Volume 186 (April 2013)

Formerly known as **COSPAR Information Bulletin**;

sectors are all warmly encouraged to attend.

The symposium will be organised around four core sessions representing multi-author plenary review papers and posters over a 3-day period. The symposium is organised by NOAA/UCAR with support from the GODAE OceanView Project Office.

Presentations will show the progress of operational oceanography infrastructure, will address key scientific & technological advances and also focus on future challenges and opportunities. Key speakers will be invited to represent the achievement in the core areas and poster sessions will provide an overview of current R&D efforts, user applications and stakeholder involvement. The symposium will be followed by 1.5-day internal review to examine the GODAE OceanView objectives and to advise on future areas of development and activities.

The programme will be available after selection of papers and posters.

Organizing Committees consisting of members from GODAE OceanView project office, representative from the University of Maryland, external experts and members of the GODAE OceanView Science Team (GOVST) have been assigned to take responsibility of the planning and arrangement of the symposium and the review.

Registration and submission of abstracts will open in 2013. Papers and posters will be selected to present main topics to promote discussions among different communities of developers and users.

More information on the conference can be found on the GODAE OceanView Symposium pages:

www.godae-oceanview.org/outreach/meetings-workshops/Symposium-Review-2013/.

Meeting Reports

COSPAR Capacity Building Workshop on Infrared and Submillimetre Astronomy" - Buenos Aires, Argentina, October 2012

[By Carlos Gabriel and Mariano Méndez]

The Workshop on Infrared and Submillimetre Astronomy took place in Buenos Aires, Argentina, from 15 to 26 October 2012. Primarily organized by COSPAR together with the local organisers Universidad Nacional de San Martín (UNSAM) and the Instituto de Tecnologías en Detección y Astropartículas (ITeDA), it counted on support from several international organisations, like the space agencies ESA and NASA, the International Astronomical Union (IAU), the Centro Latinoamericano de Física (CLAF), the International Centre for Theoretical Physics (ICTP), as well as the local organisations Consejo Nacional de Investigaciones Científicas y Técnicas CONICET, the Comisión Nacional de Actividades Espaciales (CONAE) and two ministries, the Ministry of Science, Technology and Productive Innovation and the Ministry of Education.

The main aim of the workshop was to introduce young astrophysicists (PhD students and post-docs) to infrared and submillimetre astronomy and multi-wavelength opportunities and to train them in the use of data and tools mainly from the space missions Herschel (ESA), and Spitzer (NASA). Details about the workshop can be found under the COSPAR Capacity Building Program pages:

http://cosparhq.cnes.fr/Meetings/Workshops.htm.

A total of 34 applicants from 8 different Latin-American countries were selected out of a total of 50 candidates. One of the selected students (from Argentina) could not make it at the last minute, leaving us with 33 students participating in the school.

The participants were from Argentina (16), Brazil (4), Mexico (4), Venezuela (4), Colombia (2), Chile (1), Peru (1) and Uruguay (1). The geographical distribution showed a

strong local component, however diversified regionally within the country. The gender distribution was even, with 14 females and 19 males. It has to be noticed that neither geography nor gender was a criterion for selection in this workshop, but just scientific qualification.

This was the first COSPAR Capacity Building workshop in the field, therefore the core of the lecturers participating had no previous experience of this kind (although all of them are experienced scientists and have lectured in other types of workshops on several occasions). The long (two weeks) duration and the highly practical aspects of the workshop, with direct supervision of the students in projects, were new, and turned out to be the most challenging aspects for the lecturers. The scientific leader of the team was Prof. José Cernicharo from the Astrobiology Centre in Madrid.

The venue of the workshop was the public University of San Martin (UNSAM), located in the city of San Martín, in the so-called Gran Buenos Aires urban area, directly on the city border of Buenos Aires.

