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ANALYZING THE OBLIGATION TO RECOVER AND RETURN SPACE OBJECTS UPON CONTROLLED RE-ENTRY UNDER INTERNATIONAL SPACE LAW

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Abstract

Cases of Uncontrolled Re-Entry and impact of Space Objects have been increasing over the last few years. This has led to a call for multilateral negotiations on a Controlled Re-entry Agreement and for countries to commit to a National Controlled Re-entry Regime.

With countries developing reusable vehicles and objects that can be controlled and maneuvered upon re-entry into airspace, will such objects still be regarded as Space Objects upon Re-entry? In absence of legal demarcation between Airspace and Outer Space, the relevance of governance under Air Law or Space Law falls on the definition of a “space object”.

The status of being defined as a “Space Object” is pertinent considering that State Parties are obliged under Article VIII of Outer Space Treaty (OST) and Article 5 of the Return and Rescue Agreement (ARRA) to assist in the recovery of space objects found in their territory and beyond and return it to the owner/launching State respectively.

Thus this paper will analyze whether state parties are obligated to recover and return such objects that have been deliberately re-purposed to perform surveillance or other military/illegal activities in their airspace, upon controlled re-entry from Outer Space.

Firstly, considering that neither the OST nor ARRA define a Space Object, this paper will evoke subsequent State practices under Vienna Convention of Law of Treaties to suggest that obligations to “recover and return” under Article VIII of the OST and Article 5 of the ARRA shall apply only to uncontrolled re-entry of space objects and not to controlled re-entries. Further, the paper will analyze the Object and Purpose of ARRA to establish that obligations under Article 5 shall be applicable only during the time of unintentional or accidental landing and not during deliberate act of surveillance or breaches of Airspace of a country.

Secondly, this paper will clarify the definition of “Space Objects” under ARRA to exclude those objects that can be maneuvered/controlled in Atmosphere upon re-entry, regardless of it being a component part of a space object. Further, the paper will use the definition under Annex 2 of Chicago Convention to classify such objects as Aircrafts.

Finally, the paper will conclude that to prevent adversaries from exploiting the ambiguity in International space law, it is important for countries to work on a clear and uniform definition/interpretation of “Space Object” at the UN Open Ended Working group on Reducing Space threats, before committing to a controlled re-entry regime.

Keywords: Space Objects, Uncontrolled, re-entry, Return and Rescue Agreement, Outer Space Treaty, Open-ended working group.

Acronyms/Abbreviations

1. Outer Space treaty (OST)
2. Return and Rescue Agreement (ARRA)
3. United Nations (UN)
4. Liability Convention (LIAB)
5. Registration Convention (REG)
6. United Nations Committee on Peaceful Uses of Outer Space (UNCOPUOS)
7. Guidelines for the Long-term Sustainability of Outer Space Activities (LTS Guidelines)

8. National Aeronautics and Space Administration (NASA)
9. Indian Space Research Organisation (ISRO)
10. European Space Agency (ESA)
11. Vienna Convention on the Law of Treaties (VCLT)
12. United Nations Office for Outer Space Affairs (UNOOSA)
13. Open-Ended Working Group on Reducing space threats through norms, rules and principles of responsible behaviours (OEWG)
14. International Civil Aviation Organization (ICAO)
15. Standards and Recommended Practices (SARPs)

1. Introduction

There has been a rise in instances of uncontrolled reentries of space objects in several parts of the world. Such uncontrolled reentries if not monitored may pose risk to lives and properties on earth. Well-known examples of large-mass uncontrolled re-entries include the re-entry of the 18 tonnes booster stage of China's Tiangong space station, re-entry of Falcon 9 second stages¹. In light of this, the Outer Space Institute had developed and released its third International Letter requesting Governments to negotiate a multilateral agreement for controlled re-entries and undertake the initiative by immediately and unilaterally committing to national controlled re-entry regimes.² The dangers of reentries along with invoking the Liability Convention³, the Outer Space Treaty,⁴ brings us back to the much-neglected international treaty, i.e., the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return Objects Launched into Outer Space.⁵

Unlike the period when the Space Treaties were drafted, the technological advancements today have

enabled controlled re-entries of space launch vehicles and many other objects, which are launched or intended to be launched into space. The recent incidents⁶ wherein unidentified objects claimed to be having surveillance and military purposes were spotted in the airspace of another state emphasize on the need for laws to pace up with technological changes and address the overlap and conflict between applicability of Air Law and Space Law. While the ARRA deals with the recovery and return of objects that have reentered from space, it is ambiguous as to what constitutes a "space object," and on the obligation to return those objects upon controlled re-entry discovered in the airspace, performing military activities.

