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Annual Report 2007-2008

Impressum

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Cover Page

Puzzle composed of six images (from the upper left to the lower right):

1. Image of the Bullet Cluster, which is a much-studied pair of galaxy clusters (X-ray: NASA/CXC/CfA/ M.Markevitch, Optical and lensing map: NASA/STScI, Magellan/U.Arizona/D.Clowe, Lensing map: ESO WFI).

2. Merging neutron stars are probably responsible for some gamma-ray bursts (ESA 2002/Medialab).

3. Rosetta swings by Mars (ESA, image by AOES Medialab).

4. The Galactic Center Radio Arc (Farhad Zadeh et al. (Northwestern), VLA, NRAO).

5. Soho charts Sun's temparature variations (Soho (ESA & NASA), MDI/SOI and VIRGO data imaged by A. Kosovichev, Stanford University).

6. This image provides a close-up on the jets of ionised gas ejected by Bepi Colombo's solar electric propulsion (SEP) system (ESA - C. Carreau).

INTERNATIONAL SPACE SCIENCE INSTITUTE

Annual Report 1 July 2007–30 June 2008

The International Space Science Institute (ISSI), located in Bern, Switzerland, is an Institute of Advanced Studies in space sciences where scientists from all over the world meet in a multi- and interdisciplinary setting to reach out for new scientific horizons. ISSI's main task is to contribute to the achievement of a deeper understanding of the results of space research missions.

Contents

Who is Who?

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* Membership ended on 30 June 2008.

All these lists show the status at the end of the thirteenth business year (30 June 2008). For current lists, please visit the ISSI website at `www.issibern.ch`.

From the leaving Chairman of the Board of Trustees

Another year of multiple and highly successful Space science activities with Working Group meetings, Workshops and publications by the institute come to an end. A year also, of intensive effort by the Directorate to obtain agreement from the Earth Observation directorate of ESA and the Swiss Space Office to provide the additional financial resources required to start-up "Earth Science from Space" activities, based on the respective initiative of the Executive Director and agreed upon by the Board of Trustees. The response of both sponsoring parties is positive. As a consequence, the staff of ISSI will increase according to program needs and an additional expertise in the directorate has been established, electing Prof. Lennart O.Bengtsson of Sweden by the Board.

The secretary of the Board Dr. Hansjörg Schlaepfer, has assumed this function since the creation of the Foundation. He has provided valuable contributions to setting up the management regulations for the Institute and has assured good relations with the governmental authorities. In May, Dr. Schlaepfer has handed in his resignation. Fortunately he will continue editing the well known SPATIUM issues, published by the Association Pro-ISSI. Prof. Kathrin Altwegg from the University of Bern will from now on serve as Board secretary.

Membership of both, the BOT and the Science Committee are stable, the discussions of the Personnel - and Finance Committees of the Board with the Directorate concerning budget for FY 2008/09 did not give rise to any extraordinary measures to be taken and the approximate financial result for FY 2007/08 indicates that it will be close to budget. Whilst the application for the financial contribution of Switzerland for FYs 2008 to 2010 has been submitted to SSO, the respective demand to ESA for 2010 to 2012 will have to be provided in 2009. The contribution of the University of Bern is agreed until 2011. After now 13 years - the first meeting of the BOT took place on April 10, 1995 - the President, as he wished since quite some time, can now hand over his duty to the successor elected: Dr. Simon Aegerter, at the 28th meeting of the Board.

Time has come for me to step back from this always interesting, sometimes hectic, but extremely rewarding function of being weekly connected with the Space Science community and its exponents in the institute, its Science Committee and the BOT. For an engineer who has been involved in Space Technology and as such been able to contribute to the building of scientific satellites and instruments since 1964, it was a great honour to be asked by those who had invented and developed the ISSI idea, to set up the ISSI Foundation and serve as its first President.

Hanspeter Schneiter

Zürich, 23 May 2008

From the new Chairman of the Board of Trustees

On the day that our first son was born, the Eagle landed in the Sea of Tranquility.

On the day that our second son was born, I signed, on behalf of the Swiss National Science Foundation, the agreement to finance the GEOS experiment to be built by Contraves according to the plans developed by Johannes Geiss' group.

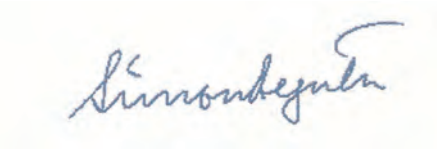
Space Science – of sorts – almost stood in the way of me getting acquainted with my sons when they were born.

There was an earlier contact with Space Science. After my graduation from the University of Bern and a 6-month research stint in India, I joined the group of Willard F. Libby, the inventor of radiocarbon dating, at UCLA in 1967. Having been under the tutelage of Hans Oeschger, the radiocarbon specialist at the University of Bern, I had some pretty clear ideas on what I wanted to do about elucidating the enigma of the wiggles in the C-14 calibration curve.

Well, WFL had a different idea. "Simon, I want you to take charge of project «Laundry Bag»". Doesn't sound very exciting, does it? In fact, project Laundry Bag actually *was* pretty exciting: the idea was to put a large sheet into space in order to collect solar wind. That sheet of Mylar had to be coated with a layer of ultra pure Aluminum and that layer would be the medium where the Solar Wind matter would be collected. Little did we know that Johannes Geiss in Bern was about to put just such a sheet on the surface of the moon.

Project Laundry Bag never got off the ground, but the Swiss Solar Sail did. However, there *was* a result of project Laundry Bag: we *did* develop a procedure to produce the most ultra pure Aluminum. In a way project Laundry Bag is a metaphor for the mission of ISSI. Payloads are designed for a precise purpose. Experiments are fine tuned to collect data to verify or falsify a certain theory or hypothesis. These data contain information that goes way beyond that purpose. Why throw that information away? It is there for grabs. That is the mission of ISSI: optimise the use of data. Extract what information there is. Interpret it on the highest scientific level. Publish.

I hope to be able to help to further that mission.



Simon Aegerter

Wollerau, 1 July 2008

From the Directors: The Thirteenth Year

The 13th year of ISSI will remain marked by the establishment of the first contract with the Earth Observation Directorate of ESA. Even though ISSI's programme has in the past included dedicated Earth science activities (Solar Variability and Climate in 1999, GOCE Workshop in 2002, Solar Variability and Planetary Climates in 2005), plus a handful of scientific teams, it is the first time that an official involvement of ISSI in this vital field of science is materialized through a contract. This involvement follows the conclusions of the March 2006 Forum on Earth Observations and is the outcome of an extensive effort of discussion between ISSI and ESA Earth Observation Directorate. The structure of this programme was described in last year's ISSI Annual report and is established for 3 years and based on two phases. The first is presently running and agreed, while the second will follow a Forum in May 2009, during which the continuation, contents and detailed schedule of the new phase will be discussed, based on the results of the first. With the agreement of both parties, the programme should continue until end 2010 and be concluded by a workshop, the resulting book of which will represent the conclusive act. The topic of this workshop should be focused on the main scientific involvement of ISSI in the programme. It is of course expected that this first contract will be followed by a more permanent involvement in Earth science, in a way similar to how ISSI operates with the Science Programme of ESA. In that perspective and for the safeguard of the excellence of ISSI's involvement.

In parallel and as mentioned also last year, ISSI has increased its participation in the Europlanet activity. From the status of collaborating partner in Framework Program 6, ISSI will now become full partner in FP 7, as a result of its active involvement in the series of meetings which led to the submission on 29 February 2008 of the new FP 7 proposal now in the final stage of negotiation with the European Commission. This includes the organization of 4 Workshops at ISSI, the publication of the resulting book volumes, and support for the organization and conduct of one Summer School at Alpbach, Austria, in the field of planetology. Through this participation, ISSI will be in a position to receive directly from the European Commission the related funding to a total amount of 182,000 Euros over 4 years.

This year also a new agreement was negotiated with the Swiss Space Office and signed by the President of the Swiss Confederation, Pascal Couchepin, on 19 June 2008. This will grant us a total budget of 3.66 M CHF for four years. This essential support will secure, together with the continued support from ESA, the Swiss National Science Foundation, and the University of Bern, the continuation of ISSI's activities for the years to come. It is to be recalled that the current agreement with ESA's SPC will be renegotiated in the spring of 2009.

ISSI's scientific activity was intense in the 13th year with 3 workshops programmed:
Planetary Atmospheric Electricity – First Europlanet, (23-27 July 2007), From the Heliosphere to the Local Bubble (15-19 October 2007) and Origin and Evolution of Solar Magnetism (21-25 January 2008). The latter is the first of a series of three dedicated to Magnetism in the Solar System. On the front of international teams, a record number of 51 sessions were held by 43 teams in the period covered in the report. Overall 620 scientific visitors were involved in ISSI's activities totalizing 3253 person-days (as compared to 2851 last year), 50% being new visitors. Among them we find a record number of 148 American scientists, the highest ever, testifying of the keen interest of the international community in ISSI's activities.

ISSI's future plans are also fairly crowded with 4 Workshops already programmed and two additional candidates foreseen in the course of 2008/2009. To this, we must add the 20 International Teams selected in response 2008 Call. Among them are 3 new teams representing the Earth Science Community on top of the IPY proposals selected in 2007, and a new initiative dealing with the Climate of Venus. In addition ISSI's continued support to the Alpbach Summer School has culminated in 2008 with some 5 ISSI staff members participating, including André Balogh as the Head Tutor of the school. In view of enlarging the menu of future Workshops, at its May meeting, the Science Committee has proposed a

From the Directors: The Thirteenth Year

more systematic consultation of the scientific community, initiating the first steps of a bottom-up approach. The screening of the proposals issued from that consultation, will be made at the fall meeting of the Science Committee which will also discuss the various possibilities for a further screening aiming at selecting the topics of highest scientific quality.

The allocation of ISSI funds to young scientists in support of their participation to the various ISSI activities is having a great success. The scheme is indeed becoming very popular among the Teams and Workshops and the young scientists themselves. 42 young scientists were involved in the Teams and Workshop activities, i.e., an additional 18% above the institutional participants.

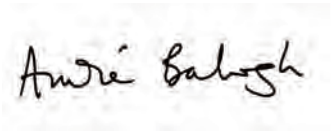
As far as the publications are concerned we are proud to see a steady production: four books have been added to the ISSI Space Science Series and five new volumes are in preparation. Three new ISSI Scientific reports have also been published and three more are in preparation.

The principle of rotation of the ISSI scientific staff has been implemented and has seen several changes. Two of our postdocs, Kathryn Fishbaugh and Oliver Botta left ISSI in August 2007 and April 2008 respectively. Subsequently, two new postdocs have been recruited in 2008: Emiliya Yordanova for one year (magnetospheric physics) and Angelo Pio Rossi for 2 years (Mars science, geology). Anita Kilchenmann finished her PhD in June and left ISSI in August 2007.

Concerning the non-scientific staff, Katja Schüpbach joined ISSI in November 2007 as a new part-time secretary (50%), while Andrea Fischer's employment was increased from 40% to 80%, and Brigitte Fasler became Mrs Brigitte Schutte on May 24, 2008.

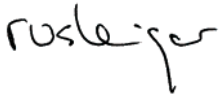
All these aspects are developed in more details in the course of the report and we certainly encourage the reader to look at the relevant sections.

Last but not least, we warmly welcome Dr. Simon Aegerter, the new Chairman of the Board of Trustees and we look forward to a very fruitful and constructive cooperation between ISSI's executive and the Board.



André Balogh

Roger-Maurice Bonnet



Rudolf von Steiger

About ISSI

The International Space Science Institute (ISSI) is a nonprofit organization set up in Bern in 1995 as a foundation under Swiss law with an endowment by Oerlikon Space AG, formerly Contraves Space AG. Three statutory bodies govern ISSI: the Board of Trustees, the Directorate, and the Science Committee. A fourth important body, the Association Pro-ISSI, promotes the idea of ISSI, especially within Switzerland.

The European Space Agency (ESA), the Swiss Confederation, and the the Swiss National Science Foundation (SNF) provide the financial resources for ISSI's operation. The latter through a grant to its Directors. The University of Bern is present with a Director and further contributes in kind facilities. ISSI received tax-exempt status from the Canton of Bern in May 1995.

The ISSI cafeteria and meeting point hosted over 620 visitors in the thirteenth business year.

Governing and Supporting Bodies

ISSI's Board of Trustees oversees the work accomplished at the Institute, exerts financial control, and appoints the Directors and members of the Science Committee. It consists of representatives of the Founder, and of the funding Institutions. Furthermore the Board of Trustees may nominate up to five personalities representing the national and international science community, space industry and space politics for terms of 3 years. The Board of Trustees is presided over by Simon Aegerter, and met two times during the thirteenth business year, on 9 November 2007 and 23 May 2008.

The Science Committee, chaired by Len Culhane, is made up of 16 internationally known scientists active in the fields covered by ISSI. It advises and supports the Directorate in the establishment of the scientific agenda providing a proper equilibrium among the activities and reviews and grades the Team proposals in response to the annual Call. Science Committee Members serve a three year term (with a possible extension of 1 year). The Science Committee met twice, on 8-9 October 2007 and 20-21 May 2008.

The Directorate is in charge of the scientific, operational and administrative management of the Institute. During the thirteenth business year, the Directorate consists of Roger-Maurice Bonnet (Executive Director), André Balogh (Imperial College London) and Rudolf von Steiger (University of Bern).

The Association Pro-ISSI, founded in spring 1994, counts about 120 members. Pro-ISSI promotes the idea of ISSI by organizing public lectures, where internationally known space scientists introduce their results. Summaries of these talks are published about twice a year in the journal SPATIUM. Member benefits include invitation to lectures and a free subscription to SPATIUM. The Board of the Association Pro-ISSI is presided over by Klaus Pretzl.

A list of the board members of ISSI's four bodies at the end of June 2008 can be found on page 4.

About ISSI

The web site of the International Space Science Institute got a new face in its thirteenth business year.

Infrastructure

For visitors and teams, several conference rooms and guest offices are available. These are all equipped with high speed network connections (partly wireless), some of them also have printers and projectors for large screen presentation. ISSI's backbone switch has been upgraded to cope with 10 Gigabits per second transfer rate.

During the business year the infrastructure received several improvements. The offices number 32 and 33 on the third floor have been combined into a medium size seminar room. This was implemented by removing the wooden wall which divided both rooms. A state of the art projector, fixed to the ceiling, has also been installed.

The Sun server has been retired as a result of more people using the Linux server instead. The 2 workstations that were connected to Sun server have also been retired.

