

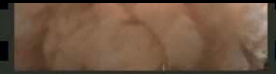
A photograph of an Atlas V rocket launching from a launch pad. The rocket is ascending vertically, leaving a large, bright orange and white plume of fire and smoke. The launch pad is visible in the foreground, with several service towers. The background shows a coastline with the ocean and a blue sky with scattered white clouds.

*Space Transportation
Atlas V / Auxiliary Payload Overview*

*Lockheed Martin
Space Systems Company*

*Jim England
(303) 977-0861
Program Manager, Atlas Government Programs
Business Development and Advanced
Programs
3 August 2006*

Video – Take a Ride



Reliable & Versatile Launch Vehicle Family



Atlas I
AC-69

Jul 1990

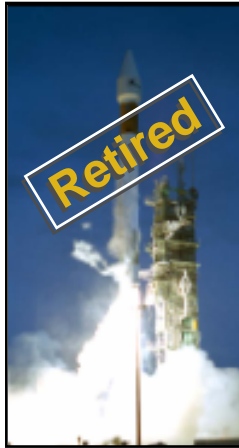
8/11



Atlas II
AC-102

Dec 1991

10/10



Atlas IIA
AC-105

Jun 1992

23/23



Atlas IIAS
AC-108

Dec 1993

30/30



Atlas IIIA
AC-201

May 2000

2/2



Atlas IIIB
AC-204

Feb 2002

4/4



Atlas V-400
AV-001

Aug 2002

4/4



Atlas V-500
AV-003

Jul 2003

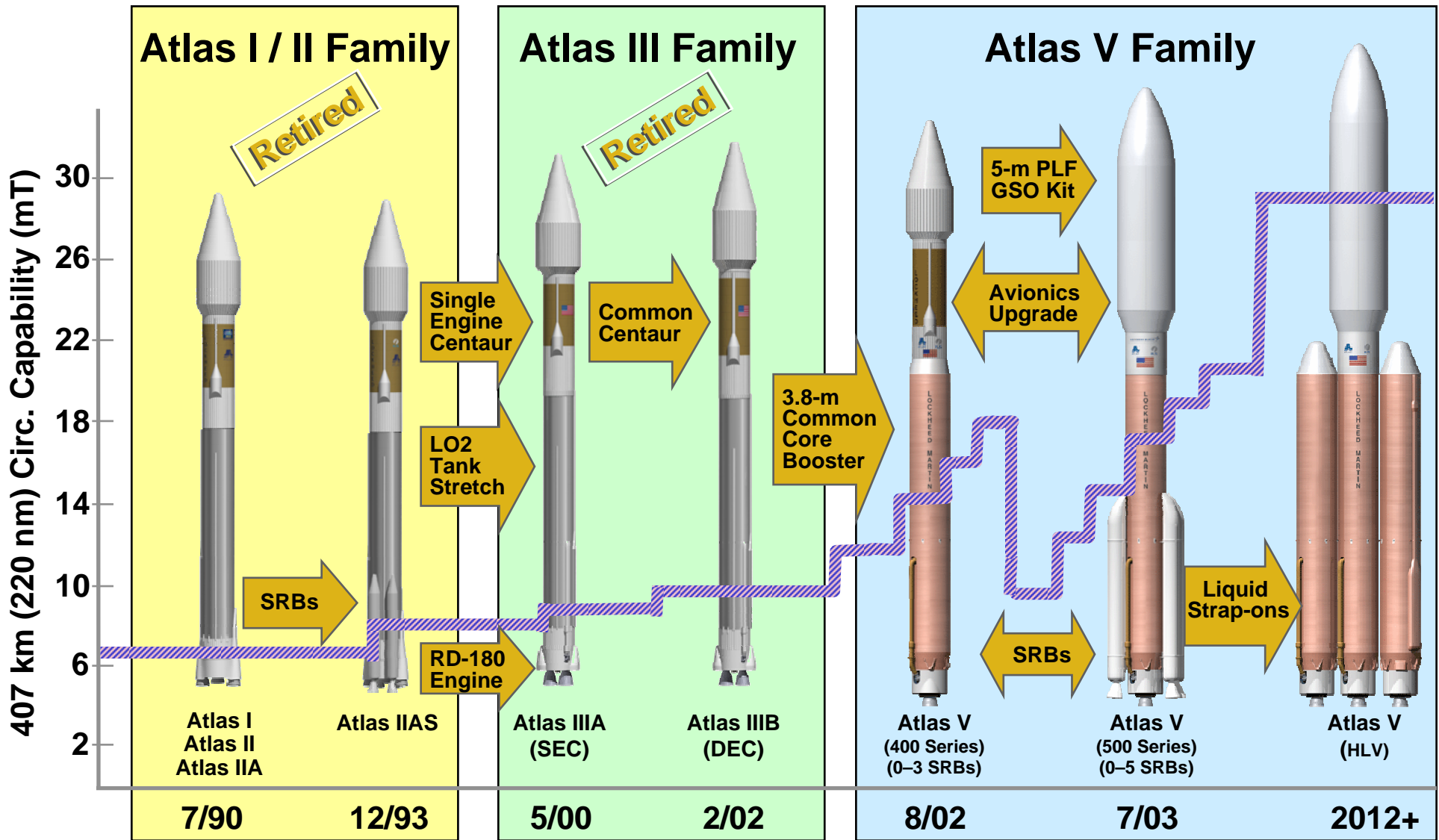
3/3

■ First Flight **X/Y** X Successes / Y Flights

- Consecutive Successful Atlas Centaur Flights: 79
- First Flight Successes: 8 of 8
- Mission Success: 100% Atlas II, IIA, IIAS, IIIA, IIIB, and V Families
- Retired Variants: A, B, C, D, E, F, G, H, I, II, IIA, IIAS, IIIA, IIIB

