

## **DIVISION II                      SUN AND HELIOSPHERE**

### *SOLEIL ET HELIOSPHERE*

Division II provides a forum for astronomers studying a wide range of problems related to the structure, radiation and activity of the Sun, and its interaction with the Earth and the rest of the solar system.

<b>PRESIDENT</b>	<b>David F. Webb</b>
<b>VICE-PRESIDENT</b>	<b>Donald B. Melrose</b>
<b>PAST PRESIDENT</b>	<b>Arnold O. Benz</b>
<b>BOARD</b>	<b>Thomas J. Bogdan, Jean-Louis Bougeret, James A. Klimchuk, Valentin Martinez-Pillet</b>

### **DIVISION II COMMISSIONS**

<b>Commission 10</b>	<b>Solar Activity</b>
<b>Commission 12</b>	<b>Solar Radiation and Structure</b>
<b>Commission 49</b>	<b>Interplanetary Plasma and Heliosphere</b>

### **DIVISION II WORKING GROUPS**

<b>Division II WG</b>	<b>Solar Eclipses</b>
<b>Division II WG</b>	<b>Solar Interplanetary Nomenclature</b>
<b>Division II WG</b>	<b>International Solar Data Access</b>
<b>Division II WG</b>	<b>International Collaboration on Space Weather</b>

### **PROCEEDINGS BUSINESS MEETING on 21 August 2006**

#### **1. Introduction**

The scientific fields represented by Division II, solar and heliospheric physics, were well represented at the IAU XXVI General Assembly in Prague, 2006. The Division sponsored or co-sponsored a total of five meetings at the GA, four Joint Discussions and one Special Session. The JDs were: JD01 “Cosmic Particle Acceleration; from Solar System to AGN”, JD03 on “Solar Active Regions and 3D Magnetic Structure”, JD08 on “Solar and Stellar Activity Cycles”, and JD17 on “Highlights of Recent Progress in the Seismology of the Sun and Sun-like Stars”. The Special Session 5 was on “Astronomy for the Developing World” and included a sub-session on the International Heliophysical Year. In addition, Dr Alan Title presented an Invited Discourse on “The Magnetic Field and its Effects on the Solar Atmosphere as Observed at High Resolution”. Thus, there was no need to have a separate scientific meeting of Division II.

On August 21, 2006 an open business meeting of Division II was held during most of the day. About 50 members attended. The meeting included reports from the three Commissions, from the four Working Groups, from the pertinent IAU Representatives, and other matters. This report summarizes the discussions and conclusions. No separate Commission meetings were held. Two of the four Working Groups, Solar Eclipses and International Collaboration on Space Weather, held separate meetings at the GA and these reports appear elsewhere in this volume.

The summary reports of Division II and its Commissions and Working Groups over the period 2003–2006 can be found in *Reports on Astronomy, Transactions IAU Volume XXVIA* (2007, Ed. O. Engvold).

## 2. Division report

The proposed incoming officers of Division II were presented by the President and confirmed by the attending members. These included for the first time a Division Secretary, Lidia van Driel-Gesztelyi. The Chairs of the four Working Groups and the pertinent IAU Representatives were likewise presented and confirmed by the members. All of these positions were approved by the EC at the General Assembly.

Pertinent results from recent EC meetings were presented and discussed. These included the changes and improvements to the IAU website, improvements in the Commission email address lists, election of new IAU and Commission members, and the revisions in the IAU statutes and by-laws. The importance of updating, maintaining and making effective use of the e-mail lists of Commission members was emphasized. IAU headquarters are trying to assure that the addresses are correct and up to date, but there is room for improvement. We need to request that the e-mail lists of all Commission members be sent to the incoming Presidents. It was suggested that the e-mail lists be routinely tested and email newsletters be sent out on a regular basis. It was proposed that the Division ask the IAU to make aliases for the full Commission membership e-mail lists, which would make contact with the members considerably easier. The new IAU database should allow such alias creation. It was also suggested that better use be made of the web-pages of the Division and of the Commissions. The President noted that the IAU no longer hosts websites of the Divisions or Commissions; the hosting of these must be arranged by each of the Presidents. It is an inefficient system since it means that every three years new sites have to be found and the files transferred.

On elections it was suggested that the Commissions make the elections of new members of the Organizing Committees for the next term, 2009 - 2012, more democratic by widely advertising the nomination process in advance. This process should begin at least half a year before the next GA and could utilize the email/newsletter system. However, since there are currently 200-400 members in each Commission, this system should be tested and streamlined before then.

A sunset clause for Commission OC members was discussed. It was suggested such that no member should have more than three consecutive terms, or that only one third of the OC be renewed after each term, and that inactive members should be removed after one term.

