

Space: Technical Considerations

Victoria Samson, Secure World Foundation

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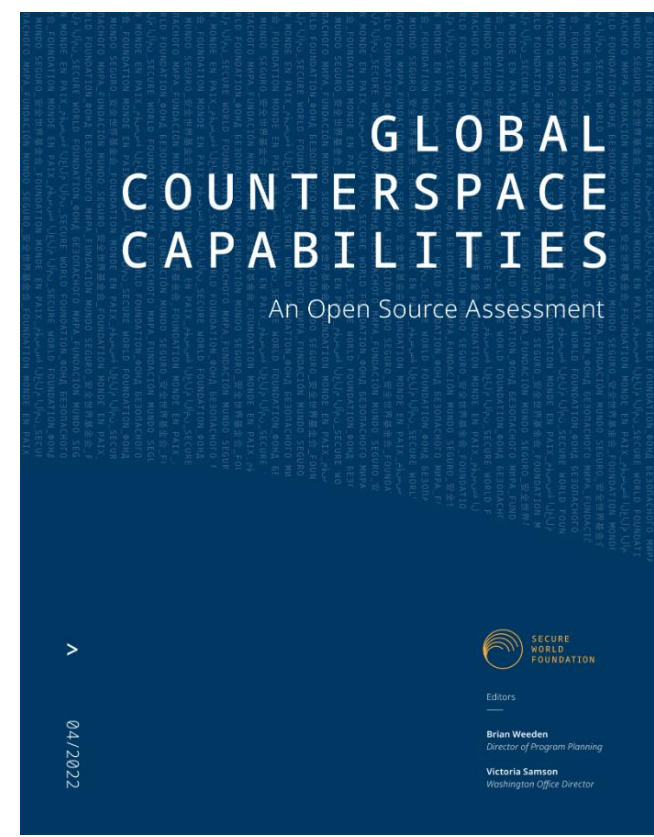
Secure World Foundation (SWF) is a *private operating foundation* that promotes cooperative solutions for space sustainability

Our vision: The secure, sustainable, and peaceful uses of outer space that contribute to global stability on Earth

Our mission: Secure World Foundation works with governments, industry, international organizations, and civil society to develop and promote ideas and actions to achieve the secure, sustainable, and peaceful uses of outer space benefiting Earth and all its peoples



- Existence of counterspace capabilities is not new, but the circumstances surrounding them are
- Significant R&D/testing of a wide range of destructive & non-destructive counterspace capabilities by multiple countries
- ***Only non-destructive capabilities are actively being used in current military operations***



<https://swfound.org/counterspace>



2022 Global Assessment

	U.S.	Russia	China	India	Aus.	France	Iran	Japan	North Korea	South Korea	U.K.
LEO Co-Orbital	■	▲	■	●	●	●	●	●	●	●	●
MEO/GEO Co-Orbital	■	▲	■	●	●	●	●	●	●	●	●
LEO Direct Ascent	■	▲	▲	■	●	●	●	●	●	●	●
MEO/GEO Direct Ascent	■	▲	■	●	●	●	●	●	●	●	●
Directed Energy	■	▲	■	●	●	■	●	●	●	●	●
Electronic Warfare	▲	▲	▲	■	●	■	■	●	■	●	●
Space Situational Awareness	▲	▲	▲	■	■	■	■	■	●	■	■