Mission Success: One Launch at a Time

Recent Atlas / Centaur Evolution



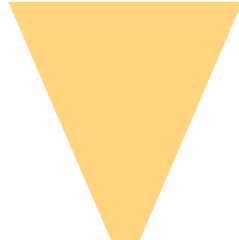
Demonstrated Low-risk Continuous Improvement

Atlas V Common Elements



4.2-meter
PLF
(LPF, EPF, XPF)

Common Centaur



5.4-meter
Contraves PLF
(68, 77, 87)



RL10A-4-2
Single or Dual
Engines



Common Core
Booster™

Solid Rocket Booster (SRB)



Common Propulsion



RD-180 Engine

Atlas V 400
(0-3 SRBs)

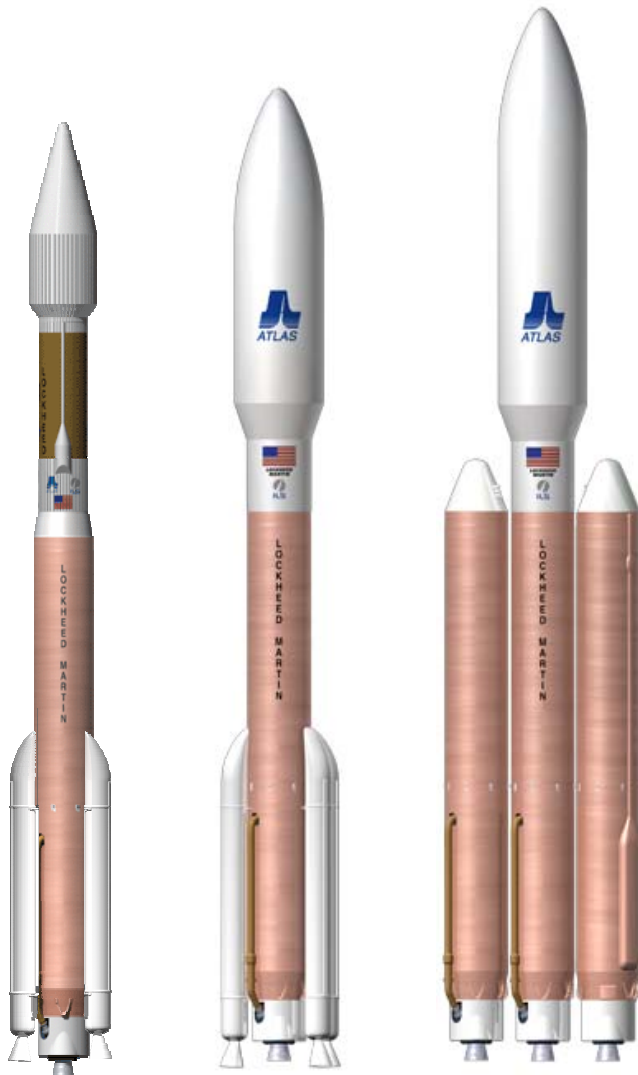
Atlas 500
(0-5 SRBs)

HLV

Atlas V Configuration Summary



Atlas V Launch Vehicle Family



400

500

HLV

Vehicle Naming Convention: Atlas V xyz

1st Digit = x = PLF Diameter (meters)

2nd Digit = y = No. of SRBs (0 to 5)

3rd Digit = z = No. of Centaur Engines (1 or 2)

Vehicle Series:	400	500	Heavy
PLF Diameter	4.2 Meter LPF EPF XEPF	5.4 Meter Short (68') Med (77') Long (87')	5.5 Meter Long (87')
No. of Strap-Ons	0 thru 3 SRBs	0 thru 5 SRBs	2 LRBs
No. Centaur Engines	1 or 2	1 or 2	1 or 2

The Atlas V Launch Vehicle Family Provides:

- Modular, Common Element Design
- 4 & 5 Meter Payload Fairings
- Standard Payload Interfaces
- Standard Kits for GSO

Atlas V Configurations



401	411	421	431	501	511	521	531	541	551	HLV
✓	✓	---	✓	---	---	✓	✓	---	✓	---
✓						✓				

Flights: 401, 401, 521, 521, 431, 401, 551, 411....

