



# Nano/Microsatellite Market Assessment 2012

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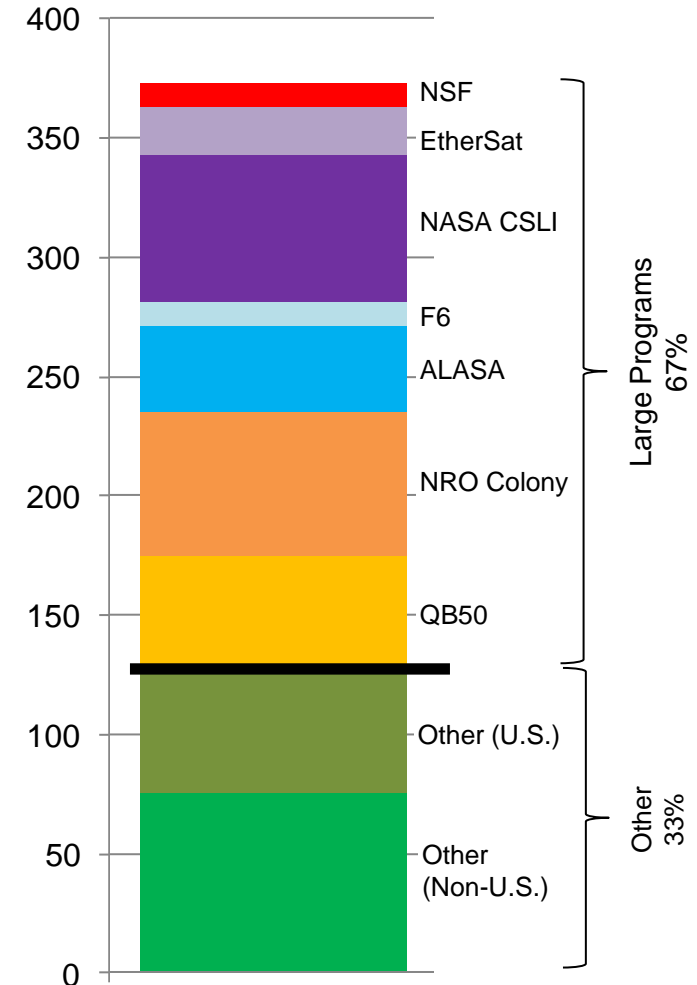
# Overview

- SpaceWorks presents a [limited release of selected charts](#) from the 2012 version of its nano/microsatellite market analysis and launch projections
- For this study, nano/microsatellites are defined as those with masses between 1 kg and 50 kg
  - Pico satellites with masses below 1 kg are not within the scope of this study
- SpaceWorks has projected global launch demand in the nano/microsatellite market according to a Gompertz logistic curve from 2012 to the year 2020
  - Not a “forecast” in that SpaceWorks places no value judgment on whether developers will successfully meet their announced launch date or not
- Two projections were developed from “Announced” and “Optimistic” data sets
  - “Announced” data set contains all publicly announced nano/microsatellite projects and programs
  - “Optimistic” data set consists of the announced plus quantitative and qualitative adjustments to account for the expected sustainment of current projects and programs (e.g. follow-on to QB50, CubeSat Launch Initiative, DARPA SeeMe)
- The data source for this study is the [SpaceWorks Orbital Satellite Database \(OSD\)](#)
  - The OSD is a database of all known historical and future satellite projects, including all known nano/microsatellites
  - Currently 377 known future nano/microsatellites in the OSD
  - Currently 43 known future picosatellites in the OSD (not included in this study)
- Projections indicate strong growth in nano/microsatellite launches, with [an estimated range of 138 to 224 nano/microsatellites \(1-50 kg\) that will need launches globally in 2020](#) (versus 24 in 2011)

# Nano/Microsatellite Future Program Summary (1-50 kg)

Name of Program	Time	Organization	Country	Mass (kg)	Number Launched	Total Number
NSF Geospace & Atmospheric CubeSat	2008-2015	NSF	USA	2	2	12
EtherSat	2013-2014	NASA Ames Research Center	USA	3	0	20
NASA CubeSat Launch Initiative	2011-2014	NASA	USA	1-8	7	69
F6	2015	DARPA	USA	45	0	10
ALASA (SeeMe, etc.)	2014-2015	DARPA	USA	45	0	36
NRO Colony I & II	2010-2015	NRO	USA	3	2	62
QB50	2014	Various/ von Karman Institute	Various	2	0	50