The campus main building has been constructed using an old circular multiple garage building for locomotives as its base. Several garages could be accessed thanks to a rotating platform in the centre of that complex. A classroom with capacity for 50 persons used for lectures was just right in size. It could also be used partially for practical work, in addition to two other computer labs that were available for us. These two computer labs were equipped with desktops, eighteen in total, with eight of them equipped with large internal memory (8GB RAM).

Only a few students (five in total) did not have their own laptop they could work with, and had to work in one of the computer labs. The better-equipped desktops were however also necessary for students with projects needing high memory (i.e. mapping with Herschel data, but only possible for small maps). The practical work was arranged in groups so as to make optimal use of the facilities. The internet connectivity (especially wireless) was largely below expectations and represented one of the main problems for downloading data, even needed literature.

Accommodation and half-board for all students and lecturers during the 2 weeks was arranged in a hotel in Villa Urquiza, a city district of Buenos Aires, around 6 km from the UNSAM. Dedicated transport was provided by the UNSAM in the morning from the hotel to the university and vice versa in the afternoon. Lunch was offered in a restaurant at the city of San Martín, fully booked at noon for that purpose during the whole workshop. Accommodation in the hotel was in single rooms for lecturers and double rooms shared by the students.

While all these aspects were satisfactory, again the internet connectivity at the hotel was somewhat below standards, representing an added difficulty when students tried to download data over night to cope with the low connectivity at UNSAM.

The programme was structured with approximately 35% of the time dedicated to science lectures, 10% to lectures on missions' specifics (spacecraft, instruments and data analysis software) and 55% to the student projects. As in previous occasions, the lecturers also acted as project supervisors.

The students had to propose their own projects at the time of registration. It turned out that the majority of the proposals were too ambitious for being realized within the two weeks of the workshop, for several of them there was even no (evident) public data, also in several cases the data volumes involved were too large, and their analysis would have been impossible with the hardware limitations we had at the workshop.

This was recognized already before the workshop started and consequently data samples for all different kind of sources were collected by the Herschel specialists and brought in a couple of 1TB external hard disks to Argentina. Spitzer data did not pose such a large problem, since the volumes involved are orders of magnitude smaller and therefore it should be possible to download them over the

network during the workshop.

In order to make it feasible for the students to get results during the workshop, maximising the learning process, the students were organized in seven basic projects (more or less related to their original proposals), for which data were available or could be easily obtained. Supervision was accordingly organized.

The fact that most students used their own laptops represented again a challenge due to the different operating systems and flavours. The additional burden, not only for the installation of the different mission specific tools but also due to eventual problems with specific libraries, etc., could be mitigated by asking the students to try to install and check all the packages needed in the weeks previous to the workshop (a list was sent to them).

Both Spitzer and Herschel missions were prepared to support through their helpdesks, answering in the shortest time any request in this period. On top of the mission specific packages (a single package in the case of Herschel, a long list of tools in the case of Spitzer), tools for modelling photodissociation regions, dust emission and extinction, etc., should be installed as well as templates for interpretation of spectra containing PAHs.

Some of the code used is based on IDL, relatively expensive licensing software. Instead of asking the students to purchase it, we contacted the company distributing IDL (Exelis) a month ahead and obtained free licenses for all students (and UNSAM computers) for the time of duration of the workshop. Many thanks to Exelis!

At the end of the workshop each student group gave a shared presentation (7-20 minutes depending on the size of the group + 5-10 minutes discussion time) summarizing the results obtained. Two different rooms were used in parallel (for galactic and extra-galactic topics) for accommodating all the presentations in the final afternoon.

The results have been satisfactory, showing that all the participants understand in principle the methodologies of the work in the field and are to a good level able to work with data and tools of at least one of the missions, in several cases with both, after returning to their home institutes.

Celebrating 10 Years of International Living with a Star (ILWS)

[Report by H.J. Haubold]

The International Living With a Star programme celebrated 10 years of successful international collaboration with a special ILWS 10th Anniversary Symposium. The events ran on 12-14 February 2013 in Vienna, Austria. Representatives from 22 participating countries met to review the successes and accomplishments of the past and discuss plans for the future, providing new direction to this international collaborative enterprise.