Many new items have been bought this year. Among these items are: new printers, new desktops (Windows and Mac), new laptops (Windows and Mac), two new projectors and a new scanner.

As a result, the Institute provides a heterogeneous workstation environment with a total of eighteen desktops and ten laptops. The workgroup network is part of the University's local area network, so that its resources (e.g., the SUN, Linux cluster server, license server and special peripherals) are available as well. With the locally installed computer peripherals, the Institute's staff and guest scientists are able to perform most computing tasks and access the Internet. The network consists of the following:

- Two servers: Linux and Windows 2003
- Fourteen PCs three of which run both Linux and Windows
- Four Mac computers running Mac OS Leopard
- Ten laptops (eight PCs and two Mac Book Pros).
- Five printers, two of which in color
- Five projectors
- Two wireless access points
- One digital video camera, still camera, scanner, ...

ISSI also regularly updates software packages and provides access to the large scientific packages (such as IDL, Matlab, Grapher, ArcView GIS, ISIS, and Maple) either locally or by connecting to the University's servers.

Last but not least, ISSI has a brand new web site built up from scratch. The relaunch of the new homepage was in May 2008.

The present web site is split into six main fields: About ISSI, Program, Publications, Local Guide, Association Pro-ISSI and the Spotlight. The audience finds in the Spotlight the latest news, like upcoming meetings and events, latest publications or other activities of ISSI staff members. The web site is regularly updated. Please feel free to visit `www.issibern.ch`.

ISSI's Personnel

The ISSI staff at the end of the 13th business year on 2 July 2008:
From left to right: Angelo Pio Rossi, Saliba F. Saliba, Andrea Fischer, Irmela Schweizer, Rudolf von Steiger, Roger-Maurice Bonnet, Emiliya Yordanova, Silvia Wenger, André Balogh, Johannes Geiss, Vittorio Manno and Katja Schüpbach. Missing on the picture: Brigitte Schutte.
Details can be found on page 4, in the section Who is Who.
Picture was taken by Margrit Vetter.

In our 13th business year, several personnel changes have taken place:

Two new postdocs started their work at ISSI: Emiliya Yordanova, a Discipline Scientist in magnetospheric physics joined ISSI in January 2008 as well as Angelo Pio Rossi a Discipline Scientist in Mars science and geology, who is a new ISSI staff member since March 2008. Katja Schüpbach supports the ISSI secretariat since November 2007.

Kathryn Fishbaugh post-doc term ended at the end of July 2007. She is now working at the Smithsonian Institution, Washington D.C., USA.

Anita Kilchenmann left ISSI after receiving her PhD degree at the end of August 2007. She is now working at the Federal Department of Defence, Civil Protection and Sport in Spiez, Switzerland. Oliver Botta took the opportunity to work at the State Secretariat for Education and Research (SER) in Bern, Switzerland, in May 2008. He is still collaborating with ISSI in his function as Scientific Consultant in Space Science at the Swiss Space Office.

At the end of the 13th business year, the ISSI staff consisted of 13 members: three Directors, one Honorary Director, two staff scientists, and seven staff members, some of whom are working part time.

Financial Overview

Statement of Operations (in CHF), 13th Financial Year, 1 July 2007 to 30 June 2008				
Expenses		**Revenues**		
Salaries and related costs[1]	1'170'095.46	European Space Agency	1'760'000.00	Audited by Ernst & Young, Bern
Fixed costs	262'079.55	ESA Earth Obs. Programme	74'251.70	
Operating costs[2]	242'717.75	Swiss Confederation	810'800.00	
Investment (depreciated)	41'092.30	Other income[3]	93'523.99	
Workshops, Working Groups, Teams, Visiting Scientists (ISSI funded)[4]	943'603.57	Result of the year	-78'987.06	
Subtotal Expenses	**2'659'588.63**	**Subtotal Revenues**	**2'659'588.63**	
Workshops, Working Groups, Teams, Visiting Scientists (SNF funded)[5]	163'879.90	Swiss National Science Foundation (SNF)[5]	163'879.90	Audited by SNF
Total Expenses	**2'823'468.53**	**Total Revenues**	**2'823'468.53**	

Remarks:
[1] **Salaries:** It should be noted that the majority of the ISSI staff members (including directors) are scientists actively conducting research as well as taking care of organisational, editorial, and administrative tasks.
[2] **Operating costs** include repair and maintenance, insurance, supplies, administration, and public relations.
[3] **Other income** covers extraordinary income, interest income, and exchange gain or loss.
[4] **Workshops, etc.** also include the balance from income and expenses of guest apartments.
[5] **SNF:** Grant from Swiss National Science Foundation to R. von Steiger and related expenses.

The 13th year ended with a surplus of nearly 79'000 CHF, which is relatively high yet reasonably close to the budget, which foresaw a surplus in the amount of 75'000 CHF.

On the revenue side, both the contributions of ESA and of the Swiss confederation were increased over the previous year by 2.5% and 1.5%, respectively. In addition a new contribution from the ESA Earth Observation Program was received, starting a 3-year program described elsewhere in this report. Consequently it was possible to select a record number of new International Teams, 21 in Space Sciences and 8 in the Earth Observation Program. Our efforts to bring the result of the year closer to zero by the late selection of an additional Team during the course of the year were largely cancelled by unexpected income from interest and exchange rate gain. The total of more than 1.1 million CHF (including the contribution from the Swiss National Science Foundation SNF) spent for Workshops, Working Groups, Teams, and Visitors is the highest in ISSI's history. All other expenses remained essentially constant as compared to the previous year.

It is important to note that ISSI also receives indirect contributions that do not appear in the table above. One of the directors is employed directly by the University of Bern. Moreover, ISSI benefits from the University of Bern and from Oerlikon Space AG through in kind contributions such as Internet connectivity, library access, the secretariat of the Board of Trustees, and support of the Association Pro-ISSI.

About Pro-ISSI

The Pro-ISSI Association was founded in 1994 under Swiss law with the goals to create an International Space Science Institute in Switzerland and to communicate the fascinating results of space sciences to the Swiss public. The first goal was reached in 1995 when the International Space Science Institute (ISSI) was created as a foundation under Swiss law. Pro-ISSI, whose members are, amongst others, representatives from universities, industry, politics and public administration, provides a bridge between ISSI and the public in Switzerland by organizing public lectures and publishing the presentations in the issues of SPATIUM. Typically there are 2-3 SPATIUM issues published per year. The Pro-ISSI Association, which consists of about 120 members, meets once per year for a general assembly.

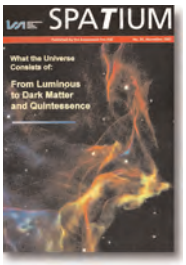
Pro-ISSI Activities and the SPATIUM Series

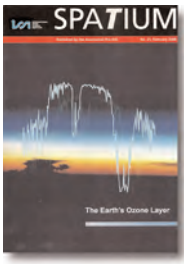
Earth sciences will in future also belong to the diversified research program of ISSI. With this in mind Pro-ISSI organized a public lecture on 31 October 2007 on the story of the vulnerable Earth ozone layer with the German title: "Wenn der Mensch mit der Natur spielt: die verletzliche Ozonschicht". The lecture, which was well received by the audience, was given by Yasmine Calisesi, an expert in athmospheric chemistry and a former staff member of ISSI. The SPATIUM issue, with the number 21, based on this presentation appeared in February 2008.

On 3 April 2008 Ruth Durrer of the Geneva University was invited to talk about the latest developments and results in cosmology. In her talk she demonstrated impressively how the latest precision measurements of the cosmic microwave background radiation, the supernovae type1 and the large scale structure surveys provide us exciting information about the expansion and the mass/energy budget of the universe. The fascinating subject has attracted a large audience.

Based on a presentation of Giovanni Fabrizio Bignami, former President of the Italian Space Agency and Professor at the Pavia University, with the title "4440: A secret number in Astronomy", Hansjörg Schlaepfer has created a SPATIUM issue which describes in a fascinating and captivating way the development of astronomy and space sciences from thousands of years ago to the present. This SPATIUM issue with the number 19 was published in August 2007. Another SPATIUM issue, with the number 20, appeared in November 2007 with the title "What the Universe consists of: From Luminous to Dark Matter and Quintessence". This SPATIUM is based on a presentation by Uwe Wiese of the University Bern which he gave on 27 March 2007. This issue illuminates in an impressive way the interplay between the physics of the micro-cosmos, i.e., elementary particle physics, and macro-cosmos, i.e., astrophysics and cosmology. One of the greatest miracles is, that we know of the existence of dark matter and dark energy, which fill 95% of our universe, but we still do not know about their true nature.

In connection with a workshop on solar magnetism, held in January 2008 at ISSI, a captivating public lecture with the title "The discovery and investigation of solar magnetism" was given by Eugene N. Parker of the Chicago University on 23 January 2008. Eugene N. Parker is a world wide known expert and one of the pioneers in this field of research. In his lecture he was leading the audience from the past history to the latest developments of solar magnetism research. An issue of SPATIUM based on this presentation will be published in fall 2008. All published issues of SPATIUM can be downloaded as pdf-files on `www.issibern.ch`.

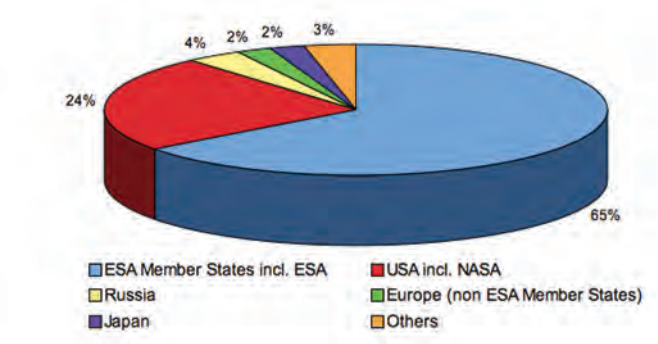




The SPATIUM CD-ROM and the Covers of SPATIUM no. 19, 20 and 21.

Scientific Activities: The Thirteenth Year

ISSI visitors' origin countries



Pie chart showing the ISSI visitors' countries of origin. A total of 620 scientists worked during the thirteenth ISSI business year, 302 of them were for the first time at ISSI.

The Programme and the Tools

ISSI's operation mode is fivefold: multi- and interdisciplinary Workshops, Working Groups, International Teams, Visiting Scientists, and Forum.

Workshops are selected by the Directors in consultation with the Science Committee. Proposals or suggestions for Workshops may also originate from the outside and be addressed to the Directors. The programmes and speakers are defined by a group of highly qualified experts serving as convenors. The Workshops of a week duration (sometimes repeated) can be attended by up to 45 invited scientists. Workshops always lead to a volume of the Space Sciences Series of ISSI (SSSI) published by Springer and in parallel as issues of Space Science Reviews.

Working Groups are set up by the Directorate for specific tasks, also of technical nature. They have a smaller number of members and meet repeatedly as necessary to achieve the assigned objective. The results of the Working Groups' activities are in general published as titles of ISSI Scientific Report Series (SR) under the responsibility of ESA's Publication Division.

International Teams consist of about 10 or more external scientists, addressing a specific scientific topic in a self-organized fashion, under the responsibility of a Leader in a series of two to three one-week meetings over a period of 12 to 18 months. The results of these activities are customarily reported in scientific journals. The selection of Teams results from an annual Call for International Teams issued in January and from the subsequent review and prioritization done by the Science Committee.

Visiting Scientists spend variable periods of scientific activity at ISSI.

Forum is an informal and free debate among some fifteen to twenty five high-level participants on open questions of political and scientific nature. Forum does not ne-cessarily lead to formal recommendations or decisions. They are held at ISSI for a duration of two or three days.

The Thirteenth Year in detail:

The **Young Scientists** is a new scheme that has been set up in the year to give the possibility to young scientists, within 2 years of the PhD to participate in the activities of Teams and Workshops. A special budget has been allocated to this initiative. The scheme was only implemented in the last eight months but quickly became very popular. 42 young scientists profited from it, and participated in the activities of 21 Teams and 2 Workshops.

During the thirteenth year of activity, the programme consisted of:

3	Workshops
1	Working Group
43	International Teams
	more than 13 Individual Visitors

A total of 620 international scientists participated in the scientific activities of ISSI.

EUROPLANET - Planetary Atmospheric Electricity

Europlanet is a network of over 110 European and U.S. laboratories deeply involved in the development of planetary sciences and support to the European planetary space exploration programme. With the broad community connection made through its Discipline Working Groups and other activities, Europlanet offers an ideal base from which to identify new fields of research for planetary sciences and to stimulate collaborative work among its member laboratories. For Europlanet, developing collaboration with ISSI in holding workshops and producing books on these new and emerging subjects is both natural and extremely stimulating, considering the high profile, international standing and proven success of ISSI.

The first Europlanet-ISSI workshop took place from 23-27 July 2007 and gathered about 40 experts from two communities, planetary scientists and atmospheric physicists.

Electrical phenomena have been studied for centuries in the Earth's atmosphere, leading to a progressively better understanding of electrification sources (galactic cosmic rays, deep cloud convection, etc.), their manifestations (lightning, discharges and electromagnetic emissions) and their hazards. Atmospheric electricity still offers outstanding challenges to modern environmental research. For example, the very mechanism of charging of cloud droplets is only partly understood, and understanding the complex 3-D geometry of thunderstorm convection cells is only beginning. Even more, a significant fraction of electrostatic discharges, those which occur between the cloud tops and the ionosphere base and manifest themselves through spectacular optical phenomena such as sprites, elves, coronae, have only recently been discovered. Taranis, the first European in-depth global study of these phenomena from space is still only in its preparation phase. Many discoveries are ahead of us.

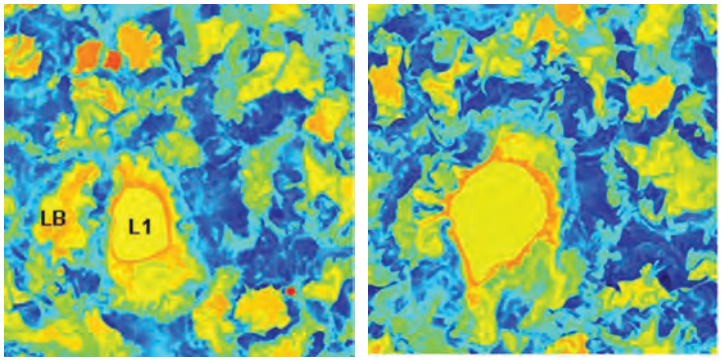
While terrestrial atmospheric electricity is well established yet rapidly evolving, its planetary counterpart is in its infancy. One of the major merits of the workshop and its book is to show the universality, the diversity and the importance of atmospheric electrical phenomena across the solar system.

