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Newsletter mailing list

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By mailing this form you enable us to compile a useful address file of European solar physicists. It will be available to solar physicists, for free via email as a LaTeX file and for Dfl. 100 on peel-off labels suitable for conference announcements. Send requests to Gé Geijtenbeek[1].

Rob Rutten

[1]Email: geijtenbeek@hutruu51, geijtenbeek@ruunsc.fys.ruu.nl

Solar Physics from Space
The Solar and Heliospheric Observatory

"Would you like to inaugurate a new feature 'Solar Physics from Space'?", your editor wrote to me. Indeed, I welcomed his request, for I had intended to contribute a 'Letter to the Editor' anyway. My letter would have deplored the pervasive ignorance on SOHO in the European Solar Physics Community, and would probably have started like this:

"When I became chairman of the Astronomy and Astrophysics Division of the European Physical Society (EPS), I expected that – from time to time – I would have to remind my colleagues dealing with night-sky objects that there is a nearby star, called the Sun, which is also worth studying, particularly when technological advances offer the promise of decisive progress and discoveries. Yet, here I find myself having to remind my European solar-physics colleagues that there is a major, predominantly European, solar space project – namely SOHO, the Solar and Heliospheric Observatory – which they seem to ignore! Are members of the EPS Solar Physics Section so focused on work on the photosphere that they do not consider SOHO to be a 'real' solar project, although it will observe virtually all parts of the Sun except the photosphere? (In fact, SOHO is equipped to study the solar interior, chromosphere, transition zone and corona, as well as the solar wind)."

My motivation to write such a letter became stronger by what I saw in the recent, excellent textbook on the Sun by our colleague Michael Stix, a similar pattern as in the first Newsletter of the Solar Physics Section of EPS: design studies of two major, but still not approved solar projects – the Orbiting Solar Laboratory, OSL, and the Large Earth-Based Solar Telescope, LEST – presented in quite some detail (even with an illustration), but SOHO, a solar space mission set for launch in 1995, not mentioned at all!

Thanks to your editor's action, I am now in the position to write this tirade as – a presumably welcome – invited contribution rather than as an unsolicited 'Letter to the Editor'. However, in order not to abuse this privilege I will refrain from further thoughts on the sociology of solar physics and concentrate on a description of SOHO.

Given the apparent lack of knowledge of this important solar observatory, I will also not dwell on other space projects relevant to solar physics, be they projects that have been flown in the recent past (as the Spacelab solar physics payload or the helioseismology experiment on Phobos), be they in the midst of a series of flights (as HRTS), or approved and under design, construction and test (as Eureca or Atlas), or still in the planning phase (as OSL and SIMURIS). These descriptions might be saved for later features with similar titles and more suitable (albeit perhaps less opinionated) authors.

SOHO is part of the Solar Terrestrial Science Programme (STSP), the first 'Cornerstone' of ESA's long-term scientific programme 'Horizon 2000'. STSP aims at basic understanding of the physical processes occurring in the solar-terrestrial context, and is carried out jointly by ESA and NASA (whereby ESA, contributing two-thirds of the overall cost, is the senior partner). The other part of STSP is the four-spacecraft Cluster mission, which performs in-situ studies in three dimensions of the terrestrial magnetosphere.

The scientific aims of SOHO are best summarised by the following three questions:

1. Why does the corona exist, how is it heated?
2. Where and how are the solar-wind streams accelerated?
3. What are the structure and dynamics of the solar interior?

