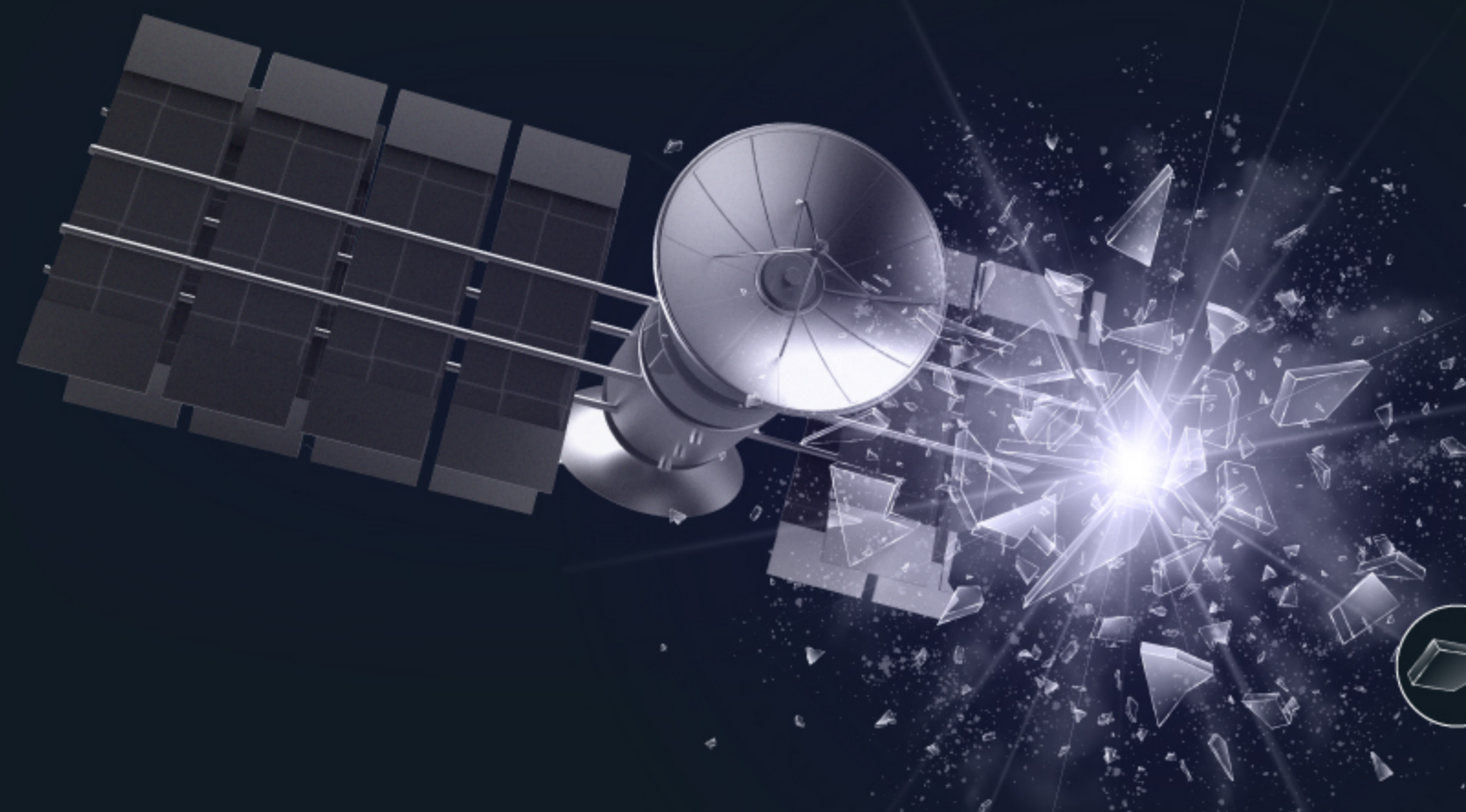


Anti-Satellite Weapons

THREATENING THE SUSTAINABILITY OF SPACE ACTIVITIES

ANTI-SATELLITE (ASAT) WEAPONS are weapons that are designed to deceive, disrupt, deny, degrade, or destroy space systems.



Some ASAT weapons are designed to destroy satellites by hitting them with a high-speed missile, which can produce a massive amount of debris.

The destruction of a single 10-ton satellite can generate:

- 8-14 million objects 1mm-1cm in size
- 250-750,000 objects 1-10cm in size
- 5-15,000 objects >10cm in size

Source: Union of Concerned Scientists

All the Space Debris in Earth's Orbit

Distribution of space debris from all sources, by size and number of objects



The use of destructive ASAT weapons adds to the increasing amount of space debris in Earth's orbit.

