



INTERNATIONAL
SPACE
SCIENCE
INSTITUTE



Annual Report 2000-2001

From the President of the Board of Trustees

In its sixth year of operation, ISSI celebrated its official fifth anniversary with a remarkable event on 30 November 2000. The sixth year could be characterised as being dense, extremely varied in terms of activities, and once again successful.

This success continues to be based on three cornerstones:

- the competence and dedication of the Directorate and its staff,
- the attractiveness of the subjects selected by teams and defined for workshops by ISSI Directors, and
- the various publications on the results and findings of the work carried out at ISSI.

It bears pointing out again that not every institute enjoys Directors who, in addition to taking care of day-to-day activities and participating personally in workshops, are active politically to ensure the continued support of the principal sponsors. And not every institute has scientists who involve themselves in the routine work as well as scientific activities of the institute, ensuring that high-quality events and publications result. Nor does every institute have the dedicated programme, administrative, editorial, systems engineering and secretarial staff that ISSI has and provides for its visitors. The Board of Trustees recognises and appreciates this dedication by the Directors and staff members.

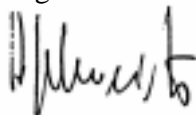
In spite of its success, ISSI will see some changes in the coming year or two. The activities of the search committee of the Board of Trustees, established in 1998 to address the task of finding successors for its first Directors, are coming to an end. Having found a successor for Professor Hultqvist some time ago, the committee is expected to present one to two candidates as a successor to Professor Geiss soon.

The Board of Trustees, at its meeting of October 1999, decided that it would be desirable to change the procedure for electing Board members set out in the Public Deed of the Foundation. The desire to change this is based on the Board's wish to directly involve the principal international sponsoring agencies in the process, in place of the Swiss Association Pro-ISSI.

A proposal for the necessary changes to the Public Deed was discussed by the Board at its meeting in November 2000. It was considered too complicated. A new version, taking into consideration the comments received, has now been drafted and distributed to the members, the Executive Director of the institute and the President of the Association Pro-ISSI. This version has been widely accepted and was approved at the Board meeting on 15 June 2001. As the changes are minor and clearly formulated, it can be expected that both the Foundation Supervising Agency and the Association Pro-ISSI will approve its introduction.

What continues without a change is the healthy financial situation of the institute. The Directorate and staff, based on their experience gained over the last six years, have ISSI's financial affairs under control, and a stable income situation has been established.

It is a great pleasure for the President to note that there has been one extraordinary event in this financial year. The Albert Einstein Society of Berne awarded the Albert Einstein Medal to Professor Johannes Geiss on 6 June. We are honoured that ISSI's Executive Director has received this award, and we congratulate Professor Geiss most sincerely.



H. Schneiter

Who's Who

ISSI BOARD OF TRUSTEES

President:

H. Schneider, Industrial Ombudsman for ESA, Zurich

Members:

- H. Balsiger, University of Bern
R. M. Bonnet, Director, Scientific Programme, ESA, Paris
P. Creola, Swiss Space Office, Bern
A. A. Galeev, Director, IKI, Moscow
B. Hauck, President, Council of Swiss Scientific Academies, Bern
R. Lüst, Max-Planck-Institut für Meteorologie, Hamburg
C. Nicollier, ESA, Houston, Texas
H. Matsuo, Director-General, ISAS
H. Ortner, Chairman, Board of Trustees, International Space University, Strasbourg
B. Vittoz, Swiss Federal Institute of Technology, Lausanne
M. J. Waldis, Attorney at Law (acting on behalf of Contraves Space AG)
E. Weiler, Associate Administrator of Space Science, NASA (non-voting liaison member)
U. Würzler, Vice Rector, University of Bern

Secretary:

H. Schläpfer, Contraves Space AG, Zurich

ASSOCIATION PRO-ISSI

Board:

- H. Debrunner, University of Bern (President)
H. Schläpfer, Contraves Space AG, Zurich (Treasurer)
H. Balsiger, University of Bern
B. Hauck, University of Lausanne
H. Mey, Ascom AG
H. Schneider, Industrial Ombudsman for ESA, Zurich
G. A. Tammann, University of Basel

Note: Status during the sixth business year; for a current list, please see the ISSI homepage.

ISSI DIRECTORS AND STAFF

- Johannes Geiss, Executive Director
Götz Paschmann, Director
Rudolf von Steiger, Director
Kathrin Altwegg, Consultant
Stephan Graf, Junior Scientist
Stein Håland, Junior Scientist
Gabriela Indermühle, Secretary
Reinald Kallenbach, Staff Scientist
Vittorio Manno, Institute Programme Manager
Anuschka Pauluhn, Junior Scientist
Ursula Pfander, Editorial Assistant
Xavier Schneider, Computer Engineer and System Administrator
Diane Taylor, Administrator / Public Affairs Specialist
Silvia Wenger, Secretary

ISSI SCIENCE COMMITTEE

Chairman:

- D. J. Southwood, Imperial College, London (U.K.) until Spring 2001
R. Pellinen, Finnish Meteorological Institute, Helsinki (FI) after Spring 2001

Members:

- M. Banaszekiewicz, Space Research Centre, Warsaw (PL)
S. Bauer, University of Graz (A)
A. Coradini, Istituto di Astrofisica Spaziale, CNR, Frascati (I)
L. A. Fisk, University of Michigan, Ann Arbor (U.S.)
A. A. Galeev, IKI, Moscow (Russia)
G. Haerendel, Max-Planck-Institut für extraterrestrische Physik, Garching / International University Bremen (D)
R. Lallement, Service d'Aéronomie, CNRS, Verrières-le-Buisson (F)
S. Leutwyler, University of Bern (CH)
J. Linsky, University of Colorado, Boulder (U.S.)
G. A. Tammann, University of Basel (CH)
T. Terasawa, University of Tokyo (Japan)
H. Völk, Max-Planck-Institut für Kernphysik, Heidelberg (D)

From the Directors: The Sixth Year

The sixth year of the International Space Science Institute can perhaps be characterised as a year of stability and consolidation. Above all, we are very pleased with the stable funding situation from the four major funding agencies of ISSI as well as with the continued support in kind from Contraves Space AG. Over the past few years we have succeeded in renewing the initial support for several years: from the European Space Agency after a thorough review in 1998, the Swiss Confederation in 2000, the Canton and University of Bern in 1999, and the Swiss National Science Foundation in 1999, as well. This stability is the basis for a strong and well-planned programme of Workshops and International Teams addressing the central topics of Solar System science, including its boundaries both in the direction of Earth sciences and of astrophysics.

After the record-setting six Workshops in the previous year, the programme this year included only two ISSI Workshops: one on *Matter in the Universe*, clearly a topic at the astrophysical boundary of space sciences, and another on *Auroral Plasma Physics*, the third in a series leading up to the planned integrated volume on this topic. Moreover, the first of two meetings of the Working Group on *Radiometric Inter-calibration of SOHO* took place, an activity that will eventually lead to a volume in the ISSI *Scientific Report* series. Three volumes in the *Space Sciences Series of ISSI* appeared as a result of workshops in the year before: *Cosmic Rays and Earth* (Volume 10), *Solar Variability and Climate* (Volume 11), and *Chronology and Evolution of Mars* (Volume 12), one more is in press at Kluwer's to appear in late 2001: *The Astrophysics of Galactic Cosmic Rays* (Volume 13), and editorial work on two volumes is ongoing: *Auroral Plasma Physics* and *Matter in the Universe*.


Consistent with our prediction made last year in these pages, the reduction in the Workshop/Working Group branch of our programme to three major meetings with some 99 participants was compensated for by an increase in the International Teams branch. The number of active teams remained constant at 17, though, in total, some 130 team members spent more than 190 work-weeks at ISSI during the sixth year, as compared to about 120 members and some 165 work-weeks in the year before.

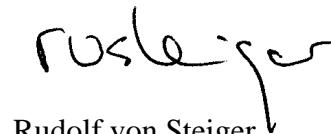
The ISSI staff remained stable during the year with three Directors (one part-time), four other scientists (one part-time), and six staff members (two part-time). Changes to the staff include the start of Anuschka Pauluhn as a junior scientist, working mainly in the field of solar physics and essentially managing the Working Group on *Radiometric Inter-calibration of SOHO*, and we are happy to welcome her to the institute. On the other hand, Stephan Graf, who worked as a junior scientist for more than two years in the field of cometary chemistry at ISSI, left us to join the cometary group at the Physikalisches Institut of the University of Bern, just next door. Our best wishes accompany him there.

Although we are pleased with the current stability of ISSI, we are well aware that this must not mean stagnation. It is now that the groundwork is being laid for future evaluations and reviews, which are expected to take place in the next year or two. We must continue to be open to all of the Solar System science community (with outreach to Earth science and astrophysics), providing them with friendly administrative support and meeting their technical needs so they can take maximum advantage of their visits from the first to the last day. We are happy

to have dedicated scientists and administrative staff who understand very well that the institute

exists, above all, for its visitors, and that ISSI must never become a routine place.


Johannes Geiss


Rudolf von Steiger

August 2001


Götz Paschmann



ISSI staff at the end of the sixth business year: (left to right) Xavier Schneider, Stephan Graf, Kathrin Altwegg, Gabriela Indermühle, Stein Håland, Ursula Pfander, Reinald Kallenbach, Anuschka Pauluhn, Rudolf von Steiger, Johannes Geiss, Götz Paschmann, Silvia Wenger, and Diane Taylor, Missing is Vittorio Manno. (Photo by Urs Lauterburg)

About ISSI

Set up in January 1995 in Bern as a foundation under Swiss law, the International Space Science Institute (ISSI) is governed by three bodies: the Board of Trustees, the Science Committee and the Directorate. A fourth important body, the Association Pro-ISSI, promotes the idea of ISSI, especially within Switzerland, and appoints the members of the Board of Trustees. A list of the members of the board of the Association Pro-ISSI is found on page 2.

ISSI is a nonprofit organisation and received tax-exempt status from the Canton of Bern in May 1995.

Governing Bodies

ISSI's Board of Trustees oversees the work of the institute, controls the budget, and appoints the Directors and members of the Science Committee. Made up of representatives of the Inter-Agency Consultative Group (IACG) member agencies, the scientific community, Swiss industry, and the Swiss government who are appointed by the Association Pro-ISSI, the Board was again presided over by Hanspeter Schneiter, now Industrial Ombudsman of the European Space Agency (ESA). The Board met twice during the sixth business year, on 30 November 2000 and 15 June 2001. One member, Professor Vittoz, retired during the year. A complete list of members, as of the November meeting, is on page 2.

The Science Committee is made up of internationally known scientists active in the fields covered by ISSI and provides guidance for the science programme by advising the Directorate of ISSI and the Board of Trustees. David J. Southwood of Imperial College in London, who has been the chairman since ISSI's inception,

resigned in Spring 2001 when he became the Director of the ESA Scientific Programme in Paris. Risto Pellinen of the Finnish Meteorological Institute, Helsinki, Finland, was elected chairman, effective immediately. Members serve three-year terms, with possible extensions of two years.