Atlas V Launch History



AV-001
Aug 21, 2002



AV-002
May 13, 2003



AV-003
Jul 17, 2003



AV-005
Dec 17, 2004



AV-004
Mar 11, 2005



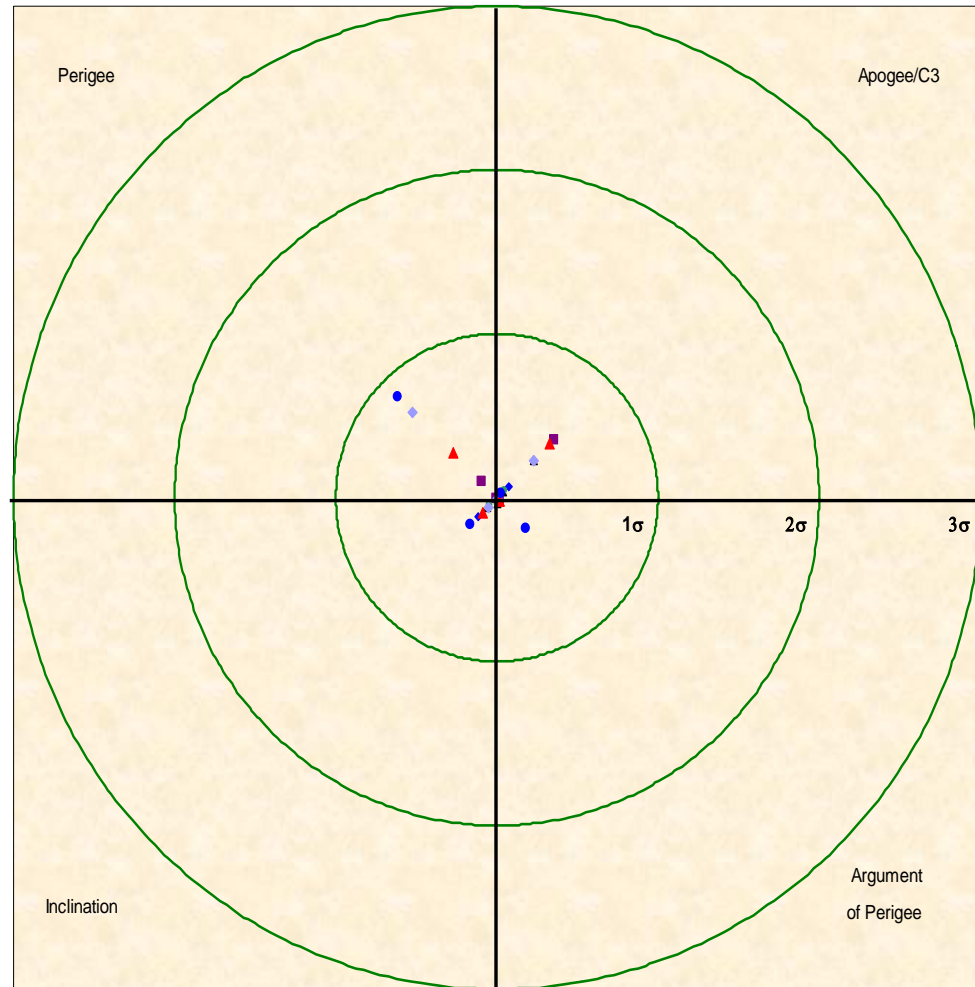
AV-007
Aug 12, 2005



AV-010
Jan 19, 2006



AV-008
20 Jan 2006



- ◆ AV-001
- ▲ AV-002
- AV-003
- AV-005
- ◆ AV-004
- ▲ AV-007
- AV-010

Outer Circle
Represents 3σ
Accuracy
Requirement

Eight Missions: 100% Mission Success

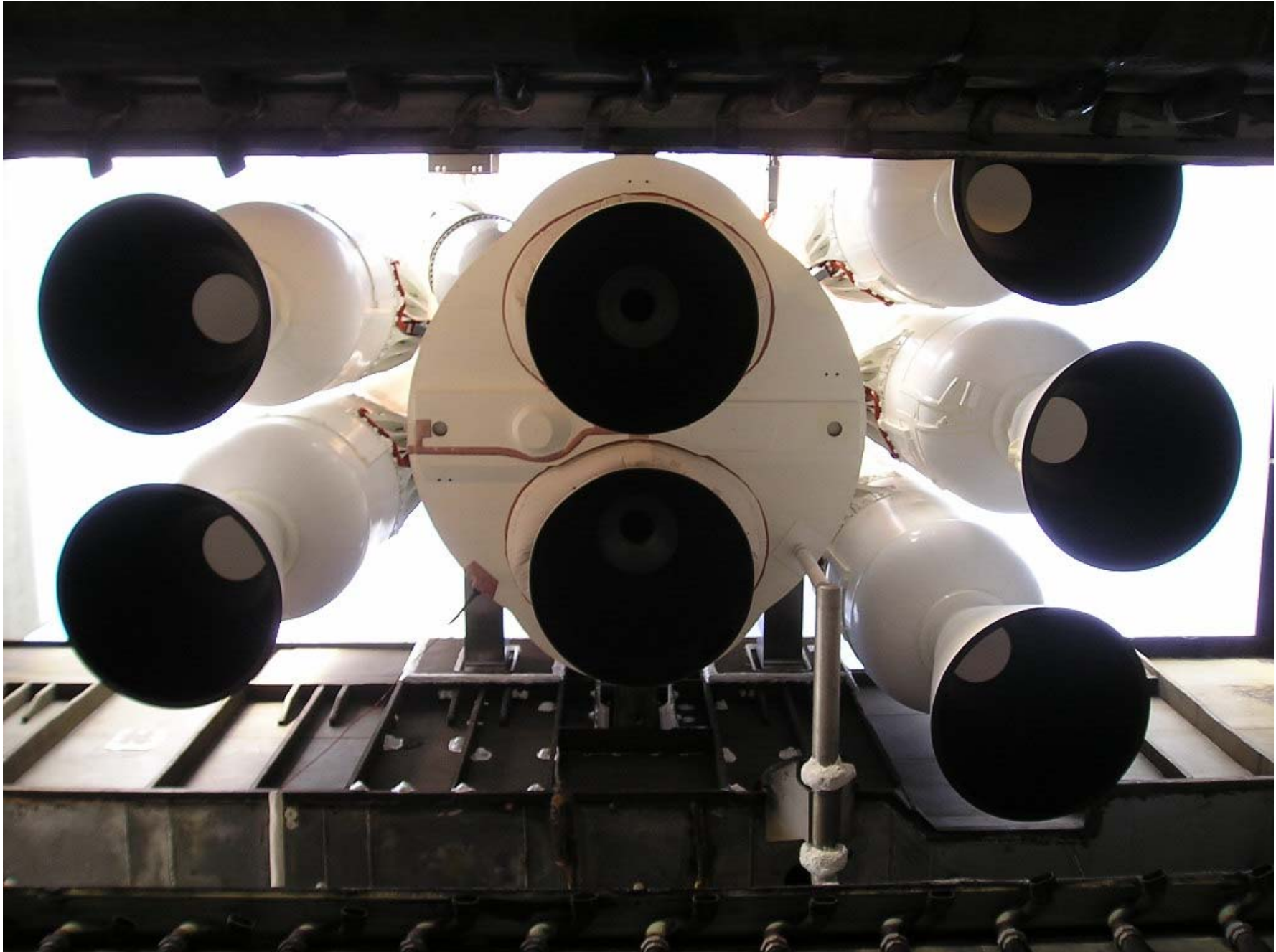
AV-010 / Pluto New Horizons Launch

- January 19, 2006
- NASA Pluto New Horizons Spacecraft
- First 551 configuration
- First Block 2 Avionics
- First Block B SRB
- Nuclear certification required
- Nominal flight profile
- Injection conditions well within 1 sigma
 - C3, RLA, DLA

