

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Small Launchers: Concepts and Operations (7)

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## THE SMALL LAUNCH VEHICLE SURVEY - A 2021 UPDATE (THE ROCKETS ARE FLYING)

**Abstract**

Even with the challenges posed by the world-wide COVID pandemic, small vehicle "Launch Fever" has not abated. In 2015 we first presented this survey, and we identified twenty small launch vehicles under development. By the end of 2019 five new vehicles in this class were operational, 41 were identified under development, and a staggering 58 more were potential new entrants. Some are spurred by renewed government investment in space, such as what we see in the U.K. Others are new commercial entries from unexpected markets such as China. All are inspired by the success of SpaceX and the desire to capitalize on the perceived demand caused by the mega constellations. In this paper we present an overview of the small launch vehicles under development today. When available, we compare their capabilities, stated mission goals, cost and funding sources, and their publicized testing progress. We also review a number of entrants that have dropped out since we first started this report. Since the paper was last presented one more system has become operational, two attempted, but failed at their first launch, and a number of new companies have emerged. Despite the pandemic, two or three more systems hope to achieve their first successful launch in 2021. There is evidence that this could be the year when the small launch market finally becomes saturated; however, expectations continue to be high and many new entrants hope that there is room for more providers. In order to present the most unbiased, and neutral data to our audience, we purposely avoid making any judgements on vehicle maturity or business case realism. However, with over 130 vehicles tracked in our research, a number of specific trends in performance, cost, and technologies can be identified. Finally we attempt to answer the question of the validity of small vehicle development, when established players such as SpaceX, Ariane, and ULA believe that the continued growth area is for larger, not smaller vehicles.