



Promoting Cooperative Solutions for Space Sustainability

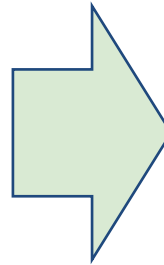
Space Domain Trends and Threats

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Major trends in the space domain

Old Space Paradigm

- National
- Secret
- Military-led
- Independent
- Strategic



New Space Paradigm

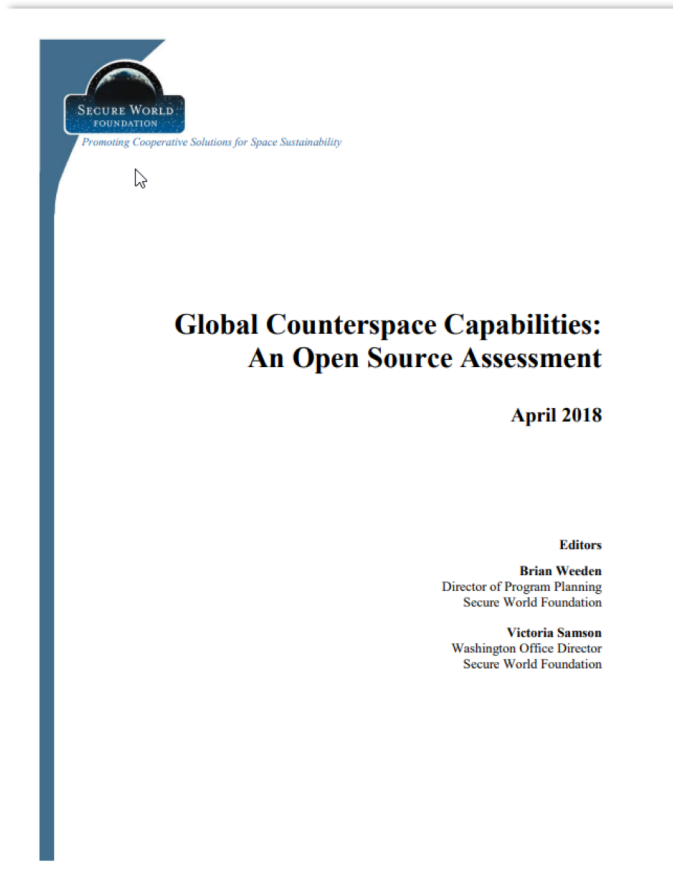
- International
- Transparent
- Commercial-led
- Interdependent
- All levels of war

Space is becoming “normalized”



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Counterspace threats



<https://swfound.org/counterspace>



<https://www.csis.org/analysis/space-threat-assessment-2018>



Counterspace Categories

- **Direct Ascent (DA-ASAT):** weapons that use ground, air, or sea-launched missiles with interceptors that are used to kinetically destroy satellites through force of impact, but are not placed into orbit themselves
- **Co-orbital:** weapons that are placed into orbit and then maneuver to approach the target
- **Directed Energy (DEW):** weapons that use focused energy, such as laser, particle, or microwave beams to interfere or destroy space systems
- **Electronic Warfare (EW):** weapons that use radiofrequency energy to interfere with or jam the communications to or from satellites
- **Cyber:** weapons that use software and network techniques to compromise, control, interfere, or destroy computer systems



Threat Summary - Russia

- Recapitalizing some of the counterspace capabilities they had during the Cold War but had been mothballed/gone fallow
- Multiple tests of ground-based DA-ASAT / mid-course missile defense interceptors
- Limited testing of ground- and air-based DEW laser dazzlers
- Multiple demonstrations of on-orbit rendezvous and proximity operations (RPO) but unclear if weapons-related
 - Could be general tech development and/or intelligence collection
- Operational use of EW capabilities to support integrated military operations in Syria and Ukraine

Threat Summary - China

- Sustained effort to develop a wide range of counterspace technologies
- Multiple tests of ground-based DA-ASATs / mid-course missile defense interceptors
 - Could be developing as many as 3 different types but primary focus is LEO
- Multiple demonstrations of on-orbit RPO but unclear if weapons-related
 - Could be general tech development and/or intelligence collection
- Likely strong EW and DEW capabilities, but no public evidence of use in current military ops
- Strong focus on doctrinal/organizational integration of counterspace



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Threat summary – Iran and North Korea

- Nascent space programs with very limited technical capabilities
- Likely to have some components for a DA-ASAT but not all and no indication of any dedicated R&D or testing
- Very limited capabilities for sophisticated satellites or RPO, no indication of any dedicated R&D or testing
- Demonstrated operational use of EW against commercial SATCOM and public GPS



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Policy implications

- How should the ***US military be organized*** to meet the changing space domain and threat environment?
- What can be done to ***protect current space capabilities and deter attacks***?
- How can the U.S. ***accelerate the development of new capabilities and architectures*** to meet future threats?
- How does the ***globalizing/commercializing space domain*** impact U.S. response to space threats?