

JHU APL JANUS Program: Establishing a pipeline-based suborbital launch program

HT Smith¹, R Hacala¹, E Hohlfeld¹, W Edens¹, CA Hibbitts, L.J Paxton¹, SP Arnold¹

¹ The Johns Hopkins University Applied Physics Laboratory, Laurel, MD;

The Johns Hopkins University/Applied Physics Laboratory's (JHU/APL) is actively exploring the scientific, engineering and educational applications for commercial reusable spacecraft. These burgeoning capabilities will offer unprecedented opportunities regarding access to space with frequent low-cost access to the region

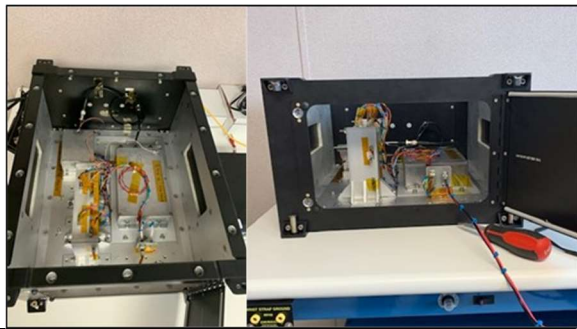


Figure 1: APL JANUS 2.1 Instrument: payload with GPS receiver in enclosure (left), front view of payload ready for flight (right).

of space from the ground to the boundary of near-Earth space at ~110 km.

In situ research of this upper region (often referred to as the “ignorosphere”) is difficult because it is too high for aircraft and balloons and yet too low for orbital satellites and spacecraft. However, this region is very significant because it represents the tenuous boundary of Earth’s Atmosphere and Space. It contains a critical portion of the atmosphere where the regime transitions from collisional to non-collisional physics and includes complex charged and neutral particle interactions. A detailed understanding of this region is required to understand the Earth’s atmosphere and serves as an analog to other planetary atmospheres.

The primary focus of our program is establishing the JANUS platform which supports future experiments and technology demonstrations by

providing power, data, control and ambient condition monitoring. The most recent payload version (V2.1) includes a high-resolution 3D accelerometer/gyro, a 3D fluxgate magnetometer as well as a GPS receiver.

To date, the APL JANUS program has flown 8 successfully suborbital test flights on the Blue Origin New Shepard, the Virgin Galactic Spaceship 2 and the Masten Space Systems Xombie launch vehicles. Additionally, APL has been selected to fly 5 more suborbital missions on these vehicles. Here we summarize the status of the APL JANUS program and the strategy for expanding the program. This will include the results from previous test flights as well as a

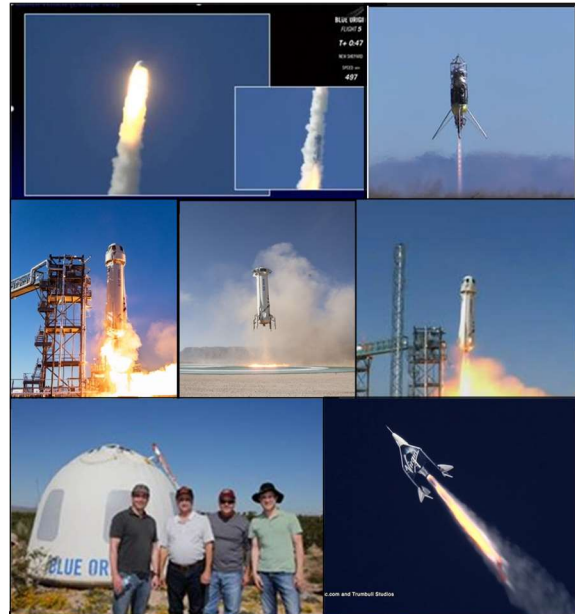


Figure 2. Images from completed JANUS flight tests

description of the more complex payload missions that have been selected for flight. We particularly would like to acknowledge the NASA Flight Opportunities Program for funding the majority of our missions.