

THE USE OF OUTER SPACE FOR MILITARY PURPOSES:

Article IV of the Outer Space Treaty

by

SEÁN HARRY STRIJDOM

submitted in accordance with the requirements for the
degree of

MAGISTER LEGUM

at the

UNIVERSITY OF PRETORIA

SUPERVISOR: PROF DR STEPHAN HOBE

2013

THE USE OF OUTER SPACE FOR MILITARY PURPOSES:

Article IV of the Outer Space Treaty

Abstract

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, (hereinafter referred to as the Outer Space Treaty) was signed in 1967, and it came into force later in the same year. The Outer Space Treaty deals with activities that occur in outer space, and regulates the operations of states in the area beyond Air Law. The Treaty is considered to be a successful and widely accepted treaty with one hundred and two parties.

Article I of the Treaty gives the freedom of exploration and use of outer space, and it stipulates that every state may explore and use outer space in the interests of all countries. It further stipulates that outer space shall be the province of mankind. This article is, therefore, the general starting point and overall ‘freedom of space’ article in the treaty.

The Treaty then continues to give exceptions and conditions to the provision in Article I. For example, Article II states that outer space is not subject to appropriation, and Article III states that the exploration and use of outer space must be done in accordance with International Law as well as “in the interest of maintaining international peace and security and promoting international cooperation and understanding.” The concentration of this paper will be on Article IV which deals broadly with the military use of outer space.

Article IV stipulates, in its first paragraph, that state parties may not place any Weapons of Mass Destruction, such as nuclear weapons, in orbit around the earth. Weapons of Mass Destruction may also not be installed or stationed in outer space in any way. This paragraph, although short, has created many debates and discussions on its exact content. This paragraph will be discussed in light of the current views on the military use of space. The restrictions will be evaluated and the activities that are not expressly prohibited will also be analysed.

Paragraph two of Article IV proclaims that the Moon may be used only for peaceful purposes and that the establishment of military bases or fortifications is prohibited. The paragraph further stipulates that no testing of weapons or military manoeuvres may occur on the Moon. This paragraph deals exclusively with the military use of the Moon or other Celestial bodies.

Together, the two paragraphs of Article IV create the limitations on the exploration and use of space. The problem arises when one attempts to apply these provisions, because they are much like the rest of the Outer Space Treaty, broadly drafted and with no definitions of key terms.

This paper will discuss the interpretation and application of Article IV and illustrate the shortcomings and achievements of the Article. The Treaty will be evaluated in the context of other current legal instruments, and the practices of a number of countries will be examined to show the current standpoint and relevance of Article IV of the Outer Space Treaty.

Table of Contents

Abstract	3
Table of Contents	4
Chapter One: Introduction	6
1.1 History	6
1.2 Background Information	6
1.3 Problem Statement	9
1.4 Delineation and Limitations	10
1.5 Structure of Dissertation	10
Chapter Two: The Outer Space Treaty: an overview	11
2.1 Introduction	11
2.2 Purpose	11
2.3 Summary	12
Chapter Three: Article IV of the Outer Space Treaty: Content and Evaluation	15
3.1 Content	15
3.2 Meaning and Interpretation	15
Chapter Four: A hypothetical application of Article IV and the Outer Space Treaty	20
4.1 Introduction	20
4.2 Application of Article IV in three scenarios	20
4.3 Conclusion	22
Chapter Five: The Outer Space Treaty in Context of Other Current Legal Instruments	24
5.1 Introduction	24
5.2 Other space treaties	24
5.3 Other Treaties	27
5.4 Practices	30
5.5 Conclusion	32
Chapter Six: General Conclusion and Recommendations	34
6.1 Summary of findings	34
6.2 Additional Instruments to assist Article IV	35
6.3 Permissibility of Military Activities in Outer Space	35
6.4 Conclusion	36
Bibliography	38
Primary sources	38
Treaties, Conventions and Resolutions	38
UN Conferences	39

Foreign Policies and Laws	39
Domestic Policies and Legislations.....	39
Secondary sources	39
Books.....	39
Journal Articles	40
Other	41

Chapter One: Introduction

1.1 History

In August 1957, the Union of Soviet Socialist Republics (USSR) launched the first Intercontinental Ballistic Missile (ICBM), the R-7 Semyorka. The missile entered the Earth's atmosphere and travelled an astonishing distance of 6000km before completing its flight.¹ Two months later, in October 1957, the first artificial satellite, Sputnik I, was launched by the USSR and began to orbit the Earth.² At the time this seemed an unbelievable feat. No one could imagine the implications of achieving the placement of a satellite in outer space. The success of the Russian's ICBMs and satellites surprised the United States of America (USA) and caused them to intensify their efforts in their space programme.³ So began the space race, the race to place a man on the moon. A mere four years later the first human, Yuri Gagarin from the USSR, entered the Earth's orbit and successfully completed a space flight, making a full orbit of the Earth.⁴

The relationship between the USA and the USSR was a fragile one. From the end of the Second World War, the two world super powers became engaged in a cold war.⁵ Tension between the states was palpable to the extent that any achievement by the one state was viewed by the other as an attack on its success. Nowhere was this more evident than in the space race and the contest of placing objects into outer space. The competition between the two states became so heated and embroiled that it was unusual and, for many, unexpected when they both agreed to the drafting of the Outer Space Treaty in December 1966.⁶

1.2 Background Information

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, (hereinafter referred to as the Outer Space Treaty) was signed in 1967,⁷ and it came into force later in the same year. The Outer Space Treaty deals with activities that occur in

¹<http://www.energia.ru/english/energia/launchers/rocket-r7.html> accessed 22.10.2013.

²<http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1957-001B> accessed 22.10.2013.

