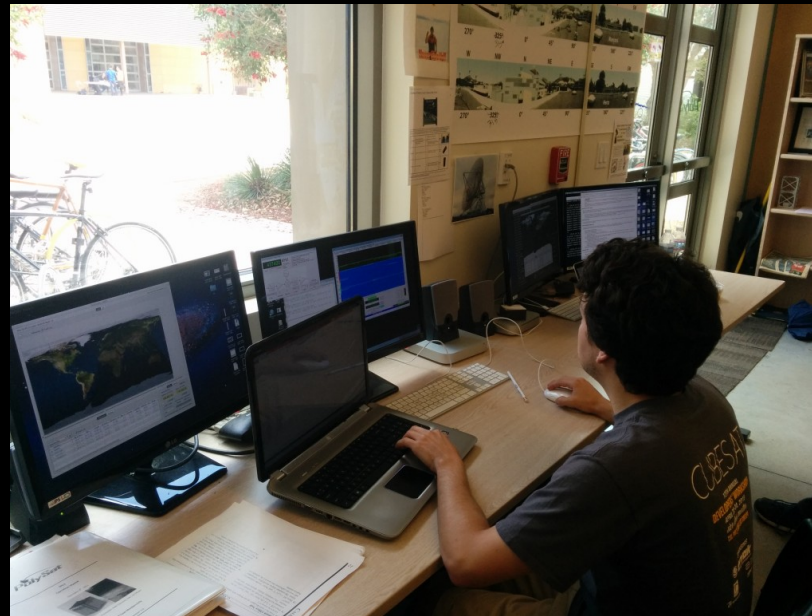
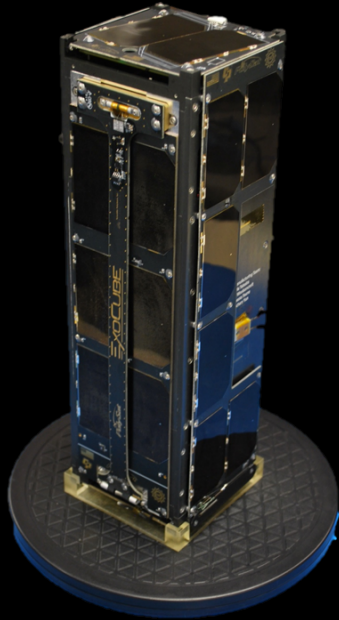
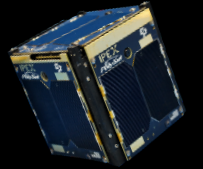


# PolySat Missions and Operations Engineering Lessons



Nikolaus Powell

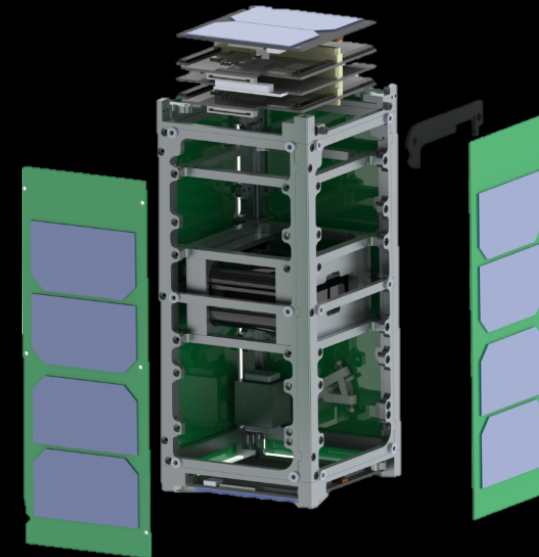
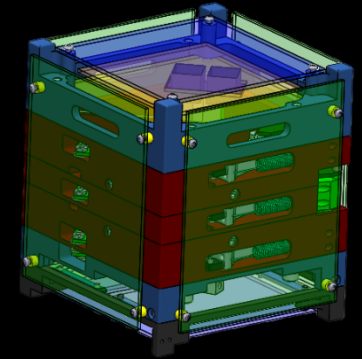