ILWS is an international organization dedicated to the advancement of space weather science missions and research. Space weather is a growing field of research, as it studies how variations in the Sun and the Earth's space environment influence life and technology on Earth and in space.

ILWS was created out of the need to combine global forces in order to explore solar-terrestrial relations, from basic science to applications and space weather predictions. Following the NASA programme "Living With a Star," ILWS emerged in late 2002 as a continuation of the four-agency Interagency Consultative Group (IACG), embracing the following goals: "*How and why does the Sun vary, How does the Earth respond, and What are the impacts on humanity?*

ILWS has grown to a membership of 33 member space agencies and organizations. The outgoing Chair was Prof. Wu Ji (Chinese Academy of Sciences). Dr. C. Philippe Escoubet (ESA) assumed the position of ILWS Chair at the end of the Symposium.

The Working Group meeting started 13 February at the Austrian Academy of Science, Vienna, as about 50 representatives from ESA, NASA and other national space organizations, agencies and scientific institutions from all over the world reported on their agency's

activities in the field of space weather science and prediction.

After the Working Group meeting, on 14 February there was a symposium in celebration of this successful international collaboration and a reception for the 10th Anniversary of ILWS at the Vienna International Center of the United Nations, where delegates from 74 space-faring nations and many governmental and non-governmental organizations related to space activities met at the Scientific and Technical Subcommittee of the United Nations Committee On the Peaceful Uses of Outer Space (COPUOS) in parallel with the ILWS Science Symposium and anniversary celebrations.

The symposium was organized by Prof. Hermann Opgenoorth, Swedish Institute of Space Physics, Uppsala (the first chair of ILWS in 2003-2004), and ILWS Executive Secretary Dr. Barbara Thompson of NASA. Dr. Rumi Nakamura from the Austrian Academy of Sciences was the local host and served as Chair of the ILWS Working Group meeting.

The UN Braces for Stormy Space Weather

[Report by H.J. Haubold]

50th session of the Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space, 11-22 February 2013, Vienna

Rewind to the late 1950s. The Soviet Union had just launched the first artificial satellite, Sputnik. The United States, caught short, was scrambling to catch up, kick-starting a Cold War space race that would last for decades.

Space was up for grabs, and it seemed like anything could happen.

Into this void stepped the United Nations. In 1958, the General Assembly "recognizing the common interest of mankind in furthering the peaceful use of outer space ... and desiring to avoid the extension of present national rivalries into this new field...." established the Committee on the Peaceful Uses of Outer Space (COPUOS). COPUOS became a forum for development of laws and treaties governing space-related activities. Moreover, it set the stage for international cooperation on problems that no one nation could handle alone.

The UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS), credit: UN Information Service

As the years went by, COPUOS membership ballooned from 18 to 74 nations, while items such as space debris, near-Earth asteroids, space-based disaster management, and global navigation were added to the committee's regular agenda. At each annual meeting in Vienna, Austria, COPUOS members confer about these issues, which present some key challenge or peril to the whole planet.

This year, a new item is on the agenda: space weather.

"This is a significant development," says Lika Guhathakurta of NASA Headquarters in Washington. "By adding space weather to the regular agenda of the COPUOS Science and Technical Subcommittee, the UN is recognizing solar activity as a concern on par with orbital debris and close-approaching asteroids."

Space weather is the outer-space equivalent of weather on Earth. Instead of wind, rain and snow, however, space has radiation storms, the solar wind, flares and coronal mass ejections. The source of space weather is the sun, and although solar storms are launched 93 million miles from Earth, they can make themselves

felt on our planet.

"Strong solar storms can knock out power, disable satellites, and scramble GPS," says Guhathakurta. "It's a global problem made worse by increasing worldwide reliance on sensitive electronic technologies."

Members of the Science and Technical Subcommittee heard about some of the potential economic impacts of space weather. For instance, modern oil and gas drilling frequently involve directional drilling to tap oil and gas reservoirs deep in the Earth.

