INTERNATIONAL
SPACE
SCIENCE
INSTITUTE

2009
2010 Annual Report

Imprint

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Cover Page

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

1. Hubble weights in on the heaviest stars in the Galaxy, NASA Hubble Space Telescope Collection (NASA, ESA and A. Schaller (for STScI)).

2. Envisat radar image featuring the eastern side of Ellesmere Island, the northernmost Canadian island, and portions of the northwest coast of Greenland, the world's largest island (ESA).

3. Supernova shock wave is producing a spectacular new light show, NASA Hubble Space Telescope Collection (NASA, P. Challis, R. Kirshner (Harvard-Smithsonian Center for Astrophysics) and B. Sugerman (STScI)).

4. The outer C and inner B rings respectively from left to right of the planet Saturn (NASA, JPL, University of Colorado, LASP).

5. Chandra X-ray and 2MASS infrared images of DB00-6, NASA Chandra Space Telescope Collection (X-ray: NASA, CXC, Northwestern U., C.Law and F. Yusef-Zadeh; Infrared: 2MASS, UMass, IPAC-Caltech, NASA, NSF).

6. Three different components of the Hubble COSMOS survey: The normal matter (in red) determined mainly by the European Space Agency's XMM-Newton telescope, the dark matter (in blue) and the stars and galaxies (in grey) observed in visible light with Hubble (NASA, ESA and R. Massey (California Institute of Technology)).

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The International Space Science Institute (ISSI) is an Institute of Advanced Studies where scientists from all over the world meet in a multi- and interdisciplinary setting to reach out for new scientific horizons. The main function is to contribute to the achievement of a deeper understanding of the results from different space missions, ground based observations and laboratory experiments, and adding value of those results through multidisciplinary research. The program of ISSI covers a widespread spectrum of disciplines from the physics of the solar system and planetary sciences to astrophysics and cosmology, and from Earth sciences to astrobiology.

From the Chairman of the Board of Trustees

It has been an unusually hot summer in Switzerland. It was even hotter in Russia. The day I write this, the Muscovites languished in 37° heat. I have myself experienced a sweltering Moscow a month ago. More about that later.

Is all that heat unusual? Is it just an incident, or the harbinger of a trend? We don't really know. The global climate is a complicated system and it is hard to analyze from the inside. And it goes to show what an interesting object for space research planet Earth is. It is now three years since ISSI has embarked on a new program: Earth Observation from Space. The coming fourth year will be the terminal year. The Board of Trustees, together with the Directorate hopes not only to continue, but to expand that program in the coming years. Climate is an important, but not the only puzzle that can best be solved with the help of observations from space: think of the magnetosphere, solar flare interactions with the upper atmosphere as well as Earth's surface and the mass balance of the ice sheets, to name a few.

Since the inception of ISSI, the Russian Academy of Science has been a partner and was represented in the Board of Trustees by the Director of the Russian Institute of Space Research (IKI). This year, that partnership has been formalized by a contract by which the Academy pledges an annual financial contribution to the budget of ISSI. I had the privilege and the pleasure to sign that contract on behalf of the Board of Trustees in Moscow on June 23rd. I was deeply impressed by the high regard that ISSI enjoys among Russian scientists and officials. Professor Lev Zelenyi, the director of IKI and member of ISSI's Board of Trustees deserves high praise for his able and persistent efforts that finally saw this successful end. Thank you, Professor Zelenyi! Thanks are also due to the Academy of Sciences and its Vice President Professor A.F. Andreyev.

Speaking of thanks: The Directorate and the whole crew of ISSI under the able leadership of Professor Roger-Maurice Bonnet have again done an outstanding job to help all the teams, workshops and groups to be a success. This year even more than before: a record number of scientists came to Bern to exchange views, plan projects, write papers and books. In the name of the Board of Trustees: Thank you all for doing more than what is expected.

Simon Aegerter

Wollerau, July 24, 2010

ISSI is fifteen years old. At such an early age, humans have not reached full maturity and it may be also the case for ISSI. One thing is however undisputable: the success of the Institute! Success can be measured through several indicators, some numerical some qualitative.

The number of workshops organized this year has reached a record number of five between December 2009 and April 2010, including three in the core programme of space sciences, one in the Europlanet series and one in Earth sciences. The International Teams selection has hit the largest number ever of proposals sent to ISSI with 71 letters of intent and 66 proposals submitted, showing the continuously growing interest of the scientific community in that tool symbolic of the bottom-up approach followed by the Institute. At the same time, the scientific quality of the received proposals has also increased as evidenced by the 2010 selection, with the Science Committee having to place its lower limit right in the first proposals of the "good" category. In the past year, 802 visitors came to the Institute of which 334 (42%) were first–time visitors. The cumulative number of visitors in the 15 years of the Institute's existence has reached the impressive number of 2859 coming from 46 different countries. Furthermore, our "Young Scientists" Programme is having a large success (more than 200 since 2008) to the great satisfaction of the science community served by ISSI.

The main measure for scientific success is the number of citations of the peer reviewed publications in ISSI's Space Sciences Series (as measured by the ISI Web of Knowledge), which shows a remarkable increase between 5% to sometimes more that 50% since last year's evaluation, depending upon the volume in the series. Even the older volumes continue to gather citations up to the present at about the same rate as the newer ones. This underlines the fact that ISSI volumes are indeed perceived as useful references to the status of a particular field for a long time. Not surprisingly, the impact factor of Space Science Reviews, the journal from which the ISSI volumes are reprinted, has risen steadily to nearly 3, a more than twofold increase from three years before. In 2009 it has reached a spectacular value of 4.6, to the great satisfaction of the publisher.

This year has witnessed a continuous progression of the Earth sciences activities, which evidence a substantial success since their inception in 2008 through the contract with ESA. In the course of this contract, 21 teams including International Polar Year projects and topics connected to ESA's "Living Planet" programme convened in ISSI. One Workshop, "Earth's Cryosphere and Sea Level Change" was held in March and met with considerable success, attracting a large number of specialists including several from Switzerland. Two additional Workshops in Earth science topics are in preparation and a third one may conclude the activities of the contract. Following this remarkable success, the question is how best to continue. There is a significant interest of an increased involvement in the ESA EO Programme, in particular in the area of climate change, which will benefit strongly from the kind of critical assessment and in-depth review that ISSI does provide. A modest increase in financial support would allow a real increase in ISSI capacity to pursue these climate-related science objectives. In the future, a new type of association with ESA's Directorate of Earth Observation should be envisaged, similar to the one presently in use with the Directorate of Science and Robotic Exploration. Discussions have started in early 2010 with the ESA Director General and the Swiss Delegation to the ESA council, in view of negotiating before the end of 2010, when the present contract comes to completion, a multi-annual agreement between ISSI and ESA which would encompass all ISSI activities of interest to ESA.

Following the strategic line of diversifying the budget sources of the Institute, a remarkable success was achieved this year when the Russian Academy of Sciences offered to grant ISSI an annual contribution equivalent to CHF 75,000 for 3 years starting in 2010. This is the first time that a national organisation (with the exception of Switzerland) contributes directly to the budget of ISSI.

From the Directors

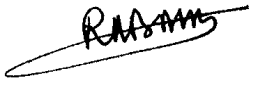
At 15 years of age, it is time for ISSI to analyse in more depth its future strategic orientations. As indicated in our message in last year's annual report, quantitatively, these will be clearly determined by the decisions to expand or not the premises and the staff of the Institute, which are today rapidly reaching the level of saturation of their capacities. With an open mind at possibilities to increasing them (although no such opportunities have yet materialized for new and larger premises with similar advantages to those we presently enjoy, in particular through the proximity with the University), we are of the opinion that the present resources are well fit to offering the best service to the international scientific community. We do think that the present limits to the growth of ISSI might be compensated through a broader usage of electronic and Informatics Technologies and teleconferencing. We therefore intend to explore the capabilities of a system of coordinated resources applied to the ISSI tools. ISSI could lead the way forward in applying new technology and methodology to advance science activities.

In reflecting on the future strategies envisaged for ISSI, we have analysed which measures should be adopted, which would make ISSI better. Here is a list of such potential orientations, which we intend to discuss with our authorities, the ISSI Board and the Swiss Space Office:
i. Continuously following the evolution of space research in astronomy and planetary sciences, robotic solar system exploration and Earth sciences and adapting the programme to this evolution,
ii. Improving and broadening the usage by the science community of all ISSI working tools through a generalisation of the bottom-up approach, more interdisciplinarity, and more involvement of scientists from Russia, Japan, China, India and South America,
iii. Capitalising on the assets that ISSI represents for space agencies/organisations, in particular for ESA,
iv. Negotiating a global agreement with ESA which would encompass all ISSI activities of interest to ESA,
v. Reinforcing ISSI connections with Swiss scientific Institutions and in particular the University of Bern,
vi. Improving outreach activities.

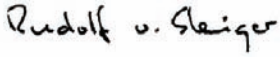
This year will be marked with the departure of the Institute of one of us – André Balogh – at the end of October 2010. The ISSI Board has selected Prof. Len Culhane as his successor. We all welcome this new collaborator who is not unknown to ISSI as a former Chairman of the Science Committee between 2004 and 2009. This year was also the last for one of our Post Docs, Angelo Pio Rossi. Last but not least, Brigitte Schutte left the Institute in March after more than 8 years of excellent service and help to ISSI, and was replaced by Jennifer Zaugg. We would like to express to all of them our utmost appreciation for the work they have done and for their contribution to ISSI's activities whose quality and level they have raised thanks to their dedication, enthusiasm, professionalism and high team spirit.

André Balogh

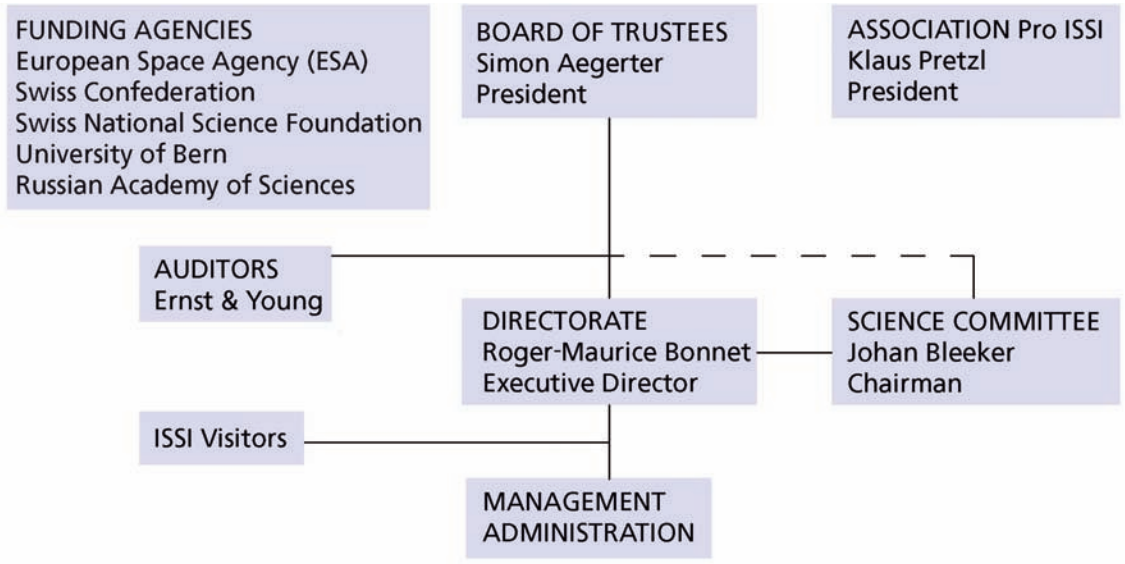
Lennart Bengtsson



Roger-Maurice Bonnet



Rudolf von Steiger



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 Contraves Space AG, later renamed Oerlikon Space AG and now part of RUAG. 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 University of Bern contributes through a grant to a Director and in-kind facilities. Since 2010 the Russian Academy of Science is supporting ISSI with an annual financial contribution. Details can be found on page 12. ISSI received tax-exempt status from the Canton of Bern in May 1995.

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.

The Science Committee, chaired by Johan Bleeker, is made up of 17 internationally known scientists active in the fields covered by ISSI. The Science Committee 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 Directorate is in charge of the scientific, operational, and administrative management of the Institute. It interacts with the Funding Agencies, the Swiss authorities, the Board of Trustees, the Science Committee and the Association Pro ISSI. During the fifteenth business year, the Directorate consists of Roger-Maurice Bonnet (Executive Director), André Balogh (Imperial College London), Rudolf von Steiger (University of Bern) and Lennart Bengtsson (MPI for Meteorology, Germany).

The Association Pro ISSI, founded in spring 1994, counts about 130 members. Pro ISSI promotes the idea of ISSI by organizing public lectures, where internationally known 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.

The Board of Trustees

front row from left to right:
Vice Chairman: Hans Balsiger, University of Bern, Switzerland
Chairman: Simon Aegerter, the Cogito Foundation, Wollerau, Switzerland
David Southwood, ESA, Paris, France
back row from left to right:
Lev M. Zelenyi, Russian Academy of Sciences, Moscow, Russia
Lennard A. Fisk, University of Michigan, Ann Arbor, USA
Risto Pellinen, Finnish Meteorological Institute, Helsinki, Finland
Hanspeter Schneiter, Oerlikon Space AG, Zurich, Switzerland
Johannes Ortner, International Space University, Strasbourg, France
Daniel Neuenschwander, Swiss Space Office, Bern, Switzerland
Willy Benz, University of Bern, Switzerland
Klaus Pretzl, President of the Pro ISSI Association, Bern, Switzerland

missing on the picture:
Claude Nicollier, EPFL/STI Lausanne, Switzerland
Secretary of the Board: Kathrin Altwegg, University of Bern, Switzerland

This list shows the status of the end of the fifteenth business year on 30 June 2010.

front row from left to right:
Michael Thompson, University of Sheffield, UK
Einar-Arne Herland, ESRIN ESA, Frascati, Italy (ex officio ESA)
Chairman: Johan Bleeker, SRON Netherlands Institute for Space Research, Utrecht, the Netherlands
Richard Marsden, ESTEC ESA, Noordwijk, the Netherlands (ex officio ESA)
Thierry Dudok de Wit, LPCE, CNRS, Orléans, France
Claus Fröhlich, PMD Davos, Switzerland
Götz Paschmann, MPI Garching, Germany
back row from left to right:
Dimitry Titov, MPI Lindau Katlenburg, Germany
Gerhard Beutler, University of Bern, Switzerland*
Valery L. Shematovich, Institute of Astronomy, RAS, Moscow, Russia
Tobias Owen, University of Hawaii at Manoa, USA
Atsuhiro Nishida, JAXA, Tokyo, Japan*
Monica Tosi, INAF Osservatorio Astronomico di Bologna, Italy
Duccio Macchetto, Space Telescope Science Institute, Baltimore, USA
Reiner Rummel, MPI Garching, Germany*
Robert Kandel, Institute Pierre Simon Laplace, Palaiseau, France

missing on the picture:
John Harries, Imperial College of Science and Technology London, UK

* Membership ended on 30 June 2010

This list shows the status of the end of the fifteenth business year on 30 June 2010.

The ISSI Staff

from left to the right:
Maurizio Falanga, Science Program Manager
Andrea Fischer, Editorial Assistant
Silvia Perri, Post Doctoral Scientist
Jennifer Zaugg, Secretary
Symeon Koumoutsaris, Post Doctoral Scientist
Johannes Geiss, Honorary Director
André Balogh, Director
Roger-Maurice Bonnet, Executive Director
Saliba F. Saliba, Computer Engineer and System Administrator
Irmela Schweizer, Librarian
Rudolf von Steiger, Director
Silvia Wenger, Assistant to the Executive Director
Angelo Pio Rossi, Post Doctoral Scientist
Katia Schüpbach, Secretary

Lennart Bengtsson
Director Earth Science

Michel Blanc
Discipline Scientist
EuroPlaNet

In the fifteenth business year following personnel changes have taken place:
After eight years Brigitte Schutte handed over her responsibilities as Secretary to Jennifer Zaugg who is full time working for the Institute since March 2010. Angelo Pio Rossi took the opportunity to continue his research in Mars science and geology at the Jacobs University, Germany, as Visiting Scientist in May 2010.

A panorama picture of ISSI's meeting point.

The ISSI facilities offer an area of 700 m^2 on two floors, consisting of office space for staff members, a conference room, two seminar rooms (up to 40 participants each), two smaller rooms for the visiting teams (one room for up to 14 and the other room for up to 10 participants), and two offices for visiting scientists. The rooms are all equipped with high speed network connections (partly wireless), some of them also have printers and projectors for large screen presentation. There is also a big coffee and reading area as a favourite meeting point for our visitors.

In the course of the fifteenth business year a new Mac server has been installed in the server room. This allows all users to use a centralized backup system and a centralized shared internal calendar. This update was very useful especially since most of the ISSI staff are now using Mac computers.

