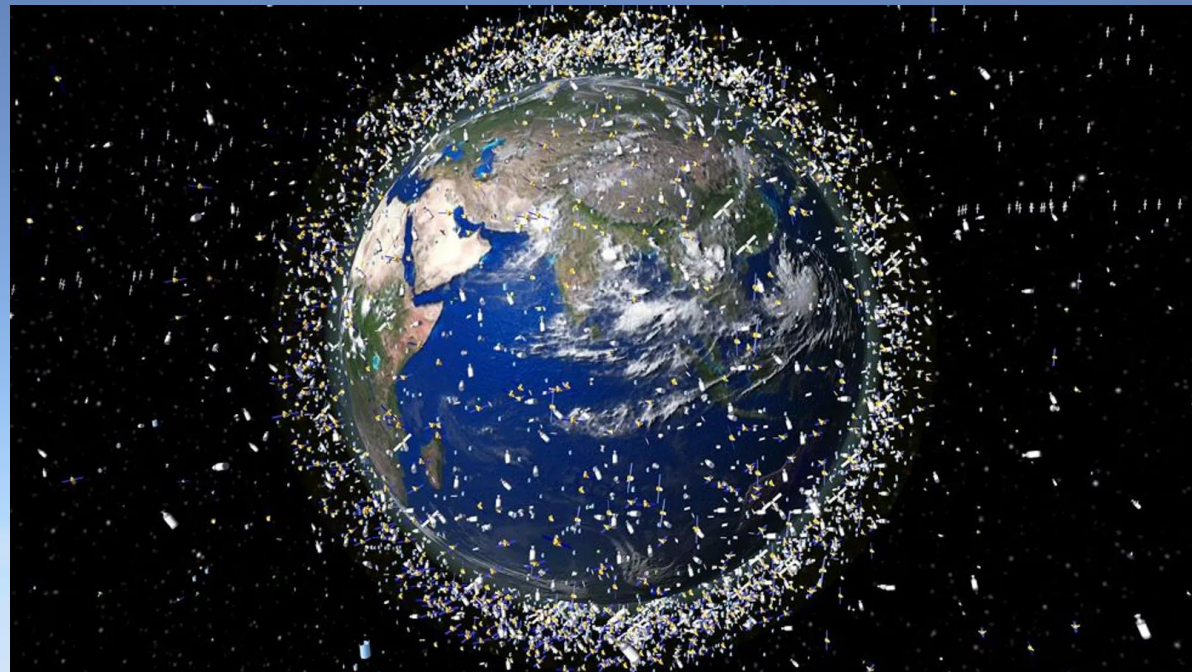


Overview of The Liability Convention

*Liability for damage caused by a
space object*



<https://www.bbc.com/future/article/20120518-danger-space-junk-alert>



**BOND
UNIVERSITY**

David Kuan-Wei Chen

18 May 2023

Why is liability important?