## 3. Commission reports

Each of the Presidents of the three Commissions summarized the scientific progress in their fields as presented in the Commission reports in the triennial Reports on Astronomy (Transactions IAU Volume XXVIA, 2007, Ed. O. Engvold).

Commission 10 studies various forms of solar activity, including networks, plages, pores, spots, fibrils, surges, jets, filaments/prominences, coronal loops, flares, coronal mass ejections (CMEs), solar cycle, microflares, nanoflares, coronal heating etc., which are all manifestation of the interplay of magnetic fields and solar plasma. Increasingly important is the study of solar activities as sources of various disturbances in the interplanetary space and near-Earth "space weather".

Over the past three years a major component of research on the active Sun has involved data from the *RHESSI* spacecraft and other current and planned solar observations from spacecraft. Significant advances were made in these areas: solar flares with emphasis on new results from *RHESSI*, two theoretical concepts, magnetic reconnection and magnetic helicity, coronal loops and heating, the magnetic carpet and filaments, and coronal mass ejections and space weather.

Commission 12 covers research on the internal structure and dynamics of the Sun, the "quiet" solar atmosphere, solar radiation and its variability, and the nature of relatively stable magnetic structures like sunspots, faculae and the magnetic network. In large part, the solar magnetic field provides the linkage that connects these diverse themes. The same magnetic field that produces the more subtle variations of solar structure and radiative output over the 11-year activity cycle is also implicated in rapid and often violent phenomena such as flares, coronal mass ejections, prominence eruptions, and episodes of sporadic magnetic reconnection.

The last three years brought significant progress in nearly all the research endeavors touched upon by Commission 12. The underlying causes for this success remain the same: sustained advances in computing capabilities coupled with diverse observations with increasing levels of spatial, temporal and spectral resolution. Significant advances were made in these areas: Irradiance and its Variability, Helioseismology, Surface Magnetism, Structure of the Quiet Sun Chromosphere, Dynamo and Magnetoconvection, Solar Instrumentation, and Steady Coronal Structure.

Commission 49 covers research on the solar wind, shocks and particle acceleration, both transient and steady-state, e.g., corotating, structures within the heliosphere, and the termination

shock and boundary of the heliosphere. During the last three years there was considerable progress made in studies of solar energetic particles, compositional and other signatures in the heliosphere, solar wind pickup ions, the termination shock, which was finally crossed by a spacecraft, and the boundary between the heliosphere and interstellar medium, and in solar wind modeling and space weather. Observations from the following spacecraft were extensively used during this period: *Ulysses*, *Cassini*, *Voyager 1* and *2*, *MESSENGER*, *ACE*, *Genesis*, *SOHO*, *Wind*, and *RHESSI*.

#### 4. Working Group reports

The four Working Groups of the Division are *Solar Eclipses*, chaired by Jay Pasachoff, *Solar and Interplanetary Nomenclature*, chaired by Edward Cliver, *International Solar Data Access*, chaired by Robert Bentley, and *International Collaboration on Space Weather*, chaired by David Webb. Each has its own website which is linked under the general Division II site. At the Prague GA each of the Working Groups were extended for at least another three years.

The IAU Working Group on *Solar Eclipses* advises a variety of astronomers and public organizations about the total, annular, and partial solar eclipses visible around the world, and about how to observe them safely. Their Website contains links to articles about eclipses and how to observe them and to maps and guides. Working Group members Fred Espenak (USA) and Jay Anderson (Canada) provide a NASA Technical Publication every few years about the next major eclipse. Michael Gill maintains a Solar Eclipse Mailing List, with daily exchanges of many messages among amateur and professional eclipse observers. The total solar eclipses during the current triennium were in Antarctica (22 November 2003), and across northern Africa, the Mediterranean, mid-Turkey, Russia and Kazakhstan (29 March 2006). IAU Symposium No. 233 was planned in Cairo immediately following this eclipse. Annular eclipses were in Pacific/Panama/northern South America (8 April 2005) and Spain and Africa (3 October 2005). Partial phases are visible in countries hundreds of kilometers to either side, and provide an excellent opportunity for public education, coordinated with IAU Commission 46 on Education and Development.