Space debris can travel at up to 29,000km/h, posing an active threat to other objects in orbit.

Source: ESA

The Impact of Destructive ASAT Weapons

There are two types of destructive ASAT tests:



Co-orbital

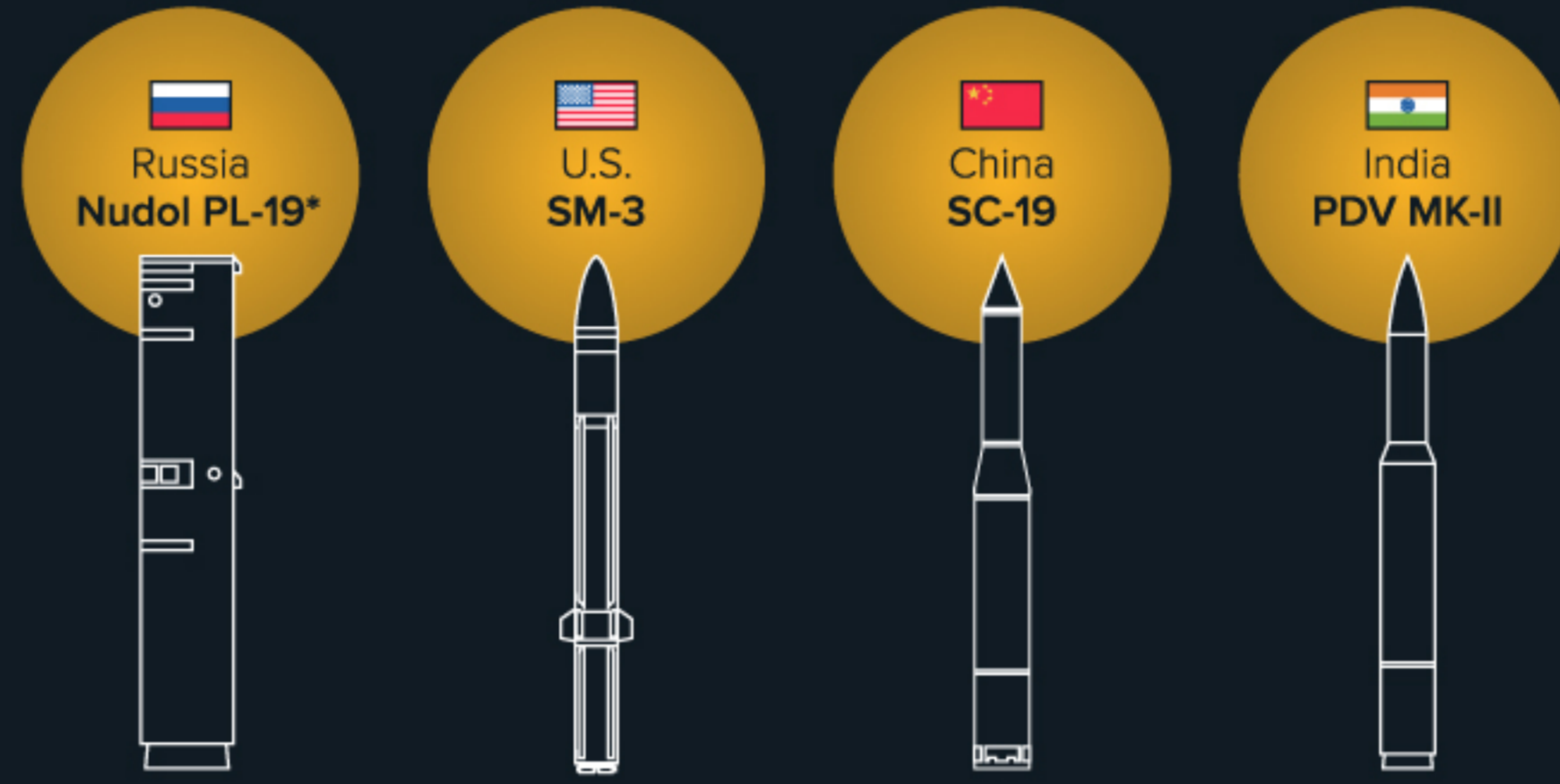
Weapons that are placed into orbit and maneuver close to a target and attack it by various means, including direct collision, fragmentation, or using robotic arms.