Other new items were also bought in the 15th business year. Among these items are: a new digital photo camera, new computers (3 Mac desktops, 3 Mac laptops, 2 Windows desktops), two new printers, two new boosters for ISSI's wireless networks.

ISSI's workgroup domain network is part of the University's local area network, so that its resources (e.g., plotter, Linux cluster server, grid 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:

- Three servers – Mac, Linux and Windows 2003
- Seven Windows workstations one of which run both Linux and Windows
- Eight Mac workstations running Mac OS Snow Leopard
- Thirteen laptops (five Windows and eight Macs)
- Nine printers, three of which in color
- Five projectors
- Two wireless access points
- One digital video camera, one still camera, two scanners.

ISSI's software packages are regularly updated. These software packages provide 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. This provides a heterogeneous workstation environment in the Institute.

New, stronger and less energy-consuming lights were also installed in both corridors of the first floor.

The ISSI website is regularly updated. Please feel free to visit `www.issibern.ch`.

Financial Overview

The fifteenth year ended with a deficit of 68'955.66 CHF, more than twice than the budget, which foresaw a deficit in the amount of 31'000 CHF. On the other hand the deficit is very close to the surplus of the previous year.

On the revenue side there are two new funding agencies: EurPlaNet, where ISSI is now a full partner, and the Russian Academy of Sciences (see also page 4). The main ESA contribution from the Science directorate was increased by 2.5%, and the Swiss contribution was increased by 1% compared to the previous year. Unfortunately this was more than offset by a substantial exchange loss of the Swiss Franc to the Euro.

On the expense side the salaries have increased by some 2% over the previous year, matching a similar increase at the University of Bern, whose procedures ISSI follows in administrative matters. Both fixed costs and operating costs have also increased, while the total spent for Workshops, Working Groups, Teams and Visitors decreased by a few percent. We will keep a close eye that this trend will not continue in the future.

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

Operating Revenues in CHF for the 15th Business Year (1.7.2009-30.6.2010)

ESA Science Directorate		1'734'000.00
ESA Earth Observation Programme		221'825.00
Swiss Confederation		910'000.00
EuroPlaNet		74'624.35
Russian Academy of Sciences		75'000.00
Other income [3]		-177'117.13

Operating Expenses in CHF for the 15th Business Year (1.7.2009-30.6.2010)

Salaries and related costs[1]	1'336'777.68	
Fixed Costs	280'331.25	
Operating Costs [2]	267'033.40	
Investment (depriciated)	20'090.05	
Workshops, Working Groups, International Teams, Visiting Scientists (ISSI funded) [4]	1'003'055.70	
Result of the Year		68'955.66
Subtotal	2'907'288.08	2'907'288.08

Audited by Ernst & Young, Bern

Swiss National Science Foundation (SNF)

Workshops, Working Groups, International Teams, Visiting Scientists (SNF funded)	174'071.65	
Grant from SNF [5]		174'071.65

Audited by SNF

Total	**3'081'359.73**	**3'081'359.73**

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** includes 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.

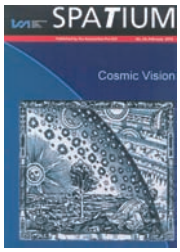
The Pro ISSI Association was founded in 1994 under Swiss law with the goals to create an International Space Science Institute in Switzerland and to communicate the fascinating results of space sciences to the Swiss public. The first goal was reached in 1995 when the International Space Science Institute (ISSI) was created as a Foundation under Swiss Law. Pro ISSI, whose members are, among others, repre-sentatives 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 issues of SPATIUM. Typically there are 2-3 SPATIUM issues published per year. The Pro ISSI Association, which presently consists of 129 members, meets once per year for a general assembly.

Pro ISSI Activities and the SPATIUM Series

In the period of this report Pro ISSI organized four public lectures:
Francesco Pepe from the University of Geneva gave an exciting lecture on 1 July 2009, under the title "Beobachtung neuer Welten". He described the various methods that were leading to the discovery of more than one hundred extra-solar planets. Further investigations of these objects will allow us to learn more about their properties and the burning question: Is life on these planets possible?
On October 30, 2009 Emmanuel Dormy from the Ecole Polytechnique in Paris reviewed in his lecture entitled "The origin of the Earth magnetic field" the recent progress in understanding this long lasting puzzle. He entertained the audience with some table-top experiments illustrating the mechanism of the self-excited dynamo action, which seems to be the underlying effect for the creation of the earth magnetic field.
Thomas Stocker of the University of Bern gave a captivating review of the scientific facts of the world climate change and its consequences in his lecture on 24 March 2010 with the title "Klimawandel: Gefahr oder Chance?". He pointed out that the consequences of the climate change would create enormous costs and would confront the population in various regions with big challenges. Nevertheless, they can be predicted with high precision, which enables an effective strategy planning for solving the problems.

Picture showing the opening slide of the Pro ISSI talk held in June 2010 by ISSI's Executive Director Roger-Maurice Bonnet about the "Spaceship Earth" which is the largest and most elaborate self-sustainable, bio-diverse international space station at the disposal of mankind.

"Spaceship Earth" was the title of the lecture given by Roger-Maurice Bonnet from ISSI on 10 June 2010. In this fascinating lecture he touched on all aspects the inhabitants of the spaceship Earth have experienced since life appeared on Earth several billion years ago, how their survival was challenged by several cosmic events, and how the present generation is faced with the ever growing population and the limited resources. He illustrated this by using the analogy between the Earth and a spaceship.
In February 2010 number 24 of the SPATIUM series was published with the title "Cosmic Vision". It was written by Hansjörg Schlaepfer and summarizes David Southwood's Pro ISSI talk as well as the cosmic vision plan of ESA.



Cover of SPATIUM number 24 "Cosmic Vision".

And finally a new Board was elected by the general assembly of the Pro ISSI Association on 30 October 2009: Klaus Pretzl (President), Nicolas Thomas (Vice President), Frank Rutschmann (Treasurer), Hansjörg Schlaepfer (SPATIUM Editor), and Silvia Wenger (Secretary).

Scientific Activities: The 15th Year

The Program and the Tools

ISSI's mode of operation is generally fivefold: multi- and interdisciplinary Workshops, Working Groups, International Teams, Forum, and Visiting Scientists. In the 15th business year a total of 802 international scientists participated in the scientific activities of ISSI:

Workshops consist of up to 50 invited scientists exchange their views on a scientific theme, typically during a week's duration. Workshops always lead to a volume of the Space Science Series of ISSI and in parallel as issues of Space Science Series. In the 15th year five Workshops were organized, which summaries can be found on the following pages.

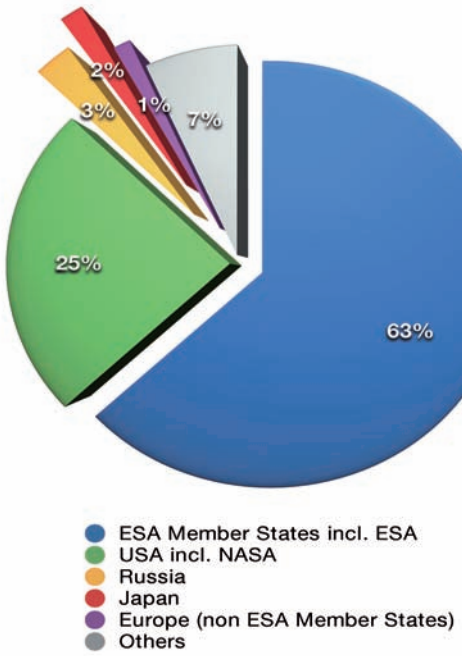
Working Groups have a smaller number of members and meet repeatedly as necessary to achieve the assigned objective. The results of the Working Groups' activities are in general published as titles of ISSI Scientific Report Series under the responsibility of ESA's Publication Division. In the course of the year 4 Working Groups met at ISSI. The aims of these Working Groups were already described in the previous Annual Reports.

International Teams consist of about 15 external scientists, addressing a specific scientific topic in a self-organized fashion. The results of these activities are customarily reported in scientific journals. In the fifteenth year, 61 Teams used the ISSI facilities, 11 from the 2007, 16 from the 2008 and 26 from the 2009 Calls.

A **Forum** is an informal and free debate consists among some 25 high-level participants on questions of political and scientific nature for about two days. A Forum does not necessarily lead to formal recommendations or decisions. In the 15th business year no Forum took place.

Visiting Scientists spend variable periods of scientific activity at ISSI. 9 individual visitors used the ISSI facilities during the year.

The **Young Scientists** Program is designed to bring PhD students and young post docs in contact with the community at work. These young scientists are invited by ISSI to complement the membership of Workshop, Working Groups, International Teams and Forum. 95 young scientists participated in the ISSI activities in the course of the 15th year.



Pie chart showing the ISSI visitors' countries of origin. A total of 802 scientists worked during the fifteenth ISSI business year, 334 of them were for the first time at ISSI.

How to use ISSI tools

As a general rule participation in ISSI's activities is by invitation only. The financial support for the invited scientists covers the local accommodation expenses and a per diem while in Bern.

International Teams: A call for proposals is released every year in January. These proposals are evaluated by the ISSI Science Committee and selected by the Directorate.

Workshops, Working Groups, and Forum: There is no annual call. The scientific community may suggest at any time Workshops, Working Groups, and Forum by submitting an idea on one page maximum. The ISSI Science Committee will evaluate these suggestions and the ISSI Directorate will take a final decision.

Workshops are selected by the Directors in consultation with the Science Committee. Proposals or suggestions for Workshops may originate from the external community. The program and speakers are defined by a group of experts serving as convenors. The Workshops of a week duration can be attended by up to 50 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.

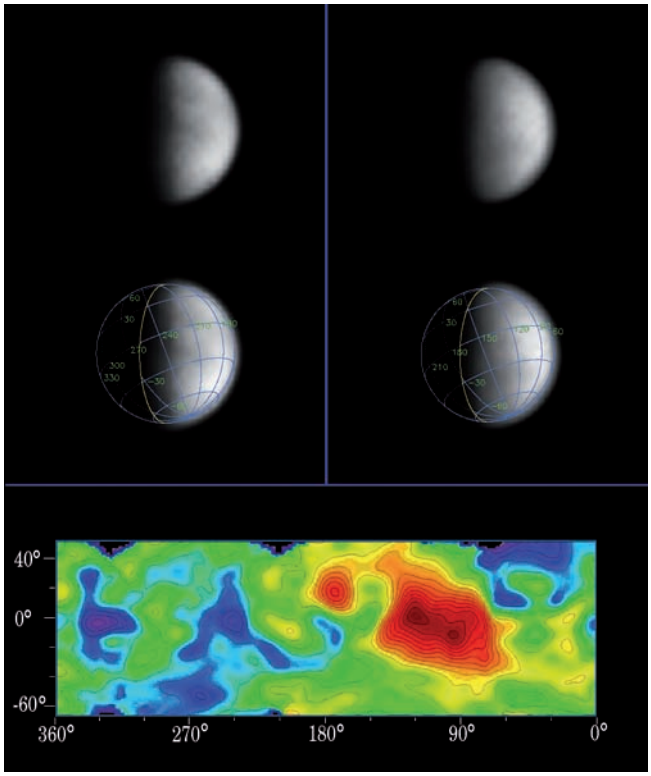
EUROPLANET Workshop – Comparison of the Plasma Environments of Mars, Venus, and Titan

This Workshop – held from 30 November until 4 December 2009 – was organised in the FP7 Europlanet RI programme. ISSI is a signatory participant of this project. According to its workplan, Europlanet in each year suggests several Workshop topics, and ISSI, according to his own rules, selects one of those. The main conveners of this Workshop were Karoly Szego (KFKI Research Institute for Particle and Nuclear Physics, Budapest), Ari-Matti Harri (Finnish Meteorological Institute, Helsinki), and Norbert Krupp (Max Planck Institute for Solar Research, Lindau).

Last year Europlanet organised a very successful Workshop on the Ionosphere of Titan that was preceded by a workshop on Mars, resulting a book: "Mars' Magnetism, and Its Interaction with the Solar Wind". As a logical continuation of these, comparison of the plasma-spheres of Titan, Mars, and Venus were in the focal points of this meeting.

Currently there are three active missions to explore the non-magnetic system objects Mars, Venus, and Titan; namely the MEX, VEX, and the Cassini missions. In this context the science objectives of the meeting were:

- Present and discuss new results of these missions
- Explore similarities and differences
- Identify the most important focal points for future research (data analysis)
- Initiate new collaborations within the Europlanet community



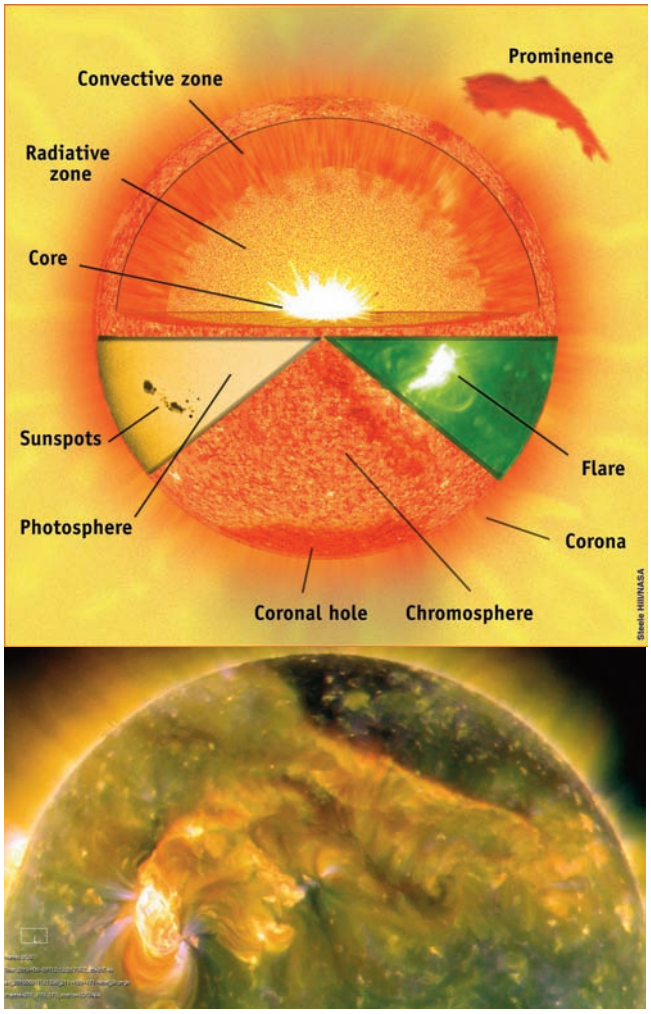
The two images displayed here show Titan from a vantage point 17 degrees below its equator, yielding a view from 50 degrees north latitude all the way to its south pole. The image on the left was taken four days after the image on the right. Titan rotated 90 degrees during that time. The two images combined cover a region extending halfway around the moon. The observed brightness variations suggest a diverse surface, with variations in average reflectivity on scales of a couple of hundred kilometres. (Image Credit: NASA/JPL/Space Science Institute)

The major topics of the Workshop were

- The upstream plasma environments (special emphasis on the magnetodisk, and on the variable conditions of Saturn; upstream composi tions, sources of ionisation)
- Comparison of ionospheres
- The dynamics of the boundary layers and plasma escape
- Exosphere and ENA
- Upstream of Titan
- Magnetotails
- Modelling: MHD and hybrid models

The product of this Workshop as a volume of the Space Sciences Series is in preparation and is expected to appear at the end of 2010.