The Working Group on *Solar and Interplanetary Nomenclature* is chaired by Edward Cliver (USA) and includes Jean-Louis Bougeret (France), Hilary Cane (Tasmania), Sara Martin (USA), Reiner Schwenn (Germany), and Lidia van Driel-Gestelyi (France, UK, Hungary). With the help of the broader community, the WG identifies terms used in solar and heliospheric physics that are thought to be in need of clarification, and then Commissions topical experts to write essays reviewing the origins of terms and their current usage or misuse. The essays are published in EOS, the weekly publication of the American Geophysical Union. The essays published during this triennium were Gradual and Impulsive Solar Energetic Particle Events by Cliver & Cane in 2002, Magnetic Storm – Still an Adequate Name by Daglis in 2003, Terminology of Large-Scale Waves in the Solar Atmosphere by Vrsnak in 2005, and The Last Word: The Definition of Halo Coronal Mass Ejections by St. Cyr *et al.* in 2005.

A new Working Group on *International Solar Data Access* was formed in 2003 to coordinate all solar data access efforts but mainly the international efforts being made on virtual solar observatories. It is chaired by Robert Bentley and has the following members: Frank Hill (USA), Neal Hurlburt (USA), Helen Coffey (USA), Andre Csillaghy (Switzerland), Nadge Meunier (France), Kevin Reardon (Italy), Masumi Shimojo (Japan), Hongqi Zhang (China), Alexander Stepanov (Russia), Luis Sanchez-Duarte (ESA), Dominic Zarro (USA), Aaron Roberts (USA), Adam Szabo (USA), Chris Harvey (France), Chris Perry (UK), David Webb (USA), Franioise Genova and Bob Hanisch (IVOA). The group now covers not only the solar part of Division II but also includes the heliosphere to ensure interoperability among data sets needed to support Space Weather and related studies. Five virtual observatory initiatives from the solar and heliospheric communities are involved in the group. Discussions have focused on data models, descriptions of data resources, and coordinate systems. At least one member of the International Virtual Observatory Alliance (IVOA) participates in the Working Group.

The Working Group 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. The site currently includes the international activities of the *International Heliospheric Year* (IHY), the *International Living with a Star* (ILWS) program, the CAWSES (Climate and Weather of the Sun-Earth System) Working Group on *Sources of Geomagnetic Activity and Space Weather studies in China*.

The *International Heliospheric Year* is an international program of scientific collaboration being planned for the time period around 2007, the 50th anniversary of the International

Geophysical Year. 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. Complete and updated information on the IHY can be found at the main IHY site: <http://ihy2007.org>. Nat Gopalswamy is the Chair of the IHY subgroup within the Division II Space Weather WG. David Webb is the IAU Representative for the IHY. Four key activities are being promoted under the IHY program: science activities, the UN Basic Space Sciences (UNBSS) initiative, IGY Gold, and public outreach activities. The science activities are centered around Coordinated Investigation Programs (CIPs), campaigns on focused topics of heliophysical interest in 2007–2008. The IHY disciplines are solar, solar-terrestrial, heliospheric, climate, and atmosphere/ionosphere/magnetospheric sciences. The CIPs will involve as many instruments from space and the ground as possible from around the world. The United Nations IHY effort is being led by Hans Haubold under the UNBSS program. The UNBSS activities include deployment of scientific instruments in developing nations for space science investigations by scientists from developed nations and annual workshops. Within the IAU the IHY was discussed in Special Session 5 at the Prague GA in 2006 on support for astronomy education and research in developing countries. The IGY Gold program recognizes scientists around the world who worked for IGY 1957 programs. Public outreach activities include spreading knowledge of space science and exploration to the public and inspiring the next generation of space scientists.

The CAUSES Working Group on *Sources of Geomagnetic Activity*, also 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. Other members of this group are B. Jackson (USA), V. Obridko (Russia), A. Prigancova (Slovakia), B. Schmieder (France), K. Shibasaki (Japan), D. Webb (USA), and S. T. Wu (USA).

Finally, the Working Group on *Space Weather Studies in China* is chaired by Jingxiu Wang. As a member of the International Space Environment Service (ISES) Regional Warning Centers, RWC-China provides users with various services, and plays an important role in space environment services for the Chinese Shenzhou series of space missions. Projects initiated to enhance space weather observations include the Geospace Double Star Program (DSP), with coordinated measurements between DSP and Cluster II providing important new results. Solar space projects being developed include the Chinese *Space Solar Telescope (SST)*, the *Small Explorer for Solar Eruptions (SMESE)*, and the *Kuafu* Project, a set of three satellites to monitor space weather. The Meridian Chain Project is a Chinese multi-station chain along the 120 E meridian for monitoring space environment variations. Basic research on space weather is supported by the National Natural Science Foundation of China (NSFC), the Chinese Academy of Sciences, and the Ministry of Science and Technology of China. The “Space Weather Research Program” was selected by the NSFC as one priority research area in 2001–2005 and has been extended for another five years. The Chinese Academy of Sciences strongly supports basic research on solar and space sciences aimed at establishing the physical foundation of space weather forecasting.