To provide answers to these interrelated questions, a payload covering three disciplines has been selected:

1. The *coronal payload*, which will investigate the outer layers of the Sun – the chromosphere, transition region and corona – by powerful spectroscopic diagnostics, in part also combined with coronagraphic methods. The derived physical parameters (density, temperature and velocity) of the solar plasma within the coronal structures (the so-called 'building blocks' of the corona) will yield the constraints needed to discriminate among the numerous existing models of such structures. Measurements of the dynamic behaviour of the coronal plasma in these structures will elucidate the heating mechanism(s) of the corona.
2. The *solar-wind payload*, which will study the solar wind streams at one astronomical unit by in-situ techniques with a set of modern particle analysers. These instruments will be able to determine mass, energy and ionisation stage of the solar-wind ions. Combining theoretical models, in-situ observations remote sensing of the solar wind in the acceleration region will allow a unified approach to the hitherto elusive questions of solar-wind acceleration – which are probably interrelated with the coronal heating mechanism(s).
3. The *helioseismology payload*, which will probe the interior structure of the Sun by monitoring the velocity and luminosity oscillations at the solar surface. From these measurements information about the internal structure (temperature, pressure, composition) and rotation can be obtained by the methods of helioseismology.

Now, what is really new about the SOHO experiments? Obviously, the comprehensive helioseismology diagnostics made possible by a combination of space-based instruments sensing luminosity and velocity oscillations (of the 'Sun as a Star' as well as with spatial resolution) represent an unsurpassed, extremely powerful tool, which is bound to bring decisive progress in a young and rapidly developing field. The advanced particle analysers with their unprecedented collection efficiency and energy resolution will bring new insight into the solar wind acceleration. The coronal instruments will have spatial and spectral resolutions that are considerably better than those flown on Skylab, for example. The grazing incidence region, which gives access to the short wavelengths of the lines needed in measurements of electron temperatures through the line-ratio technique, will finally become accessible with spatial resolution of a few arc seconds. The wide wavelength range covered by the SOHO spectrometers will also permit 'viewing' of material over a wide temperature range (2×10^4 K to several times 10^6 K). Line-of-sight velocities will be measurable with arc-second spatial resolution down to a few km/s. Moreover, the ultraviolet coronagraph spectrometer will be able to measure transverse velocities of hydrogen atoms and several 'minor' ions in a field of view extending out to 10 solar radii by use of the so-called Doppler-dimming technique.

Finally, all measurements will be made continuously: SOHO's halo orbit around the Lagrange point L1 located on the Earth-Sun line basks in continuous sunlight.

The science of SOHO will be open to participation by the wide scientific community, through calls for proposals from guest investigators about one year before launch. Although the Announcement of Opportunity will primarily address scientists in the ESA Member states and through NASA in the USA, participation of scientists from non-member states is normally not excluded. A description of the SOHO mission and its experiments is given in ESA Report SP-1104 "The SOHO Mission – Scientific and Technical Aspects of the Instruments", which can be obtained from Mr. N. Longdon, ESA Publications Division, ESTEC, Postbus 299, NL-2200 AG Noordwijk, The Netherlands for Dfl. 25 or US$ 10. Many instrument consortia have prepared poster presentations, which you are bound to encounter at future conferences.

Martin C.E. Huber
ESA Space Science Department, ESTEC, Noordwijk

Institute Profile
Ondřejov Observatory

The history up to 1970 of the solar observations at the Ondřejov Observatory of the Astronomical Institute of the Chechoslovak Academy of Sciences has been described by Švestka (1970).

The *staff* of the Solar Department at Ondřejov changed considerably during the twenty years since 1970. Four older scientists (V. Bumba, J. Kleczek, L. Křivský, V. Letfus) had recently to retire. They hope to keep the opportunity to work scientifically. The remaining staff consists of 9 scientists (P. Ambrož, head of the department, P. Heinzel, J. Jiřička, M. Karlický, M. Klvaňa, M. Kopecký, P. Kotrč, M. Sobotka and A. Tlamicha), 2 graduate assistents (L. Souček, St. Šimberová), 5 graduate technicians (O. Kepka, M. Knížek, J. Rečková, J. Tomsa, T. Vaněk) and a few ob-

servers and other technical support staff.

