A novel Inatable Aerodynamic Decelerator (IAD) and platform for multi-point measurements in the ionosphere, has been evaluated in the REXUS (Rocket-borne Experiments for University Students) program. The experiment, named LAPLander (Light Airbag-Protected Lander), was launched from Esrange 4th of March 2010 to an altitude of 88 km. LAPLander is a 3.043 kg right-circular cylinder with a diameter of 24 cm and a length of 8.4 cm when the IAD is folded inside. At ejection LAPLander is spin stabilized around its polar axis with 3.5-4 Hz. Contact was lost after ejection which points to an electrical failure. This thesis presents an evaluation of the LAPLander IAD and a 6 Degrees-Of-Freedom (6-DOF) flight analysis. The 6-DOF simulation indicates that LAPLander would start to wobble, but if the rotation around its polar axis is decreased more than estimated, it will start to autorotate. Perhaps with high enough angular rate to demand special precautions if a parachute is to be used as a mean of recovery. The LAPLander IAD is designed to deploy at 6 km altitude. If the IAD was inated in space instead, the resulting reduction in the ballistic factor at reentry would save mass on the heat protection system, and thus save mass on the overall recovery system. An IAD derived from the LAPLander IAD capable of a 250 km apogee reentry will be provided. The IAD incorporate CO2 cartridges to inate the system, these do each contain a CO2 valve. A pre-launch valve failure resulted in that LAPLander ew without a working IAD. The valves are based on the principle that resistors heat Field's metal above 62°C (the melting temperature). The main mechanism of the
valve failure seems to be brittle creep in the Field's metal at this point. Some IAD
ination-problematics have been detected and this report provides a few
recommendations.

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