R. Pfaff for the SRWG
Revised: March 22, 2006

New Mesospheric Payload -- Science-Driven Design Considerations

Below are some science-driven design considerations from the SRWG to the SRPO for the new mesospheric payload currently on the SRPO Technology Roadmap.

All input below is for the "standard" MLRS vehicle (nominal apogee ~ 90km) presented to us at the SRWG meeting. There is considerable interest in the "enhanced" MLRS vehicle (nominal apogee ~130 km) as well.

After listing some general considerations, we provide what we believe are different levels of payload complexity, from the simplest to the most complex, that we would like to see made available to the science community. Note that we did not find a strong reason to include a GSP receiver as part of the standard payload complement and suggest that be implemented downstream. However, we are aware of one science application in which an experimenter would develop a custom GPS receiver as part of his experiment that would thus be separate from the Wallops furnished hardware. We recall that getting the GPS to work was one of the main obstacles with the Dart development.

A programmatic consideration is that costs be kept low. The SRWG believes that the mesospheric payloads must be substantially less expensive than, for example, ones that might use the 12 inch diameter Orion payload. For example, we hope that (say) 6 mesospheric payloads might be comparable in cost to a typical ionospheric payload.

General

Apogee (Standard)	100 km (desired) 90 km (nominal)
Mass	TBD kg (commensurate with apogee)
Payload Diameter	6 inch (desired) 4 inch (nominal)

Experiment Section Length (under nose cone, but not including the nosecone volume which we assume will be partially available to the experimenter)

12 inch (desired)
8 inch (nominal)

Launch Flexibility

Ability to launch up to 6 payloads in a 3 hour period
Mobile launcher capability (at non-standard ranges)

Mesospheric Payloads -- In order of Increasing Payload Complexity

Level 0 -- No telemetry or power

Example experiments: falling sphere, chaff release

Note: Mechanical timer or fuse (activated on lift-off) initiates release.

Level 1 -- power, option for simple telemetry w/o PCM system, no deployables

Example experiments: beacon experiment, nose-tipped Langmuir probe

Level 2 -- power, T/M link with PCM encoder, deployable nose cone, attitude knowledge (option) from miniature magnetometer and/or sun sensor,

Example experiments: Forward looking dust detector (exposed under nose cone), photometer, small E-field probes, etc.

Level 3a -- same as Level 2 but add ability to flip payload at apogee and/or separate motor.

Example experiments: dust and other detectors that need to be in the ram, upward and downward looking sensors, etc.

Level 3b -- same as Level 2 but add GPS receiver