# Space Law&

# Armed Conflict

Module 3

American Red Cross

# The Hstory of Humanity in Space



Russian cosmonaut Yuri Gagarin becomes the first human in space 1961

NASA's Viking I becomes the first spacecraft to land on Mars 1976

## 1957

The Soviet Union launches the first satellite, Sputnik, into space

## 1969

Neil Armstrong becomes the first man on the moon

1998 The first piece of the International Space Station (ISS) is launched



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SpaceX becomes the first non-governmental organization to launch a spacecraft into orbit and return it safely 2010

> 2024 Over 9,000 active and over 3,000 inactive Satellites orbit the Earth

## WHAT DO WE USE SATELITES FOR?



# **Civilian Satellite**

Telecommunications and broadcasting:
Internet, telephone, and television services

Navigation and transportation:
GPS for cars, airplanes, and ships



## WHAT DO WEUSE SATELITES FOR? (cont.)



 Weather forecasting and Earth resources monitoring:

 Predicting storms, forest fires, and volcanic eruptions

## **Civilian Satellite** Uses

Scientific research
Space exploration





# The Hstory of Military Operations in Space

The first intercontinental ballistic missile (ICBM) is tested in the USSR 1957 China enters the ASAT race by destroying an old weather satellite with a ballistic missile 2007

**1959** The U.S. launches *Bold Orion*, its first ASAT test

## 1975

A 14.5mm cannon aboard the secret Soviet military space station Almaz is fired remotely while in orbit



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Russia is suspected of planning to launch a nuclear weapon into orbit 2024

### 2019

The U.S. establishes the Space Force as the sixth branch of its military



## WHAT DO WE USE SATELITES FOR?



# Military Satellite

 Intelligence & Surveillance:
 Identifying troop locations & weapons facilities

 Early-Warning Systems:
 Detecting missile launches

• Navigation (e.g., GPS)



## WHAT DO WEUSE SATELITES FOR? (cont.)







# Military Satellite

 Communications
 Data networks allow armies to issue commands & act together

 Targeting

 Satellite information is used to deploy ground forces and fire munitions



# Why do Wé Need Space Law?

Increased human presence in outer space?



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## Role of the law?

# Why do Wé Need Space Law?

Space is being leveraged for military purposes. Many space objects are dualuse: they serve **both** civilian and military purposes. Space objects are vulnerable and attractive targets.

A legal framework is needed to address these potential conflicts and the resulting suffering on Earth. Youth Action Campaign

Damaging space objects can have devastating effects on humans and the natural environment.

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**What is Space Law?** Space law is a robust framework of international treaties, agreements, and conventions that govern the use of and activities occurring in outer space.

 Most of these treaties do not specify application during an armed conflict, but the language and coverage is broad.

• IHL applies during armed conflicts on Earth, the high seas, and outer space.

•



# Types of Space Conflicts







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## 1. Entirely in Space

2. Space-based with Ground Effects

## 3. Ground to Space

## International Treaties & Space Law

Outer Space Treaty 1967 Convention on International Liability for Damage Caused by Space Objects 1972

**1963** Partial Test Ban Treaty

### **1968**

Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space



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Agreement Governing the Activities of States on the Moon and Other Celestial Bodies 1984

**1976** 

Convention on Registration of Objects Launched into Outer Space

## The Partial Test Ban Treaty (1963)

- The PTBT prohibits nuclear weapons tests and nuclear explosions underwater, in the atmosphere, and **in outer space**.
  - Underground nuclear tests are permitted so long as no radioactive debris falls outside the nation conducting the test.





### Signing of the PTBT

# The Outer Space Treaty (1967)

- The OST emphasizes the use of outer space for "peaceful purposes."
  - It forbids establishing military bases, testing weapons, and conducting military maneuvers on celestial bodies.
  - No state can claim territorial sovereignty in space or place WMDs in orbit, either.





### Signing of the OST

## The Outer Space Treaty (1967) (cont.)

- The OST does not prohibit all military operations in outer space.
  - e.g., self-defense
     & reconnaissance
- The full breadth of international law, including IHL, applies in space as well.





### Signing of the OST

# The Agreement on the Rescue of Astronauts (1968)

- States must take all possible steps to rescue and assist astronauts in distress and promptly return them to their launching authority.
- States must also offer their assistance in recovering space objects that return to Earth outside the launching state's territory.



