



Legality of Non-Cooperative Satellite Removal


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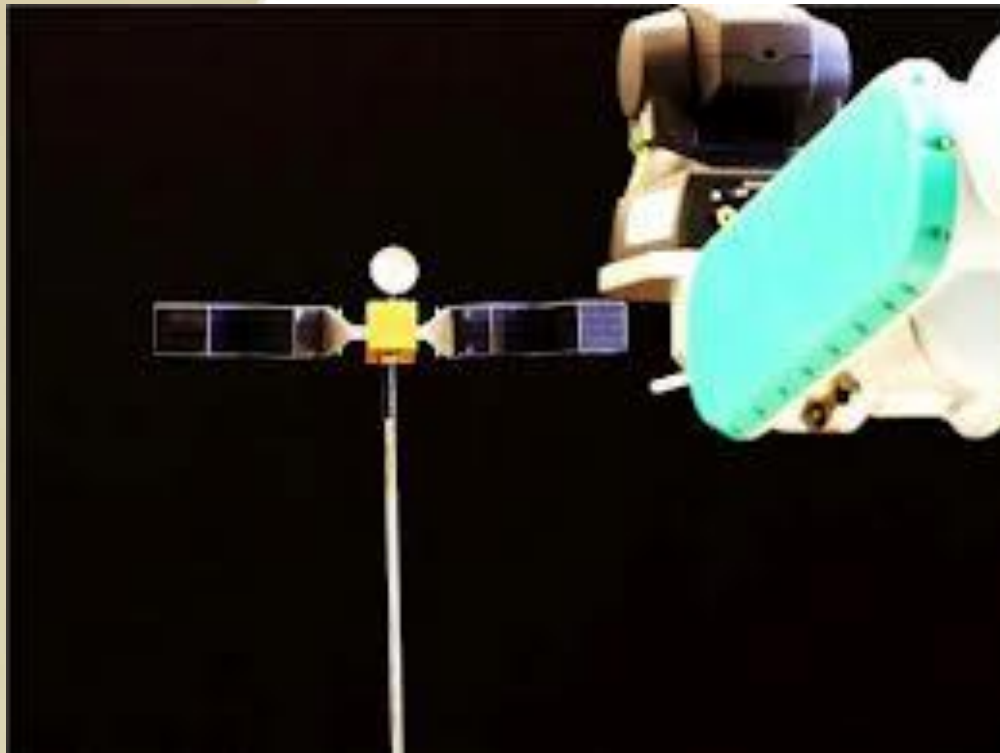
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Case of Envisat

- **configuration :**
10m x 5m x 26m
weight : 8 tons
- **2002 - launched by**
ESA
- **April 2012 - lost**
communications link
- **May 2012 - ESA**
declared Envisat' s
end-of-mission



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- "a huge problem that will not go away for about 150 years"
 - "Lowering Envisat to an orbit that would allow reentry within 25 years, however, was never an option because of its design and limited amount of fuel" —ESA