To address this ambiguity, this paper at first examines the obligation of states under Art. 5 ARRA, when instances of "controlled reentries" are used by another state for surveillance activities and breaches of airspace of the former.

Given the uncertainty surrounding the definition of "space object", essentially concerning ARRA, this paper argues the need to exclude such objects that can be maneuvered or controlled in airspace for some time upon their re-entry. It further attempts to analyze how aspect of "control" over object impacts the applicability of ARRA and then suggests the most feasible alternative by widening parameters of the term "Aircraft" under Annex 2 of Chicago Convention to enclose such objects within its framework.

Finally, the paper will conclude with how states can address this issue through existing frameworks under ICAO and the recently formed Open-Ended Working Group on Reducing space threats through norms, rules and principles of responsible behaviors.

2. The obligation to recover and return space objects under the Return and Rescue Agreement in instances of surveillance upon controlled re-entry.

It is indubitable that space exploration requires international cooperation and mutual trust amongst States irrespective of their differences back on earth.

One of such instances of states cooperating internationally is to comply with the obligations to recover and return space objects that have been launched by another territory, The OST and the ARRA obligates State Parties to recover and return the space objects that have landed or discovered in their territory or beyond to the launching state and thereby codifies and promotes this norm of international cooperation.

Both these instruments, negotiated and drafted during the cold war, establish the important practices and norms of space governance. At present both the OST and ARRA have 119 and 99 ratifications respectively, and are regarded as customary international law which means that the obligations of these instruments apply regardless of a State being a signatory to it or not.

On the recovery and return, Art. VIII of OST states *“Such objects or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data prior to their return”*⁷

Art. 5, ARRA further expands the obligations under Art. VIII, OST. The Article obligates contracting parties to the Agreement, when a space object or its component part has been known or discovered upon

return to earth, either under its jurisdiction or on high seas or in any other place⁸:

- To notify the launching authority and the UN Secretary-General. [Art. 5(1)]
- To take steps if practicable to recover the space object or component parts found in its jurisdiction, upon the request of the launching authority, with its assistance if requested by the contracting party. [Art. 5(2)]
- To return to or hold at the disposal of the launching authority, which shall, upon request, furnish identifying data prior to the return of the object. [Art. 5(3)]
- Notwithstanding the second and third obligations above, to notify the launching authority, if it has a reason to believe that the space object discovered under its jurisdiction is hazardous or deleterious. In that case the launching state shall take effective steps immediately under the direction and control of the contracting party to eliminate possible danger of harm. [Art. 5(4)]

Apart from obligations, Art 5. relieves the contracting party of bearing the expenses associated with the recovery and return of the space object or its component by stating that such costs shall be borne by the launching authority. [Art. 5(5)]

Both Art. VIII OST and Art. 5 ARRA are clear that the obligation to recover, return or deal accordingly applies only to “Space objects or its component parts”. But neither of these instruments clearly define what a “Space object or a component part” is nor clarify what kinds of return to earth will oblige the contracting parties to recover and return the object to the launching authority.

To look outside of these two instruments, although the LIAB and REG attempts to define a space object, neither Space law instruments clarify the

circumstances which either regard or disregard an object, especially during its re-entry to earth, from being a space object.

Finally, none of the Air Law or Space Law instruments clearly delimit or define where an air space or outer space starts or ends.

These above limitations are clearly important to evaluate the obligation of state parties to recover and return space objects under OST and ARRA especially in situations where a space object behaves like an air object, in an airspace of another state, like in certain types of controlled re-entry.

So, what is Controlled Re-entry?