The board appointed three new members: Marek Banaszekiewicz, Space Research Centre, Warsaw, Poland; Samuel Leutwyler, University of Bern, Switzerland; and Heinrich Völk, Max-Planck-Institut für Kernphysik, Heidelberg, Germany. These scientists replaced Hans Balsiger, University of Bern, Switzerland; Annie-Chantal Levasseur-Regourd, Université de Paris, France; and Karoly Szegö, KFKI Research Institute for Particle and Nuclear Physics, Hungarian Academy of Sciences, Budapest, Hungary.

The 14 members are listed on page 2. The Science Committee met twice during the sixth business year, on 29–30 November 2000 and 14 June 2001.

Appointed by the Board of Trustees, the Directorate during the sixth year was made up of three Directors: Johannes Geiss, who serves as Executive Director, Rudolf von Steiger, and Götz Paschmann, who is at ISSI six months during the year. The Directorate takes care of the scientific, operational, and administrative direction of the institute.

Funding

ISSI receives funding from the European Space Agency (ESA), the Swiss Confederation, the Canton and University of Bern, and the Swiss National Science Foundation.

ISSI's first funding came in late 1994 when the ESA Council unanimously approved funding through 1999. The Science Programme Committee of ESA and the ESA Council voted during 1998 to extend ISSI's funding for the period 1999 to 2003.

In December 1994 the Swiss government, through its Federal Office for Education and Science (in the Federal Department of Home Affairs), approved funding for 1995 and 1996. On 9 April 1997 the Swiss Federal Council granted ISSI additional funding for 1997 to 1999. On 5 June 2000 the Federal Council approved funding for the year 2000 under Article 16 of the *Forschungsgesetz*. Beginning in 2001 (and ISSI's next business year), funding will come from the Swiss Space Office, also in the Federal Department of Home Affairs.

ISSI was granted a deficit guaranty by the Canton of Bern for its first four years. During the fourth business year, the Board and the Directorate worked to change this to a more direct form of support. The fifth business year was a transition year, with a form of fixed payment, in which the University of Bern provided the salary of one of the Directors. This arrangement continued in the sixth business year.

This business year was year two of a three-year grant from the Swiss National Science Foundation to ISSI for its programme directly related to Workshops, Working Groups, International Teams, and Visiting Scientists.

ISSI's relationship to the Inter-Agency Consultative Group (IACG) continued throughout the sixth year. Although this group – made up of the European Space Agency, the Russian Space Agency (represented by the Space Research Institute – IKI – of the Russian Academy of Sciences), the Institute of Space and Astronautical Science of Japan (ISAS), and the U.S.A.'s National Aeronautics and Space Administration (NASA) – does not provide financial support to ISSI, it does provide important scientific and political support for the institute. At its

meeting in Bern in October 1998, it established a permanent secretariat and archive at ISSI and appointed Vittorio Manno of the ISSI staff to serve as the executive secretary until 2002.

Personnel

During the sixth business year, Johannes Geiss, Rudolf von Steiger and Götz Paschmann (also of the Max-Planck-Institut für extraterrestrische Physik in Garching) led the institute.

Full-time staff were: Vittorio Manno, Institute Programme Manager; Diane Taylor, Administrator / Public Affairs Specialist; Reinald Kallenbach, Staff Scientist; Stephan Graf, Junior Scientist; Stein Håland, Junior Scientist; Anuschka Pauluhn, Junior Scientist; Xavier Schneider, Computer Engineer and System Administrator; and Gabriela Indermühle and Silvia Wenger, Secretaries. On a part-time basis, Ursula Pfander provided editorial assistance, and Kathrin Altwegg of the University of Bern continued as a consultant on cometary science.

Anuschka Pauluhn, from Germany, joined ISSI on 1 April 2001 as a junior scientist. Stephan Graf left ISSI at the end of May to join the Physikalisches Institut of the University of Bern.

Furnishings / Infrastructure

During the sixth business year, a separate cooling system was installed in the seminar room, as temperature regulation during large meetings continued to be a problem. ISSI, along with the other tenants of Hallerstrasse 6, received a new sign and a new mailbox, part of a change to provide uniform appearance and overall improvement for the building.

The institute continued to provide two two-bedroom apartments and a one-bedroom apartment for long-term visiting scientists.

ISSI staff and visitors continued to enjoy the two paintings by Ludek Pešek, *Dust Storm on Mars* and *Mars Seen from Its Moon Deimos*,

generously donated by Mrs. Beatrice Pešek after her husband's death in December 1999.

Computing Facilities

The institute's workgroup provides a heterogeneous workstation environment with a total of 40 PC, Macintosh and SUN workstations. The workgroup network is part of the university's local area network, so that its resources (e.g., the SUN, SP2 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.

Two PCs run Linux and two others have both Windows and Linux. All other PCs run Windows NT4 or 2000. Macintosh units use MacOS 9.1 and X, except an older unit that runs MacOS 8.6, and the SUNs use Solaris 2.5.1, 7, and 8.

The most important update during the sixth year was the network. On the first (main) floor every computer now has faster access to the Internet (100 Mbits per computer, instead of 10

Mbits shared by all). The seminar room is now well equipped, with 10 simultaneous connections possible. In the future, the general number of connections can be increased by adding a new switch in the server room.

The Web and ftp server of the institute, which was hosted by an NT server, has been transferred to a Linux server, thus providing better security and faster access. Some light modifications to the ISSI Web structure were made at the same time. At the end of the business year three old Power Macintoshes were replaced with three G4s running MacOS 9.1 and X.

The institute also replaced several PC laptops with new, more powerful ones. In addition, the institute updates software regularly and uses the large scientific packages (including IDL and Matlab) either locally or by connecting to the university servers.

ISSI's homepage is at www.issi.unibe.ch. Details of the Inter-Agency Consultative Group may be found at www.iacg.org.

Scientific Activities: The Sixth Year

ISSI's scientific programme continues to focus on Solar System sciences: heliospheric physics, solar-terrestrial physics, solar wind and solar processes, cometary physics and chemistry, and planetary science. Parts of the programme address topics at their limits, both in the directions of astrophysics and cosmology and of Earth sciences.

The programme is realised through **Workshops and Working Groups, International Teams, and Individual Visiting Scientists.**

The Directors, in consultation with the Science Committee and other experts, select Workshops and Working Groups. These last one week and are attended by invitation by up to 45 scientists.

International Teams are proposed by individual scientists and agreed upon by the Directorate, often following outside peer review.

Individual Visiting Scientists are invited for extended periods by the Directors to pursue their research and perform scientific tasks of relevance to ISSI's programme.

All scientific activities result in some form of publication. Volumes in the *Space Sciences Series of ISSI (SSSI)*, edited by Kluwer Academic Publishers in Dordrecht, The Netherlands, which also appear as issues of *Space Science Reviews*, report the results of workshops. Publications in refereed scientific journals and/or volumes in the *ISSI Scientific Report* series, published by the ESA Publications Division, report the scientific output of the teams and individual visitors.

WORKSHOPS AND WORKING GROUPS

Two workshops and a working group were held during the sixth business year. Three volumes were added to the *Space Sciences Series of ISSI*.

HELIOSPHERIC PHYSICS

Although no workshops were held in heliospheric physics during the sixth business year, it was a prominent field in previous years, as can be seen in the *Space Sciences Series of ISSI* Volumes 1, 3, 5, 7, and 10, and it will remain so in the future. The last of these, *SSSI* Volume 10, *Cosmic Rays and Earth*, appeared during the year. It was edited by Reinald Kallenbach, ISSI, together with the convenors John W. Bieber, Bartol Research Institute, Newark, Delaware, U.S.A.; Evgenia Eroshenko, IZMIRAN, Moscow region, Russia; Paul Evenson, National Science Foundation, Arlington, Virginia, U.S.A., and Bartol Research Institute; and Erwin Flückiger, University of Bern, Switzerland. Its first section summarizes important properties of solar and galactic cosmic rays in the heliosphere and their connection to space weather. The second section details methods of collecting and interpreting ground-based cosmic ray data, with an emphasis on recent innovations and the integration of the global neutron monitor network with spacecraft observations.

The volume is dedicated to the late John A. Simpson, inventor of the neutron monitor, a key research tool in space physics and solar-terrestrial relations. John Simpson delivered his contribution to the volume but passed away at the age of 83 before it appeared.

Currently, activities in the field of heliospheric physics continue in several teams. Plans for future workshops include one on *Coronal Mass Ejections* (CMEs), one of the key features shaping the heliosphere at solar maximum activity. This will pair nicely with *SSSI Volume 7* on Corotating Interaction Regions (CIRs), which play a similar fundamental role at solar minimum.

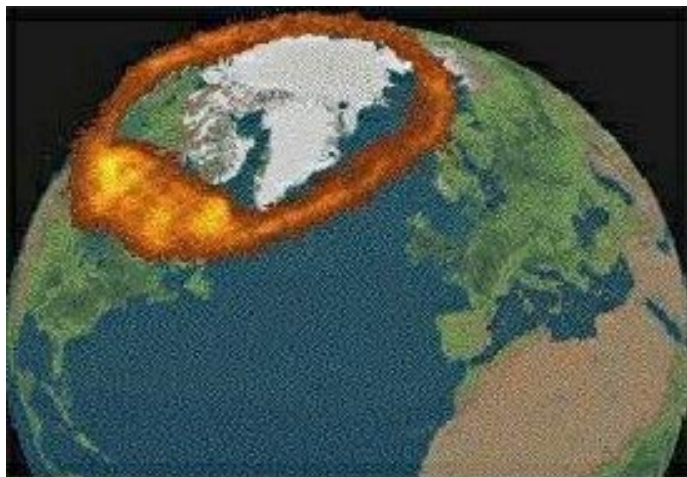
SOLAR-TERRESTRIAL PHYSICS

The current major ISSI project in the field of Solar-Terrestrial Physics is devoted to *Auroral Plasma Physics*. The goal of the project is to write a comprehensive and integrated textbook on the subject, reflecting the breakthroughs in our understanding of the underlying physics gained from recent observations. Not only is the aurora arguably the most intriguing plasma phenomenon in Earth's magnetosphere, but also the auroral plasma processes are expected to be ubiquitous in the entire Universe.

The project is coordinated by a core group consisting of: Joseph E. Borovsky, Los Alamos National Laboratory, Los Alamos, New Mexico, U.S.A.; Charles W. Carlson, University of California, Berkeley, U.S.A.; Gerhard Haerendel, International University Bremen, Germany; Bengt Hultqvist, Swedish Institute of Space Physics, Kiruna; Hannu Koskinen, Finnish Meteorological Institute, Helsinki; William Lotko, Dartmouth College, Hanover, New Hampshire, U.S.A.; Kristina Lynch, University of New Hampshire, Durham, U.S.A.; and Göran Marklund, Royal Institute of Technology, Stockholm, Sweden. Götz Paschmann of ISSI is the Project Leader.

Following two workshops in fall 1999 and spring 2000, with almost 30 invited participants, another meeting of nearly the full team took place 3–7 December 2000 to produce a second draft of the book. Further detailed writing and editing work was done at a special meeting of mostly U.S. members in Berkeley 14–17 May 2001. A meeting

by the European members is planned in October 2001. The book will be published in the *Space Sciences Series of ISSI* in early 2002.



