

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Future Space Transportation Systems Verification and In-Flight Experimentation (6)

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SHEFEX II FIRST MISSION REPORT

**Abstract**

Within the SHEFEX flight test programme, the German Aerospace Center focuses on the development for re-entry and hypersonic technology. Using adapted sounding rocket systems as used for micro gravity research it is possible to perform cost effective flight tests in a short time period. Thus, besides material or structural testing of hardware, the comparison of real flight data with numerical simulations and ground test results is very important to adjust and verify simulation tools and the plausibility of ground test results.

Launched by a Brazilian two staged sounding rocket system SHEFEX II was a consequent next step in technology test and demonstration. Considering all experience and collected flight data obtained during the SHEFEX I Mission, the test vehicle was enlarged and extended by an active control system, which allows active aerodynamic control during the re-entry phase. Thus, besides the faceted ceramic thermal protection system and actively cooled elements, ceramic based aerodynamic control elements (canards), mechanical actuators and an automatic flight control unit were implemented as key technology experiments. In addition, supporting subcomponents like different inertial platforms and a star tracker sensor were part of SHEFEX II to provide accurate data related to position and orientation of the vehicle.

In addition, some other experiments including advanced sensor equipment for temperature, heat flux and pressure, high temperature antenna inserts etc. were flown with SHEFEX II. From national and international companies and universities some passenger experiments were integrated to investigate and demonstrate advanced metallic and ceramic based thermal protection elements and a sensor system package, which was developed for ESA's EXPERT mission.

The paper will present the launch campaign of April 2012 and some of the first results.