Commercial Suborbital launch vehicles: novel opportunities to enhance ground based research of the MLTI.

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Introduction: The continued increase in low-cost access to the MLTI by commercial suborbital payloads provides an opportunity to augment ground-based observations and advance scientific understanding. These vehicles achieve altitudes up to 110 km that make them uniquely suited for providing frequent and low cost in situ (and deployable) observations of a region that is traditionally difficult to access directly (Figure 1).

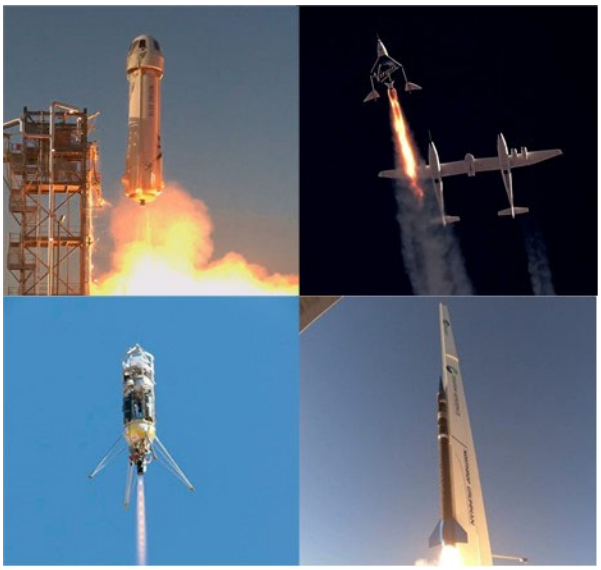

Figure 1. Commercial suborbital launch vehicles (clockwise from top left: Blue origin, Virgin Galactic, UP Aerospace and Masten Space systems.

Multiple companies are currently developing (and flying) various manned and unmanned spacecraft designs that can provide low cost (<$100k for internal cabin, <$200K for external and <$8k for very small educational mission), frequent access to this region with payload capacities exceeding 650 kg and a guaranteed safe return of payloads. Most of these vehicles have flown from the Mohave Spaceport in California, Spaceport America in New Mexico and the West Texas Launch Site in Texas; however, numerous spaceports are planned at multiple locations around the world. Thus, these vehicles could be used to perform joint observations with ground-based facilities.

Of particular interest, these vehicles provide a relatively gentle flight environment with a guaranteed safe return of payload inside of a pressurized crew cabin (or externally mounted). This provides a unique flight environment that is more analogous to benchtop testing than traditional flight environments. Such conditions enable the use of earlier stage payloads (prototypes, engineering models, etc.) that can make more sue of COTS components. Additionally, these payloads can be flown iteratively and further developed after each flight. This will essentially raise the laboratory environment to suborbital space and enable application of lower cost instruments that can be ready for flight much faster than traditional spaceflight projects (Figure 2).

Figure 2. Integrations of payloads on commercial suborbital spacecraft.

This possibility of conducting frequent and low cost coordinated remote and in situ studies of the MLTI could greatly improve our understanding of this region. With several companies conducting operational and/or test flights now is the time for scientists to explore how this potentially revolutionary advancement in low cost access to near-Earth space could enhance ground based study of the MLTI.