Workshops



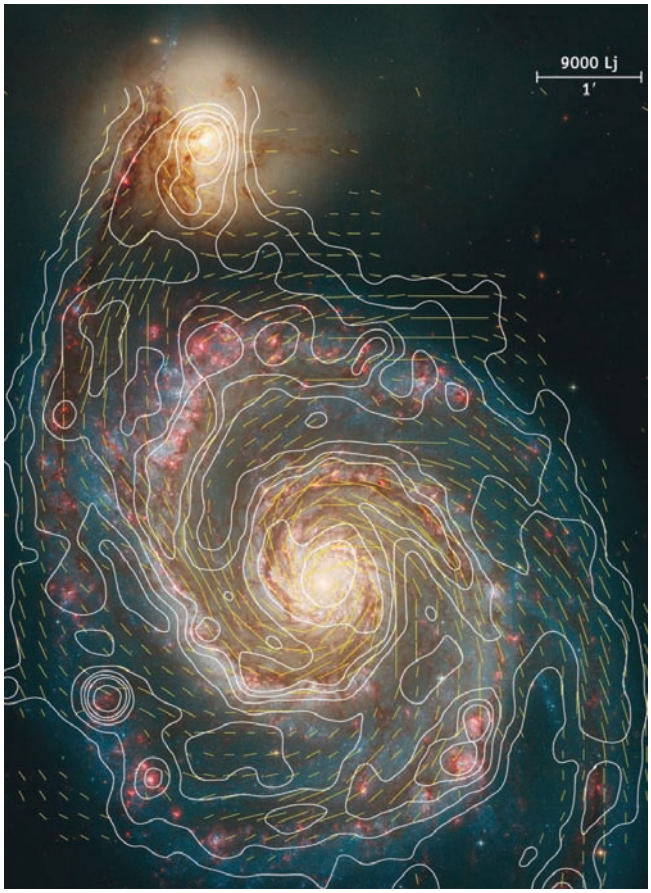
The upper picture shows the parts of the Sun. The three major interior zones are the core (the innermost part of the Sun where energy is generated by nuclear reactions), the radiative zone (where energy travels outward by radiation through about 70% of the Sun), and the convection zone (in which convection currents circulate the Sun's energy to the surface). (Image Credit: SOHO, Steve Hill, NASA)
The lower picture was taken on August 1, 2010. After a long solar minimum, the Sun is no longer so quiet. This extreme ultraviolet snapshot of the Sun captured a complex burst of activity playing across the Sun's northern hemisphere. The image shows the hot solar plasma at temperatures ranging from 1 to 2 million kelvins. Along with the erupting filaments and prominences, a small solar flare spawned in the active region at the left was accompanied by a coronal mass ejection (CME), a billion-ton cloud of energetic particles headed for planet Earth. Making the 93 million mile trip in only two days, the CME impacted Earth's magnetosphere, triggering a geomagnetic storm and both northern and southern auroral displays. (Image Credit: NASA, Goddard, SDO AIA Team)

Multi-scale Physics in Coronal Heating and Solar Wind Acceleration - from the Sun into the Inner Heliosphere

The Workshop took place on January 25-29, 2010. It was attended by 40 invited participants, who had been convened by David Burgess (UK), Eckart Marsch (Germany), Jim Drake (USA), Marco Velli (Italy), Thomas H. Zurbuchen (USA), and Rudolf von Steiger (ISSI). Four of the participants took part in ISSI's Young Scientist program.
The heliosphere is filled with solar wind originating in the solar corona. The physical states of coronal plasma, and its multi-scale structure, are defined by physical processes in spatial regimes which range over many orders of magnitude from the scale of 1 AU to the kinetic scales of the plasma in the corona and the heliosphere. In many cases, the understanding of the kinetic processes is crucial for the understanding of macroscopic phenomena.
The Workshop explored this theme in three sessions, each of which was dedicated to a specific question:
• What is the physical process that is responsible for the heating and acceleration of the solar wind from coronal holes?
• What is the relative role of the magnetic topology and reconnection in the release of slow wind and coronal mass ejections?
• What are the processes that dominate the thermodynamic evolution of the solar wind in the inner heliosphere?
Particular emphasis was put on ample discussions in order to explore cross-linkages, which are at the heart of our understanding of the heating of the closed and open corona, and the acceleration of the solar wind. The Workshop also focused on novel data and on theoretical models that have observable consequences through remote sensing, particularly in near-solar and inner heliosphere observations, such as the ones anticipated by the upcoming Solar Orbiter (ESA) and Solar Probe+ (NASA) missions to be developed by the international community.
Currently the Workshop volume is in preparation, edited by the convenors. The authors are encouraged to also reflect in their papers as much of the discussion results as possible, and several of them will combine their papers, thus adding value to their individual contributions. The Volume is expected to appear in the Space Sciences Series of ISSI at the end of 2010.

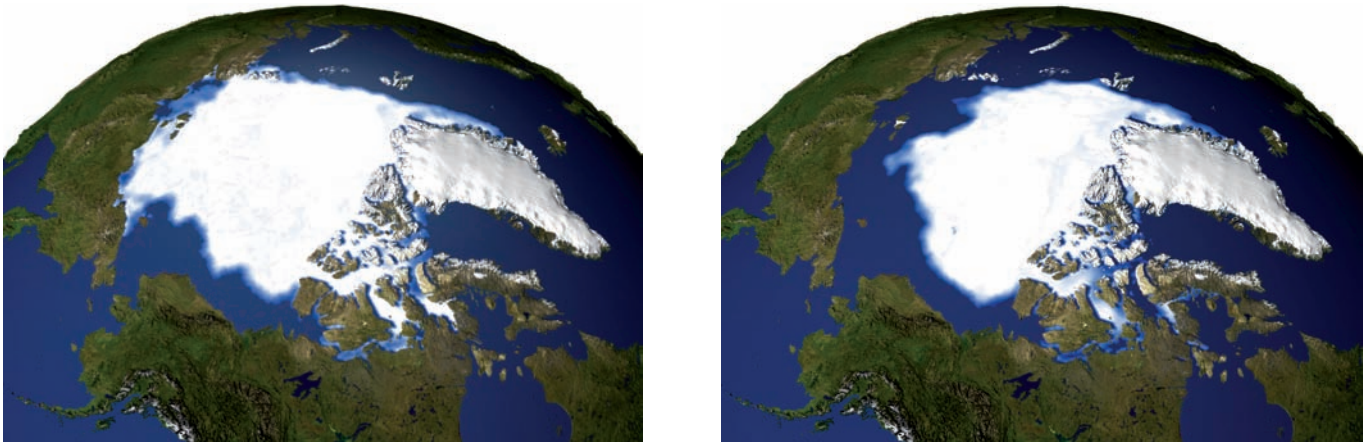
Large-Scale Magnetic Fields in the Universe

The Workshop took place on 1-5 March 2010, with 41 participants, among them seven young scientists. The objective of the Workshop was twofold. First, through a series of talks by leading experts in the field, it reviewed the current status, the unsolved problems and the perspectives for progress in the observation, theory and numerical simulation of cosmic magnetic fields, especially at large scales. Second, both through talks and the discussions at the Workshop, the roles played by large scale magnetic fields in various astrophysical processes and environments received considerable attention.
The interdisciplinarity of the Workshop allowed the assessment of the connection of stellar winds and supernovae to diffuse interstellar magnetic fields; the very large scale aspects of magnetic fields in the Milky Way and other galaxies; structures and processes in radio galaxies and jets, as well as in clusters of galaxies. The topics also included cosmological magnetic fields and structure formation, and a lively discussion of magnetic fields in the early Universe. Having gathered experts across the spectrum of remote high-energy astrophysical observations, the general intercalibration and cross-compatibility of the observations received, possibly for the first time in this topic, a great deal of attention.
The Convenors of the Workshop were Rainer Beck (Max-Planck-Institut für Radioastronomie, Bonn, Germany), Andrey Bykov (Department of Theoretical Astrophysics, Ioffe Physico-Technical Institute, St.Petersburg, Russia), Anvar Shukurov (School of Mathematics and Statistics, Newcastle University, UK), Rudolf Treumann (University of Munich, Germany), Lawrence Widrow (Department of Physics, Engineering Physics, and Astronomy, Queen's University, Kingston, Canada), and André Balogh (ISSI, Switzerland) who will be the Editors of the Volume in the Space Science series of ISSI that will present an up-to-date synthesis of the topic of the Workshop.



Picture showing the total radio emission (contours) and magnetic field vectors 4.8 GHz, combined from observations with the VLY and the Effelsberg telescope. The underlying image is from the Hubble Space Telescope. (Image Credit: A. Fletcher and R. Beck/Hubble Heritage Team, graphics by "Sterne und Weltraum" from R. Beck, Mesurements of Cosmic Magnetism with LOFAR and SKA, Adv. Radio Sci., 5, 399-405, 2007)

Workshops



Those two pictures show the annual minimum sea ice extent and concentration for 25 years, from 1979 (picture on the left) to 2005 (picture on the right). (Image Credit: NASA/Goddard Space Flight Center Scientific Visualization Studio)

The Earth's Cryosphere and Sea Level Change

There is general agreement that rising sea level in the long term is perhaps the most severe consequence of a warming climate. A sea level rise has been going more or less unabated during the last 150 years or so. The total increase since then is estimated to ca 25 cm. During the second half of the 20th century it has undergone a slow acceleration and amounts presently to just above 3 mm/year. The main causes are thermal expansion of seawater and the progressive melting of mountain- and coastal glaciers and parts of the large land ices. Present observations and model studies show ongoing mass losses of glaciers worldwide and a net melting of the land ice on Greenland.

A particular concern in recent years has been a rapid acceleration of some of the large glaciers on Greenland and Antarctica suggesting larger net losses than previously estimated. These have been supported by different space measurements including those from ICESat and GRACE. However, recent modelling results with a more detailed representation of non-linear dynamical effects influencing the deformation of the ice flow seems to imply counteracting processes that swiftly can decelerate the flow and thus periodically accelerating and decelerating glaciers might be part of their natural behaviours. Needless to say, this must be further explored and justifies a continuous monitoring of the dynamics of the land ices as well as detailed modelling.

The view of the Workshop is that detailed numbers are difficult to justify as both climate models and the scenarios are changing and there are no scientific reasons that the range might narrow but rather widen as more aspects of the climate system are considered. Instead it is more sensible to make risks assessments and not predictions.

A fundamental problem facing virtually all Earth system studies is the need for long-term observation and monitoring as well as better and more relevant observations. The dilemma is that the time scale of the internal mode of variability of the system is significantly longer that the lifetime of a dedicated space mission making it extremely difficult to separate a climate signal from the noise of natural processes. This calls for a dual strategy combining new space missions with continued and extended measurements by already proven space instruments.

The main objective of the Workshop, that was the first organized under the Earth Science Program, was to make a comprehensive assessment of the ongoing research in the area. To that extend ISSI had invited leading scientists in geodynamics, glaciology, meteorology, oceanography and soil sciences. The interaction between different experts that not normally meet, contributed strongly in making the Workshop scientifically very stimulating and informative. Currently a book volume in the Space Sciences Series of ISSI is preparation and will appear in spring of 2011.

Cosmic Rays in the Heliosphere II: Temporal and Spatial Variations

The second Workshop on Cosmic Rays in the Heliosphere took place on April 12-16, 2010. It was attended by 45 invited scientists, who had been convened by Jürg Beer (EAWAG, Switzerland), Bernd Heber (Kiel University, Germany), Randy Jokipii and Jozsef Kota (both University of Arizona, USA), Frank McDonald (University of Maryland, USA), Harm Moraal (North-West University, South Africa), and Rudolf von Steiger (ISSI). Five of the participants took part in ISSI's Young Scientists program.

The first Workshop under that title was one of the earliest in ISSI's history back in 1996-97. Since then not only an entire sunspot cycle has been completed, but also a vast amount of new observations have been made throughout the entire heliosphere. In particular the two Voyager missions had left the supersonic solar wind and are now exploring the heliosheath region. It was therefore timely to revisit the theme of Cosmic Rays in the Heliosphere once again and assess the progress made in more than a decade.

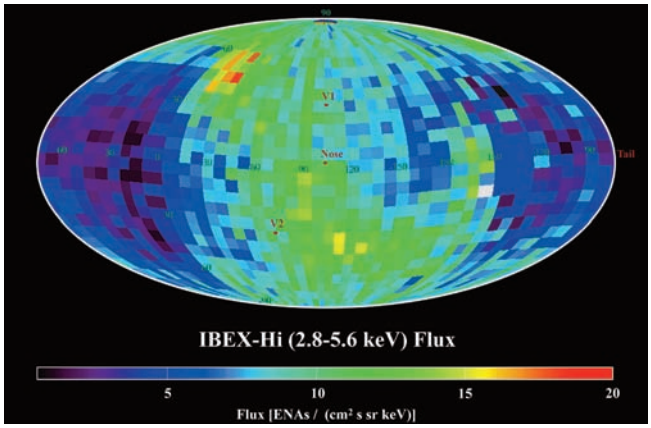
The goal of the Workshop was to assess the current state of our understanding of the spatial and temporal variations of galactic and anomalous cosmic rays in the heliosphere, and their relation to effects on the Sun. Since the last workshop on cosmic rays in the heliosphere, one solar cycle ago, observations and theory have led to much-improved understanding. Observations in the heliosheath and in a broad range of heliographic latitudes in the inner heliosphere have provided important new information on the global structure of the heliosphere, its time variations, and the resulting effects on cosmic rays, thus improving our understanding of the key physical mechanisms through which the Sun controls the spatial and temporal variations of cosmic rays. The recent, unusually long-lasting solar minimum also offers a unique opportunity to study into the physics how cosmic-ray modulation operates. This has the potential of significantly improving our understanding of the long-term variation of cosmic rays and therefore to unravel the past behaviour of our Sun, and possibly, climate.

The Workshop was divided into five sessions: An opening, or introductory session was to set the stage by giving an overview, which was then followed by three topical sessions each concentrating on a specific theme:

- Identify the key mechanism(s) of cosmic ray modulation and how changes on the Sun relate to changes in the observed characteristics of cosmic rays in the Heliosphere.
- Examine the current long-lasting solar minimum and understand its implications for solar-cycle variations and long-term variations.
- Interpretation of long term variations of cosmogenic radionuclides in terms of solar variability and climate change on Earth.

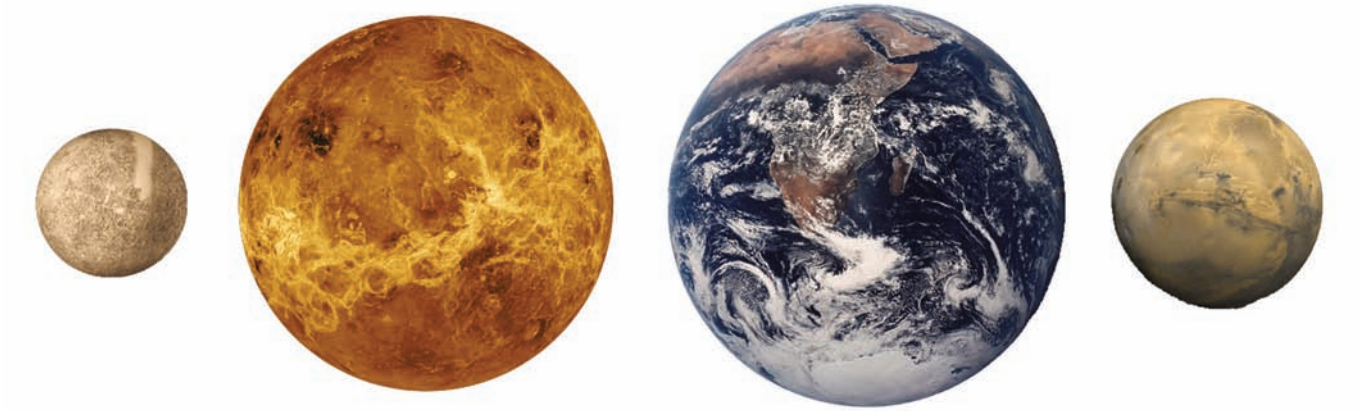
This was then followed by a summary session which also was to identify requirements for future investigations, both theoretical and observational.

Currently the Workshop volume is in preparation, edited by Jürg Beer, Bernd Heber, Jozsef Kota, and Rudolf von Steiger. It is expected to appear in the Space Sciences Series of ISSI in the Spring of 2011.



The Interstellar Boundary Explorer (IBEX) mission is a NASA-funded satellite that orbits Earth and maps the boundary of our Solar System from Earth's point of view looking outward. IBEX has completed the first all-sky maps of this boundary by detecting particles traveling inward from the boundary toward our region of the Solar System. The boundary of our Solar System is created by the interaction between charged particles from the Sun that are streaming outward, called the solar wind, and material between the stars, called the interstellar medium (ISM). (Image Credit: Southwest Research Institute, NASA)

Forthcoming Workshops



The terrestrial planets are the four innermost plantes of the solar system: Mercury, Venus, Earth, and Mars. They are called terrestrial because they have a compact, rocky surface like the Earth's. The planets Venus, Earth, and Mars have significant atmospheres, while Mercury has almost none. This diagram shows the approximate relative sizes of the terrestrial planets. (Image Credit: Lunar and Planetary Institute)

Quantifying the Martian geochemical reservoirs EUROPLANET Workshop

ISSI's involvement in "Europlanet Research Infrastructure" funded by EU within FP7 program, includes the organization of 4 Workshops at ISSI, and the publication of the resulting book volumes. This is the second workshop within the ISSI/Europlanet FP7 framework. The overall theme and aim will be on the Martian geochemistry. The objective is to bring together selected Planetary scientists directly involved in space-based exploration of the Martian surface, using orbital and/or in-situ instruments, Earth scientists studying samples generally accepted as coming from Mars (SNC meteorites), and Planetary and/or Earth scientists who are simulating, either numerically or in the laboratory (experimentally) the physical and chemical processes occurring on or within Mars.

The major scientific topics will include – (1) Alteration of the Martian surface: constraints from space-based observations; constraints from study of SNC's; constraints from experimental studies. The relative importance of different volatile species (e.g., S, Cl, CO2) will be a central issue. (2) Magmatism on Mars: constraints from space-based observations, from study of SNC's, from experimental studies. These are central issues for constraining the composition and temperature of the Martian interior. (3) Water on Mars: How can available data be used to constrain how water is distributed within the different geochemical reservoirs of Mars? (4) Internal structure: Is it possible to propose realistic models for internal structure and chemical variability, consistent with all the available observations and theoretical/experimental data? The Workshop will take place in February-March 2011 and is convened by Michael Toplis, Tilman Spohn, Jim Bell, Christophe Sotin, Eric Chassefière, and Michel Blanc.

