

Europe without Space?— A thought experiment

At the latest since the adoption of the European Space Policy in April 2007, it has become a commonplace among European decision-makers that space-based technologies provide a broad range of benefits for private users, governments and public institutions alike and must therefore be fostered. The same message is conveyed by the short film “Space & You”, produced by the Directorate General “Enterprise and Industry” of the European Commission and available on its website (http://ec.europa.eu/enterprise/space/index_en.html, Rev. 2008-10-27).

Yet what exactly are the societal benefits derived from space, and do they outweigh the high costs for the development and launch of space technologies? To illustrate how space has by now profoundly altered and enriched our lives – often without us even noticing it – the thought experiment “Europe without Space” is conducted here: If one imagined that the European countries completely abandoned all involvement in space activities from one day to the next, how would this alter our daily lives? And what influence would it have on the EU’s international scientific, political and economic standing?



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Europe with Space— Benefits and Future Prospects

As the thought experiment “Europe without Space?” has shown, European citizens, public institutions and businesses benefit greatly from Europe’s involvement in space. Although the annual taxes dedicated to space-related purposes amount to hardly more than the costs of a cinema ticket for each citizen of the ESA Member States, Europe has been able to celebrate major scientific achievements in space and has established itself as a key mission partner of the large space-faring nations. As was further exemplified by the design and construction of the European Columbus Laboratory for the International Space Station (ISS) and the Automated Transfer Vehicle (ATV) Jules Verne, Europe has joined the ranks of the technological leaders in the space domain, which has had important spill-over effects not only for the European space industry but also for the scope and pace of technological innovation in Europe in general. In the area of space applications, satellites have brought news, entertainment and educational programmes to remote households and are boosting economic development by making agriculture more effective, air, road and sea travel faster and safer, and financial transactions more reliable. Finally, space applications are promoting human security by aiding in crime prosecution, humanitarian operations, or the management of food, resources and natural or man-made disasters.

In order to maintain and further increase its benefits from space activities, Europe should:

- increase the number, lifetime and utility of its space-based services,
- unite different user communities under more comprehensive user frameworks,
- involve the private sector in space ventures to the greatest possible degree, for instance through Public-Private Partnerships (PPPs),
- bridge the gap between academic research and technology development on the one side and the practical implementation of space applications on the other side,
- better exploit the potential of space for education and inspiration, e.g. by means of school projects or raising money for charity through space missions,
- take cooperation in the space field as a starting point for strengthening Europe’s role in the world in general,
- promote long-term security in space through comprehensive and fair space traffic rules.



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„Europe without Space?“



Why space is indispensable for Europe’s future

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Society and Business

No satellite television: About 100 million TV screens in Europe would stay blank if the EU ceased all space activities – this being the number of European households with direct or indirect access to satellite television. Apart from broadcasting entertainment, global news or sports events like the Olympics, satellite television is used for educational purposes especially in remote areas, as by the Italian university distance education programme “NETTUNO” or the “Trapeze” remote schooling system developed by ESA and Belgium. Moreover, many of the 64 million migrants in Europe could not stay in touch with developments in their home countries without satellite TV.

Less reliable weather forecasts: Without weather satellites such as Meteosat (operated by EUMETSAT, a consortium of 30 European Member and Cooperating States), the accuracy and range of weather forecasts would significantly decrease. Because satellites can cover remote areas and fill in gaps between weather ground stations that are often hundreds of kilometres apart, they provide the only means for obtaining global and gap-free weather information. Aside from benefitting private citizens, accurate weather forecasts also have important business implications, e.g. for planning airplane routes or harvest dates. If Europe stopped using weather satellites, this would thus greatly hurt European citizens and enterprises.

Less effective road and sea travel: Satellite navigation has profoundly improved the effectiveness of road and sea travel in Europe in recent years. For instance, several countries have implemented or are currently implementing GPS-based toll collect systems, among them the UK, Germany, the Netherlands, Austria and Hungary. It has also been estimated that satellite navigation reduces vehicle mileage by 16% and travel time by 18% and that by 2020, over 450 million cars will be equipped with on-board satellite navigation systems worldwide. In the maritime sector, satellite navigation helps to monitor cargo and fleets, optimise loading and delivery schedules, and locate fishing traps and nets. None of these benefits would accrue to Europe if it abandoned its space-related activities.

Less agricultural rationalisation: Satellite-based navigation has found its way into precision agriculture by optimising fertiliser spreading, minimising pesticide spraying, increasing sowing precision and measuring crop yield during harvest. A European farmer reported: “Since I started using GPS, I’ve made a 10% saving in time.” Without access to space technologies, Europe would not be able to benefit from such advances in agricultural technology made possible through space.

Loss of business opportunities and jobs: The European space industry has an annual turnover of more than five billion euros and currently employs about 40,000 people. In addition, 250,000 jobs are estimated to be directly dependent on the European space sector. In effect, almost 300,000 jobs would thus be threatened if Europe stopped being involved in space activities.

Inaccurate financial transactions: GPS-based time synchronisation has come to play a very important role in the financial sector, for instance for determining the exact timing and sequence of orders on the stock market. If Europe abandoned this practise from one day to another, this would have serious consequences for investors.