The auroral oval observed by the VIS imager onboard the Polar satellite. After the Auroral Plasma Physics project is completed, activity will focus on the physics of shocks and discontinuities in space plasmas, based on data from ESA's Cluster mission. Cluster consists of four spacecraft, launched in summer 2000, that fly in formation through Earth's magnetosphere. Since the magnetospheric boundaries are in constant motion and phenomena often have small spatial extent and change rapidly in time, a single observer has great difficulty in separating temporal from spatial variations in the data. Cluster is the first mission where this difficulty can be overcome. By early 2002 data analysis is expected to have advanced to a state where the integration of individual results, a typical ISSI task, is the prime goal.

COMETARY PHYSICS AND CHEMISTRY

Comets contain more pristine material than any other object in the Solar System. It is for this reason that comet research is essential for studying the formation and early history of the Solar System.

Following the ISSI workshop on *Composition and Origin of Cometary Materials* in September 1998, the results of which were published in

Volume 8 of the *Space Sciences Series of ISSI*, some scientists formed teams to continue to work at ISSI in the field of cometary research. A small core group that met 6–8 December 2000 to discuss future activities, including the continuation of cometary research and the origin of the Solar System, confirmed these teams. The latter topic will be addressed in a Planetary Science workshop on *Solar System History from Isotopic Volatile Signatures* in 2002.

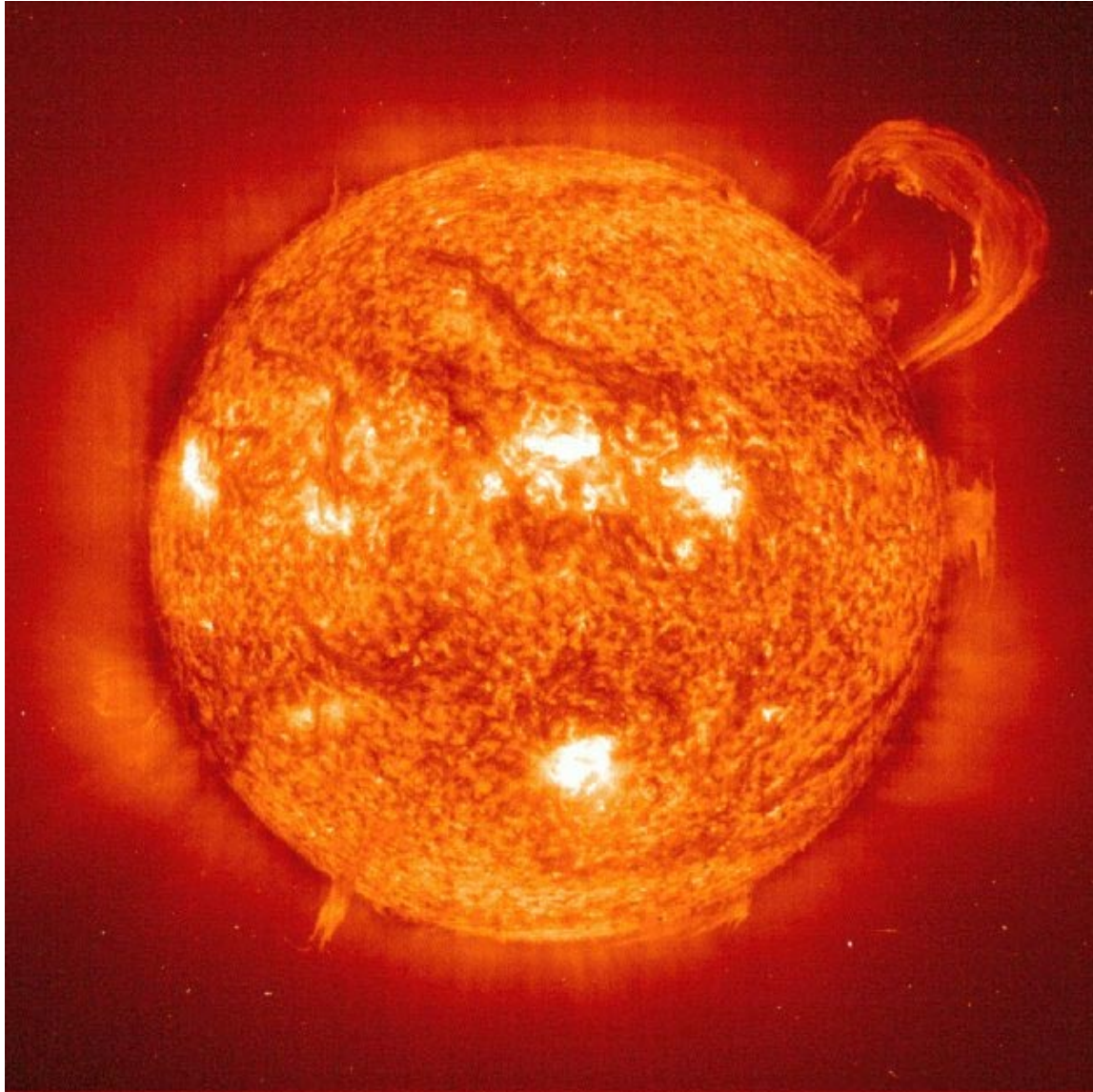
In cooperation with the company ARIAS in Bern, ISSI has begun to develop models of the interaction of comets with the solar wind and of the expansion of the outer comae and the formation of comet tails. The long-range aim of this activity is to prepare for the Rosetta mission, to rendezvous with Comet Wirtanen in 2011. The models that are developed in this co-operation will also find application in the interpretation of the data obtained by Ulysses during its passage through the distant tail of Comet Hyakutake and in the interpretation of the results that are continuously obtained by remote sensing of comets.

SOLAR WIND AND SOLAR PROCESSES

The workshop on *Solar Variability and Climate* took place 28 June–2 July 1999, representing a significant first step towards the expansion of the ISSI programme in the direction of Earth sciences. During the sixth year, work on the resulting volume was completed by the editors – Eigil Friis-Christensen (Danish Space Research Institute, Copenhagen), Claus Fröhlich (Physikalisch-Meteorologisches Observatorium Davos/World Radiation Center, Davos, Switzerland), Joanna Haigh (Imperial College, London, U.K.), Manfred Schüssler (Kiepenheuer Institut, Freiburg; now at Max-Planck-Institut für Aeronomie, Lindau, Germany), and Rudolf von Steiger (ISSI) – and the volume appeared as *SSSI* Vol. 11 and *Space Science Reviews* Vol. 94 (November 2000). It consists of all introductory and contributed papers plus a paper from each of the discussion sessions and a workshop summary paper. It concludes with the text of the press release

that was presented at the “public forum” (co-organised with ProClim–, the Swiss Forum for Climate and Global Change of the Swiss Academy of Sciences) immediately after the workshop. The emphasis of this forum was that the Sun is an important factor affecting the Earth’s climate, possibly including the warming observed during the first half of the 20th century; yet the warming in the past 20 years is clearly beyond what may be attributed to solar variability and must be significantly influenced by anthropogenic causes.

A new activity under the title of *Radiometric Inter-calibration of SOHO* was set up, following a proposal by Martin C.E. Huber (then of ESA-ESTEC, Noordwijk, The Netherlands). Originally conceived as an International Team, this was converted to a Working Group due to the great interest of both the community and of ISSI in this very important topic. A group of some 35 experimenters and observers, mainly from the CDS, EIT, LASCO, SUMER, and UVCS instruments on SOHO, met at ISSI 12–16 February 2001 to present and compare the absolute and relative calibrations of their instruments. Although such an activity is of a very delicate nature, participants presented and discussed issues openly, a tribute in particular to group leaders Martin Huber and Anuschka Pauluhn (now at ISSI). The Working Group is currently preparing individual instrument calibration papers and will meet again for a week in October 2001, where the focus will be on the intercalibration issues between the different instruments. Conclusion of the activity is planned for sometime in 2002 (perhaps after a smaller third, editorial meeting) with the appearance of a volume in the *ISSI Scientific Report* series, edited by Martin Huber, Anuschka Pauluhn, and Rudolf von Steiger. It is expected that such a volume will provide an important service to the community by allowing a more quantitative interpretation of the already impressive output of images from SOHO.

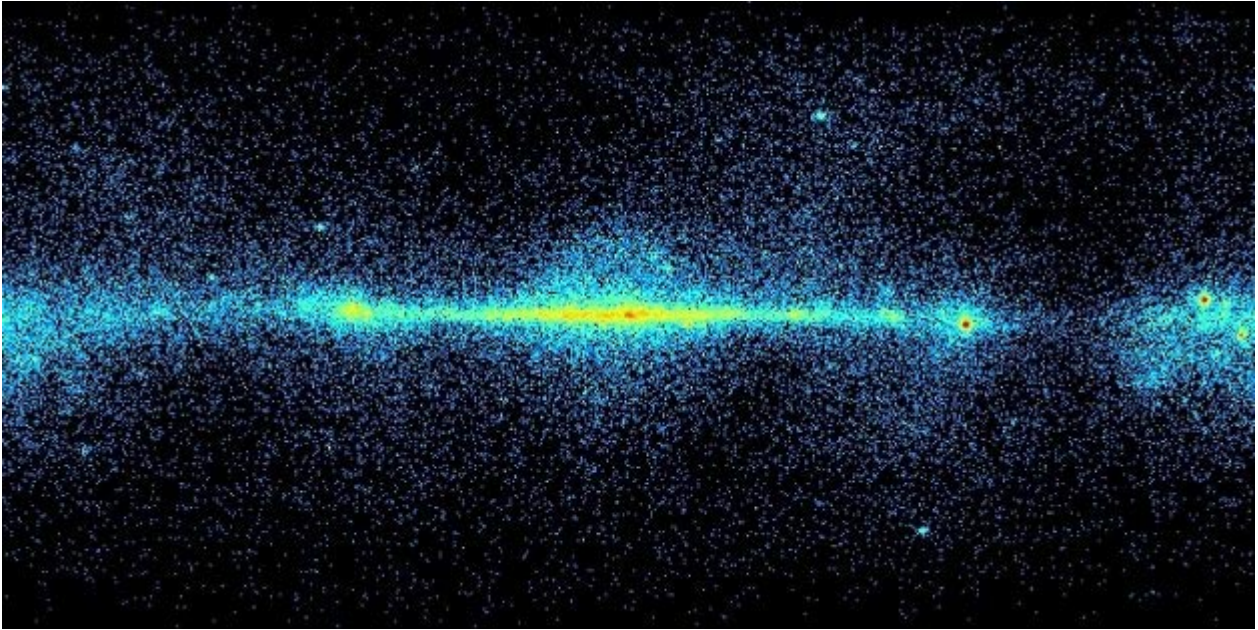


The Sun as seen in the He 304 Å line (Image courtesy of SOHO/EIT consortium. SOHO is a project of international cooperation between ESA and NASA).