**Large Program Breakdown for Announced Future Launches**

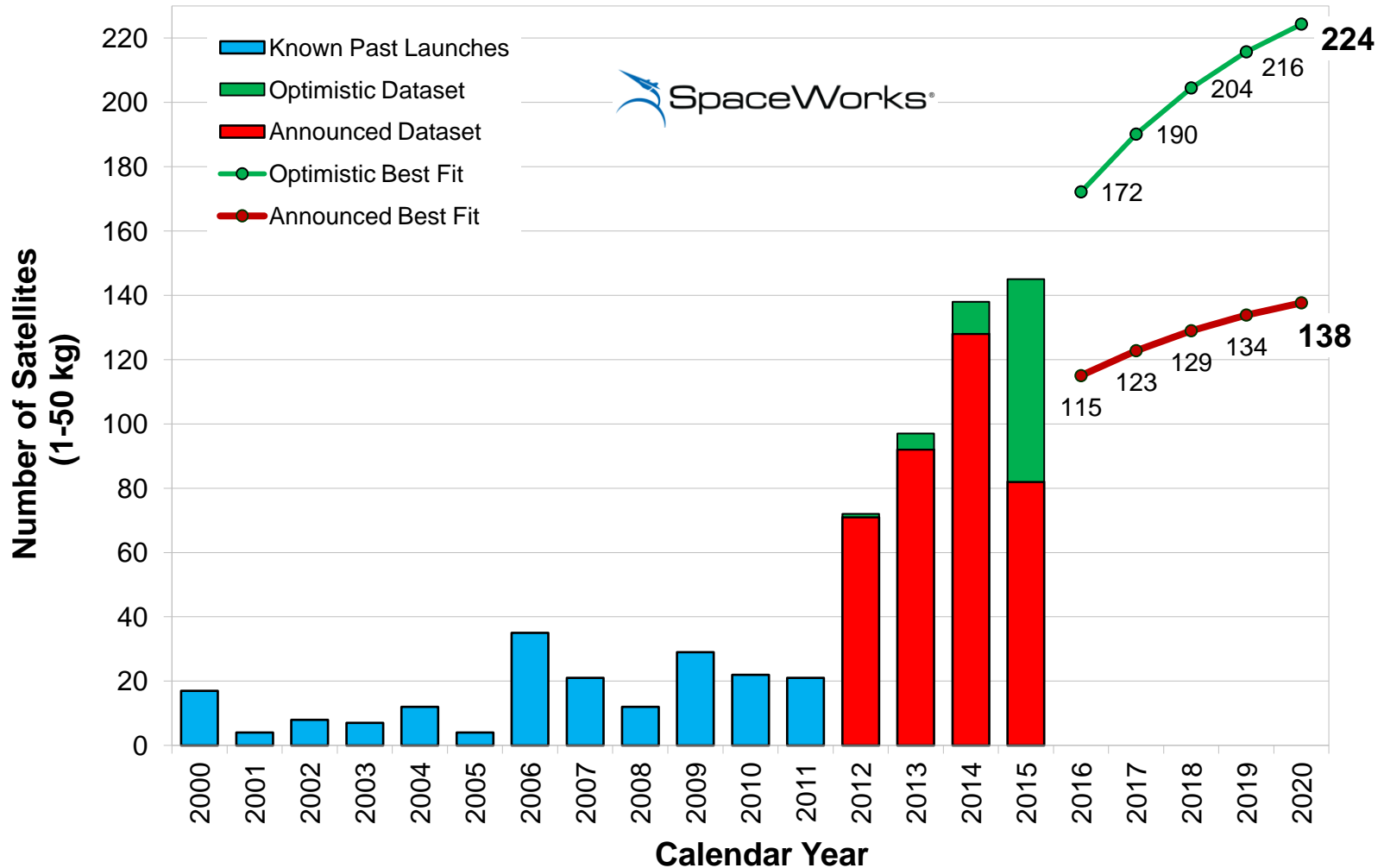


**Announced Future Launches 2012-2015**

Notes: Refer to end notes 1 and 2.