## 5. Reports from IAU representatives

The following members of Division II are the current IAU Representatives to these scientific organizations: Oddbjorn Engvold, International Council for Science (ICSU); Marek Vandas, COSPAR Scientific Commission D on Space Plasmas in the Solar System; Arnold Benz, COSPAR Scientific Commission E2 on The Sun as a Star; Helen Coffey, International Space Environment Service (ISES); Nat Gopalswamy, Scientific Committee on Solar-Terrestrial Physics (SCOSTEP); and David Webb, The International Heliophysical Year (IHY).

Helen Coffey from NOAA NDGC presented a report on the ISES. ISES is a permanent service of the Federations of Astronomical and Geophysical Data Analysis Services (FAGS). ISES encourages and facilitates near-realtime international monitoring and prediction of the space environment. It accomplishes this task through: 1) the International URSIgram Service providing standardized rapid free exchange of space weather information and forecasts through its Regional Warning Centers (RWC); 2) preparing the International Geophysical Calendar each year, which gives a list of World Days during which scientists are encouraged to carry out their experiments; and 3) the monthly Spacewarn Bulletins that summarize the status of satellites in earth orbit and in the interplanetary medium.

Coffey and Elena Benevolenskaya discussed long-term databases, such as synoptic solar magnetic field maps, noting that they are very important and should be maintained. An international statement is needed on the importance of maintaining long-term stable data sets, which could

be used for example for the calibration of newer data sets. Proposing such an IAU resolution for this GA had been discussed earlier with GS Engvold, but was dropped due to lack of time and uncertainty as to its usefulness. Tom Bogdan pointed out that with limited resources, these programs and data sets should be prioritized by Division II and its Commissions to help guide the bureaucrats in funding decisions.

Nat Gopalswamy gave brief reports on SCOSTEP and on CAWSES, Climate And Weather of the Sun-Earth System. SCOSTEP is an ICSU organization that organizes and conducts international solar-terrestrial programs of finite duration in cooperation with other ICSU bodies. CAWSES is SCOSTEP'S comprehensive international STP program for 2004–2008. Its aim is of significantly enhancing our understanding of the space environment and its impacts on life and society. The main functions of CAWSES are to help coordinate international activities in observations, modeling, and applications crucial to achieving this understanding, to involve scientists in both developed and developing countries, and to provide educational opportunities for students of all levels. It is comprised of four scientific themes represented by Working Groups: WG-1: Solar Influence on Climate, WG-2: Space Weather: Science and Applications, WG-3: Atmospheric Coupling Processes, and WG-4: Space Climatology. Gopalswamy is the new IAU Representative for SCOSTEP, replacing Brigitte Schmieder. The Division thanks Brigitte for her long and excellent service in this position. Gopalswamy also chairs the CAWSES Working Group on Sources of Geomagnetic Activity, a subgroup of WG2.

Dave Webb gave a report on IHY activities within the IAU (see above). He reminded everyone of the meeting of the Division II WG on International Collaboration on Space Weather later during the GA (see the report of this WG elsewhere in this volume).

Marek Vandas gave a report on the solar-heliospheric activities within COSPAR. The science of Division II is represented on two Scientific Committees in COSPAR, D on Space Plasmas in the Solar System and E2 on The Sun as a Star. A. Hady commented that if COSPAR has an IAU Representative then IAGA should also. IAGA, the International Association of Geomagnetism and Aeronomy, is an important international scientific association promoting the study of terrestrial and planetary magnetism and space physics, and is one of the seven Associations of the International Union of Geodesy and Geophysics(IUGG). The next IAGA meeting is with the IUGG General Assembly in Perugia, Italy, 2–13 July 2007. Webb agreed and noted that the Division should take an action through the EC to contact IAGA about this.

## 6. Other matters

There were a number of other matters that were discussed at the meeting:

### 6.1. Honoring Z. Svetska and C. de Jager

The Division acknowledged the wonderful and lifelong contributions of Drs Svetska and De Jager to solar physics in general and specifically for starting and maintaining the journal *Solar Physics* over all these years. Svetska was feted at a special luncheon during the GA and in several articles in one of the GA Newsletters. During the Division meeting D. Webb, O. Engvold, L. van Driel-Gesztelyi, J. Klimchuk and F. Farnik gave tributes to these men.

