CubeSats, 18 SPCS and the Orbital Environment

• Community Interests
  • Commercial Operator concerns?
  • Stifled Innovation?
• How can we serve the CubeSat community most effectively?
• How can the CubeSat community help us?
Defining the Question

• Starting point: "What is a (launched) CubeSat?" (i.e. who are the study objects/ community).

• Currently using 1U, 2U etc for CubeSats, other nanosats considered separately.

• Refinement / expansion -
  • Repeatability, modularity manner of deployment?
Study Population-1

- 558 CubeSats (1U, 2U, 3U… ) of which 116 are known to be decayed
- 50 Small Satellites (tubesats, other), 2 known to be decayed
- Overall on-orbit catalog of ~19000 (~2-3%)
Study Population-2

- ISS period
  ~93 minutes,
  Apogee
  ~400 km
Study Population-3

CubeSats (558)
- >ISS: 48, 9%
- <ISS: 229, 41%
- Unlisted: 281, 50%

Non-Cube (50)
- >ISS: 4, 7%
- <ISS: 56, 93%
- Unlisted: 0, 0%
Study Population

- Superimposing individual objects launched/deployed since 2010*
Study Population

• Shifting focus towards LEO
Future Work: In the pipeline

- Conjunction statistics
  - Proportion of high interest events involving study population
    - How well does the percentage of events reflect the percentage of objects
  - Sensor tasking changes due to conjunctions with study population
- Statistical comparison of regularly calculated Pc to Pc based on more realistic sizes
- Typical timeline for spacecraft identification
  - Launch > Deployment > Identification > Cataloging
Future Work: Wishlist

• Knowledge of propulsion tests
  • Improves ability to maintain orbit knowledge
  • Potential to help evaluate maneuvers

• Re-entry Statistics/ Operational Status
  • More accurate portrayal of the on-orbit community.
Conclusion/Recommendation

• Community Interests
  • Concern Factor?
  • Stifled Innovation?

• How can we serve the CubeSat community most effectively?
• How can the CubeSat community help us?