ASTROPHYSICS AND COSMOLOGY

Two workshops on *The Astrophysics of Galactic Cosmic Rays* were held during the previous business year, and editorial work continued during the reporting period. Editors of the volume are Roland Diehl (Max-Planck-Institut für extraterrestrische Physik, Garching, Germany), Reinald Kallenbach (ISSI), Etienne Parizot (Université Paris-Sud, Orsay, France), and Rudolf von Steiger (ISSI). The volume will consist of 26 introductory papers, a summary by the editors, and two working group reports on Tests of Galactic Cosmic Ray Source Models and on

Key Measurements in the Future. The volume will be dedicated to Reuven Ramaty, one of the pioneering figures in the field, who died in May 2001. All participants will remember his presence at both workshops, in which, although he was already severely affected by amyotrophic lateral sclerosis (the same as Stephen Hawking), he participated as actively and in as lively a manner as ever before. It is an honour to have Reuven Ramaty's paper in the volume, which will be published later in 2001 in *Space Science Reviews* and as Volume 13 of the *Space Sciences Series of ISSI*.



Gamma-ray emission from the Milky Way galaxy, as seen with the EGRET telescope, using four years of data (Image: University of California, Riverside, http://tigre.ucr.edu/halo/logdat_annot.html).

A workshop at the very edge of the scientific programme of ISSI – and of science as a whole – dealt with the topic of *Matter in the Universe* and took place 19–23 March 2001. Convenors were John Ellis (CERN, Geneva, Switzerland), Philippe Jetzer (University of Zürich, Switzerland), Heinrich Leutwyler (University of Bern, Switzerland), Klaus Pretzl (University of Bern), Rafael Rebolo (University of La Laguna, Tenerife, Spain), Norbert Straumann (University of Zürich), Gustav Andreas Tammann (University of Basel, Switzerland), and Johannes Geiss and Rudolf von Steiger (ISSI) and brought together active researchers in the fields of cosmology, astrophysics, nuclear and particle physics, and space science to assess the exciting new developments in the search for abundant and yet-unknown forms of matter in the Universe. The subjects addressed included cosmic microwave background radiation (CMB) and its anisotropies, large-scale structures, clusters, intergalactic absorption, dark matter components of galaxies, globular clusters, supernovae of type Ia (SNe Ia) distance measurements, gravitational lensing and microlensing, X-ray observations, Lyman-alpha observations, detection of weakly interacting massive particles (WIMPs), detection of neutrino oscillations, particle candidates for dark matter,

and baryonic matter (nucleosynthesis).

Some 40 participants discussed these topics and their relation to the different forms of matter and energy in the Universe, reaching a rather consistent picture: The Universe contains just the right amount of matter and energy to make it flat, yet 70 percent of the total is in the form of dark energy (either as a cosmological constant or perhaps in even more exotic forms called quintessence). Of the remaining 30 percent, only about five percent is baryonic, or normal, matter, and the other 25 percent is in exotic forms such as WIMPS (Weakly Interacting Massive Particles) or MACHOS (Massive Compact Halo Objects) ... and only one percent can be seen as stars in the sky. So it seems that some five centuries after the Copernican revolution, which pushed humanity away from the centre of the Universe, we are bound to be relegated even further away, as some minute side component of its constituents.

The workshop findings are being edited by Philippe Jetzer, Klaus Pretzl, and Rudolf von Steiger and will be published in *Space Science Reviews* and as Volume 15 in the *Space Sciences Series of ISSI* in the first half of 2002.



*Earth, Moon and Mars, with relative sizes to scale (Image: **Spatium** No. 5, Earth, Moon and Mars)*

PLANETARY SCIENCE

Chronology and Evolution of Mars was published as *SSSI* Volume 12 and as *Space Science Reviews* Volume 96, April 2001. The editors are Reinald Kallenbach and Johannes Geiss of ISSI and William K. Hartmann of the Planetary Science Institute, Tucson, Arizona, U.S.A. This book combines the expertise of geochemists, geophysicists, and photo-geologists to constrain timescales and geological processes that have governed the evolution of Mars.

In order to achieve this goal, the workshop participants used densities of impact craters on lunar surface areas that were dated by the radiometric ages of returned lunar rocks as a reference for inner Solar System chronology. Crater densities on the surface of Mars as a function of age were then derived from the lunar record, taking into account the difference in asteroid and comet fluxes crossing the orbits of Mars and Earth. The resulting ages of geological units on Mars indicate ongoing geological activity from ~ 4.5 Gyr (billions of years) ago until modern time. The most ancient surfaces contain primordial crustal material with strong magnetisation

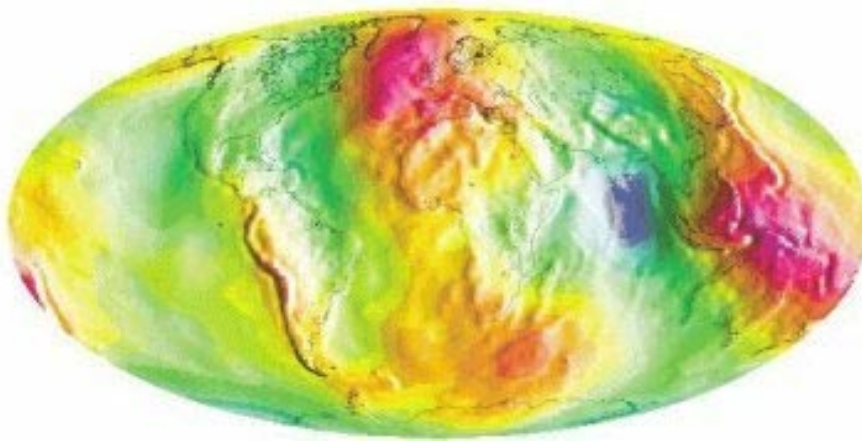
that has survived from the time of Mars' core formation. Other surfaces were created during times of major volcanism ~ 3-4.5 Gyr ago, probably associated with a denser atmosphere and a fluvial environment. Young surfaces indicate volcanism and modest water release late in the history of Mars, with the youngest activity probably as late as a few tens of Myr (millions of years). Neither Earth nor Moon offer such a geological record extending over nearly the whole lifetime of the planetary system.

This picture of the chronology of Mars is consistent with the range of radiometric ages of Martian meteorites. Moreover, by remote infrared sensing of the Martian surface, two broad groups of igneous rock units with basaltic and andesitic chemistry were identified. This is compatible with the in-situ chemical analyses at the Pathfinder landing site.

A new activity in this area, on *Solar System History from Isotopic Volatile Signatures*, began in this year with a convenors' meeting on 8 March 2001. This group, made up of Thérèse Encrenaz of DESPA/Observatoire de Paris, Meudon, France; Johannes Geiss of ISSI;

Reinald Kallenbach of ISSI; Konrad Mauersberger of the Max-Planck-Institut für Kernphysik in Heidelberg, Germany; Tobias Owen of the University of Hawaii, Honolulu,

Hawaii, U.S.A.; and François Robert of the Laboratoire de Minéralogie, Museum national d'Histoire naturelle, Paris, France, began plans for a workshop in January 2002.



Geoid as determined by GRIM5. (Image: ESA/ESTEC)

EARTH SCIENCES FROM SPACE

The expansion of ISSI's programme in the direction of Earth sciences that was initiated with the workshop on Solar Variability and Climate will be continued and intensified with a workshop entitled *Earth Gravity Field From Space – From Sensors to Earth Sciences*. In February 2001, at an initial meeting of the convenors – Reiner Rummel (Technische Universität München, Germany), Gerhard Beutler (University of Bern, Switzerland), Mark Drinkwater (ESA-ESTEC, Noordwijk, The Netherlands) and Rudolf von Steiger (ISSI) – the goals and structure of the workshop were defined. This workshop will mainly be aimed at the new insights into the global static gravity field and the geoid that are expected from the ESA explorer mission GOCE, to be launched in 2005, and the U.S. satellite gravity mission GRACE (2001–2006), which will measure, in addition, the temporal variations of the gravity field.

The workshop will bring together some 50 experts in their fields to discuss:

- strategies for ultra-precision orbit determination and gravity field modelling with the data of the upcoming gravity field missions,

- the use of accurate and high-resolution gravity models in Earth sciences whereby, in particular, synergy is expected between the various science fields in their use of this type of new information, and

- gravity field requirements and possible sensor and mission concepts after GRACE and GOCE.

The workshop will be divided into six sessions, each one directed by a session chair:

1. Precise Orbit Determination and Gravity Field Modelling (Georges Balmino, GRGS-CNES, Toulouse, France),

2. Solid Earth Physics (Roberto Sabadini, University of Milan, Italy),

3. Ocean Circulation (Christian Le Provost, Observatoire Midi-Pyrénées, Toulouse, France),

4. Geodesy (Christian Tscherning, University of Copenhagen, Denmark),

5. Sea Level (Philip Woodworth, Bidston Observatory, Birkenhead, U.K.), and

6. Future Concepts (Miguel Aguirre, ESA-ESTEC, Noordwijk, The Netherlands).

The workshop is planned for March 2002 and will result in a volume in the *Space Sciences Series of ISSI* less than one year later.

INTERNATIONAL TEAMS

Teams at ISSI are composed of up to 15 scientists of different nationalities, institutions, and areas of expertise who come together to jointly address scientific questions of particular relevance. The teams meet for variable periods at ISSI and present results in scientific journals. Their activity is organised and conducted by a team leader who initiated the proposal to ISSI. Although in close contact with ISSI's scientific staff, the teams work for the most part independently to complete their project.

Teams may be set up at any time following review and acceptance of the proposal by external referees and ISSI's scientific staff. ISSI commits financial support to a team for one year, with extensions possible. Details of the teams may be found at on the Web at www.issi.unibe.ch under "Scientific Activities," "International Teams".

The following teams were at ISSI during the sixth business year:

• *Physics of Mass Loaded Plasmas*

Objective: To summarise the existing knowledge on the physics of mass-loaded plasmas and related phenomena, to provide a basis for future co-operative work in this area.

Team leaders: *Karl-Heinz Glassmeier of the University of Braunschweig, Germany, and Karoly Szegö of KFKI Research Institute for Particle and Nuclear Physics, Budapest;* 17 team members from France, Germany, Portugal, the United Kingdom, and the United States.

Schedule: Editorial meeting 28 August–2 September 2000.

Output: Review paper in *Space Science Reviews*.

Status: Completed.

• *Advanced Data Analysis Methods*

Objective: To collect in a handbook material on advanced analysis techniques, such as neural net-

works, wavelet analysis, principal component analysis, linear parametric models, higher-order spectra, phase-space techniques, and their application to space data.

Team leaders: *Joachim Vogt, Technische Universität Braunschweig, and Götz Paschmann, Max-Planck-Institut für extraterrestrische Physik, Garching, Germany;* 9 team members from France, Germany, Poland, Sweden, Switzerland, the United Kingdom, and the United States.

Schedule: 9–12 January 2001.

Output: Handbook in the *ISSI Scientific Report* series.

Status: Ongoing.

• *Dust Plasma Interaction in Space*

Objective: To address issues of collective dust-plasma interactions in space and their applications to astrophysics, laboratory and industrial plasmas.

