"Getting CubeSat Missions to Orbit Over the Next Decade"

27th Annual AIAA/USU Conference on Small Satellites
2013

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Launch Services Program
NASA
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
# ELaNa Missions Manifest

## 2009

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<tr>
<td>NASA</td>
<td><img src="image1.png" alt="Manifested" /> ELaNa I March 4, 2011 Glory - Taurus 1 PPOD 3 CubeSats</td>
<td><img src="image2.png" alt="Manifested" /> ELaNa III Oct 28, 2011 NPP - DII 3 PPOD 5 CubeSats</td>
<td><img src="image3.png" alt="Manifested" /> ELaNa V Nov 28, 2013 CRS#3 - F9 4 PPODs 5 CubeSats</td>
<td><img src="image4.png" alt="Manifested" /> ELaNa VIII April, 2014 CRS#4 - F9 2PPODs PPODs 2CubeSats 2 CubeSats3 CubeSats</td>
<td><img src="image5.png" alt="In Work" /> ELaNa IX Aug 2014 3 PPODs</td>
<td><img src="image6.png" alt="In Work" /> ELaNa X Oct 2014 3 PPODs</td>
<td><img src="image7.png" alt="In Work" /> ELaNa Nov 2016 3 PPODs</td>
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<td>NRO</td>
<td><img src="image8.png" alt="Manifested" /> ELaNa VI Sept 13, 2012 NROL-36- DII 3 PPOD 4 CubeSats</td>
<td><img src="image9.png" alt="In Work" /> ELaNa II Nov 2013 NROL-39 – AV 2 PPODs 4 CubeSats</td>
<td><img src="image10.png" alt="In Work" /> ELaNa XI Nov 2014 AFSPC-5NROL-55 – AV 2 PPODs 2 PPODs</td>
<td><img src="image11.png" alt="In Work" /> ELaNa XII Dec 2014 2 PPODs 2 CubeSats</td>
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<td>ORS</td>
<td><img src="image12.png" alt="Manifested" /> ELaNa IV NET 9/30/13 ORS-3 4 PPODs 11CubeSats</td>
<td><img src="image13.png" alt="In Work" /> ELaNa VII Oct 2013 ORS-4 1 PPODs 2 CubeSats</td>
<td><img src="image14.png" alt="In Work" /> ELaNa XI Nov 2014 AFSPC-5NROL-55 – AV 2 PPODs 2 PPODs</td>
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<td><img src="image16.png" alt="In Work" /> ELaNa 2015 PPODs CubeSats</td>
<td><img src="image17.png" alt="In Work" /> ELaNa 2016 PPODs CubeSats</td>
<td><img src="image18.png" alt="In Work" /> ELaNa 2017 PPODs CubeSats</td>
<td><img src="image19.png" alt="In Work" /> ELaNa 2018 PPODs CubeSats</td>
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- [Manifested](image20.png)
- [In Work](image21.png)
# Developments

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<thead>
<tr>
<th></th>
<th>Atlas V</th>
<th>Delta IV</th>
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<th>Taurus XL</th>
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<td>Studied</td>
<td>In Development Dec '14</td>
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![Rocket Images](rocket_images.png)
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
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)*
Questions