This drilling technique depends on accurate positioning using global navigation systems. Drill heads could go awry, however, if the Sun interferes with GPS reception.

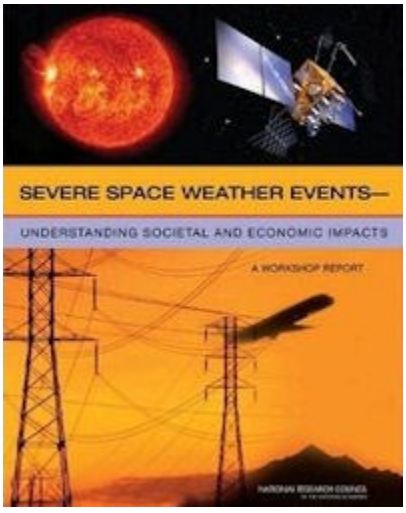
Solar energetic particles at the magnetic poles can force the re-routing of international airline flights resulting in delays and increased fuel consumption. Ground induced currents generated by magnetic storms can damage transformers and increase corrosion in critical energy pipelines.

Permanent damage to the Salem New Jersey Nuclear Plant GSU Transformer caused by the severe geomagnetic storm of 13 March 1989 (Photos courtesy of PSE&G)

"Space weather is a significant natural hazard that requires global preparedness," says Prof. Hans Haubold of the UN Office for Outer Space Affairs. "This new agenda item links space science and space technology for the benefit of all humankind."

The elevation of space weather on COPUOS's agenda coincides with the 10th anniversary of the International Living With a Star program on 14 February. The programme is an ad hoc group of nations that got together in 2003 to lay the groundwork for worldwide cooperation in the study of space weather. The UN will help take their efforts to the next level.

A key problem that the UN can help solve is a gap—many gaps, actually—in storm coverage around our planet. When a solar storm sweeps past Earth, waves of ionization ripple through Earth's upper atmosphere, electric currents flow through the topsoil, and the whole planet's magnetic field begins to shake.



A NASA-funded study by the National Academy of Sciences lays out the economic consequences of severe space weather

"These are global phenomena," says Guhathakurta, "so we need to be able to monitor them all around the world."

Industrialized countries tend to have an abundance of monitoring stations. They can keep track of local magnetism, ground currents, and ionization, and provide the data to researchers. Developing countries are where the gaps are, particularly at low latitudes around Earth's magnetic equator. With assistance from the UN, researchers may be able to extend sensor networks into regions where it was once politically unfeasible.

Space weather might play a role in Earth's climate, too. For example, the Maunder minimum, a 70-year period almost devoid of sunspots in the late 17th to early 18th century, coincided with prolonged, very cold winters in the northern hemisphere. Researchers are increasingly convinced that variations in solar activity have regional effects on climate and weather that pay no attention to national boundaries, and thus can only be studied in meaningful detail by international consortia.

"The new permanent agenda item of the Science and Technology Subcommittee is an important opportunity to harness the effort of all Members to ensure coordinated global action," comments Terry Onsager of the United States' National Oceanic and Atmospheric Administration (NOAA). Now that space weather has been elevated to a permanent place on the COPUOS agenda, it will be a matter of regular conversation among UN diplomats, scientists and emergency planners. This is important because, while space is no longer up for grabs, it is still true that in the realm of space weather almost anything can happen.

Learn more about the Committee on Peaceful Uses of Outer Space at:

www.oosa.unvienna.org/oosa/COPUOS/copuos.html

50th Session of the Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space
Vienna, Austria, 11-22 February 2013

[Report by Hans Haubold]

An informal summary of deliberations of member states concerning space weather during the session.

The Subcommittee, at its forty-ninth session, agreed that an agenda item entitled "Space Weather" should be introduced as a regular item on the agenda of the Subcommittee, in order to allow member States of the Committee and international organizations having permanent observer status with the Committee to exchange views on national, regional and international activities related to space weather research with a view to promoting greater international cooperation in that area. The Subcommittee noted that it could, through that item, serve as an important advocate for efforts to close existing gaps in the space weather research field.