³Hobe S, Schmidt-Tedd B, Schrogl K (hereinafter Hobe S *et al*) "Cologne Commentary on Space Law Volume I" (2009) Carl HeymannsVerlag, Cologne at pg3 (hereinafter Hobe S *et al* CoCoSL 22009)

⁴Siddiqi, Asif A (2000). *Challenge to Apollo: The Soviet Union and the Space Race, 1945–1974*. Washington, D.C.: NASA.

⁵See *inter alia* Gaddis JL *The Cold War: A New History* (2005) Penguin Press.

⁶UNGA 1499th plenary meeting, 19 December 1966.

⁷*Id*

outer space and regulates the operations of states in the area beyond Air Law. The treaty is considered to be a successful and widely accepted treaty with one hundred and two parties and twenty six signatories⁸

One of the reasons for the success of the Treaty was that both the USA and the USSR realised that, if space was allowed to be used for military purposes, it would create risks and threats that neither one of them could possibly deal with or even imagine at the time.⁹ It was, therefore, agreed that Article IV in the Outer Space Treaty would specifically address the issue of the military uses of outer space and protect the neutrality of the Moon and all other celestial bodies. The whole Outer Space Treaty was drafted in a manner that has been likened to an arms control treaty¹⁰ which, given the political climate at the time, was not unexpected. Throughout the Treaty, provisions make reference to “the interest of all countries”, “the¹¹ province of all mankind”, “freedom” and “co-operation”¹² as well as “maintaining international peace”¹³ and “peaceful purposes”.¹⁴

Now, more than forty five years later, the provisions of the Outer Space Treaty have been interpreted, discussed, and debated countless times, often on topics that the drafters could never have imagined or predicted. One of the most hotly debated articles is Article IV which deals explicitly with the military use and exploitation of outer space. Almost every Article has, however, been interpreted at some stage.

Article I of the Treaty gives the freedom of exploration and use of outer space, and stipulates that every state may explore and use outer space in the interests of all countries. It further stipulates that outer space shall be the province of mankind. It provides that outer space is *res communis* and cannot belong to anyone person. This article is, therefore, the general starting point and overall ‘freedom of space’ article in the treaty.

The Treaty then continues to give exceptions and conditions to the provision in Article I. For example, Article II states that outer space is not subject to

⁸ For a summary of the status of the treaty go to <http://www.oosa.unvienna.org/oosa/SpaceLaw/treatystatus/index.html> accessed 11.04.2013.

⁹ *Supra* fn3.

¹⁰ Kopel V “Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space” (2008) United Nations Audiovisual Library of International Law Including the Moon and Other Celestial Bodies.

¹¹ Hobe S *et al* “Cologne Commentary on Space Law Volume I” (2009) Carl Heymanns Verlag, Cologne at pg72.

¹² Outer Space Treaty 1966 Article I.

¹³ *Ibid* at Article III.

¹⁴ *Ibid* at Article IV.

appropriation or any claims of sovereignty. Article III then states that the exploration and use of outer space and the Moon must be done in accordance with International Law as well as “in the interest of maintaining international peace and security and promoting international cooperation and understanding”.¹⁵

Article IV stipulates, in its first paragraph, that state parties may not place any Weapons of Mass Destruction, such as nuclear weapons, in orbit around the earth.¹⁶ Weapons of Mass Destruction may also not be installed or stationed in outer space in any way. This paragraph, although short, has created many debates and discussions relative to its exact content.

Paragraph two of Article IV proclaims that the Moon may be used only for peaceful purposes and that establishing military bases or fortifications is prohibited. The paragraph further stipulates that no testing of weapons or military manoeuvres may occur on the Moon. This paragraph deals exclusively with the military use of the Moon or other Celestial bodies.

Whereas Article I grants freedom of use and exploration of space, Article IV limits this to peaceful purposes only and specifically restricts the placement of nuclear weapons in orbit around the earth and also the fortification of the Moon.

Article IV contains two provisions, one deals with the placement of nuclear, or other, weapons of mass destruction in orbit around the Earth, and the another one deals with the fortification or establishment of military bases on the Moon. The exact context and interpretation of this Article of the Outer Space Treaty is the topic of this paper. It will be shown that Article IV of the Outer Space Treaty is a fundamental and vital piece of International Law, without which the Space law regime would be missing a crucial regulation.

Since the beginning of the space age, the military use of space has been of vital interest to all states.¹⁷ The vast array of uses that satellites bring to the military field range from communication to reconnaissance and has completely changed the manner in which military operations are performed. Indeed, it is now impossible to imagine any military operation being performed without the use of satellites or any other utilisation of outer space. The once exclusively military sphere occupied by

¹⁵ *Ibid* at Article III.

¹⁶ *Ibid* at Article IV.

¹⁷ Hobe S et al, “Cologne Commentary on Space Law (Volume 1): Outer Space Treaty” at pg 3.

satellites has, however, recently opened up so that commercial and private satellites become more prominent every day.¹⁸ Today life as we know it is completely impossible without the use of satellites. Communications, broadcasts, navigation, and weather are handled by satellites. Many satellites have, thus, developed a dual role, with both military and non-military functions.¹⁹

It is surprising then that, since the inception of the provisions of the Outer Space Treaty, Article IV and the regulations on the military exploitation of outer space have not once been contravened.²⁰ No state has ever attempted to place a Nuclear weapon in orbit in space or to use any portion of any celestial bodies for military fortifications or bases. The most controversial occurrence related to the military use of outer space has been the placement and testing of conventional weapons in outer space.²¹

Finally, it is important to remember that like all law, International law should never be considered in isolation. In this regard, the Outer Space Treaty should be read in conjunction with the UN Charter²² as well as other space law legal instruments, namely the Rescue Agreement²³, The Liability Convention²⁴, the Registration Convention²⁵, and the Moon Agreement²⁶. The Antarctic Treaty²⁷ and the Partial Test Ban Treaty²⁸ can both be viewed as sources of inspiration for the Outer Space Treaty, and when compared with it can often be regarded as being the direct sources from which provisions for the Outer Space Treaty were taken.²⁹

1.3 Problem Statement

Article IV is an important Article in the Outer Space Treaty and the reason, to many, for the existence and formulation of the Outer Space Treaty.³⁰ It regulates the military aspects of outer space and limits the activities that may be carried out in

¹⁸*Ibid* at pg9.