### AGREEMENT ON THE RESCUE OF ASTRONAUTS, THE RETURN OF ASTRONAUTS AND THE RETURN OF OBJECTS LAUNCHED INTO OUTER SPACE

(1968)

ENTERED INTO FORCE: 3 December 1968

The Contracting Parties,

Noting the great importance of 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 calls for the rendering of all

possible assistance to astronauts in the event of accident, distress or emergency landing, the prompt and safe return of astronauts, and the return of objects launched into outer space,

Desiring to develop and give further concrete expression to these duties,

Wishing to promote international co-operation in the peaceful exploration

and use of outer space,

Prompted by sentiments of humanity,

Have agreed on the following:

Article 1

Each Contracting Party which receives information or discovers that the personnel of a spacecraft have suffered accident or are experiencing conditions of distress or have made an emergency or unintended landing

territory under its jurisdiction or on the high seas or in any other place not under the jurisdiction of any State shall immediately:

## The Liability Convention (1972)

- The State from which a space object is launched is responsible for any harm caused by the object, regardless of intent.
  - The convention focuses on restitution for damages and procedures for the settlement of claims.





### Space debris on Earth

## The Convention on the Registration American Red Cross of Objects Launched into Outer Space (1976)

- States and IGOs must establish national registries of their space objects that include the "general function" of the object.
- This information must also be provided to the UN Secretary-General.





Artist rendering of space congestion

# The Moon Agreement (1984)

- The Moon and other celestial bodies should be used exclusively for peaceful purposes.
- The Moon and its natural resources are the common heritage of mankind.





### Earth from the Moon

# Does IHL Apply in Space?





## • IHL applies to "all forms of warfare and to all kinds of weapons, those of the past, those of the present and those of the future."

UN International Court of Justice, Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons (1996).



# Refresher. Applying IHL Principles to Outer Space

## Military Necessity

## Distinction



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## Proportionality

## Preventing Unnecessary Suffering

## Refresher. Military Necessity



## Any military action must achieve a legitimate military purpose.

## and...

Said action must weaken the military capacity of other parties to the conflict.

# Applying Military Necessity to Space

- Destroying the Hubble Space Telescope violates the principle of military necessity for the same reason that bombing a hospital does:
  - The destruction of both objects would not weaken militarily a party to the conflict.



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The Hubble Space Telescope

## Refresher. Distinction



Parties to a conflict must always distinguish between civilians and combatants and civilian and military objects.







# Applying Distinction to Space

- Many satellites are "dual use" objects they serve both military and civilian functions.
- Does targeting a dual use satellite violate the principle of distinction?



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Rocket preparing for launch

# Applying Distinction to Space

- Many satellites are "dual use" objects they serve both military and civilian functions.
- Does targeting a dual use satellite violate the principle of distinction?
  - NO! As long as the satellite makes an ongoing contribution to military operations.



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Rocket preparing for launch

## Refresher. Proportionality





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The harm to civilians and civilian property from an attack cannot be excessive when weighed against the anticipated military advantage of the attack.

## Applying Proportionality to Space

- The test: would the collateral damage be excessive when weighed against the concrete and direct military advantage anticipated?
- Types of weapons that can be used against satellites:
  - o Kinetic
    - Direct ascent missile
  - Non-Kinetic
    - Electromagnetic interference, cyber attack



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Artist rendering of a satellite collision

# Refresher. Preventing Unnecessary Suffering

The means and methods used in warfare must not be designed or calculated to cause unnecessary suffering or superfluous injury.

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# Applying the Prevention of Unnecessary Suffering to Space

- Weapons designed or calculated to cause unnecessary suffering to combatants on Earth may be fired from space.
  - E.g.: a chemical weapon stored on a satellite is fired down on Earth.



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### Artist rendering of a space rocket



## Crowded Skies: Increased Number of Satellites in Space

The International Space Station is established 1998 1000 satellites orbit the Earth 2012

**1957** The first satellite, the USSR's Sputnik, is launched 2010

The first private space launch is successful



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Over 9,000 active and over 3,000 inactive Satellites Orbit the Earth 2024

2019 SpaceX begins the Starlink Satellite Constellation

## Due Regard Principle Outer Space Treaty Article IX

In the exploration and use of outer space....State Parties to the Treaty shall be guided by the principle of cooperation and mutual assistance and shall conduct all their activities in outer space....with due regard to the corresponding interests of all other States Parties to the Treaty.



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### Signing of the OST

# Applying Due Regard Space Debris



- into orbit.
  - down on Earth.