The magnetometer (MAG) on board ESA's Venus Express detected wave signals that show evidence of lightning in the atmosphere. This picture is an Artist's concept on lightning on Venus (Image credit: ESA, image by C. Carreau).

Standing as a good example of a universal process, lightning is common and currently observed at Jupiter and Saturn, it is likely at Uranus and Neptune, and evidence of its existence in the atmosphere of Venus accumulates from Venus Express data. But many basic questions about its generation and occurrence are open: does cloud convection need water to generate electrification and lightning? Is there a global electrical circuit at any other planet than Earth?

Space exploration of the solar system has also illustrated the broad diversity of charging and discharge phenomena, in Martian dust storms or on planetary rings and dust particles, for instance, or through levitation processes at the surfaces of airless bodies.

Finally, the importance of electrical phenomena in the history of solar system evolution is also emerging more and more as research progresses. Did atmospheric discharges play a role in the dynamics and chemical activity of the primordial Solar



Colour-coded temperature map of a slice a 3D Local Bubble high resolution simulation representing the present time (left). In the "future", the LB and Loop 1 will merge partially (right). (Image Credit: D. Breitschwerdt)

Nebula? Or in the synthesis of the first prebiotic molecules of early Earth as suggested by Miller and Urey more than fifty years ago? Or in the growth and dynamics of atmospheric aerosol?
The workshop and the publication no. 30 in the Space Science Series of ISSI (details can be found on page 59) are lead by François Leblanc (Europlanet) and Michel Blanc (ISSI), composed of K. Aplin, R.G. Harrison, M. Kamogawa, S. Klos, J.-P. Lebreton, M. Parrot, S. Pulinets, R. Treumann and Y. Yair.

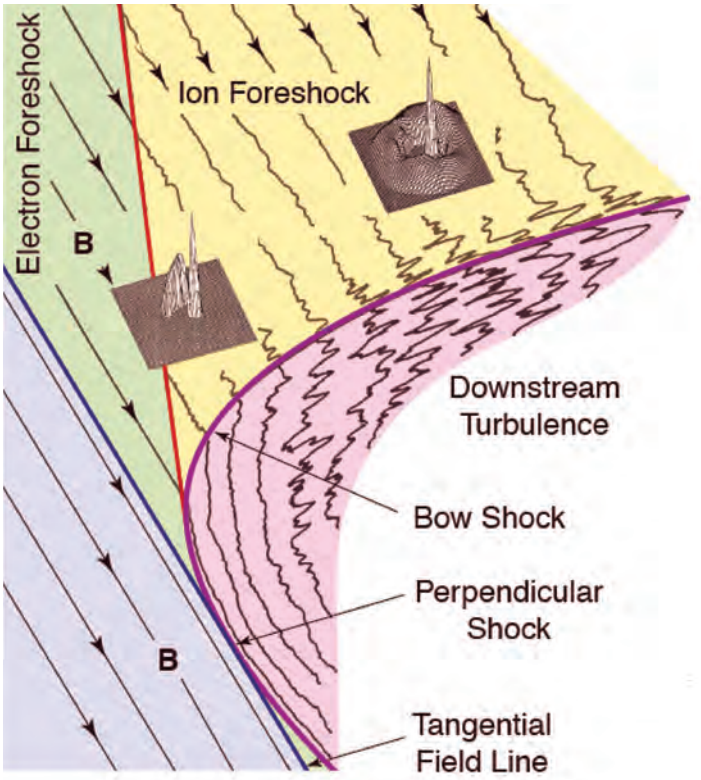
From the Outer Heliosphere to the Local Bubble

For a long time studies of the outer heliosphere and of the interstellar medium were two fields of research that were evolving in near isolation of each other. The very first ISSI workshop, in 1995, made an attempt to bring the two communities together, as the resulting volume on "The Heliosphere in the Local Interstellar Medium testifies". Twelve years later ISSI decided to come back to that theme, not only because the first volume is out of print, but mainly to address, discuss, and interpret the vast amount of new observations and results made since then, most notably the crossings of the termination shock by both Voyager spacecraft. The convenors of this new workshop were J. Linsky (Chair), D. Breitschwerdt, P. Frisch, V. Izmodenov, E. Möbius, and R. von Steiger. The Workshop as held on 15-19 October 2007 and attended by some 40 scientists.
The convenors compiled a format that would summarize these developments, identify and critically assess the important physical processes, and foster interdisciplinary research. With a number of specific objectives in mind they formulated a workshop program based on seven questions that the speakers were asked to address: (1) What are the dominant physical processes in the termination shock and inner heliosheath? (2) What is the three dimensional shape and structure of the dynamic heliosphere? (3) How are the interstellar plasmas and dust located inside and outside of the heliosphere related? (4) What are the origin and physical properties of the very local ISM? (5) What are the energy and pressure equilibria in the Local Bubble? (6) What are the important physical processes in the multiphase interstellar medium located inside the Local Bubble? (7) What are the roles that magnetic fields play in the outer heliosphere and Local Bubble?
During the course of the meeting, it became clear that magnetic fields play important roles in most of the phenomena discussed at the workshop. Therefore, the final question may be the most basic of the seven questions to answer. To place these questions into a broader context, the convenors requested several speakers to give "big picture" talks on the time evolution of the heliosphere, the origin and evolution of the Local Bubble, the ISM beyond the Local Bubble, and challenges in modelling the heliospheric/ISM interface. Finally, a summary speaker added insightful comments on all that had transpired.
Terminology is often an issue that confuses our understanding of phenomena. One such issue is the best name for the partially ionized plasma that surrounds the heliosphere. After much discussion, the participants decided on the term ''circumheliospheric interstellar medium'' or CHISM and proposed that this term be

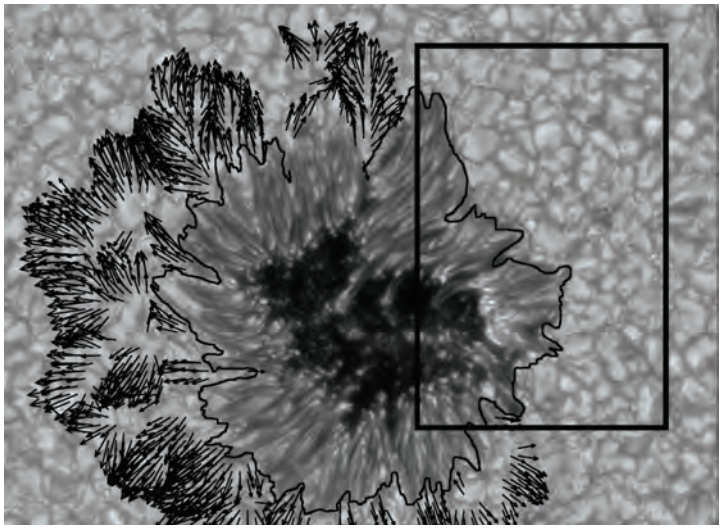
used in the future.
Currently a book volume, no. 31 in the Space Sciences Series of ISSI, is being edited and will appear later in 2008.

Collisionless Shocks in the Heliosphere

Collisionless shocks are met in ubiquity throughout the entire universe. They occur everywhere where matter expands or collapses and interacts either with obstacles which stand in its path or impinges on other streams of matter. In almost all except for very particular cases the matter is highly dilute and collisions are extremely rare. This is the case when we speak of collisionless shocks. The matter has not sufficient time to wait for direct particle collisions to dissipate the excess streaming energy. Since such dilute matter is in the plasma state the particles, electrons and ions, carry electric charges and are vulnerable to electromagnetic fields. The entire interaction is thus mediated by the electromagnetic field via the excitation of plasma instabilities and is confined to a narrow transition region: the shock. The vivid interest in collisionless shocks arose when it was recognised by Enrico Ferm in 1949 that such shocks can serve as the engine that accelerates particles to cosmic ray energies.
More than half a century of collisionless shock research has brought the field to a certain intermediate level of maturity as well theoretically as, after the advent of the space age that allowed for investigating shocks in situ with the help of spacecraft borne instrumentation, also observationally and experimentally. It was recognised by the directorate of ISSI that at this stage a comprehensive account of the present state of the art in collisionless shock physics would be in place. This led to the proposal of organisation of a Working Group with the purpose of writing a reference ISSI Report on collisionless shocks that should be restricted to the accessible collisionless shocks in the Heliosphere: solar coronal shocks, interplanetary shocks, planetary bow shocks and, last not least, the heliospheric terminal shock. This Scientific Report is thought of as a service to the community. It should distinguish itself from other writings by its consistency, not being a collection of papers having a more tutorial character.
With this goal in mind, a group of six scientists was invited to participate in the Working Group acitivity: S.D. Bale, M.A. Balikhin, K.-L. Klein, V. Krasnoselskikh, B. Lembège, and R. Treumann (chair).
The ISSI Scientifc Report no. 11 on "Collisioness Shocks in the Heliosphere" is in preparation and will be published in the next business year.



Sketch of the bow shock in the magnetised solar wind flow showing the electron foreshock (green) and ion foreshock (yellow), the tangential field line (blue) at the perpendicular bow shock, and the boundary between the two foreshocks (red line). The two inserts show the ion beam at the ion foreshock boundary and the diffuse ion component deep inside the ion foreshock. Downstream of the shock is the magnetosheath. The sheath is weakly fluctuating behind the quasi-perpendicular and highly fluctuating behind the quasi-parallel shock. (Image Credit: R. Treumann)



The dark umbra and surrounding penumbra of a sunspot against the background of solar (photospheric) granulation, with an indication of flows away from the sunspot associated with the transport of magnetic field on the Sun. (Image Credit: Picture is taken from the workshop presentation of Valentin Marínez Pillet)

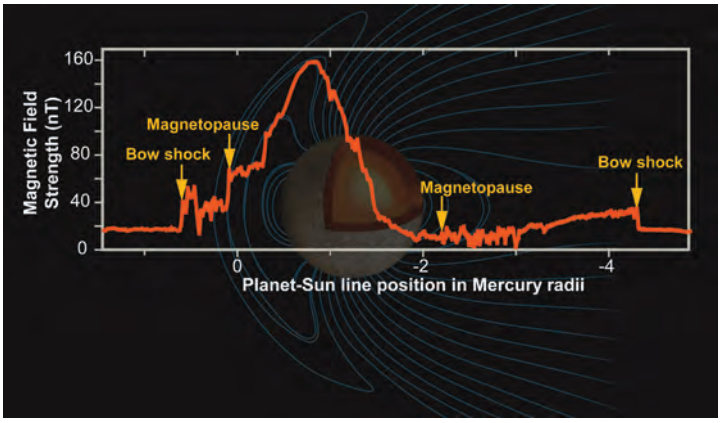
The origin and dynamics of solar magnetism

The workshop took place on 21-25 January 2008, with the participation of 40 leading solar physicists and a specially invited group of 5 young scientists. The objective was to review our understanding of key aspects solar magnetism, its origin in the solar dynamo as well as its evolution and dynamics on all relevant temporal and spatial scales. For this, the workshop addressed the following topics:
(1) Processes that are thought to play a key role in the solar dynamo: tachocline dynamics, differential rotation, torsional oscillations, meridional flow, polar field reversals, (2) The transport of magnetic flux to the surface of the Sun: flux tube formation and dynamics, flux emergence, (3) The formation and structure of sunspots and solar active regions, as well as the dynamics and dissipation of photospheric magnetic fields, (4) How magnetic field that emerge from the solar interior to its surface are coupled to the overlying solar atmosphere and the heliosphere, and (5) The status of our ability to forecast solar phenomena on timescales from activity cycles to eruptive events.

This workshop was the first gathering in recent years in its breadth and ambition to review "the status of our knowledge and ignorance of solar magnetism", the title of the keynote opening talk by Professor Eugene Parker, the most respected expert on solar magnetism over the past half century and the "inventor" of the solar wind.
The presentations given during the workshop provided both reviews of the background on the complex physical processes in the Sun's interior and status reports on the latest observational and theoretical research. All currently competing models of the solar dynamo were highlighted and led to lively discussions that helped the mutual understanding of the problems. To underline the links of this workshop to the forthcoming Planetary and Terrestrial Magnetism workshops, a very well received review paper was presented by Professor Ulrich Christensen on the comparison between planetary dynamos and the solar dynamo. The book form of the outcome of the workshop, under the editorship of Michael Thompson and André Balogh (with help from the convenors of the workshop) is being edited and will be published in the Space Science Series of ISSI as Volume 32.
The participation of the five young scientists (Laura Bone, Sonia Danilovic, Laurene Jouve, Hannah Schunker and Michal Svanda) was much appreciated by all the participants and all five have expressed their appreciation of being able to meet the leading scientists in their field.
The year 2008 marks both the centenary of the discovery of solar magnetic fields in sunspots by George Ellery Hale and the fiftieth anniversary of Eugene Parker's seminal paper on the solar wind. To celebrate the occasion, a University Colloquium was held by Eugene Parker on "The discovery and investigation of solar magnetism", a highly appropriate and well-attended event with which ISSI is proud to have been associated. An Issue of Spatium (Number 22) is in preparation based on Professor Parker's colloquium.

Workshop Series on Magnetism in the Solar System

Two forthcoming workshops are, respectively, the second and third in the series of workshops organised on the general subject of magnetic fields in the solar system. The two topics are Planetary Magnetism, to take place on 1 to 5 September 2008, and Terrestrial Magnetism, on 9 to 13 March 2009. The coordinator of these three workshops, on behalf of ISSI, is André Balogh. A joint meeting of the convenors for the three workshops was held on 29-30 November 2007 to ensure that the common theme, the origin and role of magnetic fields in the solar system, receives the emphasis that is intended in the series. As a result, presentations about the topics of the other two workshops have been scheduled in each workshop and a representative also included among the convenors of the two last workshops. Following the success of the first of the series, on Solar Magnetism held in January 2008 (see on page 18), we are looking forward to completing this important series, a first that provides a linked theme to the workshops.