¹⁹*Id.*

²⁰*Ibid* at pg 71.

²¹For a discussion of the most controversial of such tests see Sieff M “China Officially Announces Anti Satellites Test Successful” United Press International (Washington DC) 24 January 2007 at http://www.spacewar.com/reports/China_Officially_Announces_Anti_Satellite_Test_Successful_999.html.

²²Charter of the United Nations and Statute of the International Court of Justice, 1945.

²³The 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space.

²⁴The 1972 Convention on International Liability for Damage Caused by Space Objects.

²⁵The 1975 Convention on Registration of Objects Launched into Outer Space.

²⁶The 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies.

²⁷Antarctic Treaty adopted 1 December 1959.

²⁸Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water adopted 5 August 1963.

²⁹For example Article I of the Antarctic Treaty 1959.

³⁰Institute Of Air And Space Law, Faculty Of Law, McGill University “*Background Paper: Peaceful And Military Uses Of Outer Space: Law And Policy*” (2005).

outer space and also on celestial bodies. This paper evaluates Article IV's limitations and allowances whilst considering the general question of which military activities are permissible in outer space and on celestial bodies.

Together, the two paragraphs of Article IV create the limitations on the exploration and use of space. The problem arises when one attempts to apply these provisions because they are much like the rest of the Outer Space Treaty, broadly drafted and with no definitions of key terms. This paper will discuss the interpretation and application of Article IV and illustrate the shortcomings and achievements of the Article.

1.4 Delineation and Limitations

The military use of outer space is regulated by many multilateral and bilateral treaties as well as policies, internal legislation, and state practices. Attention will be given to the multilateral treaties drafted by the Committee on the Peaceful Uses of Outer Space, a number of directly applicable multilateral treaties, and two bilateral treaties between the USA and USSR. The general practice of Russia, USA, China, the European Community and South Africa only will, furthermore, be addressed.

This paper will not address the demilitarisation treaties or any treaties relating to the prohibition of the proliferation of nuclear weapons on Earth.

1.5 Structure of Dissertation

This dissertation is divided into six chapters. Chapter One is the Introduction in which the topic is introduced, research objectives stated, and problem statement discussed. Chapter Two provides a brief overview of the Outer Space Treaty.³¹ Chapter Three will discuss the content and meaning of Article IV of the Outer Space Treaty. Chapter Four then deals with the application of Article IV and Chapter Five with the Article IV in the context of other legal instructions. Finally, Chapter Six concludes the paper and attempts to answer the problem statement.

³¹Outer Space Treaty 1966.

Chapter Two: The Outer Space Treaty: an overview

2.1 Introduction

The Outer Space Treaty was drafted in a time when space travel and the exploration of outer space had become a very sudden reality. Technology had evolved much more quickly than the law, and states found that few regulations governed the use of outer space and its exploration.^{2.1 History}

When the USSR launched the first ICBM in August 1957, states around the world, and the USA in particular, realised that the use of space for military purposes had become a real and apparent threat. It was largely in response to the launching of small satellites³² and the knowledge of ballistic missiles which could enter the earth's atmosphere that the United Nations General Assembly (UNGA) passed a resolution in 1958³³ addressing the peaceful uses of outer space. It was stipulated that outer space should be used exclusively for peaceful purposes. At the time, humans had not entered outer space³⁴ and could not reasonably fathom all the uses and implications attached to the exploration of outer space. The resolution was broadly phrased and referred to the "common interest of mankind in outer space"³⁵ and "the common aim that outer space be used for peaceful purposes only"³⁶. The defining feature and lasting legacy of this resolution was the establishment of the *ad hoc* Committee on the Peaceful Uses of Outer Space (COPUOS). COPUOS was later established permanently in 1959.³⁷ Following an increase in pressure from states, particularly the USA and USSR, the Outer Space Treaty was formulated.³⁸ In 1966, the UNGA eventually adopted the Outer Space Treaty as it stands today.³⁹

2.2 Purpose

The preamble to the Outer Space Treaty describes the purpose of the treaty sufficiently when it states that the state parties to the treaty recognise "the common interest of all mankind in the progress of the exploration and use of outer space for

³²For example Sputnik 1 in 1957 and Explorer 1 in 1958.

³³UNGA resolution 1348 (XIII) of 13 December 1958.

³⁴ Only in April 1961 did the first human travel to outer space with the Vostok 1 carrying Yuri Gagarin.

³⁵UNGA resolution 1348 (XIII) of 13 December 1958 Preamble.

³⁶*Id.*

³⁷UNGA resolution 1472 (XIV) of 12 December 1959.

³⁸United Nations Committee on the Peaceful Uses of Outer Space "Draft Treaty Governing the Exploration of the Moon and Other Celestial Bodies".

³⁹UNGA resolution 2222 (XXI) of 19 December 1966.

peaceful purposes” and, further, “that the exploration and use of outer space should be carried on for the benefit of all peoples irrespective of the degree of their economic or scientific development”⁴⁰.

Both major space super powers at the time, the USA and the USSR, realised that ensuring the peaceful use of outer space would be to their mutual benefit. This concept is one of principal purposes of the Outer Space Treaty and features in the Treaty on many occasions. ‘Peaceful’ or ‘Peace’ is mentioned four times in the preamble, once in Article III, three times in Article IV, twice in Article IX, and once in Article XI. It is, therefore, simple to conclude that the peaceful use of outer space is a theme that runs through the entire treaty.⁴¹

A second purpose of the Outer Space Treaty is to ensure a fair, free, and non-discriminatory approach to space exploration in addition to a spirit of cooperation regarding the use of space.⁴² The Outer Space Treaty makes many specific provisions regarding the sharing or cooperative use of outer space. An example in Article I where the treaty states that “there shall be freedom of scientific investigation in outer space...” and, further in Article X, where the treaty confirms that “in order to promote international co-operation in the exploration and use of outer space” state parties to the treaty will consider the issue on the basis of equality.

