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1 December 2005

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Today, on Thursday 1 December 2005, a research rocket deployed by the German Aerospace Center (DLR) and the European Space Agency (ESA), took off from Kiruna in northern Sweden at 10:04 CET. The launch was a successful continuation of the science programme TEXUS (the German abbreviation for *Technological Experiments in Zero Gravity*) operated by the two organisations. During the parabolic flight at a maximum height of 270 kilometres, there will be approximately six minutes of weightlessness on board the rocket. Scientists from German universities and from industry will be using this weightless environment to explore problems in biology, materials science and physics.

The three experiments on board the current mission, TEXUS EML, were primarily concerned with issues in materials science. These experiments were almost fully automatic, but they were directly monitored from the ground via data transmission and could also be directly remote-controlled by the researchers. The equipment, housed in a 3m long cylindrical lightweight metal structure, landed by parachute according to plan about 20 minutes after the launch.

Material compositions in zero gravity

The rocket's main payload was the Electromagnetic Levitation System (EML). Using this system, scientists from the University of Ulm and the company Hydro Aluminium Deutschland GmbH studied the thermophysical properties of material compositions that are of interest to industry in two separate experiments. Thus, for example, the rocket carried titanium-aluminium compounds like those which are used in aircraft and power station turbines. Much more accurate measurements can be made in zero gravity than in laboratories on Earth, because a weightless environment serves to reduce considerably the necessary holding forces and thus internal flows in the liquid metal probe which would interfere with results. This allows researchers to gather highly accurate data which will be key to future computer simulations. Simulations of this type are becoming ever more important to modern manufacturing processes.

A third experiment, sponsored by DLR and the German Federal Ministry for Education and Research, was carried out by the Centre for Applied Space Technology and Microgravity at the University of Bremen. Scientists used this experiment to measure the flow of a liquid in an unsealed capillary tube. The results of this experiment will help to answer some fundamental questions in fluid mechanics. One practical application of these results will be to help us understand the behaviour of fluids in zero gravity, for example when fuel is being supplied to the tanks of spacecraft and satellites.

DLR and ESA tasked the company EADS Space Transportation from Bremen with preparing for the launching and managing the TEXUS EML mission. Munich-based firm Kayser-Threde and DLR's mobile rocket base (MORABA) at Oberpfaffenhofen (Germany) are also involved in the mission.

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