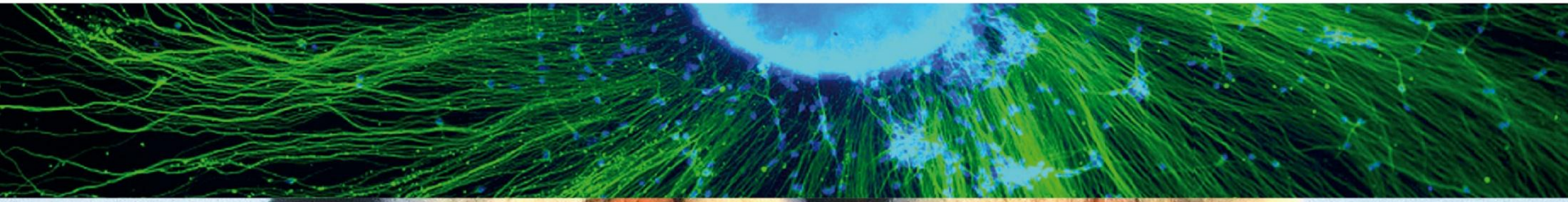
EUROPEAN SCIENCE FOUNDATION

European Science Foundation



ESF Member Organisations

ESF is an independent association of 67 Member Organisations

- research funding organisations
- research performing organisations
- academies and learned societies