# Nano/Microsatellite Launch History and Projections

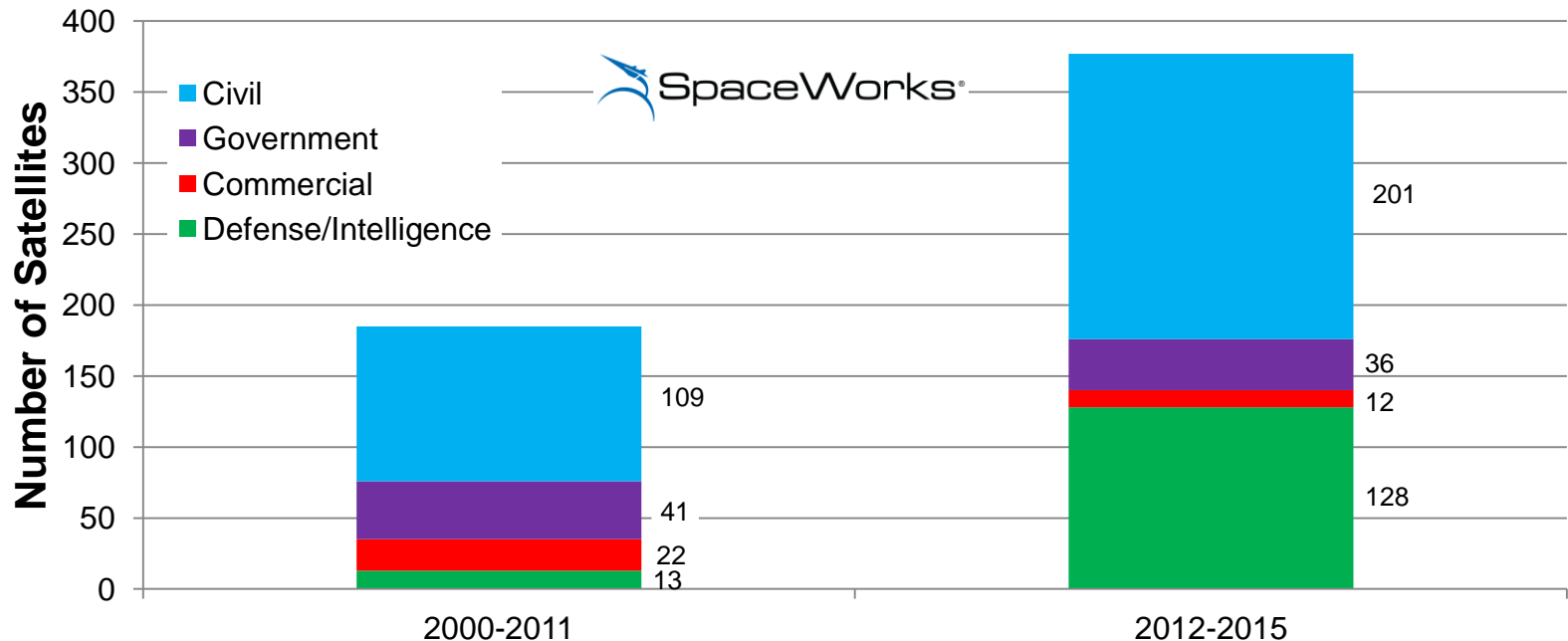
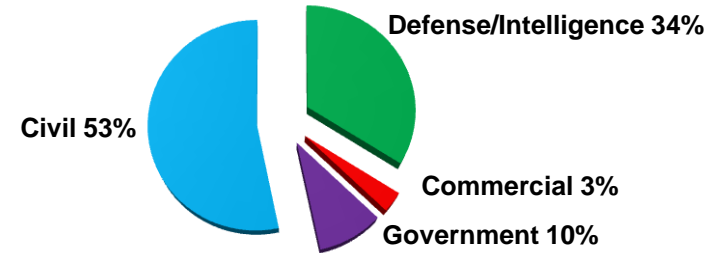
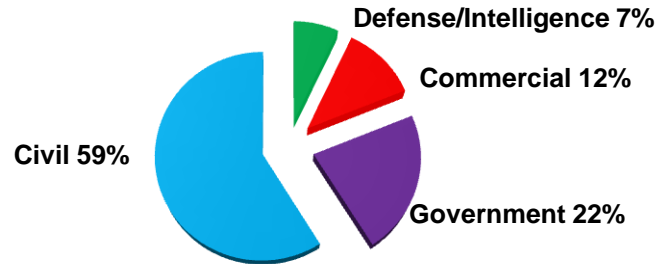
Projections based on the announced plans of nano/microsatellite developers and programs indicate a range of 138 to 224 nano/microsatellites requiring launch by 2020



Notes: Refer to end notes 1, 2, 3, 4, and 5.

# Nano/Microsatellite Trends by Sector

Evidence of increased defense/intelligence sector interest in nano/microsatellites