*Fastest Satellite Vehicle
Ever Launched*



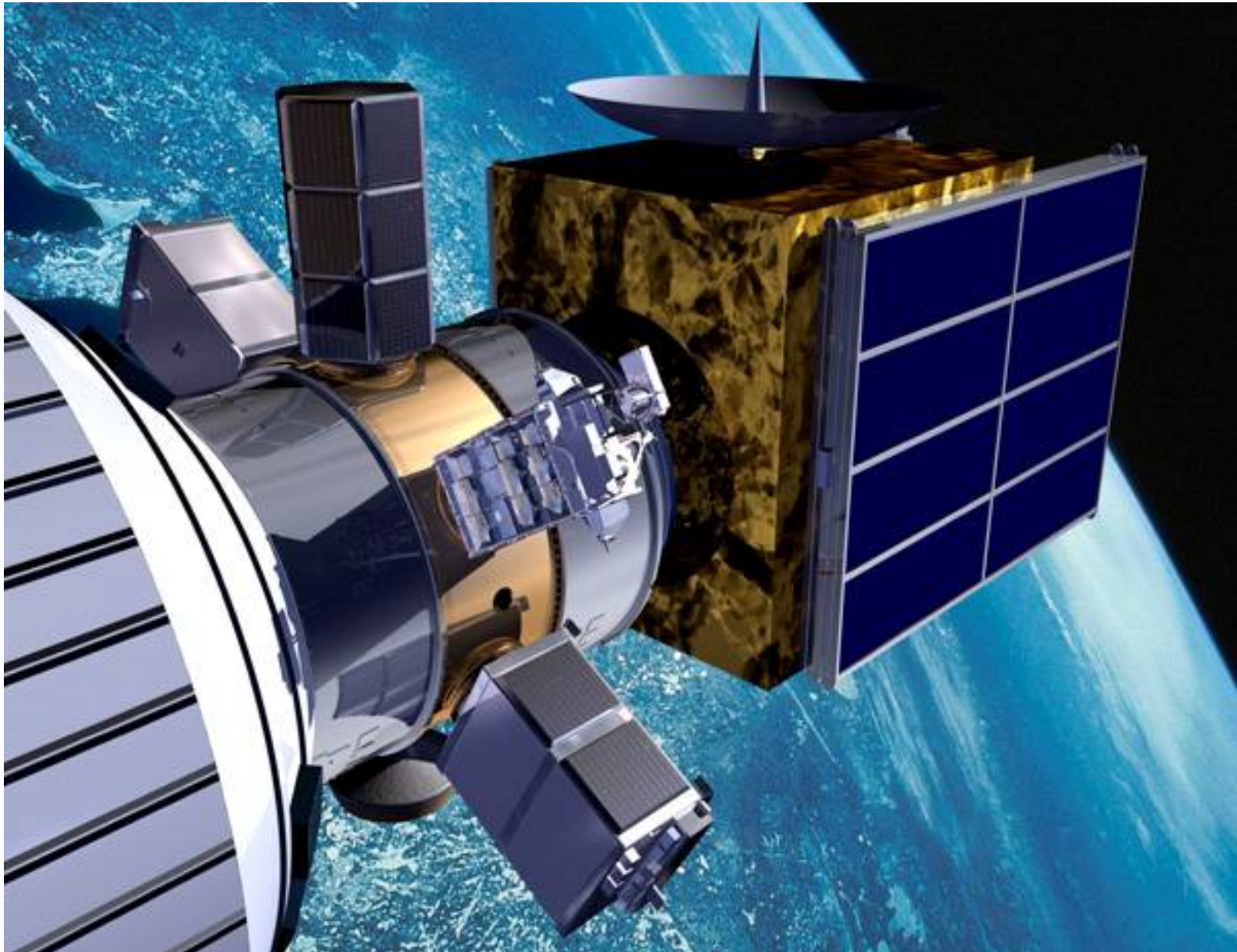
AV-010 Pluto: View from the flame bucket



