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**U.S. Policies Relevant to Orbital Debris
(Presentation)**

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Executive Summary

Orbital debris, sometimes referred to as space junk, is defined as all human-made, non-functional objects—including fragments and elements thereof—that exist in Earth orbits or are re-entering Earth's atmosphere (IADC 2007). The international community has the Outer Space Treaty, the Liability Convention, and the Registration Convention that are all relevant to orbital debris. The United States has a number of policies, either through congressional action leading to regulation or through executive branch policy that set forth guidance on orbital debris issues. This is an evolving landscape as regulatory agencies are undergoing updates to their regulation on orbital debris, and new national-level policies have recently been signed. This talk will outline the current orbital debris policies and how they are changing.



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U.S. Policies Relevant to Orbital Debris

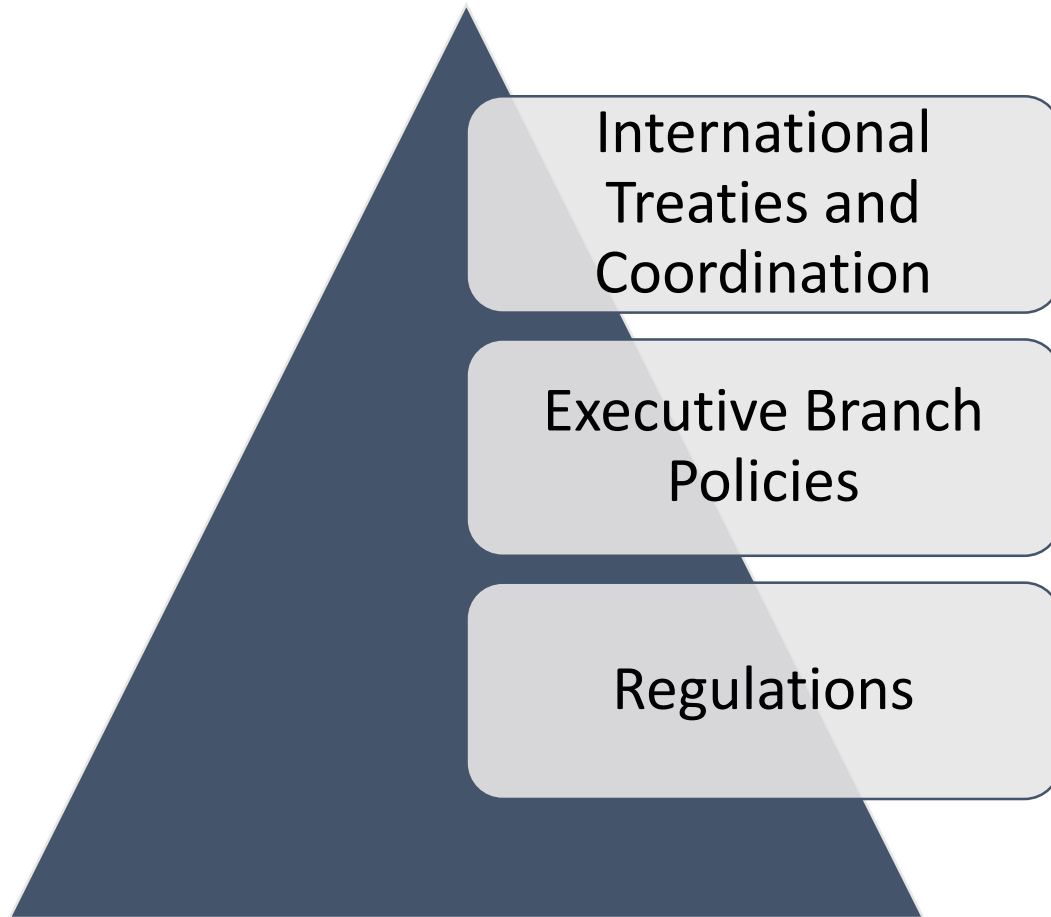
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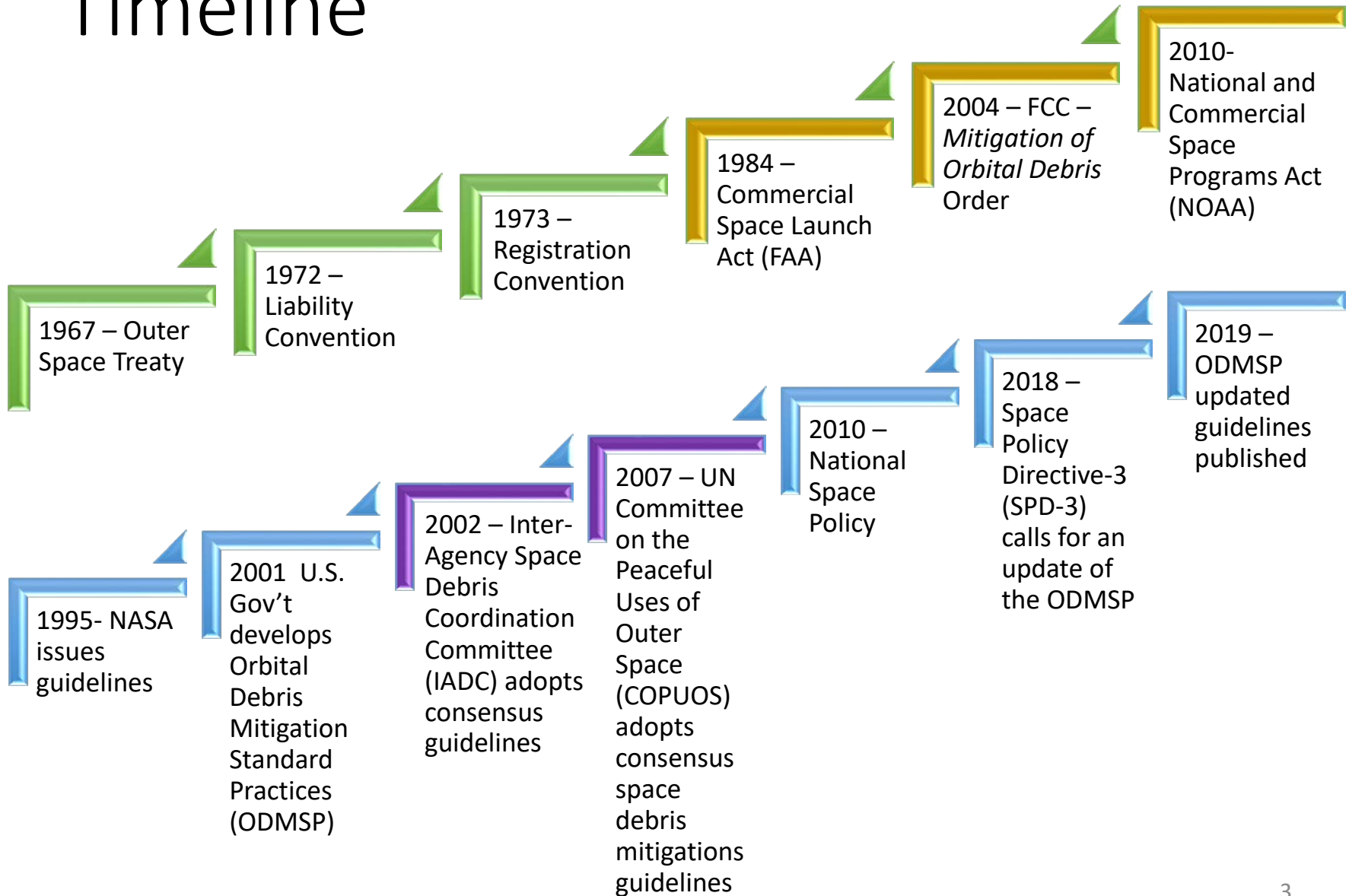
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Outline



