“Coach Class to Orbit:” the NPS CubeSat Launcher

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Background

• Strong CubeSat development community already exists
  – Over 100 universities
  – DoD and other Gov’t agencies
  – Industry (Boeing, Aerospace Corp)

• U.S. launch opportunities for CubeSats are scarce
  – 44 CubeSats launched
  – 28 CubeSats on-orbit
  – Only 5 CubeSats successfully launched in United States

"CubeSats in Education and Industry," CubeSat Developers Workshop, April 2007
Concept

- Utilize existing standards and processes
  - ESPA/ABC carrier interface
  - Cal Poly Cubesat organization
    - Broker for university satellites
    - Standards for CubeSats and P-PODs
  - STP launch process
NPSCuL-Lite Design

8 P-PODS
Up to 24U volume of CubeSats
ESPA and ABC Compatible
Integration Process

CubeSat Flight Experiments

CubeSats from NPS and other USG partners

Space Test Program (or other launch provider)

Integration & Launch

University CubeSats integrated into P-PODS at Cal Poly

P-PODS and Sequencer integrated into NPSCuL

Finished P-PODs delivered to NPS for integration into NPSCuL

Finished NPSCuL delivered for integration onto ESPA/ABC
Atlas V ABC/SP Installation
NPSCuL-Lite Progress

• Preliminary qualification test complete
  – Lessons learned:
    • Fastener selection and analysis
    • Flat mating surfaces
  • Second qualification unit built
  • Analyses in progress

Upcoming:
• P-POD mass model manufacturing and integration
• Qualification testing
• Build and acceptance test flight unit
Military Needs:
- Enabling technology for access to space (via U.S. launchers)
- Urgent & prolonged need for military space professionals
- Foster innovation in universities for DOD-relevant science & technology
- Relatively affordable and timely DoD technology demonstration

Priority Rankings:
- 2008 DoD SERB - #36 out of 62
- 2008 DoN SERB - #13 out of 30
NPSCuL- Enabling Research & Technology Demonstration

NPS Nano-satellite Experiments:

“NPS Solar Cell Array Tester” [Dr. J.H. Newman]
“Tiny Spacecraft Assembly, Reconfiguration & Prox-Ops” [Dr. M. Romano]
“TINYSCOPE” (Tactical Imaging Nanosat Yielding Small Cost Operations for Persistent Earth-coverage) [Dr. M. Romano]
NPSCuL- Building Space Professionals

- Education
  - Conduct data analysis
  - Explore potential for operational uses
  - Certify and build flight unit

NPSCuL-Lite Student Team: Nick McGrail, Christina Hicks, Shane Driscoll

“Mini-Satellite Launcher Makes NPS Player in CubeSat Space Race”
NPS Update January 16, 2009

- Conference presentations
- Apply lessons learned / corporate knowledge in Space Systems Curricula
- Master's theses
Questions?

NPSCuL
Coach Class to Orbit
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