Direct-ascent (DA)

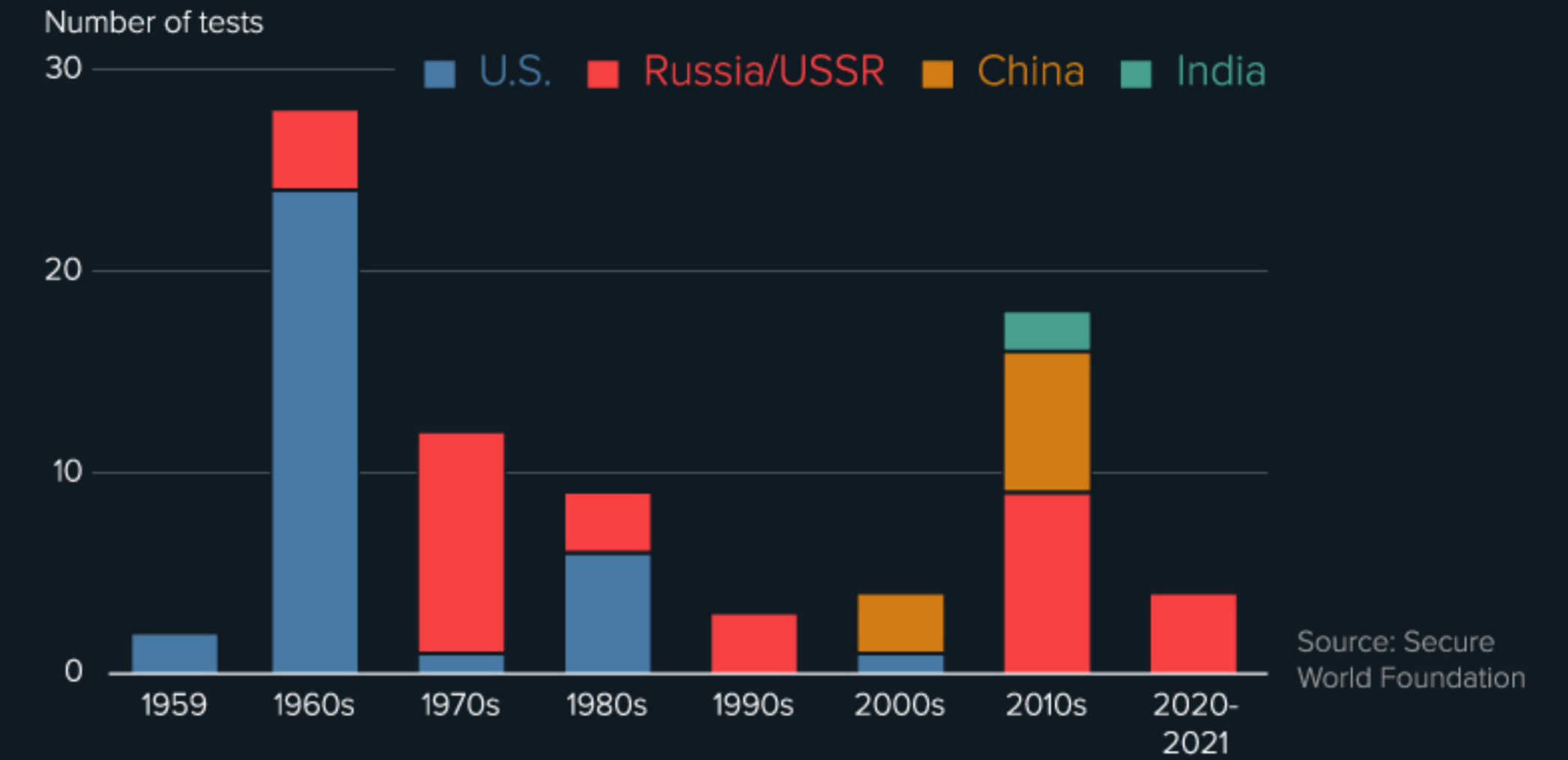
Missiles that are launched from the Earth's surface or from the air to destroy a satellite target.

Types of Direct-ascent ASAT Weapons



Note: Missiles not shown to scale. *Illustration is of the canister containing the PL-19 missile; no image of Nudol missile is available.

Since 1959, there have been 80 ASAT tests carried out by four countries.



Destructive ASAT tests generate thousands of debris objects that spread across vast distances. Not all the tests depicted above generated debris. Tests with known debris are shown below.

How to read this

- Co-orbital tests (Blue circle)
- Direct-ascent tests (Yellow circle)

Debris spread: Range of altitudes from test to farthest debris.

Total pieces of tracked debris created: Indicated by the size of the circle.

Target object: Indicated by a satellite icon.