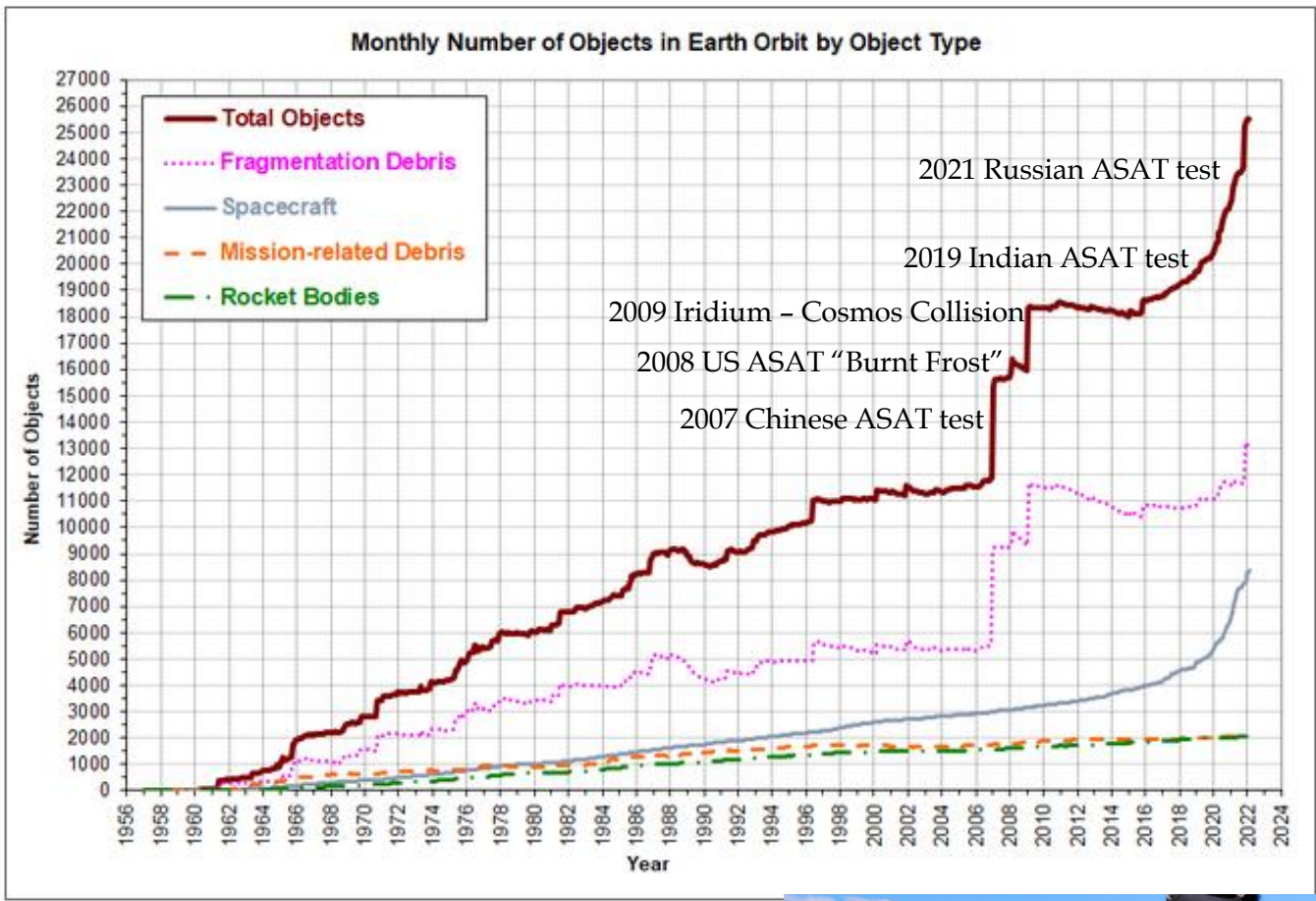


Chart showing number of objects >10 cm in LEO. Credit: NASA

Number of space objects in orbit



Saudi Arabia in 2000



South Africa in 2000



Texas, US, in 2003



NSW, AU, 2022



Queensland, AU, 2008

<https://orbitaldebris.jsc.nasa.gov/modeling/legend.html>

Recovery and Return of Objects launched into Outer Space

<https://www.unoosa.org/oosa/en/treatyimplementation/arra-art-v/unlfd.html>

| Number | Date of Discovery | Notifying State | Document Symbol | Location of Discovery | Physical Characteristics | | | | | | Identifying features | Originating Space Object | | Remarks |
|-----------------------------------|-------------------|-----------------|-----------------|----------------------------|--------------------------|--|--------|----------------|--------|--------|----------------------|--------------------------|----------------|---|
| | | | | | Shape | Material | Length | Width/Diameter | Height | Mass | | Designator | Date of Launch | |
| Objects discovered in 2022 | | | | | | | | | | | | | | |
| RD-22-04 | */09/2021 | Australia | A/AC.105/1286 | Yambuk, Victoria | Cylindrical | Inconel metal with composite fibre overwrap | 1.2 m | 0.5 m | ----- | 50 kg | ----- | 2019-094 | 20/12/2019 | Identified as a high pressure helium bottle from a Centaur upper stage of an Atlas V rocket |
| RD-22-03 | 09/07/2022 | Australia | A/AC.105/1281 | Jindabyne, New South Wales | Curved, semi-circular | Titanium, steel, aluminium, fibreglass, carbon fibre and insulated materials | 2.1 m | 0.75 m | ----- | 35 kg | ----- | 2020-084A | 16/11/2020 | Identified as part of SpaceX Dragon capsule trunk section |
| RD-22-02 | 09/07/2022 | Australia | A/AC.105/1281 | Jindabyne, New South Wales | Triangular | Titanium, steel, aluminium, carbon fibre and insulation materials | 3.2 m | 0.58 m | 0.08 m | 100 kg | ----- | 2020-084A | 16/11/2020 | Identified as part of SpaceX Dragon capsule trunk section |
| RD-22-01 | 09/07/2022 | Australia | A/AC.105/1281 | Jindabyne, New South Wales | Flat with a slight curve | Titanium, steel, aluminium, carbon fibre and insulation | 1.05 m | 0.9 m | ----- | 20 kg | ----- | 2020-084A | 16/11/2020 | Identified as part of SpaceX Dragon capsule trunk |

What is liability under international (space) law?