Observing and Modeling Earth's Energy Flow

This Workshop is concerned with the Earth's energy flows of solar radiation absorbed by the Earth and the terrestrial radiation emitted to space and the associated internal fluxes. A key issue is the identification of an imbalance (directly or indirectly) in the energy balance caused by increasing greenhouse gases in the atmosphere and changes in clouds and aerosols affecting the planetary albedo. The Workshop will bring together scientists from different disciplines including solar physics, satellite observations, atmospheric dynamics, cloud physics and ocean measurements. The conveners of the Workshop are Richard Allan (University of Reading, UK), Robert Charlson (University of Washington, USA), Claus Fröhlich (World Radiation Center, Davos, Switzerland), John Harries (Imperial College, UK), Paul Ingmann (ESTEC, ESA), Robert Kandel (Institut Pierre Simon Laplace, France), Norman Loeb (NASA Langley, USA), Brian Soden (University of Miami, USA), Kevin Trenberth (NCAR, Boulder, USA), Roger-Maurice Bonnet, and Lennart Bengtsson (ISSI, Switzerland). The Workshop will take place from 10 to 14 January 2011.

Coupling between the Earth's Atmosphere and its Plasma Environment

Two environments of Earth permeate the near-Earth space: the Earth's atmosphere and the Earth's plasma envelope. The atmosphere extends out from Earth's surface up to an altitude of below ~1000 km. The Earth's plasma environment starts from altitudes above ~50-70 km and stretches out far into space being subject to the interaction with the solar wind. Both are permeated by Earth's approximately dipolar magnetic field to which the atmosphere is indifferent, while it completely determines the dynamics of the plasma. This plasma has a twofold origin: part of it, the more energetic one, comes from the solar wind. The less energetic part is contributed by the atmosphere when illuminated by solar UV radiation and to a lesser extent when bombarded by Cosmic Rays, energetic particles from the Radiation Belts, and auroral precipitation. Little is known about the interaction of plasma and atmosphere. Both reservoirs are considered being separate entities. It is only the narrow overlap region around 100-400 km altitude, the ionosphere, where mutual effects have been considered. The present Workshop that will be held end of September 2010 has as its aim to investigate whether and to what extent atmosphere and plasma environments of Earth affect each other. It will consider questions like long-term trends in the atmosphere-ionosphere transition region, effects of plasma processes on atmospheric tides, planetary waves and stratospheric heating, and effects of these variations on the plasma, coupling of atmosphere and plasma by gravity waves, the related Joule heating of the neutral gas, changes in the atmospheric chemistry induced by plasma effects, the central role of lightning and the marginal importance of ULF and VLF waves. Little is know so far about these couplings, and it is not certain whether it is important or not as dynamically the main component is the dynamics of the atmosphere which dominates whether and climate. The Workshop is intended to provide a synopsis of most of the known effect and possibly elucidating questions which could be subject to further investigation. It will be attended by 48 renown scientists from both fields, among them 5 young scientists. As usual the talks given will comprise a further volume of the Space Science Series of ISSI scheduled to appear within about one year after the Workshop.

The Sun's limb peeks above the distant horizon as seen from Earth orbit. Clouds appear in silhouette as the sunlight is reddened by dust in the dense lower atmosphere. Molecules in the more tenuous upper atmosphere are preferentially scattering blue light. This picture was recorded by the International Space Station. (Image Credit: Expedition 15 Crew, NASA)

Particle Acceleration in Cosmic Plasmas

Energetic atomic particles are ubiquitous in the Universe, from suprathermal particles in the solar wind at a few keV to the ultra-high energy cosmic rays coming from cosmic particle acceleration sources outside our galaxy. The Workshop's objective is to provide a forum where a critical review of observations and theory can be confronted across the cosmic scales. It will gather solar system plasma physicists and astrophysicists who will cover the vast range of scales in which accelerated particles are generated. In recent years, considerable progress has been made in observations, theory and computer simulation in the diverse astrophysical contexts from the Earth's magnetosphere all the way to galactic and extragalactic environments. The novelty of the Workshop is its ambition to bring about a fruitful dialogue between astrophysicists and space plasma physicists and thus to lead to a synthesis of achievements in this research field. The Workshop is intended as the first in a projected series of three on cosmic plasmas. The convenors for the Workshop are: Andrey Bykov (Ioffe Physical-Technical Institute, St. Petersburg, Russia), Robert P. Lin (Space Science Laboratory, University of California Berkeley, USA), John C. Raymond (Harvard-Smithsonian Center for Astrophysics, USA), Manfred Scholer (Max-Planck Institut für Extraterrestrische Physik, Garching, Germany), and André Balogh (ISSI). The Workshop will take place from 16 to 20 May 2011.

International Teams

International Teams consist of about 4-15 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 18 to 24 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.

List gives Teams that were active in the 15th business year. A rationale is given only for the new selected teams for the others see the previous Annual Reports.

Teams selected in 2007

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

Team leader: Tomaso Belloni, INAF-OAB Merate, Italy
Session: 12-16 October 2009 (Editorial Meeting)

Transport of Energetic Particles in the Inner Heliosphere

Team leader: Wolfgang Dröge, University of Würzburg, Germany
Session: 7-11 September 2009

Interpretation and Modelling of Solar Spectral Irradiance Measurements.

Team leader: Ilaria Ermolli, INAF Rome, Italy
Session: 7-11December 2009

Comet Modeling (II)

Team leader: Tamas Gombosi, University of Michigan, Ann Arbor, USA
Session: 28-30 October 2009

Atmospheric Water Vapour

Team leader: Niklaus Kämpfer, University of Bern, Switzerland
Session: 13-16 July 2009

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

Team leader: Vladimir Krasnoselskikh, LPCE/CNRS-University of Orléans, France
Session: 23-27 November 2009

Martian landforms have been shaped by winds, water, lava flow, seasonal icing and other forces over millennia. This view shows color variations in bright layered deposits on a plateau near Juventae Chasma in the Valles Marineris region of Mars. A brown mantle covers portions of the bright deposits. Researchers have found that these bright layered deposits contain opaline silica and iron sulfates. (Image Credit: NASA/JPL-Caltech/University of Arizona)

Evolution of Exoplanet Atmospheres and their Characterisation.

Team leader: Helmut Lammer, Austrian Academy of Sciences, Graz, Austria
Session: 21-23 June 2010

GeoSpace at the System-Level

Team leader: Mark Lester, University of Leicester, UK
Session: 9-13 November 2009

A Study of Shock Acceleration Using Strong Turbulence Methods

Team leader: Karim Meziane, University of New-Brunswick Fredericton, Canada
Session: 17-21 May 2010

Nuclear Planetology

Team leader: Igor Mitrofanov, IKI, Moscow, Russia
Session: 28 June - 2 July 2010

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
Sessions: 26-28 August 2009 and 6-9 April 2010

Teams selected in 2008

Inter comparison of Global Models and Measurements of the Martian Plasma Environment
Team leader: David A. Brain, University of California, USA
Session: 28 September - 2 October 2009

AsteroFLAG-Sounding the Stars
Team leader: William J. Chaplin, University of Birmingham, UK
Session: 14-18 December 2009

From the Sun to the Terrestrial Surface: Understanding the Chain
Team leader: Consuelo Cid, University of Alcala, Spain
Session: 16-18 February 2010

Conjugate Response of the Dayside Magnetopause and Dawn/Dusk Flanks Using Cluster-THEMIS Conjunctions and Ground Based Observations
Team leader: Malcolm W. Dunlop, Space Sciences Division, SSTD, Rutherford Appleton Laboratory, UK
Session: 16-20 November 2009

Auroral Small- and Meso-Scale Structures, Origin and Function
Team leader: Harald Frey, University of California, USA
Sessions: 21-25 September 2009 and 27 May -1 June 2010

Relativistic Reconnection and Collisionless Shocks
Team leader: Michael Gedalin, Ben-Gurion University, Israel
Session: 7-11 September 2009

Coronal Prominence Cavities
Team leader: Sarah Gibson, High Altitude Observatory, USA
Sessions: 3-5 November 2009 and 28 June - 2 July 2010

Coupling of Atmosphere Regions with Near-Earth Space at Mid and Low Latitudes
Team leader: Christian Hanuise, LPCE CNRS, France
Session: 1-5 February 2010

Bridging the Gap Between the Middle and Upper Atmosphere: Coupling Processes Due to Winds and Waves Over an Extended Altitude Range
Team leader: Peter Hoffmann, Leibniz-Institute of Atmposheric Physics, Germany
Session: 19-23 October 2009

Magnetic Reconnection and Particle Energization: Synergy of In Situ and Remote Observations
Team leaders: Yuri Khotyaintsev, IRF, Sweden and Stuart Bale, University of California, USA
Session: 7-9 September 2009

Investigation of the Fly By Anomaly
Team leader: Claus Lämmerzahl, ZARM, University of Bremen, Germany
Session: 1-5 March 2010

Determination of Energy and Angular Distribution of Accelerated Electrons in Solar Flares
Team leader: Anna Maria Massone, INFM - LAMIA, Italy
Session: 8-13 February 2010

Advances in Understanding of the Structure and Dynamics of Magnetic Flux Transfer at the Earth's Magnetopause
Team leader: Steve Milan, University of Leicester, UK
Session: 31 August - 4 September 2009

Intercomparison of 1D Photochemical Models of Titan Atmosphere
Team leader: Pascal Pernot, CNRS Paris, France
Sessions: 9-13 November 2009 and 10-12 May 2010

Multi-scale Electrodynamics of Magnetosphere-Ionosphere Interactions at High Latitudes
Team leader: Anatoly V. Streltsov, Dartmouth College, USA
Session: 25-29 January 2010

Solar Small-Scale Transient Phenomena and their Role in Coronal Heating
Team leaders: G. Tsiropoula, National Observatory of Athens, Greece and M. Madjarska, Max Planck Institute for Solar System Research, Germany
Session: 25-28 January 2010

International Teams

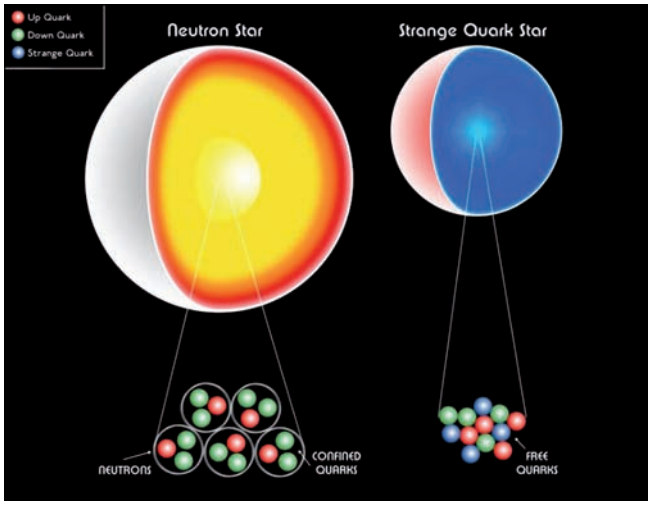
Teams selected in 2009

The Gravity Wave Project Merging Space- and Groundbased Observational Constraints for Gravity Wave Parameterizations in Climate Models

Team leader: Joan Alexander, NWRA, Colorado Research Associates, USA
Session: 22-26 February 2010
Scientific Rationale: Gravity waves, sometimes called buoyancy waves, have dramatic effects on the circulation in planetary atmospheres through the wave drag and diffusion they induce. The goal of the team work is to create a self-consistent global dataset of atmospheric gravity wave momentum fluxes and propagation properties for climate and weather forecasting applications. This is accomplished with cross-calibration along with careful consideration of the limits and uncertainties involved in each of the relevant satellite and ground-based data sets. The team includes the leading experts on the use of each of the relevant data sets for gravity wave studies. A collection of different gravity wave parameterizations are in use at different international modeling centers, and this means each parameterization requires specification of a slightly different set of input parameters. The team includes key members of the global modeling community who will ensure that the dataset will be created in a readily useable form for modeling work.

Strong Gravitational Field and Ultra-dense Matter in Neutron Stars

Team leader: Tomaso Belloni, INAF Osservatorio Astronomico di Brera, Italy
Session: 18-22 January 2010
Scientific Rationale: The team meetings aimed at collecting our current knowledge on observational effects of strong gravity close to neutron-star systems, and on the internal constitution of neutron stars, allowing a thorough discussion of the current theoretical standpoint. These meetings bring together a selected number of geographically scattered scientists, both observers and theoreticians, actively working on these topics. This team meeting provides a framework for broad discussion that helps shape up the research on this topic in the next 5 to 10 years, and is intended to allow results, which are not within reach of smaller local collaborations. The team addresses two main questions: (1) Which observational phenomena taking place very close to neutron stars allow us to test predictions of General Relativity (for instance, the existence of the innermost stable circular orbit); (2) What are neutron stars made of? Are they made of neutrons, or do they contain pion or kaon condensates, or even strange matter? The outcome of this project will help defining strategies and instrumentation set-ups for the candidate next high-energy mission, IXO.



In a neutron star (left), the quarks that comprise the neutrons are confined inside the neutrons. In a quark star (right), the quarks are free, so they take up less space and the diameter of the star is smaller.
(Image Credit: Illustration: CXC/M. Weiss)

Comparative Study of Induced Magnetopheres

Team leader: Cesar Bertucci, Institute for Astronomy and Space Physics - IAFE, Buenos Aires, Argentina
Session: 29 March 2010 - 1 April 2010
Scientific Rationale: The team works on a comparative study of two central topics in the formation of the induced magnetospheres of Mars, Venus, Titan and comets: the interrelation between the pick-up ions originating in their exospheres and the properties of ion cyclotron waves, and the physical properties of plasma boundaries. 1) Ion cyclotron waves are indicators of exospheric-pick-up ions. Wave linear theory predicts their frequency and polarization but there are discrepancies on their spatial distribution and the predicted exospheric densities at long distances. The team studies the generation and evolution of these waves from realistic exospheric conditions. The absence of waves around Titan is also investigated. 2) Plasma boundaries mark differ-

ent phases of the momentum and energy transfer. The team addresses questions such as: are the boundaries at different objects equivalent? Are their scale heights comparable? Which factors control their location? What is the role of the cold/hot neutral coronae in their formation? The team uses observations from past and present missions, as well as simulations.

Mining and Exploiting the NASA Solar Dynamics Observatory Data in Europe

Team leader: Véronique Delouille, SIDC-Royal Observatory of Belgium, Brussels, Belgium
Sessions: 19-21 October 2009 and 28-30 April 2010
Scientific Rationale: The Solar Dynamics Observatory (SDO) with its three solar instruments onboard will ensure many new discoveries. Instead, to use SDO data effectively, the solar physicist needs adequate tools and metadata that allow retrieving datasets relevant for addressing particular science questions. Space Weather forecast also benefits from automated detection of solar events. Mining SDO data, representing them meaningfully, and creating useful metadata require automatic tools based sometimes on advanced mathematical techniques. Participants to the ISSI team have developed software for the pre- or post-processing solar data. The goal of this ISSI team is to compare different algorithms, to discuss the desired outputs and their operational implementation in data centers. The team is also seeking how to combine different algorithms in order to enlarge their scope and potentially define new meaningful representation. Finally, the team addresses the problem of searching for early precursors of solar eruptions. This subject has impacts both on Space Weather applications, as well as on the understanding of the physics underlying solar eruptions.

