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SOUNDING ROCKETS ARE UNIQUE EXPERIMENTAL PLATFORMS

Abstract

Sounding rockets are unique experimental platforms! They are unmanned, short-term available, cost-effective and can achieve both, in-situ measurements or flight experimentation in all layers of the atmosphere and multi-minute operations in space with heights and distances of well over 1,000 km. During the flight, the data can be sent to ground stations in real-time. The user has the opportunity to interact in the experiment timeline by means of a telecommand and control. The payloads can often be recovered and reused in large parts.

Mobile Rocket Base (MORABA), a department of Space Operations and Astronaut Training within the German Aerospace Center (DLR), has the expertise to customize flight systems to suit mission requirements and the mobile infrastructure to launch and operate anywhere in the world. Many possible applications are conceivable and have been successfully demonstrated with more than five hundred flights in the past five decades since the foundation in 1967.

Classic parabolic trajectories are standard, but trajectories with low elevations, so-called suppressed trajectories can be performed as well. They allow a longer experiment time in denser atmosphere layers at higher dynamic pressures. For reentry experiments, velocities in excess of Mach 10 and attitude controlled entry conditions are achievable. Sounding rockets are versatile and ideal for testing space technologies. In the field of microgravity research, they are an important link between ground-based and airborne research platforms and space stations. Melting furnaces, X-ray sources, even Genetically Modified Organisms (GMO) are easier and faster to implement on sounding rockets compared to manned missions. In hypersonic research, sounding rockets are used as propulsion systems that provide the initial conditions for Scramjet engines, or to validate ground based wind tunnel tests and computer simulations of new aerodynamic configurations. Tests of thermal protection systems can be performed in real atmosphere conditions. Although both land and water recovery systems exist, the use of impact-resistant flight recorders to redundantly store large amounts of data has been demonstrated. Sounding Rockets are also the only research platform to offer in-situ measurements of the atmosphere in both the ascent and descent flight path. By tailoring the apogee, the passage speed is adjusted to optimize scientific conditions.

In conjunction with the permanent and well-equipped European launch centers Andøya and Esrange Space Center, Mobile Rocket Base offers its expertise and mobility to the international research community for missions with Sounding Rockets.