The magnetic field of Mercury measured on the first flyby of the planet by NASA's MESSENGER mission in January 2008. For Mercury, its unexpected intrinsic magnetic field has provided the vital clue to its internal state and has helped to understand the formation and evolution of the terrestrial planets. (Image Credit: Figure courtesy of NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington)

Planetary Magnetism

The convenors for this workshop are: Ulrich Christensen, Mario Acuña, André Balogh, Doris Breuer, Karl-Heinz Glassmeier and Gauthier Hulot. The magnetic fields (or their absence) of solid bodies in the solar system are a principal source of information on their formation, evolution and current state. The origins of these magnetic fields are different in the different planets, satellites and asteroids. This workshop is expected to be unique in addressing the whole range of mechanisms of magnetic field generation, internal dynamos, induction and remnant magnetisation, as well as their specific manifestation in the different bodies. It is planned that the measurements (almost exclusively from in situ observations by visiting spacecraft) and modelling techniques will be critically reviewed as these are the basis on which rests the physical interpretation of the observations. The terrestrial planets will be reviewed and the four different cases will be examined for both the presence of an internal field (Mercury, the Earth) and its absence (Venus, Mars). In this context, the Earth will be treated as one of the planets, and what we know about the Earth's magnetism will be applied, as appropriate, to the case of the other bodies. The two closest gas giants, Jupiter and Saturn provide very different conditions for the formation of internal dynamos. The thermal evolution of the planets and their inferred internal structures will be reviewed to provide the context for the formation of mechanisms that generate magnetic field. Smaller bodies, the Galilean satellites of Jupiter and some asteroids that are known to have a magnetic field will also be included in the workshop.

Forthcoming Workshops

Terrestrial Magnetism

The Convenors for this workshop are: Gauthier Hulot, André Balogh, Ulrich Christensen, Cathy Constable, Mioara Mandea, Nils Olsen. The Earth's magnetic field has been the subject of study for centuries, leading to an increasingly precise understanding of its different sources and generation mechanisms. More recently, global mapping from ground based measurements and space has contributed a considerable wealth of data gathered by the Danish Ørsted and the German CHAMP satellites and more observations are planned by ESA's SWARM mission. The objective of the workshop is to review the state of research in terrestrial magnetism concerning the main field of the Earth generated by the geodynamo, the lithospheric field as well as external and induced contributions to the overall magnetic field. Core dynamics and geodynamo processes on all timescales will be reviewed, from reversals to geomagnetic jerks. It is intended that recent models of the geomagnetic field will be compared to geodynamo simulations. Problems related to the separation of internal and external terms which is essential for the identification and evaluation of the sources and source processes of the field will also be examined. Critical areas still remaining for upcoming space missions will be identified. The workshop will also address the predictability of changes in the geomagnetic field and their potential consequences.

The Nature of Gravity

The motivation of this workshop are the data available on Gravitomagnetism, in particular the results of the Gravity Probe B 'null-experiment' that has measured the Lense-Thirring effect in orbit around the Earth. Results on this effect derived from the observation of astrophysical systems as well as from laser ranging of Earth-orbiting satellites will also be presented and discussed. The other sessions of the workshop are devoted to tests of basic laws and principles, namely investigating possible violations of Newton's inverse-square law and the equivalence principle as well as the problem of the constancy of the fundamental physics constants, Constraints on Gravitational Theory from Cosmological Observations, Quantum Gravity and Grand Unified Theory. The final session is devoted to The Assessment of Uncertainty: to what Extent are High-accuracy Measurements in Space Possible? I.e., to a question, which critics of performing fundamental physics measurements on un-manned space platforms are asking.
The workshop will take place from 6 to 10 October 2008. The nature of Gravity workshop is convened by Martin C.E. Huber (chair) and Rudolf Treumann (chair), C.W. Francis Everitt, Reinald Kallenbach, Rüdeger Reinhard, Gerhard Schäfer, and Bernard F. Schutz.

Icy Satellites - Europlanet: Moons of the outer solar System: exchange processes involving the interiors

The objective of this second Europlanet workshop in collaboration with ISSI is to gather 45 specialists of the icy moons to discuss our current understanding of the exchange processes which cause the astonishing variety of icy surfaces. Both the workshop, which will constitute the first step of the project development, and the book, which will represent its final product, will describe and discuss the different elements of this theme. The conveners of the workshop are Oliver Grasset (Europlanet lead) and Michel Banc (ISSI lead), Athéna Coustenis (LESIA), Hauke Hussmann (DLR Berlin), Tobias Owen (Astronomy Institute, Hawaii), Robert Pappalardo (NASA/JPL), Sho Sasaki (University of Tokyo), and Diego Turrini (INAF/IFSI Rome). The workshop will take place from 17 to 21 November 2008.

International Teams

Proposals for International Teams are solicited through yearly Calls issued in January. Thereupon follows a competitive evaluation and selection by the Science Committee at its May/June meeting and the approved Teams start their activity in the second semester of the year.
In the thirteenth business year, 43 International Teams used the ISSI facilities, 27 of them resulting from the Call for proposals 2007, 14 from 2006. 2 Teams from the 2005 Call completed their activity. The Teams had a total of 51 sessions mostly of 5 days duration and are listed below:

Teams selected in 2005

WFM (Wave Field Measurement)

Team leader: François Lefeuvre, LPCE/CNRS, Orléans, France
Session: 26-30 November 2007
Scientific rationale: The aim of the study is to define how wave field measurements on board magnetospheric satellites may be used to trace Wave Particle Interactions (WPI) involved in magnetosphere/ionosphere/atmosphere couplings. Emerging ideas will be tested from existing models and available satellite data. Results may be used to trigger specific observational programmes of the CNES micro satellite DEMETER (in orbit since July 2004) and TARANIS.

Investigation of the Pioneer Anomaly

Team leader: Slava G. Turyshev, Astrophysics and Gravitation Group, JPL, USA
Session: 18-22 February 2008
Scientific rationale: To date, the Pioneer 10 and 11 spacecraft are the most precisely navigated deep-space vehicles. However, the Pioneers' orbit reconstructions were limited by a small, anomalous, constant, blue-shifted, Doppler frequency drift. The drift can be interpreted as due to a constant sunward acceleration This interpretation has become known as the Pioneer anomaly. The limited data analyzed previously allowed the detection of the anomaly in the Pioneer data, but not a determination of its origin. The analysis of the entire existing Pioneer data is vital to understanding the anomaly and to finding its origin.

Teams selected in 2006

Advances in the Scientific Basis for Monitoring, Modeling and Predicting Space Weather

Team leader: Anna Belehaki, National Observatory Athens, Greece
Sessions: 10-14 September 2007 and 31 March - 4 April 2008
Scientific rationale: Space weather activities in Europe include both the monitoring of the space environment and the development of models. Coordination of existing national activities in Europe has been only recently initiated in the frames of the COST Action 724 "Developing the scientific basis for monitoring, modeling and predicting Space Weather" with the involvement of 23 countries. As a step forward, COST724 community recognizes the necessity to synthesize the scientific achievements made by COST724 and prepare the way for future research in this area. This Team project is essential for the accomplishment of the goals of the European Action COST724 and will provide important conclusions for strengthening space weather related activities in Europe through specific exploitation actions.

AsteroFLAG? From the Sun to the Stars

Team leader: William Chaplin, University of Birmingham, UK
Session: 18-22 February 2008
Scientific rationale: The detection of Sun-like oscillations in other stars offers the prospect of being able to test theories of stellar evolution and stellar dynamos using many stars rather than just one (the Sun). A wide range of asteroseismic targets is on offer at different epochs along stellar evolutionary life cycles. With new space missions soon to be launched (e.g., COROT7), others under development (e.g., Kepler8) and extension of the ground-based capabilities planned (e.g., the proposed SONG9 asteroseismic net-

International Teams

This Hubble image shows the galaxy cluster Abell 1689, which contains a million stars in all. Its gravity acts as a cosmic lens, bending and magnifying the light of the galaxies located far behind it. This natural phenomenon is called gravitational lensing. Their light bent by the gravity of the cluster, the far-away galaxies appear as arc-shaped objects around it. The increased magnification allows astronomers to study remote galaxies in greater detail. (Image Credit: NASA/ ESA/ JHU (L. Bradley, H. Ford)/ UCSC (R. Bouwens, G. Illingworth))

work), we stand on the threshold of a large increase not only in the number of stars for which data are available, but also in the lengths of those datasets. The objective of the team is to make a significant contribution to position the field to make optimal use of the new, and future, asteroseismic data.

Star Cluster Formation and Evolution in Context of Quiescent Versus Violent Star Formation Paradigm

Team leader: Richard de Grijs, University of Sheffield, UK
Session: 10-14 December 2007
Scientific rationale: Star clusters are ubiquitous in most galaxies and robust tracers of the violent star-formation activity in their host galaxies over cosmological timescales. The first few 10^7 years of a cluster population's lifetime are as yet poorly understood. The objective of the team is to obtain robust constraints on the initial conditions for cluster formation and on the importance of their environmental characteristics by using a combination of ground-based and Hubble Space Telescope observations, which are largely in hand and ready for further analysis.

Comparative Cluster-Double Star Measurements in the Magnetotail

Team leaders: A.N. Fazakerley, Mullard Space Science Laboratory, Dorking, UK and M.W. Dunlop, Space Sciences Division, SSTD, Rutherford Appleton Laboratory, UK
Session: 16-18 July 2007
Scientific rationale: Following on from the successful ISSI team studying "Comparative Cluster-Double Star measurements of the dayside magnetosphere", the current team seeks to extend the investigation to the nightside, in particular to magnetotail studies using data from the summers of 2004, 05 and 06. Such a constellation offers the possibility of performing convincing simultaneous timing measurements of substorm signatures in both the near-Earth-tail and the near-Earth neutral line region. Together with ground-based data, the long standing question of whether substorm activity originates in the CD region or the NENL region will be probed. The team work will use data from the many instruments onboard each spacecraft, and supplementary data from other useful spacecraft and ground based facilities will be employed as appropriate.

Effects of the Heliosphere Breathing Due to Solar Cycle Variations as seen in the Backscattered Solar Lyman-Alpha Radiation

Team leader: Vlad Izmodenov, IKI, Academy of Sciences, Moscow, Russia
Session: 12-18 November 2007
Scientific rationale: Solar-cycle variations of the profiles of backscattered Lyman-alpha measured by SOHO showed that the effective line-of-sight velocities and temperatures of interstellar H atoms are changing with time. The measured profiles can only be explained by presence of two populations of interstellar H atoms entering into heliosphere through the heliospheric interface. Time-dependent models are also needed to understand radial dependence of the Lyman-alpha intensities as measured by the Voyagers and Pioneer 10 spacecraft. The team will explore the effects of the heliosphere breathing due to the solar cycle variations

by analyzing backscattered solar Lyman-alpha radiation collected by SOHO/SWAN, Voyager 1, HST, Galileo and Cassini spacecraft over the solar cycle. The analysis will be performed by using state-of-the-art kinetic models of interstellar H atom distributions.

Data Assimilation for Solar Dynamics and Dynamo and Forecast of Solar Activity Cycle

Team leader: Alexander Kosovichev, Stanford University, USA
Session: 8-12 October 2007
Scientific rationale: Data assimilation is a powerful analysis method in which observed information is accumulated into dynamical models taking into account physical constraints and properties. This team of solar physicists, observers and modelers, and experts in data assimilation methods will develop initial applications of the data assimilation methods to key solar physics problems of the internal dynamics and magnetic field generation and transport, using data from the SOHO space mission and ground-based observatories. One important application of the new methodology is prediction of the strength of the solar cycle.

Dust – Plasma Interactions: Observations in the Interplanetary Medium and in the Environment of Solar System Objects

Team leader: Ingrid Mann, Kobe University, Japan
Session: 13-17 May 2008
Scientific rationale: Many processes in astrophysics base on dust-plasma interactions and most of the dust-plasma interactions are at present not directly measured. The team will undertake a survey of dusty plasma effects and dust plasma interactions in the interplanetary medium, in the environment of solar system objects and in the Earth's atmosphere. From this it will shape a set of future research questions for experimental, observational and theoretical studies of dust-plasma phenomena.

The RHESSI Mission: Inversion Methods for Imaging Spectroscopy

Team leader: Anna Maria Massone, CNR-INFM LAMIA, Genova, Italy
Sessions: 10-15 September 2007 and 28 January - 2 February 2008
Scientific rationale: This project is the continuation of "The RHESSI Mission: X-Ray Spectra and Image Analysis by Means of Inversion Methods". The main goal is to integrate 2D spatial imaging in hard X-rays and gamma rays with 1D high resolution spectroscopy into an imaging-spectroscopy approach which will allow spectral changes associated with the propagation of the emitting electrons to be measured and assessed against candidate energy transport models. Such imaging spectroscopy approach will provide powerful new constraints on the mechanisms of energy gain and lossduring solar flares.

Aeronomy of Titan

Team leader: Ingo Müller-Wordag, ICL, UK
Sessions: 27-31 August 2007 and 2-4 June 2008
Scientific rationale: The Team shall explore the Aeronomy of Saturn's largest moon, Titan. Scientific topics to be address include the energy balance and horizontal structure of Titan's upper atmosphere, atmospheric waves, Titan's ionosphere and its interaction with Saturn's magnetosphere, the exosphere and atmospheric escape processes. The team will consist of experts from across Europe and the U.S., many of which are closely involved with the ongoing Cassini/Huygens mission exploring Titan in unprecedented detail. The timing of this activity is ideal in that it allows discussion of observations from the first 2-3 years of the mission and identification of future needs for the mission, supporting ground based observations, laboratory measurements and theoretical models.

International Teams

The Role of Spectroscopic and Imaging Data in Understanding Coronal Heating

Team leader: Susanna Parenti, Royal Observatory of Belgium, Belgium
Session: 22-25 October 2007
Scientific rationale: An understanding of the mechanisms responsible for solar and stellar coronal heating is still an open question. For the solar case, the most commonly accepted interpretation to this problem involves processes acting at small spatial and temporal scales, such as Parker's (1988) nanoflare model, where the coronal heating is ensured by a repetition of a large number of small events, unresolved by the instrumentation presently available. Solar-B, STEREO and SDO, will soon deliver high resolution spectroscopic and imaging data. This project intends to develop methodologies to couple the data from new missions and the predictions from state-of-the-art theoretical models in order to provide major advances in the understanding of coronal heating.

Understanding the Role of Current Sheets in Solar Eruptive Events

Team leader: Giannina Poletto, Arcetri Astrophysical Observatory, Firenze, Italy
Sessions: 3-4 September 2007 and 3-7 March 2008
Scientific rationale: Current sheets (CSs) are a basic prerequisite for magnetic reconnection. The goal of the research is to define current sheet properties in the solar atmosphere and their signatures in the interplanetary medium, and to understand their role in the development of solar eruptive events. Magnetic reconnection has been invoked as the process responsible for small and large scale solar eruptive events. The above phenomena are different facets of the process responsible for solar eruptive events. To put them in a unified scenario we need to recognize the phenomena as they evolve through the solar atmosphere to the Earth and beyond.

