasan (India), Hugh S. Hudson (USA), Kanya Kusano (Japan), Cristina H. Mandrini (Argentina), Hardi Peter (Germany), Bojan Vršnak (Croatia), and Yihua Yan (China).
The question of whether to continue to have a Commission Secretary will be taken up by the new OC. It is expected that a Commission e-mail list will soon be available and that all regular members will participate in the next election of the OC.

Meeting Proposals: The OC solicited, reviewed, and endorsed proposals for Symposia and Joint Discussions. It also offered advice on how the proposals could be improved. Many OC members expressed a concern that Symposia tend to be too broad and suggested that more focused meetings would have greater scientific value and attract more leading scientists. It was recognized that focused proposals can have difficulty getting the support of multiple Division

Presidents and therefore are less likely to be selected. It is hoped that the IAU Executive Committee will consider this issue.

Triennial Report: A team effort involving the entire OC produced a very nice summary of science progress in Solar Activity over the prior three years. It was published in Transactions IAU, Vol. XXVIIA, cf. Klimchuk *et al.* (2008), and is available on the Commission website.

Website: A C10 website was created (http://www.mssl.ucl.ac.uk/iau_c10/index.html). Among other things, it includes recent reports of the Commission and a history of OC members and officers dating back to 1970 (Presidents dating back to 1925).

Solar Naming Convention: Carolus Schrijver, incoming V-P, proposed a standardized convention for identifying solar events (e.g., flares) to be included in publications so that search engines can easily identify other relevant publications in the on-line literature. C10 formally endorsed the proposal, and it has recently been adopted by *Solar Physics*, with other journals hopefully to follow. The proposal can be found on the Division II website.

At the end of the C10 business meeting, the President invited the audience to make suggestions on how the Commission could better serve its members. No significant response was received.

2.10. *C12 Business Meeting*

The President of C12, Valentin Martinez-Pillet, took the chair for the business meeting of C12. He thanked the members of the outgoing OC, described the election of the incoming OC, and summarizes the activities of C12 over the triennium.

The election was not carried out by polling the entire membership, due to the absence of a Commission specific e-mail list. It was commented that it would be ideal if IAU could provide such e-mail lists. In their absence, the Commission Presidents only have the option of creating such lists at their home institutions, but it would be difficult to justify the effort in creating, verifying and maintaining such lists. Only through Commission-wide e-mail lists) would it be possible to involve the full membership in future OC elections. The President noted the result of the election for the incoming OC:
President: Alexander Kosovichev (USA)
Vice-President: Gianna Cauzzi (Italy)
Past President: Valentin Martnez Pillet (Spain)
Board: Martin Asplund (Germany), Axel Brandenburg (Sweden), Dean-Yi Chou (China Taiwan), Jörgen Christensen-Dalsgaard (Denmark), Weiqun Gan (China PR), Vladimir D. Kuznetsov (Russian Federation), Marta G. Rovira (Argentina), Nataliya Shchukina (Ukraine), and P. Venkatakrishnan (India).

The President advised that the C12 website can be found at:
http://www.iac.es/proyecto/iau_divii/IAU-Com12/main/index.php
where information about related IAU Symposiums and links to appropriate web sites (e.g., IAU membership lits) can be found.

The President referred to the triennial report of C12, cf. Martinez Pillet *et al.* (2008), which includes contributions from scientists who are not OC members and who made relevant investigations to hot topics. Specific topics covered in this way were solar abundances, dynamo activity and solar-cycle minimum.

Sasha Kosovichev (incoming President) asked how members can change Commission/Division ascription within IAU. The President commented that IAU has already established a login facility at the Union web site where some personal information can be changed. It would be ideal if information about the ascription to specific Commissions/Divisions could be negotiated using this tool. As incoming President, Sasha noted that a specific request along these lines to the IAU Executive will be made.