Science and Technology

End of scientific discoveries in space: Without space science, we would know hardly anything about the origins of the Earth, the origin and development of the Universe or the possibility of life on other planets. To find out more about outer space and the context on which life on Earth depends, the European Space Agency (ESA) has for decades conducted scientific missions exploring our solar system and the Sun’s environment, often also in cooperation with international partners. Among the scientific milestones achieved through these missions are close-up looks at the Moon, Mars and Venus, the landing of a probe on Saturn’s largest moon Titan, the measurement of the expansion of the Universe by the Hubble telescope, or recently the investigation of the interior of sun-like stars by the COROT satellite.

End of scientific research of the planet Earth: Space science not only helps us to explore the Universe, but also to look back on our planet Earth through different eyes. For instance, satellites have become indispensable tools for measuring winds and monitoring resources, sea level rise and global temperature change. In Europe, more than 2800 scientific projects currently rely on data transmitted by ESA’s Envisat, ERS and Third Party Mission satellites. If Europe completely abandoned its involvement in space activities, it would thus also close itself off from paramount scientific knowledge and advances.

Pace of technological innovation slowed down: The space industry has become a major driver of technological innovation in Europe. Until 2008, more than 200 space technologies were transferred to non-space applications via ESA’s Technology Transfer Programme. Examples include a romper suit for the tele-monitoring of ill babies (based on a technology developed for monitoring astronaut health) or a software for the extraction and processing of natural gas from the North Sea (originally a space operations simulation software). Without space research, technological innovation in Europe would lag increasingly behind the space-faring nations, eventually resulting in a loss of income and qualified jobs.

Lost chances to tap on new energy forms: For several decades already, scientists have been investigating possibilities for collecting solar power in space, converting it to electricity and transmitting it to the Earth by means of Solar Power Satellites (SPS), Power Relay Satellites (PRS) or Lunar Power Stations (LPS). Although these ideas are only visionary as of yet, Europe would permanently forestall its partaking in any such trailblazing possibilities if it gave up its space activities.

Lost chances of education and inspiration: In popular culture, space is generally associated with adventure, high technology, and the hopes and future of humanity. Science fiction novels, comic strips like “Captain Future”, TV series such as “Star Trek” or “The Jetsons” and films like “Starwars” or “WALL•E” have not only enthused young people for decades, but have also fostered an interest in science, engineering and technology-oriented careers. As is exemplified by the Space Generation Advisory Council (SGAC), a youth organisation with over 4,000 members in 90 countries, space issues are also inducing young people to become politically involved. If Europe turned away from space, it would therefore deprive its youth of an important vehicle for developing visions for the future.

Security and Influence

Military and strategic disadvantages: Four countries in Europe currently operate dual-use or military satellites: France, Germany, Italy and the UK. During field operations, these satellites provide communications services (telephony, internet, video conferencing) and can be used for radar surveillance and telemedicine purposes. If the European militaries stopped using or developing military satellite applications, this would not only reduce the effectiveness of their operation planning but also imply a great strategic disadvantage vis-à-vis other nations and especially the U.S. and Russia, which in 2006 together operated about 220 of the 270 existing military satellites.

Solving crimes more difficult: Not only militaries, but also police forces rely on satellite applications. For instance, Criminal Police Offices use GPS-based navigation systems for tracking suspects’ routes and whereabouts. Already in 1999, GPS-based evidence led to the conviction of a person responsible for several bombings in Germany. Without satellite-based surveillance instruments, less crimes would thus be solved or prevented in Europe.

Less lives saved: If Europe had given space the cold shoulder in 2006, 157 lives would not have been saved with the help of the COSPAS-SARSAT international satellite system. Since its inception in 1982, the COSPAS-SARSAT system has helped to rescue 22,412 persons worldwide. In 2006, there were 60 distress situations on European territories, out of which COSPAS-SARSAT gave the only alert in 35% and the first alert in another 20% of the cases.

Disaster monitoring more difficult: In the monitoring and management of natural and man-made disasters, Earth observation satellites are much more cost-effective and less dependent on daylight and good weather conditions than traditional airplane surveys. For instance, when the oil tanker *Prestige* split in half off the coast of Spain in November 2002 – spilling more than 75 million litres of oil into the Atlantic ocean – data from ESA’s Envisat and ERS satellite systems were used by both relief agencies and the European Commission to coordinate the emergency operations. If Europe abandoned all space activities, this would seriously affect the cost and effectiveness of disaster monitoring and management operations in Europe.

Political isolation of Europe: In spite of its high security relevance, space as a policy area is often characterised by technical issues and interdependence among actors. For this reason, cooperation and pragmatic alliances have emerged in the space field that could hardly have been established in other policy areas. For instance, Switzerland was among the founding members of the European Space Agency although it never joined the European Union, and Canada has been actively participating in ESA’s governing bodies under a Cooperating State Agreement since 1979. Moreover, ESA has formalized cooperation with many non-European States on projects as diverse as the International Space Station, the “Tiger” initiative for water resource management in Africa or the joint ESA-China “Dragon” Earth observation programme. If Europe jumped off the space train, it would thus deprive itself of a very valuable “soft power” policy instrument and development cooperation tool as well as of the opportunity to shape international regulations in the space field in the framework of the United Nations.