U.S. Policies on Orbital Debris

Timeline



Outer Space Treaty - 1967

Articles VI

- “the activities of non-governmental entities in outer space ... **shall require authorization and continuing supervision** by the appropriate State Party to the Treaty”

Article VII

- “Each State Party to the Treaty that launches or procures the launching of an object into outer space, ..., and each State Party from whose territory or facility an object is launched, is internationally **liable** for damage to another State Party to the Treaty

Article VIII

- “A **State Party** on whose registry an object launched into outer space is **carried shall retain jurisdiction and control** over such object...”



Soviet Ambassador Anatoly F. Dobrynin, UK Ambassador Sir Patrick Dean, US Ambassador Arthur J. Goldberg, US Secretary of State Dean Rusk, and US President Lyndon B. Johnson at the signing of the Outer Space Treaty on January 27, 1967 in Washington.
Space Review 2017

Liability Convention - 1972



UNITED NATIONS
Office for Outer Space Affairs

Launching State is defined as

- A State which launches or procures the launching of a space object;
- A State from whose territory or facility a space object is launched

Article II

- Launching state liable to pay compensation

Article IV

- make multiple launching states involved in a space debris intervention jointly and severally liable for any harm or damage to the persons or property of other States Parties.

Registration Convention - 1973

Article II stipulates that the Launching State shall

- “...register a space object by means of an entry in an appropriate registry which it shall maintain. Each launching State shall inform the Secretary General of the United Nations of the establishment of such a registry.”

Article IV of the Convention on Registration of Objects Launched Into Outer Space

- provides a mechanism for the Launching State to notify the United Nations Office for Outer Space Affairs (UNOOSA) of the change in status of a space object

Inter-Agency Space Debris Coordinating Committee (IADC) - 1993

Purpose:

- to exchange information on space debris research activities between members
- to facilitate opportunities for cooperation in space debris research
- to review the progress of ongoing cooperative activities
- to identify debris mitigation options

	Agencia Spaziale Italiana (ASI)
	Centre National d'Etudes Spatiales (CNES)
	China National Space Administration (CNSA)
	Canadian Space Agency (CSA)
	German Aerospace Center (DLR)
	European Space Agency (ESA)
	Indian Space Research Organisation (ISRO)
	Japan Aerospace Exploration Agency (JAXA)
	Korea Aerospace Research Institute (KARI)
	National Aeronautics and Space Administration (NASA)
	Russian Federal Space Agency (ROSCOSMOS)
	State Space Agency of Ukraine (SSAU)
	UK Space Agency

United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) - 1959

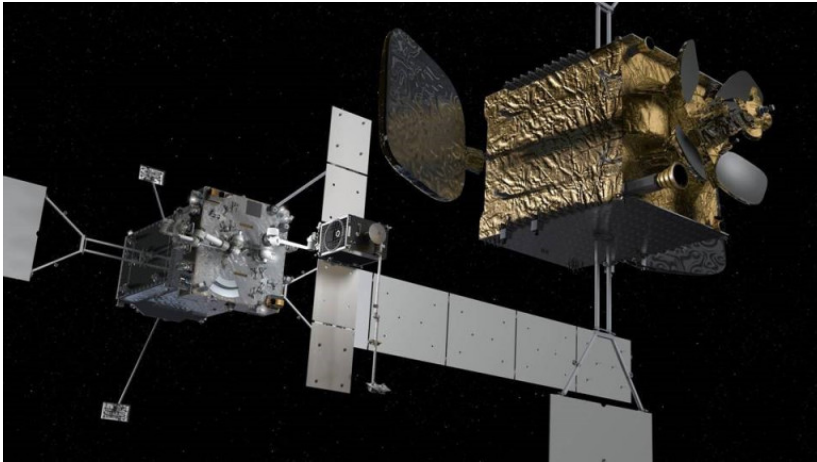


2018 – Group developed 21 Long-Term Sustainability (LTS) Guidelines which UN COPUOS Member states agreed to

Themes:

- Sustainable space utilization supporting sustainable development on Earth
- **Space debris**, space operations, and tools to support collaborative space situational awareness
- Space weather
- Regulatory regimes and guidance for new actors in the space arena

National Policies



- U.S. National Space Policy, Presidential Policy Directive 4 (PPD-4), 2010
- **Space Policy Directive – 3 (SPD-3), 2018**
- **U.S. Government Orbital Debris Mitigation Standard Practices, 2019**

Space Policy Directive-3, National Space Traffic Management Policy

— INFRASTRUCTURE & TECHNOLOGY | Issued on: June 18, 2018

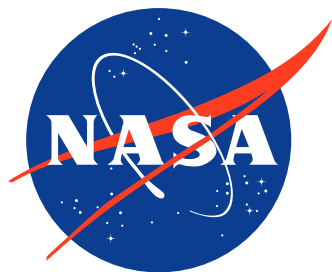


Goals:

1. Advance SSA and STM Science and Technology
- 2. Mitigate the effect of orbital debris on space activities**
3. Encourage and facilitate U.S. commercial leadership in S&T, SSA, and STM
4. Provide U.S. Government-supported basic SSA data and basic STM services to the public
5. Improve SSA data interoperability and enable greater SSA data sharing
6. Develop STM standards and best practices
7. Prevent unintentional radio frequency (RF) interference
- 8. Improve the U.S. domestic space object registry**
- 9. Develop policies and regulations for future U.S. orbital operations**