in 29 countries

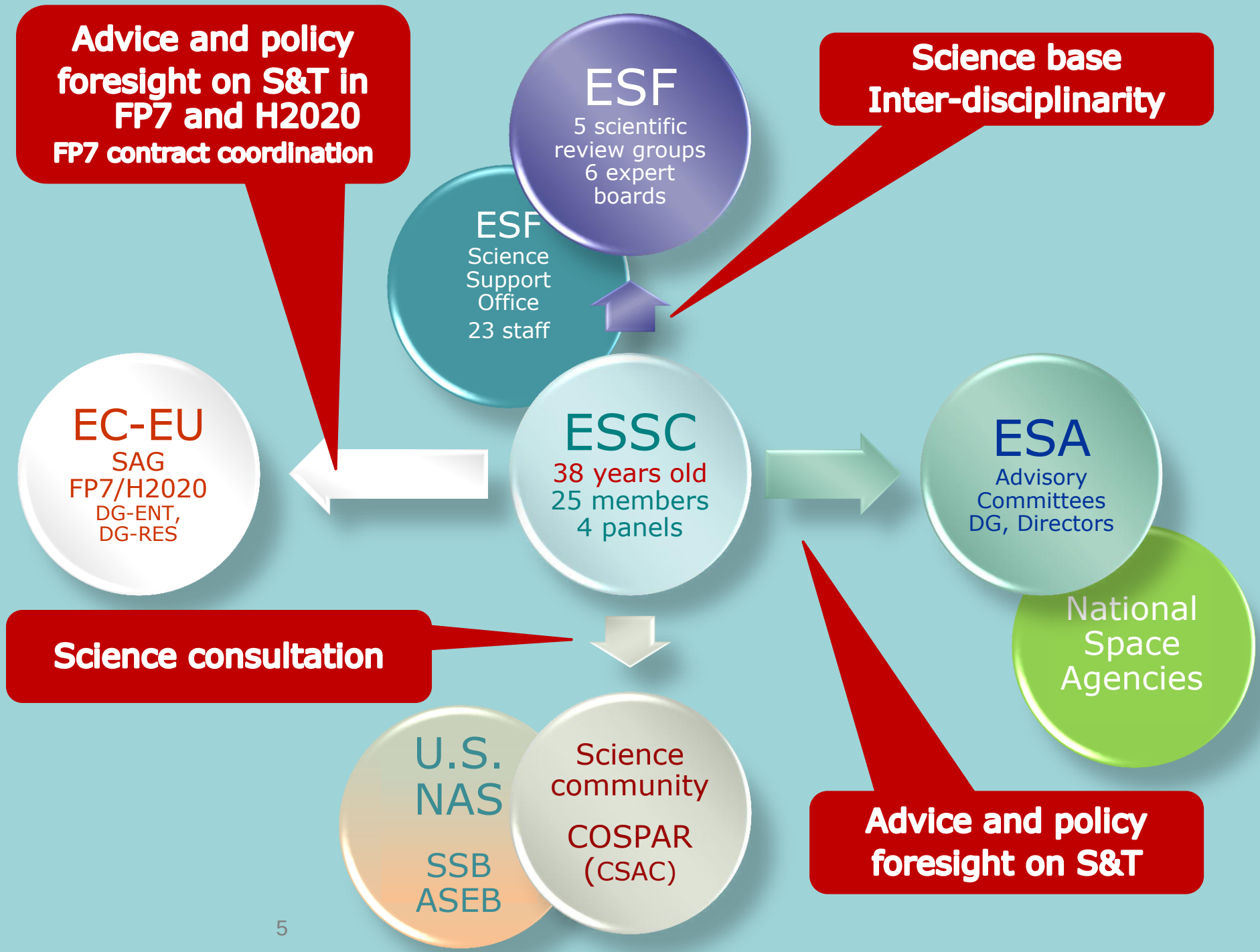
Expert Boards and Committees

Voices for European science

Nuclear Physics European Collaboration Committee	
European Space Sciences Committee	
European Marine Board	
European Polar Board	
Committee on Radio Astronomy Frequencies	
Materials Science and Engineering Expert Committee	

ESSC Mission Statement

“ The mission of the ESSC is to provide an independent European voice on European space research and policy. It is the ESF’s expert body on space research ”


Advice and policy foresight on S&T in FP7 and H2020
FP7 contract coordination
ESF
5 scientific review groups
6 expert boards
Science base
Inter-disciplinarity
ESF
Science Support Office
23 staff
EC-EU
SAG FP7/H2020
DG-ENT, DG-RES
ESSC
38 years old
25 members
4 panels
ESA
Advisory Committees
DG, Directors
National Space Agencies
Science consultation
U.S. NAS
SSB
ASEB
Science community
COSPAR
(CSAC)
Advice and policy foresight on S&T

Ex officio representation

- **European Space Agency**
  - Council at Ministerial level
  - High-level Science Policy Advisory Committee
  - Scientific advisory committees at programme level
- **European Commission** (during FP7)
  - FP7 Space Advisory Group (individuals)
  - SAG Exploration sub-committee (individuals)
- **US National Academies**
  - Space Studies Board
  - Discipline committees of the SSB (CAPS)
- **Other representations**
  - COSPAR Science Advisory Committee (ex officio)
  - UKSA's Science Policy Advisory Committee
  - UN Office of Outer Space Affairs (NEO Action Team 14)
- **Past representations**
  - OECD (NEO Work Group)

ESSC Chair: Jean-Pierre Swings

Solar System and Exploration

- **Ian Crawford**, Moon **(Chair)**

- **Ester Antonucci**, Solar physics
- **Doris Breuer**, Mars
- **Kari Muinonen ,** Small bodies
- **Hermann Opgenoorth,** Earth sciences and space physics
- **Petra Rettberg**: Exobiology, biology

Research in Weightlessness

- **Gregor Morfill**, Complex plasmas (**Chair**)

- **Gilles Clément**, Neurophysiology
- **Dominique Langevin,** Fluid physics and foam
- **Michael Lebert**, Biology
- **Andreas Meyer** , Materials science

Astronomy and Fundamental physics

- **Roberto Battiston,** Fundamental physics, **(Chair)**

- **Pierre Binetruy**, Fundamental physics
- **Paolo de Bernardis,** IR/sub-mm astronomy
- **Jørgen Christensen-Dalsgaard**, Exoplanets and astroseismology,
- **Jean-Pierre Swings,** Astronomy
- **Jordi Torra**, Galactic astronomy and astrometry
- **Stéphane Udry,** Exoplanets

Earth Sciences

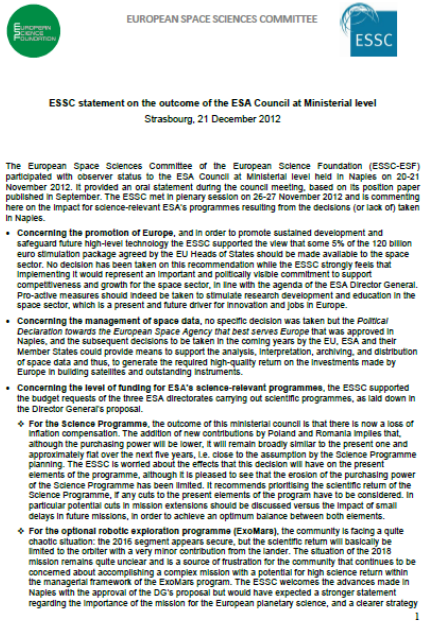
- **Frans von der Dunk,** Space law and policy, (**Chair**)