2.3 Summary

Although some authors have, over the years since the introduction of the Outer Space Treaty, referred to the treaty as an arms control treaty⁴³, the true nature, intention, and implications of the treaty surpass those of an arms control treaty. At the time of its creation, the primary concern over the use and exploration of outer space may have been its military implications and its threat to the delicate political status of Earth during the cold war, but the treaty manages to deal with the military concern rather succinctly and efficiently. From the very first resolutions passed by the UNGA until the final product we now have, the central theme has always been the peaceful use of outer space. Many different facets of ‘peaceful use’ exist in the treaty, and so arms control is but a minor part of the greater structure of the treaty. The treaty

⁴⁰Outer Space Treaty 1967 Preamble.

⁴¹See Institute of Air and Space Law, Faculty of Law, McGill University “Background Paper: Peaceful and Military Uses of Outer Space: Law and Policy” (2005).

⁴² See especially Article I, Article IX, Article X and Article XI.

⁴³See *inter alia* Kopel V “Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space” (2008) United Nations Audiovisual Library of International Law Including the Moon and Other Celestial Bodies.

attempts to describe broadly as many situations as the formulating states could at that time envisage

Apart from Article I and Article X discussed above, the treaty states in Article II that outer space is not open to appropriation, sovereignty, or control by any state. Article III further stipulates that states shall conduct all activities in outer space with the interest of maintaining international peace and security.⁴⁴

With one hundred and two parties and twenty signatories, the Outer Space Treaty is generally regarded as a successful and effective legal instrument which has to date had no major contraventions. In fact, there are only two main criticisms of the Outer Space Treaty commonly raised.

The first issue revolves around the treaty's lack of meaningful environmental protection and debris control mechanisms, while the second concerns the treaty's lack of definitions. Both of these issues may be addressed by interpreting the treaty. Articles I, III, VI, VII, VIII and IX all contain provisions which may be construed as supporting the protection of the environment. Article I refers to the "benefit and interest of all countries" a term which could imply that a state should conduct itself in a courteous manner and refrain from polluting outer space. Article III mentions that states shall conduct activities in outer space "in accordance with international law" and, therefore, one may assume that all international law principles relating to environmental protection would, therefore, be applicable. Articles VI and VII both deal with the liability of states for damage or other harm which transpires as a consequence of one of their space objects, and it places responsibility on the liable launching state to comply with safety and legal rules.⁴⁵

The second criticism centres on the Treaty's interpretation and the definition of some of the words and phrases found in the Treaty's provisions. The treaty's lack of definitions leads to the greatest debate as interpretations vary from state to state. One must, however, note that, when interpreting the Outer Space Treaty, one needs to follow the general rules of treaty interpretation stated in the Vienna Convention on the Law of Treaties (VCLT).⁴⁶ These rules include, *inter alia*, interpretation in good

⁴⁴Article III Outer Space Treaty.

⁴⁵Hobe S *et al* *CoCoSL 2009* pg 79-85 for interpretation discussion

⁴⁶Article 31 Vienna Convention on the Law of Treaties 1969.

faith in context and with cognisance of its object and purpose,⁴⁷ subsequent agreements between the parties⁴⁸, and subsequent application of the treaty.⁴⁹ Although these provisions in the VCLT clarify a number of issues in the Outer Space Treaty, they cannot resolve all the situational issues and issues of interpretation that arise.

The Outer Space Treaty has been influential in the development of International Law and all Space Law related legislation, policies, and regulations ever since its adoption in 1967. Almost all the Articles have set instrumental and pioneering regulations each regarding a specific Space Law issue, none more so than Article IV which regulates, and sets essential base rules, for the military activity in outer space. Always a contentious issue, the military use of outer space is often the main cause of debate when reviewing the Outer Space Treaty.

⁴⁷*Id*

⁴⁸*Ibid* at Article 31(3) (a).

⁴⁹*Ibid* at Article 31(3) (b).

Chapter Three: Article IV of the Outer Space Treaty: Content and Evaluation

3.1 Content

The Outer Space Treaty Article IV reads:

States Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner.

The Moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the Moon and other celestial bodies shall also not be prohibited.

It is clear that Article IV contains two provisions. The first provision focuses on Weapons of Mass Destruction, including nuclear weapons, and their placement in space and in orbit around the earth. The second provision contains prohibitions and stipulations focused on the Moon and other celestial bodies. Broadly speaking, it stipulates that the Moon and all other celestial bodies are to be used exclusively for peaceful purposes. These two provisions have together been referred to as the Outer Space Treaty provisions on the military use of outer space. Together the two paragraphs of Article IV create limitations on the exploration and use of space and restrict the military uses of outer space.

3.2 Meaning and Interpretation

The first provision stipulates that state parties may not place any Weapons of Mass Destruction, such as nuclear weapons, in orbit around the earth.⁵⁰ Weapons of Mass

⁵⁰Article IV of the Outer Space Treaty.

Destruction may also not be installed or stationed in outer space in any way.⁵¹ This paragraph, although short, has created many debates and discussions with reference to its exact content. Since the Treaty contains no definitions, it is debateable which weapons are Weapons of Mass Destruction and which are not. Interpretations vary, and many journal articles exploring the different concepts have been printed.⁵² The interpretations range from ‘Weapons of Mass Destruction means only nuclear weapons’ to ‘Weapons of Mass Destruction includes any weapon which is created or may through use cause mass destruction, damage, or loss of life’.⁵³ Suffice it to say that the interpretation of the first provision of Article IV of the Outer Space Treaty has many different implications. It is also important to note that the other words which create debate about the first provision of Article IV are “orbit around”. ICBMs make use of the earth’s orbital curve to reach distances not normally obtainable by conventional missiles. These weapons, however, never complete a full orbit of earth and so many have dismissed this occurrence as not constituting ‘orbit around the Earth’. Certainly many ICBMs may be regarded as Weapons of Mass Destruction but fall short of the proviso “orbit *around* the Earth” (own emphasis added).

