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“Getting CubeSat Missions to Orbit Over the Next Decade”

27th Annual AIAA/USU Conference on
Small Satellites
2013

Garrett Skrobot

ELaNa Project Manager

Launch Services Program

NASA



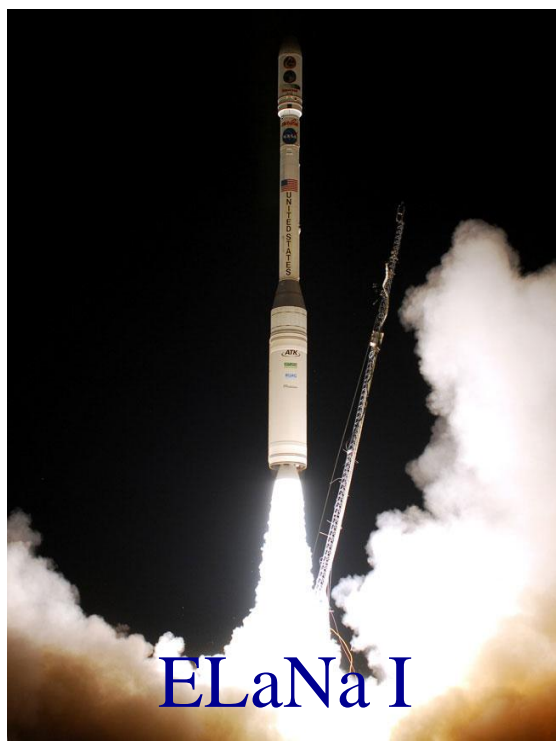
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What do we do within LSP for CubeSats?

We Manifest...Integrate...and Launch... CubeSats from the CubeSat Launch Initiative list for NASA

To date we have launched 12 CubeSats Missions





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ELaNa Missions Manifest 2009



ELaNa Missions Manifest

LV Provider	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	
NASA 	 ELaNa I March 4, 2011 Glory – Taurus 1 PPOD 3 CubeSats	 ELaNa III Oct 28, 2011 NPP – DII 3 PPOD 5 CubeSats	 ELaNa V Nov 28, 2013 CRS#3 – F9 4 PPODs 5 CubeSats	 ELaNa VIII April, 2014 CRS#4 – F9 2 PPODs 2 CubeSats	 ELaNa IX Aug 2014 CRS#5 – F9 PPODs 2 CubeSats	 ELaNa X Oct 2014 SMAP – DII 3 PPODs 3 CubeSats	 ELaNa July 2016 ICESat II – DII 3 PPODs CubeSats	 ELaNa Nov 2016 JPSS-1 – DII 3 PPODs CubeSats
NRO 		 ELaNa VI Sept 13, 2012 NROL-36 – DII 3 PPOD 4 CubeSats	 ELaNa II Nov 2013 NROL-39 – AV 2 PPODs 4 CubeSats	 ELaNa XI Nov 2014 AFSPC-5 2 PPODs 4 CubeSats	 ELaNa XII Dec 2014 NROL-55 – AV 2 PPODs 2 CubeSats			
ORS 			 ELaNa IV Nov 13 ORS-3 4 PPODs 11 CubeSats	 ELaNa VII Mar 2013 ORS-4 1 PPODs 2 CubeSats				
Commercial					 ELaNa 2015 PPODs CubeSats	 ELaNa 2016 PPODs CubeSats	 ELaNa 2017 PPODs CubeSats	

Manifested

In Work

36 Manifested 36 Un-Manifested



Developments

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Atlas V		Delta IV	Delta II	Taurus XL	Athena	Falcon 9	
Common	ABC NPSCul	Common	2 nd Stg Struts Section	Aft End 3 rd Stg	Aft End	CRS	Fairing
Studied	Flown	Studied	Flown	Flown	Studied	In Development '14	In Development 2014





