



# ESSC News

The newsletter of the ESF Expert Committee  
on Space Research

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## Editorial

For over 30 years the European Space Science Committee (ESSC) of the European Science Foundation (ESF) has been an integral part of the European space scene by providing independent advice on matters pertaining to all areas of space research. Allegedly it is the only body of its kind in Europe where such advice can be provided to European decision-makers, without having to take into consideration national bias or the obligation to balance the needs and priorities across the various fields of space research; namely, astronomy and solar system, space physics, Earth observation, life and physical sciences in space.

This capacity is the result of two converging processes. On the one hand, the wish of the ESSC funding organisations to support such a unique structure in exchange for useful advice; on the other hand, the acceptance by these same institutions of the ESSC membership renewal process where scientists are nominated and appointed solely according to their expertise and recognition at the European and international level and not as representatives of any given nation. This process ensures the independence of the recommendations delivered by the ESSC, either through direct commissioning by various space-prone institutions, or through the proactive approach of the ESSC itself.

Besides having carried out 33 studies during this period the ESSC has taken an active part in all the important decisions of the last decades, starting 25 years ago with the organisation of an international workshop in Strasbourg – where the foundation was laid for what became the Cassini-Huygens mission – up to two months ago with the presence of the ESSC as observer to the Berlin Ministerial Conference of European Space Agency (ESA) Member States, where major decisions were finally taken by the ministers to stop the decline in the buying power of various ESA programmes.

The ESSC must now face the challenges of a coordinated and fully supported European space policy, of Europe's future solar system exploration programme, of a concerted implementation of Global Monitoring for Environment and Security (GMES), of the anticipated retirement of the US Space Shuttle and International Space Station and Europe's corresponding answer. It must also adapt to a changing environment and increased requests for its expertise. The Strategic Plan 2006-2010 intends to provide the ESSC with the corresponding tools, with the support of its funding organisations.

This ESSC Newsletter should become one of these tools, aiming at increasing the visibility of our activities with our funding organisations, but also with the space science community at large, the space agencies and the European Commission. We also hope that it will become an interactive forum for the ESSC community, that is, the scientists who have been its members since the inception of the Space Science Committee in 1975. By providing them with a view of our work, we very much hope that they will in turn contribute by making suggestions for improvement and becoming a sort of ESSC 'second circle'.

Very best wishes for 2006.

**Gerhard Haerendel**

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## 1. ESA Council of Ministers, 5-6 December 2005, Berlin

The Council of ESA Member States held at ministerial level ended with what is considered as a quite positive and substantial outcome. An ESSC delegation (G. Haerendel, J.-C. Worms) attended the conference with an observer status and had the opportunity to table a written declaration and issue an oral statement. The decisions taken by the ministers seem to indicate a wish to change the downhill trend in funding of science programmes in ESA, initiated in Toulouse in 1995.

To concentrate on the science-related programmes:

- Space science (mandatory programme): for the first time since the ill-famed Toulouse Conference in 1995, funding for the mandatory programme was increased by member states at a level of 2.5% per annum. This halts the decline in buying power of this most successful programme, as recommended by the ESSC-ESF.
- The Earth Observation Envelope programme was subscribed at a level of 83.6% at the proposal of the Director General; this is to be balanced against what happened in Edinburgh in 2001, where only half of the requested amount was granted. This is also, albeit to a lesser extent, in line with our recommendations.
- Aurora is on the right track, with its first part, ExoMars, now an official programme of the ESA, which was oversubscribed at a level of 109.8%. The Aurora Core Programme is however subscribed at only 47%.
- GMES is also oversubscribed (almost 130%; to be confirmed). This is to be put in parallel with the intentions of the European Commission in this area (see below).
- The Clipper programme, while not officially abandoned, has been put on hold. The original proposal of the Director General (€30 million) showed intended subscriptions of some €8 million. The remaining interested partners withdrew their support and transferred it to other programmes, as it was agreed that no realistic programme could be achieved with that low level of funding.
- The ELIPS programme did not however stir a lot of interest in the debates and attracted only some 50% of the Director General's request. Although the Edinburgh meeting witnessed a similar cut to ELIPS 1, this current lack of funding could prove a severe blow to a number of engaged programmes in that area of research where Europe is leading the way, even with regard to the USA.