The concept of “orbit around the Earth” has been contentious ever since the introduction of the Outer Space Treaty. In the draft Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects⁵⁴ introduced by the Russian Federation and China at the Conference on Disarmament on 29 February 2008⁵⁵, a broad definition was given intending to assist in understanding the term “orbit around the Earth”. This treaty in Article I (d) states that, “A weapon shall be considered to have been ‘placed’ in outer space if it orbits the Earth at least once, or follows a section of such an orbit before leaving this orbit, or is permanently located somewhere in outer space”. Although the term “orbit around the Earth” is not defined, the definition indicates that circling the Earth once or even following a section of an orbit before leaving is sufficient for this purpose. If such an interpretation is applied to the Outer Space treaty term “orbit

⁵¹*Id.*

⁵²See for instance David P. Fidler, "Weapons of Mass Destruction and International Law" (February 2003), American Society of International Law; Carl F Hylin, "Stemming The Arms Race In Outer Space: Suggested Revisions Of The Outer Space Treaty Based On Three Successful Arms Control Measures" 16 Cal. W. Int'l L.J. 118 1986 and Thomas Graham, "The Law and the Military use of Outer Space" in *Safeguarding Space for All* UNIDIR.

⁵³ David P. Fidler, "Weapons of Mass Destruction and International Law" (February 2003), American Society of International Law.

⁵⁴ Known as the PPWT

⁵⁵CD/1839 29 February 2008

around the Earth”, then ICBMs and similar weapons would, through travelling along a portion of an orbital line, be construed as orbiting. It is doubtful, though, that this was the intention of the parties at the time of the signing of the treaty.

There is also no direct ban on ASAT weapons in the Outer Space Treaty, although ASAT weapons would ideally need to conform to the other articles in the Outer Space Treaty. An example of this is Article VII wherein it is stipulated that the launching state of a space object remains liable for that object and occurrences which arise owing to that object’s presence in outer space. Article II also places an obligation on state parties to conform to international law and “act in the interest of maintaining international peace”. The article also makes no provision for nuclear-powered satellites, which could seemingly become nuclear weapons if they fell to earth. Nuclear-powered satellites are a real threat as shown by the 1978 crash down of Cosmos 954 in North-western Territories, Canada. The Soviet satellite fell to Earth in a remote area of Canada. No deaths were caused, but the area was contaminated with nuclear fallout.⁵⁶

Nuclear-powered satellites appear to be permissible in terms of the Outer Space Treaty,⁵⁷ so long as their purpose is to operate as a satellite and not as a Weapon of Mass Destruction. This means that, as long as the satellite uses the nuclear energy for power or movement and not as a weapon, it will be permissible in outer space.

Another problem that this provision creates is that it explicitly excludes only Weapons of Mass Destruction from being placed in orbit around the earth. This means then that weapons that are not Weapons of Mass Destruction may be placed in orbit around the Earth. Another allowance relating to Weapons of Mass Destruction concerns the testing of such weapons in outer space. According to the Outer Space Treaty, Weapons of Mass Destruction may be tested in outer space on condition that the tests are not conducted on the Moon or any other Celestial body.⁵⁸

Paragraph two of Article IV deals with the Moon and other Celestial bodies. When reference is made to the Moon in the Outer Space Treaty it is almost always the intention to include all celestial bodies as well. This procedure will be followed unless

⁵⁶ THE LIFE AND DEATH OF COSMOS 954 by Gus W. Weiss accessed 14.04.13 at <http://www.loyola.edu/departments/academics/political-science/strategic-intelligence/intel/cosmos954.pdf#search=%22cosmos%22>. See also the Use of Nuclear Power Sources Treaty.

⁵⁷ *Id.*

⁵⁸ Thomas Graham, “The Law and the Military use of Outer Space” in *Safeguarding Space for All* UNIDIR.

specifically stated otherwise. The second paragraph of Article IV proclaims that the Moon may be used only for peaceful purposes and that establishing military bases or fortifications on it is prohibited. The paragraph further stipulates that no testing of weapons or military manoeuvres may occur on the Moon. This paragraph deals exclusively with the military use of the Moon or, as mentioned, other Celestial bodies.

The prohibitions on establishing a military base, installation, or fortification on the Moon specifically restrict such structures from being placed on the surface of the Moon and not anywhere else in outer space. It is, therefore, permissible to have a fortification, installation, or military base on a satellite or space station.⁵⁹ The functions of military satellites may range in nature from reconnaissance or navigation to communications or weaponry, with the exclusion of weapons of mass destruction.

The testing of any type of weapon, not just Weapons of Mass Destruction, and military manoeuvres on a celestial body are also expressly prohibited in terms of Article IV. It is abundantly clear from this provision that all weapons, conventional and those of mass destruction, are not permitted to be tested on the Moon. Military manoeuvres refer to the deploying or moving of military units. Broadly speaking, this means that no celestial bodies are available for military purposes but, narrowly, there are some exceptions.

The use of the word 'peaceful' rather than 'non-military' has caused a debate over the true intentions of the Article. For example, does the word 'peaceful' mean 'non-military' or 'non-aggressive'?⁶⁰ It is almost universally accepted that the drafters intended the word 'peaceful' to mean 'non-military' and not, as is sometimes contended by the USA in particular⁶¹, 'non-aggressive'. The difference may be subtle but 'non-aggressive' allows for far more activities than 'non-military'. For example, this means that Space may be used for military purposes as long as there is no aggression or threat or use of force.⁶² The supporters of the contention that non-

⁵⁹ See Erickson L "Space Flight: History, Technology and Operations" pg 413 for a discussion on the Russian 'Almaz' program and the 'Salyut' military space stations.