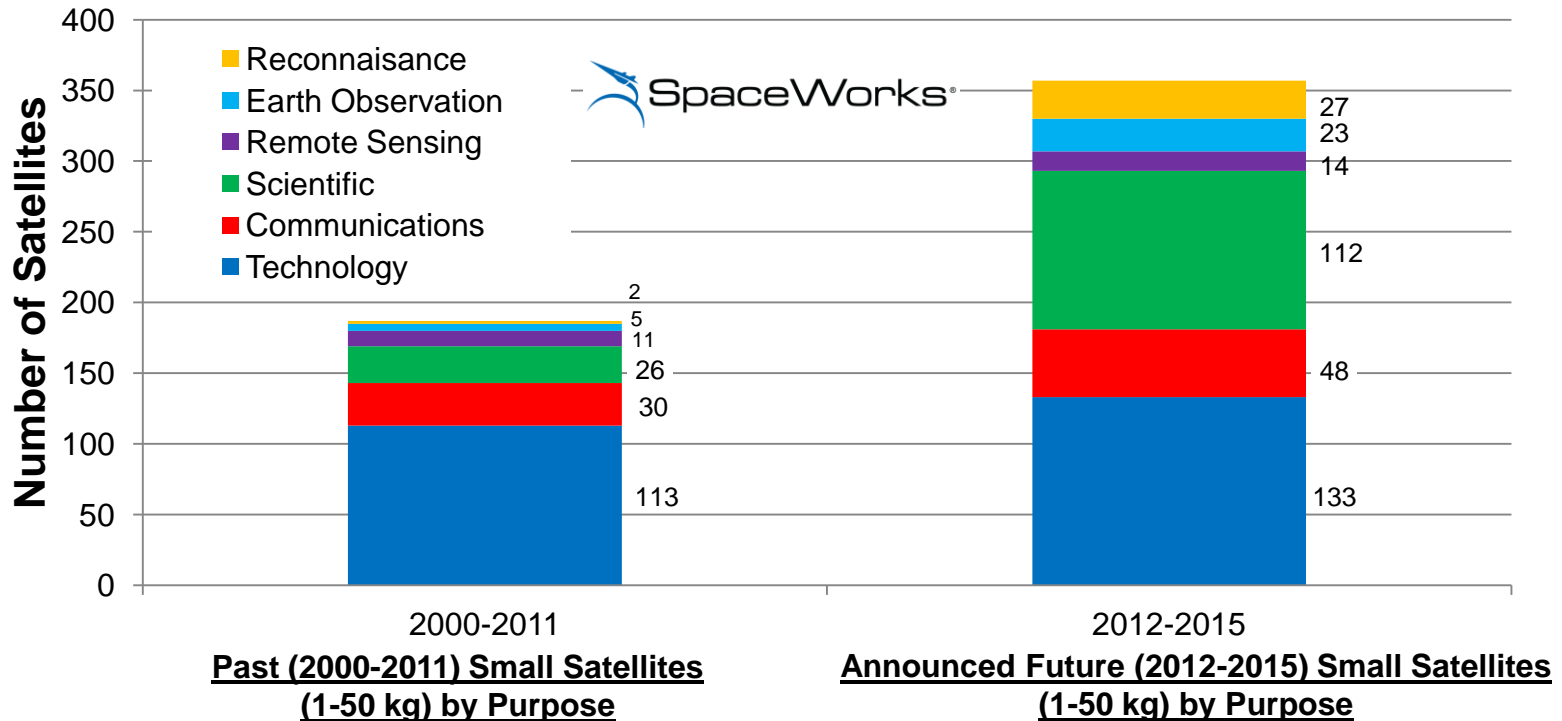
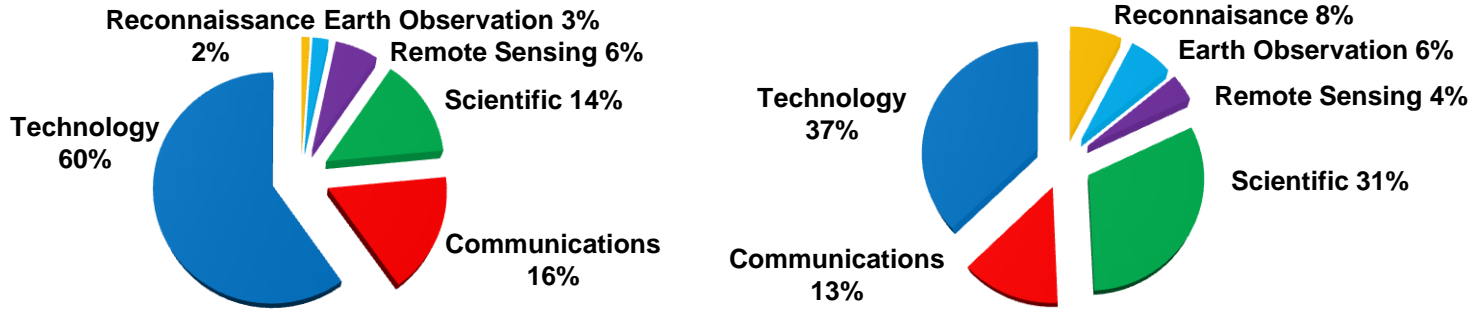
**Past (2000-2011) Small Satellites (1-50 kg) by Industrial Sector**

**Announced Future (2012-2015) Small Satellites (1-50 kg) by Industrial Sector**

Notes: Refer to end notes 1, 2, 6, 7, 8, and 9.

