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## News Archive 2009

### Happy birthday, Columbus!

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On 7 February 2008, Space Shuttle Atlantis (flight STS-122) was launched from Kennedy Space Center in Florida to bring the Columbus space laboratory to the International Space Station, ISS. Columbus was permanently attached to the ISS and taken into operation on 11 February 2008, as the first European space laboratory for long-term research under space conditions.



Hans Schlegel working on the Columbus laboratory

Columbus is Europe's main contribution to the ISS. It is expected to remain in service for at least ten years. Immediately after it had docked to the ISS, research on board Columbus began. From February to March 2008, for instance, the WAICO experiment (Waving and Coiling of Arabidopsis) was carried out. This gravitational biology experiment aims to establish the orientation of plants in the absence of gravity. WAICO was the first of a range of biological research experiments to be conducted in Biolab, one of the experiment racks in the Columbus laboratory. WAICO 2, the follow-up experiment, has been scheduled for summer 2009.

#### DLR experiments in the Columbus laboratory

The Expose-EuTEF facility, used to conduct radiation biology and astrobiology experiments, has been operational since February 2008 as well. It currently accommodates experiments such as DOSIS, investigating radiation dosimetry, ADAPT, investigating adaptation strategies of microorganisms, and PROTECT, investigating the resistance of spores to extraterrestrial conditions. All three experiments are provided by the Institute of Aerospace Medicine (Institut für Luft- und Raumfahrtmedizin) of the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR). Another DLR experiment is SOLO (Sodium Loading in Microgravity). This human physiology experiment investigates if an increased dietary intake of salt intensifies the bone resorption that already occurs in weightless conditions even further.

In total, some 40 German experiments have been started on board the ISS since 2001, and in some cases they have already been completed as well. This research has focused on the fields of biotechnology, aerospace medicine and plasma crystal research. At the moment, some 60 additional German experiments are awaiting implementation. In short, the astronauts have more than enough research work to do.

#### Columbus Control Center: On duty 24 hours a day



DLR Columbus Control Center

When Columbus was taken into operation, the Columbus Control Center (Columbus-Kontrollzentrum), located within the German Space Operations Center (Deutsches Raumfahrt-Kontrollzentrum) at DLR Oberpfaffenhofen, also became fully operational. The Columbus Control Center controls the operation of the space laboratory and coordinates its scientific programme on behalf of ESA. Since last year, more than 75 scientists and engineers of the Industrial Operator Team (IOT) have been on duty for the European space laboratory, in order to ensure its round-the-clock operation. In total, they have already invested 240 000 working hours in the Columbus project. This has allowed the control centre to gain some important experience already.

"The Columbus module has been operational for a year now, providing a platform for experiments in weightless conditions. However, constant monitoring from Earth is required to ensure a pleasant and safe working environment for the astronauts", says Dr Dieter Sabath, Head of Mission Operations at the Columbus Control Center. "The Flight Control Team has successfully prepared and carried all of the work required to operate Columbus during the first year. It has also provided support for the necessary maintenance work. It has become clear, however, that to ensure Columbus's long-term operation we need to spend almost exactly the same amount of time on preparatory work as on shift work at the terminals. For the moment, though, shift work still constitutes the greatest part of our activities."

#### **Six astronauts on board ISS at all times from May 2009**



The ISS with the Columbus module

The experience gained so far has also made it possible to shape the cooperation between the different ground teams (the Flight Control Team, or FCT, the Ground Control Team, or GCT, the European Planning Team, or EPT, and the Engineering Support Team, or EST) in a more efficient way, and to develop concepts for future improvements. This increased efficiency is essential for handling the intensified payload operation on board Columbus that will begin when Belgian ESA astronaut Frank de Winne boards the ISS for the European long-term mission OasISS in May.

From that moment, the resident crew of the ISS will double in size from three to six astronauts. This means that astronauts will have more time to operate the experiments (an increase from about 30 to about 100 hours of astronaut labour hours per increment for ESA experiments). This in turn means that more work is required to prepare the additional experiments, and that more ground-based support is required during their operation, as it is possible that several experiments will be conducted at the same time. Frank de Winne's presence on board the ISS also brings about a substantial increase in the Columbus Control Center's workload, since it is the main point of contact for European astronauts.

## **Contact**

### **Andreas Schütz**

German Aerospace Center (DLR), Corporate Communications, Spokesman  
Tel: +49 2203 601-2474  
Mobile: +49 171 3126466  
Fax: +49 2203 601-3249  
E-Mail: andreas.schuetz@dlr.de

### **Dr. Dieter Sabath**

German Aerospace Center (DLR)  
Tel: +49 8153 28-2494  
Fax: +49 8153 28-1455  
E-Mail: Dieter.Sabath@dlr.de

### **Prof. Hans-Günter Ruyters**

German Aerospace Center  
Space Administration, Microgravity Research and Life Sciences  
Tel: +49 228 447-214  
Fax: +49 228 447-735  
E-Mail: Guenter.Ruyters@dlr.de

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