Team leader: *Padma K. Shukla, Bochum University, Germany;* 14 members from Belgium, Germany, India, Italy, Norway, Portugal, Russia, Sweden, the United Kingdom, and the United States.

Schedule: 20–24 November 2000, 11–16 June 2001.

Output: Publications in scientific journals.

Status: Ongoing.

• *Observational Consequences of Sub-Resolution Physics in the Solar Atmosphere*

Objective: To investigate the solar activity as the result of events taking place at spatial scales well below the observational resolution and their observational manifestation.

Team leader: *Giorgio Einaudi, University of Pisa, Italy;* 15 team members from France, Germany, Greece, Italy, Russia, Switzerland, the United Kingdom, and the United States.

Schedule: 23–27 February 2001.

Output: Papers to be published in scientific literature.

Status: Post-completion editorial meeting.

• **Local Late Galactic Evolution**

Objective: To study the galactic evolution as a function of time and galactocentric distances of a number of nucleosynthetically diverse species to address questions such as the birthplace of the Sun and inflow of material into the disc of our Galaxy. The evolution of the isotopes of hydrogen, helium, and neon near the solar ring of the Galaxy is investigated by comparing Solar System data from various space missions with the data on interstellar gas flowing through the heliosphere obtained by SWICS/Ulysses.

Team leader: *Johannes Geiss, ISSI*; 3 members from France, Italy, and the United States.

Schedule: 12–13 March 2001.

Output: Publications in scientific journals.

Status: Ongoing.

• **Injection and Dissipation of the Energy in the Earth's Magnetosphere During Magnetic Storms**

Objective: To use concrete events to determine input parameters of the paraboloid model of the magnetosphere and relate to AMPTE/CCE satellite passes, to compile the energy balance based on calculation of currents and comparison with actual solar wind energy input, and to determine the contribution of various ions to observed ground magnetic field variations.

Team leader: *Y.I. Feldstein, IZMIRAN, Moscow Region, Russia*; 3 team members from Germany and Russia.

Schedule: 25 February–7 March 2001.

Output: Publications in scientific journals.

Status: Ongoing.

• **Modelling of the Cometary Nucleus**

Objective: To compare four independently developed one-dimensional algorithms to model heat and gas diffusion in porous comet nuclei. Differences in results from these models must be resolved before they can be used for data analysis. These simple algorithms are also fundamental for the development of advanced models: Nuclei with mixtures of crystalline water ice and frozen gases in separate phases, amorphous water ice with trapped gases, inclinations of the spin axis (seasonal effects), and multi-dimensional effects (shadowing).

Team leader: *Walter Huebner, Southwest Research Institute, San Antonio, Texas, U.S.A.*; 6 members from France, Germany, Israel, Italy, and the United States.

Schedule: 7–11 November 2000.

Output: Publications in scientific journals.

Status: Completed.

• **Analytic Study of Low Frequency Waves in High-Beta Plasma**

Objective: To develop a comprehensive kinetic theory for low-frequency waves in a high- β space plasma. The resulting model may then be applied to the analysis and interpretation of data from the Interball and Cluster II satellites. Particular attention will be paid to the development of a user-friendly interface to the analytical model, enabling experimenters to compare theoretical results with data.

Team leader: *M. Balikhin, Sheffield University, Sheffield, U.K.*; 3 members from Germany, Mexico, and Russia.

Schedule: 26 July–2 August 2000, 5–24 January 2001.

Output: Publications in scientific journals.

Status: Ongoing.

• **Multiscale Dynamic Processes near Magnetospheric Boundaries and in the Cusp**

Objective: To advance the understanding of plasma and magnetic energy transfers that take place at magnetospheric boundaries and in the cusp, on scales from the ion Larmor radius to several Earth radii. By comparing models and theory with data obtained in the framework of the International Solar Terrestrial Programme (ISTP), it will be possible to study the hierarchy of processes from small scales dominated by turbulence and kinetic effects up to global scales controlled by MHD.

Team leader: *Arne Pedersen, University of Oslo, Norway*; 8 members from the Czech Republic, France, Germany, Japan, Russia, and the United States.

Schedule: 11–15 September 2000, 2–7 April 2001.

Output: Publications in scientific journals.

Status: Ongoing.

• ***Travelling Convection Vortices: Correlated Signatures and Origins***

Objective: To compare the results of numerical simulations and analytical models for each proposed mechanism with case and statistical studies of TCV characteristics in order to identify their predominant generation mechanism(s), using past studies that have variously attributed TCVs to bursty reconnection, impulsive penetration, the Kelvin-Helmholtz instability, and pressure-pulse driven waves on the magnetopause, as well as to interchange instabilities somewhat deeper within the magnetosphere.

Team leader: *D. Sibeck, Applied Physics Laboratory, Johns Hopkins University, Laurel, Maryland, U.S.A.*; 13 members from Denmark, Finland, Germany, Russia, the United Kingdom, and the United States.

Schedule: 24 July–4 August 2000.

Output: Publications in scientific journals.

Status: Completed.

• ***New Physical Parameters of LIM Through Co-ordinated Observations of the Gravitational Focussing Cone at 1 AU***

Objective: To combine complementary data sets taken during the last two passages of the Earth through the interstellar focussing cone, previous data, and modelling in order to derive a consistent set of interstellar parameters.

Team leader: *Eberhard Moebius, University of New Hampshire, Durham, New Hampshire, U.S.A.*; 14 members from France, Germany, Poland, Russia, and the United States.

Schedule: 25–29 June 2001.

Output: Publications in scientific journals.

Status: Completed.

• ***Tracing Coronal Hole Boundaries into the Solar Wind***

Objective: To study coronal hole boundaries using a combined set of UVCS and SWICS (Ulysses and ACE) data. The connection between solar and heliospheric data is performed using 3D-MHD simulations to account for stream-stream interactions in the heliosphere.

Team leader: *Rudolf von Steiger, ISSI*; 6 members from Italy, Switzerland, the United States.

Schedule: 2–5 March 2001.

Output: Publications in scientific journals.

Status: Ongoing.

• ***Most Recent Advances in the New Polar Wind Theory and Observations***

Objective: To analyse the Akebono (EXOS-D) suprathermal mass spectrometer (SMS) polar wind data set and to compare the observation data with theoretical predictions.

Team leaders: *Supriya Ganguli, SAIC, McLean, Virginia, U.S.A., and Tom Chang, Massachusetts Institute of Technology, Cambridge, Massachusetts, U.S.A.*; 7 members from Belgium, Canada, Japan, and the United States.

Schedule: 7–11 August 2000.

Status: Completed.

• ***Central Issues in Solar Flare Physics***

Objective: To take a highly critical look at the current status of solar flare theory and reassess both the basic assumptions that are currently invoked as well as how the major advances in acceleration physics and reconnection theory can be implemented.

Team Leader: *Peter Cargill, Imperial College, London, U.K.*; 8 members from France, Germany, Greece, Italy, Japan, United Kingdom, and the United States.

Schedule: 29 October–1 November 2000, 15–18 May 2001.

Status: Ongoing.

• ***Energetic Particles in the Galaxy***

Objective: To investigate the effect of spatial and temporal variations of cosmic ray sources in the Galaxy on the spectra of energetic particles in the interstellar medium and on the spectra of diffuse Galactic non-thermal emission.

Team Leaders: *Heinrich Völk and Felix Aharonian, Max-Planck-Institut für Kernphysik, Heidelberg, Germany*; 4 members from Russia.

Schedule: 1–23 February 2001.

Status: Ongoing.

• ***Comet Nucleus-Coma Boundary Layer Model***

Objective: To investigate the expansion of gas in the innermost coma. This includes thermody-

dynamic dis-equilibrium effects in the nucleus-coma boundary layer, entrainment of dust by escaping coma gas, development of a dust mantle, gas effusion from the interior of the nucleus on the night side, and the physics and chemistry of short-lived chemical species (e.g., S_2).

Team Leader: *Walter Huebner, Southwest Research Institute, San Antonio, Texas, U.S.A.*; 5 members from Italy, Germany, France, and Israel.

Schedule: 2–6 April 2001.

Status: Ongoing.

• ***Solar Wind Disturbances and Properties of the Upper Ionosphere from INTERBALL and MIR Data***

Objective: To combine data from the INTERBALL tail probe measured in the solar wind and the measurements of the electron density profile measured by the HF-sounding experiment onboard MIR spacecraft. MIR was often located near the maximum of the F region of the ionosphere. Apart from standard information obtained by topside sounding, this fact provides the opportunity to estimate the degree of ionospheric plasma turbulence from some particular characteristics of the sounding signal. This turbulence usually relates to the influence of electric fields.

Team Leader: *Paul Gough, University of Sussex, U.K.*; 7 members from Russia (IKI and Rostov State University) and United Kingdom (Sheffield University, University of Sussex).

Schedule: 25 June–7 July 2001.

Status: Ongoing.

VISITING SCIENTISTS

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

The following nine visiting senior scientists and one visiting junior scientist were at ISSI during the sixth business year:

• **Walter Huebner**, Southwest Research Institute, San Antonio, Texas, U.S.A., 8 April–29 May 2001.

• **Bengt Hultqvist**, Swedish Institute of Space Physics, Kiruna, Sweden, 18 November–8 December 2000, 6–20 May 2001.

• **Vladislav Izmodenov**, Moscow State University, Moscow, Russia, 20 June–17 August 2001.

• **Galina Korotova**, IZMIRAN, Moscow Region, Russia, 23 November–23 December 2000.

• **Werner Mende**, Berlin-Brandenburgische Akademie der Wissenschaften, Berlin, Germany, 2 May–1 June 2001.

• **David Southwood**, Imperial College, London, U.K. (now European Space Agency, Paris), 27 July–12 August 2000, 5–16 September 2000.

• **Igor Tolstikhin**, Polar Geophysical Institute, Kola Scientific Center of the Russian Academy of Science, Apatity, Murmansk Region, Russia, 22 April – 31 May 2001.

• **Rudolf Treumann**, Max-Planck-Institut für extraterrestrische Physik, Garching, Germany, 23–25 July 2000, 10–30 August 2000, 25 November–17 December 2000, 31 March–19 April 2001.

• **Thomas Zurbuchen**, University of Michigan, Ann Arbor, Michigan, U.S.A., 19 June–18 July 2000.

• **Mirjam Hofer**, IAS, Rome (now at ESTEC, Noordwijk, The Netherlands), 13 September–21 October 2000, 26 November–7 December 2000.

ISSI SEMINARS

10 November 2000:

Martin Harwit, Cornell University, Ithaca, New York, U.S.A., Colloquium on “The Extragalactic Infrared Background and Its Cosmological Implications,” co-sponsored by ISSI and the Physikalische Institute and Astronomisches Institut of the University of Bern.

18 May 2001:

Jeffrey Linsky, JILA, University of Colorado, Boulder, Colorado, U.S.A., Colloquium on “What ultraviolet and X-ray spectroscopy is tell-

ing us about the atmospheric structure of active late-type stars,” co-sponsored by ISSI and the Physikalische Institute and Astronomisches Institut of the University of Bern.