# Nano/Microsatellite Trends by Purpose

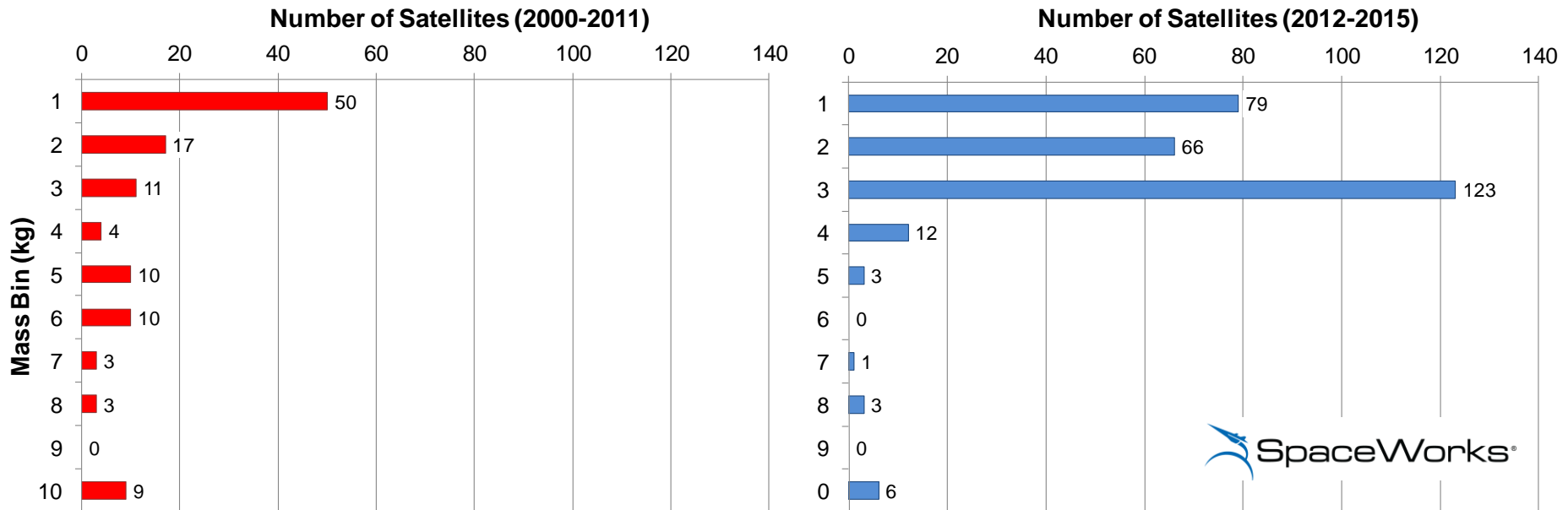
Evidence of adoption of small satellites for applications beyond technology demonstration



Notes: Refer to end notes 1, 2, 6, 7, and 8.

# Nanosatellite Size Trends

Announced future nanosatellites suggest sustainment of the historically popular 1U (1 kg) CubeSat as well as the emerging 2U and 3U nanosatellites



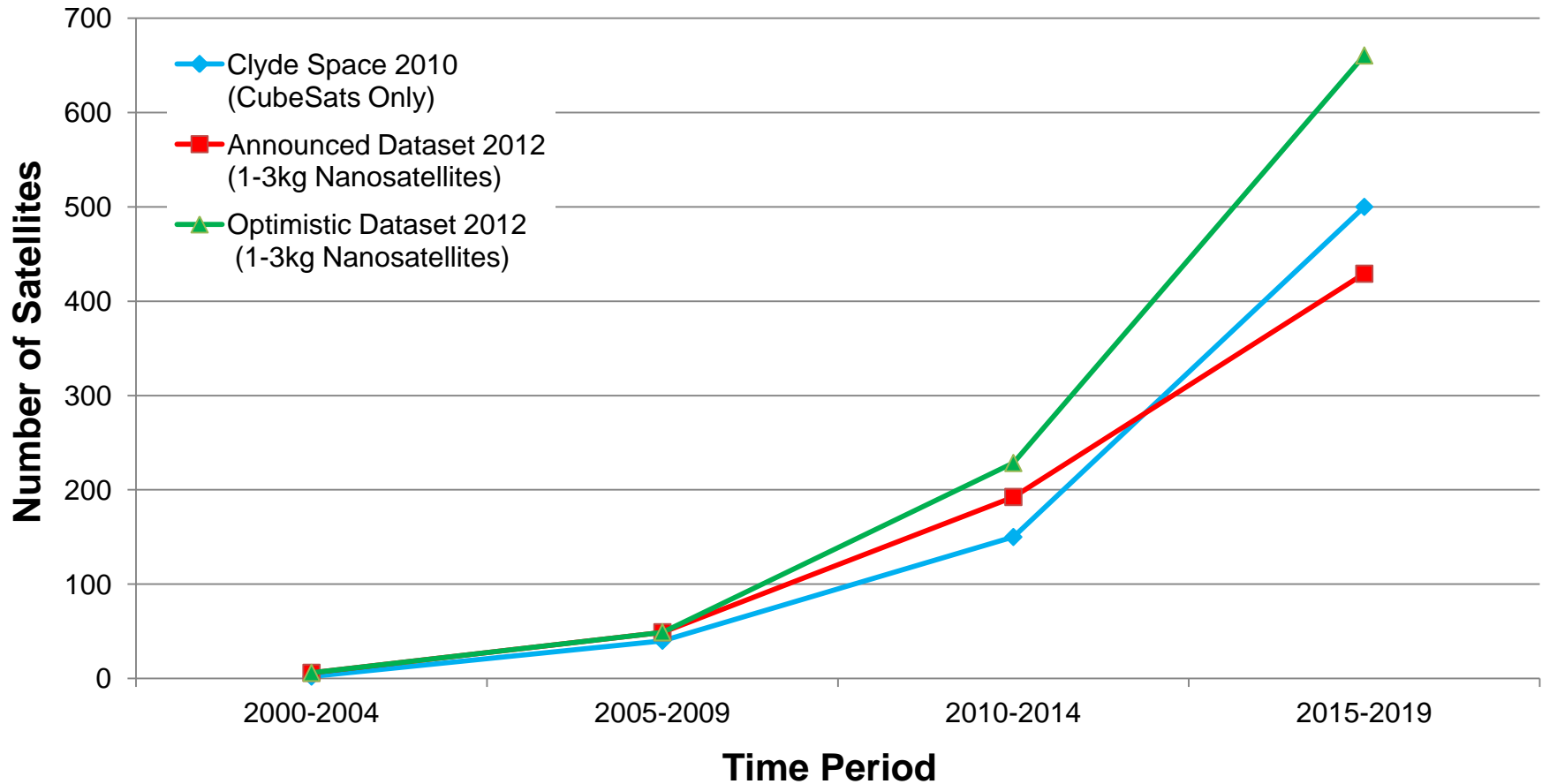
Past (2000-2011) Nanosatellites (1-10 kg)