Solar Chromospheric Flares

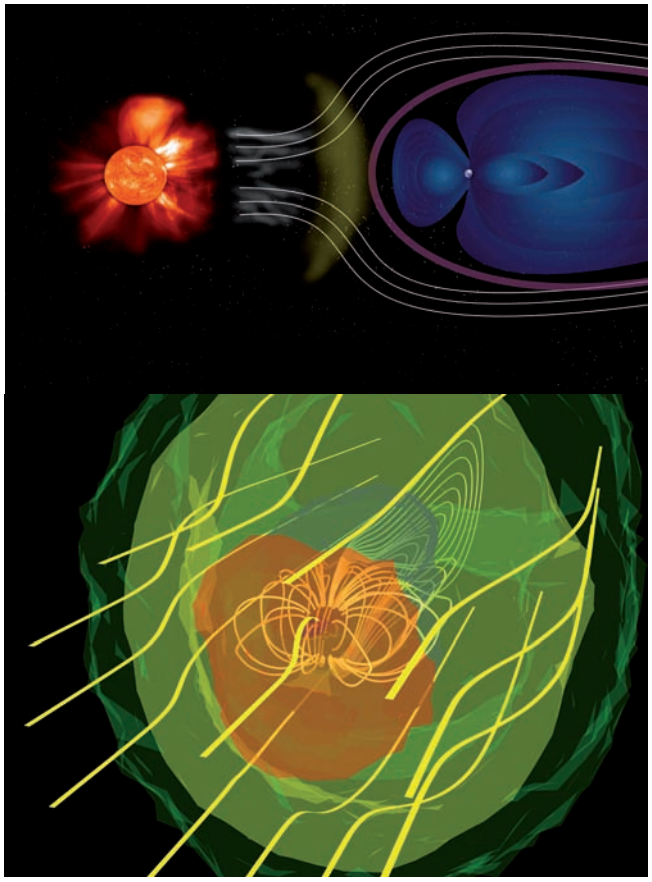
Team leaders: Lindsay Fletcher, University of Glasgow, UK and Jana Kasparova, Astronomical Institute, Academy of Sciences, Czech Republic
Sessions: 23-27 November 2009 and 31 May - 4 June 2010
Scientific Rationale: The team of experts in the theory and observation of solar chromospheric flares focus on the question of energy deposition in solar flares. How can multi-wavelength, high spatial, spectral and temporal resolution observations of the flare chromosphere from spaceand ground-based observatories be interpreted in the context of detailed modeling of flare radiative transfer and hydrodynamics? With these tools we can pin down the depth in the chromosphere at which flare energy is deposited, its time evolution and the response of the chromosphere to this dramatic event. The team undertakes a program of advanced numerical simulation and multi-wavelength data analysis, and studies the diagnostic potential that these bring, with the possibilities offered by future instrumentation in also mind.

Picture of an ISSI Team led by Véronique Delouille.

Saturn Aeronomy

Team leader: Marina Galand, Imperial College London, UK
Sessions: 21-25 September 2009 and 18-22 June 2010
Scientific Rationale: The team studies the aeronomy of Saturn, focusing on the three key, interconnected science topics (1) Solving the energy crisis of Saturn's neutral upper atmosphere; (2) Modeling the "average" ionosphere observed by Cassini/RSS and (3) Understanding ionospheric variability observed by Cassini/RPWS and RSS. After five years of Saturn's atmospheric and magnetospheric observations by the Cassini/Huygens mission as well as important Pioneer, Voyager and Earth-based measurements, we are now at a stage that allows us to look with confidence and in more depth at these dataset. Additionally, improved model capabilities have become available over the recent years that await comprehensive validation by this dataset. The team includes experts working on Cassini, Voyager, Earth-based observations, numerical modeling of the Saturn's upper atmosphere, and reaction rate estimates for tackling the complex cross-disciplinary issues arising from the science questions.

International Teams



The upper picture demonstrating a wind of particles from the Sun called the solar wind buffets the blue funnel-shaped magnetosphere around the Earth. (Image Credit: ESA)
The other picture showing a view of the magnetosphere on the sunward side. The interaction of the solar wind with the field and particles compresses this region to form a shield-like structure. (Image Credit: NASA/Goddard Space Flight Center Scientific Visualization Studio)

Observations and Theories of Suprathermal Tails and Anomalous Cosmic Rays in the Heliosphere and Heliosheath

Team leaders: George Gloeckeler and Lennard Fisk, University of Michigan, USA
Sessions: 31 August - 4 September 2009 and 25-29 May 2010
Scientific Rationale: Observations in the last decade revealed the ubiquitous presence of suprathermal tails, many of them -5 power laws with a rollover at some higher energy (so-called common tails). The commonality of these common tails begs for theoretical explanations. Neither Voyager spacecraft found evidence for the acceleration of Anomalous Cosmic Rays (ACRs), at the termination shock. This, and numerous other energetic particle observations in the heliosphere, cast doubt on the universality of diffusive shock acceleration, and several alternative mechanisms for producing the common tails and ACRs have been proposed, and the merits of these in accounting for the observations are currently hotly debated. Goals of this team of 16 experts are: (a) to establish uniform data selection criteria: (b) using these selection criteria, to focus on analysis of suprathermal ion and electron data, thus documenting how often and under what conditions the -5 power law tails occur: and (c) to resolve outstanding theoretical issues of models that explain the observed suprathermal tails and ACR acceleration.

A Statistical Investigation into Coupled Magnetospheric-Ionospheric Dynamics via Multi-Scale, Multi-Instrument, Data Assimilation

Team leader: Adrian Grocott, University of Leicester, UK
Sessions: 14-18 September 2009 and 26-30 April 2010
Scientific Rationale: The aim of this project is to investigate the dynamics of the near-Earth space environment by performing a statistical analysis of various datasets derived from observations of the coupled solar wind-magnetosphere-ionosphere system. The primary goal is to provide a global picture of the dynamics of the system under various interplanetary and geophysical conditions via the novel integration of a number of different data-sets obtained over the past decade. These will include data products from space-based missions including auroral imagers and magnetospheric satellites as well as ground-based facilities such as ionospheric radars and magnetometer chains. Statistical studies that use such data-sets have proven to be a powerful means of elucidating the complex nature of our space environment whilst a series of case studies that combine these different types of observations have enabled detailed analyses of a variety of magnetospheric and ionospheric phenomena. The team intends to develop and exploit a new multi-instrument statistical database to provide a more complete understanding of the coupled magnetosphere-ionosphere dynamics.

Space-Borne Monitoring of Polar Sea Ice and Monitoring of Antarctic Sea Ice during IPY

Team leader: Petra Heil, AAD & ACE CRC, Australia
Session: 7-11 June 2010
Scientific Rationale: The Arctic and Antarctic sea-ice covers are important components within the global climate system, critically modifying the region's albedo, as well as the ocean-atmosphere exchange of momentum, energy and moisture. While significant changes have been observed in recent years in the Arctic, our knowledge of Antarctic sea-ice thickness, volume and dynamics is far from complete. This observational gap might be filled by data derived from the ESA CryoSat-2 new generation of satellite-based altimeter. Data from CryoSat-2 will provide opportunities to unveil in- formation on the Antarctic sea-ice thickness, which currently remains largely unobserved, apart from few in situ or aerial measurements. CryoSat-2 data will be available free of charge to approved ESA projects. This project joins CryoSat-2 proponents with a shared focus on polar sea ice. The goals of the team activity are to: (1) intercompare Arctic and Antarctic variability, both seasonally and regionally, in terms of sea-ice thickness and derived parameters; (2) investigate the driving forces in changing the Antarctic sea-ice cover; and (3) advance our understanding of the relative importance of processes involved in modifying the distribution of Arctic and Antarctic sea ice.

MOlecules and DUst at LOw metallicity: MODULO

Team leader: Leslie K. Hunt, INAF-Osservatorio di Arcetri, Firenze, Italy
Session: 10-12 March 2010
Scientific Rationale: Dense clumps in cool molecular clouds are thought to be the "cradles" of star formation, but finding molecules at low metallicities has been exceedingly difficult. Although we expect some dependence of CO content on metallicity, this gross deficit is rather surprising. Generally, the gas component of the interstellar medium (ISM) and star formation are intimately linked. The power-law relation between star-formation rate (SFR) in galaxies and gas surface density, Σ, (the Kennicutt-Schmidt, KS law) holds over a wide range of environments from quiescent spiral disks with low SFR surface densities (Σ SFR) to circumnuclear starbursts and ultraluminous infrared galaxies (ULIRGs) where the SFRs are much higher. However, metal-poor dwarf galaxies which

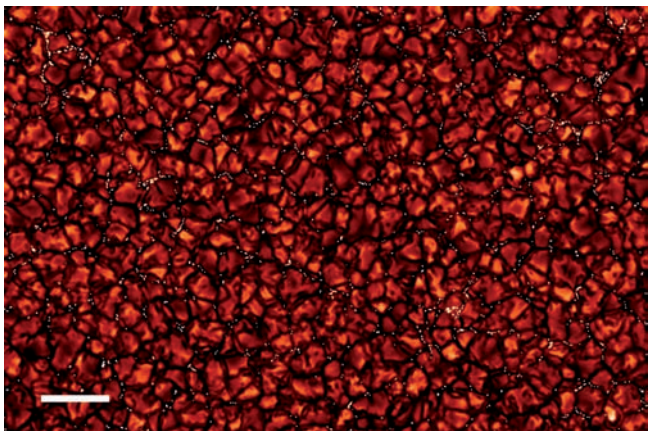
Impression of the ISSI Team Meeting led by Petra Heil in June 2010.

are forming stars at high Σ SFR do not follow the "standard" KS relation. While most dwarfs form stars relatively slowly, some of them form stars almost as violently as ULIRGs. However, unlike ULIRGs, they do this in an ISM, which is apparently almost entirely atomic; how such galaxies form stars is the subject of this proposal. We explore alternatives to CO as a tracer of molecules and star formation at low metallicity; this is done both from theoretical and observational points of view, and will include an assessment of how molecular content depends on properties of the ISM.

Enceladus as an Active Moon

Team leaders: Sascha Kempf, Max Planck Institute for Nuclear Physics, Germany and Juergen Schmidt, University of Potsdam, Germany
Sessions: 18-22 January 2010 and 14-18 June 2010
Scientific Rationale: In the light of the Cassini Mission to Saturn, Enceladus turned out to be one of the most intriguing bodies of the solar system. Data returned by various instruments of the spacecraft provide compelling evidence that this moon is unusually active and is capable to maintain a pronounced ice volcanism. Analysis of the composition and dynamical properties of the ejected material suggests the existence of a subsurface ocean. Four years after the discovery of Enceladus' plumes the time is ripe to bundle the expertise of researchers from different fields in an interdisciplinary approach. An ISSI team provides an ideal platform to share and discuss data and modelling efforts and to develop the global picture of the origin and evolution of Enceladus' activity. The workshops are intended to facilitate existing and trigger new collaborations between team members.

International Teams



The solar surface is a striking patch work of granules in this very high resolution picture of the quiet Sun. (Image Credit: J. Sanchez Almeida (IAC), et al.)

Theory and Model for the New Generation of the Lunar Laser Ranging Data

Team leader: Sergei Kopeikin, University of Missouri-Columbia, USA
Session: 16-19 February 2010
Scientific Rationale: Lunar Laser Ranging (LLR) measurements are crucial for advanced exploration of the evolutionary history of the lunar orbit and the laws of fundamental gravitational physics. Current LLR technique measures distance to the reflectors on the Moon with the precision of one millimeter that strongly demands further significant improvement of the theoretical model of the Earth-Moon system. This model should based on general relativity and rely upon the most recent IAU standards. The team's goal is in developing such a model with accounting for all classic and relativistic effects at the millimeter-range level. The team also focuses on exploring the new opportunities of LLR to perform the most precise fundamental test of general relativity in the solar system.

Submillimeter Solar Flare Observations

Team leaders: Samuel Krucker and Hugh Hudson, University of California, USA
Sessions: 9-13 November 2009 and 9-11 June 2010
Scientific Rationale: The purpose of the team is to systematize our knowledge of the emission of solar flares in the THz range (submillimeter wavelengths). This is essentially a new field of solar flare research, with substantial ambiguities of interpretation but potentially great significance because of the implications for high-energy particle acceleration. It is also a timely topic due to the potential for future observations in the THz domain with the new instrumentation at the Solar Submillimer-wave Telescope (SST), the Atacama Large Millimeter Array (ALMA), and proposed space instrumentation such as DESIR on SMESE (SMall Explorer for Solar Eruptions). The team therefore anticipates discussions of current observations, vigorous debate of the theories in the context of the broad coverage of solar flares now available at other wavelengths, and the potential of the new instruments to address the questions arising.

Solar Prominence Formation and Equilibrium: New Data, New Models

Team leader: Nicolas Labrosse, University of Glasgow, UK
Session: 29 March - 1 April 2010
Scientific Rationale: The team is spanning a wide range of expertise in order to make progress in the understanding of solar prominences, and in particular the mechanisms capable of explaining their formation and their equilibrium. The team consists of 11 members whose research interests combine data analysis and interpretation, spectro-polarimetry, radiative transfer modeling (including polarized radiative transfer), and modelling of the magnetic field and plasma. The team members discuss the latest developments in these fields, interpret existing space observations, set up and propose new observational programmes using space instrumentation, and decide modelling strategies to be carried out between the meetings. The outcome of the research is a better understanding of the formation processes of solar prominences and of the physical conditions necessary for the stability of quiescent prominences.

Land Data Assimilation: Making Sense of Hydrological Cycle Observations

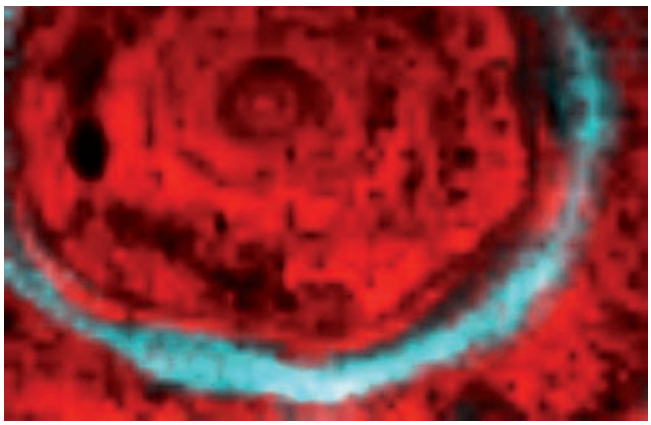
Team leader: William Lahoz, Norwegian Institute for Air Research, Norway
Session: 2-4 February 2010
Scientific Rationale: The purpose is to bring together various ongoing efforts in hydrological cycle studies (data assimilation theory and application, NWP, models, observations) and discuss the state-of-the-art and bring together leading scientists, with focus on the upcoming ESA Earth Explorer mission SMOS (Soil Moisture and Ocean Salinity).

The Rapid Temporal Evolution of the Observed Magnetic Field and the Associated Processes in the Earth's Liquid Outer Core

Team leader: Vincent Lesur, Geo Forschungs Zentrum Potsdam, Germany
Session: 4-5 November 2009
Scientific Rationale: Recent models of the Earth's magnetic field, derived from observatory and satellite data, present rapid temporal evolutions, on sub-decadal time-scales, that have not been seen before. These rapid evolutions are particularly apparent in the secular acceleration, i.e. in the time derivative of the core field secular variation. What is the origin of this signal? How much is it distorted by the conductive mantle? What processes in the core can give rise to these fast evolutions? This team addresses these questions covering three specialties: Data analysis, Core flow modeling and Magnetohydrodynamics. Regarding the data analysis, the repeatability of the observed signal and its evolution in time has to be investigated; the impact of the conductive mantle estimated. As the magnetic field acceleration is now better resolved, the temporal evolution of the core flow models can be studied. The frozen-flux approximation and quasi-geostrophy assumptions need to be tested by, for example, characterizing under these assumptions hydromagnetic normal modes in the core that could be responsible for the observed fast changes in both the field and the flow.

Nano Dust in the Solar System: Formation, Interactions and Detection

Team leader: Ingrid Mann, Kobe University, Japan
Sessions: 21-25 September 2009 and 22-26 March 2010
Scientific Rationale: The aim is to carry out a study of cosmic nano particles in the solar system. This study takes into account results from astrophysical research and astronomical observations of nano particles in the interstellar medium and consider the perspectives of mineralogy, laboratory physics, space plasma physics, and solar system dynamics. A large fraction of the heavy chemical elements in the different environments of the Galaxy (as well as in other galaxies) is contained in small solid dust particles, among them particles with sizes smaller than about 100 nm are loosely referred to as nano particles. The properties of nano particles are different from those of larger solid dust particles leading to different behavior in many astrophysical processes and this is especially so for particles < a few 10 nm. Because of their large surface area relative to the small mass nano dust particles efficiently interact with surrounding atoms, ions, molecules and radiation and therefore are important for the physical evolution of different cosmic environments.

