

## Summary of *Defending the Ultimate High Ground: China's Progress Toward Space Resilience and Responsive Launch*

The United States and China have each built extensive space architectures, and they now depend on space-based assets for a wide range of economic, scientific, and military applications. This issue brief analyzes China's progress toward space resilience across four objectives: disaggregating space-based capability through satellite proliferation, diversifying orbital locations where satellites are placed, increasing access to space through a robust space launch industry, and the ability to quickly launch satellites in response to need—a capability known as tactically responsive space launch (TRSL). China has demonstrated rapid progress toward each of these objectives and appears to have surpassed the United States in one specific measure: TRSL, which would be needed in the low-likelihood, high-consequence scenario when crucial mission-supporting satellites must be quickly replaced.

The report finds that:

- **China is rapidly expanding its space architecture by placing more satellites in orbit each year.** Of the 842 Chinese satellites placed in orbit from 1970 to 2022, 419 have been launched since the outset of 2019.
- **China is placing its new satellites in a diverse set of orbital regions.** China continues to expand its presence in more traditional orbits like low Earth orbit (LEO), medium Earth orbit (MEO), and geosynchronous orbit (GEO) while also positioning satellites in less common regions.
- **China is quickening its space launch pace and expanding its launch industry.** Of the 505 Chinese launches from 1970 to 2022, 249 have occurred since 2017.
- **China has prioritized the development of a TRSL capability designed to quickly launch satellites in the event of an emergency.** China is leveraging several of its new mobile, solid-fuel launch vehicles to provide this capability and has performed multiple demonstrations since 2013.

### Recommendations to address the TRSL gap:

1. **Develop strategies for managing stored inventories of satellites and technical designs consistent with TRSL objectives.** Satellites maintained in storage and

designed for rapid launch would minimize the time required to re-establish a degraded on-orbit capability.

2. **Increase investments in solid-fuel launch vehicles.** New investments could prioritize storability, mobility, minimizing required ground support equipment, and rapid launch capability.
3. **Partner with commercial launch providers to develop and maintain liquid-fuel launch vehicles for TRSL.** The U.S. government could partner with the American commercial launch industry to bolster the capabilities of one or more existing liquid-fuel launch vehicles to meet its TRSL objectives.

**For more information:**

- Download the report: <https://cset.georgetown.edu/publication/defending-the-ultimate-high-ground>
- Contact: Sam Bresnick ([Samuel.Bresnick@georgetown.edu](mailto:Samuel.Bresnick@georgetown.edu))