Announced Future (2012-2015) Nanosatellites (1-10 kg)

Future growth of 6U (8 kg) class is speculated based on current dispenser development efforts and anecdotal evidence

Notes: Refer to end notes 1, 2, 6, 7, and 10.

# Projections for Small Nanosatellites (1-3 kg)



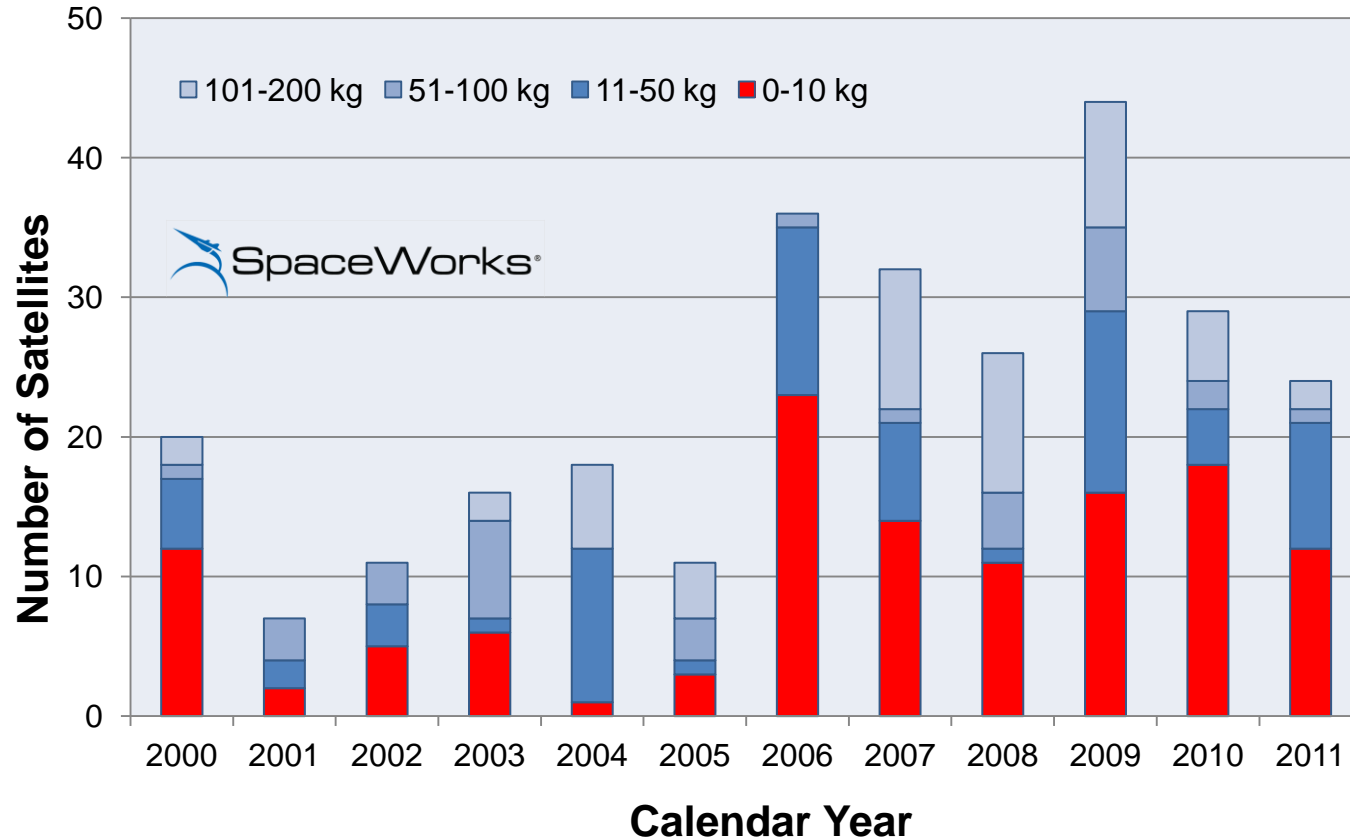
**SpaceWorks Nanosatellite Projections (1-3 kg)**  
**Compared with Clyde Space 2010 Forecast**