2.11. *Proposals for IAU meetings*

The President of the Division resumed the chair. He opened the meeting for possible proposals for solar-sponsored IAU Symposia in 2011, 2012 and 2013. There are nine IAU Symposia in each calendar year. Two of the Symposia in 2010 are solar-related:
IAUS 273 "Physics of the Sun and star spots" Los Angeles, USA, 23–26 August
IAUS 274 "Advances in Plasma Astrophysics" Catania, Italy, 6–10 September

The schedule for proposing Symposia is that same each year. Specifically, for Symposia in 2011, the deadline for Letters of Intent is mid-September 2009, and complete proposals will be required by early December 2009. The successful proposals will be known by mid-2010.

2.12. *Other business*

Carine Briand suggested that Division II proposes to the General Secretary of the IAU that he send to the Italian government a letter in support of the reconstruction of Aquila University astronomically related sites. The incoming Division president, V. Martinez Pillet, suggested that he raise this issue at the Executive meeting on the last day of the GA.

Nat Gopalwamy presented a proposal from Sarah Gibson for a WG on comparative solar minima: characterizing the heliophysical "ground state". There was general support for the proposal. A more detailed report on this proposal is included in § 3.7 below.

Carine Briand raised the issue of the low visibility of Solar and Heliospheric sciences. A proposal was made to form a Division II WG whose main objective will be to start activities related to public outreach of Heliophysics sciences. It was pointed out that there would be overlap with the activities of C55 (Division XII), that links should be created with C55, and that eventually the activities of this WG are likely to be incorporated into those of C55. It was agreed that we should proceed with such a new WG for the next three years. A brief report is included in § 3.8 below.

Sasha Kosovichev presented a proposal from C12 for a WG on the coordination of synoptic observations of the Sun. In the subsequent discussion, Todd Hoeksema remarked on the importance of long-term continuous synoptic observations, and on the difficulty of maintaining a continuous series. It was agreed that C12 should decide what action to take on this matter.

Cristina Mandrini presented a brief report on solar physics research in Argentina. Solar physics in Argentina is young compared to other branches of astrophysics. There are about eight PhD students working in solar physics and/or heliospheric physics. Cristina emphasized the need for schools for these students. One such school was organized in association with the IHY in 2006, and she pointed out the difficulty of organizing of such meetings due mainly to financial problems. Two instruments provide data, that are freely available, the Hα Solar Telescope (HASTA, high temporal cadence increased during flares) and the Mirror Coronagraph (MICA, prototype of C1) both in Observatorio Felix Aguilar in San Juan. A third instrument is the Solar Submillimeter Telescospe (SST) in collaboration with the Brazilian group led by P. Kaufmann in Complejo Astronomico El Leoncito, San Juan.

3. Reports from WGs and IAU representatives

Chairs of WGs and IAU representatives on other international organizations (COSPAR, IHY, SCOSTEP, ISES) were invited to give reports. The following reports were received.

3.1. *WG on Solar Eclipses (Jay Pasachoff)*

During the 2006-9 triennium, members of the IAU WG on Solar Eclipses of IAU Division II worked on matters of professional liaison and public information for total solar eclipses in Siberia/China on 1 August 2008 and, just before the General Assembly, in India and China on 22 August 2009; for annular eclipses in French Guiana on 22 September 2006, New Zealand and the South Pacific on 7 February 2008 (annular in Antarctica), and Indonesia and Australia's Cocos Islands on 7 January 2009; and partial in eastern Asia on 19 March 2007 and in Argentina and Brazil on 11 September 2007. The WG Website, at
http://www.eclipses.info/>http://www.eclipses.info,
is a convenient reference for professional astronomers, amateur astronomers, and the general public. The WG is also in liaison with the Program Group on Public Education at the Times of Eclipses of IAU C46 on Astronomy Education and Development. WG Chair Pasachoff (2007) wrote "Observing solar eclipses in the developing world" for the proceedings of an IAU Special Session.

