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# CSLI/ELaNa

CubeSat Launch Initiative/Educational Launch of  
Nanosatellite

April 27, 2017

Garrett L Skrobot

Advanced Exploration Systems

**NASA**



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# CubeSat Launch Initiative



**NASA's CubeSat Launch Initiative (CSLI) provides opportunities to educational and non-profit organizations to build small satellite payloads which will fly as auxiliary payloads on previously planned missions.**

**NASA  
DoD  
NRO**



**ISS**





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# Missions



## ELaNa

ELaNa Mission	Primary Mission	# of CubeSat Missions	Status
ELaNa I	Glory	3	Failed
ELaNa III	NPP	5	Launched
ELaNa VI	NROL-36	4	Launched
ELaNa IV	ORS-3	11	Launched
ELaNa V	CRS#3	5	Launched
ELaNa VII	ORS-4	2	Failed
ELaNa II	NROL-39	4	Launched
ELaNa VIII	ORB-3	1	Failed
ELaNa IX	ORB-4	2	Launched
ELaNa X	SMAP	3	Launched
ELaNa XI	AFSPC-5	1	Launched
ELaNa XII	NROL-55	4	Launched
ELaNa XVII	OA-7	3	Launched



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# CSLI Call Status



	Proposals	Selected	Adjust	Flown	Manifest	% Launched	% Launch & Manifested	Offered
1 <sup>st</sup> Selection	6	4	4	4		100%	100%	100%
1 <sup>st</sup> Initiative	16	12	16*	16*		100%	100%	100%
2 <sup>nd</sup> Initiative	25	14	12	11	1	92%	100%	100%
3 <sup>rd</sup> Initiative	33	26	27**	12	5	48%	68%	100%
4 <sup>th</sup> Initiative	34	24	15	4	9	17%	87%	93%
5 <sup>th</sup> Initiative	22	16	11	1	8	9%	69%	85%
6 <sup>th</sup> Initiative	22	14	12	1	9	8%	83%	100%
7 <sup>th</sup> Initiative	21	21	21		17	0%	81%	90%
8 <sup>th</sup> Initiative	38	34	34					
	217	165	152	49	49	32%	64%	74%

\* Includes 2 reflights and 2 selected out of sequence to fill open launch slots

\*\* 2 reflights



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# CubeSat Missions Manifest



LV Provider	FY 2017	FY 2018	FY 2019	FY 2020
<b>NASA</b> 	 ELaNa XIV NET 8/29/17 JPSS-1 (DII) 5**	 MarCO 5/5/18 InSight (AV) 2*	 ELaNa XVIII 9/12/18 ICESat-2 (DII) 3**	 TROPICS 3 Missions NET Aug 2019 TBD 1*
<b>NASA ISS</b> 	 ELaNa XVII 3/2/17 OS-7 3* <i>Launched</i>	 ELaNa XXII 8/1/17 SPX-12 7*	 ELaNa XXIII NET Apr 2018 TBD 9*	 ELaNa ISS 24U NET Oct 2018 TBD
<b>NRO</b> 				
<b>ORS/STP</b>  		 ELaNa XV 9/15/17 (U/R) STP-2 3*		
<b>Commercial</b>		 ELaNa XIX Nov 2017 VCLS (RL) 10*	 ELaNa XX Dec 2017 VCLS (VG) 12*	 ELaNa XIII TBD TBD 2*
			 U-Class 24U NET Oct 2018 TBD	

SPL Manifested   
 ELaNa Manifested   
 In Work

\* # CubeSat Missions

\*\* Number includes 1 non-CLSI CubeSat Mission

Launched	Manifested	Un-Assigned
49	49	54



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# Recent Launches



## ELaNa IX – May 16, 2016 – ISS Deployment

- **MinXSS(HiLite) – University of Colorado, Boulder**
- **STMSat-1 – St. Thomas More Cathedral School**
- **CADRE – University of Michigan**