The Subcommittee heard the following scientific and technical presentations (www.unoosa.org/oosa/en/COPUOS/stsc/2013/presentations.html):

a) "Space weather application for navigation and radio communication in Indonesia", by the representative of Indonesia;
b) "Space weather: South Africa's abilities and capabilities", by the representative of South Africa;
c) "International Centre for Space Weather Science and Education (CSWSE)", by the representative of Japan;
d) "ISWI update", by the representative of the United States of America;
e) "Solar Max", by the representative of the United States of America;
f) "MiniMax24 observation campaign", by the representative of SCOSTEP;
g) "ICG and its programme on GNSS applications", by the representative of the Office for Outer Space Affairs.

The Subcommittee had before it the following reports and documents:

a) Education Curriculum: Global Navigation Satellite Systems (ST/SPACE/59);
b) Report on the United Nations/Austria Symposium on Data Analysis and Image Processing for Space Applications and Sustainable Development: Space Weather Data, held in Graz, Austria, from 18 to 21 September 2012 (A/AC.105/1026);
c) Report on the United Nations/Ecuador Workshop on the International Space Weather Initiative, held in Quito, Ecuador, from 8-21 October 2012 (A/AC.105/1030).

The Subcommittee noted that the objectives of the Space Weather item were:

a) To provide benchmark measurements of the responses of the magnetosphere, the ionosphere, the lower atmosphere and the Earth's surface in order to identify global processes and drivers that affected the terrestrial environment and climate;
b) To further the global study of the Sun-Earth system in order to understand the external and historical drivers of geophysical change;
c) To foster international scientific cooperation in the study of current and future space weather phenomena;
d) To communicate the unique scientific results of space weather research and societal impacts to interested members of the scientific community and to the general public.

The Subcommittee expressed its appreciation to the secretariat of the International Space Weather Initiative and the Office for Outer Space Affairs for conducting an international campaign, from 2010 to 2012, aimed at exploring solar-terrestrial interaction and deploying ground-based worldwide instrument arrays for space weather investigation, particularly in developing countries. As a result of that campaign, more than 100 States, of which over 80 were developing countries, were actively collecting data to be used to understand how space weather, caused by solar variability, could affect space systems and human space flight; electric power transmission; high-frequency radio communications; global navigation satellite system (GNSS) signals; long-range radar; and the well-being of passengers in high altitude aircraft.

The Subcommittee expressed its appreciation to the secretariat of the International Space Weather Initiative and the Office for Outer Space Affairs for the numerous publications, posters, and leaflets they had published and disseminated and for the exhibitions they had organized to promote the International Living With A Star and International Space Weather Initiative among the space science and technology community and the general public, particularly in developing countries.

The Subcommittee noted with appreciation that the publication of the ISWI Newsletter by the International Center for Space Weather Science and Education of Kyushu University,

Japan, and the maintenance of the ISWI Website (http://iswi-secretariat.org/) by the Bulgarian Academy of Sciences provided a comprehensive overview of the extensive activities conducted worldwide between 2010 and 2012 to implement the objectives of the International Space Weather Initiative.

The Subcommittee noted with appreciation that Canada, Chile, Ecuador, Germany, Indonesia, Japan, Republic of Korea, Russian Federation, South Africa, United States of America, SCOSTEP, and the Office for Outer Space Affairs had reported on their achievements and on the activities they had carried out in 2012 in the framework of the International Space Weather Initiative.

The Subcommittee welcomed the fact that the United Nations Programme on Space Applications had organized three workshops on the International Space Weather Initiative, hosted by Egypt in 2010, Nigeria in 2011, Ecuador in 2012, and the first UN/Austria Symposium on Data Analysis and Image Processing for Space Applications and Sustainable Development: Space Weather Data, hosted by Austria in 2012. The Subcommittee also welcomed the upcoming Second UN/Austria Symposium on Space Weather, scheduled to take place in September 2013, to be hosted by the Austrian Academy of Sciences on behalf of the Government of Austria.