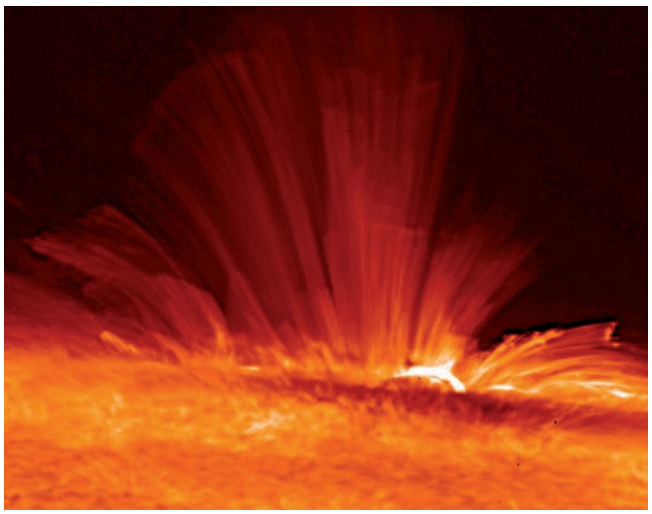


Saturn's north pole hexagon and aurora.
(Image Credit: NASA/JPL/University of Arizona)

Auroras of the Outer Planets

Team leader: Jonathan Nichols, University of Leicester, UK
Session: 4-8 January 2010
Scientific Rationale: Observations of auroral emission from radio to X-rays provide a global view of the dynamics of planetary magnetospheres, and at present are revolutionizing our understanding of the plasma environments of Jupiter and Saturn. These planets have large magnetospheres, this situation contrasts markedly to the Earth's magnetosphere, which is driven by the interaction with the solar wind, although that the solar wind also affects the auroras greatly on the outer planets. Auroral observations are obtained by either Earth-based remote sensing plat-forms, e.g. the Hubble Space Telescope, or spacecraft such as Cassini. Several unique data sets have recently been obtained which present different facets of the auroral process of the outer planets. This team brings together ultraviolet, infrared, X-ray, radio, and in situ particles and fields observations along with world-leading expertise in order to address the following topics: How are the auroral emissions of different wavelengths related? How are the auroral observations related to in situ measurements? What affects the morphology of the auroral emission? Such multi-instrument studies are crucial

International Teams



This picture of the solar "chromosphere" reveals the structure of the solar magnetic field rising vertically from a sunspot (an area of strong magnetig field), outward into the solar atmosphere. The chromosphere a thin "layer" of solar atmosphere "sandwiched" between the sun's visible surface (or photosphere) and its outer atmosphere (or corona). The chromosphere is the source of ultra violet radiation. (Image Credit: Hinode JAXA/NASA/PPARC)

if we are to test the models, which try and explain the dynamics of the outer planets magnetospheres, and to reach a global understanding of their manifestations.

Phobos and Deimos – After Mars Express, Before Phobos Grunt

Team leader: Jürgen Oberst, German Aerospace Center, Berlin, Germany
Session: 29 March - 1 April 2010
Scientific Rationale: In 1877, the astronomer A. Hall (US Naval Observatory) discovered that Mars is accompanied by two satellites, Phobos and Deimos. The origin of the two has remained uncertain to the present day. A Martian origin has been difficult to model and to match to their spectra, but models for their capture also have major shortcomings. Spectral signatures and the overall low density suggest that Phobos has a composition similar to carbonaceous chondrites and therefore raises the possibility that Phobos contains a large fraction of volatiles. Several space missions have identified Phobos as a target, from where the recovery of extraterrestrial samples may be comparably straightforward. Mars Express, currently the only Mars spacecraft to carry out Phobos flybys, has returned new data on Phobos, including imagery, spectral data, and gravity field measurements. The next step of Phobos study is the Phobos sample return mission (Phobos Grunt), under development by the Russian Space Agency. There are other suggestions for missions to study Phobos and Deimos in USA and Europe. The team includes astronomers, geophysicists, geologists, cartographers, and planetary explorers from East and West to review the present state of knowledge on this small Martian satellite, and discusses measurements and observations that are required to further the understanding of Phobos.

Directional Discontinuities in the Interplanetary Magnetic Field

Team leader: Götz Paschmann, Max Planck Institute for Extraterrestrial Physics, Germany
Session: 19-23 October 2009
Scientific Rationale: Directional discontinuities of the interplanetary magnetic field are ubiquitous features in the solar wind. A key issue has been the identification of the nature of these discontinuities: Are they tangential discontinuities, i.e., surfaces separating plasmas of different properties, or are they rotational discontinuities, where the plasmas on the two sides are magnetically connected, and the properties are, to first order, the same. Using the large set of directional discontinuities identified by Thorsten Knetter in the Cluster data, the team focuses his investigation on three interrelated topics. The first is to put Knetter's results suggesting the absence of rotational discontinuities on a firmer footing, by establishing tighter limits on the normal components. The second goal concerns the quantitative analysis of the Alfvenic fluctuations that many of the discontinuities are embedded in. As the third goal, the team identifies local structures in the discontinuities, based on the magneto-hydrodynamic (MHD) reconstruction technique that allows determination of two-dimensional coherent MHD structures from time-series of magnetic field and plasma data.

Exploiting the Multi-Wavelength Lensing Survey

Team leader: Daniel Schaerer, Observatoire de Genève, Switzerland
Session: 1-5 February 2010
Scientific Rationale: The team is carrying out a unique, large, multi-wavelength survey of massive galaxy clusters known to be strong gravitational

lenses with the Very Large Telescope (VLT), the Hubble Space Telescope (HST), the SPITZER Space Telescope, the Herschel Space Observatory, and other facilities. The main scientific objectives of this "Multi-Wavelength Lensing Survey" are to resolve the IR/sub-mm cosmic background, to detect and map the far-IR/sub-mm spectral energy distribution of distant ($z > 2$) galaxies, and to characterize the first galaxies at $z > 6$. The team gathers the main CoIs of our observing programs and covers all the expertise necessary to reduce, analyse, and interpret the observational data.

Geospace Coupling to Polar Atmosphere

Team leader: Annika Seppälä, British Antarctic Survey, Cambridge, UK
Session: 19-23 April 2010
Scientific Rationale: The team working on Geospace coupling to Polar Atmosphere aims to study the impact of the near-Earth space to the polar atmosphere and lower ionosphere. The science interests lie on examining how the forcing from the Sun and the near-Earth space induces changes in this region extending from low to high altitudes, particularly through precipitation of high energy particles. The goal is to use a variety of different data sets from ground based and satellite platforms together with state of the art models of the atmosphere and ionosphere to achieve a unified global picture of the geospace impact on the Earth's atmosphere through the Polar Regions.

Defining the Full Life-Cycle of Dwarf Galaxy Evolution: the Local Universe as a Template

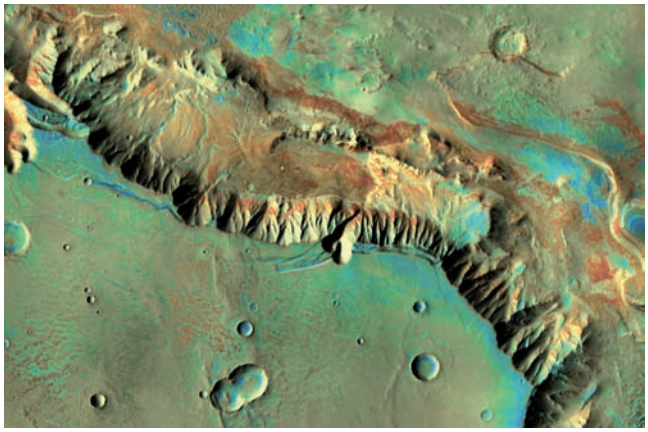
Team leader: Eline Tolstoy, University of Groningen, the Netherlands
Session: 9-11 December 2009
Scientific Rationale: The discovery of the tidally-disrupted Sagittarius dwarf galaxy, one of the closest satellites of the Milky Way, provided the first compelling evidence of nearby merger phenomena. The detailed process by which galaxies arrive at their current state remains largely speculative. Understanding how dwarf galaxies evolve is therefore extremely important. The Local Universe provides a unique opportunity to study and model the detailed properties of a range of dwarf galaxy types – star by star. To this aim, the team combines complementary (spectroscopic, photometric, theoretical) expertise to attack this problem in the most comprehensive possible way. The primary goal is to determine if there is an evolutionary link between early (dwarf spherical and elliptical) and late dwarf galaxies (dwarf irregulars and blue compact dwarfs), and the team is comparing detailed abundance determinations and star formation histories with detailed chemo-dynamical evolution models. Through these comparisons, the team members will quantify the effect of galactic scale winds on the evolution of these small systems, and to determine how a starburst can occur and lead to runaway star formation in some of them. As a by-product, this effort will also prepare the exploitation of future facilities both in space (e.g., JWST, GAIA) and on the ground (e.g., VLT/MUSE, Gemini/WFMOS on Subaru).

Picture showing I Zwicky 18 classified as a dwarf irregular galaxy which is much smaller than the Milky way Galaxy. (Image Credit: NASA/ESA/STCcI (A. Alosi))

Monitoring Arctic and Antarctic Sea Ice from Various Satellite Products

Team leaders: Hongjie Xie and Burcu Ozsoi-Cicek, University of Texas at San Antonio, USA
Session: 15-19 March 2010
Scientific Rationale: The 14% of the Earth's surface known as the Polar Regions is witnessing change that is unprecedented in modern time due to global warming. Sea ice insulates and influences the heat transfer, mass, exchange of gases and interaction between the atmosphere and ocean. It is important to understand sea ice variations and properties to be able to understand its relation and contribution to climate change. Satellite data, in principle, allows for detection of changes in ice concentration and ice ex-

International Teams



Valles Marineris on the Mars is a chasm vastly larger than Earth's Grand Canyon that also has many layers of rock that serve as windows into the past. (Image Credit: NASA/JPL-Caltech/ASU)

tent, ice type, ice thickness, ice drifts over large areas usually derived independently from single sensors. Passive microwave sensors and active microwave sensors unhampered by cloud cover and darkness are particularly well suited to obtain large spatial and long temporal records of sea ice concentration, extent, drift, ice types, and ice thickness. There are also relatively high spatial resolution visible and infrared sensors to extract additional information about the ice cover. Last but not least, lidar data provide information about the freeboard or at least the location of the snow surface in relationship to the surface water and a good general idea about the overall thickness of the sea ice. Understanding those satellites and derived geophysical products and their accuracies are therefore crucial for the long term monitoring of sea ice and for comparison with model predictions.

Dispersive Cascade and Dissipation in Collisionless Space Plasma Turbulence – Observations and Simulations

Team leader: Emiliya Yordanova, Swedish Institute for Space Physics, Sweden
Session: 19-23 April 2010
Scientific Rationale: The goal of the team is to study the cascade and dissipation at small scale turbulence in different (astrophysical, interplanetary and near Earth's) plasmas. The work is based on the recent knowledge on this topic and the synergy between novel data analysis of in-situ multipoint observations (Cluster, Themis) and advanced numerical simulations (AstroGK and Landau fluid codes). Magnetized plasmas in the Universe are turbulent and characterized by multiple spatial and temporal scales. If the large MHD scale turbulence is relatively well-documented, the physics lying behind scales smaller than the ion gyroscale, where the energy is dissipated and the description of turbulence fails, and where a second cascade may take place, in the so called dispersive range, remains an open question. Investigating plasma turbulence at these scales is important for basic plasma physics, but the expected results have crucial implications on various processes occurring in laboratory and astrophysical plasmas (e.g., transport and particle acceleration, plasma heating and magnetic reconnection) as well as on designing and operating future space missions (e.g., MMS, Cross-Scale, Solar Orbiter).

Interior Layered Deposits: What do they tell us about Mars Evolution?

Team leader: Tanja Zegers, ESTEC ESA, the Netherlands
16-18 November 2009
Scientific Rationale: The team aims to study the nature and origin of the Interior Layered Deposits (ILDs) on Mars. These deposits are associated with the most abundant outcrops of hydrated sulfates on Mars, and thus are likely to preserve a record of liquid water in Martian history. The significance of sulfate-bearing ILDs as indicators of the past climate conditions on Mars, makes them prime targets for future in situ investigations by lander missions such as Mars Science Laboratory and ExoMars, which focus on the search for past and present habitable environments. ILDs are mainly found in the equatorial regions, usually in topographic lows, such as Valles Marineris, chaotic terrains, and large impact craters. Layering is visible on metre scale, and partial erosion reveals intricate intersection patterns between geological layering and the topography. The process by which these deposits formed has remained enigmatic, despite enhanced image and spectral resolution from orbit. Potential genetic models include lake and river deposits, wind-blown sediments, sub-aerial or sub-glacial volcanic deposits, and most recently evaporitic deposits in a spring environment. It is the goal to put constraints on possible formation mechanisms, since the potential for these units as a record for habitable environments strongly depends on the process by which they formed.

The Teams below have been selected for implementation from the proposals received in response to the 2010 Call for International Teams

Extracting Physical Information from Spectropolarimetric Observations. Comparison of Inversion Codes
Team leader: Juan M. Borrero (G)

AsteroFLAG-Ensemble and Differential Seismology of Solar-Typestars
Team leader: William J. Chaplin (UK)

The Earth's Radiation Belts: Physical Processes and Dynamic Modeling
Team leaders: Norma B. Crosby (B) and Richard B. Horne (UK)

Mapping Neutron Stars with Type I X-ray Bursts
Team leader: Andrew Cumming (CA)

Astrophysics and Cosmology with Galaxy Clusters: the X-ray and Lensing View
Team leader: Stefano Ettori (I)

Magnetic Flux Emergence in the Solar Atmosphere: Comparing Observational and Model Conditions Leading to Active Region Formation and to the Interaction of the newly Emerged Flux with the Ambient Magnetic Field
Team leaders: Klaus Galsgaard (DK) and Francesca Zuccarello (I)

The Methane Balance – Formation and Destruction Processes on Planets, their Satellites and in the Interstellar Medium
Team leader: Wolf D. Geppert (SE)

Atmospheric Trace Gas Data Set Inter-Comparison Project
Team leader: Michaela I. Hegglin (CA)

Investigating the Dynamics of Planetary Magnetotails
Team leader: Caitriona Jackman (UK)

The Substorm Current Wedge
Team leader: Larry Kepko (US)

Filamentary Structure and Dynamics of Solar Magnetic Fields
Team leader: Irina N. Kitiashvili (US)

Critical Assessment and Standardized Reporting of Vertical Filtering and Error Propagation in the Data Processing Algorithms of the NDACC Lidars
Team leader: Thierry Leblanc (US)

Fermi Shock Acceleration Process: From Non-Relativistic to Ultra-Relativistic Shocks
Team leader: Alexandre Marcowith (F)

Plasma Coupling in the Auroral Magnetosphere–Ionosphere System (POLARIS)
Team leaders: Octav Marghitu (RO) and Joachim Vogt (G)

Numerical and Laboratory Explorations of the Response of Solid Celestial Bodies and their Granular Surfaces to various Kinds of Stresses Under Variable Gravity
Team leaders: Patrick Michel (F) and Akiko M. Nakamura (JP)

Study of Cosmic Ray Influence upon Atmospheric Processes
Team leader: Irina A. Mironova (RU)

Study of Gamma-ray Loud Binary Systems
Team leader: Andrii Neronov (CH)

Utilizing the smallest Martian Craters to analyze Surface Ages and Geological Evolution
Team leaders: Olga Popova (RU) and William Hartmann (US)

Remote Observation of Aerosol Cloud-Precipitation Climate Interactions
Team leader: Anni Reissell (FI)

Physics of the Accretion Column of X-ray Pulsars
Team leader: Gabriele Schönherr (G)

Plasma Entry and Transport in the Plasma Sheet
Team leader: Simon Wing (US)

The Physical Mechanisms of AGN Feedback
Team leader: Michael W. Wise (NL)

Visiting Scientists

Individual Scientists are invited for extended periods to work on scientific subjects at the forefront in areas of interest to ISSI. The results of this research are to be published as books or in major scientific journals, with appropriate acknowledgement to ISSI.

Following scientist worked at ISSI in the course of the fifteenth business year:

Felix Aharonian, High Energy Astrophysics, Max Planck Institute Heidelberg, Germany, 28.2.-14.3.2010.

Ekkehard Kührt, DLR, Germany, 2.6.-25.09.2009.

Bernd Heber, Christian Albrecht University Kiel, Germany, 1.-12.12.2009 and 1.-17.4.2010.

Ingrid Mann, Kobe University, Japan, 27.7.-22.9.2009.

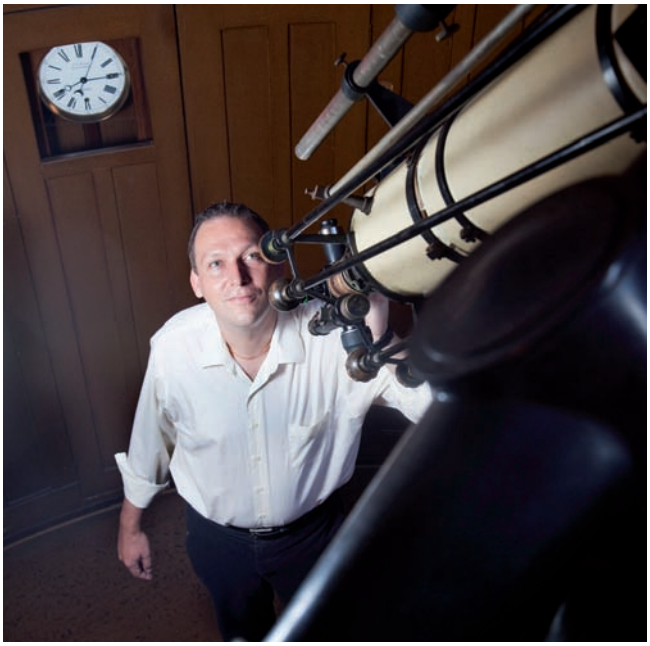
Fulvio Melia, Department of Physics and Astronomy, University of Arizona, USA, 8.11.-7.12.2009.