⁶⁰ Bin Cheng "Military Use of Outer Space: Article IV of the 1967 Space Treaty Revisited" in Cheng CJ and Kim DH (eds) "The Utilisation of the World's Air Space and Free Outer Space in the 21st Century".

⁶¹ Heintze HJ "Peaceful Uses of Outer Space and International Law" and I. Vlastic, "The Legal Aspects of Peaceful and Non-Peaceful Uses of Outer Space" in B. Jasani, ed., *Peaceful and Non-Peaceful Uses of Space. Problems of Definition for the Prevention of an Arms Race* (New York, NY: Taylor & Francis, 1991).

⁶² Article 2(4) of the UN Charter.

military is the correct interpretation cite as substantiation the Statute of the International Atomic Energy Agency which differentiates peaceful from military uses on the basis that all military uses are non-peaceful. The proponents of the second interpretation, that peaceful means 'non-aggressive', refer to Article III of the treaty in which all International Law, and, therefore, the UN Charter, is made applicable to Space Law thus recognising defensive military action as legal.⁶³The main contention with regard to this interpretation is the inclusion of the word 'exclusively' which seems to indicate a distinct desire and intention to exclude all military activity.

The final two sentences in Article IV state that, "The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited" and further that, "The use of any equipment or facility necessary for peaceful exploration of the moon and other celestial bodies shall also not be prohibited." These two sentences were inserted almost directly from the Antarctic treaty, apart from a few stylistic changes. The reason for these provisions is to ensure that states continue to explore and advance the studies of the Moon and other celestial bodies without the fear of violating the anti-military terms of the Outer Space Treaty. The discretion of the states is left wide open with the wording of the last two sentences as no definition of 'peaceful exploration' or 'necessary' exists.

⁶³Jasentuliyana N "Space Weapons and International: A Critique of Existing Treaties" 1985 in "An Arms Race in Outer Space: Could Treaties Prevent it?" McGill Centre for Research of Air & Space Law.

Chapter Four: A hypothetical application of Article IV and the Outer Space Treaty

4.1 Introduction

Being such a successful treaty and being applicable to more and more situations everyday as technology become cheaper and more accessible means that the Outer Space Treaty has profound applicability in relation to modern International Law.⁶⁴ Although Article IV of the Outer Space Treaty set the ground work for the regulation of the military uses of outer space, the subsequent treaties and agreements developed its foundation and clarified the issues left vague by Article IV.

Article IV has, since its acceptance in 1966, never been transgressed. This in itself is a crowning achievement for a treaty forty-five years old. Add to the success of the Outer Space Treaty the fact that Article IV has successfully ensured that the few visits to the Moon have been for exclusively peaceful or explorative purposes. Article IV has, however, needed to be supplemented throughout the years or informed by bilateral and multilateral treaties. The provisions of the Moon Agreement are a prime example of the development to Article IV needed in order to obtain a completely military-free, or at least nuclear-free, outer space.

4.2 Application of Article IV in three scenarios

Read collectively, the provisions relating to the military use of outer space regulate the placing of nuclear weapons and other weapons of mass destruction in orbit around the earth and moon, the testing of such weapons in outer space, the peaceful use of the Moon, and the ban on the fortification of celestial bodies. The peaceful use of the Moon is secured by both the Moon Agreement and the Outer Space Treaty.⁶⁵

Upon reflection, one notices that three distinct models of military Space law may exist, namely through the enactment of the Outer Space Treaty, the present situation, and the ideal scenario.

At the concluding of the Outer Space Treaty, Space Law was still very much in its infancy and consisted of only a few multilateral and bilateral treaties. Since space exploration and travel was still in its formative years, no established practice had yet

⁶⁴Freeland S “In Heaven as on Earth? The International Legal Regulation of the Military Use of Outer Space” 2011

⁶⁵For a discussion see Qizhi H “The Outer Space Treaty in Perspective” 1997

developed. NASA had only recently been established, and bilateral treaties between the USA and USSR formed the basis of the space law structure. This meant that the Outer Space Treaty came into being as a revolutionary regulation of outer space activities. The only comparable treaty discussed previously at the time of the enactment of the Outer Space Treaty is the Partial Test Ban Treaty of 1963. This means that, with the enactment of the Outer Space Treaty in 1966, the military use of Space was regulated by both Article IV of the Outer Space Treaty and Article I of the Partial Test Ban Treaty. Practically this meant that states were prohibited from conducting tests or other explosions of nuclear weapons in space, from placing Weapons of Mass Destruction, including Nuclear weapons, in orbit around the Earth, from establishing military bases, fortifications, or installations on the Moon and from using the Moon for non-peaceful purposes.

The second scenario of applicability is the present situation where the Outer Space Treaty is supplemented by the collection of bilateral and multilateral treaties that have been passed since 1966. These include the ABM Treaty, the Liability Convention, the Registration Convention, the Use of Environmental Modification Techniques Convention, SALT II Treaty, and the Moon Agreement. The present situation is, however, not without its shortfalls, such as the failure of the Moon Agreement and the flaws of the ABM Treaty. The full application and use of the applicable legal instruments is discussed elsewhere in this paper, but it may be held that each subsequent legal instrument attempts to provide consistency where the Outer Space Treaty or any other applicable treaty did not. The present situation is also lacking a definitive glossary of terms and clear definitions of several of the provisions in the various treaties, especially in the Outer Space Treaty. The result of this is that many interpretations and versions of the regulations are applied without complete uniformity and consistency. In the scope of International Law then, Space Law is unable to regulate the activities in, and use of, outer space consistently.