Investigating Solar Diameter, Shape and Irradiance

Team leader: Jean-Pierre Rozelot, OCA-GEMINI, Grasse, France
Session: 1-5 October 2007
Scientific rationale: Variations of the solar diameter and shape are ultimately linked to changes in the interior of the Sun, associated with evolutionary processes, solar activity and solar energy output. Their investigation is important for the Earth's climate research and fundamental physics. The objective of this team is to investigate these changes and relationships using data from SOHO and ground-based observatories, to compare with theoretical models of solar variability and discuss new approaches to data analysis and interpretation from the new space missions, PICARD, Golf-NG\Dynamics and Solar Dynamics Observatory.

Electron-positron Annihilation in the Milky Way: From Positron Sources to Annihilation Sites

Team leader: Nikos Prantzos, IAP, Paris, France
Session: 24-28 October 2007
Scientific rationale: The recent results of the SPI instrument aboard ESA's INTEGRAL gamma-ray observatory allowed for the first time to map that emission and revealed an unexpected feature: a strong concentration towards the Galactic bulge, with a bulge/disk luminosity ratio much larger than observed in any other wavelength. A closer study of the subject reveals new layers of complexity, since positrons (even of low energy, like those produced by radioactivity in supernovae) may propagate far away from their sources, making it difficult to infer the underlying source distribution from the observed gamma-ray image. For all those reasons, the 511 keV line of the Milky Way is undoubtedly the hottest subject in gamma-ray line astronomy today. The team will address the following topics: positron sources, positron propagation, positron annihilation and the 511 keV gamma-ray sky.

Formation of Cyclotron Lines in Neutron Star Accretion Columns

Team leader: Joern Wilms, University of Warwick (UK) and University of Erlangen-Nürnberg (Germany)
Session: 10-14 March 2008
Scientific rationale: Observations of these lines provide the only direct way to measure the magnetic fields of neutron stars, which are an important ingredient for our understanding of neutron star evolution and the interaction of neutron stars with their environment. The aim of the team is to provide a census of existing cyclotron line source data, to agree on an analysis strategy for unpublished data from these sources, to compare different numerical models for cyclotron line formation, and to compare these numerical models with selected observational data.

Teams selected in 2007

Aerosol-Cloud-Precipitation-Climate Interaction

Team leader: Meinrat O. Andreae, Max Planck Institute for Chemistry, Mainz, Germany
Session: 28-30 January 2008
Scientific rationale: Increasing concentrations of anthropogenic aerosol particles have an effect on the amount as well as the spatial and temporal distribution of clouds and precipitation affecting the hydrological cycle. The complex interactions between meteorological parameters, aerosols, cloud microphysics and dynamics makes it difficult to assess the effect on precipitation change and climate. Due to the uncertainty of the interactions and effects from local to global scale, a coordinated multidisciplinary approach engaging both experimentalists and modellers is timely. The main objective is to bring together an international multidisciplinary group of scientists from the areas of aerosol physics and chemistry, cloud dynamics, and cloud microphysics.

Mapping Magnetospheric Regions at Saturn: A Mini Jovian Analogue?

Team leader: Christofer S. Arridge, MSSL/UCL, UK
Session: 22-26 October 2007
Scientific rationale: In July 2004 the Cassini spacecraft entered Saturn orbit after a seven year voyage. The combined operation of an outstanding suite of instruments with the orbital tour of the spacecraft offers a unique opportunity to explore in-depth the Saturnian plasma and fields environment and enable the study of a magnetospheric system which strongly interacts with other components of the Saturnian system: the planet, its rings, numerous satellites (icy moons and Titan) and various dust, neutral and plasma populations. This very rich magnetospheric environment contains uniquely diverse regions compared with those observed elsewhere in the solar system and a staggering array of magnetospheric phenomena and processes which we are only beginning to comprehend. Understanding the physics of the Saturnian system has been made difficult by the significant temporal variability in the system. By using a multi-instrument approach and studying a significant number of orbits, a better understanding of the spatial structure and physical processes will be gained. The new Cassini data set provides us with a unique opportunity for comparative studies of the saturnian, jovian and terrestrial magnetospheric environments.

Exozodiacal Dust Disks and Darwin

Team leaders: Jean-Charles Augereau, LAOG Grenoble, France, and Alexander Krivov, Jena University, Germany
Session: 27-31 August 2007
Scientific rationale: The quest for extrasolar planets has become, over the last decade, one of the main scientific drivers for numerous instrumental initiatives worldwide. Both at ESA and NASA, space-based missions (resp. DARWIN and Terrestrial Planet Finder, hereafter TPF) are currently being designed to directly detect photons from Earth-like planets at mid-infrared wavelengths. As recognised by the space agencies, the presence of warm

dust, in the form of an exozodiacal cloud in the habitable zone around nearby stars, might significantly compromise the ability of these missions to reach their goal. Our current knowledge of dust within a few astronomical units around nearby solar-type stars is largely insufficient to feed the DARWIN/TPF design studies with realistic numbers, and the solar systemzodiacal cloud is by default systematically used as a reference. Preliminary ground-based observations conducted by our team recently showed that exozodiacal disks may in fact show structures and brightness levels that significantly depart from the solar system case. Ongoing design studies of DARWIN-like missions are thus based on assumptions on the exozodiacal emission levels which are not representative of the diversity of dust clouds around nearby stars. The team will focus on the investigation of extrasolar analogs of the zodiacal cloud in the context of planet detection with future space-based missions such as DARWIN, with a final goal to identify the dominant source of dust production, and to develop a software tool capable of (1) interpreting the currently ongoing observations of exozodiacal dust and (2) predicting the structure and level of circumstellar dust that can be expected around the DARWIN target stars.

Probing the Accretion/Outflow Connection in X-Ray Binaries and Active Galactic Nuclei

Team leader: Tomaso Belloni, INAF-OAB Merate, Italy
Session: 14-18 January 2008
Scientific rationale: The team is aimed at putting together knowledge over a wide range of aspects of the connection between accretion of matter and ejection of relativistic jets in astronomical systems containing a black hole, both inside our galaxy and at the center of other galaxies, joining observational to theoretical approaches. The physics of the ejection of relativistic jets is largely unknown. The main question to be answered is: how is the matter prevented from falling into the black hole, to be collimated and ejected from the system at relativistic velocity? The most promising way to obtain an answer is to study the relation between the jets and the observed properties of the accreting flow. The main goals are to establish scaling laws to connect systems of widely different masses and to obtain a robust estimate of the role of jet ejection in the observed high-energy properties.

Light Scattering Phenomena in Small Body Surfaces

Team leader: Alberto Cellino, INAF Turin, Italy
Session: 7-11 January 2008
Scientific rationale: An urgent task in asteroid science is the derivation of a new, updated calibration of the relation between the albedo of the objects and the observable properties of the state of polarization of their reflected light. Asteroid polarimetry is one of the best available techniques for deriving asteroid albedos, but its full potential is currently hampered by insufficient knowledge of some important calibration constants. We note that the Rosetta space probe will perform two flybys with asteroids (2867) Steins and (21) Lutetia in 2008 and 2010, respectively; a very nice opportunity to test updated theoretical expectations, taking also into account that these two ob-jects do not belong to the most usual asteroid taxonomic classes, and/or are known to exhibit unusual polarimetric properties. The team wants to attack the problem of the large errors, up to 0.5 mag, known to affect the listed values of asteroid absolute magnitudes, which has serious consequences for our ability to derive accurate asteroid sizes and albedoes. The solution to this problem is directly related to a better understanding of the laws of variation of the apparent brightness under different illumination conditions, a classical problem of light scattering.

Transport of Energetic Particles in the Inner Heliosphere

Team leader: Wolfgang Dröge, University of Würzburg, Germany
Session: 12-16 November 2007
Scientific rationale: The Team will carry out observational studies of plasma, mag-

netic field and charged particle data observed on Wind, ACE, STEREO, SOHO, Cluster and Ulysses, to examine and test the theoretical basis for our understanding of scattering and transport at energies typical for solar particles. The focus will be on particles from impulsive solar events which typically originate from a localized source on the solar disk, have acceleration time scales which are short compared to the transport time scales, and are not accompanied by large-scale interplanetary disturbances such as Coronal Mass Ejections and shock waves which would impose complicated boundary conditions for the processes we are interested in here. As the morphology of observed particle fluxes even in these events reflects contributions from a possible lateral transport in complex magnetic fields in the solar corona and from transport parallel and possibly perpendicular to the magnetic field embedded in the solar wind, we will also use concomitant observations of solar radio and X-ray emission to resolve injection of particles close to the Sun. The results will help to improve our knowledge of the structure of magnetic fluctuations and particle transport in the inner Heliosphere and aid in identifying key observational requirements for future space instrumentation intended to address this problem.

Interpretation and Modelling of Solar Spectral Irradiance Measurements.

Team leader: Ilaria Ermolli, INAF Rome, Italy
Session:14-17 November 2007
Scientific rationale: The knowledge of both the variation of the Sun's spectrum (the solar spectral irradiance or SSI) and the causes of this variability is rather incomplete. In fact, measurements of the SSI have been intermittent both temporally and spectrally since the beginning of space experiments in 1970s. Moreover, measurements have focused mainly on the far UV spectral range, due to the larger relative variability of the SSI at these wavelengths. The modelling of the SSI measured variations is also less accurate than that of the bolometric solar irradiance variations. Although semi-empirical and theoretical models have progressed markedly during the last decade, they are far from the expected accuracy. A thorough physical understanding of SSI variations is required in the framework of solar research, as well as within the context of Sun-Earth connection studies. In fact, SSI variations, particularly in the near UV, are emerging as the most prominent solar driver of the terrestrial climate.
The objectives of the project are (1) interpreting results of SSI space based measurements through inter-comparisons with physical models of SSI (2) assessing and improving the accuracy of SSI data by re-evaluation and data inter-comparison (3) extending SSI data series back in time through data inter-calibration and modelling efforts (4) improving the current physical modelling of SSI by comparing semi-empirical and theoretical approaches and (5) discussing changes to current modelling efforts with consideration of physical processes.

Comet Modeling (II)

Team leader: Tamas Gombosi, University of Michigan, Ann Arbor, USA
Sessions: 1-3 October 2007 and 17-19 March 2008
Scientific rationale: To generate a versatile suite of comet environment models for both weak and active comets. The team will generate a set of comet environment engineering models for the new target of the Rosetta mission. The environmental models will be validated (to the extent possible) with remote observations of the target comet and of other comets as well as with in-situ observations from previous comet missions.

Multi-Wavelength Study of Unidentified Very High Energy Gamma-Ray Sources: Finding the Cosmic Accelerators

Team leader: Dieter Horns, University of Tübingen, Germany
Session:17-21 December 2007
Scientific rationale: The team will review the multi - wavelength knowledge and interpretation of the recently unidentified

very high energy (VHE: E> 100 GeV) gamma-ray sources in the Galactic plane. So far, the origin of most of these VHE gamma-ray sources as well as the acceleration and radiation processes involved in the production of gamma-rays remain unclear. The combination of multi-wavelength information including radio, optical, X-, and gamma-ray observations provides important clues for the identification of the sources as well as for the underlying particle population and radiation processes (leptonic versus nucleonic origin of gamma-ray emission) involved. The main objectives of our work are (a) to provide a comprehensive review of the available observational data and their interpretation in the framework of phenomenological and theoretical modeling and (b) to suggest key observations and single out the most promising objects to be studied with current and future space and ground based instruments. This will be a vital step towards understanding the origin of cosmic rays.

Atmospheric Water Vapour

Team leader: Niklaus Kämpfer, University of Bern, Switzerland
Session: 11-14 February 2008
Scientific rationale: Various instruments on ground, balloon, aircraft, and satellite platforms are required for adequate observation of the extremely variable, spatio-temporal distribution of atmospheric water vapour. Accurate, height-resolved measurements of water vapour over the whole altitude range from the ground to the stratosphere are a challenging task for all available traditional and modern measurement techniques, as the water vapour mixing ratio varies over five orders of magnitude. The inter-comparison of various measurement techniques and methods allows the assessment of their accuracy and is a prerequisite for a planned and efficient improvement of instruments and data analysis techniques.
The aims are: Accuracy of different sensor types, In situ (balloon or aircraft): radiosondes, frost point and Lyman-alpha hygrometers, Remote sensing: Fourier transform infra-red spectrometers (FTIR), Raman and DIAL differential absorption (DIAL) lidar, microwave radiometers, solar and star occultation sensors, Calibration issues, Retrieval concepts, and Synergy of combining and merging data obtained by different techniques.

High-Mach-number Collisionless Shock Dynamics: Theory and Simulations versus Multi-Point Measurements in Space

Team leader: Vladimir Krasnoselskikh, LPCE/CNRS-University of Orleans, France
Session: 31 March - 4 April 2008
Scientific rationale: Shock waves are usually considered to be nonlinear waves that cause irreversible changes of state of the media and from macroscopic point of view they are stationary. The four-spacecraft Cluster mission gives opportunities for experimental studies of the Earth's bow shock nonstationarity, because multi-spacecraft measurements provide a good opportunity to discriminate temporal and spatial variations. Cluster measurements reveal several examples of nonstationary shock and recently the first unambiguous evidence of shock front reformation was found. The topics the team will work on are: Dynamics of high-Mach-number shocks seen by different instruments aboard Cluster satellites, Comparison of Cluster measurements with the predictions of theoretical studies and computer simulations, Relationship between particle distributions and waves observed in a close vicinity of the shock front, Nonlinear processes in the shock front, and Acceleration of electrons and ions resulting from the shock dynamics.

Spectroscopy and Imaging of Quiescent and Eruptive Solar Prominences from Space

Team leader: Nicolas Labrosse, University of Glasgow, UK
Session: 4-7 December 2007
Scientific rationale: The team - whose research interests combine data analysis and interpretation, radiative transfer modelling, and modelling of the magnetic field and plasma - discuss the latest developments in these fields, interpret existing

space observations, set up new observational programmes using space instrumentation, and decide modelling strategies to be carried out between the meetings. The expected outcome of the proposed research is a better understanding of the formation processes of solar prominences, of the physical conditions necessary for the stability of quiescent prominences, and of the mechanisms leading to prominence activation and eruption.

Evolution of Exoplanet Atmospheres and their Characterisation.