The *scientific programme* of the department concerns the temporal and spatial evolution of solar activity phenomena, both from the global and local point of view and including their mutual relationships; measurements of magnetic fields and velocity fields; modeling of sunspots, flares and prominences; spectral line formation including NLTE and partial redistribution effects; MHD particle acceleration in activity processes. We habitually take part in international programmes in solar physics and solar-terrestrial relationships, cooperating at the same time with several Eastern and Western institutions under multilateral or bilateral agreements.

Of the *optical instruments* listed by Švestka (1970) the flare spectrograph (Valníček *et al.* 1959) has been improved and is in use in various programs, while the horizontal rotatable spectrograph is under reconstruction and the spectrohelioscope no more in operation. Two double instruments are available for photospheric and chromospheric photography. The smaller one takes solar patrol pictures in white light and Hα, whereas the excellent Clark objective (d = 20.5 cm) is used to investigate details in the photospheric structure of active regions during their development. A special optical scheme produces ciné frames of sunspots with very low scattered light and at large image scale ($f_{\rm eff} \approx 30$ m), in a narrow band ($\Delta\lambda \approx 6$ nm) around the Na D_1 and D_2 lines (Bumba *et al.* 1973, Sobotka *et al.* 1990). Another objective (21 cm, 9 m) with a 0.08 nm Šolc-Lyot filter is used to photograph chromospheric fine structure in Hα, while a small prominence coronagraph with a Lyot filter of 0.35/0.70 nm bandwidth permits automatic time-lapse Hα filming of prominence evolution.

There are also two new horizontal instruments with SITAL optics for spectrometry and for magnetic field measurements with a new fast-scanning photoelectric magnetograph (coelostat mirrors d = 60 cm, telescope mirror d = 50 cm, $f_{\rm eff}$ = 35 m, spectrograph f = 10 m, Bausch&Lomb grating; Ambrož *et al.* 1980, Gutke 1970). A similar third instrument will soon be installed at an altitude of 3000 m near Alma Ata, in cooperation with the Sternberg Astronomical Institute in Moscow. Finally, although the observing conditions in Ondřejov are rather good (Bumba *et al.* 1976), we have established a double solar telescope on the island Hvar in Jugoslavia (Ambrož *et al.* 1979, Ambrož 1979), in cooperation with Zagreb University.

With regards to *radio instrumentation* we maintain continuous recording of solar radio flux densities at 260, 536 and 808 MHz with one 7.5 m telescope and spectral observation (100–1200 Mhz) with another one. A SEA-monitor records solar flares on 27 kHz and a 3 m telescope registers the 3000 MHz flux. A new digital spectrometer for the 2.0–4.5 GHz range is in experimental use since April 1989 (Tlamicha 1991). All these radio systems operate automatically, including calibration.

Solar *X-ray and particle* observation campaigns are occasionally run in cooperation with the Cosmic Astrophysical Research Department of our institute, employing Interkosmos satellites and platforms.

We have always attempted to register solar activity events with as extended a coverage as instrumentation permits, to provide a meaningful basis for interpretation and theoretical modelling. Our plate vault contains extensive photographic material, including white-light sequences of sunspot fine structure, Hα flare-development pictures, flare spectrograms and movies of prominence evolution. There are also magnetic maps ($H_{\parallel}$) for many active regions and radio flux registrations for the above frequencies and spectral ranges.

For the future we plan continuation and extension of our observing and exploitation of our old and new data in interpretation and physical modelling, in improved cooperation with colleagues abroad. At the same time we look forward to see foreign solar physicists use our instruments, observations, methods and experience.