Members of the WG include Iraida Kim of Moscow State University (Russia), Hiroki Kurokawa of Kwasan Observatory (Japan), Jagdev Singh of Indian Institute of Astrophysics (India), Vojtech Rusin of the Astronomical Institute of the Slovak Academy of Sciences (Slovakia), Atila Ozguc of the Kandilli Observatory (Turkey), Fred Espenak of NASA's Goddard Space Flight Center (USA), Jay Anderson of University of Manitoba (Canada), Glenn Schneider of the University of Arizona's Steward Observatory (USA), Michael Gill of the Solar Eclipse Mailing List (U.K.) and Yihua Yan of the National Astronomical Observatories (China). Espenak is the world's major source of predictions of eclipse paths and circumstances and Anderson provides meteorological information; their work is available on the Web, linked to

http://www.eclipses.info/>http://www.eclipses.info
and directly at
http://eclipse.gsfc.nasa.gov/eclipse.html,
and as NASA Technical Publications, all of which acknowledge the support of the IAU WG on Eclipses. Espenak & Meeus (2007), Espenak & Meeus (2008) also published "Five Millennium Canon of Solar Eclipses: -1999 to +3000" and "Five Millennium Catalogue of Solar Eclipses: -1999 to +3000 (2000 BCE to 3000 CE)." Gill now runs the Solar Eclipse Mailing List at: SEML@yahoogroups.com, a valuable resource for many of the most dedicated eclipse observers.

Pasachoff and Anderson attended a Solar Eclipse Workshop in Delhi in January 2009 to help Indian students and others prepare for the 22 July 2009 eclipse. In the event, successful airplane observations were obtained and some ground-based observations were obtained from a few Indian sites, though the weather in India was, as predicted, overall not conducive to viewing.

Two eclipse review articles, Pasachoff (2009a) and Pasachoff (2009b), were published.

Yan was recently added to the WG because he was chief solar scientist for observations and planning for the 22 July 2009 eclipse, the longest in the 18 year 11 1/3 day Saros series, which was mainly observed from China, with totality approaching 6 minutes. Among the tasks of the WG on Solar Eclipses with which Yan helped were discussions about arrangements for the duty-free import of observing equipment for the eclipse observations and official invitations on behalf of the Chinese National Academy of Sciences to aid scientists in obtaining visas to China. Pasachoff had traveled with Yan, with Lin Lan of Hangzhou High School, and with Jin Zhu, director of the Beijing Planetarium, to reconnoitre near Shanghai for eclipse sites, and they chose three alternatives: Jinshanwei (on the coast south of Shanghai), Moganshan (at 300 m altitude north of Hangzhou), and Tianhuangping (at 900 m altitude west northwest of Hangzhou). The site at Tianhuangping was finally adopted by research teams from many nationalities, and was considered the IAU site. It included scientists from the United States, China, Australia, Greece, France, Russia, Georgia, Bulgaria, and elsewhere. For the actual eclipse, the weather was not ideal, but all aspects of the eclipse, including the corona, were viewed, though through clouds. Conditions at Moganshan (fog) and Jinshanwei (rain) were worse, so it is fortunate that most scientists were concentrated at Tianhuangping. Some preliminary images are available at www.williams.edu/astronomy/eclipse/eclipse2009.

Several ships observed the eclipse, including one that obtained the maximum of 6 min 42 sec under clear skies. Excellent observations were obtained at Enewetak atoll, Marshall Islands, by Miloslav Druckmüller, Vojtech Rusin, and colleagues. See
http://www.zam.fme.vutbr.cz/ druck/eclipse/Ecl2009e/0-info.htm

The good offices of the IAU WG on Solar Eclipses will continue during the next triennium with an annular eclipse on 15 January 2010 in India, Sri Lanka, Bangladesh, and Myanmar; with a total eclipse on 11 July 2010 in Easter Island and at sea and on atolls in French Polynesia; with four partial eclipses in 2011, and with an annular eclipse on 20 May 2012 whose path includes southeastern China, southeastern Japan, and the western United States, including major radio telescopes. Preparations will be made for the 13 November 2012 total solar eclipse that will cross Australia's Cape York peninsula and Cairns. A Solar Eclipse Workshop is under discussion for 2011, a year with no total or annular eclipses but with four partial eclipses, which would be the successor to similar Workshops held most recently at the Griffith Observatory, California, USA, in 2007, and prior to that in Milton Keynes, U.K., in 2004, and in Antwerp, Belgium, in 2000; such workshops have been held in years with no total or annular eclipses.