Video – Pluto NH



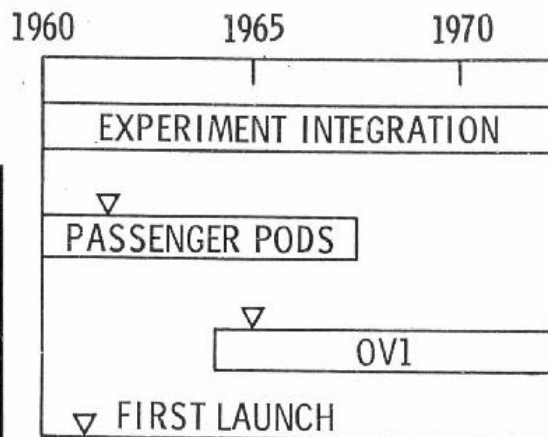
Secondary Payload Carriers – 2006



Previous Atlas Secondary Missions



SPACE EXPERIMENT INTEGRATION SUMMARY

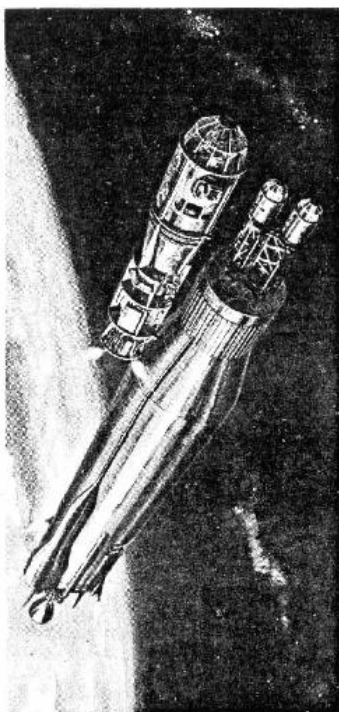


TOTAL SPACECRAFT BUILT 81

TOTAL EXPERIMENTS INTEGRATED 467

TOTAL OV1s BUILT 23

TOTAL OV1 EXPERIMENTS INTEGRATED 124



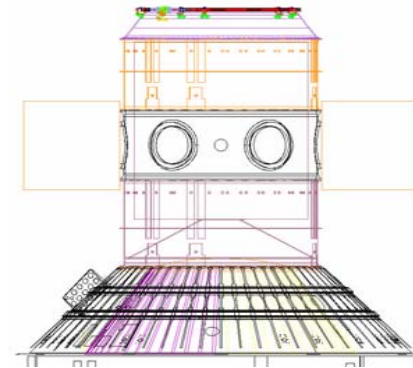
EXPERIMENT CATEGORIES

- 3 BIOSCIENCE
- 199 GEO. & ASTROPHYSICAL
- 195 NUCLEAR TEST MEASUREMENTS
- 30 MISSILE PLUME INVESTIGATIONS
- 32 SPACECRAFT SUBSYSTEM TESTS
- 8 ZERO GRAVITY
- 467 TOTAL

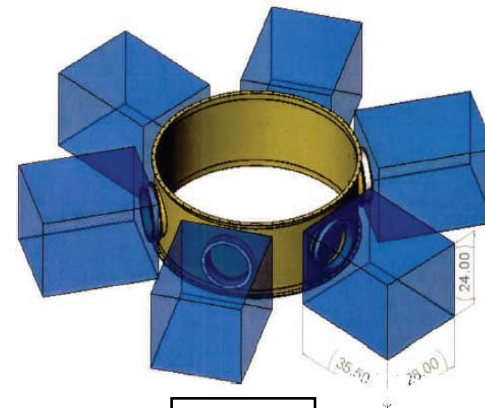
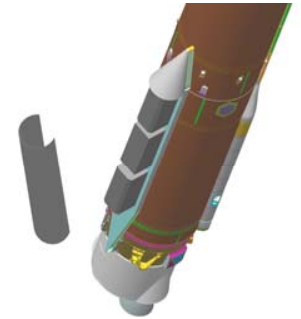


Atlas V Secondary Payload Capabilities

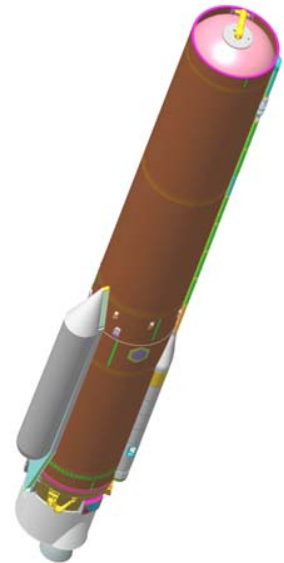
- Internal Payload Carrier (IPC)
 - Capability to Support Large Secondary Payloads
 - Flight Scheduled on STP-1 (Dec 2006)
 - Flight Scheduled on LRO (Oct 2008)
 - All EELV and Commercial Mission As Available (DMSP, NPOESS, GPS)
- eXternal Payload Carrier (XPC)
 - Supports Suborbital Flight Test Requirements
- Others Carriers in Development
 - Type-C Carrier (TCC)
 - Aft bulkhead Carrier (ABC)
 - Upper Stage Payload Carrier (USPC)
 - Dual Payload Carrier (DPC)