According to NASA's Orbital Debris Program Office, *"Controlled [re]entry normally is achieved by using more propellant with a larger propulsion system to cause the spacecraft to enter the atmosphere at a steeper flight path angle.⁹ This will enable the vehicle to then enter the atmosphere at a more precise latitude and longitude, and the debris footprint can be positioned over an uninhabited region, generally located in the ocean."*¹⁰

According to ISRO, *"Controlled re-entries involve deorbiting [the space object] to very low altitudes to ensure impact occurs within a targeted safe zone."*¹¹

Such controlled re-entries have mostly been done to inactive satellites or space debris as a part of end of the life mission, which has become vital to reduce space debris as well as prevent the risk posed by uncontrolled re-entries of space objects on people and property on earth. Such procedures have also become part of best practices. For example, the LTS Guideline B.1¹² and Guideline B.9¹³ suggests states to furnish information on uncontrolled re-entries of Space objects and Guideline D.2 suggest states to investigate and consider new measures to manage space debris

population and may include developing technologies for controlled re-entries to prevent risk to lives, property or environment.¹⁴ Further Space agencies such as ESA have committed to reduce the risk posed by space object reentries as a part of their Zero Debris Charter.¹⁵

These kinds of controlled re-entry are intended to land to prevent impact of the object with a territory containing population and property. For example, ISRO recently landed its Megha Trophique Satellite in the Pacific Ocean through controlled re-entry.¹⁶ The ESA too performed a controlled re-entry of its Aeolus satellite, landing it in antarctica.¹⁷

These types of controlled re-entries are performed by the launching authority with ability to limitedly control and maneuver the re-entering space object over another state's airspace, to land them away from a location to avoid accidents. Further these re-entering space objects can also be considered Space Debris since they are inactive or non-functional as defined by UN COPUOS Space Debris Mitigation Guidelines, 2007.¹⁸

But what about active/ functional space objects such as reusable launch vehicles that have the ability to land on predetermined and precise locations or those space objects in the future that have the ability to fully control their trajectory within a state's airspace in order to carry out surveillance or intelligence gathering operations?

Currently only a few states have attained capabilities to perform controlled re-entries and land the space object on designated spots, but in the future more states can follow suit.

Adversaries can use controlled re-entries of space objects to remain stationary over a sensitive point that can enable them to collect intelligence in a sustained manner in real time.¹⁹ And unlike satellites, these

objects do not have predictable orbital dynamics and can catch the subjects unaware of surveillance.

The development in the capabilities of controlled re-entries and maneuvers can in the future lead to fully controlled re-entries of space objects being performed by launching authority for surveillance over the airspace of a contracting party to gather intelligence or for any other purposes. Such a launching state can demand for its space object to be recovered and returned by the State in whose territory the object may have been found. Further the act of demanding its recovery and return can become part of the launching state's Lawfare to purportedly establish its compliance with International Law such as the U.N Charter or the Outer Space Treaty or raise it as a breach of obligation of the Contracting state under ARRA if that state fails to return the object.

For example, the recent incident surrounding Air Balloon operated by the Chinese over US airspace in January 2023 split both parties into two different positions, with the Chinese contending that it was a scientific balloon that drifted away from its course due to weather whereas the U.S claiming it to be a Surveillance balloon that flew over its sensitive areas.²⁰ The Balloon was shot down over the Atlantic Ocean and the U.S declined to return the debris to China.²¹ Although the act dealt with operation of a balloon in an airspace, there can be contentions and conflicts in the future over operations of space objects upon controlled re-entry.

Pursuantly, such cases of intentional maneuver in airspace or a controlled re-entry of a space object utilized for surveillance or military purposes raise questions on whether the obligations to recover and return such objects under Art. 5 ARRA will prevail over the right to safeguard and uphold the security and sovereignty of the contracting state.

While Art. 5, ARRA does not expressly state about the conditionality related with the obligation to return space objects that perform surveillance or intelligence collection upon re-entry, recourse can be made under Art. 31 of The Vienna Convention on the Law of treaties²² that lays down the General rule of interpretation of a treaty.

While VCLT was adopted in 1969, ARRA was adopted in 1968 and OST in 1967. Despite its adoption succeeding OST and ARRA, the VCLT has been used by ICJ to interpret treaties and agreements that pre-date it.²³ Thus, it is unquestionable to extend the application of VCLT over ARRA. Further, both Art 31 and 32 of VCLT are regarded as Customary International Law²⁴ thus extending its applicability even to States not party to such instrument.