Legend: none ● some ■ significant ▲



ASAT Tests by Year

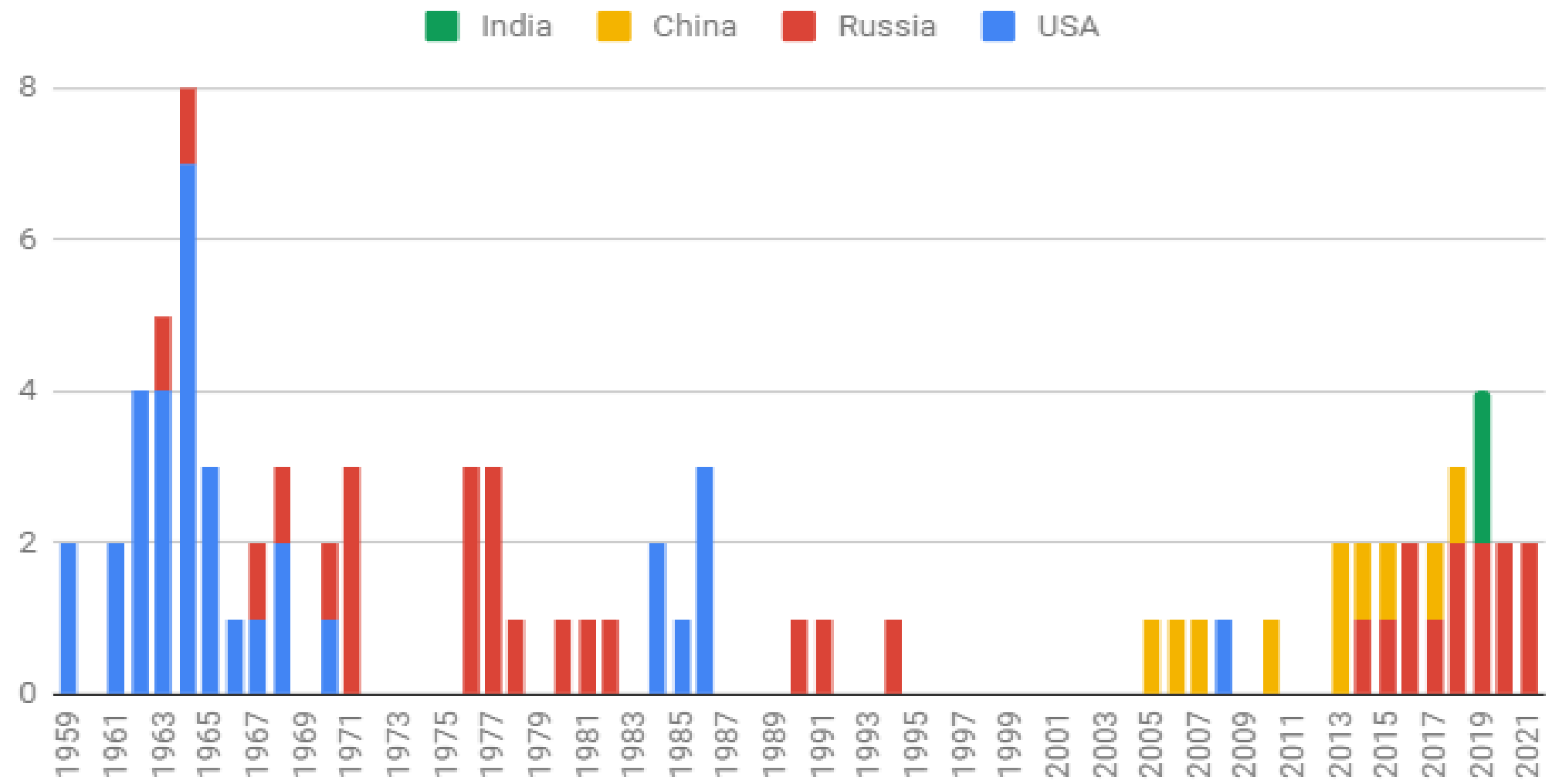




TABLE 5-1 – ORBITAL DEBRIS CREATED BY ASAT TESTS IN SPACE

DATE	COUNTRY	ASAT SYSTEM	TARGET	INTERCEPT ALTITUDE	TRACKED DEBRIS	DEBRIS STILL ON ORBIT	TOTAL DEBRIS LIFESPAN
Oct. 20, 1968	Russia	IS	Cosmos 248		253	79	50+ years
Oct. 23, 1970	Russia	IS	Cosmos 373		147	35	50+ years
Feb. 25, 1971	Russia	IS	Cosmos 394		117	52	50+ years
Dec. 3, 1971	Russia	IS	Cosmos 459		28	0	3.3 years
Dec. 17, 1976	Russia	IS	Cosmos 880		127	58	45+ years
May 19, 1978	Russia	IS-M	Cosmos 970		72	64	40+ years
Apr. 18, 1980	Russia	IS-M	Cosmos 1171		48	5	40+ years
Jun. 19, 1982	Russia	IS-M	Cosmos 1375		62	59	35+ years
Sept. 13, 1985	U.S.	ASM-135	Solwind	530 km	285	0	18+ years
Sept. 5, 1986	U.S.	Delta 180 PAS	Delta 2 R/B		16	0	< 1 year
Dec. 26, 1994	Russia	IS-M	Unknown		27	24	25+ years
Jan. 11, 2007	China	SC-19	FengYun 1C	880 km	3527	2763	15+ years
Feb. 20, 2008	U.S.	SM-3	USA 193	220 km	174	0	1+ year
Mar. 27, 2019	India	PDV-MK II	Microsat-R	300 km	128	1	2+ years
Aug.-Dec. 2019	Russia	Cosmos 2535	Cosmos 2536		27	14	3+ years
Nov. 15, 2021	Russia	Nudol	Cosmos 1408	470 km	1402	1225	Unknown
Total					6349	4379	



Other technological considerations

- Rise of very large LEO constellations is changing the fundamental nature of space and governance is not keeping up
- Commercial space is playing a much more prominent role in active military conflict, leading to statements about it being considered a lawful target
- More space situational awareness (SSA) options increases transparency but also possibly confusion about whose data to trust
- Dual-use, dual-purpose technologies complicate understandings of intent
- Decreasing cost of access to space is allowing new actors on orbit who may not know/be able to carry out best practices (like cybersecurity)
- No space race but geopolitical rivalry might replicate itself on the Moon and in plans for cislunar activities

Questions?

Thanks.

Victoria Samson,
vsamson@swfound.org

@SWFoundation