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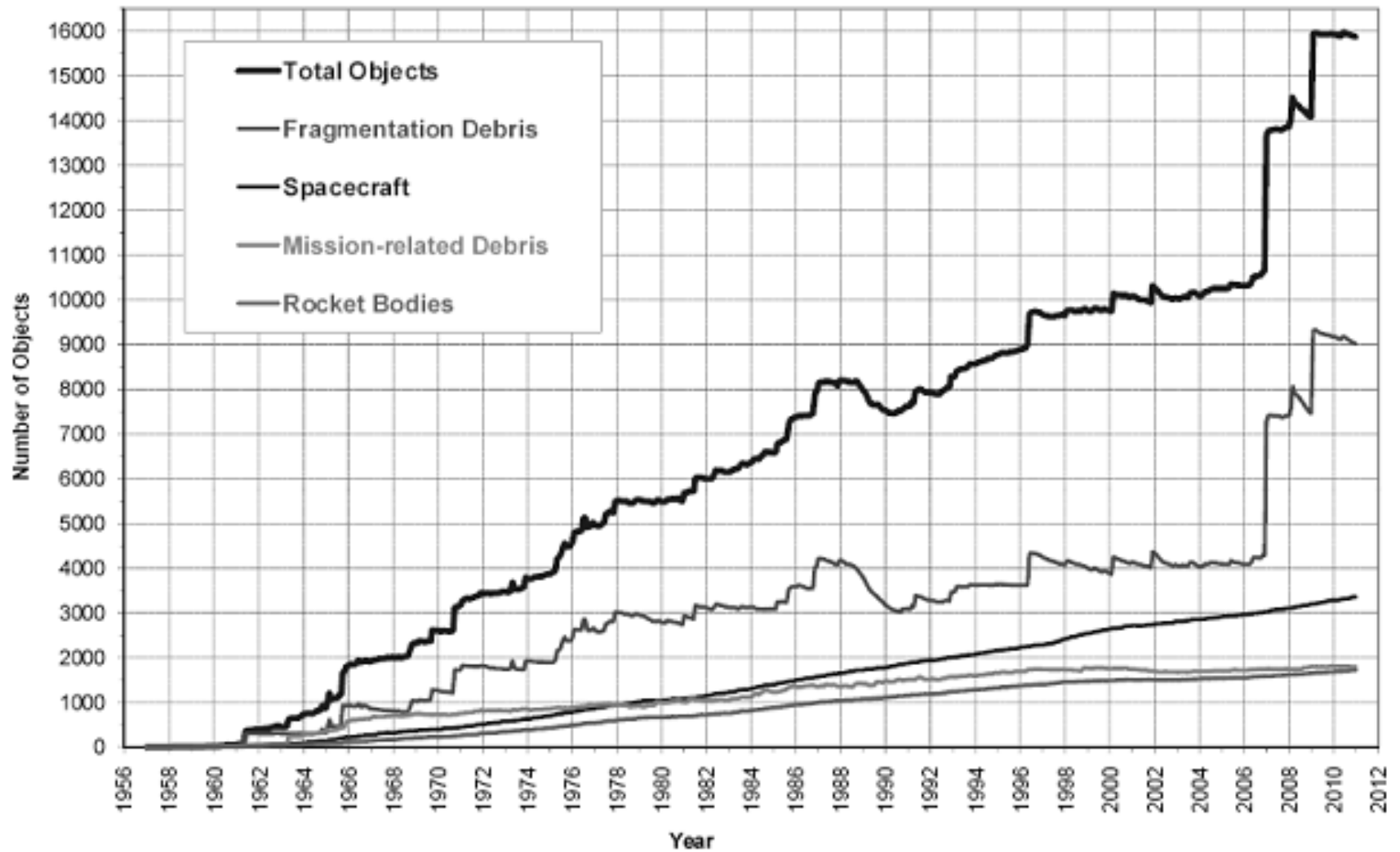
- **1. Are debris mitigations effective?**
- **2. If there is a debris mitigation obligation?**
- **3. If there is no legally binding obligation of debris mitigation, is it illegal to remove space debris without prior consent?**