(i) *Object and Purpose*

Under Art. 31(1) VCLT “A *treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose*”

Further, under Art. 31(2) VCLT, the context for the purpose of the interpretation of a treaty shall include its text and preamble. The preamble of the treaty can generally offer the *Ratio Legis* or the reasons for which the treaty was adopted²⁵ and can be used to derive the Object and Purpose of a Treaty.²⁶

Referring to the Preamble of ARRA, the agreement was adopted to enable prompt and safe return of astronauts and the return of space objects and was prompted by sentiments of humanity.²⁷

Notably ARRA was adopted at a time when the world witnessed accidents involving spacecraft and astronauts, including instances where space objects

accidentally landed on territories beyond the launching state. For example, in 1962, a component part of Sputnik 4 launched by the USSR accidentally landed in the U.S and was returned by the latter to the USSR Embassy.²⁸ Further, in 1967 when the U.S Biosatellite II re-entered earth, it was recovered by the help of Australian facilities and returned to the U.S.²⁹

The Agreement was also adopted to develop and expand the obligations given under Art. V and Art. VIII, OST and importantly promote international cooperation in the peaceful exploration and use of outer space.

It is clear that the rights and obligations of ARRA are driven by the need to respond to situations of emergency, distress faced by the Personnel of Spacecrafts and unintentional/accidental landings of such spacecrafts or space objects.³⁰

Further, interpreting the texts of provisions under ARRA; There is a distinction in the treatment of Personnels and Space Objects, subjecting the former to receive a more immediate obligation to rescue and a prompt return to the Launching authority. This can be reflected in the texts of Art. 1-4 of the ARRA that deals with the Rescue and Return of Personnel of Aircrafts. Further, Art. 1 to 4, ARRA unlike Art. 5(5) do not specify the obligation of the launching state to bear the cost borne by the contracting party to rescue and return personnels.

The duality in the treatment of personnel and Space objects, indicates that while the rescue and return of personnel carries the humanitarian sentiment, the return of space objects upon re-entry is mainly for scientific or other related reasons. The rationale to return space objects to the launching authority was mentioned in a statement made by a representative of the U.S that it was towards shared scientific interest.³¹

A return of a space object may enable scientists to examine that object and learn more about space science and engineering.³² Further the examination of a returned space object can provide clues on what went wrong in case of a miscarried project.³³

This implies that the obligation under Art.5 cannot be considered as absolute in the same humanitarian vein of Art 1 to 4, ARRA. It is invoked only when there is a miscarried project and to enable the analysis of the miscarriage and not in acts of surveillance during re-entry.

Finally, in order to prioritize the safety and security of the state in whose territory such space objects may be found, Art. 5 ARRA offers exceptions under Art. 5 (4) by enabling state parties to eliminate possible danger of harms associated with space objects that are believed to be of a hazardous or deleterious nature.

Thus, it can be interpreted that the obligations under Art. 5 ARRA are not unconditional or absolute in all circumstances.

Thus, in light of the Object and Purpose of ARRA, the contracting party may not be unconditionally obliged to recover and return space objects that have performed controlled re-entry to maneuver over a state's airspace for surveillance, thereby threatening their security. They can only be obligated to return when there is an unintentional/accidental re-entry devoid of surveillance or military activities.

(ii) Subsequent State Practice

Under Art. 31(3)(b) VCLT, interpretation can be gathered from “*Any subsequent practice in the application of the treaty which establishes the agreement of the parties regarding its interpretation*” State practices towards the application of Art. 5 of ARRA are recorded by UNOOSA.³⁴

There has been a total of 95 instances of notification offered by contracting parties as per Art.5(1) ARRA to the launching authorities &/or UN secretary general.³⁵ All these 95 instances involved reporting of Space objects and component parts that included metallic parts, launch vehicles, satellites, debris, stages of launchers, payloads. None of them were objects that were indicated to have been used for intelligence gathering over a state's airspace. Further, none of these objects were reported by the Contracting parties to have performed manoeuvre, surveillance over their airspace or importantly have breached their airspace.

