

**An Experiment Carrier Capsule Demonstrator Project with Hyperspectral Imaging for VTVL Vehicles.** R. M. Branly<sup>1,2</sup> and E. S. Howard<sup>1</sup>, <sup>1</sup>Broward College, Dept. of Physical Sciences, 3501 SW Davie Road, Davie FL 33314, <sup>2</sup>Air and Space Education Consortium, Box 1614 Cape Canaveral MPO, 8700 Astronaut Blvd., FL 32920.

**Background:** The recent NASA/Northrup Grumman Lunar Lander Challenge has clearly demonstrated the feasibility of suborbital flights with Vertical Take-off Vertical Landing (VTVL) vehicles. Three major teams developed rocket systems capable of accurate vertical landings. Some of the companies have identified experiment payload carrying flights as the next goal in vehicle development.

**Summary:** A team of researchers and college students has designed and built a payload carrier capsule capable of carrying 50 to 100 kilograms of experiments. The Experiment Capsule Demonstrator consists of a one meter diameter conical external structure with an optional internal structure manufactured from composite materials. The structure is inspired by the space-craft of the Apollo era. The capsule is designed to ride atop Masten Space System's "Xombie" and "Xoie" (X0.1E) VTVL rocket vehicles. The experimental payloads fit within modular containers that are provided by the launch operator. The payload carrier capsule contains a battery power source independent from the rocket propulsion vehicle. The capsule demonstrator also includes a basic data recording module.

The Air and Space education Consortium in partnership with Masten Space Systems and members of Broward College have designed a Hyperspectral imaging system as a primary payload aboard the Masten Space Systems payload demonstrator project. Hyperspectral imaging is a powerful technique that can be used both in atmospheric and geology remote sensing applications. ASEC and Broward College are using this opportunity to introduce students to the science of spectroscopy through a Project Based Learning initiative. VTVL vehicles provide an opportunity to fly student and faculty experiments often enough to impact existing educational STEM initiatives. The plan incorporates educational examples developed at NASA's Jet Propulsion Laboratory. Early flights are expected in the second quarter of 2010.