IPC



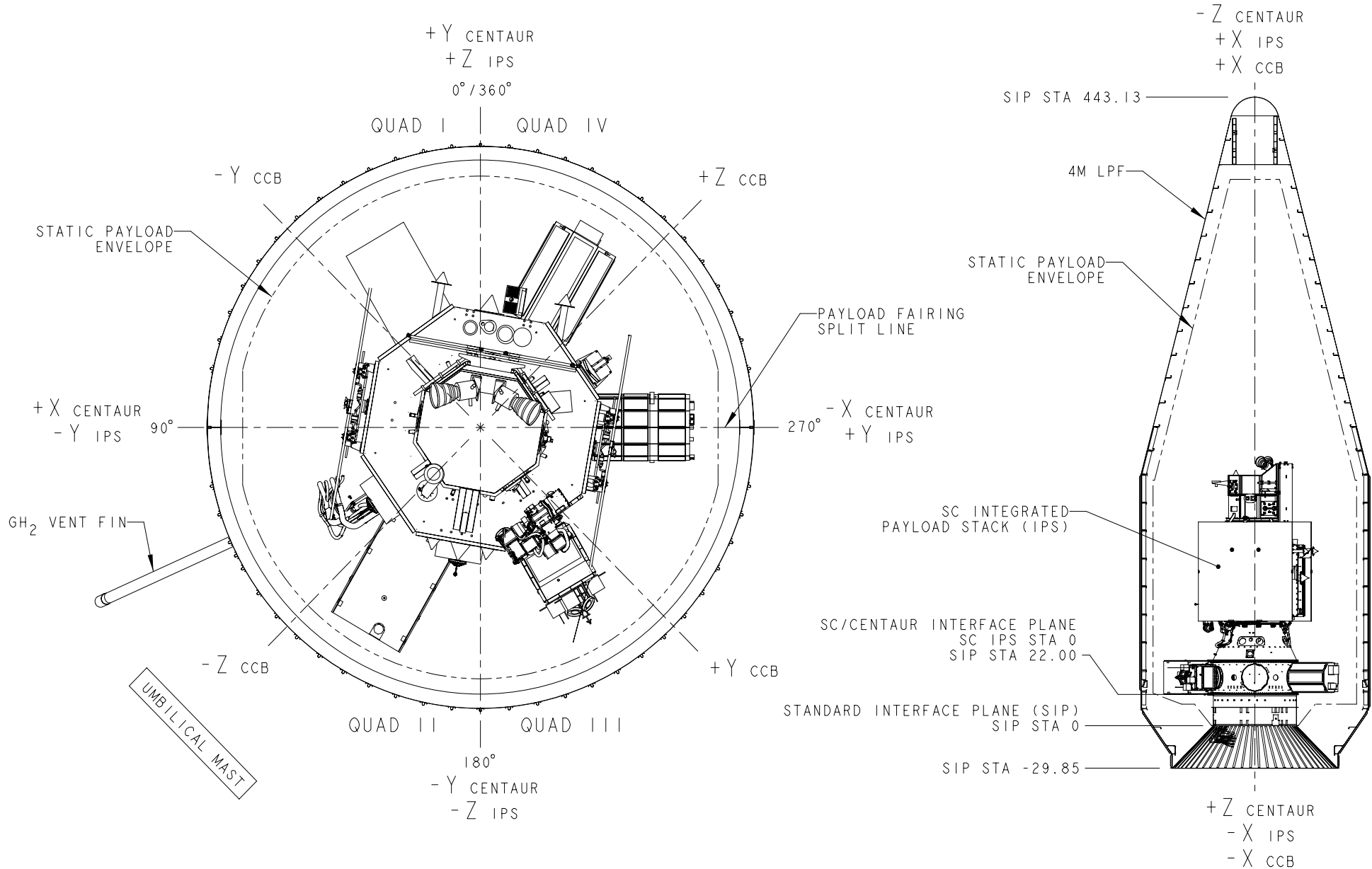
ESPA



XPC

Multiple Atlas Secondary Launch Options

STP-1 with an IPC

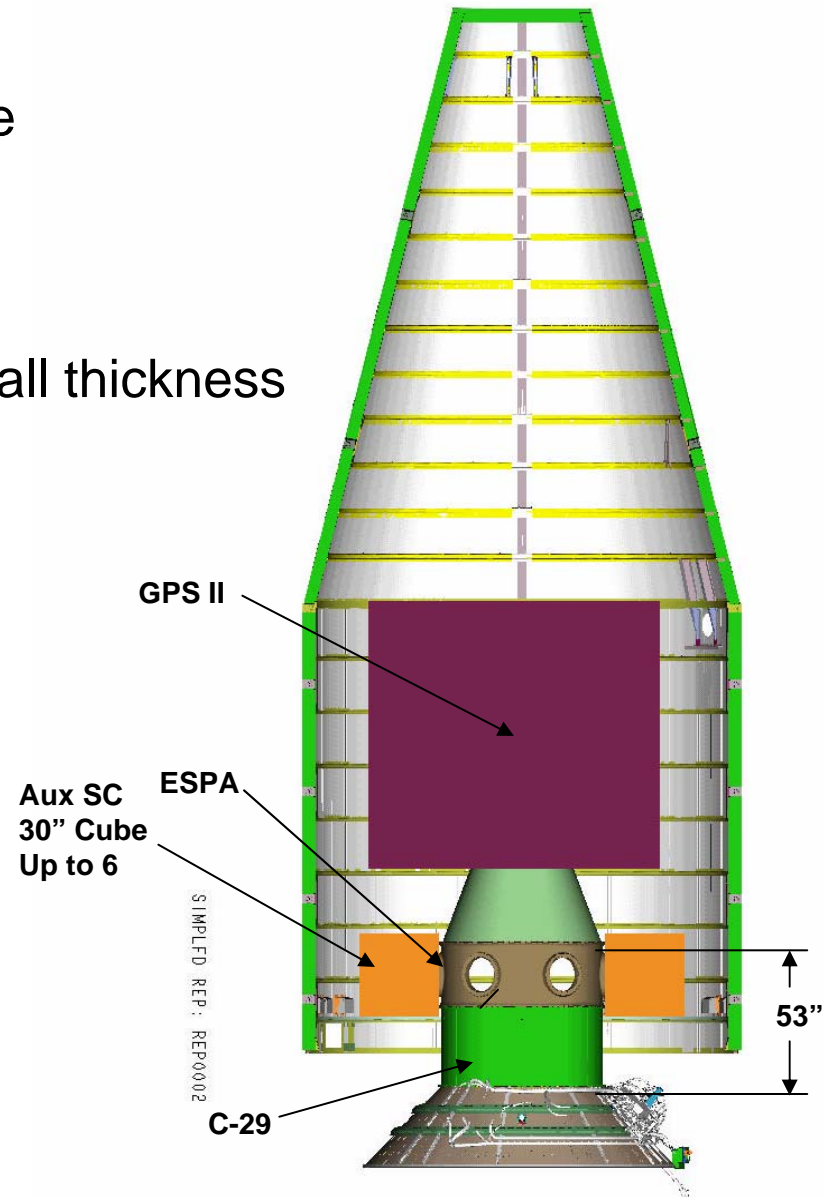


• The November 2006 STP-1 Mission to demonstrate small satellite capability

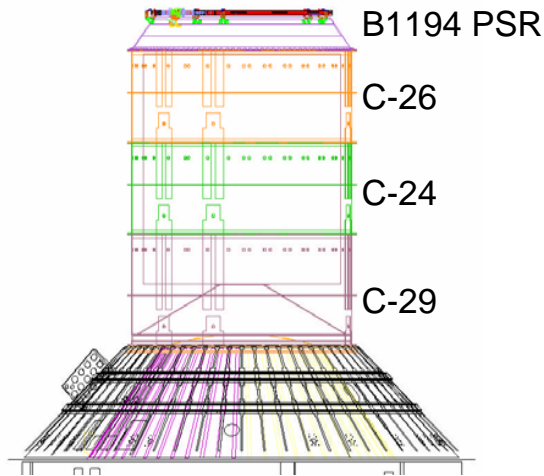
GPS IIF with an IPC

- Performance Margin > 1500 lbs
 - IPC stack height shown is 53"
 - Max 106" IPC stack height possible

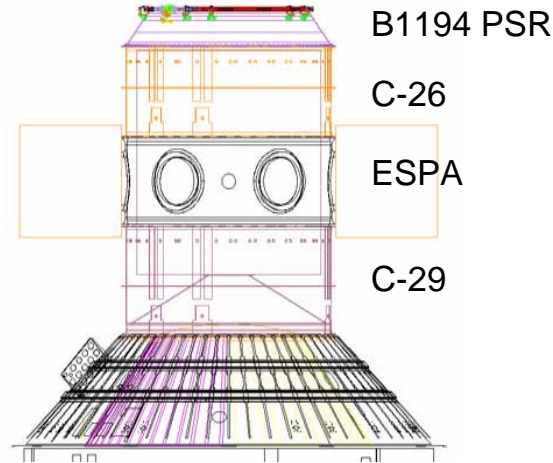