Artist rendering of a space collision



## As greater numbers of satellites are launched into space, it becomes more likely that some satellites will collide with space debris, throwing thousands of fragments

• Even small pieces of space debris can cause severe damage to other satellites or to the natural environment

# What Kind of Collateral Damage could be Created by Attacking a Satellite?



- Debris from an attack falls to earth, killing civilians or destroying civilian objects.
- 2. Debris from an attack remains in orbit and collides with a critical civilian satellite
- 3. A destroyed or disabled dual-use satellite can no longer carry out its civilian function.



# How could a state target a dual-use satellite while minimizing the collateral damage?



Utilizing non-kinetic strikes that target specific components of a satellite will allow States to abide by the fundamental principles!



# Specialized IHL Concerns & Protections The Natural Environment





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## Does IHL Apply to the **Environment**?



• IHL prohibits any means and methods of warfare that cause "widespread, long-term and severe effects" to the natural environment.



Environmental Modification Convention, art. 1, May 18, 1977.



## Environmental IHL Protections

## 1977 Environmental Modification Convention

Additional Protocol I, Article 35(3)



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## Additional Protocol I, Article 55(1)

## 1977 Environmental Modification Convention

 The Convention prevents the use of the environment as a means of warfare and prohibits the deliberate manipulation or modification of the natural environment as a means of destruction or damage which would have widespread, long-lasting or severe effects.





Artist depiction of a weather-altering satellite

## Applying the Environmental Modification Convention to Space

- Consider theoretical weaponry that has the capability to manipulate or modify the natural environment, such as:
  - Climate-modifying satellites
    - Hurricanes, flooding, droughts,
       increased or lowered
       temperatures
  - Tide-disrupting technology





Artist rendering of a weather-altering satellite

## Additional Protocol I, Article 35(3)

 Article 35(3) prohibits employing materials and methods of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment.





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Artist depiction of destruction to the natural environment

# Applying AP I, Art. 35(3) to Space

- During an international armed conflict, would a state be allowed to launch a missile from space which would intentionally destroy a significant part of the enemy's natural environment?
- What about incidentally but foreseeably?



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Artist rendering of a missile

## Additional Protocol I, Article 55(1)

 Article 55(1) places an obligation on states to take care when conducting warfare that their means and methods do not cause widespread, long-term and severe damage to the natural environment and thereby prejudice the health or survival of the population.







Fire burning through a field

# Applying AP I, Art. 55(1) to Space

- States must ensure that their means and methods of warfare do not damage the natural environment or impact the health and survival of civilians.
- Consider the climate-modifying satellites again, and the consequences of generating a hurricane to destroy a coastal military base, flooding civilian farms and contaminating the clean water supply.



Hurricane captured from space

# Specialized IHL Concerns & Protections Private & Non-Governmental Actors















# Does IHL Apply to Private & NGO Actors?



![](_page_45_Picture_3.jpeg)

## • IHL is binding on all actors and their activities that may be closely linked to conflict.

![](_page_45_Picture_5.jpeg)

## Private-Sector Space Companies

# S P A C E

# Skyloom

![](_page_46_Picture_3.jpeg)

![](_page_46_Picture_4.jpeg)

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## BLUE ORIGIN

# **RBITAL**

# Private & NGOIHL Rules

## **Private Activity** but Public Responsibility

![](_page_47_Picture_2.jpeg)

![](_page_47_Picture_3.jpeg)

![](_page_47_Picture_4.jpeg)

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## **Minimizing Harm** while Benefitting Society

## The Convention on the Registration of Objects Launched into Outer Space (1976)

![](_page_48_Picture_1.jpeg)

Information on space objects can also be provided to the UN Secretary-General for the UN register. • This is voluntary.

Artist rendering of space congestion

![](_page_48_Picture_5.jpeg)

States and intergovernmental organizations must establish national registries of their space objects.

## The Registration Convention in Practice

- 88% of space objects were registered as of June 2024
  - The current minimum space object size for U.S. registration is 6–10 cm, or about the size of a baseball.

![](_page_49_Picture_3.jpeg)

## American The Convention on the International Youth Action Campaign Liability for Damage caused by Space Objects (1972)

![](_page_50_Picture_1.jpeg)

Space debris on Earth

- Any State which launches objects into space is potentially liable to pay compensation for damage caused by its objects.
- The Convention outlines procedures for the settlement of claims, although legal liability is complex and will likely pose challenges for accountability.

![](_page_50_Picture_5.jpeg)

## The Liability Convention in Practice

- The Liability Convention has only been invoked once in the 1978 Cosmos 954 Incident, when a Soviet nuclear-powered satellite reentered the atmosphere and scattered debris across north-western Canada.
  - The Soviet Union agreed to pay Can\$3,000,000.