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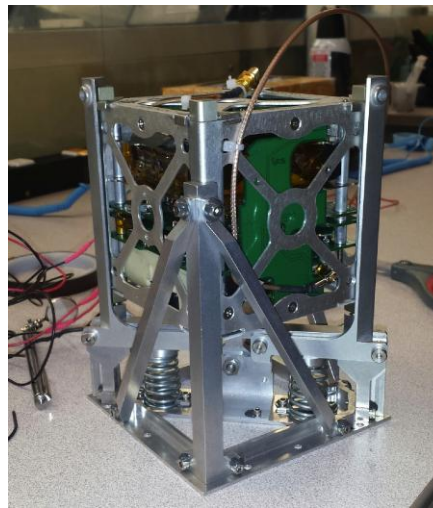
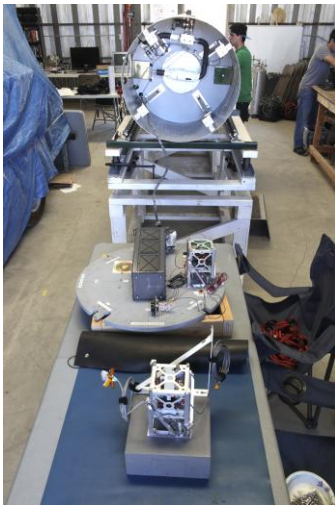
Developments



- **MOOG/CSA ESPA Six U carrier**



- **Tyvak - Nano Launch Carrier System will reduce the mass of the cubesat carrier system for use on future Nano Launch Vehicles**





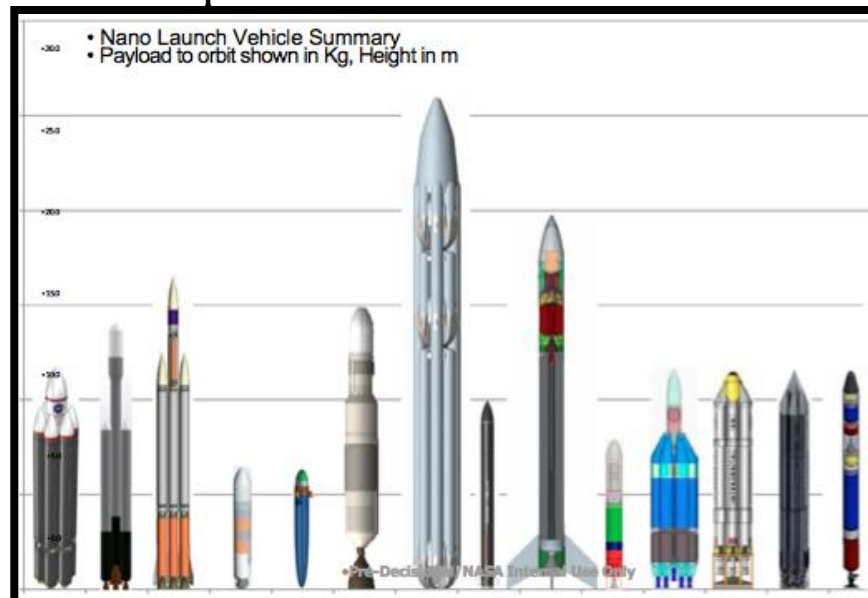
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CubeSat NanoLaunch



- Launch Services Program working to release an RFP for potential CubeSat-Class Payload launch services

- Requirement: 15kg (3-3U) to 425km (orbit inclination between 0°-98°)
- 9/30/13 – 12/15/16 Period of Performance
- Launch Window: 1/15/16 – 12/15/16
- Provides for dedicated STEM initiative with multiple contracted P-POD launches
- Dedicated Nano Launch Vehicle
- High Risk Tolerant Approach
- No “first flight” requirement
- ICD & Mission Success Criteria
- LSP insight through milestone reviews
- FAA Licensed Launch





SBIR NanoLaunch Technologies



- **Six contractors are working the 2012 Enhanced Phase I SBIRs in the NanoLauncher technology subtopic**
 - **Tyvak Nano-Satellite Systems LLC**
 - » *Flexible Low Cost Avionics for NanoSatellite Launch Vehicle Control and GPS Metric Tracking*
 - **Millennium Engineering and Integration Company**
 - » *Automated Flight Safety Inference Engine (AFSIE) System*
 - **Garvey Spacecraft Corporation**
 - » *Incremental Evolution of a 10/250 NLV into a 20/450 NMSLV*
 - **Ventions, LLC**
 - » *Regeneratively-Cooled, Pump-Fed Propulsion Technology for Nano / Micro Satellite Launch Vehicles*
 - **Tethers Unlimited, Inc.**
 - » *SWIFT-nanoLV Avionics Platform*
 - **Invocon, Inc.**
 - » *Wireless Intra-vehicle Communication System (WICS)*



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Questions