



## **ESA's Support To Science Element (STSE): A New Opportunity for the Science Community**

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In 1998, the document ESA SP-1227: "The Science and Research Elements of ESA's Living Planet Programme", laid out the research objectives for the scientific component of the Living Planet Program. These were formulated around four themes: Earth Interior, Physical Climate, Geosphere/Biosphere and Atmosphere & Marine Environment: Anthropogenic Impact. These themes encompassed the full scope of Earth Science. Although no specific area of Earth Science was prioritised, the document emphasised the need to move towards an integrated Earth System Model, where the role of internationally coordinated scientific programmes and coordination with national programmes and other agencies and organisations were recognised as being a key aspect of the science strategy.

In 2006, the EO Science Strategy was updated (ESA/PB-EO(2006)89) under the auspices of the ESA's Earth Science Advisory Committee (ESAC) in wide consultation with the scientific community. The resulting document: "The Changing Earth – New Scientific Challenges for ESA's Living Planet Programme" (ESA/SP-1304) outlines the new scientific direction for the future progress of the ESA Living Planet Programme. In particular, the document set out the 25 major challenges for our understanding of the Earth System with especial focus on those areas of knowledge where satellite data may make a major contribution.

Achieving those challenges will require a large international effort involving, novel observation, enhanced data sets, improved models and coordinated research. ESA is contributing to those efforts through its missions (e.g., the ERS1 and 2, ENVISAT, the Meteorological satellites and the coming Earth Explorers and Sentinel series) and exploitation programs. However, in order to further reinforce the ESA support to the scientific community, a dedicated element of the Envelop program was launched in 2008, the Support To Science Element (STSE).

STSE aims at providing "scientific support for both future and on-going missions, by taking a proactive role in the formulation of new mission concepts and of the related scientific agenda, by offering a multi-mission support to the scientific use of ESA Earth Observation mission data and to the promotion of the achieved results".

The program is articulated in four main action lines:

### **a. Future Mission Concepts**

This Action Line will undertake science activities in support of the development of future mission concepts and their scientific agenda, with the ultimate target of establishing a solid portfolio of scientifically sound novel mission concepts in preparation for the next generation of Earth Explorers. This will involve a development process in support of scientific institutions in member countries to investigate new mission ideas and developing them to a level where they can form the basis for an actual mission proposal.

### **b. Novel Observations and products**

The ultimate goal of this Action Line is to establish a wide portfolio of novel and scientifically sound geo-information products that go beyond the single mission baseline objectives, setting up a solid scientific basis for novel EO data sets, new applications and future services. This will involve activities in support of scientific institutions and industry in member countries to investigate, develop and validate novel and enhanced algorithms and methods and bringing them to a status of maturity where they can be the basis for a demonstration phase or

for transferring to an operational stage.

c. Support to Earth Science

The ultimate target of this Action Line is to enhance the scientific exploitation and use of ESA data by the earth science community maximising the scientific return and earth system research results of ESA missions. This will involve scientific activities aimed at improving our knowledge of the Earth system and its processes, improving modelling, data assimilation and forecasting exploiting ESA EO assets. In particular, this Action Line will be implemented mainly by a dedicated initiative, The Changing Earth Science Network, which provides support to young scientist (at post-doctoral level) to address the strategic scientific challenges of the Living Planet Program.

d. Strategic Actions

The objective of this Action Line is to reinforce the strategic links of the Agency with the major international scientific programs, allow ESA to provide a timely and rapid response to key scientific priorities and needs that may arise at any time from international science programs or innovative initiatives and undertake opportune strategic studies in response to requirements concerning the development of the EO science strategy.

This paper will describe the main activities carried out under this new element of ESA's EO programs, present the activities already initiated and the coming opportunities for the future.