

# euinsight

## The EU and Space: Science, Exploration, and Industry

For more than three decades, Europe has been actively involved in developing space technology and science through both national programs and the efforts of the European Space Agency (ESA), an intergovernmental agency launched in 1975 to promote European cooperation in space.

Today, much of Europe—and indeed much of the world—depends on space-based technology, whether for communication, navigation, or observation, and space has become a key issue for the European Union. In 2003, the European Commission—the executive arm of the EU—and ESA formally joined forces, drawing on each organization's complementary strengths to further advance European space travel, exploration, research, and technology in the 21st century.

The European Commission drives the exploitation of space for the benefit of its citizens; ensures the continuity of relevant operational services; develops appropriate regulatory frameworks; and coordinates and promotes a single European position in international fora.

The ESA and its 17 member countries—including 15 EU Member States—are responsible for the implementation of space programs, space-related scientific research, and the procurement of resources needed for

space activities, particularly access to space and technology.

EU-ESA operations are supported by a new European space policy, jointly drafted by the European Commission and ESA, which outlines for the first time a unified European vision for the space sector. The new policy strives to develop and exploit space applications which serve the needs of Europe and its citizens; address space-related security and defense issues; foster a strong and competitive space industry; ensure independent, cost-effective access to space; and promote a European initiative in space exploration.

### European Science in Space

In February 2008, NASA's space shuttle Atlantis successfully delivered ESA's state-of-the-art Columbus laboratory to the International Space Station (ISS), ushering in a new era for European scientific and industrial research and technology development.

Columbus—Europe's first permanent human outpost in orbit—nearly doubled the laboratory capacity of the ISS and can support hundreds of experiments annually. The laboratory is ESA's biggest single contribution to the International Space Station, and is equipped with flexible research facilities that offer capabilities in areas



| Jules Verne ATV (ESA/D. Ducros)

including biology, human physiology, fluid and material sciences, physics, astronomy, remote sensing, and technology development. A network of User Support and Operations Centers throughout Europe allows researchers on the ground to follow on-board experiments in real time.

As a partner in the ISS program, ESA also contributes to ISS operations through unmanned servicing missions, such as the one carried out by Jules Verne, the first of five Automated Transfer Vehicles (ATVs), in April 2008. Jules Verne ferried spare parts, experiments, propellant, and crew equipment and supplies to the ISS, which depends on such regular deliveries. ATVs also re-boost the space station to compensate for its orbital decay, and are indispensable to the operation of the ISS.

### Europe's Launch Capabilities

Independent and cost-effective access to space is a strategic objective for Europe, and in the near future, Europe will have a range of launch vehicles capable of launching the smallest scientific satellite or the heaviest commercial communication device from ESA's Kourou spaceport in French Guiana.

The ESA-developed Vega launcher for smaller missions will complement the current Ariane heavy-lift launchers and the Russian Soyuz medium-lift craft that is being adapted for use at Kourou.

### European Space Agency (ESA)

Established in 1975, ESA conceives and implements—on behalf of its member states—space activities and programs that would be beyond the capabilities of individual European countries. ESA's earliest objectives remain valid today: a competitive European space industry; researchers that lead the way in scientific discovery; high-quality satellite-based services for European citizens and governments; and a strong share of the global space market.

With headquarters in Paris and technical and operation centers throughout Europe, ESA has an annual budget of just under €3 billion. ESA cooperates with all major space powers, particularly the U.S. and Russia.

ESA's main spaceport is the Guiana Space Center in Kourou, French Guiana, on the northeast coast of South America, a site made available by France.

# Industry: Space Applications Keeping Europe Competitive

Space systems and space-based technologies are a critical part of daily life. From telecommunications to television, weather forecasting to global financial systems, most key services depend on space to function correctly, so the space industry plays a crucial role in maintaining Europe's industrial and technological competitiveness.

Europe's public sector investment in civilian space activities is approximately €6 billion, half invested through ESA, and the remainder through national programs. In addition, the EU has increased its own funding to support a European space program to €1.4 billion (2007-2013) through its 7th Framework Program (FP7) in Research and Technological development.