Xavier Jubier (France) has been added to the WG in recognition of his providing on-line eclipse maps in Google Maps and Google Eclipse:
http://xjubier.free.fr/en/site_pages/SolarEclipsesGoogleMaps.html
He has also provided Solar Eclipse Maestro for computer control of cameras during eclipses. With the end of the Chinese pair of total eclipses, Yihua Yan has rotated off the WG.

3.2. *WG on on Solar and Interplanetary Nomenclature (Ed Cliver)*

The WG on Solar and Interplanetary Nomenclature (formed in 2000) was chaired by Ed Cliver and included Jean-Louis Bougeret, Hilary Cane, Takeo Kosugi (deceased), Sara Martin, Reiner Schwenn, and Lidia van Driel-Gestelyi. With the help of the broader community, the WG identified terms used in solar and heliospheric physics that were thought to be in need of clarification and then commissioned topical experts to write essays reviewing the origins of these terms and their current usage/misusage. In all six terms were addressed and seven essays (listed below) were published. The first six essays, Burlaga (2001), Russell (2001), Cliver & Cane (2002), Daglis

(2003), Vršnak (2005) and St. Cyr (2005), and an introduction to the series, Cliver (2001), were published in *EOS*, the weekly newspaper of the American Geophysical Union, and the last, Švestka (2007), was published in *Solar Physics*.

It was decided by the WG that the backlog of significant solar/heliospheric terms "at risk" had been largely addressed and that the WG be terminated. As more terms arise, as will almost certainly be the case in a vigorous field of research such as solar-terrestrial physics, a new committee can be formed to address them.

The Chair thanks the WG members for their dedicated service during these past nine years as well as the essay authors for their insights on the science underlying the terms they considered.

3.3. *WG on International Collaboration on Space Weather (David Webb)*

The WG for International Collaboration on Space Weather has as its main goal to help coordinate the many activities related to space weather at an international level. It is chaired by David Webb and its website is at:
http://www.iac.es/proyecto/iau_divii/IAU-DivII/main/spaceweather.php
The site currently includes the international activities of the IHY, the International Living with a Star (ILWS) program, the CAWSES (Climate and Weather of the Sun-Earth System) WG on Sources of Geomagnetic Activity, and Space Weather studies in China.

The IHY is an international program of scientific collaboration that during the time period 2007-2009, centered on 2008, the 50th anniversary of the International Geophysical Year. The IHY was considered to be of sufficient importance to the IAU to have its own IAU scientific representative, currently David Webb. The physical realm of the IHY encompasses all of the solar system out to the interstellar medium, representing a direct connection between in-situ and remote observations. The IHY working group helped identify national leaders for the IHY program. The IHY organization has an International Advisory Committee and an International Steering Committee. Coordinators were appointed for eight regions of the world and ∼60 countries have functioning national committees. Complete information on the IHY can be found at the main IHY site: http://ihy2007.org. The IHY has officially closed, but it is expected that the observatory legacy part of IHY will continue under UN auspices as the International Space Weather Initiative.

The CAWSES working group on Sources of Geomagnetic Activity, chaired by Nat Gopalswamy, has as its objectives to understand how solar events, such as CMEs and high speed streams, impact geospace by investigating the underlying science and developing prediction models and tools. CAWSES has been extended as CAWSES–II for 2009–2013. The website is at: http://www.cawses.org/

The WG on Space Weather Studies in China is chaired by Jingxiu Wang and is involved with many new initiatives on space weather. The working group will be adding information and websites on active space weather studies in other countries, such as in India, Russia and the Americas.

3.4. *WG on International Data Access (Bob Bentley)*

Website: http://www.mssl.ucl.ac.uk/grid/iau/index.php

The WG on International Data Access (Sun and Heliosphere) was originally formed as a group intended only to cover the solar part of Division II. However, it was extended to include heliospheric data sets needed to support Space Weather and related studies.

