

Summary of the SOAREX 6 and 7 Flight Experiments (IPPW-7)

M. Murbach*, B. White, K. Boronowsky, J. Benton, R. Lane, H. Morgan, E. Tegnerud AND P. Papadopoulos

NASA Ames Research Center
e-mail: *marcus.s.murbach@nasa.gov*

ABSTRACT

The results of two SOAREX (Sub-Orbital Aerodynamic Re-entry EXperiments) flight experiments that were conducted in 2008 and 2009 are presented. The SOAREX-6 flight was designed for 4 experiments and flown on the 2-stage ATK X-1 vehicle on August 22, 2008. The primary experiment, the SCRAMP (Slotted Compression RAMP) probe configuration involves a re-entry body of very high dynamic stability. Despite early termination of the flight due to a vehicle GNC failure, the experiments were ejected and transmitted data, thus validating functionality. In addition, valuable techniques were developed for calibrating the re-entry flight and data recovery for long downrange flights. Nine months later, on May 28, 2009, the SOAREX-7 flight was launched, and the experiments were deployed at the 138 km apogee with a resulting entry velocity of 1.1 km/s. The primary experiment involved an evolution of the SCRAMP probe to a deployable configuration termed TDRV (Tube Deployed Re-entry Vehicle). This probe is characterized by the low ballistic coefficient (15kg/m²) with high static and dynamic stability. The probe recovered from a deliberate initial tumble, proceeded through the high convective heating portion of the trajectory, and attained sonic velocity at approximately 28 km. All video and 20 analog data channels worked nominally. The unique tubular probe packaging, high dynamic stability, and low convective heating are shown to be attractive for a variety of planetary Companion missions.