 PolySat  
Picture taken by IPEX (Cal Poly / JPL) on Dec. 6th 2013

# Current Work



- DAVE (CP7)
  - Damping and Vibrations Experiment
  - Test particle dampers in a microgravity environment
  - Updating electrical architecture to accommodate current system board
  - Documentation
  - Maintaining satellite within standards
- LEO (CP9)
  - Launch Environment Observer
  - Record thermal and dynamic data and communicate through Wi-Fi
  - Integrated testing with Merritt Island High School
  - Final flight checkout process
  - Manifested for 2016 launch
- ISX (CPI 1)
  - Ionospheric Scintillation eXplorer
  - Early design phase and requirements
  - Analyzing scintillation patterns of transionospheric signals

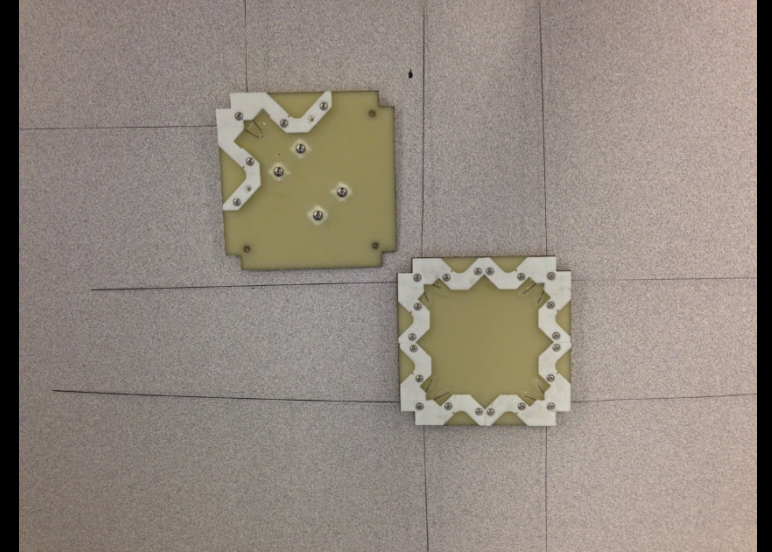


# Recent Problems

- Exocube Antenna Design
  - Antenna deployment failure
  - No way to test deployables after flight qualification testing without invalidation
- Exocube Boom Deployment Design
  - Deployment difficulties
  - Complicated stowing procedure
- Friis Ground station
  - Motor caused antenna shaking (1 degree steps)
  - Poor receive sensitivity



- New antenna design
  - Modified route for deployment reliability
  - Low profile, variable size, simple stowing
  - Increased quantity, assortment, and documentation of test and procedures
- Friis Ground station modifications
  - New motor ramps up, more torque (0.1 degree steps)
  - LNA repositioned further up in receive path
  - Receive-only modification for +2 dB gain
- Utilizing multiple locations through remote automated passes
  - Raspberry Pi's
  - Running computing processes of ground stations