Considering instances of offering assistance to return a space object as per Art. 5(3) ARRA, in 1970 immediately after ARRA became effective, The U.S government returned 4 fragments of Space Object launched by USSR to its representatives³⁶. In 2004, Argentina returned parts of solid fuel engine of a U.S Delta 2 upon request to U.S, with the U.S stating that it will bear the cost of recovery and return of component as per Article 5(5) ARRA.³⁷

Most recently in 2016, the U.S government notified the Chinese government and offered assistance in identifying and recovering the space objects that had reentered in the U.S³⁸ and the Indonesian Government at the request of SPACE-X from U.S, returned objects that were part of its Falcon 9 Rocket, found in their area upon re-entry.³⁹

Notably, in 1978, when the Cosmos 954, believed to be a surveillance satellite, unexpectedly dropped off from its orbit and re-entered into earth, it disintegrated and scattered over Canada.⁴⁰ Regardless of it being operated as a surveillance satellite in space or not, Canada as per Art. 5 (1) notified the UN Secretary General as well as the USSR of the Objects found in its territory.⁴¹ But Canada did not report this as an

instance of a breach of its Airspace or surveillance by the Cosmos-954 in its own airspace.

Thus, upon analyzing subsequent state practices, it can be implied that so far Art. 5 of ARRA has been applied only to cases of unintended or accidental re-entry of space objects and have so far not applied for recovery and return of Space Objects that have impacted their territories or been found upon controlled re-entry or maneuver for surveillance or other military activities.

Although it is logical to state that the practices of recovery and return may only begin when there are instances of such re-entry and surveillance in the future, it must be reiterated that any act of interpreting Art. 5(2) and (3), to recover and return such objects must be a series of applications and not a single application, in order to be qualified as Subsequent State practices under Art. 31 VCLT⁴².

Thus, in absence of subsequent state practices currently to recover and return those space objects that perform surveillance upon controlled re-entry, it can be interpreted that there cannot be an obligation to recover and return such objects under Art. 5 ARRA.

(iii) Travaux Préparatoires,

Art. 32 of the VCLT deals with supplementary means of interpretations and involves recourse to the preparatory documents (Travaux Préparatoires).

Considering the rules of interpretation of a Treaty, even if the General Means of interpretations under Art 31. VCLT is clear, the supplementary means of interpretations under Art. 32 such as Travaux

Preparatories can still be used to establish conformity with such interpretations.⁴³

Based on the Travaux Préparatoires of ARRA, it can be considered that the obligation to recover and return the space object to the launching state under Art.5 ARRA is unconditional and absolute.⁴⁴

This can be reflected in the refusal by the United States and others to the USSR's contention of excluding space objects used for surveillance and intelligence gathering to be returned to the launching state.

During the period of Negotiations of ARRA, Art. 7 of the USSR's Proposal on rescue of Astronauts and spaceships making emergency landings, stated *"Space vehicles aboard which devices have been discovered for the collection of intelligence information in the territory of another state shall not be returned"*⁴⁵

This particular clause under Art. 7 was however subsequently removed in the revised USSR draft of the agreement.⁴⁶ This removal was due to the concerns of the U.S and other Western states over an absence of an arbitral clause that made them susceptible to endless difficulties in practice of it.⁴⁷ It did not however reflect the intention of parties to dilute the security aspects associated with the re-entry of a space object.

Another reason why these important substantive considerations were not elaborately discussed or implemented in the draft was because of the fast - tracked nature of adopting ARRA.⁴⁸

Thus, based on the General and Supplementary Interpretations of Art. 5, ARRA, it can be established that the obligation to return and recover a space object is absolute only when the situation demands a response to an unintentional or accidental landing upon re-entry and not in instances of performing surveillance or other

military activities in the airspace of another country during controlled re-entry.

3. Space Object: A Definitional Issue

Despite various scholars and jurists highlighting the importance and need for defining certain terms stated in the 5 main Space treaties, the definitional issue pertaining particularly to delimitation of air space and outer space and the term "space object" has continued until today. Previously, considering that international negotiation to formulate a definitive term was challenging and complex, States agreed upon definition of space object that would not require definitive classification⁴⁹. However, as private investments in the space sector are increasing, the further commercial and technological development and sustenance will be highly benefited by clarity and uniformity of law.

The Art 1, LIAB and Art. 1 REG states that the term "space object" includes component parts of a space object as well as its launch vehicles and parts thereof.

This expression is vague and lacks certainty as required in any definition. In International Law, two main approaches are devised to determine a space object: the Spatialist and the Functionalist Approach. While the Spatialist argument advances the point that where the atmosphere legally terminates the outer begins, the functionalist argument rejects a technical or arbitrary delimitation of airspace but delimits legal airspace from outer space by the character or nature of the activity regulation⁵⁰.