- **Heiko Balzter**, Land-atmosphere interface
- **Ian Brown,** Glaciology
- **Andreas Kääb,** Earth Observation and satellite-based glaciology
- **Vinciane Lacroix**, GMES and disaster management
- **Pieternel Levelt**, Atmospheric physics and chemistry
- **Mathias Schardt**, Soil remote sensing

Activities (ESSC & ESF Space Office)

- **FP7 Coordination Actions (Coordinator/Project Office)**
  - CAREX (2008-2011) and THESEUS (2010-2012)
  - MEGAHIT* (2013-2014) and ASTROMAP (2013-2015)
  - MASE (2013-2016)
- **Shaping Space in Horizon 2020 – written contribution in 2011 and SRC survey during summer 2013**
- **Commisionned studies (ESA)**
  - ELIPS programme 4th evaluation (2011-2012)
  - Planetary Protection guidelines evaluation for ESA on Mars Sample Return (2011-2012) and Phobos Sample Return (2014?)
  - Foresight on breakthrough technologies TECHBREAK (2010-2013)

** with Russia*



RECENT REPORTS AND PUBLICATIONS

Upcoming

- Chair renewal foreseen at the May plenary meeting
- Next period marked by evolution of ESF and establishment of hosting entity for ESF Expert Boards and Committees
- Next ESSC Strategic Plan 2014-2018
  → towards a European Space Board?
- Next (46th) plenary meeting in Leicester, UK, with presence of Charles and Michael

News from Europe
ESA (1)

- ExoMars : agreements with Roscosmos, approval of Science Management Plan, preparation of long term plans (incl. Moon)
- postponement of Gaia's launch date
- PO/PR preparation of Rosetta's comet (CG) encounter + "docking“
- "end" of Planck

News from Europe
ESA (2)

- *Recommendation from ESA's SSAC (Bern, Oct. 29 & 30)*

  "Following consideration of the Senior Survey Committee and endorsements by AWG, SSEWG, FPAC, the SRE Director is proposing to the Science Policy Committee the selection of the science themes for the large L2 and L3 mission flight opportunities, along the following lines

  – *For **L2**, currently scheduled in **2028**, the Director proposes to select the science theme **" The hot and energetic Universe"**, to be pursued by implementing a large collecting area X-ray observatory (incl. gamma-ray bursts monitoring, note JPS)*
  – *For **L3** flight opportunity, currently scheduled in **2034**, the Director proposes to select the science theme **"The gravitational Universe"**, to be pursued by implementing a gravitational wave observatory*

News from Europe
ESA (3)

A first step towards an integrated, long-term vision for ESA on science and its enabling technologies

- HiSPAC Grand Science Themes
  1- Terrestrial & cosmic climate
  2- Understanding gravity
  3- Life in the Universe
  4- Cosmic radiation & magnetism
  + grand astronautical challenges, enabling technology clusters for future science missions (e.g. cold atom devices, large ultra-stable structures, large monolithic telescopes and mirrors)
- ESSC TECHBREAK “Overwhelming Drivers”
  1- Reduce mass, maintain stiffness
  2- Build a spacecraft that can last 50 years
  3- Deploy a 30m+ telescope into space
  4- Autonomous geophysical survey of planets
  5- Enable humans to stay in space for more than 2 years

News from Europe (4)
Privileged science partner for the EC

- Engagement with the EC since at least 1992 (FP3-FP4) and contribution to Science in GMES (2001), Green & White Papers for Space (2005) → European Space Policy
- ESSC current and former members in EC's Space Advisory Group (ESSC was asked to nominate people in previous SAG)
- EC DG-ENT systematic presence in ESSC plenary meetings
- Observer role and keynote presentations on EC-ESA international ministerial conferences on space exploration (Prague 10/2009, Brussels 10/2010)
- Keynote presentations on H2020-SPACE at an EC Hearing (Brussels, Dec. 2010)
- Keynote presentation, round table participation and concluding speech at an EC conference on FP7-SPACE (Budapest, May 2011)
- Keynote presentation at an FP7/H2020 conference (Lisbon, May 2011)
- Rapporteur at an EC conference on space technologies (Brussels, July 2011)
- **ESSC round table participation on Future Directions in European Space Research (Cyprus, November 2012)**
- **ESSC keynote presentations and Rapporteur role at EC consultation workshops on Strategic Research Clusters in H2020 (Brussels 01/2013 & Madrid 02/2013)**

