



## **Spaceborne observations of a changing Earth – Contribution from ESA´s operating and approved satellite missions.**

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The overall vision for ESA´s Earth Observation activities is to play a central role in developing the global capability to understand planet Earth, predict changes, and mitigate negative effects of global change on its populations.

Since Earth observation from space first became possible more than forty years ago, it has become central to monitoring and understanding how the dynamics of the Earth System work. The greatest progress has been in meteorology, where space-based observations have become indispensable, but it is now also progressively penetrating many of the fields making up Earth sciences.

Exploiting Earth observation from space presents major multidisciplinary challenges to the researches working in the Earth sciences, to the technologists who build the state-of-the-art sensors, and to the scientists interpreting measurements made of processes occurring on or within the Earth´s surface and in its atmosphere. The scientific community has shown considerable imagination in rising to these challenges, and in exploiting the latest technological developments to measure from space the complex processes and interactions that occur in the Earth System.

In parallel, there has been significant progress in developing computer models that represent the many processes that make up the Earth System, and the interactions and feedback between them. Success in developing this holistic view is inextricably linked to the data provided by Earth Observation systems. Satellites provide the fundamental, consistent, regular and global measurements needed to drive, parameterise, test and improve those Earth System models.

These developments, together with changes in society´s awareness of the need for information on a changing world, have repetitively supported the decisions on how ESA can best focus its resources, and those of the European community that it serves, in order to address critical issues in Earth System science. Moreover, it is a fact that many operational, managerial and regulatory activities (i.e. weather forecasting, deforestation, flooding, etc.) essential to the safe exploitation of global resources, conservation of sustainable ecosystems, and the compliance with numerous international treaties and conventions, depend absolutely on continuity of satellite missions to maximise socio-economic and environmental benefits.

This presentation will highlight some of the multidisciplinary Earth science achievements and operational applications using ESA satellite missions. It will also address some of the key scientific challenges and need for operational monitoring services in the years to come. It capitalizes on the knowledge and awareness outlined in “The Changing Earth - New scientific challenges for ESA´s Living Planet Programme” issued in 2006 together with updated views and approved plans expressed during ESA´s Earth Sciences Advisory Committee (ESAC) meetings and agreed at the recent User Consultation meeting in January 2009.