- Being internationally liable is the obligation to **indemnify another or pay compensation for damage caused**

Damage-causing State A

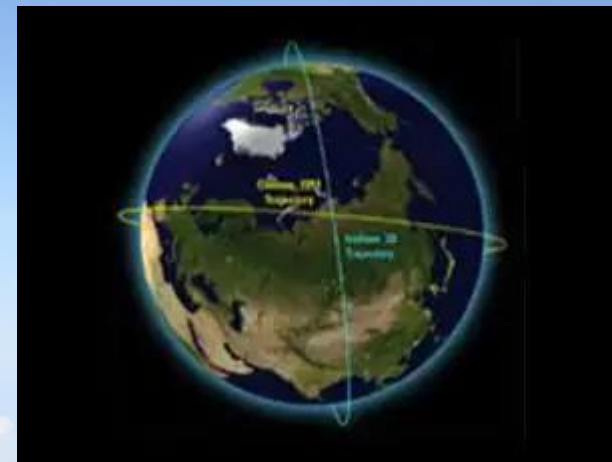


Damage-causing event



Victim State B
(or national)

- State A is **internationally liable** to State B for damage caused.
- State A must pay **compensation for damage** to State B.



Recall under the Outer Space Treaty

Article VII

Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the moon and other celestial bodies, 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 or to its natural or juridical persons** by such object or its component parts on the Earth, in air or in outer space, including the moon and other celestial bodies.

Liability is on the “State launches or procures the launching, from whose territory or facility an object is launched”

Liability for:

- Damage to another **State Party to the Treaty**
- Damage to the **natural or juridical persons of a State Party** (not own nationals)

Liability for:

- Damage **caused by a space object**
- Damage caused **component parts of a space object**
- Damage caused **on Earth, in air or in outer space**, including Moon and celestial bodies

Standard of liability is strict for ultrahazardous nature of space activities

Background of the Liability Convention

- Already in 1959, “liability for injury or damage caused by space vehicles” was considered legal issue needed “priority treatment”.
- 1963 Declaration of Legal Principles laid down basic concept “the launching State” would bear international liability, later echoed in 1967 Outer Space Treaty

Preamble

Recognizing the need to elaborate effective international rules and procedures concerning **liability for damage caused by space objects** and to ensure, in particular, the prompt payment under the terms of this Convention of a **full and equitable measure of compensation to victims of such damage,**

Scope of Liability: what kind of damage

Article I(a)

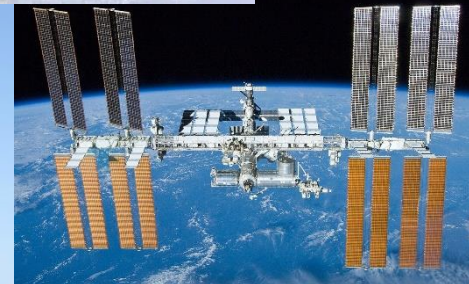
The term "damage" means **loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations;**

- material or non-material damage?
 - Shock or mental suffering?
 - Environmental damage?
- Direct or indirect damage?
- Physical or non-physical damage?

<https://canadaehx.com/2021/01/02/kosmos-954/>



Cosmos 954 crash in 1978



Cf. International Space Station Intergovernmental Agreement 1998

Art 16 Cross-Waiver of Liability

2) (c) The term *damage* means:

- (1) bodily injury to, or other impairment of health of, or death of, any person;
- (2) damage to, loss of, or loss of use of any property;
- (3) loss of revenue or profits; or
- (4) other direct, indirect or consequential damage.

Scope of Liability: damage to what/whom?

