



JOHN F. KENNEDY SPACE CENTER



ELaNa Mission Update

CubeSat Developer's Workshop 2016

Scott Higginbotham
ELaNa Mission Manager
NASA Launch Services Program



JOHN F. KENNEDY SPACE CENTER

Recent Launches



ELaNa XI – May 20, 2015 – Atlas V

- LightSail-A, The Planetary Society/ARC

ELaNa XII – October 8, 2015 – Atlas V

- Fox-1, AMSAT
- BisonSat, Salish Kootenai College
- ARC, University of Alaska – Fairbanks
- LMRST-Sat, JPL

ELaNa VII – November 3, 2015 – Super Strypi

- Argus, Saint Louis University
- PrintSat, Montana State University

ELaNa IX – December 6, 2015 – Atlas V

- MinXSS, University of Colorado - Boulder
- STMSat-1, St.Thomas More Cathedral School
- CADRE, University of Michigan





JOHN F. KENNEDY SPACE CENTER

Upcoming Launches



ELaNa XIII – NET June 2016 – Falcon 9

- ISARA, JPL
- EcAMSat, ARC

ELaNa XVI – May 2016 – Antares II

- KickSat-2, Cornell University

ELaNa XIV – Jan 2017 – Delta II

- RadFxSat, Vanderbilt University and AMSAT
- EagleSat-1, Embry-Riddle Aeronautical University
- Golden Eagle-1, Marquette University
- MiRaTA, MIT

ELaNa XV – Mar 2017 (U/R) – Falcon 9 Heavy

- LEO / StangSat, Cal Poly / Merritt Island H.S.
- ARMADILLO, University of Texas – Austin





CubeSat Mission Manifest

JOHN F. KENNEDY SPACE CENTER



LV Provider	FY 2016	FY 2017	FY 2018
NASA 		ELaNa XIV 1/20/17 JPSS-1 (DII) 5*	ELaNa XVIII 10/31/17 ICESat-2 (DII) 3*
NASA ISS 	ELaNa XVI 6/24/16 (U/R) OA-5 1*	ELaNa XVII 12/30/16 OA-7 TBD*	ELaNa 22 OA-8 6/1/17 TBD*
NRO 			
ORS/STP 		ELaNa XV 3/1/17 (U/R) STP-2 3*	
Commercial	ELaNa XIII NET June 2016 FORMOSAT-5 2*	ELaNa XIX June 2017 VCLS (RL) TBD*	ELaNa XX Dec 2017 VCLS (VG) TBD*
			ELaNa 21 Mar 2018 VCLS (FF) TBD*



SPL Manifested

April 2016



ELaNa Manifested

* # CubeSat Missions



In Work

Launched	Manifested	Un-Assigned
46	41	35



JOHN F. KENNEDY SPACE CENTER

Venture Class Launch Services (VCLS)



- New class of commercial launch vehicle service at KSC, dedicated for U-class satellites
- Improved CubeSat manifesting via NASA's CubeSat Launch Initiative (CSLI)
- As reliability is demonstrated, some providers may be appropriate for future less risk-tolerant NASA missions
- Milestones-based payment structure; **limited** LSP insight through milestone reviews
- A **single demonstration** flight was awarded to Firefly, Rocket Lab, and Virgin Galactic
- Statement of Work: Minimum 60kg to LEO (425km), orbit inclination 33 to 98 degrees, launch date no later than April 15, 2018
- Companies are responsible for LV development costs
- Each mission will carry 12 to 18 CubeSats





Other Initiatives



- **SLS EM-1**
 - Efforts to procure and qualify dispenser and associated vibration isolation and thermal protection systems are continuing
- **“CubeSat 101” Document**
 - Working with Cal Poly to develop and distribute a guidebook for CubeSat developers



Words to the wise...



- **The ISS is an awesome deployment platform, however if you are planning on or protecting for a deployment from the ISS, be sure to read/understand the NanoRacks ICD and design your hardware accordingly – ISS requirements are NOT the same as those typically enforced for ELV missions**
- **Orbital debris mitigation isn't just a good idea...it's the law – design your hardware and mission for compliance**
- **No CubeSat team is an island – Talk to those who have gone before you to avoid repeating their mistakes and share lessons learned whenever you can**
- **No license, no launch – start working you regulatory license applications AS SOON AS POSSIBLE to avoid unpleasantness**
- **Please be patient with the manifesting process, matchmaking takes time**



JOHN F. KENNEDY SPACE CENTER



Questions