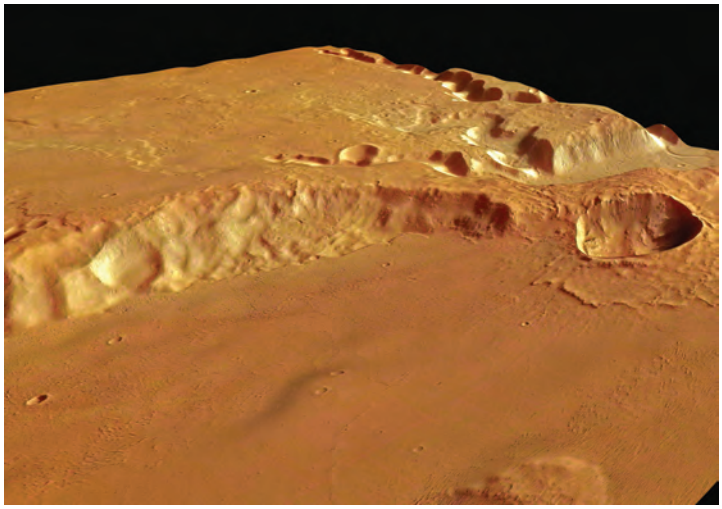
Team leader: Helmut Lammer, Austrian Academy of Sciences, Graz, Austria
Session: 17-19 March 2008
Scientific rationale: Recent studies and observations (with the Hubble and Spitzer Space Telescope) of transiting giant exoplanets suggest that spectra of transiting planets can be used to infer many properties of their atmospheres and internal structures, including hydrodynamic escape, hydrogen ENA clouds, thermal profiles, density, composition and evolution. The spectrum of the Earth displays features, such as O3, O2 and CH4 bands, or vegetation reflection, that are directly or indirectly inherited from the biosphere. Our study will start from the origins of planets within the protoplanetary nebula and will follow their evolution due to thermal and non-thermal atmospheric escape processes - related to the host stars activity-, anorganic (e.g., fractionation due to loss processes, chemical changes due to energetic particles, etc.) and organic (life appearance) modifications, and finally will evaluate the impact of these processes on the planetary spectra. The results provided by this project will have important implications for present and future space missions to detect and characterize exoplanets, like CoRoT, Kepler and further into the future Darwin/TPF.

GeoSpace at the System-Level

Team leader: Mark Lester, University of Leicester, UK
Session: 29 October - 2 November 2007
Scientific rationale: The overarching objective is to bring focus and clarity to system-level geospace science, producing a set of review papers that will in effect be an international "decadal survey". It will enable, for example, future global imaging missions that are essential to our ability to bring closure to an entire class of geospace research questions, but are at the same time proving difficult to get approved because of our inability to identify closable science questions related to geospace as a whole. The team includes researchers with expertise in global modelling, natural complexity, and a range of synoptic observations. The final task will be to outline a strategy for the closure of key questions through theoretical and computational studies.

A Study of Shock Acceleration Using Strong Turbulence Methods

Team leader: Karim Meziane, University of New-Brunswick Fredericton, Canada
Session: 11-15 February 2008
Scientific rationale: Space plasma shocks and their associated phenomena are of primary importance in cosmic electrodynamics, due to their ubiquity in heliospheric and astrophysical contexts. The extensive dataset of space plasma shock encounters collected by satellites within the past four decades has stimulated a tremendous theoretical effort. Much particle energization appears to have been explained by diffusive shock acceleration (DSA) models, but these weak turbulence methods are often not valid for the strong turbulence that is observed, and to date do not fully account for energetic particles seen in association with strongly perpendicular shocks. In addition, recent detailed examinations of 3-dimensional ion distributions in the foreshock exhibit non-thermal energetic tails that cannot be readily explained by diffusive processes. A similar conclusion is inferred from recent observations of the X-ray luminosity of gamma ray bursts. Coherent non-linear structures such as Short Large-Amplitude Magnetic Structures (SLAMS) are frequently seen in foreshocks upstream of quasi-parallel shocks, but should not produce diffusive acceleration. Similarly, the nonlinear cyclic shock-reformation processes expected to



This image, taken by the High Resolution Stereo Camera (HRSC) on board ESA's Mars Express spacecraft, shows part of the Medusa Fossae formation and adjacent areas at the highland-lowland boundary on Mars. This perspective view, looking south-west, is calculated from the digital terrain model derived from the stereo channels. (Image Credit: ESA/DLR/FU Berlin (G. Neukum))

occur should likewise alter the diffusive picture. This team of theorists, simulators and observers from space physics and astrophysics backgrounds will examine in detail the roles of strong turbulence and singular structures on the acceleration of particles near shocks.

Nuclear Planetology

Team leader: Igor Mitrofanov, IKI, Moscow, Russia
Session: 5-9 November 2007
Scientific rationale: Six inter-related major goals of the project include (1) review of mapping for celestial bodies of their nuclear emission and of distribution of chemical elements, (2) study of concepts of perspective advanced telescopes of neutrons and gamma-rays for remote sensing of Moon, Mars, etc. for adequate mapping for districting geological, mineralogical and geochemical types of surface materials, (3) study of methods of active neutron measurements for determination of composition of surface material from landers on celestial bodies, (4) review the methods of nuclear data deconvolution from orbit and from the surface for determination of elementary composition of the celestial body, (5) determination of the requirements for development of nuclear physics for needs of accurate analysis of nuclear data from celestial bodies and (6) review nuclear cosmogenic processes in the surface material of celestial bodies under the action of galactic cosmic rays and solar particle events.

Delivery of Water and Organic Matter to Young Terrestrial Planets

Team leader: Michael Mumma, NASA GSFC, Greenbelt, USA
Sessions: 10-14 December 2007 and 19-23 May 2008
Scientifc rationale: The Team seeks to better understand the organic compounds generated and destroyed in the interstellar and proto-planetary environments, through comparisons of observational, theoretical, and laboratory results. The team examines the potential for and limitations to delivery of exogenous water and prebiotic organics to planets, examining factors that enhance or restrict this potential. Special consideration will be given to incorporating new insights provided by emerging models for planetesimal accretion and dynamical scattering coupled with compositional information for comets and meteorites and models for chemical modifications of impacting material. The team will follow these factors over time, from the natal cloud core through the end of the late heavy bombardment (~ 3.9 Ga), to evaluate exogenic delivery of organic material and water to terrestrial planets.

Martian Planetary Boundary Layer: Dynamics and Interactions with the Surface and Free Atmosphere

Team leader: Arakel Petrosyan, Space Research Institute of the Russian Academy of Sciences, Moscow, Russia
Session: 13-17 May 2008
Scientific rationale: Dynamical processes in the Martian boundary layer provide the means of communication between surface ice deposits and the free atmosphere, and the means of lifting dust from the surface. The boundary layer is therefore one of the most important components of the Martian climate system. The Martian boundary layer differs from that of the

Earth in that it is more strongly forced, it is deeper, and the relative importance of radiative and convective heat fluxes in the lower boundary layer can be quite different. In order to understand the Martian boundary layer, a combination of theoretical and modeling and observational studies are necessary. Interactions between theorists, modelers, and observational scientists are needed to make progress and to provide a basis for analysis of data expected from the NASA Phoenix and Mars Science Laboratory, and other future landed missions.

Formation of Secondary Ejecta Craters and their Effects on Planetary Chronology

Team leader: Olga Popova, Institute for dynamics of Geosphere, Moscow, Russia
Session: 19-23 May 2008
Scientific rationale: The team, expert on issues of impact cratering and Mars chronology, is completing data collection and numerical simulation on the spatial and size distribution of secondary impact craters around Martian crater named ''Gratteri" in order to constrain (a) crater counting techniques used to measure Martian chronology, and (b) launch conditions of Martian meteorites.

Observations and physics of accreting neutron stars

Team leader: Juri Poutanen, University of Oulu, Finland
Sessions: 3-10 December 2007 and 10-14 March 2008
Scientific rationale: The aim of this project is to analyze all available RXTE/XMM-Newton/INTEGRAL data on the 8 known accretion-powered millisecond pulsars as well as about 20 nuclear-powered millisecond pulsars. The team develops the accretion shock model for low magnetic field neutron stars in order to predict their radiation pattern. By modeling pulsar's phase-resolved spectra with the physical model the team will determine the physical parameters of the neutron stars such as their mass-to-radius ratio, magnetic field geometry, inclination of the systems. The constraints on the neutron star radius has important implications for understanding the nuclear physics at extremely high, supranuclear densities. The team studies theoretically and observationally spectra of the X-ray bursts with the accretion shocks above the burning region and develop a general model of the spreading layer on a surface of weakly magnetized neutron star.

Comparative Study of Turbulence and Anomalous Transport in Space and Fusion Plasmas

Team leader: Sergey Savin, IKI, Moscow, Russia
Session: 7-11 January 2008
Scientific rationale: The intent of the team is to perform a comparative study of space and fusion plasma turbulence in view of applications to the anomalous transport problem. The desired outcomes are the improvement of the predictive power of turbulent cascade models, providing credible experiment interpretation, and building a bridge between the measurable statistical properties of different plasmas and theoretical derivations of the transport scaling. Plasma fluctuations observed in the turbulent plasma boundary layers at Earth's magnetopause and in fusion devices exhibit self-similar behavior, suggesting that the properties of plasma boundary turbulence are universal. In the magnetopause boundary layer, fluctuations of magnetic field and ion flux recorded by the Interball-1 spacecraft unraveled scale-invariance and intermittency of the turbulence, similar to measurements in fusion devices like tokamaks, stellarators and linear plasma machines. The team intends to compare data from these fusion devices with data from Cluster and Interball-1 in the magnetopause boundary layer. Application of software developed for the fusion plasma to a characteristic Interball-1 sample interval exhibited features of super-diffusion and multifractality that is very similar to that found in fusion boundary layers.

International Teams

Towards more effective physics-based and statistical models of the polar ionosphere

Team leader: Tony van Eyken, EISCAT Scientific Association, Kiruna, Sweden
Sessions: 30 October - 3 November 2007 and 13-17 May 2008
Scientific rationale: The goal of the work is to capitalise on the unique opportunity represented by the huge increase in data availability during the International Polar Year (IPY) of 2007-9 to dramatically improve the quality of models, and the underlying physical understanding, and in particular to develop their capabilities in now- and fore-casting. The proposal is timely, not only because of the IPY but also because of the increasing reliance of mankind on technological systems which are vulnerable to space weather events, and their consequent impacts on GeoSpace, and for whose continuing safety we require adequate understanding of the physics of the interactions to predict, and take appropriate steps to mitigate, the effects.

New generation of databases for interstellar chemical modeling in preparation for HSO and ALMA

Team leader: Valentine Wakelam, Laboratoire d'Astrophysique de Bordeaux, France
Session: 7-11 January 2008
Scientific rationale: One major question of solar system history concerns the relation between the chemical complexity observed in the interstellar medium and the prebiotic molecules in comets and on Earth during the appearance of life. This question may find some answers during the next ten years because of two future observational instruments: the Herschel Space Observatory (HSO) and the Atacama Large Millimeter Array (ALMA). By giving access to a range of frequencies not accessible from the ground, HSO will certainly permit the detection of many new molecules. In addition to finding new molecules because of its high sensitivity, ALMA will improve our understanding of the conditions of molecular formation in protostars and protoplanetary disks thanks to very high spectral and spatial resolution.
In order to improve existing models so that we can begin to cope with the large amounts of high-quality data obtainable from HSO and ALMA, we need to improve interstellar chemical databases in a variety of ways, but most importantly in the definition of the precision of reaction rate coefficients and branching fractions between different pathways so that accurate uncertainties in the results of models can be determined.

Structure and Dynamics of Coronal Plumes and Interplume Regions in Solar Coronal Holes

Team leader: Klaus Wilhelm, Max-Planck-Institut für Sonnensystemforschung, Katlenburg-Lindau, Germany
Session: 1-5 October 2007
Scientific rationale: Coronal plumes can be studied in detail with modern telescopes and spectrometers on spacecraft. Nevertheless, despite a large amount of data on these prominent features, their source is not understood. An understanding of the processes of plume formation and evolution requires a better knowledge of the physical conditions in plumes and the surrounding inter-plume environment, specifically, of the electron densities and temperatures, the effective ion temperatures and non-thermal motions, the plume cross-section relative to the size of the coronal hole, and the plasma bulk speeds; as well as any signature in the solar wind. The goals of the team are (1) to review the observations of plumes and the inter-plume medium in coronal holes as well as those related to plume signatures in the solar wind and their past interpretations; (2) based on the results, it might be appropriate to suggest additional observations taking advantage of the favourable time around the solar activity minimum near 2007 (3) and as the final steps, to interpret the observations within a theoretical concept for plume formation and dynamics, and prepare the publication of the results.

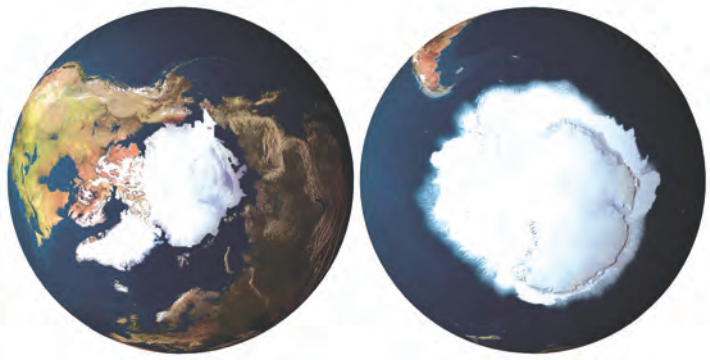
International Polar Year (IPY) Teams

Monitoring of Antarctic Sea Ice during IPY

Team leader: Petra Heil, AAD & ACE CRC, Australia
Session: 30 June - 4 July 2008
Scientific rationale: The aim of this ISSI-enabled project is to use Envisat (ASAR) data to derive information on the current state of, and the inherent variability within the Antarctic sea-ice zone. To achieve this we bring together scientists with active Envisat IPY projects with an focus on Antarctic sea-ice characteristics and processes. The following ESA IPY AOs are joined in this ISSI project: Sea-ice motion, deformation, thickness and lead dynamics in the Antarctic (AO4007,PI:Haas), Southern Ocean sea-ice cover: kinematics, thickness, polynyas, and export (AO4046, PI:Kwok), Complete mapping of Antarctic sea-ice dynamics and thickness (AO4114, PI:Heil), and Mapping and Monitoring of Circum-Antarctic fast ice. (AO4123, PI: Massom).