Article I(a)

The term "damage" means loss of life, personal injury or other impairment of health; or loss of or damage to property of **States or of persons, natural or juridical**, or property of **international intergovernmental organizations**;

As of Jan 2022:

- 98 States have ratified
- 19 States are signatories, a.o. Philippines, Tanzania, Rwanda, Oman
- 4 intl organisations have declared their acceptance of rights and obligations (Art XXII)



**European Organisation
for the Exploitation of
Meteorological Satellites**



European Space Agency

**European
Telecommunications
Satellite Organization**

**Intersputnik
International
Organization of Space
Communications**



Scope of Liability: who shoulders liability

Article I(c)

the launching State, which means

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

Launch also “includes attempted launch”: Art 1(b)

- Launch means... ?

51 USC 50501

“to place, or attempt to place, a launch vehicle and its payload, if any, in a **suborbital trajectory, in Earth orbit in outer space, or otherwise in outer space**”

Australia

SPACE (LAUNCHES AND RETURNS) ACT 2018, Sect 8

(a) “launch the whole or a part of the object into an **area beyond the distance of 100 km above mean sea level**, or attempt to do so;”

New Zealand

Outer Space and High-altitude Activities Act, Sect 4

“causing to take off or depart; or (ii) releasing”

Portugal

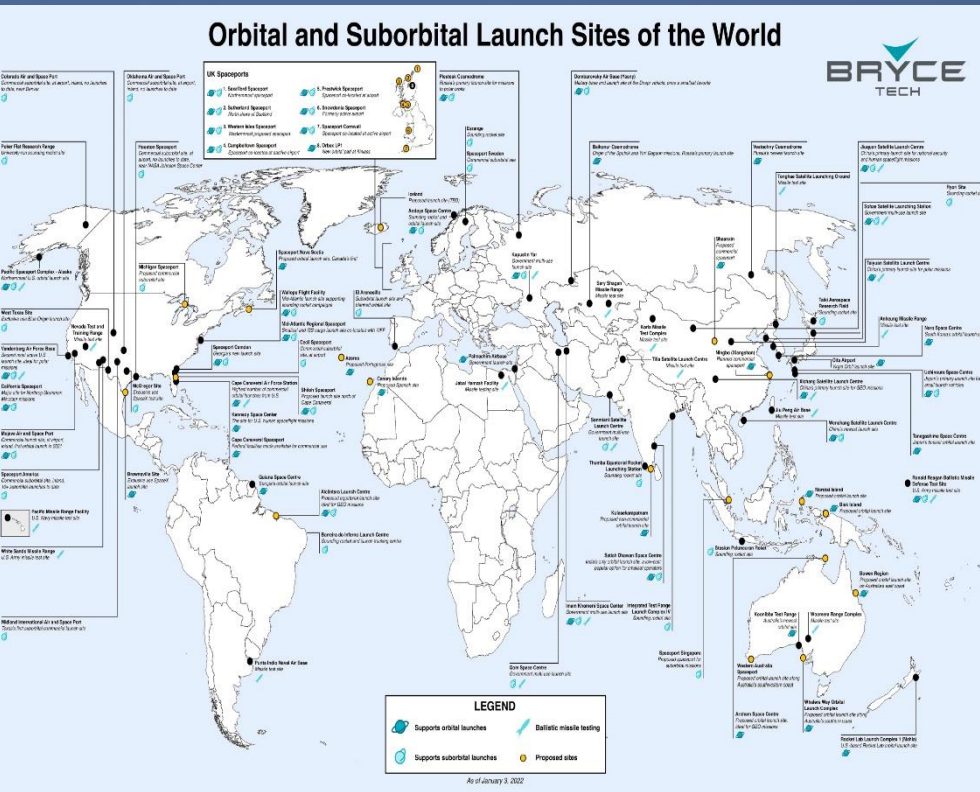
Decree-Law no. 16/2019, Art 3

“the activity through which space objects are intended to be sent or launched into space, with a view to their placing in or beyond orbit,”

Launch also includes attempted launch: Art 1(b)

- Launch
- Procure a launch
- Launch from **territory**
- Launch means from **facility**

| | | | | | | |
|-----------------------------|--|--------|-----|-----|------|------|
| 3206 | Compass-2 (launched by a Shtil carrier rocket from a submarine in the waters of the Barents Sea) | 26 May | 487 | 401 | 78.9 | 93.5 |
| UN Doc ST/SG/SER.494 | | | | | | |
| 2 | In May 2006, the Russian Federation did not launch any space objects on behalf of... | | | | | |



A submarine launch is also a launch!