### 6.2. Status of the journal *Solar Physics*

Engvold, van Driel-Gesztelyi, and J. Leibacher discussed the status of the journal, *Solar Physics*. These three are either current or past editors of the journal. A year ago the journal was acquired by Springer and it has undergone some problems in the transition. Things are improving, such as that the time from submission to publication of a paper has been reduced to six months on average. Color illustrations are now free for the electronic versions of papers.

### 6.3. Proposals for new Working Groups

The new Commission 12 President, V. Martinez-Pillet, had considered a new WG on calibration of methods of local helioseismology. However, this proposal was withdrawn because there is already such an initiative in Europe. He asked whether the IAU financially supports WG activities, and Webb answered no but that regional meetings could be organized on WG topics that IAU would support. The new Commission 10 President, J. Klimchuk, commented that the Division should have something like a political action committee to advise and influence the major funding agencies regarding solar-related science. K. Schrijver proposed a WG which would serve as an “advisory committee” under the IAU umbrella informing funding agencies on the importance of space and ground-based facilities, proposals, etc. D. Melrose noted that there are cultural differences between national agencies (e.g., the U.S. *vs* Japan) in their reaction to such

influence and that any such approach should be based on science not politics. J. Leibacher commented that this would have to be an independent international advisory body, different from the advisory committees of the funding agencies. Klimchuk said he would ask Schrijver to draft a "white paper" and lead the WG. A. Hady also suggested that we should have a WG on solar activities in developing countries.

#### *6.4. IAU meeting proposals and publication procedures*

O. Engvold, the outgoing GS, noted that there are no longer any IAU Colloquia but just nine IAU Symposia per year, and about 25 scientific meetings at the GA every three years. 25,000 Swiss Francs are provided for each IAU Symposium. For future meetings Webb noted that the Division is coordinating one IAU Symposium for next year, IAU Symposium No. 247 on Waves and Oscillations in the Solar Atmosphere: Heating and Magneto-Seismology in Porlamar, Isla de Margarita, Venezuela, 17 -22 September 2007. The deadlines for the proposed meetings for 2008 are very soon: letters-of-intent are due by 15 September and the full proposals by 1 January (it was later determined that these were due by 1 December!) The proposals should include strong scientific rationale, a draft program, tentative speakers and SOC lists (balanced for gender and geography), and any e-mail correspondence with DPs and CPs. The Division must rank the proposals every year. D. Melrose noted that in the years of the GA, the proposal meetings must cover more than one area. Several meeting proposals for 2008 were discussed. Nat Gopalswamy mentioned a proposed IHY meeting with the place yet unknown and no further details developed yet. S.S. Hasan mentioned one he would lead with Eric Priest that would be held in November 2008 possibly in Bangalore, India on Magnetic coupling between the interior and the atmosphere of the Sun. This is a well-developed proposal.

Problems that editors have had with getting Symposia proceedings published were discussed. Webb reviewed the problem areas that the editors of the two Division-coordinated Symposia in 2004, IAUS 223 and 226, had with the CUP publisher. The editors noted that editors need considerable help in preparing each proceedings. They had to do nearly all the work themselves, including getting the papers refereed, and that the three-month deadline after the meeting for submitting all the papers to the publisher was very short! Also, it was noted that only 40 pages are allowed for any of the Joint Discussions, no matter how many days they were. An action was agreed upon to bring up the problems with the proceedings with the new IAU General Secretary, Karel A. van der Hucht.

It was mentioned that the Division and Commissions devoted much effort to writing the topical reviews for the IAU Reports on Astronomy, but that these are not readily available to anyone, even the authors! Engvold noted that the IAU Transactions (XXVI A) reviewing the previous triennium have still not been published! The Division concurred that these papers should be made freely available on line. Engvold said that the contract with the publisher allows electronic publication of the Reports, and that they will be linked to ADS in fully downloadable form. Van Driel-Gesztelyi said that the reference lists in the Reports are important, so the ADS should be provided not only with the PDF file, but also the electronic reference list for each report. The latest RoA papers should be available soon. It was suggested that we put these reports on the pertinent Division or Commission websites, at least the final draft versions, and an action was taken to do this. Engvold noted that the symposia volumes should also be available on the ADS website.

#### *6.5. OC election procedures*

We discussed the current election procedures for both the Commissions and Division. Webb noted that procedures are fairly arbitrary but seem to result in good officers. He suggested that we find a way to make the elections truly democratic by including as many of the Commission members as possible. It is possible now to do this by making full use of the IAU email system, but this will be up to each CP. It was also noted that the Commission OCs should periodically review their membership lists and those of the IAU to make sure that the key scientists they want on the Commission are now or become IAU members and list the Commission(s) of choice. New members can only be approved at the GAs, so this process takes time.

David F. Webb  
*president of the Division*