Götz Paschmann, Max Planck Institute for Extraterrestrial Physics, Garching, Germany, 15.10.-1.11.2009.

Mauro Spagnuolo, Departamento de Ciencias Geologicas, University of Buenos Aires, Argentina, 8.-11.10. and 19.-30.10.2009.

Emiliya Yordanova, Swedish Institute for Space Physics, Uppsala, Sweden, 25.-29.1.2010.

Thomas Zurbuchen, Department of Atmospheric, Oceanic & Space Sciences College of Engineering, University of Michigan, Ann Arbor, USA, 31.7.-10.8.2009 and 1.1.-15.8.2010.



Thomas Zurbuchen is working as Professor for Space Science and Aerospace Engineering and is Associate Dean for Entrepreneurship at the University of Michigan. The picture was taken at the Sternwarte Bern (photo by Annette Boutellier).

Thomas Zurbuchen took a research sabbatical and was working in this period at ISSI as Visiting Scientist. To present his work, Thomas Zurbuchen answered a few questions about himself and the time spent at ISSI:

You took 8 months for a research sabbatical. Why have you chosen ISSI for your sabbatical?

T. Zurbuchen: To me, the International Space Science Institute in Bern offers three things that made it the ideal place for me and my family during the past few months. First, ISSI is a great place to work. I did some research with Dr. Rudolf von Steiger, a friend and colleague for many years. I have also found myself in deep discussions with Drs. Andre Balogh, Bonnet, Geiss, and Perri. But, I also found silent time allowing me to think about problems for days without any interruptions. These collaborations and science discussions, together with sufficient thinking time, helped me to learn a great deal. Second, ISSI provides a great place to connect. I participated in multiple working groups and team meetings and helped organize one workshop during my time here. Many of my best colleagues and friends from all over the

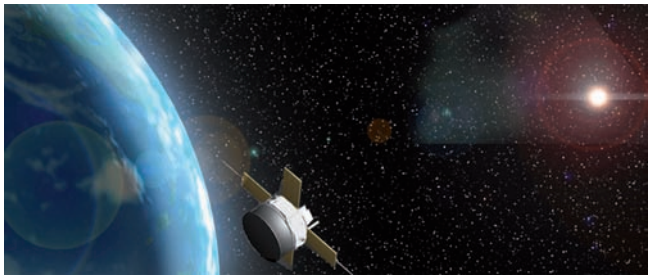
world stopped by here during the past month, often without knowing that I was actually here. Third, ISSI is a great place to live. I moved here with my family and found the most welcoming place I could imagine. My children visited a Swiss school, entering with no German language skills and are now reading German books. My family enjoyed skiing, the many sights that surrounded them, visiting the great museums and concerts in and around Bern, and swimming in the Aare river.

On which projects did you work during your stay at ISSI?

T. Zurbuchen: I worked on a variety of projects. During the first couple of months, I spent quite a lot of time editing part of the Encyclopedia of Aerospace Engineering, which is going to come out shortly. But, I also spent a lot of time focusing on solar wind data, together with Rudolf von Steiger and other colleagues at the University of Michigan and elsewhere. Together with my colleagues, I wrote papers that report on the significant cooling and other changes of the corona documented by Ulysses during its nearly 19 years of successful measurements. We also published new results based on ACE data about the relation of filament material in coronal mass ejections, and the heating of such ejections near the Sun.

How ISSI has contributed to your work?

T. Zurbuchen: ISSI has offered ample time and opportunity to think up new ideas and to finish things that have been waiting at the 90% stage for a while. For example, my research group in Michigan was very happy about my ability to focus on a paper and turn a draft around in less than 24 hours – the time-shift of 6 hours allows one to perform miracles! Yet to me, the time to think has been the most valuable. I had time to focus on the strategic direction my research should take, but also on science puzzles that have escaped a resolution until now.
The friendly and welcoming environment in and around ISSI is critical for this as well. I loved that I did not have to spend time on things like computers, networks, or even apartment details. The ISSI staff was tremendously helpful and outperformed any expectation I had before coming here.



A sketch of the Advanced Composition Explorer (ACE) which explores the heliospheric signatures of the active solar atmosphere. This Explorer mission was launched in 1997 and has enough propellant on board to maintain an orbit at L1 until ~2024. Thomas Zurbuchen is one of the Co-Investigators of this mission.
(Image Credit: T. Zurbuchen, ACE, NASA)

From your point of view, what are the key words that describe the International Space Science Institute?

T. Zurbuchen: ISSI for me stands for international collaboration, professionalism, friendliness and friendship in the pursuit of breakthrough space science. To my family, ISSI and its environment have become a home away from home. My 8 year old already told me he is going to do his first sabbatical here.

Events and ISSI in the media at a glance

Photo showing Simon Aegerter, Chairman of ISSI Board of Trustees and A.F. Andreyew ,Vice President of the Russian Academy of Science (right) signing the agreement concerning the future collaboration between ISSI and the Russian Academy of Sciences on 1st July 2010. (Image Credit: IKI RSSI)

Events

1 July 2009: Pro ISSI talk on "Entdeckung neuer Welten" by Francesco Pepe.

20 October 2009: Seminar on "Geology on Mars as on Earth?" by Angelo Pio Rossi, ISSI Post Doc Scientist.

29 and 30 October 2009: Meeting of the Science Committee.

30 October 2009: Pro ISSI Talk "the Origin of the Earth Magnetic Field" by Emmanuel Dormy.

6 November 2009: Meeting of the Board of Trustees and the ISSI Board Dinner.

4 December 2009: Seminar on "Black Hole Horizons" by Fulvio Melia, ISSI Visiting Scientist, Department of Physics and Astronomy, University of Arizona, USA.

24 March 2010: Pro ISSI talk on "Klimawandel: Gefahr oder Chance?" by Thomas Stocker.

7-9 June 2010: Meeting of the Science Committee.

10 June 2010: Pro ISSI talk on "Spaceship Earth" by Roger-Maurice Bonnet.

11 June 2010: Meeting of the Board of Trustees.

1 July 2010: Signing the agreement between ISSI and representatives of the Russian Academy of Sciences in Moscow, Russia.

ISSI in the media

Article "Der Reiz des Visionären" by Walter Kern, Clarity, Das KPMG Magazin für Wirtschaft und Gesellschaft, p. 70, 2009.

Article "Das Schweizer Sonnenwindexperiment auf dem Mond" by Simon Koechlin (SDA), 20 Minuten, 9 July 2009.

Radio Feature "Der wahre Held der Mondlandung", Swiss Radio DRS 1/DRS 4, Echo der Zeit, 19 July 2009.

Article "Der Erdverbundene" by Esther Banz, die Wochenzeitung, 16 July 2009.

Interview with the title "Weltraumforschung ist meistens Teamwork" with J. Geiss, Der Bund, p. 2/3, 18 July 2009.

Article "Auch Schweizer Technologie war bei der Mondlandung dabei", Freiburger Nachrichten, 18 July 2009.

Article "Apollo, une révolution scientifique" by Ariel Herbez, Le Temps, 20 July 2009.

TV Report "Mondlandung: Schweiz mit an Bord" including an interview with J. Geiss, Tagesschau/News, Swiss Television, 20 July 2009.

Article "Sciences. Une belle mission de découvertes" by Elisabeth Gordon, L'Hebdo, Nr. 27, 2009.

Article "Die kleine Schweiz im weiten All", p. 21/22, Magazine Via, October 2009.

Interview with the title "L'Univers comme nous ne l'avions jamais vu" with R.M. Bonnet, Le Figaro, 6 February 2010.

Article "Anomale Anomalie. Softwareschwächen könnten unerklärliche Abweichungen verursachen" by Maike Pollmann, Spektrum, 12 March 2010.

Documentary Film "Star Story" including an interview with R.M. Bonnet, Euronews TV, 2 April 2010.

TV Discussion on "Générations Nuit des étoiles" with R.M. Bonnet, Table ronde avec Alain Cirou, Ciel et Espace, Universcience TV, April 2010.

Staff and students at the Summer School Alpbach 2009

ISSI and the Alpbach Summer School

For several years, ISSI has been associated with the Summer School Alpbach, Austria, held annually since 1975, where 60 students from Europe, selected by their national space agencies or universities gather to learn about a specifically chosen space science topic. The founder and Director (to 2009) of the summer school is Prof. Johannes Ortner, a member of ISSI's Board of Trustees. The summer school is organised by the Österreichische Forschungsförderungsgesellschaft (FFG); ISSI is an official sponsor of the summer school and has contributed in many ways to its organisation and support. The summer school lasts two weeks; during this time the students, organised in four competitive teams, define the scientific objectives of a space mission and carry out a design study which is then presented to an international jury of distinguished space scientists for evaluation. The students work during the summer school is supported by a staff of leading scientists and engineers as lecturers and tutors.

For the Summer School Alpbach in 2009, the topic chosen was: "Exoplanets: Discovering and Characterizing Earth Type Planets". The increasing number of extra-solar planets and the likelihood of Earth-like objects among them have justified a closer look at the challenges that go beyond the discovery of such objects and aim at providing an insight into their nature and environment. ISSI staff involved in the 2009 summer school were Roger-Maurice Bonnet, as Chairman of the Jury, André Balogh as Head Tutor, and Silvia Wenger as Administrative Assistant; in addition, ISSI funded the participation of an additional tutor, Helen O'Brien.

As in previous years, the four student teams proposed innovative mission concepts, this time exploiting the capabilities of four different types of space-based telescopes, to detect spectral features of the exoplanets that would allow drawing conclusions about their possible atmosphere and even the presence of water vapour. Also, for the first time, fifteen of the best students were invited for a week in November to follow up the work done at the summer school and refine one of the projects proposed in Alpbach. This post-Alpbach event took place at the Institut für Weltraumforschung in Graz, Austria, supported by ESA's Education Office and by some of tutors from the summer school, including André Balogh. This refined project proposal, based on using a large telescope in the same orbit as ESA's Herschel telescope, would use photopolarimetry and advanced coronagraphic techniques to achieve the required performance. The students' description of this project has been accepted for publication in the journal Experimental Astronomy.

Staff Activities

Listed are activities in which ISSI staff scientists participated between 1 July 2009 and 30 June 2010. This includes presentations given, meetings attended, honours received, and chairmanships held.

Presentations

1-2 July 2009 – R.M. Bonnet: L'Europe et la conquète spatiale, Cycle de conférences à l'Observatoire de Besançon dans le cadre de l'Année Mondiale de l'Astronomie 2009 – AMA09, Besançon, France.

27-31 July 2009 – R.M. Bonnet: Chair of the Jury, Summer School Alpbach 2009, Exoplanets: Discovering and Characterizing Earth Type Planets, Alpbach, Austria.

16 August 2009 – J. Geiss: Die Apollo-Mondlandungen vor 40 Jahren, Festival Schloss Holligen, Bern, Switzerland.

23 August 2009 – R. von Steiger: Der Mond und unser Weltbild, Festival Schloss Holligen, Bern, Switzerland.

25-26 September 2009 – R.M. Bonnet: Le programme de l'agence spatiale européenne depuis 1969, Space Days 2009, 40 years in space: from the moon landings to today's space missions, EPFL and Comptoir Suisse, Lausanne, Switzerland.

25 September 2009 – L. Bengtsson: Temperature trends in the tropical troposphere, Max-Planck-Institut für Meteorologie, Hamburg, Germany.

25 September 2009 – J. Geiss: The first Apollo Experiment on the Moon: The Swiss Solar Wind 'Sail', 4th EPFL Space Research Day, EPFL, Lausanne, Switzerland.

26 September 2009 – J. Geiss: The first Apollo Experiment on the Moon: The Swiss Solar Wind 'Sail'. Space Days 2009: 40 Years in Space, from the Moon Landings to Today's Space Missions, Schweizerische Raumfahrtvereinigung, Space Center, EPFL, Lausanne, Switzerland.

30 September 2009 – L. Bengtsson: Why is the climate warming so irregular?, European Meteorological Society, Toulouse, France.

7 October 2009 – R.M. Bonnet: Lecturing at Ecole Française de Berne, Bern, Switzerland.

19 October 2009 – A. Balogh: BepiColombo magnetospheric and multi-point measurements, ESA BepiColombo Science Review meeting, Paris, France.

19 October 2009 – L. Bengtsson: The Status of climate change research, Royal Swedish Academy of Sciences, Energy 2050, Stockholm, Sweden.

21 October 2009 – R.M. Bonnet: L'Humanité peut-elle survivre 1000 siècles? La Grande Société de Berne, Bern, Switzerland.

6 November 2009 – S. Koumoutsaris: Examination of the Earth's Radiation budget using Satellite Observations and Modeling Data, Seminar at the ISSI Board of Trustees Meeting, Bern, Switzerland.

6 November 2009 – A.P. Rossi: Mars: Sedimentary environments from spacecraft?, Seminar at the ISSI Board of Trustees Meeting, Bern, Switzerland.

6 November 2009 – S. Perri: Turbulence in the Heliosphere, Seminar at the ISSI Board of Trustees Meeting, Bern, Switzerland.

9 November 2009 – J. Geiss: D and 3He in the Protosolar Cloud, International Astronomical Union Symposium 268, Light Elements in the Universe, Geneva, Switzerland

11 November 2009 – R.M. Bonnet: From ESRO to ESA, Symposium in Memory of Harry Elliot, Imperial College, London, United Kingdom.

11 November 2009 – J. Geiss: The Apollo Landings on the Moon, what did we learn, Colloquium "Deutérium, hélium, lithium: du big bang à la civilization contemporaine", University of Geneva, Switzerland.

12 November 2009 – R.M. Bonnet: Quel futur pour la science spatiale plus de 50 ans après Spoutnik?, Association Aéronautique et Astronautique de France et APSAT Conseil, Mandelieu et Cannes, France.

13 November 2009 – R.M. Bonnet: Hubble, 20 ans dans l'Espace, Explor'espace 2009, Cannes Centre des Congrès, Cannes, France.

18 November 2009 – L. Bengtsson: Dynamicists versus numerical modellers: A growing divide?, The Advent of Numerical Weather Prediction, University of Reading, UK.

1-2 December 2009 – R.M. Bonnet: Survivre à 1000 siècles, Conférence débat, Cité de l'Espace, Toulouse, France.

14-18 December 2009 – R. von Steiger: Polar Coronal Holes During the Past Solar Cycle – Ulysses Observations, AGU Fall Meeting, San Francisco, USA.

18 December 2009 – S. Perri and A. Balogh: Characterization of short time transitions in the solar wind, Poster Presentation, AGU Fall meeting, San Francisco, USA.

6-9 January 2010 – R.M. Bonnet: Closing speech of IAU Symposium 269, "Galileo's Medicean Moons: their Impact on 400 years of Discovery", Padova, Italy.

14 January 2010 – R.M. Bonnet: Space Astronomy Today, UNESCO Paris, France.

22 January 2010 – L. Bengtsson: Climate Change Issues - Recent progress and remaining challenges: Why is the climate warming so irregular?, Uppsala University, Sweden.

28 January 2010 – R.M. Bonnet: Space Science in the 21st Century, Center for Space Science and Applied Research, Chinese Academy of Sciences, Beijing, China.

25-29 January 2010 – R. von Steiger: Solar wind charge states and coronal temperatures, invited talk at the ISSI Workshop on Coronal Heating and Solar Wind Acceleration, Bern, Switzerland.

1 March 2010 – A. Balogh: Magnetic fields in the solar system, ISSI Workshop on Large-Scale Magnetic Fields in the Universe, Bern, Switzerland.

2 March 2010 – J. Geiss: Die Apollo-Mondlandungen: Sonnenwindsegel-Experimente aus Bern, sowie Erkenntnisse zu Entstehung und Evolution des Mondes, „Abenteuer Weltraum" Vortragsreihe der Schweizerischen Raumfahrt-Vereinigung (SRV), University of Bern, Switzerland.

10 March 2010 – A.P. Rossi: Alien (but somewhat familiar) Geology on Mars, Seminar at the Osservatiorio Geofisico Sperimentale (OGS), Trieste, Italy.

12 March 2010 – A. Balogh: Assessment of the stationarity of magnetic field fluctuations in the solar wind, Royal Astronomical Society Meeting on "Waves and Turbulence in Solar-Terrestrial Plasmas", London, UK.

14 April 2010 – A. Balogh: The magnetic field in the heliosphere, ISSI Workshop on "Cosmic Rays in the Heliosphere II", Bern, Switzerland.

16 April 2010 – L. Bengtsson: Why is climate warming proceeding so slowly and why is it so irregular?, Swedish Meteorological and Hydrological Institute, Norrköping, Sweden.

2-7 May 2010 – R. von Steiger: The structure of the outer heliosphere during the unusual present solar minimum, EGU General Assembly, Vienna, Austria.

5 May 2010 – A. Balogh: Magnetic sector structure, Corotating Interaction Regions and heliospheric magnetic topology from Solar Cycle 22 to 23, General Assembly of the European Geosciences Union, Vienna, Austria.