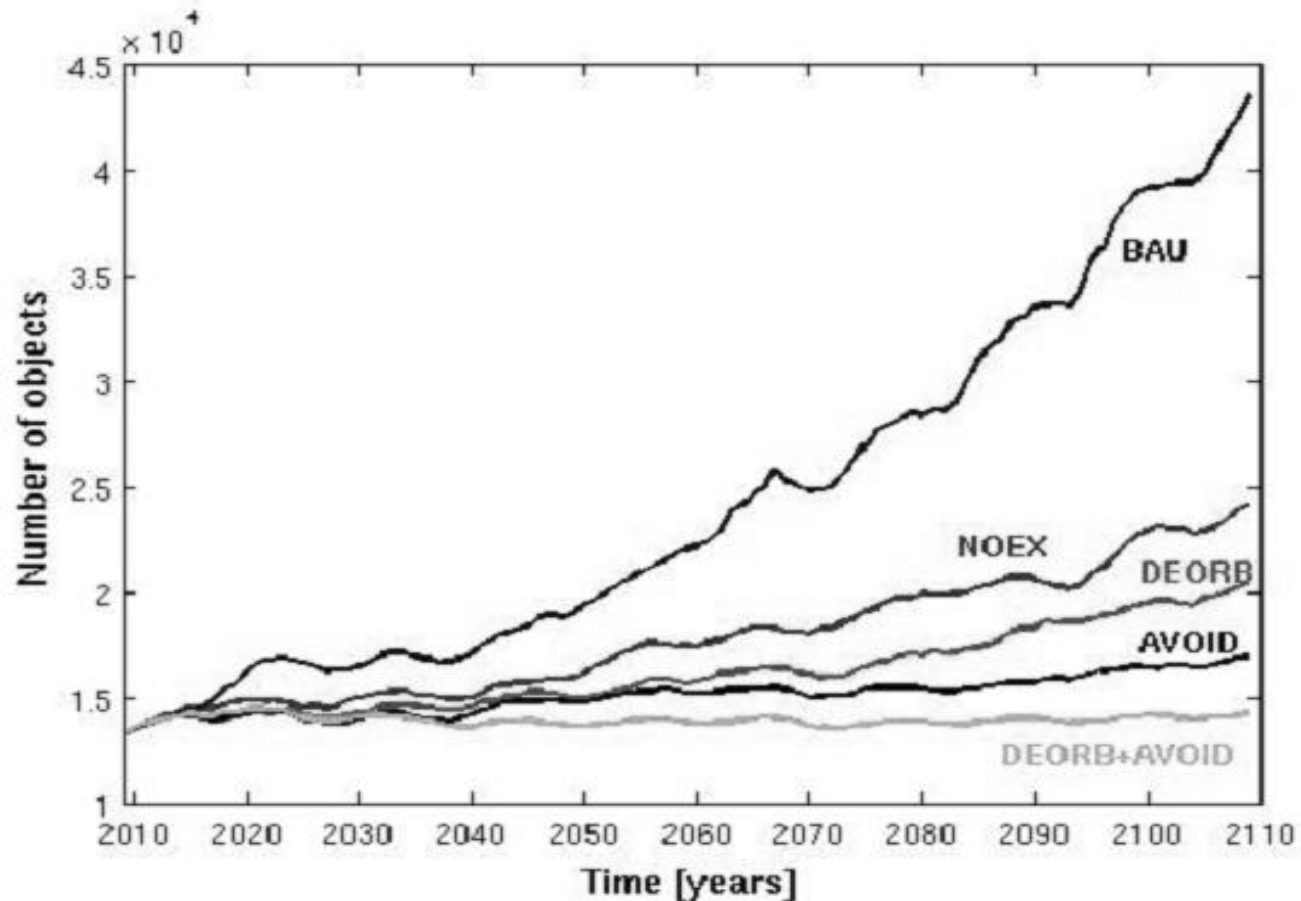
1. Are debris mitigations effective?

Historical Growth of Catalogued Objects¹³

Monthly Number of Objects in Earth Orbit by Object Type



Future Growth in the Number of Space Objects under Various Scenarios



- BAU : Business-As-Usual
- NOEX : Stopping all explorations
- DEORB : de-orbiting four large pieces of debris each year
- AVOID : collision avoidance manoeuvres
- DEORB+AVOID : active debris removal + collision avoidance



**2. If there is an obligation
to mitigate debris ?**

2. Whether there is a debris mitigation obligation.


- a. Article IX of the OST: due regard
- b. Space debris mitigation Guidelines: a possible interpretation of Article IX of OST.

a. Article IX of the OST:

- due regard to the corresponding interests

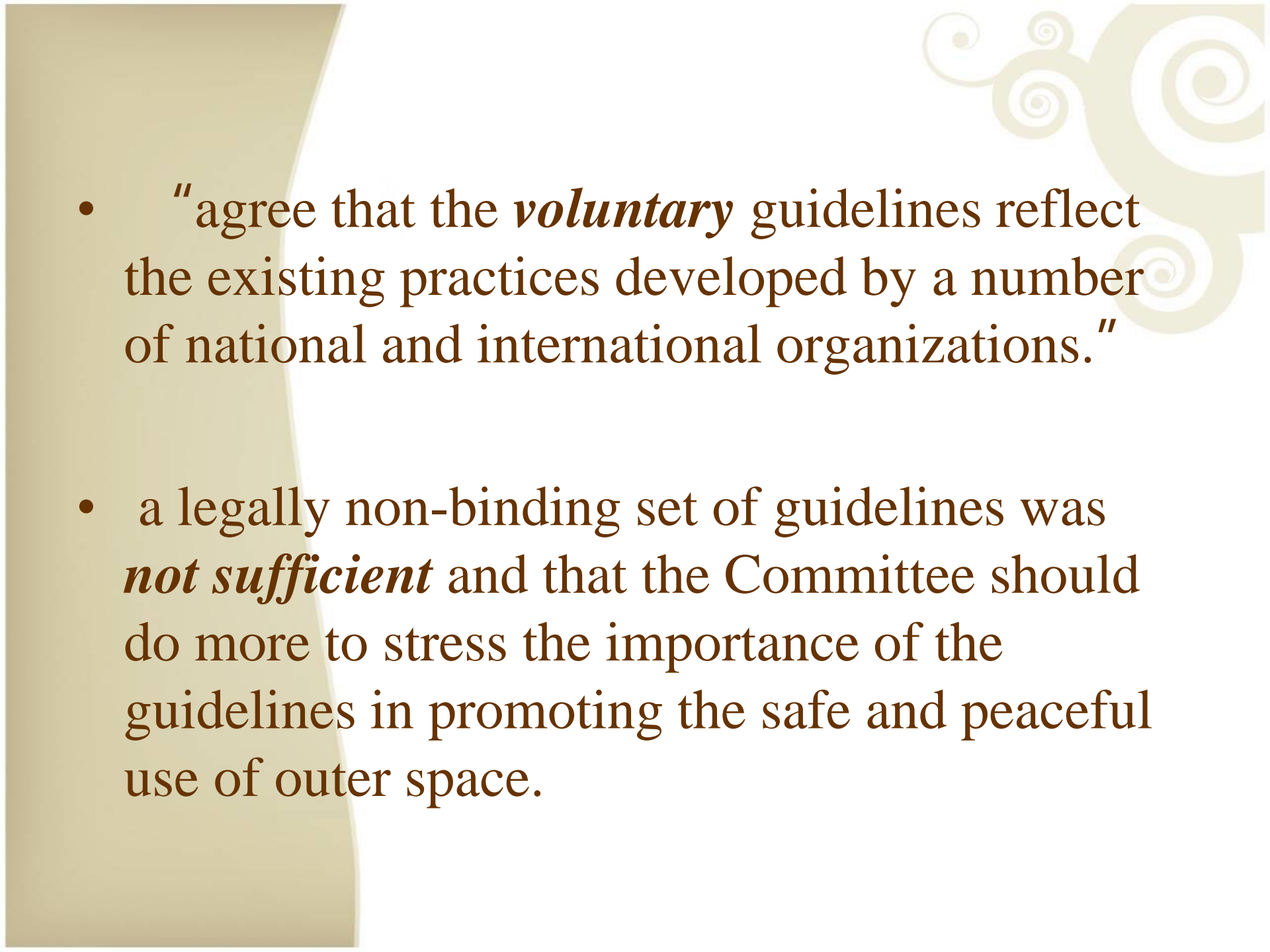
—— an obligation to take into account, both prior to (planned) and during (ongoing) space activities and experiments , the legal rights of other States Party in the peaceful use and exploration of outer space, the moon and other celestial bodies.