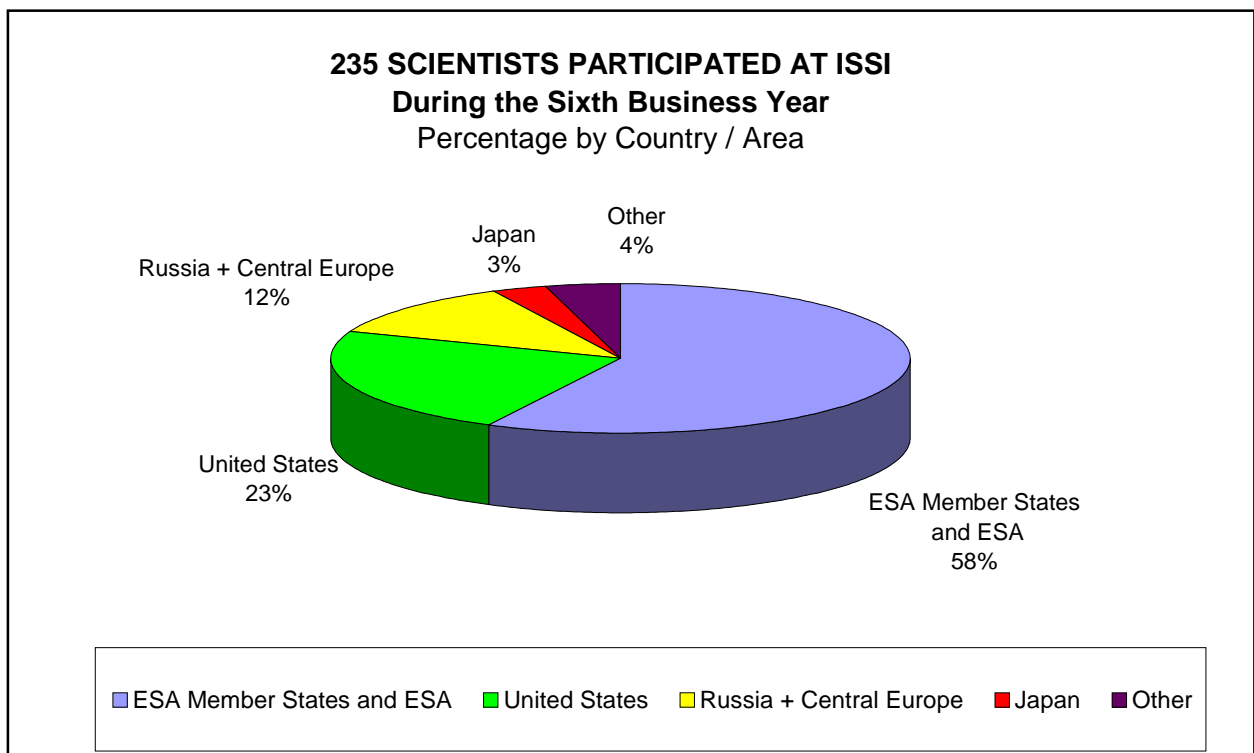
8 June 2001:

J.L. Culhane, Mullard Space Science Laboratory, University College, London, U.K., Colloquium on “Understanding the Sun’s Active Corona through Space-based Observations,” cosponsored by ISSI and the Physikalische Institute and Astronomisches Institut and Astronomisches Institut of the University of Bern.

EXTERNAL PARTICIPATION

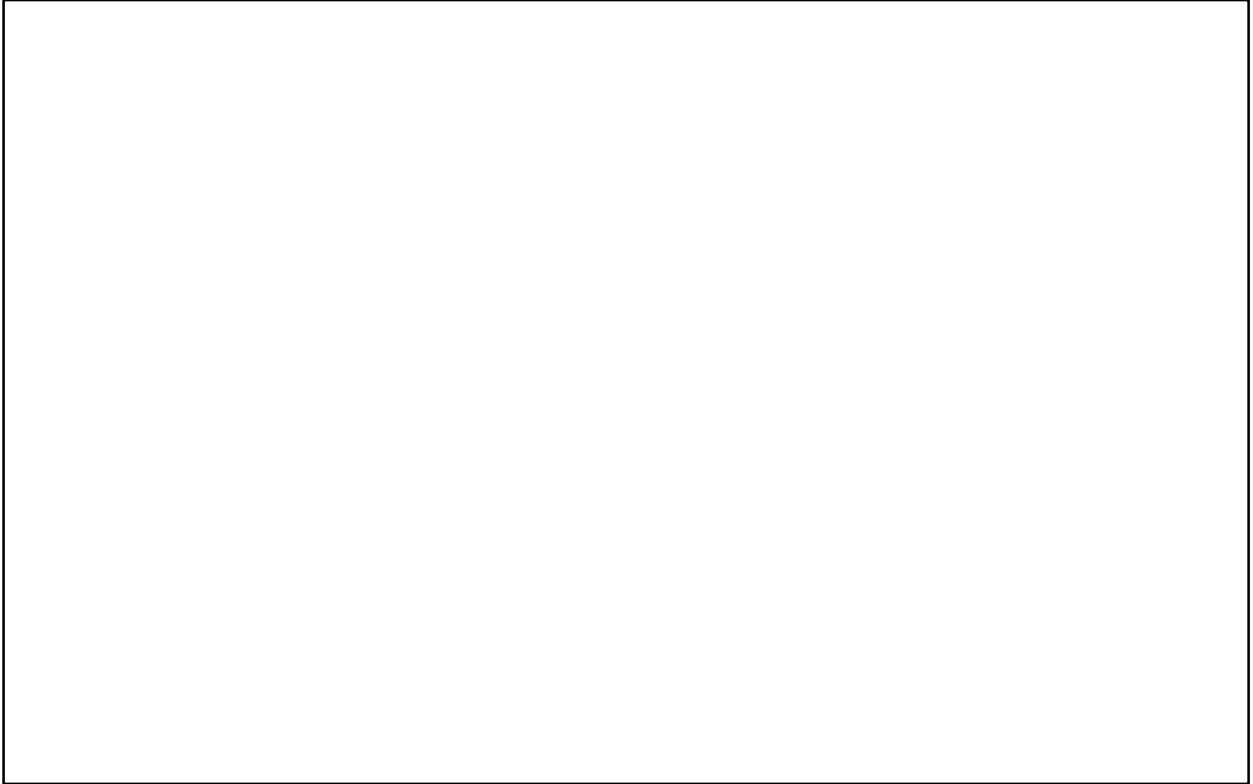
During ISSI’s sixth business year, 235 scientists from around the world participated in the ISSI programme. All of the ESA member states along with ESA itself, Japan, Russia and central European countries and the United States as well

as Canada, Greece, Israel, Mexico and an international organisation (CERN) were represented. Of the 235 scientists in this year, 102 – or 43 percent – were first-time visitors.



During the first six business years, ISSI had a total of 802 participants from 34 countries and ESA and a variety of other international organi-

sations. Although many scientists have been to ISSI more than once, they have been counted only one time.



Financial Overview

ISSI's main sources of funding continued to be the European Space Agency (ESA), the Swiss Confederation, the Canton and University of Bern, and the Swiss National Science Foundation. Moreover, important contributions "in kind" were received from Contraves Space AG and from the University of Bern.

Funding from **ESA** will continue at a constant level until 2003, as approved by the Science Programme Committee (SPC) and the Council in 1998; it is split between the budget of the SPC and the General Budget. Continuation beyond that date is expected to be dependent on a review in 2002.

During the sixth year, funding from the **Swiss Confederation** was still from Article 16 of the *Forschungsgesetz*. In the next business year it will be through the Swiss Space Office within the framework of the Swiss contribution to ESA, a new scheme implemented after a critical situation reported last year in these pages, which fortunately could be corrected through immediate action by the Board and the Directorate, with the co-operation of State Secretary Charles Kleiber.

For the funding from the **Canton of Bern**, represented by the **University of Bern**, a new

funding scheme was put in place in mid-1999, under which one of the directors is financed directly by the University. This new scheme is working very well, and even though it represents a slight decrease in funding as compared to the cantonal deficit guarantee earlier, this is compensated for by the fact that it is more stable and much easier to deal with in the bookkeeping.

Funding from the **Swiss National Science Foundation** continues under the grant with R. von Steiger as the principal applicant, which was approved in August 1999 for the period 1 October 1999 through 30 September 2002, to be used exclusively for research carried out by external scientists at ISSI.

In summary, ISSI ended the sixth business year with a very modest surplus of 11 kFr, or less than 0.5 percent of the net income. Income and expenditures during the sixth business year, 1 July 2000–30 June 2001, are given in the table below (in thousands of francs; note that these are preliminary figures that have not yet been audited). The contributions "in kind" are not listed in the table since they do not explicitly figure in the ISSI bookkeeping. They are estimated at 240 kFr from the Canton and University of Bern and 80 kFr from Industry.

Income	kCHF	Expenditures	kCHF
European Space Agency	1,502	Salaries and Related Costs*	1,217
Swiss Confederation	700	Investments, Depreciation	139
Swiss National Science Foundation (SNSF)	131	Fixed Costs	196
Rental from Apartments	34	Operating Costs	191
Interest	33	WS, WG, Teams, Visiting Scientists	
		ISSI-funded	515
		SNSF-funded	131
		Fund balance	11
Total	2,400		2,400

*It should be noted that, of the three Directors and nine full-time staff members, seven were scientists actively conducting research as well as taking care of organisational, editorial, and administrative tasks.

ISSI in the News

Keller, Roland, "Contribution suisse à un appareil de mesure," Agence télégraphique suisse, (news agency), 9 August 2000.

Weiss, Martin, "Big Brother im Weltall" (interview with J. Geiss and R. von Steiger), *SwissMade*, STAR TV, 24 August 2000.

Aecherli, Helene, und Simone Ott, "Stadt im All: Vorposten zu den Sternen," (short interview with R. von Steiger), *SonntagsBlick Magazin*, Nr. 48, 26 November 2000, p. 4.

Reproduction of the front page of 21 July 1969, "Der Mensch hat den Mond erobert," with mention of "Ein Schweizer wird als Erster Mondproben prüfen," *Der Bund*, 6. Dezember 2000, p. 2.

Imhasly, Patrick, "Im Gespräch: Auf Einsteins Spuren," (short interview with J. Geiss), *Der Bund*, 5 June 2001, p. 8.

Ochsenbein, Gabriele, "Auszeichnung für Berner Pionier der Mondforschung," (interview with J. Geiss) swissinfo (on line) and Swiss Radio International, 7 June 2001.

sgt/mg, "Berner Physiker mit Einstein-Medaille geehrt," *Zeitung im Espace Mittelland*, 8 June 2001, p. 45.

Friedli, Dr. Hansjörg, "Verleihung der Albert-Einstein-Medaille am 6. Juni 2001: Die Sonne versprüht nicht nur Licht," *Olympia Mitteilungen*, Albert Einstein Gesellschaft, Ausgabe 2001, p. 7.