V. Bumba
Ondřejov Observatory

Ambrož P., 1979 *Hvar Obs. Bull.* **3**, No. 1, 37
Ambrož P., Bumba V., Havlíček K., Ptáček J., Suda J., 1979 *Hvar Obs. Bull.* **1**, No. 1, 15
Ambrož P., Bumba V., Klvaňa M., Macák P., 1980 *Phys. Solariterr.* Potsdam, 107
Bumba V., Hřebík F., Suda J., 1976 *Bull. Astron. Inst. Czech.* **27**, 217
Bumba V., Ranzinger P., Suda J., 1973 *Bull. Astron. Inst. Czech.* **24**, 22
Gutke D., 1979 *Jenaer Rundschau* **24**, No. 1, 32
Sobotka M., Šimberová St., Bumba V. 1990 *Bull. Astron. Inst. Czech.* **41**, in press
Švestka, Zd., 1970, *Solar Phys.* **12**, 332
Tlamicha A., 1991 *Bull. Astron. Inst. Czech.* **42**, in press
Valníček B., Letfus V., Blaha M., Švestka Zd., Seidl Zd., 1959 *Bull. Astron. Inst. Czech.* **10**, 149

JOSO-LEST Meetings

The 21^{st} meeting of the JOSO Board (Joint Organization for Solar Observations) and the 8^{th} General Assembly of the LEST Foundation (Large Earth-Based Solar Telescope) were held together in Rome in November, 1989. In fact, there were four different meetings—two scientific and two administrative:

LEST Assembly

LEST President J.-O. Stenflo reported that the meteorological site testing campaign resulted in the selection of two out of the five candidate sites for further optical testing, one on La Palma and the other on Mauna Kea. At La Palma a new site became available for LEST which is adjacent to the Swedish Solar Observatory but somewhat further from the Caldera. This is now the preferred site in the Canary Islands; in fact, it is now *the* LEST site, since the LEST council decided later to discontinue further testing of Hawaii. The LEST Design Phase was started in the beginning of 1989 by the newly formed LEST Project Group at Risö, Denmark. China withdrew from the LEST Foundation in June 1989.

The LEST Annual Report 1989, a memorandum on the decision to discard Hawaii and other LEST Reports can be obtained from Dr. O. Hauge (Institute of Theoretical Astrophysics, University of Oslo, P.O. Box 1029, N-0315 Blindern, Oslo 3, Norway).

Solar Variability

This was the first meeting of a new JOSO Working Group led by Richard Muller (Pic du Midi), concerning cycle-related changes in magnetic structure, atmospheric structure (line profiles and granulation) and global properties (oscillations, diameter, irradiance, large-scale flows, differential rotation). A summary will be published in JOSO Annual Report 1989.

Line Asymmetries

This was the third meeting of JOSO Working Group 4 and concerned measurements of spectral line asymmetries in quiet and active regions and modelling of line bisectors including 5-minute oscillations and small-amplitude evanescent waves. A summary will be published in JOSO Annual Report 1989.

JOSO Board Meeting

The following resolution passed during this business meeting may be of interest here: "The next (22nd) meeting of the JOSO Board and following meetings will be simply called "JOSO Meeting", to underline the fact that these meetings are open to all the solar physics community". The next JOSO meeting will be held during October or November 1990 in Bagnères-de-Bigorre, France, again together with the LEST Assembly.

Further information on JOSO is contained in the JOSO Annual Reports. Annual Reports 1989 and 1988 are available from Prof. G. Godoli (Dipartimento di Astronomia e Scienza dell Spazio, Università di Firenze, Largo E. Fermi, I-505126 Firenze, Italy). For Annual Reports 1986/1987 and earlier one may ask Prof. W. Mattig (Kiepenheuer-Institut für Sonnenphysik, Schöneckstrasse 6, D-7800, Freiburg, FR Germany).

A. v. Alvensleben and W. Mattig
Kiepenheuer-Institut, Freiburg

Future Meetings

1990 June 3–7, *Solar Flares: Observations and Theory*, Max '91/SMM Workshop, Estes Park, Colorado, USA. Contact: Alan Kiplinger, NOAA/SEL, R/E/SE, 325 Broadway, Boulder, CO 80303, USA.