Notes: Refer to end notes 1, 2, and 11.



# Historical Global Small Satellites Launched: 2000-2011

## Signs of an emerging and sustained launch market

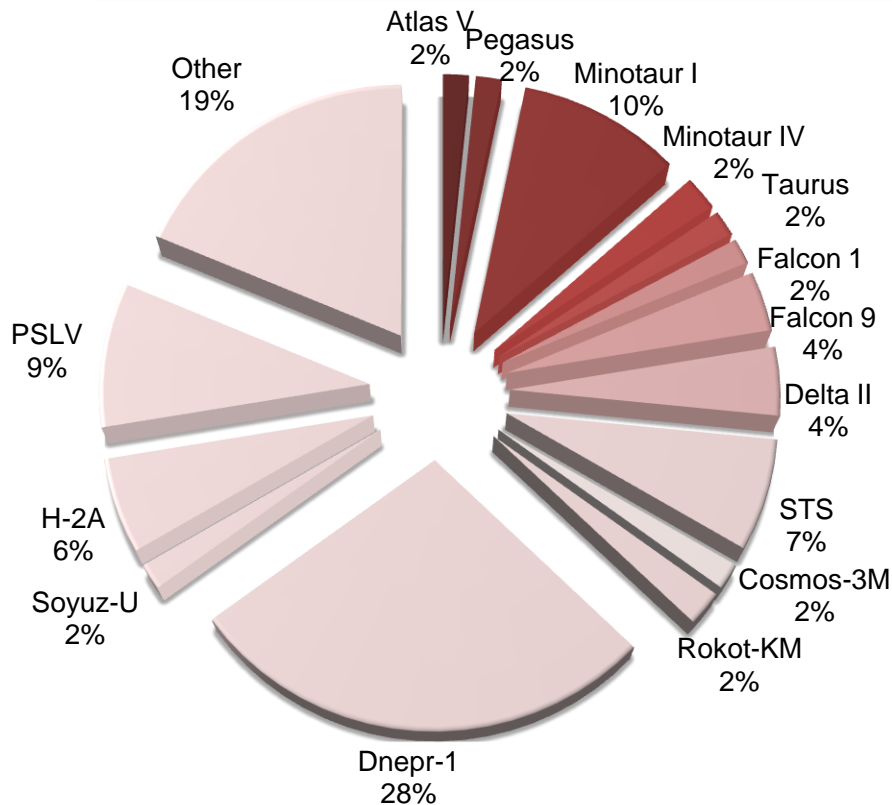


**Number of Attempted Small Satellite Deliveries: 2000-2011 for 0-200 kg Satellite Class  
(Includes Picosatellites < 1 kg)**