For several years, many of the members of the WG have discussed the idea of building a virtual observatory (VO) in heliophysics. In order to address science problems that span the disciplinary boundaries the idea was that this would provide enhanced access to solar and heliospheric data, and to magnetospheric and ionospheric data for planets with magnetic fields and/or atmospheres. Although initial attempts were unsuccessful, a proposal that was submitted in September 2008 to the Capacities thematic priority of the European Commission's Seventh Framework Programme (FP7) was accepted. The Heliophysics Integrated Observatory, HELIO, started in June 2009 and will last for three years; the HELIO Consortium has 13 members, many of whom are members of this WG. The Consortium includes experts in data from the different domains of heliophysics as well as computer scientists; NASA and ESA are also both involved.

One of the main objectives of HELIO virtual observatory is to create a collaborative environment where scientists can discover, understand and model the connections between solar phenomena, interplanetary disturbances and their effects on the planets. In order to achieve this the project has to address issues related to data quality and content, and manage the differences

in the way data are stored and described in the different domains. It is in these areas that the activities of this WG are important.

With a few exceptions, data from space-based observatories are generally of good quality and well managed. However, data from ground-based observatories have more inconsistencies than their space-based counterparts that make them harder to use in the machine world of the virtual observatory. Within the WG we have been looking at two areas that should enhance data access for both groups:

- Metadata contents of the files headers
- The naming and organization of data in archives exposed to the Internet

There are many complexities associated with making changes to existing data sets and the principle objective of the former discussion is to improve the quality of new data sets by encouraging good practices. Virtual observatories such as HELIO must, as far as possible, be able to handle the issues related to accessing existing datasets within the infrastructure that they provide.

There is significant scope, however, for improving the status quo on the latter topic. Small changes to the way files are named and the directory structure under which they are stored can radically improve their accessibility from the Internet; the benefit of such changes are not necessarily obvious until they are explained to the providers. Also, the provision of observing logs allows virtual observatories to address issues of the continuity and completeness of data sets, and manage access where all the data are not necessarily on-line.

The WG is working with HELIO and with the SOTERIA project (also funded under FP7) to try to test our ideas for improving data access. In many ways, HELIO and SOTERIA complement each other: HELIO is concentrating on infrastructure issues while a significant part of the resources of SOTERIA are devoted to working with data providers. By using the groups involved in SOTERIA as test cases for the Working Groups guidelines, we should be able to iterate the guidelines to provide maximum benefit while causing minimal disruption to the data providers. HELIO should then be able to quickly demonstrate how any changes have improved access.

By validating the ideas of the WG through a collaboration with funded projects that we have influence over, we believe that we stand a chance of making real progress in our objective on improving access to solar and heliospheric data for the whole community. It is in this area that most of our effort will be focused over the next 12–18 months.

With HELIO we are also considering whether additional improvements are required to service the needs of other communities that could be interested in these data - astrophysics and planetary science being the most obvious examples. If necessary such changes will be incorporated into the guidance material provided by the WG.

Links to HELIO, SOTERIA and related projects can be found on the WG website.

3.5. *Report on Scientific Committee on Solar-Terrestrial Physics (Nat Gopalswamy)*

The Scientific Committee on Solar-Terrestrial Physics (SCOSTEP) has completed the successful Climate and Weather of the Sun-Earth System (CAWSES) program that ran during 2004–2008. Preparations are currently made to continue this program as CAWSES–II, which will be launched in 2010 and will end in 2014.

Based on the community input obtained during various meetings since 2007, four scientific topics have emerged that focus on some of the forefront scientific challenges facing the international solar terrestrial physics community:

1). Solar Influences on Earth's Climate
2). Geospace Response to Altered Climate
3). Short-term Solar Variability and Geospace
4). Geospace Response to Lower Atmospheric Waves

In addition, two working groups have been formed that will address the issues of Capacity Building and Escience and Informatics.

In collaboration with the Solar-Terrestrial Environment Laboratory of Nagoya University in Japan, a series of educational comic books was developed to communicate solar-terrestrial science to the general public in many languages. In addition to distributing the existing comic books, new ones that address CAWSES–II science topics will be developed. CAWSES–II will support scientists from developing nations as well as graduate students and young scientists to take part in SCOSTEP/CAWSES activities and will have access to data and research tools.

