

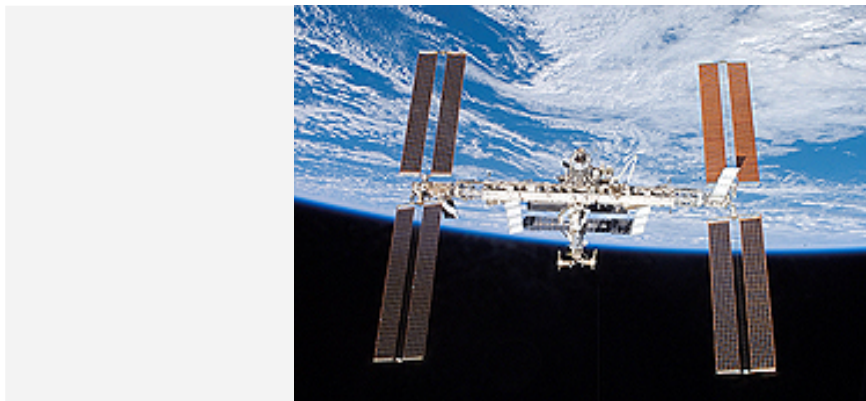
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Ten years in space: The International Space Station

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Ten years of the ISS in pictures

On 20 November 1998, a Russian Proton rocket lifted off from the Baikonur Cosmodrome for a historic mission: It was carrying the first module of the International Space Station ISS, named Zarya (Russian for "Dawn"). This cargo and control module, which weighs about 20 tonnes and is almost 13 metres long, provides electrical power, propulsion, flight path guidance and storage space. The launch of the module, also known as FGB (the Russian acronym for "Functional Cargo Block"), heralded a new era in space exploration, as, for the first time ever, lasting cooperation in space was achieved between Russia, the US, Europe, Canada and Japan.



The ISS - largest human outpost in space

Over the next ten years, many other modules were brought into orbit, and ISS developed into the largest human outpost in space. Since that time, the building blocks, transported by Russian launch vehicles or the US Space Shuttle, have expanded the ISS to the size of a soccer pitch and a current total mass of about 300 tonnes.

Competition in space replaced by a spirit of international cooperation

The history of the ISS encompasses many firsts and milestones for human spaceflight. The first important step in the run-up to the project was the conclusion of an international agreement between the US, ten European countries (represented by the European Space Agency ESA), Japan and Canada. In 1988, this so-called "unprecedented contract" entered the history of space exploration as one of the most extensive documents relating to international cooperation. Following the end of the Cold War, a spirit of international cooperation replaced the space race in which the two superpowers, the US and Russia, had been engaged up to that point. In 1993, the US invited Russia to join the International Space Station programme. Russia could not just contribute its immense wealth of experience, gained through operating its own MIR space station, but it could also provide "Proton" and "Soyuz" launch vehicles in order to supply the ISS and transport its crews. In the 1990s, Western scientists were already using the Russian MIR space station for numerous joint experiments.



Launch of Space Shuttle Atlantis in September 2000

September 2000: The first crew arrives

In September 2000, two crew members of the STS-106 US Space Shuttle mission floated into the ISS for the first time. Since November 2000, the station has been permanently occupied by two or three astronauts and/or cosmonauts.

The ISS has already become the largest "artificial" celestial object - inside, it has about the same amount of space as a jumbo jet. On its completion, scheduled for 2010, the ISS will consist of six research laboratories, two accommodation units, an observation cupola, a large number of storage areas, connecting nodes, docking devices and robotic arms.

April 2001: The first European on board



Thomas Reiter and his fellow crew members onboard the ISS

In April 2001, Italian Umberto Guidoni was the first European astronaut on board the ISS. In the summer of 2006, Thomas Reiter of Germany started a new chapter by setting off for the ISS as the first European astronaut to undertake a long-duration mission to the space station, spending almost six months on board in the context of the "Astrolab" mission in order to conduct more than 30 scientific experiments in addition to performing maintenance and service work. For the first time, European scientists were able to compile a research programme specifically designed to utilise the possibilities offered by the ISS, and to implement it over a longer period of time. Moreover, "Astrolab" was the first long-duration mission of ESA that was coordinated by the Columbus Control Centre at DLR in Oberpfaffenhofen.

Europe's main contribution to research and provisioning - the Columbus space laboratory and the ATV supply spacecraft

On 7 February 2008, Space Shuttle "Atlantis", with the two ESA astronauts Hans Schlegel and Léopold Eyharts on board, was launched on its mission to carry the "Columbus" space laboratory to the ISS. "Columbus", Europe's main contribution to the ISS, is the first European space laboratory designed for long-term, multidisciplinary research in space. Led by EADS Astrium in Bremen, 41 companies from 14 different countries were involved in developing "Columbus". Since the space laboratory was taken into operation, about 40 German experiments have been started, and in some cases they have already been

completed. This was made possible not least by successful intergovernmental cooperation, both between DLR's Space Agency (DLR Raumfahrt-Agentur) and the ISS partners and between ESA member states.



ATV docked with the ISS

In April 2008, the European ATV supply spacecraft (Automated Transfer Vehicle) fully automatically docked to the ISS for the first time, carrying a payload of 7.5 tonnes. The purpose of this spacecraft, called "Jules Verne", was to re-boost the ISS in its orbit and to supply the space station with food, fresh water, clothes, oxygen as well as technical equipment for experimentation and ISS maintenance. It was subsequently used as a storage and sleeping area, before undocking in September 2008 in order to burn up almost completely in the atmosphere during re-entry, carrying a full load of waste. The plan is to send an ATV to the ISS once every 18 months in order to ensure the station's continued operation.

Germany - foremost European ISS partner

Germany is the foremost European ISS partner for the European Space Agency ESA. As largest financial contributor, the Federal Republic contributes 41 per cent of the European ISS infrastructure. It also provides a substantial contribution to the scientific use of the space station. DLR's Space Agency coordinates the German activities within ESA's ISS programmes related to the construction, operation and use of the station. Germany contributes, among other things:

- the Columbus research laboratory
- the development of the ATV supply spacecraft (Automated Transfer Vehicle)
- the planning and execution of the utilisation and operation programme, including astronaut deployment
- the operation of the Columbus Control Centre in Oberpfaffenhofen
- the data management system for the Russian Zarya module
- the robotic arm (ERA) for the Russian section of the space station

German scientists have been involved since the scientific operation of the space station started in 2001. Since that time they have accomplished numerous single and serial experiments on board the ISS. These experiments concerned health research (research into the human equilibrium, immune and circulatory systems in weightlessness), growing protein crystals, fundamental physics (plasma research) as well as biological questions.



Hans Schlegel working on the Columbus laboratory

Showing the way for research and industry

Scientists are still expressing great interest in conducting experiments in weightlessness on board the ISS. Almost 70 new German projects, the majority of which have been initiated by DLR, have successfully left behind the international competition and are now awaiting their implementation on board the International Space Station.

The plan is to develop the European space laboratory "Columbus" into a major research facility in Earth orbit in the future, making it available for non-space-related companies as well. Such companies are increasingly interested in using weightlessness in the development of process technologies and products. Through the "GoSpace" initiative, especially small and medium-sized enterprises are to be given the opportunity to conduct research on board the ISS.

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