Some States have defined this term in their respective national space laws. The Space Activities Act of the Netherlands defines "space object" as any object

launched or destined to be launched into outer space⁵¹. The Australian Launches and Returns Act⁵² defines “space object” as (a) a launch vehicle (b) a payload (if any) that the launch vehicle is to carry into or back from an area beyond the distance of 100 km above mean sea level; or any part of such thing, even if: (c) the part is to go only some of the way towards or back from an area beyond the distance of 100 km above mean sea level; or (d) the part results from the separation of a payload or payloads from launch vehicle after launch. The Austrian law defines a “space object as an “object launched or intended to be launched into outer space, including its components”⁵³

A comparative analysis by Chistopher Hearsay⁵⁴ reviewed 33 National Space Laws, which yielded seven common definition elements surrounding the term “space object”: 1. object, 2. Intent to launch, 3. Launched, 4. Launch vehicle, 5. Payload, 6. Component parts and parts thereof and 7. Satellite

On examining the definition of the term “space object” under national space laws of various states, the term “space object” tends to be defined in relation to the element of launch and its functional aspects.

Even the definition provided by Bin Cheng as “a space object is a man-made object that is launched or intended to be launched into outer space,⁵⁵ highlights the element of launch.

Although various scholars, jurists and national space laws have undertaken to define the term “space object,” there is yet no consensus on an internationally accepted definition of the same.

(i) Interpreting the term “Space Object” in the light of ARRA:

Although ARRA does not define the term, it mentions “space object” together with the term “its component parts.” While no treaty defines the term “component parts,” Gorove states that the component parts of a space object would include all elements normally regarded as making up the space object, including fuel tanks, and even the fuel itself. Thus, any object without which the spacecraft would be regarded as incomplete, maybe taken to be a component part⁵⁶.

Since treaties are to be interpreted in good faith and in consonance of its objective and purpose wherein ordinary meaning is to be given to the terms of the treaty, it is essential to interpret the term “space object” in the context of ARRA as it triggers rights, and obligations concerning recovery and return of space objects and its component parts under Art.5.

As seen earlier, the definition of “space object” is linked to launch perspectives and focuses on when a space object becomes a space object. Keeping in mind the technological advancements concerning re-entry and potential maneuvering capabilities of space objects in airspace upon their re-entry, the question arises as when does a space object cease to be a space object considering the lack of clarity in the definition in the space treaties?

(ii) Aspect of Control or Maneuver in airspace upon re-entry: ceasing the space object as a space object

As stated earlier, the LIAB and REG state that space object includes component parts to the launch but neither the travaux preparatoires nor scholars agree which component parts remain a space object after launch. With the development of controlled re-entries, the space objects soon could be controlled and maneuvered in airspace for some time. If such objects continue to be defined as “space objects,” it would be

burdensome on the Contracting State to return such object if discovered in its territory, irrespective of the fact that such objects might be surveillance or military objects. Additionally, as Art.1 of the Chicago Convention affirms the pre-existing customary rule of international law that each state enjoys complete and exclusive sovereignty in air space above its territory⁵⁷, such object maneuvering in the air space upon its re-entry breaches such Contracting State's sovereign airspace.

(iii) Solution: Redefining such space objects as "aircrafts" upon their re-entry

When such objects are controlled or maneuvered in airspace upon their re-entry, they utilize the same air space as other commercial aviation and it is thus desirable to apply a unified regime of law to avoid further ambiguity and overlap of laws. In the 36th Session of UNCOPUOS, on a comprehensive analysis of the replies on possible issues with regards to aerospace objects, most States were of the view that both national and international air law were applicable. Further some States stated that norms of international and national air law would be applicable but only to aerospace objects capable of performing aeronautic maneuvers and such would be necessary by reason of national security and aerial safety⁵⁸. Some also opined that aerospace objects re-entering through air space could be subject to international air-traffic law. Previously some States, authors and scholars have advanced arguments that objects having hybrid mechanisms, i.e., capable of having characteristics of a space object while in outer space and that of aircrafts in airspace to be termed as "aerospace vehicles." Though the USSR attempted to define "aerospace object," this term at that point was not understood well and even today, there is no definition or criteria

stipulated to recognize any such object as "aerospace object" nor does any treaty mention the same. Thus, the authors, taking note of the complexity involved and pressing priority concerning this issue, propose to include such objects under the definition of "Aircrafts" under Annex 2 of the Chicago Convention.