CAWSES–II is to establish a Virtual Institute in order to most effectively coordinate international collaborations among scientists around world, particularly those from developing countries

as well as early career scientists and students. The Virtual Institute will take advantage of cyber-infrastructure technology and develop necessary software to facilitate cross-disciplinary research, and data and resource management. It will establish digital libraries and host virtual scientific conferences, which will benefit greatly young scientists. Public education and capacity building will continue to be a core part of CAWSES–II.

The twelfth Solar-Terrestrial Physics Symposium organized by SCOSTEP will be held in Berlin during 12–16 July 2010. The scientific deliberations will be organized along the following sessions reflecting the CAWSES–II activities: 1. Solar influences on climate, 2. Space weather: science and impacts, 3. Atmospheric coupling processes, and 4. Space climatology.

3.6. *Summary of Activities Related to the IHY Program (David Webb)*

The International Heliophysical Year (IHY) is an international program of scientific research and collaboration to understand the external drivers of the space environment and climate. Activities were centered in 2007 and 2008. The IHY involves utilizing the existing assets from space and ground as a distributed Great Observatory and the deployment of new instrumentation, new observations from the ground and in space, and public and student education. IHY officially closed in February 2009 at the United Nations in Vienna, Austria. Many IHY follow-on activities will continue over the next few years and will focus on the transition to the new International Space Weather Initiative (ISWI).

Within the IAU, coordination of IHY activities is within Division II. David Webb is the IAU representative to the IHY and will continue as the representative for the new ISWI. Hans Haubold has led the IHY effort for the United Nations under the auspices of COPUOS and the U.N. Basic Space Science (UNBSS) program.

IHY's focus on developing new and exciting EPO programs, led by Cristina Rabello-Soares, provided unique opportunities for the global community to increase the visibility and accessibility of heliophysics outreach programs. To address this focus, the IHY developed a Schools Program that developed a series of schools in 2007 and 2008 with the purpose of educating students about Universal Processes, the organizational principles and universal laws that underlie our understanding of the Universe. The IHY Schools Program was coordinated by David Webb and Nat Gopalswamy. Five main IHY schools were held: the North America school in Boulder, CO, USA, July-August 2007; the first Asia-Pacific school at Kodaikanal Observatory in Bangalore, India December 2007; the Latin America school in Sao Paulo, Brazil February 2008; the 2nd Asia-Pacific school in Beijing, China October 2008; and the Europe-Africa school in Nsukka, Nigeria November 2008.

The IHY Gold History initiative has had the goals of identifying and recognizing participants in the first IGY, preserving memoirs, etc. of historical significance for the IGY, making them available to historians and researchers, spreading awareness of the history of geophysics, and planning special events. About 150 IHY Gold members have been recognized.

Many scientific meetings and workshops related to IHY were held in 2007–2009 in many countries. In 2009 alone there were these IHY-related meetings: The IHY Africa 2009 Workshop in June in Livingstone, Zambia held in conjunction with the SCINDA 2009 workshop; an IHY session at the International Association of Geomagnetism and Aeronomy (IAGA) 11th Scientific Assembly in Sopron, Hungary in August; the Final IHY/ UNBSS Workshop in Daejeon, Korea in September; a Joint Discussion (JD16) on the results of the IHY Whole Heliosphere Interval August 12–14 at the IAU General Assembly in Rio de Janiero, Brazil; a second workshop following up on the successful 2008 IHY's Whole Heliosphere Interval (WHI) workshop will be held in Boulder, CO, USA November 10–13, 2009.

Several books and articles have or are now being published regarding IHY-related activities. These include:

1) Two versions of the Final Report of the International Heliophysical Year to the United Nations Committee on the Peaceful Uses of Outer Space (CUPOUS): a 50-page summary of IHY activities published in 2008 by the UN, and a complete report that is being published by Springer.

2) The Proceedings of IAU Symposium 257, "Universal Heliophysical Processes", held in Ioannina, Greece in September 2008, was published for the IAU by Cambridge University Press in 2009, edited by Nat Gopalswamy and David Webb.

3) Papers based on the IHY/UNBSS meeting held in Sozopol, Bulgaria in 2008 will be published in a special issue of the journal *Sun and Geosphere*.

4) A book on universal physical processes will be published by Springer based on the IHY School in Kodaikanal, India.