SeaLaunch “facility” is a platform on the high seas

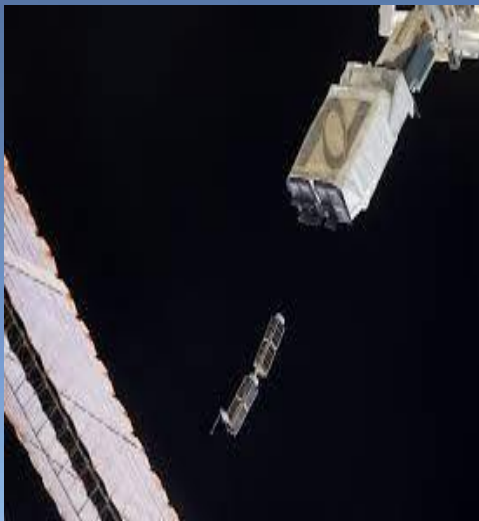
Richard Branson's Virgin Orbit has spent \$1 billion trying to reach to space — while a small New Zealand startup got to orbit for a fraction of that



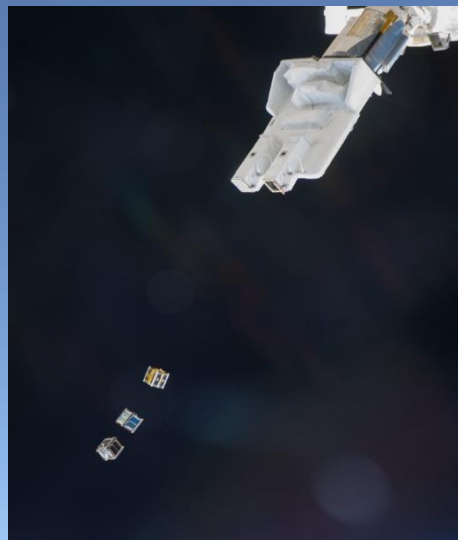
Virgin Orbit “facility” is a 747 jumbo in the air

Launch also includes attempted launch: Art 1(b)

- Launch from territory?
- Launch means from facility?
- ...what if a space object is “launched” from the International Space Station or in outer space?



Deployment from the US
Nanoracks cubesat deployer



Deployment from
the Japanese Kibo
module

EXOLAUNCH 
SpaceX Transporter-4

| | | |
|---|--------------|--------------|
|  | 12 SmallSats | 6 CarbonIXes |
|  | 9 Countries | 3 EXOpods |

EXOLAUNCH HARDWARE USED ON TRANSPORTER-4

-  CarbonIX Microsatellite separation systems
-  EXOpod Cubesat deployers
-  EXOpods 1.57m multi-satellite adapters

Mission
SpaceX's SmallSat Rideshare Program Transporter-4

Launch Vehicle
Falcon 9

Launch Site
Cape Canaveral, Florida, USA

Launch Date
April 1, 2022

12 satellites
• Microsats up to 45 kg
• Cubesats from 1U to 3.2U

Geographically diverse customer base from 9 countries, 3 continents.

Applications
• Optical Earth Observation
• Technology Demonstration
• Maritime Surveillance
• IOT Communication

Combined Payload Capacity: 400+ kg

An artist's rendering of a smallsat stack

German Exolaunch about to provide launch for 9 different countries



SpaceX about to release dozens of satellites in orbit

Scope of Liability: who shoulders liability

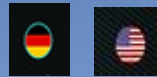
Article I(c)

the launching State, which means

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

State A

Launch service provider



State B


Territory/facility of launch





State C




Payloads (procured launch)



EXOLAUNCH 
SpaceX Transporter-4

| | | |
|--|-----------------|-----------------|
|  | 12 SmallSats | 6 CarboNIXes |
|  | 9 Countries | 3 EXOpods |

EXOLAUNCH HARDWARE USED ON TRANSPORTER-4

-  CarboNIX Microsatellite separation systems
-  EXOpod Cubesat deployers
-  EXOpods 15"/24" multi-satellite adapters

Mission: SpaceX's SmallSat Rideshare Program Transporter - 4

Launch Vehicle: Falcon 9

Launch Site: Cape Canaveral, Florida, USA

Launch Date: April 1, 2022

12 satellites

- Microsats up to 45 kg
- Cubesats from 1U to 12U

Geographically diverse customer base from 9 countries, 3 continents.