SRC survey and ESSC report

January-February and April 2013


ESSC recommendations for the Strategic Research Clusters of Horizon 2020

ESSC Recommendations for the SRC of Horizon 2020
Comparison with the EC Draft Work Programme 2014-2015

SRC proposal for Space Situational Awareness - Space Weather

The focus of this activity would be an integrated approach to space weather data and systems. Our fundamental understanding of space weather phenomena is still insufficient to provide very efficient forecast or even warnings. Solar weather activity has impact in all aspects of the European society, in particular in aspects such as satellite communications (Galileo), energy pipelines, airline safety, etc. In many of these areas Europe already has an impressive track record in terms of research and development, contributions to space missions and scientific publications.

The final goal would be to understand solar activity impact on the Earth and its environment to a level allowing prediction.

Areas of coordination within this SRC can be:

i. To develop a coupled system of models that can forecast space weather from the Sun to the Earth's surface to help protect satellites, power grids, aviation, navigation, and other forms of modern technology. The coordination action will ensure support for the science underpinning space weather.

ii. Support for observatories (digisondes, magnetometers, neutron monitors, radio burst monitors and coronagraphs and others) to guarantee continuous high quality near real time data delivery, as well as European autonomy in space weather monitoring. This is an area where the EC can really complement the ESA efforts in the domain.

iii. From a space mission definition point of view, the current level of knowledge of space environment often leads to excessive design margins ("overdesign") and higher mission costs than necessary. The coordination action will lead to the development of engineering standards to deal with 'normal' space weather as well as low frequency, high impact events. This is the area that will benefit most the European space

Call "Protection of European assets in and from space – 2014 (page 19)

The present call concerns space weather and Near Earth Objects (NEOs) (... ***Note: The NEO SRC was dropped from the ESSC final proposal***)

Space Weather activity aims at monitoring understanding and forecasting such phenomena to prevent it. Research is needed to improve our understanding and convert our scientific knowledge into an operational service.

PROTEC 1 - 2014: Space Weather (page 19)

Exploratory work studying new ideas for data analysis and modeling of space weather with a view to enhancing the performance of space weather prediction. Research into further improvement of existing models and their validation in the context of international cooperation with leading space weather service providers and/or related to emerging European space weather services.

(page 18) This should contribute to new services able to predict, with a significantly higher precision than today, space weather events affecting the Earth and the near Earth space environment

ESSC recommendations (SRCs)

- **Space Situational Awareness - Space Weather**
  an integrated approach to space weather data and systems. Goal: understanding solar activity impact on the Earth and its environment to a level allowing prediction.
- **Scientific Research Enabling Human Space Exploration**
  to further study the effects of long duration space flight and simulations on crew health and performance, to further develop efficient countermeasures, and to facilitate post-flight re-adaptation to the terrestrial environment.
- **Astrobiology and Planetary Protection**
  an integrated approach to space analogue sites that encompasses life in extreme environments, planetary protection aspects and “Search for Life” research.
- **Space Data for Climate Models**
  to develop well-calibrated space data with quantified uncertainties to be used to initialise, constrain and validate climate models

ESSC recommendations (overarching and other issues)

- **Data exploitation**
  to improve framework conditions, manpower and infrastructure for space data preservation and exploitation
- **Sustaining (ESA) missions related large communities**
  upstream and downstream support to mission teams and/or networks

- **Advanced propulsion**
  an enabler for science and industry and a cornerstone for space science and exploration
- **Small satellites and Cubesat development**
  popular topic amongst the European space sciences community
- **Technology Development**
  important goal strongly supported by the community

H2020 Work Programme 2014/2015

- No SRC directly linked to “basic” space research
- A lot of convergence between the WP language and ESSC recommendations, including more-technology-oriented SRCs (e.g. advanced – nuclear – propulsion)
- A particularly important inclusion in that language, if followed by budgetary support, is the upstream support to missions (aspect not adequately covered in Europe by ESA, nor MS)