![](_page_51_Picture_3.jpeg)

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Canadian debris collection

## Agreement on the Rescue of Astronauts, the Return American Red Cross Youth Action Campaign of Astronauts, and the Return of Objects Launched into Outer Space (1968)

![](_page_52_Picture_1.jpeg)

Space debris on Earth

- return them.
- Launching State.

• States agree to take all possible steps to rescue astronauts in distress and

Upon request, States will provide

assistance to Launching States to

recover space objects that return

outside of the territory of the

## The Rescue Agreement in Practice

 The Rescue Agreement has been invoked to retrieve and recover space objects, but never to rescue an astronaut.

![](_page_53_Picture_2.jpeg)

Astronaut space walk

## What Law Applies in Space?

THE GENEVA **CONVENTIONS OF 12 AUGUST 1949** 

### PROTOCOLS **ADDITIONAL**

TO THE GENEVA CONVENTIONS **OF 12 AUGUST 1949** 

AGREEMEN

![](_page_54_Picture_9.jpeg)

ICRC

![](_page_54_Picture_10.jpeg)

• The 4 fundamental IHL principles

 The Geneva Conventions and their Additional Protocols

• The Environmental, Corporate, and State Responsibility Principles

## Recall...

## • The outer space treaties The PTBT, the OST, etc.

![](_page_54_Picture_17.jpeg)

# Are there gaps in the law? Consider...

![](_page_55_Picture_1.jpeg)

Astronaut Edwin E. Aldrin Jr., first moon landing • If the existing framework can address debris-causing events, such as ASAT testing.

 Potential policy implications of soldiers on scientific vessels as legitimate military targets.

• Evolutions in IHL arise in the wake of conflict and the value of advocating now for action.

![](_page_55_Picture_6.jpeg)

## Apollo 10 Earth rising

![](_page_55_Picture_8.jpeg)

# SeSides

Recall the previous lessons on the outer-space treaties and IHL obligations concerning the fundamental principles, environmental protections, and corporate responsibility and apply them onto these three hypotheticals.

![](_page_56_Picture_2.jpeg)

![](_page_56_Picture_4.jpeg)

## Case Study #1

- Two states, Ryloth and Tatooine, are engaged in an IAC
- Both states possess ASAT weapons capable of disabling, jamming, or destroying enemy space objects.
- Both states are parties to all existing treaties relating to outer space and IHL
- Tatooine's military recently confirmed that Ryloth has launched a rocket into space containing a nuclear warhead for deterrent and defensive purposes.

- Did Ryloth violate any international treaties by launching a nuclear weapon into space?
- If Ryloth detonated the nuclear weapon in space, even as a test, would it vid ate any additional treaties or principles?

![](_page_57_Picture_7.jpeg)

![](_page_57_Picture_9.jpeg)

## Case Study #1 (cont.)

- Tatooine is planning an attack on one of Ryloth satellites, which is used by Ryloth's military to monitor enemy troops and communicate. The satellite also serves a civilian function by providing high-speed internet connection to civilian buildings, including a hospital.
  - Because the position of its troops is compromised, Tatooine is unable to carry out effective military operations.
  - The satellite also lies in close proximity to the space station of a third state, Naboo.
  - Blowing up the satellite with a kinetic strike would create debris that would destroy Naboo's space station and potentially kill the astronauts on board.

3) Does targeting this satellite violate the principle of distinction?

4) If not, how can Tatooine target the satellite without violating the principle of proportionality?

![](_page_58_Picture_7.jpeg)

![](_page_58_Picture_9.jpeg)

## Case Study #2

- The government of Naboo now supports Ryloth in the war and joins the conflict. Without officially declaring war, the Naboo military used their groundto-space missiles to attack Tatooine's military satellites that are close to Naboo, disrupting Tatooine's communication and targeting.
- Tatooine, outraged by Naboo's actions, is planning to deploy their climatealtering satellite to create severe hurricanes across Naboo, preventing their use of ground-to-space missiles and destroying on-planet bases and military equipment. The satellite will likely also cause significant flooding, severely damaging the agricultural industry, which provides food for both the Naboo military and civilians.
- If deployed, the climate-altering satellite would have profound consequences on Nabod's agriculture and overall biodiversity. There will likely be a famine and the natural environment is uncertain to fully recover.