6 May 2010 – R.M. Bonnet: L'Europe: modèle futur de gouvernance mondiale? Marseille, Institut Culturel Italien, Comité Européen, France.

7 May 2010 – S. Perri and A. Balogh: Validity of stationarity in solar wind flows, EGU General Assembly, Vienna, Austria.

1 June 2010 – A.P. Rossi: Introduction to Mars Geology, Seminar at the University of Chieti, Geoscience Department, Chieti, Italy.

7 June 2010 – S. Koumoutsaris: Earth Science Activities, Seminar at the ISSI Science Committee Meeting, Bern Switzerland.

10 June 2010 – R.M.Bonnet: Spaceship Earth, Pro ISSI lecture, Bern, Switzerland.

22 June 2010 – R.M. Bonnet: Dernières nouvelles du ciel, du Soleil et de la Terre, Centre Culturel, Laragne, France.

Meetings

20-24 July 2009 – A.P. Rossi: Teaching at the ESA China Mars Advanced School, Jiaxing, Zhejiang Province, China.

23–29 August 2009 – A. Balogh: 11th IAGA Scientific Assembly, Sopron, Hungary.

4 September 2009 – R.M. Bonnet: Keynote Speech for Prof. Reimar Lüst, 25th anniversary of nomination of R. Lüst as ESA Director General, Paris, France.

9-13 October 2009 – R.M. Bonnet: Space for Sustainable Peace and Progress, 60th International Astronautical Congress (IAC), Daejeon, Korea.

12-14 October 2009 – A.P. Rossi: Geological Mapping of Mars: A workshop on new concepts and tools, Il Ciocco, Italy.

14-17 October 2009 – R.M. Bonnet: Board of Trustees of the Associated Universities Inc. (AUI), Socorro, USA.

19 October 2009 – A. Balogh: ESA BepiColombo Science Review meeting, Paris, France.

Staff Activities

Prof. Yongxiang Lu, President of Chinese Academy of Sciences (left) hands over the Gold Medal and the certification of the Award for International Scientific Cooperation of the Chinese Academy of Sciences to Prof. Roger-Maurice Bonnet. (Image Credit: Xinhua Photo)

19-20 October 2009 – L. Bengtsson: Energy 2050, Symposium organized by the Royal Swedish Academy of Sciences in association with the Swedish EU presidency in autumn 2009, Stockholm, Sweden.

23 October 2009 – A. Balogh: 34th Summer School Alpbach 1st Programme Committee Meeting, Vienna, Austria.

26-29 October 2009 – A. Balogh: Bepi-Colombo Science Working Team meeting, Blois, France.

2-4 December 2009 – A. Balogh: AERES Visiting Committee CESR/DTP/LATT, Toulouse, France.

14-18 December 2009 – S. Perri: Participation in AGU Fall meeting, San Francisco, USA.

6-9 January 2010 – R.M. Bonnet: 400th Anniversary Discovery Galileo's Medicean Moons, IAU Symposium S269, Padova, Italy.

9-10 January 2010 – R.M.Bonnet: Closing ceremony and colloquim of the International Year of Astronomy, Padova, Italy.

14-15 January 2010 – R.M. Bonnet: "The Contribution of Space Science to Astronomy", COSPAR-UNESCO-IAU Colloquim, UNESCO Paris, France.

21-22 January 2010 – A. Balogh and R.M. Bonnet: 2nd Programme Committee Meeting, Summer School 2010, Vienna, Austria.

26-29 January 2010 – R.M. Bonnet, International Cooperation Gold Medal and related meetings, Chinese Academy of Sciences, Beijing, China.

17-18 February 2010 – R.M. Bonnet: Board of Trustees of the Associated Universities Inc. (AUI), Washington DC, USA.

1-5 March 2010 – A. Balogh: ISSI Workshop on Large-Scale Magnetic Fields in the Universe, Bern, Switzerland.

18-24 March 2010 – A. Balogh: Scientific cooperation meeting in RMKI/KFKI (Ulysses/Cluster, Dr. G. Erdõs, Dr. M. Tátrallyay), Budapest, Hungary.

22-25 March 2010 – R.M. Bonnet: COSPAR Bureau and CSAC meeting, Paris, France.

22-24 March 2010 – R. von Steiger: Cospar Science Advisory Committee and the Cospar 2010 Program Committee, Paris, France.

22-26 March 2010 – S. Koumoutsaris: Participation at the ISSI Workshop on the Earth's Cryosphere and Sea Level Change, ISSI, Bern, Switzerland.

12-16 April 2010 – A. Balogh: ISSI Workshop Cosmic Rays in the Heliosphere II, Bern, Switzerland.

19-23 April 2010 – S. Perri: Dispersive cascade and dissipation in collisionless space plasma turbulence – Observations and simulations, ISSI Team led by E. Yordanova, International Space Science Institute, Bern, Switzerland.

27-28 April 2010 – A. Balogh: Preparatory meeting on Workshops on Magnetospheres & Cosmic Plasmas, Bern, Switzerland.

29-30 April 2010 – R.M Bonnet: COSPAR 2012 Scientific Assembly preparation, Mysore, India.

2-7 May 2010 – A. Balogh: General Assembly of the European Geosciences Union EGU, Vienna, Austria.

3-7 May 2010 – S. Perri: General Assembly of the European Geosciences Union EGU, Vienna, Austria.

7 May 2010 – R. von Steiger: Editorial Committee of Space Science Reviews, Vienna, Austria.

10-12 May 2010 – L. Bengtsson: Crafoord Days 2010, Stockholm and Lund University, Sweden.

12 May 2010 – R.M. Bonnet and S. Koumoutsaris: ISSI/ESRIN Earth Science Progress Meeting, Frascati, Italy.

18 May 2010 – A. Balogh and S. Koumoutsaris: Summer School Alpbach, meeting of tutors, Austrian Research Promotion Agency (FFG), Vienna, Austria.

26-28 May 2010 – A.P. Rossi: Italian Astrobiology Meeting, Duino, Trieste, Italy.

Teaching

20–31 July 2009 – A. Balogh: Head Tutor, 33rd Alpbach Summer School, "Exoplanets: Discovering and characterizing Earth-type planets", Alpbach, Austria.

24–27 November 2009 – A. Balogh: Head Tutor, Post-Alpbach School – Institut für Weltraumforschung Österreichische Akademie der Wissenschaften, Graz, Austria.

Honours

L. Bengtsson: Honorary Member of Royal Meteorological Society, Reading, UK, 1 July 2009.

L. Bengtsson: Silver Medal of the European Meteorological Society (EMS), Berlin, Germany, 30 September 2009.

R.M. Bonnet: Van Karman Award 2009 of the International Academy of Astronautics, Daejeon, South Korea, 11 October 2009.

R.M. Bonnet: The 2009 International Scientific Cooperation Award and Gold Medal of the Chinese Academy of Sciences (CAS), Beijing, China, 25-29 January 2010.

Chairman- and Memberships

L. Bengtsson:
Member of Swedish Academy of Sciences.
Member of the Scientific Adivisory Committee of the Bjerknes Centre, Bergen, Sweden.
Chairman of the Scientific Advisory Committee of the Nansen Centre (NERSC), Bergen, Sweden.
Chairman of the Italian Climate Program Advisory Committee.

R.M. Bonnet:
President of the Jury of the Alpbach Summer School 2009.
President of COSPAR Committee on Space Research.
Honorary Committee for the Global Lunar Conference, IAA, Beijing, China, 31 May-3 June 2010.

M. Falanga:
Member of INTEGRAL Users Group (IUG) from 2010-2012, ESA.
Member of the organizing Committee, International Astrophysics Conference, Fast X-ray timing and spectroscopy at extreme count rates, Champéry, Switzerland.

Picture showing the Panel Discussion on "Mission Mond - Eine Reise mit Apollo 14" at the Verkehrshaus Luzern with (from left to right) Edgar Mitchell, (NASA Apollo-14 Astronaut: Sixth Man on the Moon), Lukas Viglietti (Swiss Apollo Association and organizer), Johannes Geiss (ISSI), and Claude Nicollier (Shuttle Astronaut ESA, EPFL Lausanne and member of the ISSI Board of Trustees). (photo by Daniel Sekler)

Member of the Editorial Board for Advances in Astronomy Journal.
Member of the Chandra AO12 Time Allocation Committee panel ``SNR, PWN and isolated NS'', NASA/CXC, Boston, USA, 22-24 June 2010.

Miscellaneous

R. von Steiger: Performance with the Trio "HUGO in the sky (no diamonds)" – approaching scientific data with electronic sounds and freely improvised music, Natural History Museum, Bern, Switzerland, 11 November 2009.

J. Geiss: Mission Mond - Eine Reise mit Apollo 14, Panel Discussion with Edgar Mitchell, Johannes Geiss, Claude Nicollier and Lukas Viglietti (Moderator), Swiss Apollo Association (SAA), Verkehrshaus Luzern, Switzerland, 26 February 2010.

A.P. Rossi: Research Visit at Jacobs University, Bremen, Germany, since 1 May 2010.

Staff Publications

Listed are all papers written or co-authored by ISSI staff that were submitted or that appeared between 1 July 2009 and 30 June 2010.

Balogh, A., D. Breuer, U. Christensen, and K.-H. Glassmeier, Planetary Magnetism – Foreword, Space Sci. Rev., 152, 1-4, 1-3, 2010.

Balogh, A., Planetary Magnetic Field Measurements: Missions and Instrumentation, Space Sci. Rev., 152, 1-4, 23-97, 2010.

Baumjohann, W., A. Matsuoka, W. Magnes, K.-H. Glassmeier, R. Nakamura, H. Biernat, M. Delva, K. Schwingenschuh, T. Zhang, H.-U. Auster, K.-H. Fornacon, I. Richter, A. Balogh, P. Cargill, C. Carr, M. Dougherty, T.S. Horbury, E.A. Lucek, F. Tohyama, T. Takahashi, M. Tanaka, T. Nagai, H. Tsunakawa, M. Matsushima, H. Kawano, A. Yoshikawa, H. Shibuya, T. Nakagawa, M. Hoshino, Y. Tanaka, R. Kataoka, B.J. Anderson, C.T. Russell, U. Motschmann, and M. Shinohara, Magnetic field investigation of Mercury's magnetosphere and the inner heliosphere by MMO/MGF, Planet. Space Sci., 58, 1-2, 279-286, 2010.

Bebesi, Z., K. Szegö, A. Balogh, N. Krupp, G. Erdõs, A.M. Rymer, G.R. Lewis, W.S. Kurth, D.T. Young, M.K. Dougherty, Slow-mode shock candidate in the Jovian magnetosheath, Planet. Space Sci., 58, 5, 807-813, 2010.

Bengtsson, L., K.I. Hodges and N. Keenlyside, Will extratropical storms intensify in a warmer climate? J. of Climate, 2276-2301, 2009.

Bengtsson, L., The global atmospheric water cycle, Environ. Res. Lett., 5, 025001, 2010.

Bengtsson, L., Climate Change as a Political Problem, in: Die Klimazwiebel, URL: http://klimazwiebel.blogspot.com/2010/02/lennart-bengtsson-climate-change-as.html, 16 August 2010.

Bengtsson, L., et al., On the Evaluation of Temperature Trends in the Tropical Troposphere, Clim. Dyn., in press, 2010.

Bonnet, R.M., The IAA and COSPAR, Commemoration of the 50th anniversary of the International Academy of Astronautics, 2010.

Bonnet, R.M., Probing the Nature of Gravity, Foreword, Space Sci. Rev., 148, 1, 2009.

Bonnet, R.M., Espace et Astronomie, in Audouze, J. (Ed.), Le Ciel à Découvert, Editions du CNRS, 2010.

Bonnet, R.M., Les Ballons et la Physique Solaire, in Sanfourche, J.P. (Ed.), Les Ballons et la Recherche Spatiale, IFHE Publication, 2010.

Bozzo, E., L. Stella, C. Ferrigno, A. Giunta, M. Falanga, et al., The supergiant fast X-ray transients XTE J1739-302 and IGR J08408-4503 in quiescence with XMM-Newton, Astron. Astrophys., in press, 2010.

Bozzo, E., C. Ferrigno, M. Falanga, S. Campana, J.A. Kennea, A. Papitto, Swift monitoring of the new accreting millisecond X-ray pulsar IGR J17511-3057 in outburst, Astron. Astrophys., 509, 3, 2010.

Bozzo, E., C. Ferrigno, E. Kuulkers, M. Falanga, J. Chenevez, et al., Swift follow-up of the newly discovered burster millisecond pulsar IGR J17511-3057, Astron. Tel., 2198, 2009.

Bozzo, E., L. Stella, G. Israel, M. Falanga, S. Campana, The First X-ray Eclipse of IGR J16479-4514?, Simbol-X: Focusing on the hard X-ray Universe: Proceedings of the 2nd International Simbol-X Symposium, AIP Conference Proceedings, 1126, 319-321, 2009.

Carbone, V., S. Perri, E. Yordanova, P. Veltri, R. Bruno, Y. Khotyaintsev, and M. André, Sign-Singularity of the Reduced Magnetic Helicity in the Solar Wind Plasma, Phys. Rev. Lett., 104, 181101, 2010.

D'Amicis, R., R. Bruno, G. Pallocchia, B. Bavassano, D. Telloni, V. Carbone, and A. Balogh, Radial Evolution of Solar Wind Turbulence during Earth and Ulysses Alignment of 2007 August, Astrophys. J., 717, 1, 474-480, 2010.

De Martino, D., J.M. Bonnet-Bidaud, M. Falanga, M. Mouchet, and C. Motch, XMM-Newton discovery of pulsations from IGR J21237+4218=V2069 Cyg, Astron. Tel., 2089, 2009.

De Martino, D., G. Anzolin, J.-M. Bonnet-Bidaud, M. Falanga, G. Matt, M. Mouchet, K. Mukai, N. Masetti, Exploring the Hard and Soft X-ray Emission of Magnetic Cataclysmic Variables, Simbol-X: Focusing on the hard X-ray Universe: Proceedings of the 2nd International Simbol-X Symposium, AIP Conference Proc., 1126, 210-212, 2009.

De Martino, D., M. Falanga, J.-M. Bonnet-Bidaud, T. Belloni, M. Mouchet, N. Masetti, I. Andruchow, S.A. Cellone, K. Mukai, and G. Matt, The intriguing nature of the high-energy gamma ray source XSS J12270-4859, Astron. Astrophys., 515, 25, 2010.

Ferrigno, C., E. Bozzo, M. Falanga, et al., INTEGRAL, Swift, and RXTE observations of the 518 Hz accreting transient pulsar Swift J1749.4-2807, Astron. Astrophys., in press, 2010.

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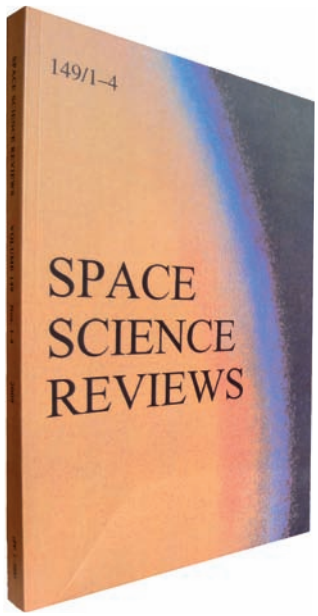

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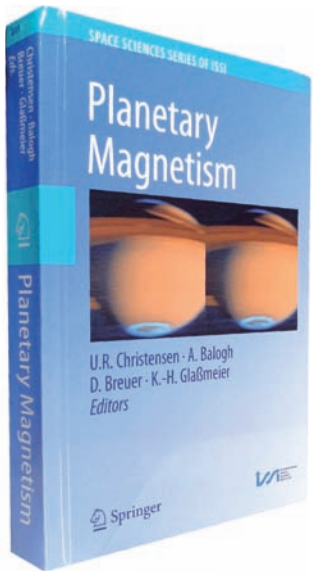

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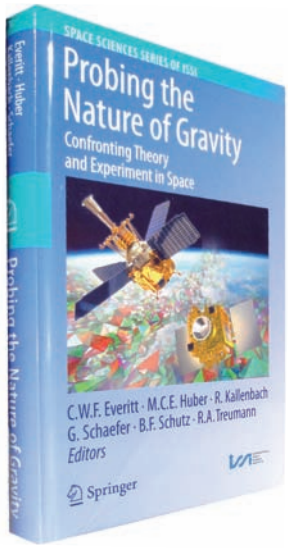

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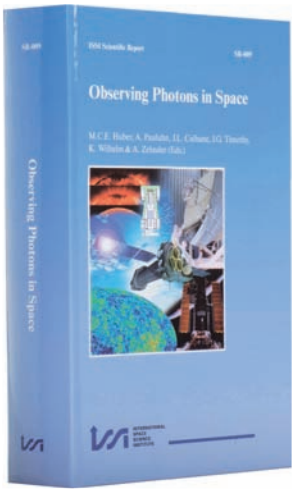

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