POLARIS – Polar Observations by Laser Altimetry, Radar Interferometry and Stereometry

Team leader: Alexey Sharov, Joanneum Research, Graz, Austria
Session: 17-21 September 2007
Scientific rationale: POLARIS is a collaborative research devoted to studying mid-term (annual to centennial) fluctuations in polar resources of ice and snow from remote sensing and ground data. This internationally coordinated initiative follows on the ESA IPY AO projects IDs. 4085, 4272 endorsed by ESA in 2007. POLARIS will be carried out in the period of IX.2007-III. 2009 thus essentially covering time frame of the 4th International Polar Year (IPY) 2007-09. Polar idea of the POLARIS project is to investigate climate- and gravity-driven fluctuations in snow and ice resources, to map and analyze glacier dynamics in the European Arctic Sector, and to study related impacts on the sea level change in the Arctic Basin using remote sensing methods of satellite altimetry, radar interferometry stereometry and gradiometry.



IPY 2007-09 is the fourth polar year, following those in 1882-83, 1932-33, and 1957-58. It involves over 200 projects (incl. those at ISSI), with thousands of scientists from over 60 nations examining a wide range of physical, biological and social research topics. Picture shows the Ice cover in the Antarctic and Arctic polar regions (Image Credit: ESA/AOES lab).

Arctic change and Polynyas: Focus on the Northeast Water Polynya and North Water Polynya/Nares Strait system

Team leader: Jeremy Wilkinson, SAMS, UK
Session: 27-29 February 2008
Scientific rationale: This team studies the changing nature of Arctic Polynyas, (a) the Northeast Water Polynya system which is situated over the continental shelf region of NE Greenland and (b) the North Water Polynya/Nares Strait system which is located between Ellesmere Island (Canada) and Greenland. The functioning of both these systems have undergone change in recent years. The establishment of an International Polar Year (IPY) Data Announcement of Opportunity by the ESA has enabled both the Northwater/Nares Strait (PI:Preben) and Northeast Water (PI:Wilkinson) to be studied in detail through remotely sensed images. This funding, welcome as it is, focused solely on the acquisition of satellite data and not collaborative dialogue or workshops between international experts in these regions. The topics are: What is the present knowledge of the dynamics and climate of the region? What activities have been planned for the future by the international community and what opportunities are available for sharing of logistics? What should be the issues of future research in the area and what opportunities are available for collaborative (joint) research programmes.

Newly Approved International Teams

The 20 Teams below have been selected for implementation among the proposals received in response to the 2008 Call for International Teams.

A virtual observatory for meteoroids
Team leader: R. Arlt (G)

Inter comparison of global models and measurements of the Martian plasma environment
Team leader: D.A. Brain (US)

Astero FLAG-Sounding the stars
Team leader: W.J. Chaplin (UK)

From the Sun to the terrestrial surface: Understanding the chain
Team leader: C. Cid (Sp)

Conjugate response of the dayside magnetopause and dawn/dusk flanks using Cluster-THEMIS conjunctions and ground based observations
Team leader: M.W. Dunlop (UK)

The Martian polar deposits: Are they a Rosetta stone for the Mars climate?
Team leader: K.E. Fishbaugh (US)

Auroral small-and meso-scale structures, origin and function
Team leader: H. Frey (US)

Relativistic reconnection and collisionless shocks
Team leader. M. Gedalin (Is)

Coronal prominence cavities
Team leader: S. Gibson (US)

Coupling of atmosphere regions with near-Earth space at mid and low latitudes
Team leader: Ch. Hanuise (F)

Identifying the UHCER accelerators us ing gamma-rays
Team leader: J.A. Hinton (UK)

Bridging the gap between the middle and upper atmosphere: coupling processes due to winds and waves over an extended altitude range
Team leader: P. Hoffmann (G)

Magnetic reconnection and particle energization: Synergy of in-situ and remote observations
Team leaders: Y. Khotyaintsev (Sw) and S. Bale (US)

Investigation of the fly-by anomaly
Team leader: C. Lämmerzahl (G)

Determination of energy and angular distribution of accelerated electrons in solar flares
Team leader: A. Massone (I)

Advances in understanding of the structure and dynamics of magnetic flux transfer at the Earth's magnetopause
Team leader: S. Milan (UK)

Intercomparison of 1D photochemical models of Titan atmosphere
Team leader: P. Pernot (F)

Multi-scale electrodynamics of magnetosphere-Ionosphere interactions at high latitudes
Team leader: A.V. Streltsov (US)

Solar small-scale transient phenomena and their role in coronal heating
Team leaders: G. Tsiropula (Gr) and M. Madjarska (G)

Decrypting and modeling the high-energy emission of Blazars
Team leader: M. Türler (CH)

Visiting Scientists

Individual scientists are invited for extended periods to work on scientific subjects at the forefront in areas of interest to ISSI. Their stay may include periods of joint activity with other colleagues. The results of this research are to be published as books or in major scientific journals, with appropriate acknowledgement to ISSI.

The following thirteen visiting scientists worked at ISSI during the thirteenth business year.

Lennart Bengtsson, ISSI Consultant Earth Sciences, Environmental Systems Science Centre, Reading, United Kingdom, 45 days.

Michel Blanc, Study director of ISSI and research scientist at CESR, Toulouse, France, 11 days.

Len Culhane, ISSI Consultant Solar Physics and high energy astronomy, Mullard Space Science Laboratory, Dorking Surrey, United Kingdom, 24 days.

Patrick Daly, Max Planck Institut für Sonnensystemforschung, Lindau, Germany, 3 days.

Len Fisk, Department of Atmospheric, Oceanic & Space Sciences College of Engineering, University of Michigan, Ann Arbor, USA, 6 days.

Bob Forsyth, Space & Atmospheric Physics The Blackett Lab., Imperial College London, United Kingdom, 52 days.

Ken McCracken, IPST, University of Maryland, College Park, USA, 19 days.

Olivier Mousis, Physikalisches Institut, University of Bern, Switzerland, 14 days.

Götz Paschmann, Max Planck Institute for Extraterrestrial Physics, Garching, Germany, 8 days.

Ken McCracken, one of the visiting scientists, collaborating with Swiss Scientists on a book about Cosmogenic Radionuclides.

Rudolf Treumann, Geophysics Section, Department of Geosciences, Ludwig-Maximilians-University Munich, Germany, 28 days.

Hunter Waite, Southwest Research Institute, USA, 4 days.

Lev Zelenyi, Russian Academy of Sciences, IKI, Moscow, Russia, 14 days.

Thomas Zurbuchen, Department of Atmospheric, Oceanic & Space Sciences College of Engineering, University of Michigan, Ann Arbor, USA, 12 days.

Futhermore, ISSI had the pleasure to host for 12 days within its premises **Isabelle Baraffe** and **Gilles Chabrier** of the Ecole Normale Superieure Lyon, France.

Staff Activities

Listed are activities in which ISSI staff scientists participated between 1 July 2007 and 30 June 2008. This includes presentations given, meetings attended, honours received, and chairmanships held.

Presentations

12 July 2008 - K.E. Fishbaugh: HiRISE Observations of North Polar stratigraphy and implications for geologic history, Abstract 3194, 7th International Mars Polar Science and Exploration Conference, Pasadena, CA, USA.

17 July 2007 - R.M. Bonnet: (Invited) Keynote evening lecture "Where are they?", Alpbach Summer School, Alpbach, Austria.

18 July 2007 - O. Botta: Signatures of Life – In-situ measurements, Alpbach Summer School, Alpbach, Austria.

2 October 2007 - A. Balogh (Invited): Solar system magnetism, International Forum dedicated to the 50th anniversary of the launch of Sputnik 1, Moscow, Russia.

4 October 2007 - R.M. Bonnet: (Invited) Space for the Future, International Forum dedicated to the 50th anniversary of the launch of Sputnik 1, Moscow, Russia.

9 October 2007 - R.M. Bonnet: (Invited) Quelle valeur donner à l'Expérience de l'Extrême, French Senate, Paris, France.

26 October 2007 - R. von Steiger: Opening remarks and Introduction to ISSI, Swiss Society of Astronomy and Astrophysics, Bern, Switzerland.

12-16 November 2007 - O. Botta with J. L. Bada and the Urey Team: (Poster contributed) The Urey Instrument for ExoMars, ESA Mars Conference, ESTEC, Noordwijk, the Netherlands.

20 November 2007 - R.M. Bonnet: The International Space Science Institute. Its potential involvement in Earth sciences, ESA Earth Science Advisory Committee, ESA Paris, France.

26 November 2007 - R.M. Bonnet: Cent ans d'Exploration Spatiale, Annual meeting of French Dentists Association, French Senate, Paris, France.

1 December 2007 - R.M. Bonnet: Evolution of International Cooperation in Space Science, Keynote speech, 50th anniversary of the Space Studies Board, Irvine, USA.

10-14 December 2007 - R. von Steiger: (Poster) Ulysses Transitions into the Polar Coronal Holes, Fall Meeting of the AGU, San Francisco, USA.

19 December 2007 - R.M. Bonnet: 50 ans d'espace. Et maintenant, Seminar, University of Liège, Belgium.

31 January 2008 - O. Botta: The Future Exploration of Mars: Mars Science Laboratory and ExoMars, Seminar Presentation, Imperial College, London, UK.

11 March 2008 - R. von Steiger: Der erste Tag der Schöpfung, Presentation at the exhibition on Genesis – the Art of Creation, Zentrum Paul Klee, Bern, Switzerland.

11 March 2008 - R. von Steiger: "HUGO hat Töne" – approaching the Human Genome Project with electronic sounds and freely improvised music, Presentations exhibition on Genesis – the Art of Creation, Zentrum Paul Klee, Bern, Switzerland.

19 March 2008 - R. von Steiger: Die Ulysses-Mission: Erkundung der Heliosphäre in vier Dimensionen, Bern Astronomical Society, Bern, Switzerland.

10 April 2008 - R.M. Bonnet : Survivre 1000 siècles. Pouvons-nous?, Seminar, University of Liège, Belgium.

13-18 April 2008 - E. Yordanova, with A. Balogh and R. von Steiger: Magnetic fluctuations in the solar wind: dependence on kinetic parameters and on the temperature of the source region determined from ion charge state composition, Geophysical Research Abstracts, Vol. 10, EGU2008-A-00000, 2008, EGU General Assembly, Vienna, Austria.

14 April 2008 - A. Balogh: Ulysses observations of heliospheric magnetic polarities, European Geosciences Union Annual Assembly, Vienna, Austria.

14-17 April 2008 - O. Botta: Participation in the NASA Astrobiology Science Conference. Co-author of four posters, session chair, Santa Clara, CA, USA.

22 May 2008 - E. Yordanova: What can we learn from the solar wind turbulence?, Workshop "Energy Transfer and Conversion Inside Magnetospheres", Uppsala, Sweden.

7 June 2008 - R.M. Bonnet: Le Programme Scientifique de l'ESRO à nos jours, Conference at Institut Français d'Histoire de l'Espace celebrating the 40th anniversary of the launch of ESRO-2, Paris, France.

10 June 2008 - R.M. Bonnet: Physics, Life, Exploration and survivability, Conference in honor of Juan Pérez Mercader's 60th birthday, Centro de Astrobiologia, Madrid, Spain.

12 June 2008 - A.P. Rossi: A geologist's view on Martian hydrological cycle, Seminar at ISSI, Bern, Switzerland.

Meetings

16-27 July 2007 - O. Botta: Participation in the Alpbach Summer School "Astrobiology" as a Team Tutor and contributor to the science programme, Alpbach, Austria.

23-26 July 2007 - R.M. Bonnet: Alpbach Summer School, Chairman of the Jury, Alpbach, Austria.

9-27 August 2007 - O. Botta: Participation in the Arctic Mars Analogue Svalbard Expedition (AMASE) 2007 as member of the SAM team, on board R/V Lance, Svalbard, Norway.

21-23 August 2007 - R. von Steiger: Panel member, NASA Heliospheric Guest Investigator Program, Washington DC, USA.

20 September 2007 - O. Botta: Member of the Ph.D. thesis committee of Zan Peeters on 'On the stability of molecules and microorganisms in interstellar and planetary environments', Leiden, the Netherlands.

21-28 September 2007 - R.M. Bonnet: 58th International Austronautical Federation (IAF) Congress, Hyderabad, India.

24-28 September 2007 - A. Balogh: Spatio-Temporal Analysis and Multipoint Measurements in Space (STAMMS2) Conference and Double-Star Workshop, Orléans, France.

4-12 October 2007 - O. Botta: Participation in Experiments related to the MILLER Project in the Drop Tower at the ZARM, Bremen, Germany.

11-12 October 2007 - R.M. Bonnet: Association of Universities Incorporated, Board of Trustees (Member), Pasadena, USA.

20 October 2007 - O. Botta: Participation at the Memorial for the late Stanley Miller, University of California at San Diego, CA, USA.

23-25 October 2007 - O. Botta: Participation in the 2nd Mars Science Laboratory (MSL) Landing Site Workshop, Pasadena, CA, USA.

10-13 December 2007 - O.Botta: Participation in the ISSI Team Meeting "Delivery of Water and Organic Matter to Young Terrestrial Planets", PI Michael J. Mumma, ISSI, Bern, Switzerland.

11 January 2008 - A. Balogh: Programme Committee Meeting, Summer School Alpbach 2008, Vienna, Austria.

18-22 February 2008 - A. Balogh: Working visit to the KFKI Research Institute for Particle and Nuclear Physics (with G. Erdõs and K. Szegõ), Budapest, Hungary.

21-22 February 2008 - R.M. Bonnet: Association of Universities Incorporated, Board of Trustees (Member), Washington DC, USA.

23 February-16 March 2008 - O. Botta: Laboratory work on meteorite and Antarctic ice samples at NASA Goddard Space Flight Center, Greenbelt, MD, USA.

9-14 March 2008 - A. Balogh: 15th Cluster Workshop and Cluster Active Archive School, Puerto Santiago, Tenerife, Spain.

25-28 March 2008 - R.M. Bonnet: COSPAR Bureau meeting (President) and Cospar Science Advisory Committee, Paris, France.

25-27 March 2008 - R. von Steiger: Cospar Science Advisory Committee and the Cospar 08 Program Committee, Paris, France.

2-4 April 2008 - A. Balogh: National Astronomy Meeting, Royal Astronomical Society, Belfast, Northern Ireland, UK.

4 April 2008 - R.M. Bonnet: Ceremony celebrating the 85th Birthday of Prof. R. Lüst, Max Planck Society, Munchen, Germany.

14-18 April 2008 - R. von Steiger: European Geophysical Union, Vienna, Austria.

14 April 2008 - R. von Steiger: Editorial Committee of Space Science Reviews, Vienna, Austria.

22-26 April 2008 - R.M. Bonnet: Association of Space Explorers - Near Earth Objects Working Group (Member), Earth University, Costa Rica.