——Minero, 2008


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- avoid their harmful contamination
 - 'harmful contamination' is a *generic referring expression*

b. Space debris mitigation Guidelines

- **Guideline 6:** Limit the long-term presence of spacecraft and launch vehicle orbital stages in the low-Earth orbit (LEO) region after the end of their mission
- **Guideline 7:** Limit the long-term interference of spacecraft and launch vehicle orbital stages with the geosynchronous Earth orbit (GEO) region after the end of their mission

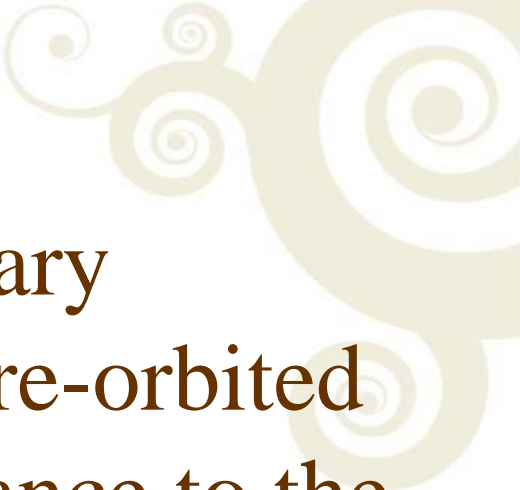
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- “agree that the *voluntary* guidelines reflect the existing practices developed by a number of national and international organizations.”
 - a legally non-binding set of guidelines was *not sufficient* and that the Committee should do more to stress the importance of the guidelines in promoting the safe and peaceful use of outer space.

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- avoid their harmful contamination
 - and where necessary, shall adopt *appropriate measures* for this purpose.

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- Treaty interpretation shall take into account "*any subsequent practice* in the application of the treaty which establishes the agreement of the parties regarding its interpretation"

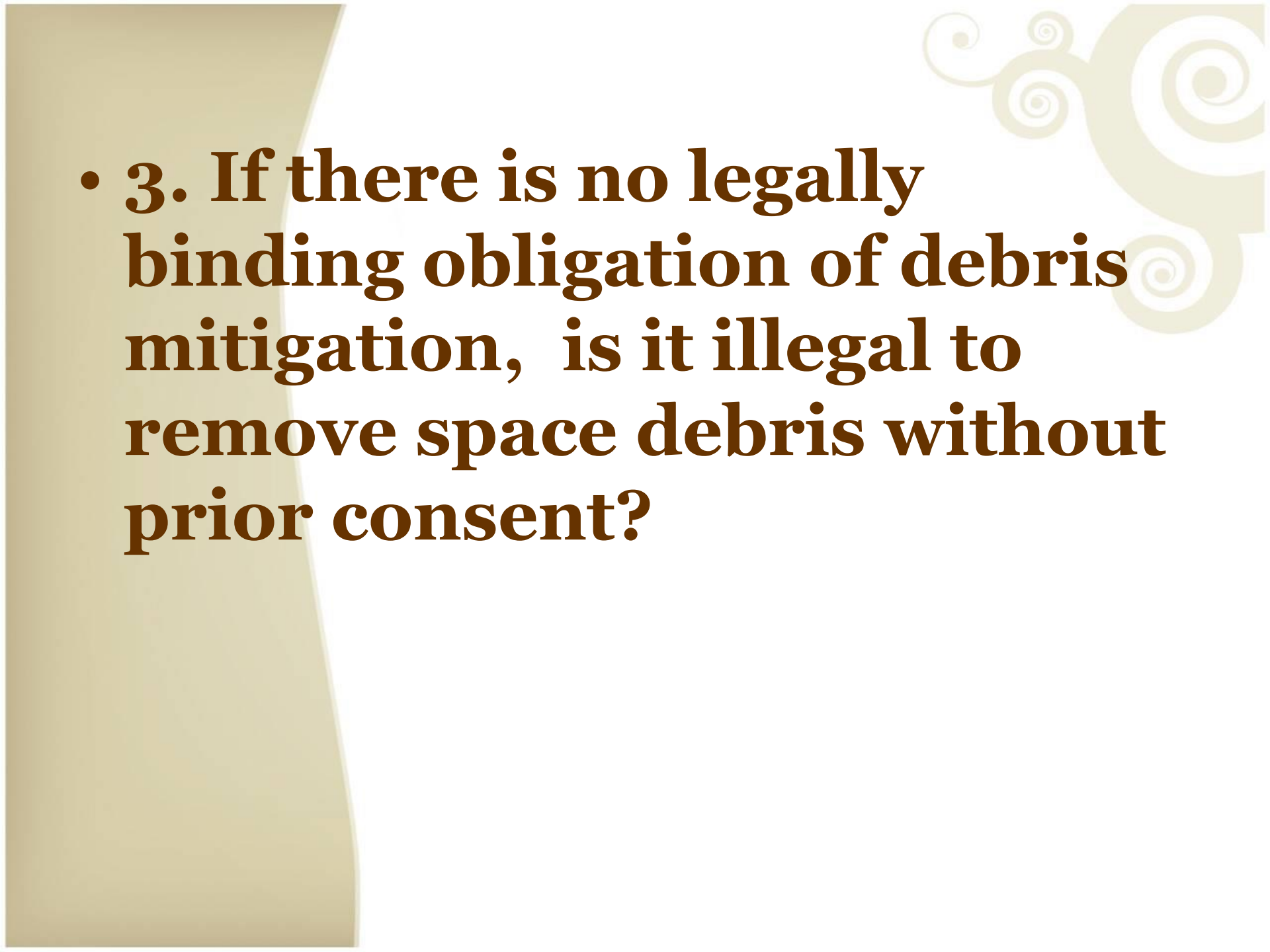
——(Vienna Convention, 1969)

