INTEGRITY ISR

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The Final Frontier Flash

U.S. satellites increasingly vulnerable to China's ground-based lasers

- Analysts have identified five Chinese laser bases
- China also has several satellite laser ranging stations
- A 1-watt laser has 1 in 1,000 chance to permanently damage a sensor; A 40-watt laser doubles the odds.
- To Damage a satellite's optical elements (pixels and filters) an anti-satellite laser must be located ~10 kilometers of intended target.
- SPACECOM & NRO to develop a "playbook" to protect US imagery satellites.

"We're pretty comfortable [in asserting] that they are developing directed energy weapons—probably building lasers to blind our satellites"—General Jay Raymond 1 Oct 2019

China conducts 22d launch of 2020; new Gaofen Earth observation satellite on orbit

- 6 Aug: Long March 2D launched from Jiuquan (Gobi Desert)
- Gaofen 9 payload: capable of 1 meter resolution imagery
- 4x Gaofen 9 satellites now operational;
- Gaufen 9 satellites are one component of the China High-resolution Earth Observation System (CHEOS).
- Ride-along: Tsinghua gravity/atmosphere scientific satellite (Q-SAT)
- This is the 50th Long March 2D launch since the rocket debuted in 1992
- LM 2D is a proven launch vehicle; only one partial failure (2016)

China has carried out 22 launches in 2020, including a test flight of the **Long March 5B** for space-station missions and the launch of the **Tianwen-1** Mars mission. Three of the 22 launches ended in failure.
The country led the world in launches in 2018 and 2019, launching 39 and 34 times respectively. China's goal for 2020 is around 40 launches, with commercial launch service providers like Expace and Galactic Energy to carry out their own missions.

Indian Lunar Lander may have survived after all:

- 31 July 2020: Space enthusiast Shanmuga Subramanian, who found the debris of India's moonlander Vikram, said that Chandrayaan-2's rover Pragyan seems to be intact on the moon's surface and had rolled out a few meters from the lander.
- New conclusions based on 4 Jan 2020 NASA imagery of Lunar South Pole
- Commands were sent to lander blindly for days; lander could have received commands and relayed it to the rover, but lander was not able to communicate it back to the earth

Analysts from the Indian Space Research Organisation (ISRO) are in communication with Subramanian in order to confirm his conclusions.