Oral statement by G. Haerendel, ESSC Chair, during the ESA Council of Ministers, Berlin, 5-6 December 2005

Finally, the European Commission, represented in Berlin by Commissioner Günter Verheugen, made some significantly important statements. These forecast a higher level of involvement of the Commission in space-related activities, in line with the recent decisions taken by the Competitiveness Council on 28 November 2005, which reached a consensus on financing future European space research under FP7. This concerns space-based applications (mainly GMES), exploration of space, research and technological development for security. Apart from its involvement on Galileo, the EC will develop as a first step three pilot services to be ready in 2008:

- the Emergency Management service (reinforcement of the European capacity to predict and respond to security and emergencies associated with natural and human-made disasters);
- the Land Monitoring service (delivery of information on land use and land cover changes);
- the Marine services (availability of data, information products and indicators on the condition of the seas).

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## 2. ESSC Strategic Plan

In line with a suggestion by the Chair and Executive Scientific Secretary which was incorporated into the response to the 2003 ESSC review panel report it was proposed to draft a strategic plan and a financial plan for the activities of the ESSC over the next five years. This suggestion was approved by the ESF Executive Board during its meeting in the spring of 2004. The Board requested that the ESSC should prepare a strategic plan which the Board will discuss and approve in the first half of 2006.

The draft strategic plan is the result of several discussions in the committee to provide the guidelines and main elements of such a document, to be discussed and approved by the ESSC members at their January 2006 plenary meeting. Following approval, a financial as well as an implementation plan should be set up. Three questions provide a frame for the structuring of this strategic plan: (1) What are the challenges to be met in the coming years? (2) What difference does and can ESSC make? (3) What is the structure needed to make that difference?

With the development of the European Space Policy and the major initiatives based on space activities at the international level, the role of the ESSC should be amplified and diversified in order to set up a high-level independent body aimed at providing advice and expertise in the European space arena, by:

- striving to keep space research as a basic pillar of the European space venture;
- supporting European visibility and advising on a role for Europe in global initiatives;
- carrying out regular surveys to address the status and perspectives of European space activities.

The foreseen date for the approval of the strategic plan is April 2006 (formal approval by the ESF Executive Board). The financial plan should be ready at the end of March and the implementation plan should be discussed and approved by the ESSC members during the June 2006 plenary meeting.

### 3. Study on funding of European space science

The ESSC has been commissioned by ESA to conduct a study on funding of European space research in the last 10 years. This project is very ambitious, especially as regards the different funding structures in each ESA member state. As a very first step, ESSC approached funding bodies in ESA member states (research councils and space agencies) to identify the level of funding devoted to space research and to identify the main laboratories and research institutions that were granted funds. Although a number of interesting integrated figures were obtained in this way, it soon became clear that we would have to redefine our approach for the following reasons: (1) there existed a risk, as yet unresolved, of duplicating the information coming from various sources; (2) several institutions were not exhaustive in providing their information; identifying gaps would then be impossible; (3) it proved quite difficult to compile the information coming from various sources with different accounting methods.

Hence, following an initial period where we attempted to retrieve the data by using two sets of questionnaires sent to individuals and funding agencies, the scope of the exercise was redefined and it was decided, in agreement with the ESA, to concentrate on global, institutionally provided figures in the three following domains:

- *Space science*: astronomy, astrophysics, planetary exploration, fundamental physics, solar physics, space physics.
- *Earth sciences*: atmosphere, ocean, solid Earth, continental land. Meteorology (for example MSG) and other 'application-oriented' programmes could also be considered.
- *EMIR/ELIPS and ISS utilisation*: physiology, medical research, life sciences, fluid science, materials science.

In order to familiarise the national funding agencies with the process of data gathering and also to agree on a common set of indicators, we organised a workshop in September 2005. Workshop attendants were sent in advance the state-of-the-art collection of data, with requests to correct/fill in missing areas. The workshop however concluded that the data gathered so far was ambiguous and incomplete and that the categories used needed to be better defined. The workshop participants were asked to provide us with their annual expenditures devoted to their national programmes and to their contributions to ESA, for the 1994-2004 period. In parallel, we asked ESA directly to provide us with its own figures. Overall, the value of the contributions from national agencies following the workshop was very different depending on the country. In some cases the correct contributions to national programmes could not be obtained, either by lack of answer or because the information had never been compiled in that country.

Ideally, we wanted to retrieve the actual spending figures in current prices and exchange rates but this information was very difficult, if not impossible, to get and we then devoted our efforts to gathering the annual budgets (planned expenditures). Correction for economic conditions/inflation was carried out in using the European Harmonised Consumer Price Index (CPI). Other inflation-related indices will also be considered.