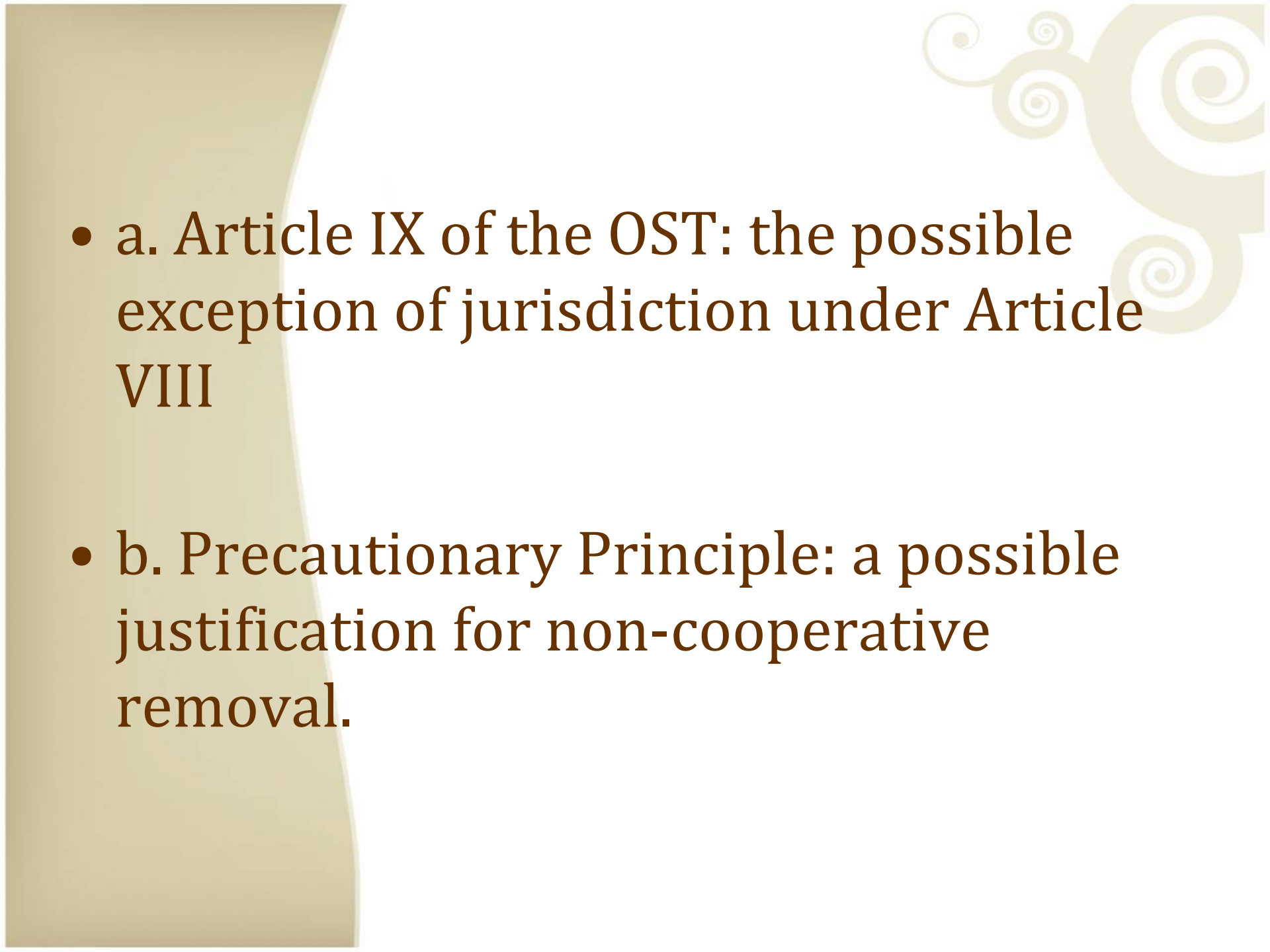
Canada	Remote Sensing Space Systems Act (2005)
France	Space Operations Act (2008)
Germany:	Assurance & Safety Requirements
Russia	National Standard GOST, R 52925, (2008)
U.S:	General Requirements to Spacecraft and Orbital Stages on Space Debris Mitigation NASA Technical Standard
U.K	Space Activities Act, (2008)
Japan	Draft Code of Conduct for Outer Space

