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CUBESATS: MEASURING OPPORTUNITY

Abstract

Since their inception 20 years ago, the influence of CubeSats on the space industry has never been greater. In the past five years (2015-2019), CubeSats constituted 40% of all spacecraft launched or deployed. In the same timeframe, the number of CubeSats in space increased two and a half times. There has also been a correlative increase in operators in space and in nations with a CubeSat in space—the latter of which grew sixfold. The undeniable significance of the opportunity CubeSats provide warrants data-centric analysis of related trends and their prospective drivers, as well as of the significant players in the CubeSat movement.

A statistical review of CubeSat activity since 2015 reveals CubeSat functions of consistent dominance (Earth observation, technology development and demonstration, radio, and science applications) and areas of new growth, including communications and data relay, internet of things (IoT), and meteorology. Further examination reveals a growing share (43%) of CubeSats launched directly from vehicles instead of being deployed from the International Space Station or by other spacecraft, attributable to growing specialization in payload fairing technology, which reduces rideshare costs and allows for more precise orbital trajectories.

The potential for CubeSats to revolutionize the space industry as they evolve has not gone unnoticed. The National Oceanic and Atmospheric Administration (NOAA) awarded contracts to three private meteorology companies in 2018—GeoOptics, Spire, and PlanetIQ—to buy space-based commercial weather data to supplement traditional government sources. CubeSat competitors have emerged to challenge constellations of larger SmallSats. Sky and Space Global (SAS), Hiber, and Swarm Technologies have begun launching a collective 418 communications CubeSats to compete with SmallSat operator OneWeb. Similarly, in competition to Starlink IoT SmallSats, AstroCast and Fleet Space Technologies have initiated the launch of over 164 CubeSats. Kepler Communications envisions taking on SmallSat behemoths and competitors with more massive spacecraft with its fleet of 140 CubeSats – a vision already underway with the launch of two CubeSats in 2018.

Despite the low financial risk of individual CubeSats (one of the many benefits of their use), the model is not entirely without risk. Helios Wire's vision of a CubeSat IoT constellation has been derailed by financial trouble, leading to its acquisition by large communications satellite competitor EchoStar. This risk may be mitigated by statistical analysis of the CubeSat market and its players in the past five years, providing the perspective that companies need to envision and successfully implement new CubeSat constellations.