# Recent Launches

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## ELaNa-XVII

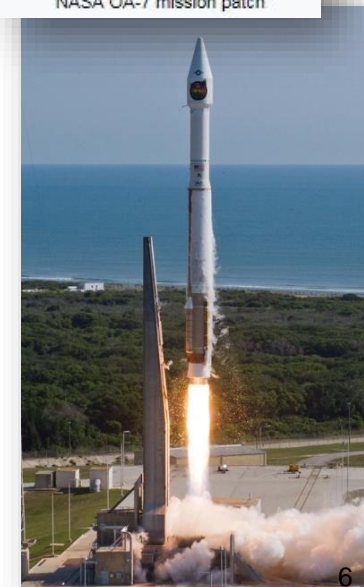
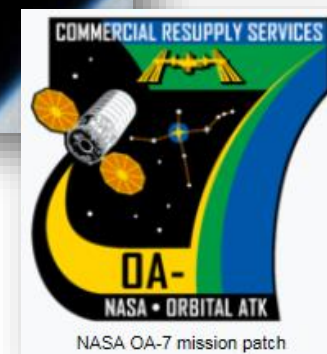
**Mission: OA- 7 Orbital Sciences Cygnus  
ISS Commercial Resupply Service (CRS)**

**Launched: 4/18/2017 AV401 CCAFS  
SLC-41**



- **Three CSLI sponsored CubeSats**

- ***IceCube (3U)* Spaceflight Validation of an 874-GHz Submillimeter Wave Radiometer for Ice Cloud Remote Sensing**
  - » NASA Goddard Space Flight Center, Greenbelt, MD
- ***CXBN-2 (2U)* The Cosmic X-Ray Background NanoSat-2 : An Improved Measurement of the Diffuse X-Ray Background**
  - » Morehead State University, Morehead, KY
- ***CSUNSat-1 (2U)* Space Test a Low Mass, Extreme Low Temperature Energy Storage System**
  - » California State University, Northridge, CA





# Upcoming Launches

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## \*ELaNa XXII – NET August 1, 2017 – Falcon 9

- ASTERIA – MIT
- LAICE – University of Illinois at Urbana-Champaign
- RBLE – NASA GSFC
- OSIRIS-3U – Pennsylvania State University
- OPEN – University of North Dakota
- HARP – University of Maryland



## ELaNa XIV – NET August 29, 2017 – Delta II

- RadFx – Vanderbilt University and AMSAT
- EagleSat – Embry-Riddle Aeronautical University
- MAKERSat – Northwest Nazarene University
- MiRaTA – MIT
- (B/U DAVE – CalPoly)



## ELaNa XV – NET Sept 2017 – Falcon Heavy

- CP9/StangSat – CalPoly/Merritt Island H.S.
- ARMADILLO – University of Texas at Austin



*\* Launch of our 50<sup>th</sup> CubeSat mission*



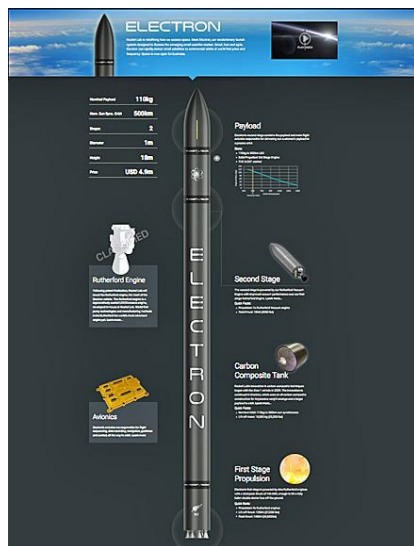
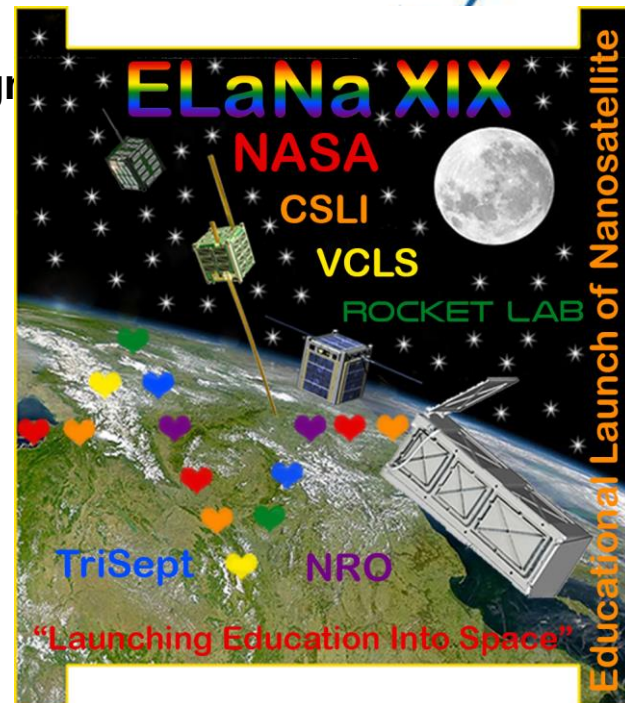
# Upcoming Launches

