Space Weapons

A growing interest in the space domain has led to the emergence of new weapon systems. This new class of space weapons is generally divided into three categories: Earth-to-space, space-to-space, and space-to-Earth. Moreover, systems can have both kinetic and non-kinetic effects that are either permanent or reversible. Earth-to-space weapons pose the greatest current danger and include direct-ascent anti-satellite weapons, which the United States, China, India and Russia have all tested, as well as directed-energy lasers and jammers.

Space-to-space systems are satellites or other assets that are placed into orbit and attack or disrupt other satellites through direct kinetic impact or the use of directed energy or high-frequency means. Space-to-Earth weapons would include any orbiting asset that used either kinetic or non-kinetic means to attack or disrupt terrestrial targets. The latter two categories pose difficult technical challenges and are unlikely to be pursued in the short term.

Proliferation Concerns

Converging trends make the proliferation of space systems likely. The miniaturization of satellites combined with falling launch costs and the commercialization of the space industry means that more players are entering the space game — not all of whom will use space for peaceful purposes. The U.S. military relies heavily on space-based assets to secure qualitative superiority over adversaries, making U.S. space systems a prime target in any future conflict. Space systems can be inherently dual-use, meaning that systems designed to serve purely civilian needs can also be used to interfere with or attack other objects in space. These same trends coincide with a growing appetite among nations for greater military presence in space.

Currently, the lack of general space norms and governing regimes incentivizes actors to probe the limits of acceptable behavior. This could mean greater chances of conflict in the future as outer space is increasingly congested with dangerous capabilities. As societal functions — both civil and military — become increasingly reliant on space, the greatest risk will likely continue to be digital vulnerabilities within space systems' terrestrial nodes. All space systems include some form of ground-based component and if these are not adequately defended from attacks, including cyber, the space system could be at risk.