Orbital Debris Mitigation Standard Practices (ODMSP) Update - 2019

1. Control of debris released during normal operations
 - Spacecraft and upper stages should be designed to eliminate or minimize debris released during normal operations.
2. Minimizing debris generated by accidental explosions
 - Limiting the risk to other space systems from accidental explosions and associated orbital debris during mission operations and after mission completion
3. Selection of safe flight profile and operational
 - Collision with large objects during orbital lifetime
 - Collision with small debris during mission operations
4. Post-mission disposal of space structures
 - Disposal for final mission orbits – 25 year rule
 - Reliability of disposal
5. Clarification and additional standard practices for certain classes of space operations
 - Large constellations
 - Small satellites
 - Rendezvous, proximity operations and satellite servicing
 - Safety of active debris removal operations
 - Tether systems



National Aeronautics and Space Administration

- Developed and maintains to be the lead agency for ODMSP
- 2017 - NPR 8715.6B - NASA Procedural Requirements for Limiting Orbital Debris and Evaluating the Meteoroid and Orbital Debris Environments
- 2019 - NASA-STD-8719.14 - Process for Limiting Orbital Debris

DOD was involved in ODMSP and provides orbital object catalogue data

- 1958 – DoD begins providing SSA information (TLEs) to NASA
- 1987 – DoD and NASA jointly developed policies and strategies to mitigate debris
- Early 1990s – NASA Goddard develops Orbital Information Group
- 2003-2005 – DoD implements SSA pilot program for commercial and foreign entities 10 U.S. Code § 2274 - Space situational awareness services and information: provision to non-United States Government entities
- 2012 – DoD Directive 3100.10 – Policy that states DoD will follow ODMSP Guidelines



Department of Transportation - Federal Aviation Administration (FAA)

- Law: Commercial Space Launch Competitiveness Act
- Regulation: 14 CFR 417.129 Safety at End of Launch
- Current Rulemaking Update: Orbital Debris Mitigation Methods for Launch Vehicle Upper Stages (Orbital Debris)



Federal Communication Commission (FCC)

- Law: Federal Communications Act, 1934
- Rules involving orbital debris, 2004-present
- Current Rulemaking Update: Orbital Debris Mitigation Rules for the New Space Age, 2018-2020
- Stay tuned for the next talk!



Department of Commerce – National Oceanic and Atmospheric Administration (NOAA)



- Law: Land Remote Sensing Policy Act, 1992
- Rules involves licensing of private remote sensing space systems
- Regulation: 15 CFR 960
- Current Rulemaking Update: DOC defers to FCC license requirements regarding orbital debris and spacecraft disposal

Standards and Best Practices

- International Organization for Standardization (ISO) standards for Space systems which includes space debris mitigation requirements
- Space Safety Coalition Best Practices for Sustainability of Space Operations
- World Economic Forum's Space Sustainability Rating
- Satellite Industry Association's Principles of Space Safety

Summary and Conclusions

- Orbital debris policy has been developed fairly independently of SSA and STM policy, though they are related
- Orbital debris policy has been focuses on debris mitigation during operations, limit probability of collision, and dispose responsibly
- Debris remediation has not traditionally been a part of the policy conversation
- Orbital debris is an international issue and solutions will require engagement with other countries
- U.S. Regulation around orbital debris is evolving
 - FCC is updating current rule involving orbital debris
 - FAA has rules on launch/reentry and is updating their orbital debris rule related to rocket bodies
 - NOAA recently updated their Commercial Remote Sensing Regulations – deferred orbital debris requirements and plan to FCC
- To date, congressional action has been limited

Backup

ODMSP

	2001	2019
Control of debris released during normal operations	X	<i>Limit the generation of mission-related debris</i>
Minimizing debris generated by accidental explosions	X	<i>Limit the generation of accidental explosion fragments</i>
Selection of safe flight profile and operational	X	<i>Limit collision with large objects</i> <i>Limit collision with small micrometeoroid and orbital debris (MMOD)</i>
Post-mission disposal of space structures	X	Maintains 25-year Post-Mission Disposal Rule, but establishes an “immediate removal from Earth orbit” as preferred approach
Clarification and additional standard practices for certain classes of space operations		X

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