Members of the team led by Eberhard Moebius (left front) met in June to discuss new physical parameters of LIM through co-ordinated observations of the gravitational focussing cone at 1 AU. (Photo by Urs Lauterburg)

Special Events

10–15 July 2000: Second “Ecole d’été d’astronomie de la Liaison Enseignants – Astronomes (LEA)” organised by the Observatoire de Lyon at St. Luc, to which ISSI exceptionally made a financial contribution.

13 and 20 September 2000: Swiss political party FDP visits ISSI, with introduction to ISSI activities by R. von Steiger.

31 October 2000: Association Pro-ISSI lecture, “Sonne und Klima,” by Jürg Beer, EAWAG/Eidg. Anstalt für Wasserversorgung, Abwasserreinigung und Gewässerschutz, Dübendorf.

29–30 November 2000: 11th Meeting of the Science Committee.

30 November 2000: 12th Meeting of the Board of Trustees.

30 November 2000: Celebration of ISSI’s fifth anniversary, at the Hotel Bellevue Palace, Bern. Willy Benz, of the Physikalisches Institut of the University of Bern, gave the keynote address on “From Dust to Planets” at the event, which was sponsored by Contraves Space.

5 December 2000: Participation in the Journée de la célébration de “40 ans de collaboration de la Suisse à l’Europe spatiale, Histoire et perspectives,” Casino de Montbenon, Lausanne.

8 December 2000: Colloquium on “The ESA Science Programme” by Bengt Hultqvist, Swedish Institute of Space Physics, Kiruna.

5 February 2001: Introduction to ISSI by R. von Steiger for the annual meeting of the Swiss Red Cross, Bern Section.

4 April 2001: Association Pro-ISSI annual meeting and lecture on “Das Wissenschaftsprogramm der ESA im 21. Jahrhundert,” by Martin C.E. Huber, ESA Headquarters, Paris.

27 April 2001: Participation in the Sun-Earth Day and Celebration of the 5th Anniversary of SOHO at the Verkehrshaus Luzern, Lucerne.

29–30 May 2001: Professor Roger Bonnet, outgoing Director of the ESA Scientific Programme, visits ISSI.

6 June 2001: J. Geiss was awarded the Albert Einstein Medal and made a presentation on “Die Materie im Universum ‘...dass ich erkenne, was die Welt im Innersten zusammenhält’.”

14 June 2001: 12th Meeting of the Science Committee.

15 June 2001: 13th Meeting of the Board of Trustees.

Staff Activities

Note: Listed are activities in which ISSI staff scientists participated between 1 July 2000 and 30 June 2001. This includes meetings attended, presentations given, lectures held, honours received, and ongoing memberships in space science organisations maintained.

Geiss, Johannes:

Participation in the meeting of the Board of Advisors of the International Space University (ISU), Strasbourg, France, 12–13 July 2000.

Participation in the Alpbach Sommerschule on “Extragalactic Astronomy and Cosmology from Space,” Alpbach, Austria, 18–27 July 2000.

Lecture on “Sources of Heliospheric Ions,” COSPAR Colloquium, “The Outer Heliosphere: The Next Frontiers,” Potsdam, Germany, 24–28 July 2000.

Participation in the ESLAB Symposium, “The Heliosphere near Solar Minimum: The Ulysses Perspective,” Noordwijk, The Netherlands, 3–6 October 2000.

Invited lecture on “Interstellar Gas Inside the Heliosphere,” COSPAR Colloquium, “The Interstellar Environment of the Heliosphere,” Paris, France, 23–26 January 2001.

Participation in the General Assembly of the European Geophysical Society (EGS), Nice, France, 25–30 March 2001.

Participation in the 138th Annual Meeting of the National Academy of Sciences, Washington, D.C., U.S.A., May 2001.

Awarded the Albert Einstein Medal: Presentation of “Die Materie im Universum ‘...dass ich erkenne, was die Welt im Innersten zusammenhält,’” Bern, 6 June, 2001.

Invited lecture on “The Protosolar Abundance“, Conference on “Deuterium in the Universe”, Observatoire de Meudon, France, 25–27 June 2001.

Member, Board of Advisors, International Space University, Strasbourg, France.

Chairman, COSPAR Nomination Committee.

Adjunct Professor, Atmospheric, Oceanic and Space Sciences Department, University of Michigan, Ann Arbor, Michigan, U.S.A.

Håland, Stein:

Poster on “Energetic particle signatures of reconnection and plasmoid formation in the magnetotail,” (with N. Ostgaard, J. Bjordal, F. Soraas, J. Stadsnes, S. Ullaland, B. Wilken, T. Yamamoto, T. Doke, D. L. Chenette, G. K. Parks, M. J. Brittacher, G. D. Reeves), First S-RAMP Conference, Sapporo, Japan, October 2000.

Talk on “Comparison of energy spectra in the ionosphere and in the central plasma sheet during a magnetospheric substorm,” (with N. Ostgaard, J. Stadsnes, F. Soraas, G. Germany, R. R. Vondrak, B. Wilken, T. Doke), American Geophysical Union Fall Meeting, San Francisco, California, U.S.A., 14–19 December 2000.

Talk on “Principal component analysis of X-ray images,” (with D. Vassiliadis, N. Ostgaard, J. Stadsnes), European Geophysical Society General Assembly, Nice, France, 25–30 March 2001.

Talk on “Improved boundary normal calculations using minimum variance analysis and wavelet de-noising techniques,” (with G. Paschmann), Sheffield Space Plasma Meeting, April 2001.

Kallenbach, Reinald:

Talk on “Fractionation in acceleration processes,” 33rd COSPAR Scientific Assembly, Warsaw, Poland, 16–23 July 2000.

Talk on “Charge-to-Mass Fractionation in Solar Energetic Particles,” at American Geophysical Union Fall Meeting, San Francisco, Calif., U.S.A., 14–19 December 2000.

Talk on “Charge-to-Mass Fractionation in Solar Energetic Particles,” 26th European Geophysical Society General Assembly, Nice, France, 25–30 March 2001.

Poster on “Isotopic composition measured in-situ in different solar wind regimes by CELIAS/MTOF on board SOHO,” 1st Joint ACE-SOHO Workshop, Bern, Switzerland, 6–9 March 2001.

Participation in the 31st “Saas-Fee” SGAA Advanced Course on Brown Dwarfs and Planets, Grimentz, Switzerland, 2–7 April 2001.

Talk on “Ionenbeschleunigung durch Plasmawellen in der Sonnenkorona,” Astrophysics Colloquium, Astronomisches Institut of the Swiss Federal Institute of Technology (ETH) Zürich, 12 June 2001.

Manno, Vittorio:

Participation in COSPAR meeting, Warsaw, Poland, 17–19 July 2000.

Attendance at launch of Cluster 2, Baïkonour, Kazakhstan, 7–10 August 2000.

Organisation and participation in the 20th IACG meeting, La Jolla, California, U.S.A., 27–28 September 2000.

Presentation at the Scientific Conference in honour of Academician A.A. Galeev, Moscow, Russia, 20–21 October, 2000.

Participation in Solar Orbiter workshop and ILWS Task Group of IACG, Puerto de la Cruz, Tenerife, Spain, 15–17 May 2001.

Paschmann, Götz:

Presentation of “The Cluster Mission” at Contraves Space, Zürich, 6 July, 2000.

Invited talk on “The Electron Drift Instrument on Cluster: Overview of First Results” at the General Assembly of the European Geophysical Society, Nice, France, 27 March 2001.

Member, Space Science Advisory Committee of ESA, since January 2001.

Member, Editor Search Committee, American Geophysical Union, January–May, 2001.

Pauluhn, Anuschka:

Participation in the 31st “Saas-Fee” SGAA Advanced Course on Brown Dwarfs and Planets, Grimentz, Switzerland, 2–7 April 2001.

von Steiger, Rudolf:

Talk on “Kinetic properties of heavy solar wind ions with high m/q from Ulysses/SWICS,” 33rd COSPAR Scientific Assembly, Warsaw, Poland, 16–23 July 2000.

Presentation on “Weltraumwissenschaft am ISSI” to the FDP Stadt Bern, 13 and 20 September 2000.

Talk on “The 3d-heliosphere from the ACE and Ulysses solar wind composition experiments,” ESLAB 34 Symposium, Noordwijk, The Netherlands, 3–6 October 2000.

Talk on “Tracing coronal hole boundaries into the solar wind,” American Geophysical Union Fall Meeting, San Francisco, California, U.S.A., 15–19 December 2000.

Presentation on “Weltraumwissenschaft am ISSI” to the SRK Section Bern, 5 February 2001.

Poster presentation on “The 3d-heliosphere from the ACE and Ulysses solar wind composition experiments,” 1st Joint SOHO/ACE Workshop, Bern, 6–9 March 2001.

Rapporteur talk on “Measuring solar abundances,” 1st Joint SOHO/ACE Workshop, Bern, 6–9 March 2001.

Talk on “Enhancements of alpha particles in coronal mass ejections” at the European Geophysical Society General Assembly, Nice, France, 26–30 March 2001.

Presentations on “HUGO hat Töne” – approaching the Human Genome Project with electronic sounds and freely improvised music – at the festival “Science et Cité,” Bern, 4–11 May 2001.

Colloquium on “Solar wind composition as a diagnostic tool,” Institute of Astronomy, Swiss Federal Institute of Technology (ETH), Zürich, 22 May 2001.

Invited talk on “Solar wind source diversity as revealed by its composition” (presented by T. H. Zurbuchen), American Geophysical Union Spring Meeting, Boston, Massachusetts, U.S.A., 29 May–1 June 2001.

Co-chair, COSPAR sub-commission D2/E3 “Transition from the Sun to the Heliosphere” (with G. Simnett).

Corresponding member, International Academy of Astronautics.

Staff Publications

Note: Listed are all papers written or co-authored by ISSI staff that were submitted or that appeared between 1 July 2000 and 30 June 2001.

