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**Law, Commerce and
ORDER IN
OUTER SPACE**

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Towards an International Regime Governing Active Debris Removal

Professor Su Jinyuan

Associate Dean of School of Law
Wuhan University, China

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NEW FRONTIERS:
**LAW, COMMERCE and
ORDER IN
OUTER SPACE**

1. Challenges

What is space debris?

- **UNCOPUOS & IADC:** “all man-made objects, including fragments and elements thereof, in Earth orbit or re-entering the atmosphere, that are non-functional”.

The latest figures related to space debris (ESA)

- **Number of space objects:** 54,000+ objects >10 cm; 1.2 million objects (1–10 cm); 140 million objects (1 mm–1 cm)
- **Number of satellites still functioning:** About 15,800
- **Number of space objects regularly tracked:** About 45,510

1. Challenges

Hazards:

- Threatening spacecraft and astronaut safety; Kessler Syndrome;
Potential damage from uncontrolled re-entry

Technological challenges

- **Limits of traditional mitigation measures:** Passivation; Post-mission disposal;
Collision avoidance

Legal challenges

- Definition of space debris
- Right / obligation to remove space debris
- Responsibility / liability in space debris removal



2. The right to remove space debris

2.1 The right to remove space debris under one's jurisdiction and control

- **Article VIII of the Outer Space Treaty**
 - The State of registry retains jurisdiction and control over space objects;
 - Jurisdiction and control over space objects includes the right to remove them.
- **Debate on the jurisdiction and control over space debris**
 - **Scenario 1:** Space debris never registered
 - **Scenario 2:** Registered space objects become debris

2. The right to remove space debris

2.2 The right to remove space debris under another's jurisdiction and control

- **Article VIII of the OST**
 - Possible infringement of jurisdiction, control, and ownership of space objects
 - **State practice:** Removal with authorization
- **Necessity: A possible exception**
 - Imminent collision risk; Protection of an essential interest and removal as the only means available; Compensation claims unlikely
- **Countermeasure?**
 - Obligation *erga omnes*; Collective countermeasures
- **Removal of space debris with debatable jurisdiction and control**

2. The right to remove space debris

2.3 “Intact non-functional space objects” v. “Component fragments”

- Redefining space debris based on jurisdiction and control would further entrench the fragmentation of international law.
- “Intact non-functional space objects” may contain technical secrets and possess recycling value. Effective ADR requires an arrangement for the transfer or authorization of jurisdiction and control.
- The removal of another State’s “component fragments” is less likely to provoke controversy.

3. The obligation to remove space debris

Arguments supporting an ADR obligation

- Article IX of the OST (prevention of harmful contamination and due regard); The pursuit of community interests; Principles of international environmental law
- Existing rules provide for obligations of conduct, not obligations of result

The development of soft law

- IADC Guidelines; ISO standard; UNCOPUOS Guidelines
- The development of CIL; subsequent practice in the application of treaties (e.g., the obligation to prevent harmful contamination under Article IX of the OST)
- State consent remains fundamental in international legal obligations

3. The obligation to remove space debris

State practice

- US, Europe, India, etc.
- 5-year disposal standard; 99% success rate

What objects are being targeted?

- **Intact non-functional space objects:** defunct satellites and rocket upper stages; increasingly viewed as candidates for mandatory removal
- **Component fragments:** extremely numerous; removal remains technologically difficult and costly; prevention and mitigation more effective

4. Responsibility and liability in debris removal

4.1 Responsibility in debris removal

- **Dual-use nature of ADR technologies**
 - Potential contribution to the weaponization of outer space
 - Balancing technological development and security imperatives
- **Environmental concerns**
 - ADR may generate additional fragments, potentially breaching the obligations of prevention and due regard
 - Good intentions do not preclude wrongfulness
- **Use of force allegations**
 - **Key elements:** intent of the acting State, gravity of the consequences, strategic importance of the target

4. Responsibility and liability in debris removal

4.2 Liability in debris removal

- **Liability framework**
 - **Damage on Earth / aircraft in flight:** absolute liability
 - **Damage in space:** fault-based liability
- **Difficulties in determining launching State and causal link**
 - **Scenarios:** Removing one's own debris; Removing another's debris with consent; Removing another's debris without consent
- **Challenges in determining fault**
 - Reasonableness, soft-law standards, reversal of the burden of proof



