University Rocket Launch Competition

presented to
National Space Grant Directors’ Meeting
Washington, DC
17-18 March 2006

Paul Mueller
Utah State University
Experimental Sounding Rocket Association
Logan, UT
Purpose of Competition

- Engineering design experience for senior-level undergraduates and graduate students
- Near-professional scale, student-designed
- Aerospace workforce development
- Recruiting opportunities for students and employers
- Outreach to K-12 students - generate excitement and motivation to study math, science, and engineering
- Payload launch opportunities to low altitudes (10,000-25,000 feet) with real launch environment
- Technology development and flight test
Technology Development and Flight Test

- Propulsion: fuel formulations, cooled nozzles, aerospike nozzles, throttling, thrust vectoring
- Recovery: limited footprint/guided recovery, flyback boosters
- Operations: closed-loop flight control, rapid turnaround, flight termination
- Cost: low-cost materials and manufacturing
- Instrumentation/data acquisition: performance, altitude, velocity
- Payloads: instrument prototypes, video systems, payload deployment systems
1st Annual Competition Successful

- 1st Annual University Rocket Launch Competition (URLC) held on Jan 5, 2006 near Green River, Utah
- Two participants: University of Alabama-Huntsville and Utah State University
- Competition criteria: launch to 10,000 feet, written report, poster presentation, launch operations and student professionalism
- Videos
Results

• UAH rocket went much higher
• Both rockets had partial recovery system failures
• Flight data not available within 1 hour of ground recovery
• Judges had to rely on written report, poster, and student professionalism in determining winner
• Chose USU as winner, though data was recovered later and showed that UAH’s rocket went to 11,200 feet while USU’s only went to 5700 feet
• Winner was not really important—objective was to have friendly competition and launch student-designed rockets safely
Future Plans

• Second competition is planned, tentatively with USU and UAH (other schools considering participation)
• Target date: September 2006 (may slip depending on when schools are ready)
• Currently recruiting more schools. Hybrid rocket can be built for about $1500 (including $150 in fuel/oxidizer per flight). Rough specifications (more details available):
  – HTPB/nitrous oxide hybrid
  – Diameter: 10 inches
  – Length: 13 feet
  – Launch/burnout weights: 200/150 lbs
  – Initial thrust: 600 lbs
  – Burn duration: 20 seconds
How would this fit with Student Space Propulsion Program (SSPP)?

• Possibilities:
  – SSPP (in SE US) entry-level: smaller-scale, lower altitude, more commercial components; teams “graduate” to URLC in West with larger rockets with more student-built hardware
  – Regional competitions: SSPP in East, URLC in West, both with entry-level and advanced classes

• We are open to suggestions
Questions?