#### Status

Concerning the ESA contributions, we have built a complete set of data for Earth and space sciences. In addition, similar figures were obtained for Japan and for the USA, enabling comparisons by discipline between Europe, Japan and the USA. This was carried out to estimate and highlight the weaknesses of Europe in terms of investment, at least vis-à-vis the USA. A first-order comparison confronts the European space budgets with the American and the Japanese budgets. A refined comparison could also make use of GNP-based and national expenditure-based ratios in various domains such as agriculture, education or environment. This could demonstrate the level of priority assigned by Europe to its space sector.

At present the data gathering process is essentially over. A meeting of the Steering Committee for this study is scheduled to take place in Frankfurt on 2 February 2006 to appraise this whole process, inspect the data obtained and the conclusions inferred therefrom. We expect to deliver the final report to ESA in April 2006.

#### A further possible step: the mission database

Ideally the figures retrieved during this study should feature actual expenditures and not budgets. Hence, in order to reach the desired detailed level of information the funding information should ultimately be cross-checked with a database gathering all the missions in which European countries have been involved, complete with the corresponding expenditures. This database should contain the following elements:

- mission
- countries involved
- mission Project Manager
- list of instruments
- Principal Investigators of instruments
- contact persons in the institutions funding these instruments.

For reasons of time, this part of the study has been put on hold but it is clear that such a tool would be extremely valuable. ESSC has now created a database of around 255 missions including 160 satellites in the domains of space physics and Earth sciences, around 70 microgravity missions and 25 ESA parabolic flights. For the 160 satellites launched between 1989 and 2003, the Project Manager of the overall mission has been contacted in order to find the email address of each Principal Investigator (PI) who collaborated to the mission, and the mission costs split by phase. Regarding the cost aspect, it is however quite difficult to retrieve anything worthwhile. Our database should feature roughly 300 space missions.

## 4. Views on ESA's Aurora programme

In preparation for the Berlin Ministerial Conference, ESA initiated a consultation to develop a stakeholder-driven European space exploration strategy, based in part on the work done since 2002 in the context of the Aurora programme. Although this future exploration programme encompasses more than just science, it is clear nonetheless that it should contain a strong underpinning science component. Therefore the ESA asked ESSC to set up an ad hoc committee of experts, in order to consult with the users' community and to produce a report to update the science aspects of ESA's space exploration roadmap.

ESSC has agreed to provide independent advice on this strategic cornerstone 'Knowledge', with the aim of identifying Europe's role, or 'window of leadership', in an international exploration programme. The programme proposal should also address what is realistically available for Europe in this domain, and the global context in which it evolves. Therefore, ESSC formed a Steering Group and ad hoc committee to carry out this evaluation exercise for ESA. The tasks of this ad hoc committee were to assess the status of the Aurora programme within a global context, to evaluate the expectations of the European scientific community with regard to the future exploration programme of Europe, and to establish science-strategic guidelines to update the science goals of ESA's space exploration programme for the next 20 years. It had two formal meetings and its members also attended other events that were relevant to the purpose of this study. Since the schedule imposed by ESA did not allow a wide user consultation, the ad hoc committee consulted with, and interviewed, relevant experts, ESA executives, etc. A report was produced by this ad hoc committee and a draft, advance version, was sent to ESA prior to the ministerial conference. Since the exercise also involved other stakeholders, the ESSC was invited to attend related events during this process. A final meeting devoted to science aspects of the exploration programmes took place in ESA headquarters in Paris on 16 September 2005, chaired by Roger Bonnet, and at which ESSC was asked to present its draft report.

ESA subsequently published a first draft version of their strategy in this domain (The Future of European Space Exploration: Towards a European Long-Term Strategy).

## 5. Intercommittee activities

There exist several activities for which the ESSC interest is shared by several ESF Standing and Expert Committees. Activities of common interest that have been identified so far are GMES, life in extreme environments, space weather, astronomy in polar regions, ethics in science, and human exploration of the solar system. The following paragraphs detail two of these activities.