Applications

- Optical Earth Observation
- Technology Demonstration
- Maritime Surveillance
- IOT Communication

Combined Payload Capacity: 400+ kg

An artist's rendering of a smallsat stack

There could be multiple launching States!

Article V provides for “joint and several” liability when there are two or more States involved in a launch

Scope of Liability: damage by a space object

Article I(d)

The term "space object" includes component parts of a space object as well as its launch vehicle and parts thereof.

"space object" includes component parts of a space object as well as the launch vehicle and parts thereof"

Spain, Decree on Establishment in Spain of the Registry of Objects Launched into Outer Space, Art 4

"Space object is **any object**, both manmade and natural objects"

Law of Indonesia about Keantariksaan, Art 1

"space object means "a) an object the whole or a part of which is to go into or come back from an area beyond the distance of 100 km above mean sea level"

Australia, Launches and Returns Act 2018, Sect 8

"Space objects" are objects designed and manufactured for use in outer space including space launch vehicles, artificial satellites, and spaceships and their components"

South Korea, Space Development Promotion Act (2005), Art 2(3)

Apollo 14: NASA's 'Rookie' Astronauts Bring Golf to the Moon (Photos)

By Christine Lunsford published February 22, 2018



PAGE 1 OF 4: PAGE 1

Walkin' on the Moon



NASA



Oops... Female astronaut loses tool bag during Shuttle spacewalk

By CLAIRE BATES
UPDATED: 11:19 EST, 19 November 2008

<https://www.dailymail.co.uk/sciencetech/article-1087092/Oops--Female-astronaut-loses-tool-bag-Shuttle-spacewalk.html>

Degree of liability

Liability depends on where the damage occurred

Article II (*ABSOLUTE*)

A launching State shall be **absolutely liable** to pay compensation for damage caused by its space object on the surface of the earth or to aircraft flight.

Canadian astronaut Chris Hadfield's guitar: a space object?



Article III (*FAULT-BASED*)

In the event of damage being caused elsewhere than on the surface of the earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable only if the **damage is due to its fault or the fault of persons for whom it is responsible.**

Musk's Tesla Roadster and the mannequin onboard: space objects?



Process of presentation claim

Article IX: claim presented through diplomatic channels

Article X: claim must be made “not later than one year following the date of the occurrence of the damage or the identification of the launching State which is liable”

Article XIX: compensation must be “determined in accordance with international law and the principles of justice and equity”

Article XIV: establishment of a Claims Commission

Article XXIII: envisions other international agreements or that reaffirm, supplement or extend its provisions

In practice, States have signed bi-/multi-lateral agreements to address liability issues

Resolution of the Council of the European Space Agency on the Agency's Legal Liability, ESA/C/XXII/Res.3 (13 December 1977)

1. The Agency shall indemnify Member States and States participating in its space programmes or activities against liability incurred by them as a result of the execution of such programmes or activities

(a) if the States are held liable in their quality of "launching States" within the meaning of the United Nations Convention;

(b) if the Agency has so agreed by virtue of a special agreement concluded between the Agency and the State concerned.

In practice, States have signed bi-/multi-lateral agreements to address liability issues

Memorandum of Agreement on Liability for Satellite Launches Between the Government of the United States of America and the Government of the People's Republic of China, 17 December 1988

Article 2

Subject to Article 4 below, the Parties agree that, as between them, the Government of the People's Republic of China assumes and shall compensate the Government of the United States of America for any and all amounts for which the Government of the United States of America may be liable under the Liability Convention; the [Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies](#), which entered into force on October 10, 1967; or any other applicable international law.

In practice, States have signed bi-/multi-lateral agreements to address liability issues

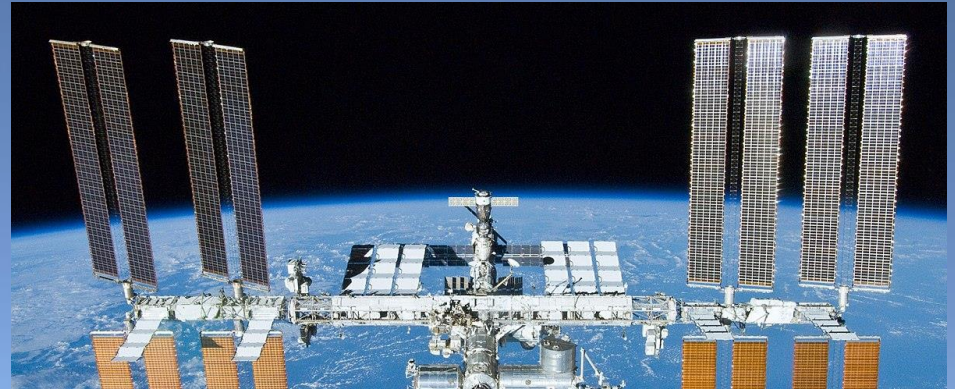
Protocol between the European Space Agency, the Government of the Republic of Italy and the Government of the Republic of Kenya on the setting up and operation of European Space Agency equipment within the perimeter of the San Marco Satellites Tracking and Launching Station in Malindi, Kenya, and on the cooperation between the Government of the Republic of Kenya and ESA for peaceful purposes, 13 Sep 1995