- Approx Weights of Bare Structure:
 - ESPA: 350 lbs
 - C-29: 100-175 lbs depending on wall thickness



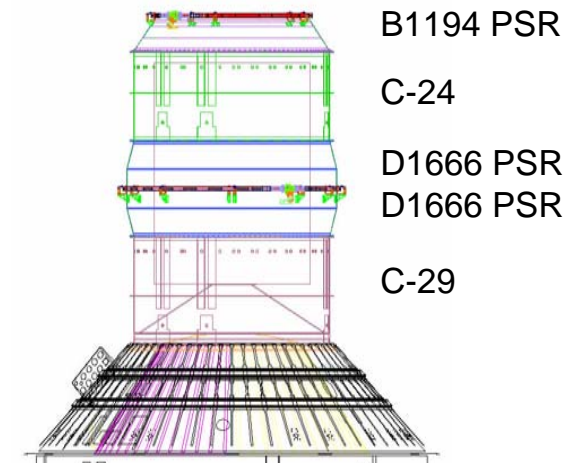
Atlas V IPC Stack Options



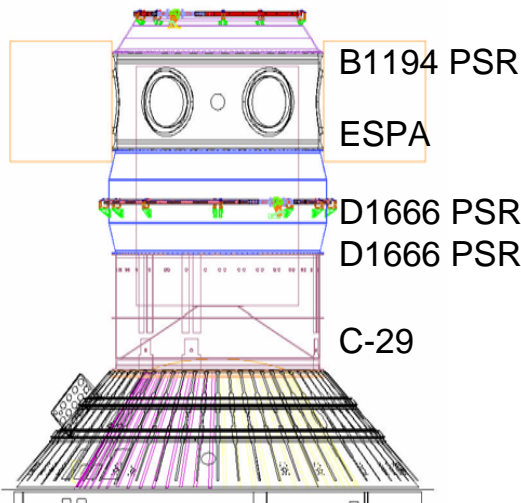
Option 1: Baseline
No Separation SP
54" Dia x 60" Ht



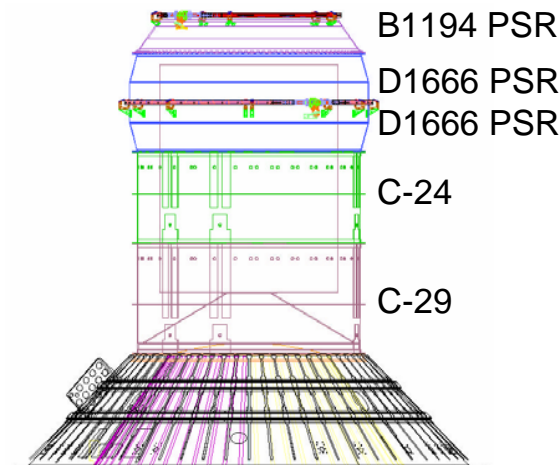
Option 2: w/ ESPA
No Separation SP
54" Dia x 60" Ht



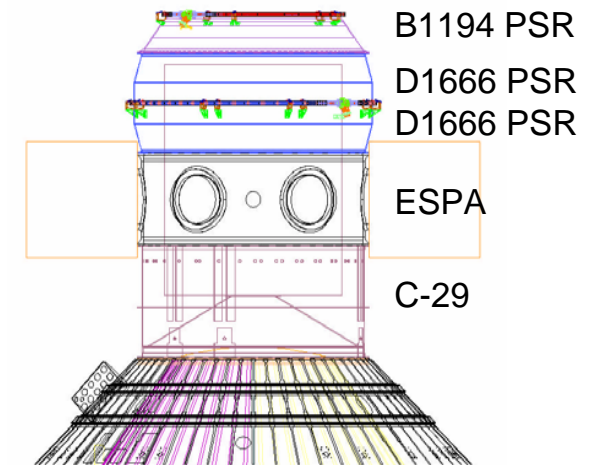
Option 3: Stack Separation
Separation SP
48" Dia x 60" Ht



