



# Amateur Radio and the CubeSat Community

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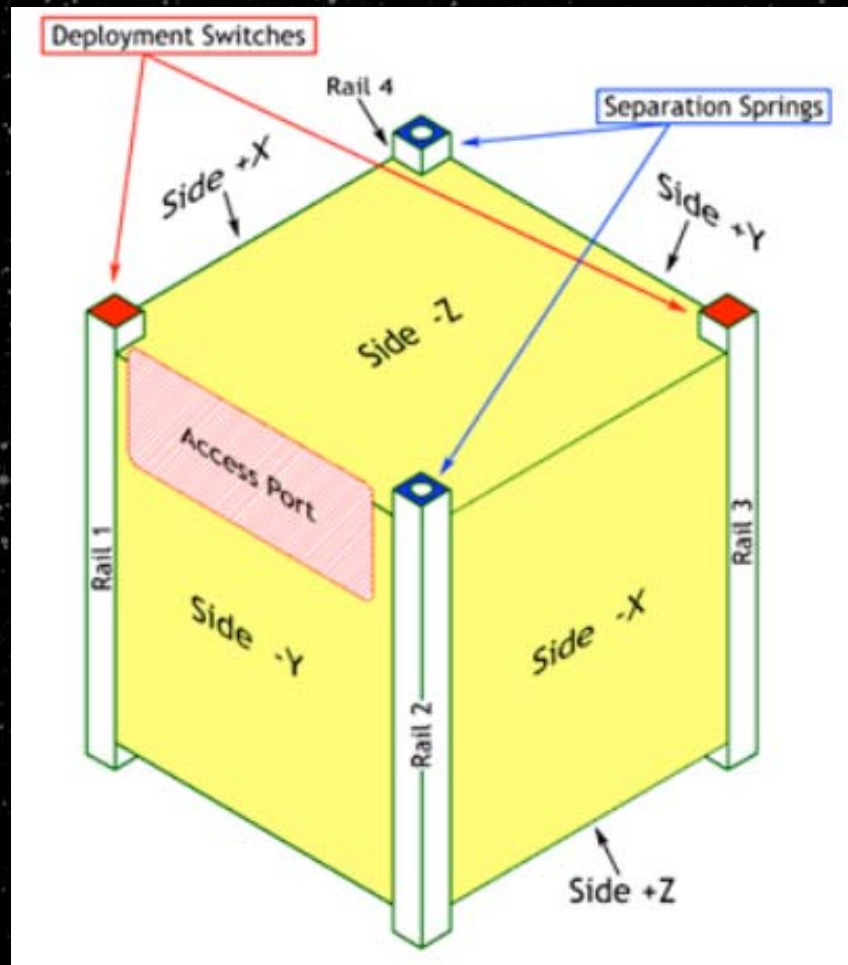
2006 AMSAT-NA Space Symposium  
San Francisco, CA  
8 October 2006

- Cal Poly Satellite Activities
- Collaboration
- Education
- Tracking new satellites
- Ground Station Network