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- Bleeker, J., J. Geiss, and M.C.E. Huber (eds.), *The Century of Space Science*, Dordrecht: Kluwer Academic Publishers, in press, 2001.
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- Diehl, R., R. Kallenbach, E. Parizot, and R. von Steiger, The Astrophysics of Galactic Cosmic Rays - Summary, *Space Science Reviews* **97**, 1–10, 2001.
- Diehl, R., R. Kallenbach, E. Parizot, and R. von Steiger, Introduction, in: R. Diehl, R. Kallenbach, E. Parizot, and R. von Steiger (eds.), *The Astrophysics of Galactic Cosmic Rays*, Vol 13, *Space Sciences Series of ISSI*, Dordrecht: Kluwer Academic Publishers, and *Space Science Reviews*, in press, 2001.
- Geiss, J., Bern - Mond und zurück! in: *Die Schweiz, Europa und die Raumfahrt - Abenteuer und Notwendigkeit* (in the series Les Cahiers rouges), Lausanne: Fondation Jean Monnet pour l'Europe/Centre de recherches européennes, 173–180, 2000.
- Geiss, J., Berne - Lune, et retour! in: *La Suisse, l'Europe et l'Espace - une aventure, une nécessité* (in the series Les Cahiers rouges), Lausanne: Fondation Jean Monnet pour l'Europe/Centre de recherches européennes, 169–176, 2000.
- Gloeckler, G., and J. Geiss, Deuterium and Helium-3 in the Protosolar Cloud, in: L. da Silva, M. Spite, and J.R. de Medeiros (eds.), *The Light Elements and Their Evolution*, ASP Conference Series, Vol. 3x 10⁸, Astronomical Society of the Pacific, in press, 1999.
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- Gloeckler, G., and J. Geiss, Heliospheric and Interstellar Phenomena Deduced from Pickup Ion Observations, in: R. Marsden (ed.), *The 3-D Heliosphere at Solar Maximum, 34th ESLAB Symposium, October 3–6, 2000*, *Space Science Reviews*, in press, 2001.
- Gloeckler, G., J. Geiss, and L.A. Fisk, Heliospheric and Interstellar Phenomena Revealed from Observations of Pickup Ions, in: A. Balogh, R.G. Marsden, and E.J. Smith (eds.), *The Heliosphere Near Solar Minimum: the Ulysses perspective*, Heidelberg: Springer Praxis Books, 287–326, 2001.
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- Håland, S., and N. Østgaard, Multi-Spacecraft Study of a Magnetospheric Substorm, in: *Space Science in Norway, 1998–2000*, 11–12, 2000.
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- Henke, T., J. Woch, R. Schwenn, U. Mall, G. Gloeckler, R. von Steiger, R.J. Forsyth, and A. Balogh, Ionisation states and magnetic topology of coronal mass ejections, *Journal of Geophysical Research* **106**, 10,597–10,613, 2001.
- Hilchenbach, M., K.C. Hsieh, D. Hovestadt, R. Kallenbach, A. Czechowski, E. Möbius, and P. Bochsler, Energetic Neutral Hydrogen of Heliospheric Origin Observed with SOHO/CELIAS at 1 AU, in: H.J. Fahr et al. (eds.), *The Outer Heliosphere: The Next Frontiers*, COSPAR Colloquia Series, in press, 2001.
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- Kallenbach, R., J. Geiss, G. Gloeckler, and R. von Steiger, Pickup ion measurements in the heliosphere—a review, *Astrophysics and Space Science* **274**, 97–114, 2000.
- Kallenbach, R., J. Geiss, and W.K. Hartmann, Introduction: A New Chapter in Mars Research, in: R. Kallenbach, J. Geiss, and W.K. Hartmann (eds.), *Chronology and Evolution of Mars*, Vol. 12, *Space Sciences Series of ISSI*, Dordrecht: Kluwer Academic Publishers, 2001, and *Space Science Reviews* **96**, 1–4, in press, 2001.
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- Pauluhn, A., I. Rüedi, S.K. Solanki, U. Schühle, K. Wilhelm, J. Lang, W.T. Thompson, J. Hollandt, M.C.E. Huber, Intercalibration of SUMER and CDS on SOHO. II. SUMER A and B detectors and CDS NIS, *Applied Optics*, in press, 2001.
- Quinn, J.M., G. Paschmann, R.B. Torbert, H. Vaith, C.E. McIlwain, G. Haerendel, O.H. Bauer, T. Bauer, W. Baumjohann, W. Fillius, M. Förster, S. Frey, E. Georgescu, S.S. Kerr, C.A. Kletzing, H. Matsui, P. Puhl-Quinn, and E.C. Whipple, Cluster EDI convection measurements across the high-latitude plasma-sheet boundary at midnight, *Annales Geophysicae* **19**, in press, 2001.
- Verani, S., K. Altwegg, J. Geiss, and S. Graf, Ethynyl radical in the coma of comet P/Halley, *Astronomy and Astrophysics*, submitted, 2001.
- Verani S., C. Barbieri, C. Benn, G. Cremonese, and M. Mendillo, Quadrantid meteor shower in the lunar sodium atmosphere, *Monthly Notices of the Royal Astronomical Society*, in press, 2001.
- von Steiger, R., Transition region: First ionisation potential effect, in: P. Murdin (ed.), *Encyclopaedia of Astronomy and Astrophysics*, Bristol: Institute of Physics Publishing, 3349–3352, 2000.
- von Steiger, R., N.A. Schwadron, L.A. Fisk, J. Geiss, G. Gloeckler, S. Hefti, B. Wilken, R.F. Wimmer-Schweingruber, and T.H. Zurbuchen, Composition of Quasi-Stationary Solar Wind Flows from Ulysses/SWICS, *Journal of Geophysical Research* **105**, 27,217–27,238, 2000.
- von Steiger, R., J.-C. Vial, P. Bochsler, M. Chaussidon, C.M.S. Cohen, B. Fleck, V.S. Heber, H. Holweger, K. Issautier, A.J. Lazarus, K.W. Ogilvie, J.A. Paquette, D.B. Reisenfeld, L. Teriaca, K. Wilhelm, S. Yusainee, J.M. Laming, and R.C. Wiens, Measuring solar abundances, in: R.F. Wimmer-Schweingruber (ed.), *Solar and Galactic Composition*, Woodbury, N.Y.: AIP Conference Proceedings, in press, 2001.
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Visitor Publications

Note: Listed are all papers written or co-authored by ISSI visitors, with some acknowledgement to ISSI, that appeared or were accepted for publication between 1 July 2000 and 30 June 2001.

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Ball, A. J., and N.I. Kömle, Forces on the Lander at the Nucleus Surface, *Report of the Rosetta Nucleus Modelling Group*, ESA SP-1165, in press 1999.

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Begemann, F., K.R. Ludwig, G.W. Lugmair, K. Min, L.E. Nyquist, P.J. Patchett, P.R. Renne, C.-Y. Shih, I.M. Villa, and R.J. Walker, Call for an improved set of decay constants for geochronological use, *Geochimica et Cosmochimica Acta* **65**, 1, 111–121, 2001.

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Izmodenov, V.V., Physics and Gasdynamics of the heliospheric interface, *Astrophysics and Space Science* **274**, 55–69, 2000.

Izmodenov, V.V., Velocity distribution of interstellar H atoms in the heliospheric interface, *Space Science Reviews*, in press, 2001.

Izmodenov, V.V., Interstellar atoms in the heliospheric interface, *Proceedings of COSPAR Colloquium on Outer Heliosphere*, in press, 2000.

Izmodenov, V.V., M. Gruntman, V. Baranov, and H. Fahr, Heliospheric ENA fluxes: how sensitive are they to the ionization state of LIC?, *Space Science Reviews*, in press, 2001.

Izmodenov, V.V., M. Gruntman, and Yu. G. Malama, Interstellar hydrogen atom distribution function in the outer heliosphere, *Journal of Geophysical Research* **106**, 10681–10689, 2001.

Izmodenov, V.V., Yu. G. Malama, A.P. Kalinin, M. Gruntman, R. Lallement, and I.P. Rodionova, Hot neutral H in the heliosphere: elastic H-H, H-P collisions, *Astrophysics and Space Science* **274**, 71–76, 2000.

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Király, P. Solar-heliospheric energetic particles - what do they teach us about galactic cosmic rays? *Journal of Physics G: Nuclear and Particle Physics* **27**, in press, 2001.

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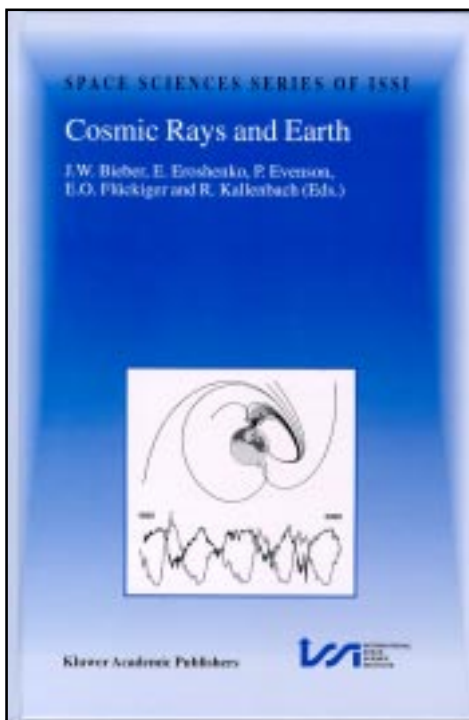
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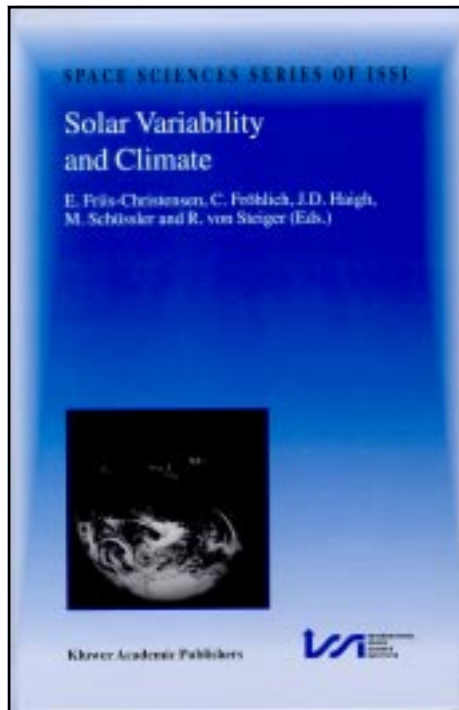
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Edited by E. Friis-Christensen (Danish Space Research Institute, Copenhagen, Denmark), Claus Fröhlich (World Radiation Center-PMOD, Davos-Dorf, Switzerland), J.D. Haigh (Blackett Laboratory, Imperial College of Science, Technology and Medicine, London, U.K.), M. Schüssler (Max-Planck-Institut für Aeronomie, Katlenburg-Lindau, Germany), and Rudolf von Steiger (ISSI). *Space Sciences Series of ISSI* (Vol. 11), Dordrecht: Kluwer Academic Publishers, hardbound, ISBN 0-7923-6741-3, 440 pp., and *Space Science Reviews* (Vol. 94, Nos. 1-2)

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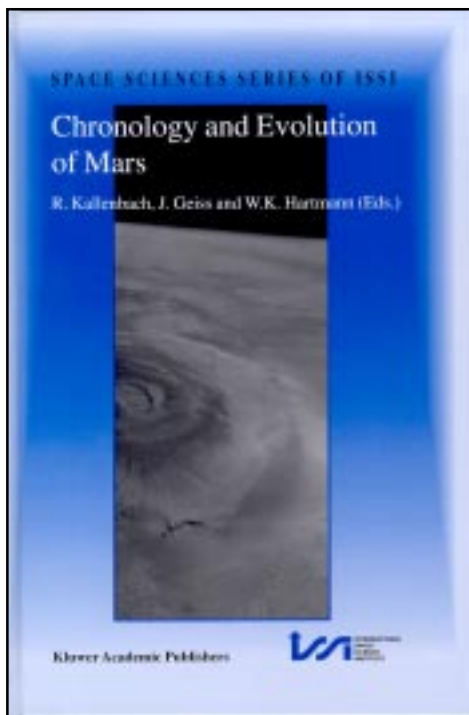
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