5-9 May 2008 - A. Balogh: 59th Ulysses Science Working Team meeting and Second Heliospheric Network Workshop, Lixourion, Island of Kefalonia, Greece.

8-9 May 2008 - R.M. Bonnet: Visit to Prime minister of Bremen, for the preparation of the 2010 COSPAR Scientific Assembly, Bremen, Germany.

21-23 May 2008 - A.P. Rossi: Tutoring and Teaching at the 2nd Mars Express Data Workshop (HRSC & OMEGA), Washington University St. Louis, St. Louis, Missouri, USA.

4 June 2008 - A. Balogh: Summer School Alpbach 2008 Tutors' Meeting, Vienna, Austria.

4 June 2008 - A. Rossi: Summer School Alpbach 2008 Tutors' Meeting, Vienna, Austria.

18 June 2008 - R.M. Bonnet: ESA's 200th Council meeting, Paris, France.

26 June 2008 - R. von Steiger: Space Studies Board Colloquium, Reception and Lecture, Washington DC, USA.

Honours

A. Balogh: 2008 Chapman Medal of the Royal Astronomical Society, London, UK.

R.M. Bonnet: 2008 Laureate of the Hubert Curien Award selected by the Eurisy Council and the Eurisy Assembly General, Paris, France.

Chairman- and Memberships

R.M. Bonnet: President of COSPAR.

R.M. Bonnet: Vice-President of Institut Français d'Histoire de l'Espace (IFHE).

O. Botta: Elected councilor of the European Astrobiology Network Association (EANA); Member of the International Society for the Study of the Origin of Life (ISSOL), the Swiss Chemical Society (SCS), and the Meteoritical Society (MetSoc).

A.P. Rossi: Member of the Science Definition Team of ESA MarsNEXT (Phase-a study).

R. von Steiger: Full Member of the International Academy of Astronautics (IAA), Paris, France.

Miscellaneous

O. Botta: Team Coordinator for the ISS Experiment MILLER, a microgravity science experiment to be flown on the International Space Station (ISS). Participation in several internal meetings and laboratory experiments in Graz, Austria.

Staff Publications

Listed are all papers written or co-authored by ISSI staff that were submitted or that appeared between 1 July 2007 and 30 June 2008.

Bada, J.L., F.J. Grunthaner, R.A. Mathies, R.C. Quinn, A.P. Zent, P. Ehrenfreund, R. Amundson, D.P. Glavin, O. Botta, L. Barron, D.L. Blaney, B.C. Clark, M. Coleman, B.A. Hofmann, J.-L. Josset, P. Rettberg, S. Ride, F. Robert, M.A. Sephton, and A. Yen, The Urey Instrument for ExoMars, p. 62, European Mars Science and Exploration Conference, ESTEC, the Netherlands, 2007.

Bada, J.L., F.J. Grunthaner, R.A. Mathies, R.C. Quinn, A.P. Zent, P. Ehrenfreund, R. Amundson, D.P. Glavin, O. Botta, L. Barron, D.L. Blaney, B.C. Clark, M. Coleman, B.A. Hofmann, J.-L. Josset, P. Rettberg, S. Ride, F. Robert, M.A. Sephton, and A. Yen, The Urey Instrument for the ESA ExoMars Mission, Astrobiology, 8, 302, 2008.

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Balogh, A., L.J. Lanzerotti, and S.T. Suess, The Heliosphere through the Solar Acivity Cycle, Springer, New York, 2008.

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Bonnet, R.M., Cinquante ans d'espace. Et après?, Rayonnement du CNRS 48, 15-23, 2008.

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Bonnet, R.M. and L. Woltjer, Surviving 1000 centuries. Can we do it?, Book, Praxis-Springer, 2008.

Botta, O., Extraterrestrial Organic Chemistry as Recorded in Carbonaceous Chondrites, in Chemical Evolution across Space and Time: From the Big Bang to Prebiotic Chemistry, edited by Lori Zaikowski and Jon. M. Friedrich, pp. 246-260, ACS Symposium Series 981, American Chemical Society, Washington, DC, USA, 2007.

Botta, O., P. Mahaffy, K. Fristad, J. Eigenbrode, P. Conrad, and A. Steele, Practical and Scientific Refinement of Protocols for Organic Analyses on Mars: Results from the SAM Team on the 2007 Arctic Mars Svalbard Expedition, Astrobiology, 8, 349, 2008.

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Carr, C, E. Cupido, C.G.Y. Lee, A. Balogh, T. Beek, J.L. Burch, C.N. Dunford, A.I. Eriksson, AI, R. Gill, K.H. Glassmeier, R. Goldstein, D. Lagoutte, R. Lundin, K. Lundin, B. Lybekk, J.L. Michau, G. Musmann, H. Nilsson, C. Pollock, I. Richter, and J.G. Trotignon, RPC: The rosetta plasma consortium, Space Sci. Rev., 128, 629-647, 2007.

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Eppler, D., J. Maule, A. Steele, O. Botta, and G. Huntress, Svalbard: Training Astronauts in Geology and Surface Exploration Activities in Mars-Relevant Environment, Astrobiology, 8, 350, 2008.

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Erdös, G., and A. Balogh, Density of discontinuities in the heliosphere, Adv. Space Res., 41, 2, 287-296, 2008.

Fishbaugh, K.E., C. Hvidberg, D. Beaty, S. Clifford, D. Fisher, A. Haldemann, J. Head, M. Hecht, M. Koutnik, K. Tanaka, and W. Ammann, Introduction to the 4th Mars Polar Science and Exploration Conference special issue: Five top questions in Mars polar science. Icarus, in press, 2008.

Glassmeier, K.H., I. Richter, A. Diedrich, G. Musmann, U. Auster, U. Motschmann, A. Balogh, C. Carr, E. Cupido, A. Coates, M. Rother, K. Schwingenschuh, K. Szego, and B. Tsurutani, RPC-MAG - The fluxgate magnetometer in the ROSETTA plasma consortium, Space Sci. Rev., 128, 649-670, 2007.

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Martins, Z., O. Botta, M.L. Fogel, M.A. Sephton, D.P. Glavin, J.S. Watson, J.P. Dworkin, A.W. Schwartz, and P. Ehrenfreund, Extraterrestrial Nucleobases in the Murchison Meteorite, Earth Planet. Sci. Lett., 270, 130-136, 2008.

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Neugebauer, M., G. Gloeckler, J.T. Gosling, A. Rees, R. Skoug, B.E. Goldstein, T.P. Armstrong, M.R. Combi, T. Maekinen, D.J. McComas, R. von Steiger, T.H. Zurbuchen, E.J. Smith, J. Geiss, and L.J. Lanzerotti, Encounter of the Ulysses Spacecraft with the Ion Tail of Comet McNaught, Astrophys. J., 667, 1262–1266, 2007.

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Pondrelli, M., A.P. Rossi, L. Marinangeli, E. Hauber, and A. Baliva, An application of Sequence Stratigraphy to Mars: the Eberswalde fan delta, Geoacta, in press, 2008.

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Visitor Publications

Listed are all papers written or co-authored by ISSI visitors, with acknowledgement to ISSI, that appeared or were accepted for publication in refereed journals between 1 July 2007 and 30 June 2008. In addition, a number of presentations made at congresses or symposia are included in the relevant proceedings, the reference of which is to be sought on ISSI's WWW-page, under 'International Teams'.

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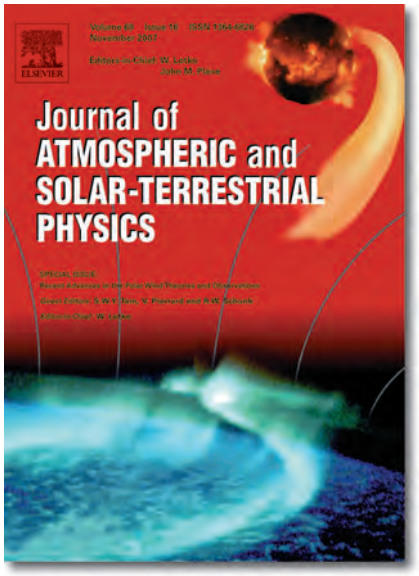

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Table of Contents

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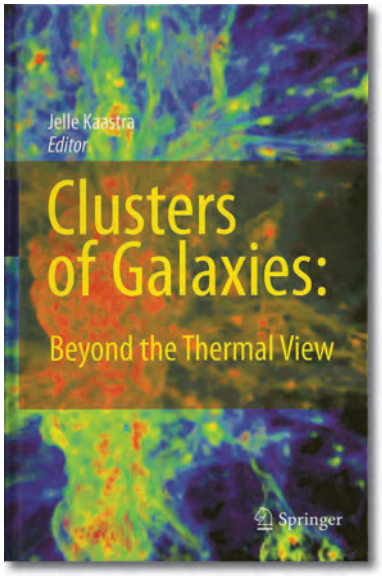

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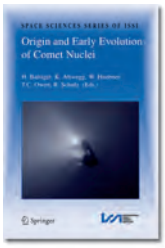

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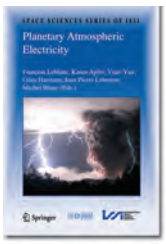

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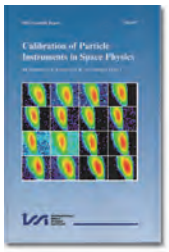

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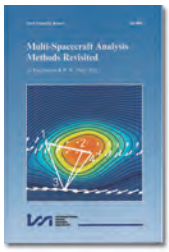

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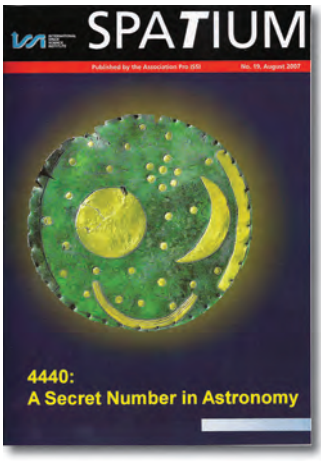

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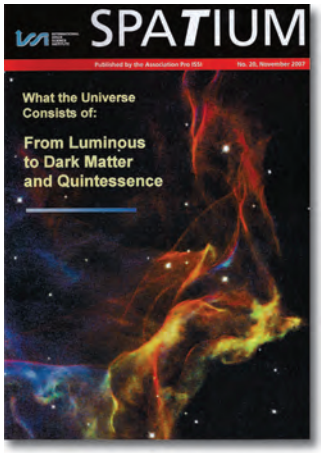

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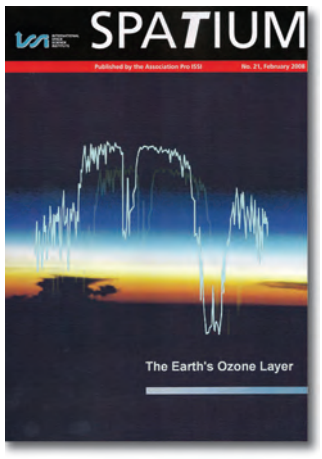

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Table of Contents

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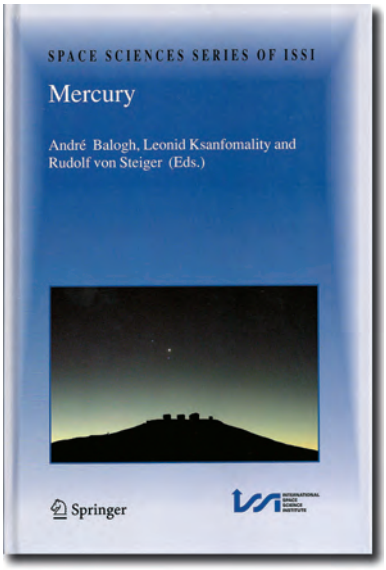

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Table of Contents

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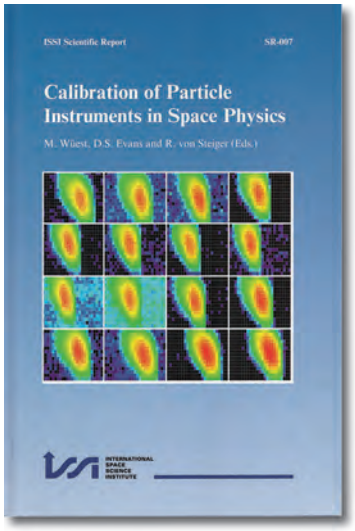

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Table of Contents

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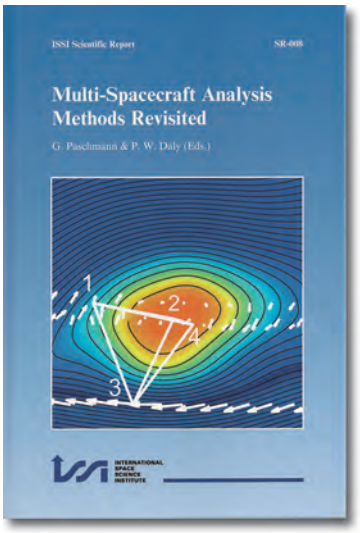

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Table of Contents

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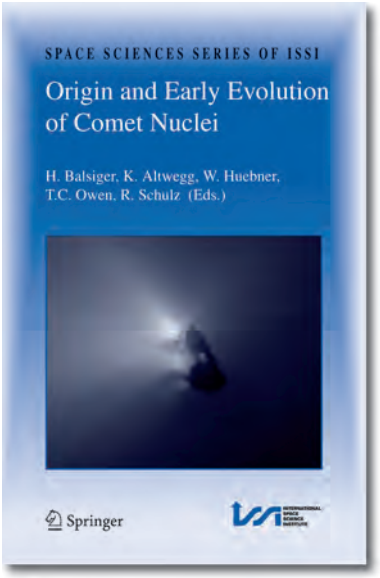

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Table of Contents

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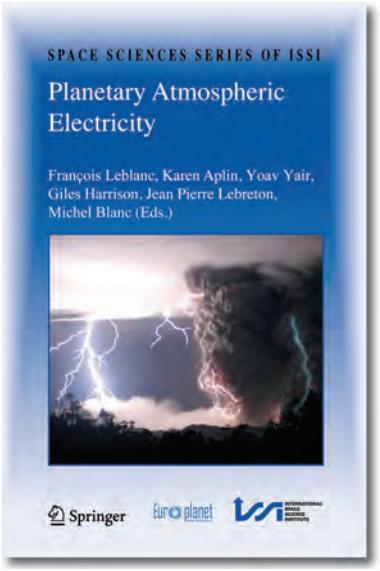

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