How would IHL protections apply to this situation? 1)

![](_page_59_Picture_5.jpeg)

![](_page_59_Picture_8.jpeg)

## Case Study #2 (cont.)

- Fortunately, Nabod's military anticipated the use of Tatooine's climate-modifying satellites and destroyed them
- The wreckage has scattered and entered Alderaan's orbit, a country not party to the current conflict.
- Some of the fragments have also hit other purely scientific satellites, destroying them and causing pieces to fall through the atmosphere and land on the planet.
- The climate-altering satellites were launched by a business on Tatooine to make the planet's weather more hospitable, before the Tatooine military coopted them
- Tatooine failed to register the satellites with the UN
- The destroyed scientific satellites belonged to an organization on Alderaan that was researching ocean currents.

Have Naboo and Tatooine violated any conventions relating to corporate 2) activity? If so, which entities can be held liable for the damage to Alderaan?

Can the principle of due regard be applied in the destruction of the 3) satellites?

![](_page_60_Picture_9.jpeg)

![](_page_60_Picture_13.jpeg)

## Case Study #3

- Ryloth has stationed soldiers on the International Space Station (ISS) to protect its civilian space technologies, including GPS and internet services.
- Tatooine now considers the ISS a legitimate military target due to the presence of the soldiers and launches a long-range missile into space, killing scientists and soldiers and destroying the station.
- As a result, GPS and internet services on Ryloth are disabled and debris falls down onto Earth, destroying farmland and a water reservoir in another country. The boosters from the rockets become space junk and are large enough to crash into other satellites and damage them
  - Was the ISS a legitimate military target? Were the soldiers aboard it?
  - Was Tatooine's strike proportional?
  - 3) If Tatooine was uncertain their attacks would cause such severe environmental damage, could they be held responsible under any of the environmental protection provisions?

![](_page_61_Picture_7.jpeg)

![](_page_61_Picture_11.jpeg)

# End of Nocie 3

Thank you!

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## Image Sources

- Slide 2 (left to right) •
  - Sputnik satellite, NASA's Viking I, moon landing, SpaceX launch, International Space Station
- Slide 3-4 (left to right, top to bottom) •
  - GPS map, cell phone, satellite dish, volcano, car gps, satellite image of storm
- Slide 5 •
  - Soviet R1 missile, Bold Orion, Space Force logo, destroyed Chinese weather satellite
- Slide 6-7
  - Satellite, military helicopter, soldiers, ground satellite dish, soldiers using GPS, rocket launch
- Slide 8 •
  - UN, satellite image of Earth •
- Slide 11 •
  - Rocket and satellite rendering, laser destroying satellite, rocket launch •
- Slide 12 •
  - U.S. signing the test ban treaty, the U.S. and U.S.S.R. agreeing to sign the OST, freefloating astronaut, space capsule returned to • Earth, rendering of satellites orbiting the Earth
- Slide 13 •
  - U.S. signing the test ban treaty •
- Slide 14-15 •
  - The U.S. and U.S.S.R. agreeing to sign the OST; •
- Slide 16 •

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- The Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space • Slide 17
  - Space debris on Earth •
- Slide 18 •
  - Rendering of satellites orbiting the Earth •
- Slide 19 ۲
  - View of the Earth from the Moon ٠

![](_page_63_Picture_26.jpeg)

## Image Sources

- Slide 20
  - Geneva Conventions, Additional Protocols, satellite orbiting space
- Slides 22 •
  - Nuclear missiles,
- Slide 23 •
  - The Hubble Space Telescope •
- Slide 25-26 •
  - Rocket preparing for launch
- Slide 28 ۲
  - Rendering of a satellite collision
- Slide 29
  - <u>Smoke in the sky</u>
- Slide 30 •
  - <u>Rendering of a rocket in space</u>
- Slide 31 (left to right) •
  - o Sputnik, ISS, SpaceX launch, Satellite, Starlink
- Slide 34
  - Burning satellite, crashed satellite, space debris
- Slide 35 •
  - Satellite hit with a laser, soldiers observing computer a screen
- Slide 47 •
  - Due Regard, SpaceX, Skyloom, Blue Origin, Sierra Space Corporation, ThinkOrbital inc.
- Slide 49

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**Objects around space** 0

- Slide 51 •

  - sign the OST Slide 58
    - •
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- Slide 60, 61
- Slide 62 •

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- Environmental Slides •

<u>U.S. signing the test ban treaty</u>; the U.S. and U.S.S.R. agreeing to

Explosion from space rendering, nuclear mushroom cloud

Astronauts on the ISS, space explosion

<u>Hurricane</u>, <u>Space junk</u>, <u>Space boosters</u>

Rendering of the ISS, rocket launching into space

Blimp, Field on fire, Hurricane, Space Junk, Weather modifying satellite, Landscape,

NGO/Private Corporation Slides Rocket, Space junk, Space junk, Hurricane, Canadian team