Galileo (the EU's global navigation positioning system) and Kopernikus (a global monitoring system for environment and security) are priority programs with applications ranging from tracking agricultural yields and climate change to widespread use of positioning and navigation services to improve transport safety and efficiency.

## Global Positioning: EGNOS and Galileo

Europe has followed a two-step approach to develop its own global navigation satellite system. The European Geostationary Navigation Overlay Service (EGNOS)—the forerunner to Galileo—was developed by ESA in partnership with the EU and Eurocontrol,

the European Organization for the Safety of Air Navigation.

EGNOS, already available throughout Europe and the Mediterranean, utilizes a network of ground stations and transponders installed in geostationary satellites to improve the accuracy of information derived from U.S. GPS signals. Financed by the EU, EGNOS is the first European-owned and operated GPS infrastructure, and will contribute to safer and more efficient air traffic management.

Galileo, Europe's state-of-the-art global navigation satellite system, is designed to provide a highly accurate, accessible, and guaranteed global positioning service by 2013. A joint ESA-EU program, it is the first such system entirely under civilian control and is totally interoperable with the American GPS and the Russian GLONASS systems. Once its full array of 30 satellites is operational, Galileo will be able to accurately determine positioning to within a meter, even in high-rise cities.

EU-U.S. cooperation has paved the way for the compatibility and joint use of Galileo and GPS and has simplified the manufacture of equipment capable of receiving both signals. The European Commission is the program manager for the deployment phase of the Galileo program, which will be entirely financed by the EU. In July 2008, the EU allocated more than €3.4 billion (2007-2013) for EGNOS and Galileo.

## Kopernikus: Global Monitoring for Environment and Security

Launched in 1998, Europe's Global Monitoring for Environment and Security (GMES)—recently rechristened Kopernikus—combines satellites in earth orbit with ground, air, and sea-based measuring instruments that provide data to support the needs of policymakers and citizens.

The joint EU-ESA Kopernikus program maps roads, topography and land-use patterns, and provides data that helps to forecast weather, urban air pollution levels and marine water quality. Kopernikus satellite images also support disaster mitigation measures and emergency relief efforts, such as those following the 2004 tsunami.

The European Commission identifies user needs and provides for development of services, while ESA manages implementation. More than 80 percent of the FP7 €1.4 billion space budget (2007-2013) supports the Kopernikus initiative.

### On the Web

#### European Space Policy

<http://ec.europa.eu/enterprise/space>



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## European Space Exploration Missions

- **Ulysses:** Constructed in Europe and launched in 1990 on the space shuttle Discovery, Ulysses has successfully orbited the poles of the sun for more than 17 years, giving scientists an unparalleled view of the heliosphere.
- **Mars Express:** The Mars Express orbiter and lander were launched in 2003 from the Baikonur Cosmodrome in Kazakhstan. The orbiter's mission includes investigating various aspects of the Martian atmosphere, providing high-resolution photo geology, and mineralogical mapping. The lander, unfortunately, was lost.
- **Rosetta:** Designed to orbit and land on a comet, Rosetta launched from Kourou in 2004 and will be the first space vehicle to thoroughly explore a comet at close quarters. Rosetta aims to study the origin of comets, which are among the most primitive objects in the solar system, to better understand the evolution of the universe.
- **Huygens:** ESA's contribution to the NASA Cassini Saturn Orbiter, Huygens is an atmospheric probe that successfully provided data on the physical, atmospheric, and meteorological aspects of Titan, Saturn's largest moon. The Huygens probe landed on Titan in early 2005 after an interplanetary journey of nearly seven years—the only landing to occur in the outer solar system and the furthest from Earth.
- **ExoMars:** Due to launch in 2013, ExoMars marks an important milestone in potential human exploration of the Red Planet. ExoMars will study the possibility of life on Mars, while demonstrating the descent and landing of a large payload as well as novel mobility and drilling capabilities.

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