Option 4: Stack Sep w/ ESPA
Separation SP
48" Dia x 60" Ht



Option 5: Stack Separation
Separation SP
48" Dia x 60" Ht

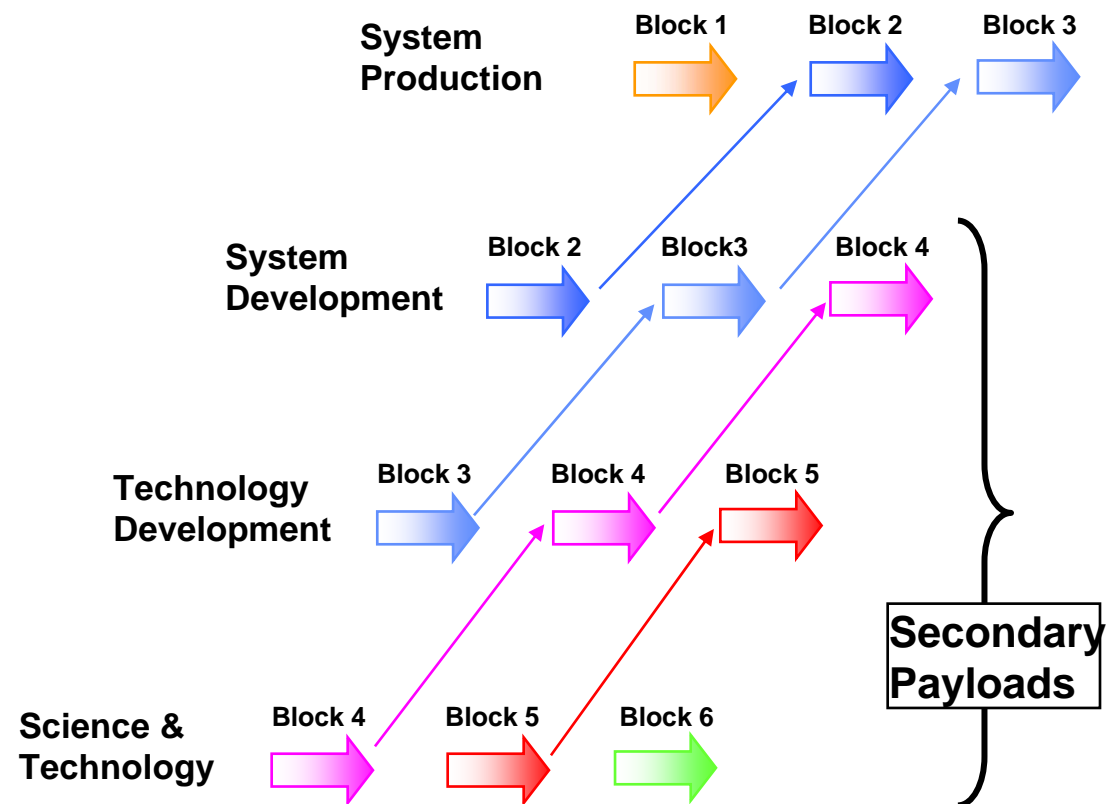


Option 6: Stack Sep w/ ESPA
Separation SP
48" Dia x 60" Ht

Secondary Capability Addresses Technology Maturity



- Effective Space Acquisition requires continuous technology development and demonstration – which in turn requires routine, low cost access to space
- USG manifests 6-8 NSS payloads per year
 - Excess performance available (GPS, DMSP, NPOESS, etc)
 - Opportunity for 6 to 12 secondary payloads per year



Secondary Payloads Enable Block Acquisition

Atlas Secondary Manifest Capability



Launch Pad	CY2006						CY2007						CY2008						CY2009						CY2010						CY2011																																									
	1st			2nd			1st			2nd			1st			2nd			1st			2nd			1st			2nd			1st			2nd																																						
	J	M	M	J	S	N	J	M	M	J	S	N	J	M	M	J	S	N	J	M	M	J	S	N	J	M	M	J	S	N	J	M	M	J	S	N	J	M	M	J	S	N																														
CCAFS LC-41	19 Jan Pluto AV010/551 ✓						NROL-30 AV009/401						Reserved 2 501						AEHF-531 LRO 401 SBIRS G-1 401						GPS IIF-6 401 GPS IIF-7 401 SBIRS G-401						GPS IIF-8 401 STP-2 401 AEHF-3 531 MUOS-1 541 MSL 541						GPS IIF-12 401 STTR-1 401 MUOS-2 541 NROL-38 401						Reserved 1 AV012/501 WGS F3 521 GPS IIF-4 401 SDO 401 WGS F4 521 NROL-33 401 WGS F1 521 GPS IIF-2 401 DMSP-11 401 NROL-41 501 NROL-39 501 NROL-45 501						12 Oct STP-1 AV013/401 →						15 Nov NROL-28 AV006/411 →																	
VAFB SLC-3E																																																																								
LEGEND Atlas V 400 Atlas V 500 Secondary Opportunity Secondary Payload Launch Under Review Successfully Launched																																																																								

Business Model for EELV Secondary Payloads

- Identify specific missions to routinely fly secondary payloads (GPS-IIF, DMSP, etc.)
- Define standard interface (volume, weight, LV services, CG, etc.)
 - Mass simulators to maintain primary spacecraft schedule
 - Plug and play swap-ability
 - Technically and programmatically transparent to primary SV
- Business Model implementation
 - USG to direct their SV programs to include secondary payloads
 - USG to fund the non-recurring secondary mission capability –cost based
 - Individual secondary payload flights for \$1-2M per slot – cost based

Disruptive Capability for Spacecraft Demonstration