The term Aircraft is defined as "any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the Earth's surface"⁵⁹.

The current regime of Air Law and Space Law were developed at a time when controlled re-entry mechanisms were not developed. However, the drafters did consider the need for standardizing air navigation procedures; the purpose and objective of the Chicago Convention, as reflected through its articles, is to create a unified and harmonious regime of safety and navigation of airspace. If the operation of such objects, without being subject to Chicago Convention, is permitted in airspace it would undermine the fundamental purpose of the Convention.

In fact, a proposal presented several years ago by the USSR, stated that a foreign space object maneuvered below 100-110 kilometers above mean sea level, should be subject to the permission of the State concerned and should be subject to that State's laws applicable to its airspace⁶⁰.

Taking a look at the current practice of few states concerning this issue, the United States has promulgated laws governing commercial space launches, vehicles, crew, and navigation, vesting jurisdiction in its Federal Aviation Administration (FAA), which has comprehensive jurisdiction over aircraft and aviation safety and navigation. In *Reinhardt v. Newport Flying Service Corp.*, Judge

Cardozo speaking for a unanimous court held that a hydroplane moored and anchored in navigable waters was a maritime “vessel” within the admiralty jurisdiction, rather than an aircraft. But he also pointed out that even a hydroplane, while in the air, is not subject to the laws of admiralty. Under the same reasoning, an aerospace vehicle might be considered a spacecraft while in outer space and an aircraft while airspace⁶¹. Furthermore, the German Aviation Code also specifies that “spacecraft, rockets and similar flying objects” are to be considered as aircraft while in airspace, and thus subject to the prevailing rules and regulations governing aircraft⁶².

(iv) No right of innocent passage:

It is pertinent to note that intentional maneuvers in airspace is different from falling of a space debris in airspace of a third-country and that the argument concerning the right of innocent passage would not be relevant as the object would be controlled or maneuvered, thus utilizing the airspace. Moreover, the right of innocent passage for spacecraft through the sovereign airspace is itself contested and many consider it as a proposal de lege ferenda (i.e., a legislative proposal not reflecting the existing law).

According to Terekhov, defunct space objects had a ‘right to fall down’ however, this does not extend to operational space vehicles to intentionally pass through foreign airspace during normal operations.⁶³

Additionally, an unconditional right of innocent passage through sovereign airspace does not exist even with respect to civil aircraft and is specifically subject to special authorization with respect to State aircraft and pilotless aircraft⁶⁴. Thus, the lack of consensus surrounding the right of innocent passage itself shows

that there is yet no customary international law or practice surrounding space objects, leave alone aircrafts or aerospace objects.

4. The way ahead:

Given the above instances, there is a need to overcome the problem concerning the definition of a space object by arriving at a uniform interpretation of “Space Objects.” It is also important to clarify various grey areas in the ARRA, e.g., whether a manned spacecraft used for surveillance upon controlled re-entry would be required to be recovered and returned?

As seen, although the comprehensive replies from States in various UN COPUOS sessions were concerned with the application of air law to “aerospace objects,” the intention of the States in accepting that air law is applicable for objects while in air space is to be noted. As International Space Law, ever since its development, has always been proactive and observing the current practices of states defining it as “aircrafts,” the authors argue that this practice be adopted before any agreement on controlled reentry regime is enacted and thereby ensure that no State or individual can take a disadvantage of the current legal lacunae. As Art 37 of the Chicago Convention confers ICAO the authority to formulate SARP addressing “such other matters concerned with the safety, regularity and efficiency of air navigation as may from time to time appear appropriate, the ICAO may include such objects which can be maneuvered or controlled upon its re-entry in airspace under the definition of “aircrafts.

Further, to address issues and concerns posed by Space based threats, an Open-ended working group on reducing space threats through norms, rules and principles of responsible behaviors (OEWG) was established in 2022.⁶⁵ So far, the OEWG has held 4

sessions and has become an important event for states to exchange mutual concerns as well as best practices to ensure transparency and confidence building in Outer Space.