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- In past 13 years, 90 geostationary satellites out of 182 have been re-orbited into graveyard orbits in accordance to the IADC mitigation guidelines
 - ——— ESA/ESOC annual reports: Classification of Geostationary Objects, from 1999 to 2011.




- The Space Debris Mitigation Guidelines may constitute ‘State practice’ of ‘*appropriate measures*’ .

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- **3. If there is no legally binding obligation of debris mitigation, is it illegal to remove space debris without prior consent?**

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- a. Article IX of the OST: the possible exception of jurisdiction under Article VIII
 - b. Precautionary Principle: a possible justification for non-cooperative removal.

a. Article IX of the OST

- Good faith requires that articles shall be interpreted in accordance with... the **spirit** of the treaty and **not its mere literal meaning**.
- shall not be presumed to have intended anything which would have been **unreasonable, absurd or contradictory**.

- 
- Article IX may “impose some limitations upon absolute nature of jurisdiction under article VIII”
 - the possible exception of jurisdiction under Article VIII

competing interests

- the right to freely explore outer space
- free from navigational hazards as well



b. Precautionary Principle

- when human activities may lead to ***morally unacceptable harm*** that is ***scientifically plausible*** but uncertain, actions shall be taken to avoid or diminish that harm.

——The Precautionary Principle, World Commission on the Ethics of Scientific Knowledge and Technology, UNESCO (2005)

Morally unacceptable harm:

- 1) threatening to human life or health, or
- 2) serious and effectively irreversible, or
- 3) inequitable to present or future generations,
or
- 4) imposed without adequate consideration of
the human rights of those affected.

Scientific Plausibility

- scientific uncertainties
- the plausibility shall not be affected by the time the hazards will happen, by saying
“however far off it might be, is not thereby any less certain and inevitable.”

——(ICJ, Gabčíkovo-Nagymaros Project (Hungary/Slovakia), 1997)

4. Conclusion

- **1. Are debris mitigations effective?**

Yes

- **2. If there is a debris mitigation obligation?**

May be:

Article IX of OST;

Space debris mitigation guidelines

- **3. If there is no legally binding obligation of debris mitigation, is it illegal to remove space debris without prior consent?**

No;

Article IX of OST;

Precautionary Principle