### Life in extreme environments

This appeared as an area which could lead these bodies to organise a joint event in the near future, each committee contributing in areas covered by its regular activity:

• ESSC	astro/exobiology
• ESSC-EPB-EMB-LESC	drilling (Lake Vostok, Gakkel ridge, etc)
• All five committees	isolation studies
• EMB-LESC	ocean thermal vents
• EPB-LESC	cryosphere, bacteria in Antarctica or other deserts

The topic can also be linked to a future ESF activity dealing with human exploration of the solar system (see below). In February 2004 a common call for Expressions of Interest was jointly issued by these ESF bodies on the topic Investigating Life in Extreme Environments. Following this call 282 Expressions of Interest from 27 countries were received: 57% of them from Germany (18%), UK (16%), Italy (14%) and France (9%). There was a significant participation from Russia (12 EoIs) and eastern European countries (25 EoIs). Concerning the topics covered, approximately 33% of the Expressions of Interest dealt with the marine environment, 22% with the polar environment and 16% with the space environment. An Advisory Group on this matter was constituted and held its first meeting on 22 October, 2004. This Advisory Group is composed of six life and Earth scientists.

More recently, the Standing Committee for Humanities (SCH) and the ESF European Medical Research Councils (EMRC) committees also decided to become involved in this activity. During its meeting in October, and after having sifted the Expressions of Interest received, the Advisory Group recommended organising a workshop bringing together 130 to 150 participants dealing with the topic Investigating Life in Extreme Environments. This workshop was organised from 5 to 8 November 2005 with the aim of refining Europe's science community's strategy for research in the area of extreme environments. It was organised around plenary and splinter sessions. As a large spectrum of the European scientific community responded to the call, the workshop was organised around seven sessions, three of which dealt with cross-disciplinary issues:

- Defining and characterising the boundary conditions of extreme environments
- Molecular adaptation and stability in extreme environments
- Microbial life in extreme environments
- Life strategies of plants in extreme environments
- Life strategies of animals in extreme environments
- Human adaptation in extreme environments
- Enabling technologies and applications.

A report from this event will be published during the spring of 2006 by the European Science Foundation.

### Global approach of human exploration of the solar system

As already indicated, one of the most important shortcomings of our evaluation of ESA's Aurora programme was the fact that the exercise had to be carried out in a very short time frame, without the possibility henceforth to conduct a wide user - consultation with the various concerned scientific communities. This limitation was made known to ESA and the possibility is currently being investigated to ask ESSC to complement the initial prospective strategic assessment by a more thorough, in-depth scientific evaluation, especially given the positive context in which Aurora evolved after the decisions made during the Ministerial Conference.

Regardless of this possible commissioned activity, this is an immediate occasion for ESSC, aided by ESF, to look at these issues in a very pro-active fashion. We could take the initiative of an international event aimed at reflecting on a global approach for human exploration of the solar system. US colleagues would be invited to participate and contribute to this reflexion. Since exploration covers themes which are broader than science and encompass the whole of society, other areas, such as humanities, medicine and social sciences should be asked to contribute. Related committees exist within ESF and would be interested by this prospect. The ESF has recently implemented a new cross-disciplinary funding instrument that might be used for supporting such an event. The next deadline is on 15 March 2006.

## 6. Annual meeting of ESSC funding organisations

The first annual meeting of ESSC Funding Organisations (EFOs) took place in Frankfurt on 25 October 2005. The aim is to offer EFOs a regular opportunity to exchange information on the ESSC activities and membership, provide suggestions for activities or requests for specialised advice. EFOs were presented with the draft Strategic Plan and financial elements. A very useful discussion took place concerning the role of the ESSC in the current context and in the near future.

### Acronyms used in this Newsletter

**ELIPS:**

European Life and Physical Sciences in Space programme

**EMB:**

Marine Board-ESF

**EMIR:**

European Microgravity Research programme

**EPB:**

European Polar Board

**GMES:**

Global Monitoring for Environment and Security

**GNP:**

Gross National (Domestic) Product

**ISS:**

International Space Station

**LESC:**

ESF Standing Committee for Life, Earth and Environmental Sciences

**SCH:**

ESF Standing Committee for the Humanities



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**European Science Foundation (ESF)**

The European Science Foundation promotes high quality science at a European level. It acts as a catalyst for the development of science by bringing together leading scientists and funding agencies to debate, plan and implement pan-European initiatives. It is an association of 78 national research councils, academies and other funding agencies from 30 countries.

**European Space Science Committee (ESSC)**

Created in 1975, the ESSC is the ESF's Expert Committee on space research. It is ESF's interface with ESA, EC and national space agencies on space-related aspects. The ESSC covers space physical science, Earth observation, and life and physical sciences in space. It investigates and presents the view of the scientific community in Europe on space research issues and provides an independent voice on European space science policy.

**Chair:** Professor Gerhard Haerendel (Germany)

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