5) A summary of the papers presented at the IAU JD16 meeting on WHI, edited by David Webb and Sarah Gibson, will be published in the IAU Highlights of Astronomy, Volume 15.

6) Brief reports by David Webb summarizing the IHY activities as related to the IAU have been published in the IAU Information Bulletins over the past few years. The final one will appear in IB105.

3.7. *New WG on Comparative Solar Minima (David Webb, Sarah Gibson)*

Website: http://ihy2007.org/IAUWG/WEBPAGES/IAUWG.shtml

The solar activity cycle, as manifested by repeated increase and then decrease in the number of sunspots visible on the Sun, has been observed and analyzed for centuries. However, only for the past few ∼11-year activity cycles have new capabilities in satellite and ground-based observations allowed us to consider how a broad range of solar, heliospheric, and geospace observables vary within and between cycles. These observations, in conjunction with theoretical and numerical modeling advances, enable an interdisciplinary, system-wide view on the origins and impacts of solar cycle variation.

Solar minimum represents the time of lowest solar activity and simplest heliospheric structure, and as such is a good place to begin putting together such a system-wide understanding. However, recent observations and analyses imply complexities in the variation within and between solar minima that have implications for analyzing and predicting space weather responses at the Earth during solar quiet intervals, and also for interpreting the Sun's past behavior as preserved in cosmogenic isotopes and historical sunspot and auroral records.

Determining the solar origins and net impacts at the Earth of solar minimum differences will require coordinated, interdisciplinary modeling efforts to bring the pieces together. The international observational and modeling coordinated campaigns known as the Whole Sun Month (WSM) and the Whole Heliosphere Interval (WHI) are examples of such efforts, for solar minimum periods in 1996 and 2008, respectively. The goals of these campaigns were to characterize the 3-D solar minimum heliosphere and to trace the effects of solar structures and activity through the solar wind to the Earth and other planetary systems, and beyond. A direct comparison of these two periods illustrates how very different solar minima may be.

The mission of this WG is to facilitate international and interdisciplinary research that focuses on the coupled Sun-Earth system during solar minimum periods. Such research seeks to characterize the system at its most basic "ground state" but also to understand the degree and nature of variations within and between solar minima.

The WG will build from the WSM and WHI legacy, with the goals of:

- Archiving observations, models, visualizations, and related publications from these periods and the solar minima that encompass them
- Coordinating ongoing research, via projects, workshops, Special Sessions/Joint Discussions, and Symposia (note: the WG has submitted a letter of intent for a 2011 IAU Symposium)
- Providing an infrastructure that could be extended to include observations and models that include both past and future solar cycles

The focus will be on variations between solar minima, but it will be essential to consider how such variations arise. This will require some degree of broader consideration of the solar cycle, both in the context of how a given solar minimum may depend upon the transport of solar magnetic flux in the years preceding it, and in the even greater context of long-term solar cycle variations. Solar activity in the past few decades has been very high compared to the past millenium. What was the heliospheric state during periods of the lowest sunspot activity, e.g., the Maunder minimum of the 17th century? Is there a minimum "ground state" for solar/heliospheric behavior? How might complexities in the solar magnetic configuration have influenced the Earth's response during such intervals? Finally, in the study the cyclic interactions of the heliophysical system, we will be mindful of insights gained into stellar variability over multiple time scales.

3.8. *New WG on Communicating Heliophysics (Carine Briand)*

There have been several valuable and successful efforts for communicating Heliophysics at national and international levels during the IHY 2007–8. These efforts are still in progress and a frame is needed to coordinate them, particularly with the activities of C55 of Division XII. As

reported above, it was agreed that we should proceed with such a new WG for the next three years. A formal proposal has been prepared and forwarded to the incoming Division President.

4. Closing remarks

I thank all those who contributed to this report, specifically, Lidia van Driel-Gesztelyi, Valentin Martinez Pillet, Jim Klimchuk, Jean-Louis Bougeret, David Webb, Jay Pasachoff, Ed Cliver, Bob Bentley, Nat Gopalswamy and Sarah Gibson.

Don Melrose
Past President of the Division

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