

THE ESA PROGRAMMES OF EARTH OBSERVATION: AN INTRODUCTION

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Earth Observation encompasses several geophysical disciplines: remote sensing, meteorology, geodesy, atmospheric studies, cryosphere studies, etc. The past, present and future satellites of Earth Observation of the European Space Agency (ESA) cover all these fields.

Building on the experience gained with the French series of SPOT satellites, the Agency has launched several remote sensing satellites (ERS-1, ERS-2 and Envisat) carrying different kinds of instruments, among which the Synthetic Aperture Radar (SAR) is mostly used yielding spectacular insights of the planetary surface and subsurface features.

ESA Meteorological satellites encompass three series of satellites, Meteosat-1 to -7 (from 1977 to 1997), MSG-1 and -2 (2002 and 2005), and Metop-1 (launched in 2006), yielding information on weather evolution and patterns. Future developments include the new MTG (Meteosat Third Generation) series.

In the frame of the Earth Exploration programme, ESA is preparing six missions to study Earth's atmosphere, biosphere, hydrosphere, cryosphere and interior, with the overall emphasis on learning more about the interactions between these components and the impact that human activity is having on the Earth's natural processes. The first of these missions GOCE (*Gravity Field and Steady-State Ocean Circulation Explorer*) will be launch at the end of 2007. It will be followed in 2009 by ADM-Aeolus (*Atmospheric Dynamics Mission*) which will observe global vertical wind profiles, Earth's gravity field and the geoid. After the launch failure of the first Cryosat in 2005, Cryosat-2 will be launched in 2009 with a radar-altimeter to measure thickness variations of Earth's continental ice sheets and marine ice cover. The mission SMOS (*Soil Moisture and Ocean Salinity*) foreseen for 2008 will study ocean salinity, the water cycle and soil moisture, all vital indicators for weather forecasting, climate monitoring and prediction of extreme events on Earth. The SWARM mission is a four-year mission foreseen to be launched in 2010, designed to investigate Earth's magnetic field. EarthCARE (*Earth Clouds, Aerosols and Radiation Explorer*), due for launch in 2012, is a cooperative mission with Japan, addressing the interactions between clouds, radiative and aerosol processes.

Finally, the joint GMES (*Global Monitoring for Environment and Security*) initiative between the European Union and ESA will collect and manage environmental and civil security data and information. Several series of satellites, known as *Sentinels*, are under study and the first *Sentinels* will be launched in 2011.

The conference will review these missions and present some main characteristics of some of them.