States at the OEWG have raised the issue of risks posed by uncontrolled re-entries of space objects and some have argued that lack of transparency on the re-entry of objects into Earth's atmosphere also posed a threat, calling for greater transparency, communication and coordination.⁶⁶

Further there were recommendations by states to consult, seek consent in advance, and/or coordination when conducting a re-entry that affects other states.⁶⁷

In the future, the OEWG may also discuss the risk of surveillance or military activities performed by space objects upon controlled re-entries.

Further there is a need to develop a repository of best practices at the OEWG to handle instances of controlled re-entries that may pose security threats to states and to prevent subjectivity in the application of law, a framework of guideline containing responsible behaviors during the time of controlled re-entry of space objects must also be looked into.

It would not be difficult to identify best practices considering that there have been instances of states

seeking authorization of another state before performing re-entry of space objects.

For example, In August 2020, upon application, JAXA received the Authorization of Return of Overseas-Launched Space Object (AROLSO) by the Australian Government⁶⁸ for its re-entry of its sample return capsule of Hayabusa2.⁶⁹

Further states must also draft national legislations to govern the re-entry of foreign space objects in their airspace like the Space (Launches and Returns) Act 2018 of the Australian Government that mandates foreign states to receive prior approval before entering the Australian airspace.

Developing Norms and Responsible behavior in phases of controlled re-entry of a space object may facilitate in offering assistance to instances that may genuinely require assistance, recovery and return and may lead to the development of space exploration and realization of its benefits. Importantly development of such norms or best practices may reduce the subjectivity in the application of the International Space treaties and national regulations and will help in distinguishing genuine/ bona fide instances of re-entries of space objects that require assistance from those that may threaten the security and sovereignty of a state.

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² Reducing risks from uncontrolled reentries of rocket bodies and other space objects, Outer Space Institute (December 19, 2022) *available at* [https://outerspaceinstitute.ca/docs/OSI%20Open%20Letter%20on%20Uncontrolled%20Reentries\(19_12_2022\).pdf](https://outerspaceinstitute.ca/docs/OSI%20Open%20Letter%20on%20Uncontrolled%20Reentries(19_12_2022).pdf) >

³ Convention on International Liability for Damage Caused by Space Objects, D.S.- Gr. Brit.-U.S.S.R., Mar. 29, 1972, 24 U.S.T. 2389 [hereinafter LIAB]

⁴ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, *entered into force* Oct. 10, 1967, art. 6, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter OST]

⁵ Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched Into Outer Space, *entered into force* Dec. 3, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 [hereinafter ARRA]

⁶ Pentagon Press Secretary Brig. Gen. Pat Ryder Holds an On-Camera Press Briefing, U.S Dept of Defense, (February 3, 2023) *available at* <<https://www.defense.gov/News/Transcripts/Transcript/Article/3288141/pentagon-press-secretary-brig-gen-pat-ryder-holds-an-on-camera-press-briefing/>>

⁷ Art. VIII, OST

⁸ Art. 5, ARRA

⁹ Debris Re-entry, Astro materials Research & Exploration Science NASA Orbital Debris Program Office *available at* <<https://orbitaldebris.jsc.nasa.gov/reentry/>>

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¹³ *ibid* Guideline B.9, LTS Guidelines

¹⁴ *Ibid* Guideline D.2, LTS Guidelines

¹⁵ ESA announces the Zero Debris Charter initiative, The European Space Agency (June 22, 2023) *available at* <<https://esoc.esa.int/esa-announces-zero-debris-charter-initiative>>

¹⁶ *Supra* (n.10) *Controlled Reentry Experiment of Megha-Tropiques-1*

¹⁷ Aeolus: a historic end to a trailblazing mission, European Space Agency (July 29, 2023) *available at* <https://www.esa.int/Applications/Observing_the_Earth/FutureEO/Aeolus/Aeolus_a_historic_end_to_a_trailblazing_mission>

¹⁸ Background, Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space p.1 [hereinafter SD Guidelines, 2007]

¹⁹ *See* Peter Layton, Chinese grey zone spy balloons over the American heartland, The Interpreter Lowy Institute (February 6, 2023) *available at* <<https://www.lowyinstitute.org/the-interpreter/chinese-grey-zone-spy-balloons-over-american-heartland>>

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²⁵ MARK E VILLAGER, COMMENTARY ON THE 1969 VIENNA CONVENTION ON THE LAW OF TREATIES 428 (2009)

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