1990 June 5–8, *Mechanisms of Chromospheric and Coronal Heating*, Heidelberg, FR Germany. Contact: P. Ulmschneider, Im Neuenheimer Feld 561, D-6900 Heidelberg, FR Germany

1990 June 25 – July 7, *28^{th} COSPAR Plenary Meeting*, The Hague, Netherlands. Contact: Netherlands Congress Centre, Postbus 82000, NL-2508 EA The Hague, The Netherlands

1990 July 17–20, *The Sun and Cool Stars: Activity, Magnetism, Dynamos*, Helsinki, Finland. Contact: I. Tuominen, Observatory and Astrophysics Laboratory, University of Helsinki, Tähtitorninmäki, SF-00130 Helsinki, Finland.

1990 August 27–31, *Solar Polarimetry*, 11^{th} Sacramento Peak Summer Workshop, Sunspot, New Mexico, USA. Contact: L.J. November, NSO-SPO, Box 62, Sunspot NM88349-0062, USA

1990 July 24–27 *Surface Inhomogeneities in Late-Type Stars*, Armagh, Northern Ireland. Contact: Project Planning, 31 Spa Road, Ballynahinch BT24 8PT, Northern Ireland

1990 July 30 – August 3, *Modeling in Solar-Terrestrial Physics*, Gordon Research Conference, Plymouth, North Hampshire, USA. Contact: M.L. Goldstein, Code 692, NASA/GSFC, Greenbelt, MD 20771, USA.

1990 September 3–7, *Stellar Atmospheres: Beyond Classical Models*, Trieste, Italy. Contact: L. Crivellari, Osservatorio Astronomico di Trieste, Via G.B. Tiepolo 11, I-34131 Trieste, Italy

1990 October 8–11, *European Astronomers Look to the Future*, 12^{th} European Regional Astronomy Meeting IAU, Davos, Switzerland. Contact: U.W. Steinlin, Astronomisches Institut der Universität Basel, Venusstrasse 7, CH-4102 Binningen, Switzerland

1990 October 16–19, *The Dynamics of Solar Flares*, Flares 22 Workshop, Chantilly, France. Contact: E. Priest, Mathematical Sciences Department, The University, St. Andrews, Fife KY16 9SS, Scotland or B. Schmieder, DASOP, F-92195 Meudon Pr. Cedex, France.

1991 May 26 – June 1, *Electromechanical Coupling of the Solar Atmosphere*, OSL Workshop, Capri, Italy. Contact: D. Spicer, Code 682, Goddard Space Flight Center, Greenbelt, MD 20771, USA.

1991 July/August, *Eruptive Solar Flares*, IAU Colloquium 133, Buenos Aires, Argentina. Contact: Z. Švestka, SRON-ROU, Sorbonnelaan 2, NL-3584 CA Utrecht, The Netherlands

1991 September 16–21, *Solar Wind Seven*, Goslar, FR Germany. Contact: Rainer Schwenn, Max Planck-Institut für Aeronomie, Postfach 20, Max Planck-Strasse 2, D-3411 Katlenburg-Lindau, FR Germany

Editorial

The SPS newsletter appears irregularly, once or twice a year. Subscription is free for every solar physicist in Europe. *To keep your name on the mailing list you should fill out the enclosed form and send it in,* unless you have done so already.

Any material of interest to solar physicists in Europe may be submitted for inclusion. Especially items on workshops and conferences for the *Future Meetings* list and short *Institute Profiles* with information on visitor programs are welcome. Please submit material to:

R.J. Rutten, Editor ESPN
Sterrekundig Instituut
Postbus 80000, NL–3508 TA Utrecht

The Netherlands.
Telephone: 31-30535200 Telefax: 31-30531601
Bitnet: rutten@hutruu51 SolarMail: rrutten
Internet: rutten@ruunsc.fys.ruu.nl
Telex: 40048 fylut nl

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