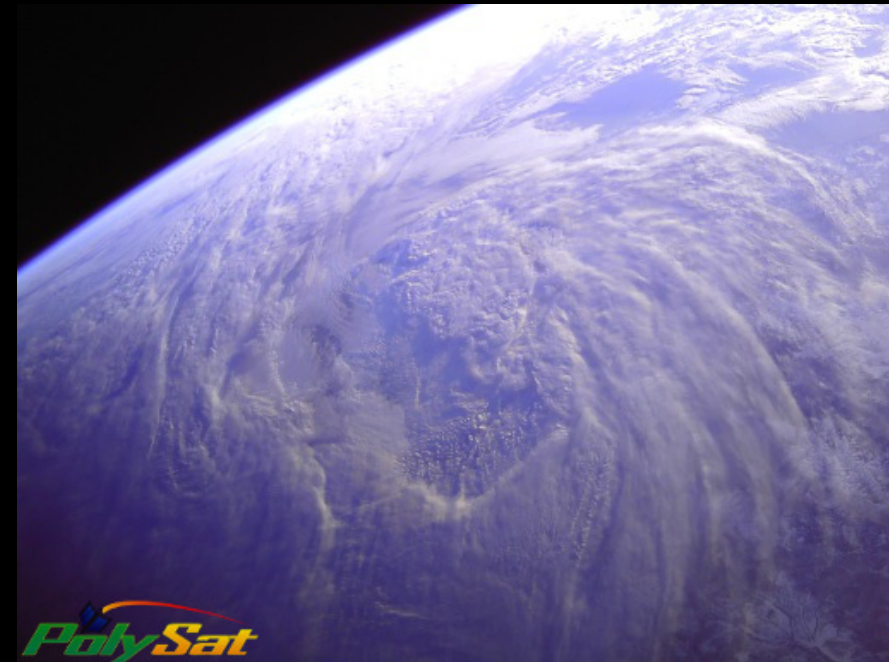




# Reliability Testing



- Establishing Risk of Failure and Mission Criticality
  - Classifying components on relative scale
  - Identifying most probable sources of complications
  - Providing source of history when considering parts for future applications
- Testing
  - Degrees of testing depending on the characteristics of components
  - Determining weak design points/components

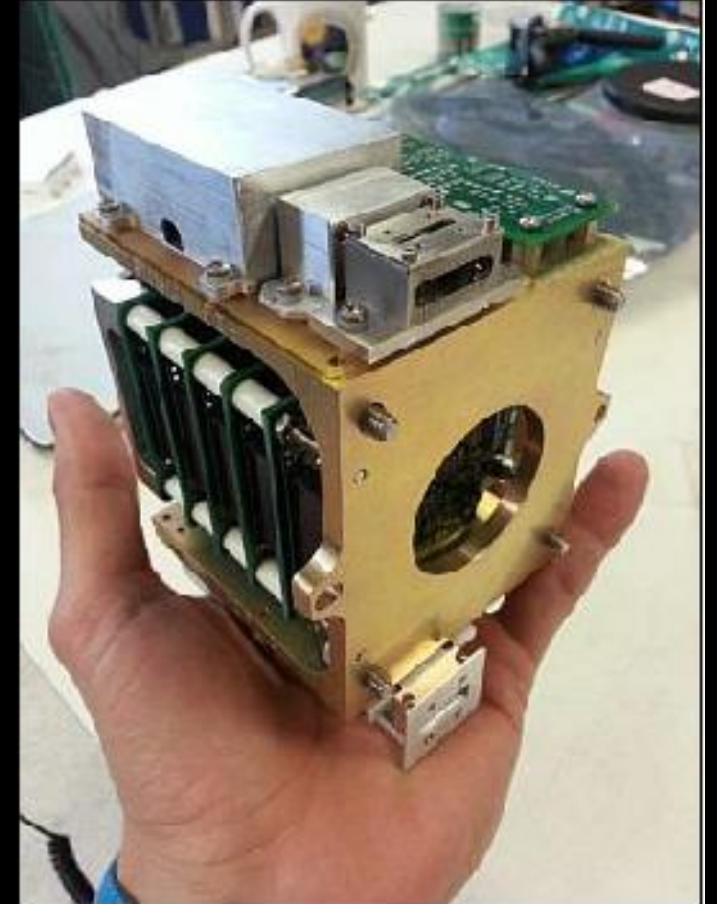


Picture taken by IPEX (Cal Poly) / JPL on Dec. 12th 2013

# Exocube Scientific Data



- Measuring ion densities
  - Hydrogen, Helium, Nitrogen, Oxygen
- Completed instrument checkout
  - Multiple species recorded
- Not running in full-blown science mode yet



# Questions?