5. Essential elements of an international regime

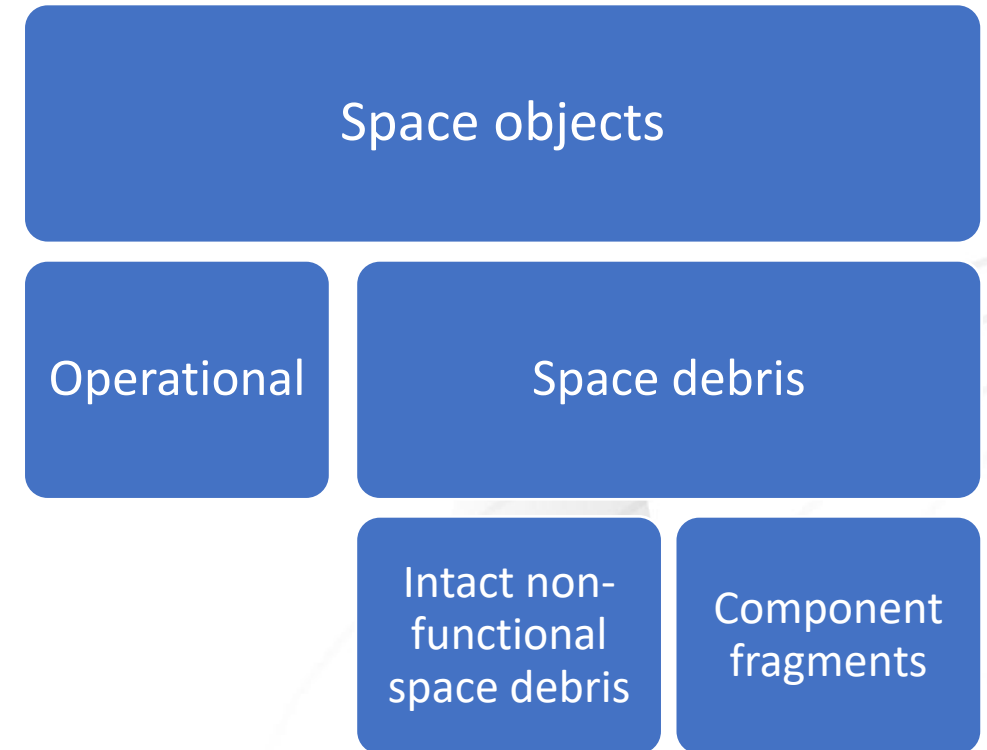
5.1 Classification of space debris

Intact non-functional space objects	Component fragments
Potential value & sensitivity	Minimal value
Main target in ADR	Managed by mitigation
Emerging obligation of removal	No removal obligation

5. Essential elements of an international regime

5.1 Classification of space debris

- **Step 1: Identify space debris**
 - Registry State maintains a list of **operational space objects**
 - Any object not on the list presumed to be space debris
- **Step 2: Classify debris**
 - Registry State maintains a catalogue of **intact non-functional space objects**
 - All remaining debris classified as component fragments by default





5. Essential elements of an international regime

5.2 Rights and obligations

- If registry State is clear:

	Rights	Obligations
Intact non-functional space objects	Consent required	Polluter pays
Component fragments	Free removal should be permitted	CBDR + Debris fund



5. Essential elements of an international regime

5.2 Rights and obligations

- If registry State is not clear:

UNOOSA Registry (“Estray Book”)



No claim



Abandoned Object



Removal & Recycling Allowed

5. Essential elements of an international regime

5.3 Rights and obligations

- **ADR operators remain accountable when:**
 - International obligations are breached
 - Damage is caused, even by lawful activities
- **Why insurance is needed?**
 - *Ubi jus, ibi remedium*
 - Reduce operational and financial risks
- **Proposed insurance framework**
 - Commercial ADR of intact non-functional space objects: Insurance purchased by removal operators
 - International ADR of component fragments: Insurance funded by debris tax levied on operators



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Thank you for your kind attention!

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