For the duration of the session, ILWS/ISWI displayed an exhibit of posters showing scientific results of the International Living With a Star (ILWS, http://ilwsonline.org/tenthanniversary/) programme and the International Space Weather Initiative (ISWI, http://iswi-secretariat.org/). For more details, see the website:

www.unoosa.org/oosa/en/COPUOS/stsc/2013/index.html

Scientific summary and highlights of the IAU Symposium 286
Mendoza, Argentina, 3-7 October 2011

[Report by Cristina Mandrini]

IAU Symposium 286, "Comparative Magnetic Minima: Characterizing Quiet Times in the Sun and Stars", was held in Mendoza, Argentina from 3 to 7 October 2011. The symposium attracted scientific experts on the various topics pertinent to the meeting from all over the world. Participants came from 23 different countries: Argentina, Belgium, Brazil, Colombia, Costa Rica, Denmark, Finland, France, Germany, Hungary, India, Israel, Italy, Japan, Mexico, Peru, Romania, Russia, Turkey, Spain, Sweden, Switzerland, U.K., and the USA. The goal of IAU Symposium 286 was to consider solar and stellar minima, from generative dynamo mechanisms to in-depth analyses from Sun to Earth for recent well-observed and modelled minima, to a range of stellar cyclic activity, to outlier "grand minima". Solar, heliospheric, geospace, atmospheric, stellar, and planetary sciences were included in the meeting's scope.

Solar and stellar minima represent times of low magnetic activity and simple helio/asterospheres. They are, thus, excellent targets for interdisciplinary, system-wide studies of the origins of stellar variability and consequent impacts on planetary systems. The recent solar minimum extended longer and was "quieter" than any we have observed in the Space Age, inspiring both scientific and public interest. A rich variety of satellite and ground-based observations, in conjunction with theoretical and numerical modelling advances, have allowed us to probe the peculiarities of this minimum as never before. The implications are far-reaching, connecting Earth to Sun to stars, radio to X-ray to cosmic rays, and the plethora of observations of recent minima to the Sun's past behaviour as preserved in cosmogenic isotopes and historical sunspot and auroral records.

At the meeting, both invited (28 talks plus a keynote talk), solicited (6 talks), and contributed (28 oral and 31 poster) presentations were given describing how

magnetic fields can be cyclically generated in solar and stellar interiors via various dynamo processes. Numerical models have increased in complexity to the point where many observed aspects of the cycles in the Sun and stars are captured, although mysteries remain such as the origins of extended or "Grand" Minima. Both stellar observations and historical and cosmogenic records at the Earth were presented to form a basis of understanding of such fascinating intervals, and of solar/stellar long-term variability in general. Along the same lines, a simple method to reconcile the Zürich Sunspot Number and the Group Sunspot Number was presented, with important and wide ranging implications towards an agreed upon and vetted single sunspot series for use in the future.

Detailed examination of the recent extended solar minimum revealed that it was the lowest and longest minimum in about a century, having weak polar magnetic fields, a complex corona and heliosphere, and recurrent high-speed streams. Simultaneously, it was found that solar minima do not all look alike, given that the Sun can have different magnetic flux configurations even during very quiet times, yielding distinct 3D magnetic flux distributions and, therefore, diverse structure of the corona and heliosphere. The larger fraction of higher-order harmonic content implicates that the corona is generally far from dipolar, so that the solar wind has many low- to mid-latitude coronal-hole sources. The many boundaries of these sources, including pseudo-streamers (large-scale closed fields that do not overlie the main solar neutral line), contribute with many transients to the solar wind, seen as blobs and other non-explosive features in images and as features with ICME-like characteristics at 1 AU. During this recent minimum, the solar field achieved a solar maximum-like corona and solar wind source situation but with weak magnetic fields and associated weak heating. The discussed results point out the need for textbooks and solar physics educators to revise the way they describe the solar wind and its sources.

