

Small Satellites and Geospatial Intelligence

Nick Bousquet

Project Manager &
Technical Lead, Leidos

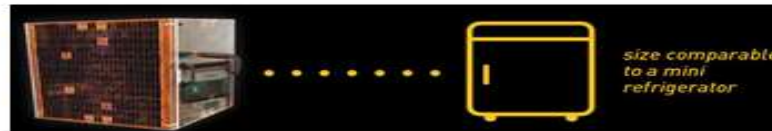


How Small is Small?

MiniSats: 100+ kilograms
Pictured: SkyBox's SkySat-1

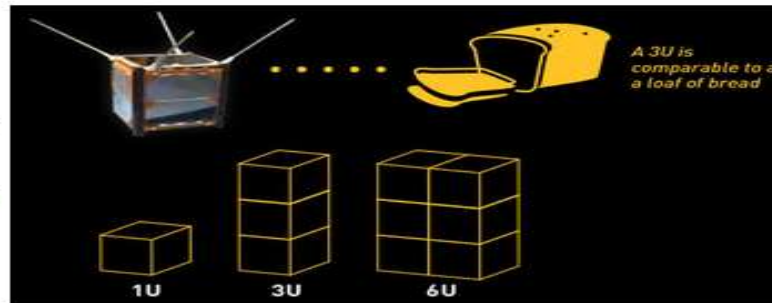


MicroSats: 10-100 kilograms
Pictured: Surrey's NigeriaSat-X



NanoSats (CubeSats): 1-10 kilograms
Pictured: Nanosat-1's ArduSat

CubeSats are a category of NanoSats that adhere to specific dimensions. A CubeSat unit (1U) has dimensions of 10x10x10cm. CubeSats can be built in 1U, 1.5U, 2U, 3U, and 6U sizes, with 3U and 6U—two 3Us side by side—being the most popular.



PicoSats: 0.01-1 kilogram
Pictured: Texas A&M University's AggieSat-2



FemtoSats (ChipSats): 0.001-0.01 kilogram
Pictured: Cornell University's Sprite



Credit: USGIF Trajectory Magazine

Small Satellite Growth Trends

- ▶ **158 small satellites were launched across all types in 2014**
- ▶ **70% increase over 2013**
- ▶ **1000's planned for launch by 2020**
- ▶ **Growing number of launch systems: Over 20 firms**
- ▶ **Many companies see themselves selling information & answers not pixels**



How will added volume, variety, velocity be made useful by the Intelligence Community?

Private Investor Market Growth



Return on Investment to date: Over 1 billion USD

Key U.S. Government Organizations

- ▶ NASA
- ▶ NGA
- ▶ NRO
- ▶ USAF Space & Missile Systems Center
- ▶ USAF Operationally Responsive Space Office
- ▶ US Army Space and Missile Defense Command



Credit: Space News

Benefits to the Intelligence Analyst

- ▶ Persistence without airspace limitations
- ▶ Resilience from countermeasures
- ▶ “Piggyback” tasking and improved collection plans
- ▶ Defeat of enemy Denial and Deception tactics



Potential Hurdles

▶ Challenge

- Parsing data relevancy without tasking control
- Analysts overwhelmed by information availability
- Merging unique information types across classifications

▶ Solution

- Expand change detection and watchbox technologies
- Utilize “smart” analysis systems like SOM
- Invest in classification access systems that are not “stovepiped”

Summary

- ▶ Small satellite technology and business is growing rapidly, the defense industry can reap huge rewards.
- ▶ Persistence from space is becoming more feasible and may change the geospatial intelligence landscape in drastic ways.
- ▶ Open source data is going to become as essential to the intelligence cycle as the traditional classified collection methods have been.
- ▶ National defense will be vastly improved due to true resilience, even in the face of newly capable enemies.

For more information

- ▶ USGIF Small Satellite Working Group
- ▶ Meets monthly
- ▶ Facilitating government, industry, and academia interaction regarding small satellites and associated TPED and launch systems
- ▶ Robert Zitz, leidos VP is Co-chair