Under the present scenario, one major concern is the dual function of satellites.⁶⁶ By this is meant the situation when a satellite, constructed for use as a commercial navigation satellite, begins to relay GPS information and tracking information to military offices for reconnaissance or other intelligence related purpose.

⁶⁶Morgan R "Military Use of Commercial Communication Satellites: A New Look at the Outer Space Treaty and "Peaceful Purposes" 1994

The last scenario of possible application is the ideal situation. This is the scenario that would apply if the shortcomings and failures experienced in the present situation were addressed or absent. The ideal situation would also leave less room for interpretations and ambiguity so that the provisions clearly and unequivocally regulated the relevant issues.

This would be obtained by, for example, including a definitions glossary in the Outer Space Treaty and having the Outer Space Treaty, the Moon Agreement, and improved multilateral treaties universally accepted by all UN member states. If the Moon Agreement were more widely accepted it would confirm the provisions of Article IV of the Outer Space Treaty and develop the regulations on the military use of outer space, along with the Outer Space Treaty and the Partial test Ban Treaty. The implications of this space law utopia would be that no weapon capable of causing damage or destruction to lives or property would be permitted to enter the realm of outer space at all. Satellites would be permitted under strict liability laws to ensure that any damage caused is regressed.

4.3 Conclusion

As tempting as it is to dwell on the notions of the utopian society and what could be if all the legal instruments were perfect, one must remember that, at the time of the drafting of the Outer Space Treaty, very little was known about or expected from outer space.⁶⁷ The Outer Space Treaty was, therefore, a revolutionary and, to many countries, futuristic treaty which few could imagine would become as influential in the politics of the world as has happened.

The failure of the Moon Agreement can be attributed to some degree to the provisions dealing with the natural resources of the Moon and the stipulation that an international regime be established to manage the exploitation of such resources. It is a disappointment then that this Agreement fails owing to the economic and financial implications of the treaty when the military implications and support of Article IV would benefit all the states. The Moon Agreement came at a time when much more information and research was available about outer space and where technology had developed to a point where most of the space faring nations had realised that the military implications of outer space were no longer the defining

⁶⁷Hobe S *et al* CoCoSL 2009 pg 3

feature and driving force behind man's exploration of outer space.⁶⁸ This was in contrast to the situation in 1966 when the Outer Space Treaty was enacted, as the super powers of the time, embroiled in the cold war, were more concerned about the military implications of being able to access outer space. It begs the question, Would the Outer Space Treaty be as widely ratified as it is now if had been presented for signing twenty years later along with the Moon Agreement?

⁶⁸*Supra* fn 63

Chapter Five: The Outer Space Treaty in Context of Other Current Legal Instruments

5.1 Introduction

Although the Outer Space Treaty is central to the regulation and control of all outer space related activities, it cannot be read in isolation or without considering the application of other legal instruments. There are a number of legal instruments which stipulate the manner and procedure of activities that occur in outer space.

Internationally we have both bilateral⁶⁹ and multilateral treaties⁷⁰ which regulate the use of outer space. Of these treaties there are Space law related treaties and treaties which were adopted in different fields of international law but which nevertheless also apply to the Space law sector.

5.2 Other space treaties

In December 1958, the UNGA passed Resolution 1348 (XIII) in which the first steps towards the Outer Space Treaty were made and the establishment of COPUOS was ensured. COPUOS later became a permanent committee in 1959⁷¹ and it must have realised the monumental task it had been assigned looming ahead. In 1967, the Outer Space Treaty became the first treaty to be negotiated by COPUOS, and, although in many ways it was the most successful, it was clear that it was not the only treaty that was deemed to be necessary. A year later, in 1968, the “Rescue Agreement”⁷² was adopted. The remaining three treaties that were eventually drafted by COPUOS were all adopted in the 1970s. The Liability Convention⁷³ was adopted in 1972, the Registration Convention⁷⁴ in 1975, and the Moon Agreement⁷⁵ in 1979.

The Rescue Agreement has little effect on or applicability with regard to the military use of outer space. It deals with the rescuing of astronauts who land on earth in

⁶⁹For example the Treaty on the Limitation of Anti-Ballistic Missile Systems signed between the USA and USSR.

⁷⁰Under which category the Outer Space Treaty would appear.

⁷¹UNGA resolution 1472 (XIV) of 12 December 1959.

⁷²The 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space.

⁷³The 1972 Convention on International Liability for Damage Caused by Space Objects.

⁷⁴The 1975 Convention on Registration of Objects Launched into Outer Space.

⁷⁵The 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies.

foreign territories. It obligates state parties to assist in all possible ways to rescue and return the personnel of a spacecraft⁷⁶ to their launching state.

The Registration Convention also has very little to do with the military use of outer space as it simply creates the obligation that launching states register the space object with the relevant UN Office.

The Liability Convention of 1972 deals with the responsibility of states for space objects that they launch into outer space. It expands upon the liability provisions of the Outer Space Treaty, but it has never been invoked for any damage or activity of a space object. Its relevance to military space law may be vague and scarcely utilised, but it could be used for any damage or harm caused by a space object and so may find applicability in the consequences of military action in outer space. If one considers the case of the Chinese ASAT weapon that was successfully tested in 2007⁷⁷ and applies the Liability Convention to the issues involved in that, one comes to the conclusion that the Chinese government may be held responsible and liable for damage that may result owing to either the weapon or the satellite which has now become debris. The implications of this scenario on the military procedures of states are stipulated in Article II and Article III of the Liability Convention.

Article II declares that states will be “absolutely liable” for damage that occurs on the surface of the earth or to an aircraft in flight owing to their space object.⁷⁸ What then are the implications for military objects that cause such damage? If one applies the Outer Space Treaty and the Liability Convention it would appear that all Weapons of Mass Destruction are disallowed, no fortification of the moon may occur, and the use of any conventional weapon, although not disallowed, may cause the launching state to be held absolutely liable for any damage caused by it on the surface of the Earth or to an aircraft in flight.