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## ELaNa XIX – NET November 2017 – Electron

- CubeSail – University of Illinois at Urbana – Champaign
- CeREs – Goddard Space Flight Center
- NMTSat – New Mexico Institute of Mining
- CHOMPTT – University of Florida
- ANDESITE – Boston University
- STF-1 – West Virginia University/NASA IV&V
- ISX – SRI International/CalPoly
- Rsat – U.S. Naval Academy
- Shields-1 – Langley Research Center
- DaVinci – North Idaho STEM Charter Academy





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# Upcoming Launches



## ELaNa XX – NET December 2017 – LauncherOne

- PolarCube – University of Colorado at Boulder
- ALBus – NASA Glenn Research Center
- MiTEE – University of Michigan
- CACTUS-1 – Capital Technology University
- Q-PACE – University of Central Florida
- SurfSat - University of Central Florida
- RadFXSat-2 – Vanderbilt University/AMSAT
- EXOCUBE – California Polytechnic University
- CAPE-3 – University of Louisiana Lafayette
- MicroMas-2b – MIT Lincoln Laboratory
- PICS – Brigham Young University
- INCA – New Mexico State University





# Upcoming Launches

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## ELaNa XXIII – NET April 2018 – ISS

- RASCEL - St Louis University
- EQUiSAAT – Brown University
- RadSat – Montana State University
- TEMPEST-D, 1- Colorado State University
- RainCube - JPL
- SORTIE – Atmospheric & Space Tech Res Associates
- CubeRRT – The Ohio State University
- CANOP – Carthage College
- MemSat – Rowan University
- OPAL – Utah State University





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# Commercial Procurement










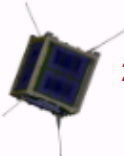
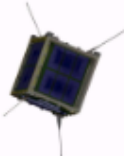
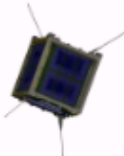
- **An RFP is being prepared for release for the procurement of U-Class Payload launch services**
  - **Requirements**
    - » **95 to 102 degrees at an altitude that meets Orbital Debris policy**
  - **Options for 3 potential launches, one each in FY19, FY20 and FY21**
  - **Each launch will be able to accommodate 24U for a total of 72U**
  - **First Launch to have a minimum buy of 12U and with a max of 24U**
    - » **Launch for CIRIS and CIRAS, both are 6U on 2018 opportunity**
- **Continue to use the JSC contract to procure services from NanoRacks for ISS deployments**



# Mission of Opportunities

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	FY18	FY19	FY20	FY21	FY22
<b>Potential ISS Flights (51.6°)</b>		 	 	 	 
<b>U-Class Commercial Flights (95° to 102°)</b>		 24 U Max	 24 U Max	 24 U Max	
<b>ESPA Missions</b> <i>ESPA CubeSat</i> Carrier Development Funded by LSP			<i>Sentinel-6A</i>	<i>SWOT (Falcon 9)</i> <i>LandSat 9</i> <i>JPSS-2</i>	<i>Atlas V (ABC)</i>
<b>VCLS Missions</b>			 <i>TROPICS</i> <i>30° Inclination</i> <i>550km</i>		



# Summary



ELaNa						
# of Selected CubeSat Missions	Adjusted # of Selected CubeSat Missions*	# of CubeSat Missions Manifested	# of Unassigned CubeSat Missions	# of ELaNa Missions	# of CubeSat Missions Launched	# of U Launched
165	154	52	54	13	49**	81

U's Launched							U's Manifested	
2011	2012	2013	2014	2015	2016	2017	2017	2018
12	9	21	15	27	0	7	96	59

80U
155U

- Averaging U launched – 14 U per year

\* Reflects adjustment for survey responses  
 \*\* Includes LSP and Re-flights