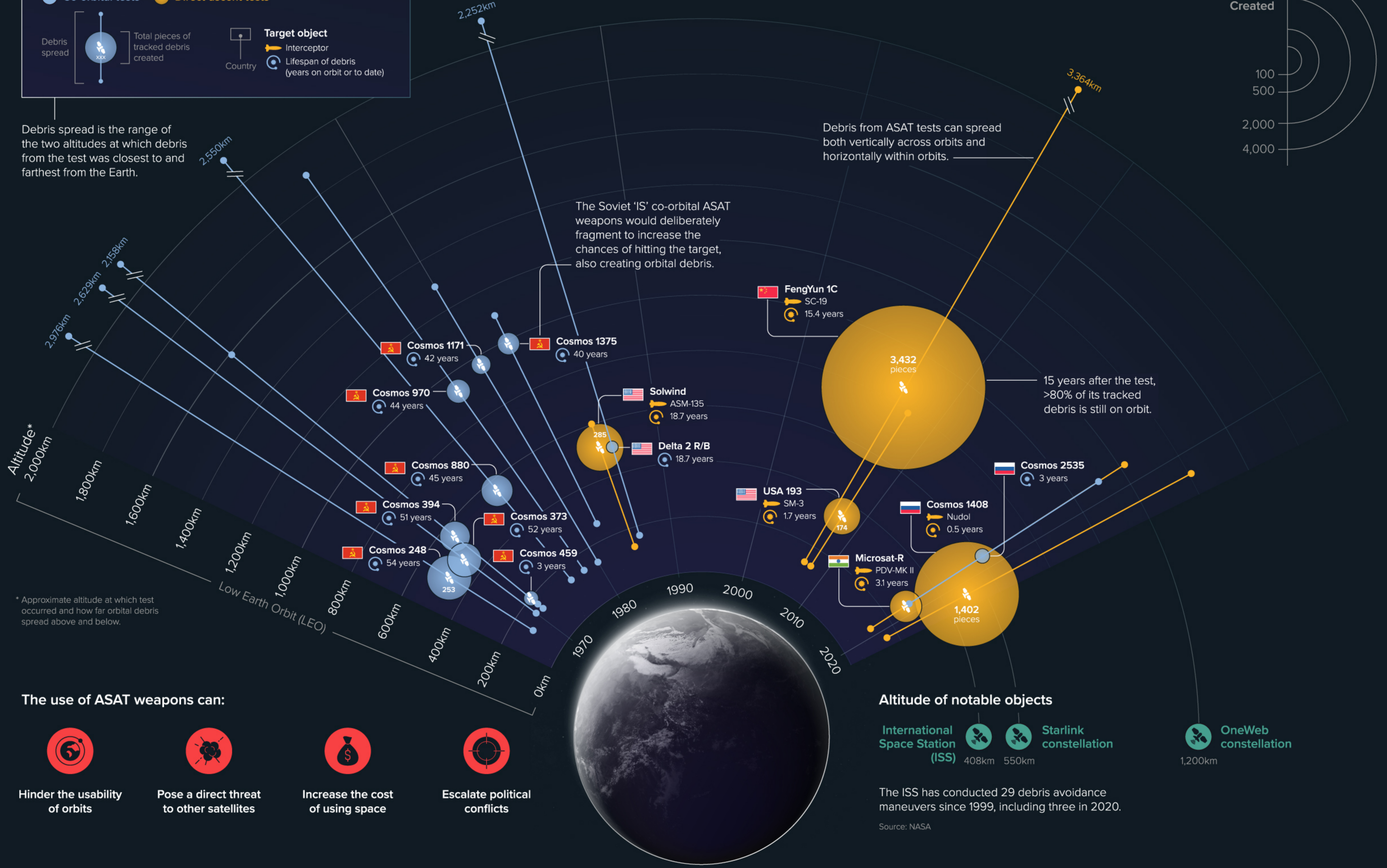
Country: Indicated by the flag.

Interceptor: Indicated by a missile icon.

Lifespan of debris (years on orbit or to date): Indicated by a clock icon.

Debris spread is the range of the two altitudes at which debris from the test was closest to and farthest from the Earth.

The Spread of Debris from Destructive ASAT Tests (1968 - 2021)



The use of ASAT weapons can:

- Hinder the usability of orbits
- Pose a direct threat to other satellites
- Increase the cost of using space
- Escalate political conflicts

While space has long had military users, it is becoming increasingly commercial and critical for civilian life.

The U.S. was the first country to pledge against conducting destructive ASAT testing to promote responsible behavior in space. As space activity increases, the threat of destructive ASAT tests requires action from countries around the globe.

"These tests, to be sure, are reckless as they are irresponsible. These tests also put in danger so much of what we do in space."

- U.S. Vice-President Kamala Harris

Secure World Foundation promotes cooperative solutions for space sustainability and the peaceful uses of outer space.

For more information about ASAT weapons, visit www.swfound.org for SWF's annual threat assessment.



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