In addition, the recent extended solar minimum provoked discussions on the possibility of a trend in the Sun's current magnetic cycles towards a Grand Minimum, and the potential implications for the Earth's climate. For instance, there is evidence that a strong decrease of the solar activity can lead to a delay of ozone recovery, partially compensating greenhouse warming, and that irradiance variability is the most important forcing for global problems. A combination of the bottom-up and top-down models seems appropriate for the radiative solar forcing of the atmosphere. The phase shift between the solar radiative forcing of surface climate and the solar cycle, indicated by the Solar Radiation and Climate Experiment (SORCE) measurements, will have an important effect on climate modelling. Although the forcing due to anthropogenic influences is about seven times larger than the radiative solar forcing, it can be assumed that solar activity does affect climate, establishing the need for a constrained set of future solar forcings and maintenance, and extension, of all relevant observations.

The question of the origins and implications of cyclic behaviour, for the Sun-Earth system and also for other stellar-planetary systems, was the subject of several presentations. For instance, it was shown that induced magnetospheres, such as that of Venus, directly interact with the solar wind and, therefore, are more prone to atmospheric evolution than intrinsic magnetospheres. Venus plasma regions and escape rates seem to be strongly influenced by the solar cycle and by the solar wind pressure. On the other hand, Mars boundaries do not appear to be so dependent on the solar cycle phase, though simulations suggest that the escape rate is. Current estimations of the escape rates are of the order of 1,025 particles per second, but these estimates may double and even increase by an order of magnitude during stormy space weather. The role of the exosphere in the interaction needs to be further assessed.

This symposium was undoubtedly unique in the sense that it brought together a diverse group of scientists who were able to take part in discussions, appreciate the scientific disciplines of others, and discover the common aspects of the physical processes involved in

the different studied environments from Sun to Earth, and stars to planets. The symposium closed with a joint discussion between all participants. A public outreach talk was given in Spanish after the symposium ended. Amateur astronomers, high school teachers and students, and the general public were invited to attend.

The Symposium Scientific Organizing Committee was chaired by Drs. Sarah Gibson and Hebe Cremades, the Local Organizing Committee by Dr. Cristina Mandrini. The symposium picture, taken in the beautiful San Martín Park of the city of Mendoza, can be seen below.

IAUS 286 participants in San Martin Park, Mendoza

Letter to the Editor

Alphabet Soup Revisited

[From Murray Dryer]

My intent here is to add some background to an early compilation of studies described by Joe Allen in his recent Letter to the Editor (Allen, 2012, *SRT* issue 185) that may be of interest to a history of cooperative international programmes. This compilation by Joe Allen, my former NOAA friend and colleague, motivated me to write this personal experience. Joe's 'alphabet soup' of acronyms is an excellent starting point for a younger future historian of this topic of solar-terrestrial physics. Hopefully, my role will contribute some dots in the subset of interplanetary physics that is leading to scientific and operational space weather developments.

My story starts with a B.S. in Mechanical Engineering and an M.S. in Aerospace Science (Stanford University, 1949 and 1950) on the G.I. bill. A '49 summer job in the 40x40-foot subsonic wind tunnel at the Ames Research Center (National Advisory Committee for Aeronautics, NACA, now NASA) introduced me to fluid dynamics in the flesh, so to speak. My job in '50 after that was at NACA's Lewis Research Center in Cleveland, Ohio, now the John Glenn Research Center. As a "wind tunnel jockey", I worked in various supersonic tunnels (10x10 foot, 6x6 foot, and 1x1 foot) with various air inlets, nozzles, and aircraft configurations (our own designs as well as others like the X-15—the first to exceed Mach 1.0). I moved to the Martin-Marietta Corporation (now Lockheed Martin) in Denver, Colorado, in 1959. After settling down