Article 10

1. The Government of the Republic of Kenya shall not be held liable, at either national or international level, through the activities of the Agency on its territory, for acts or omissions by the Agency or persons designated by it, acting or failing to act within the limits of their duties.
2. In the event of the Government of the Republic of Kenya's international liability being nevertheless involved, the Government of the Republic of Kenya shall have a right of recourse against the Agency, except where this involvement is due to gross negligence, an act or deliberate omission of the Government of the Republic of Kenya or a person acting on its behalf.
3. In the event any suit, action or claim is brought against the Government of the Republic of Kenya in respect of, or in relation to the activities carried out at the Malindi station, the Agency will hold harmless the Government of the Republic of Kenya against losses and claims in respect of injuries and damages, unless such injuries and damages are due to gross negligence, an act or deliberate omission of the Government of the Republic of Kenya or a person acting on its behalf.

In practice, States have signed bi-/multi-lateral agreements to address liability issues

Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning Cooperation on the Civil International Space Station, 29 Jan 1998 (ISS Intergovernmental Agreement)



ARTICLE 17 Liability Convention

- 1 Except as otherwise provided in Article 16, the Partner States, as well as ESA, shall remain liable in accordance with the Liability Convention.
- 2 In the event of a claim arising out of the Liability Convention, the Partners (and ESA, if appropriate) shall consult promptly on any potential liability, on any apportionment of such liability, and on the defense of such claim.
- 3 Regarding the provision of launch and return services provided for in Article 12(2), the Partners concerned (and ESA, if appropriate) may conclude separate agreements regarding the apportionment of any potential joint and several liability arising out of the Liability Convention.

In practice, States have signed bi-/multi-lateral agreements to address liability issues



SECTION 2 - IMPLEMENTATION

1. Cooperative activities regarding the exploration and use of outer space may be implemented through appropriate instruments, such as Memoranda of Understanding, Implementing Arrangements under existing Government-to-Government Agreements, Agency-to-Agency arrangements, or other instruments. These instruments should reference these Accords and include appropriate provisions for implementing the principles contained in these Accords.
 - (a) In the instruments described in this Section, the Signatories or their subordinate agencies should describe the nature, scope, and objectives of the civil cooperative activity;
 - (b) The Signatories' bilateral instruments referred to above are expected to contain other provisions necessary to conduct such cooperation, including those related to liability, intellectual property, and the transfer of goods and technical data;

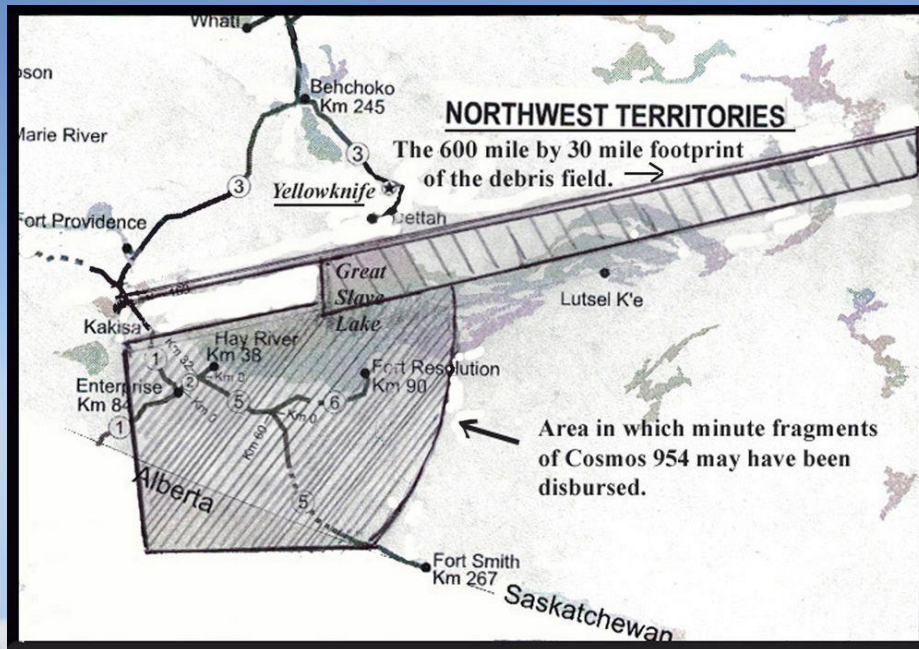
COSMOS 954:

Only State-to-State liability claim (to date?)



Settlement of Claim between Canada and the Union of Soviet Socialist Republics for Damage Caused by "Cosmos 954"

- Launched in 1977 by Soviet Union
- 1978 reentered atmosphere and crashed on Canada in NWT, Alberta, Saskatchewan



“Canada's claim is based jointly and separately on

- (a) the relevant international agreements and in particular the **1972 Convention on International Liability for Damage caused by Space Objects, ...and**
- (b) general principles of international law.”

“Canada's claim is based jointly and separately on
(a) the relevant international agreements and in particular the **1972 Liability Convention on International Liability**

“The deposit of hazardous radioactive debris from the satellite throughout a large area of Canadian territory, and the **presence of that debris in the environment rendering part of Canada's territory unfit for use, constituted "damage to property"**

“The **intrusion into Canadian air space** of a satellite carrying on board a nuclear reactor and the **break-up of the satellite** over Canadian territory created **a clear and immediate apprehension of damage, including nuclear damage, to persons and property in Canada**”

(a) **general principles of international law.**”

“intrusion of the Cosmos 954 satellite into Canada's air space and the deposit on Canadian territory of hazardous radioactive debris from the satellite constitutes a violation of Canada's sovereignty. This violation is established by the mere fact of the trespass of the satellite, the harmful consequences of this intrusion, being the damage caused to Canada by the presence of hazardous radioactive debris and the interference with the sovereign right”



<https://canadaehx.com/2021/01/02/kosmos-954/>



https://commons.wikimedia.org/wiki/File:Cosmos_954_-_Recovery_002.jpg

Some Differences between OST and LC

Outer Space Treaty

1. Damage to another State, other natural or juridical persons
2. Damage “in air”
3. Damage “on the Earth, in air or in outer space”
4. Physical damage
5. One standard of liability
6. Silence on joint liability
7. No procedure for making liability claim
8. No time limit

Liability Convention

1. Damage to property of another State or international organisations; to natural or juridical persons; loss of life, injury or impairment of health
2. “Damage to aircraft in flight”
3. On the surface of Earth or aircraft in flight ; “to a space object of one launching State or to persons or property on board such a space object”
4. Direct/indirect, physical/non-physical, material/non-material damage
5. Two tiered liability: absolute and fault-based
6. Joint and several liability, liability apportioned among launching States
7. Detailed procedure, including establishment of Claims Commission
8. Time limited liability claim

UNGA, *Application of the concept of the “launching State”*, UN Doc A/RES/59/115 (2004)

- a launching State shall register a space object in accordance with the Registration Convention
- consider enacting and implementing national laws authorizing and providing for continuing supervision of the activities in outer space of non-governmental entities under their jurisdiction
- consider the conclusion of agreements in accordance with the Liability Convention with respect to joint launches or cooperation programmes;
- submit information on a voluntary basis on their current practices regarding on-orbit transfer of ownership of space objects

Some Ongoing Challenges

- Identification of damage-causing object
- Identification of the launching State
- Space object transferred on-orbit



1989: **UK** company British Satellite Broadcasting procures satellite launch from **US**
1996: **Swedish** company buys satellite

1999: **Korean** KT Corporation procures satellite launch from **French Guiana**
2010: **China-based** ABS company buys satellite

2008: **German** company RapidEye procures satellite launch from **Kazakhstan**
2011: **Canadian** company buys RapidEye
2015: **US** PlanetLabs buys RapidEye

STATE A: **Launching State**
State of company procuring launch

STATE B: **Launching State**
State of company conducting the launch

STATE C: **Transferee State ?**
Space object transferred to company located in State C