# Cal Poly Satellite Activities



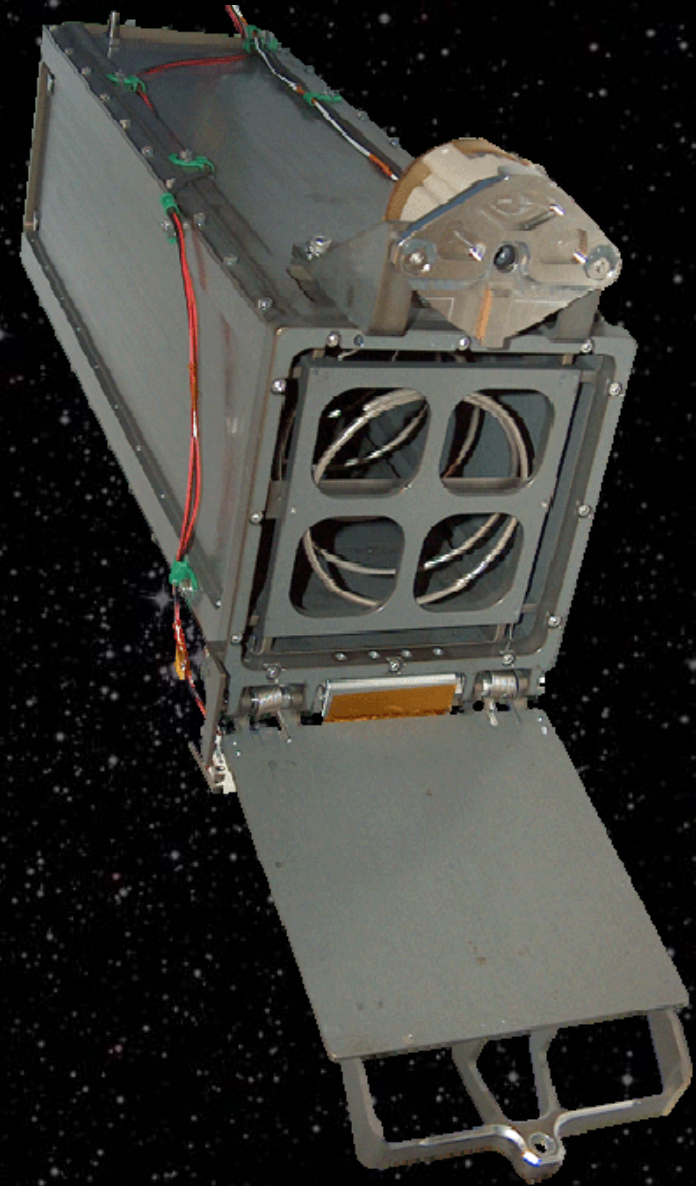
- CubeSat Standard



# Cal Poly Satellite Activities



- P-POD





- Conferences
  - Summer Workshop in August
    - Weekend before SmallSat in Logan, UT
  - Developers Workshop in April
    - April 19-21, 2007
    - Boeing's Huntington Beach Conference Center

# Cal Poly Satellite Activities



- Earth Station



# Cal Poly Satellite Activities



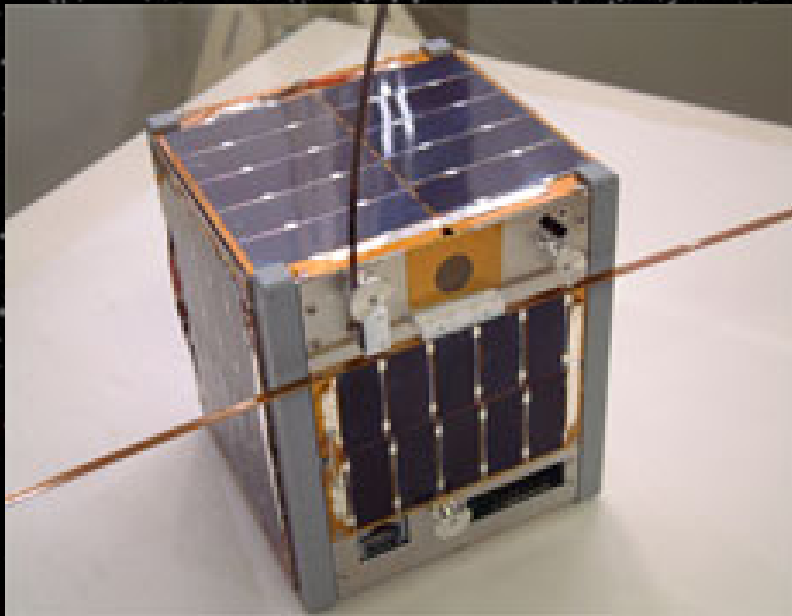
- Building Satellites



# Cal Poly Satellite Activities



- Cal Poly – University of Tokyo
- Download pictures from XI-IV (CO-56)
  - Training new students
  - 1 picture every 1-2 days





# Cal Poly Satellite Activities



- CubeSat Launches
  - Dnepr 1
    - 28 July 2006 launch failure
    - 14 CubeSats
    - 4 other secondary
  - Dnepr 2
    - December 2006
    - 7 CubeSats





- CubeSat Launches not through Cal Poly
  - University of Toronto with Mark I P-POD on Eurockot in June 2003
    - 4 CubeSats
  - Japanese M-V-8 in February 2006
    - CUTE-1.7+APD
  - Indian Antrix Polar Satellite Launch Vehicle with XPOD
    - 6 CubeSats
    - June 2007

- Both communities collaborate on
  - Education
  - Tracking of new satellites
  - Frequencies

- New hams:
  - 70% of students in the lab have their license
  - 50% have talked with XI-IV
  - 25% have talked on other Amateur birds
- These new hams are not just operators but satellite designers and builders
- These students are already interested in satellites and communication

- Example: SSETI Express
  - 100 students
  - 14 universities
  - Launched 27 October 2006
  - 3 CubeSats ejected
  - Amateur radio operators provided crucial data packets when satellite was not in view of primary earth station
  - **100 Million** (estimated) people watched on ESA TV and national news

# Tracking new Satellites



- The CubeSat community depends on other Amateurs to track the new satellites when out of range of the primary earth station
  - SSETI Express
  - XI-IV
  - HI-SAT
  - Future launches.....

- A way to link earth stations together using the internet for increased control of satellites
- Amateur radio operators can connect to the network (SETI@home)
- Japanese Universities were the first to build a fully functional network to help combat high QRM
- Project picked up by ESA/ISEB last week

- Implementation Plan:
  - 1<sup>st</sup> year core development
  - 2<sup>nd</sup> year testing and advanced development
- Organizations involved:
  - ESA Educational Department
  - SSETI and European Universities
  - AMSAT-UK
  - University of Tokyo
  - Cal Poly



- Ground Station Network:
  - Using internet, not private lines
  - Open architecture
  - Everyone can join and participate
  - Most operating systems supported
- Benefits:
  - Students involved in Amateur Radio
  - Increased link time
  - Redundant earth stations for uplink and downlink

Questions?

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