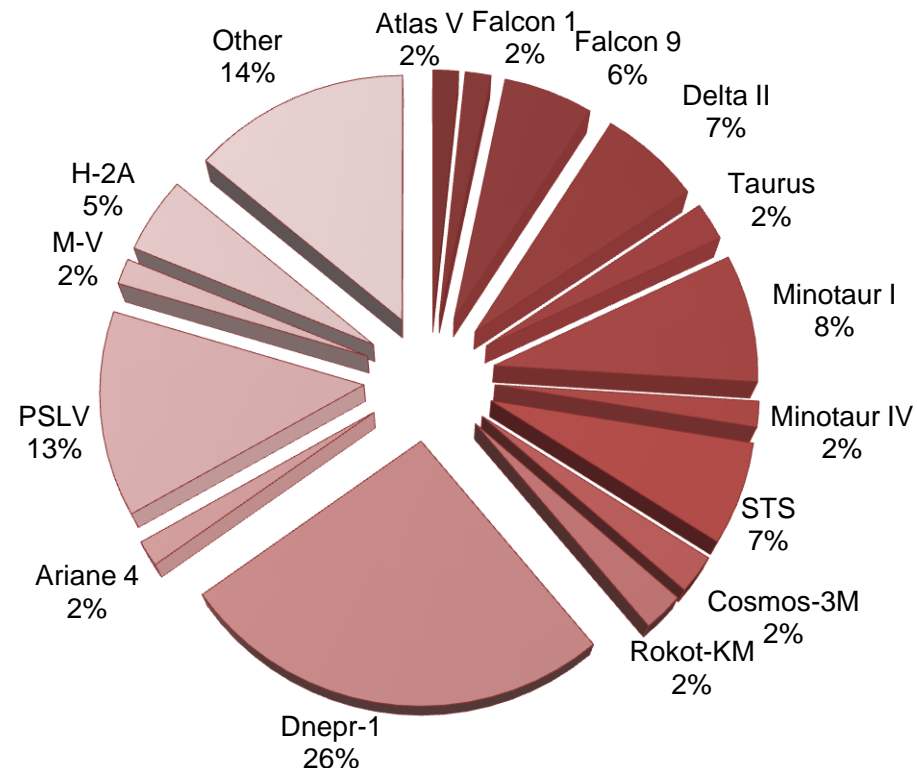
Notes: Refer to end notes 1 and 2.

# Historical Nano/Microsatellite Trends by Launch Vehicle (2000-2011)

Low cost piggy-back opportunities have historically attracted small satellite payloads to international launch vehicles



**Launch Vehicles: 2000-2011 for  
1-50 kg Satellite Class**  
(As a Percentage of Global Satellites Launched)



**Launch Vehicles: 2000-2011 for  
1-10 kg Satellite Class**  
(As a Percentage of Global Satellites Launched)

Notes: Refer to end notes 1, 2, 7, and 8.

# Conclusions

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- The nano/microsatellite market has grown considerably with the adoption of the CubeSat standard, microelectronics and other technology development, entrance of new developers, new government programs, and furthering of applications
- Projections indicate **138-224 nano/microsatellites requiring launch in the year 2020**
- Nano/Microsatellite CAGR (Compound Annual Growth Rate):
  - **Historical average growth of 7% per year** from the last 11 years (2000-2011)
  - **Announced Dataset average growth of 9% per year** over the next 8 years (2012-2020)
  - Optimistic Dataset average growth of 15% per year over the next 8 years (2012-2020)
- Nano/microsatellite (1-50 kg) development continues to be led by the civil sector, but the defense/intelligence community is showing increased interest and involvement
- Applications for nano/microsatellites are diversifying, with increased use in the future for science, Earth observation, and reconnaissance missions
- SpaceWorks will continue to update its Orbital Satellite Database (OSD) and nano/microsatellite launch demand assessment
  - Plan for annual public release of this work
  - Custom analysis and more detailed assessment are available from SpaceWorks

# End Notes

1. The number of satellites may not equal the number of launches since many small satellites are multiple-manifested (i.e. more than one satellite co-manifested on a particular launch vehicle). Data includes failed launch attempts.
2. All data for nano/microsatellite projects and programs is from publically sourced information. This may not represent all global nano/microsatellite activities.
3. The Announced data set includes some known nano/microsatellite programs for which a specific launch date has not been announced. The satellites belonging to these programs are distributed across the period (date range) for launches according to the announced program objectives
4. Future projections from 2016-2020 are determined by Gompertz logistic curve “best fit” regression with market saturation point (asymptote for number of satellites) set at 150 nano/micro satellites in a year for Announced Dataset and 250 for Optimistic Dataset.
5. The Optimistic data set contains all currently known past and future nano/microsatellites from the SpaceWorks OSD, with the addition of an inflating factor for known unknowns plus assumed sustainment of certain current projects and programs (e.g. follow-on to QB50, NASA Ames Ethersat, CubeSat Launch Initiative, DARPA SeeMe).
6. These graphs are based on the Announced data set only, and do not include additional satellites contained in the Optimistic data set.
7. The sum number of future nano/microsatellites shown in this chart may not equal the sum shown on other charts. Nano/microsatellites for which the subject data of interest is unknown have been excluded from this chart.
8. Percentages may not sum to 100% due to rounding.
9. By some traditional definitions of space industrial sectors, non-defense government space activities are a subsector of the civil sector. Here we break out non-defense government activities into a separate sector. “Government” refers to those nano/microsatellite development efforts that occur within/by the government agency or organization (e.g. NASA, JAXA). Civil refers to all other non-defense development activities (e.g. universities, federally funded research institutions), though the funding source may be a government agency.
10. Nanosatellites are binned by rounding mass to the nearest whole number. Picosatellites less than 1 kg are not included.
11. 70 percent of future satellites in the Announced Dataset are under 3kg. This percentage is applied to the projections for 2012-2019 to arrive at the estimated number of satellites under 3 kg for each data point in the projection.

# SPACE IS GO



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