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Paper Title:	Random Constellations: Future CubeSat Architectures with the Current Launch Manifest
Abstract:	<p>This paper evaluates the near-term feasibility and performance of several multi-satellite CubeSat mission concepts by constraining constellation designs to those that could be assembled using the current and prospective rideshare manifests. CubeSats have achieved growing credibility among government and commercial stakeholders as a valid architecture for future space systems, and many groups have proposed fielding CubeSat constellations for applications ranging from space-weather monitoring to space-based surveillance. Due to their small size and mass, a large number of CubeSats can be lofted to orbit to yield resilient constellations with short-refresh times and global coverage. However, the challenge of reaching the application-specific orbits necessary for some proposals is often neglected, and although several small-satellite launchers are in development, rideshare is likely to remain the most reliable access to space for CubeSats for the foreseeable future. CubeSat launch opportunities—both confirmed and projected—have been identified to provide a baseline of possible orbits going through 2018. For several promising CubeSat constellation applications, we have assessed how different combinations of these rideshare opportunities yield better or worse performance and also how many CubeSats in such “random” constellations are necessary to achieve the mission goals. We have also identified the launches in upcoming years that, if outfitted with rideshare capability, would have the most positive impact on enabling these applications. With this characterization of the trade space for future random constellations, acquisition agencies can design more streamlined space architectures that take judicious advantage of sometimes limited rideshare openings, and rideshare intermediaries will have some guidance on where the CubeSat community could most benefit from the implementation of rideshare capability.</p>