Article III may hold similar implications relating to space objects which cause damage to other objects whilst in outer space. In such instances the liability is not absolute but instead requires the element of fault.⁷⁹ Again, using the example of the Chinese ASAT weapon testing mentioned above, the liability convention would hold

⁷⁶The Rescue Agreement develops on the Outer Space Treaty by expanding who may be rescued from “astronauts” to “personnel of a spacecraft”.

⁷⁷*Supra* fn9.

⁷⁸Article II Liability Convention 1968.

⁷⁹*Ibid* at Article III.

the Chinese government responsible for any damage caused by the weapon or subsequent debris. The only condition to this is that there must be fault on the part of the launching state.⁸⁰

The military use of space objects may be restricted even further than it already is limited by the Liability Convention by Article IV of the Outer Space Treaty. At the very least, the Liability Convention may hold the appropriate launching state liable for damage caused by its space objects. It is not clear, however, whether the Liability Convention does in fact apply to military situations.⁸¹ There has only been one situation ever where the Liability Convention could be used, viz. the 1978 crash down of Cosmos 954 in North-Western Territories, Canada.⁸² The Canadians and Russians signed a protocol three years later where the Russians agreed to pay three million dollars in damage, without acknowledging any legal liability.⁸³ The issue of the application of the Liability Convention was never addressed.

The 1979 Moon Agreement expands the applicability of Article IV of the Outer Space Treaty with regards to the militarisation of the Moon and other celestial bodies. The Moon Agreement in Article 3(1) stipulates that the Moon is to be used for “exclusively for peaceful purposes”. Although this seems similar to the Outer Space Treaty Article IV, the Moon Agreement continues to stipulate that “any threat or use of force or any other hostile act or threat of hostile act on the moon is prohibited”.⁸⁴ Article IV of the Outer Space Treaty prohibits the placement of Weapons of Mass Destruction in orbit around the Earth. The Moon Agreement expands this provision by declaring that states may not place nuclear weapons or any other kind of Weapon of Mass Destruction in orbit around the Moon or “place or use such weapons on or in the Moon”.⁸⁵ Lastly, Article 3(4) of the Moon Agreement echoes the second paragraph provision of Article IV of the Outer Space Treaty which prohibits the “establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on the moon”.

⁸⁰*Id.*

⁸¹Cf Bender R “Launching and Operating Satellites: Legal Issues” 1998 and Schmitt MN “International Law and Military Operations in Space” 2006.

⁸²THE LIFE AND DEATH OF COSMOS 954 by Gus W. Weiss accessed 14.04.13 at <http://www.loyola.edu/departments/academics/political-science/strategic-intelligence/intel/cosmos954.pdf#search=%22cosmos%22>.

⁸³ Disintegration of COSMOS 954 over Canadian territory in 1978. Protocol between the Government of Canada and the Government of the Union of Soviet Socialist Republics accessed 27.10.13 at http://www.oosa.unvienna.org/oosa/SpaceLaw/multi_bi/can_ussr_001.html.

⁸⁴Article 3(2) Moon Agreement 1979.

⁸⁵*Ibid* at Article 3(3).

Although the Moon Agreement adds valuable provisions to the protection of the Moon and the use of outer space for military purposes, it has not been widely accepted. Seen as a failed treaty with only fifteen ratifications, the Moon Agreement is not truly applicable in the International Space Law regime. Of the fifteen states which have ratified the treaty, France only has any influence on the launching of space objects, and no space super powers have signed or ratified the treaty.⁸⁶

5.3 Other Treaties

Many other Treaties and Agreements have an influence on, or allude to provisions in, the Outer Space Treaty. In terms of the military use of outer space, there exist both multilateral and bilateral treaties. Of the multilateral treaties applicable to Space Law, a few inform and support Article IV of the Outer Space Treaty. These include the Antarctic Treaty⁸⁷, the Partial Test Ban Treaty⁸⁸, and the Environment Modification Convention.⁸⁹ The UN Charter is also applicable with regard to the Outer Space Treaty.

The Antarctic Treaty was drafted only a few years prior to the drafting of the Outer Space Treaty, and it was highly influential as far as the wording of the Outer Space Treaty is concerned. When one compares the provisions of the Antarctic Treaty with those of the Outer Space Treaty, one finds that many of the provisions are almost verbatim copies of each other. Article I of the Antarctic Treaty reads:

- 1. Antarctica shall be used for peaceful purposes only. There shall be prohibited, inter alia, any measures of a military nature, such as the establishment of military bases and fortifications, the carrying out of military manoeuvres, as well as the testing of any type of weapons.*
- 2. The present Treaty shall not prevent the use of military personnel or equipment for scientific research or for any other peaceful purposes.*

The provisions in Article I of the Antarctic Treaty were incorporated into the Outer Space Treaty as paragraph two of Article IV. The Antarctic Treaty is, however, stricter on the issue of the total demilitarisation of the Antarctic area than the Outer Space

⁸⁶<http://www.unoosa.org/oosa/en/SpaceLaw/treatystatus/index.html>.

⁸⁷Antarctic Treaty signed 1 December 1959.

⁸⁸Treaty Banning Nuclear Weapon Tests in the Atmosphere, Outer Space and Under Water effective October 1963.

⁸⁹Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques signed 18 May 1977.

Treaty is on outer space. The main reason for this was the strong contentions from the USA and USSR regarding the military uses and research programmes that could be conducted in outer space.⁹⁰ It was, therefore, agreed that the word “only” found in Article I (1) would be excluded from the Outer Space Treaty along with the phrase “any measure of a military nature”

The Outer Space Treaty does not ban nuclear explosions occurring in outer space. This prohibition took four years to be implemented in the ‘Partial Test Ban Treaty’ (or ‘Limited Test Ban Treaty’).⁹¹ In terms of the Partial Test Ban Treaty, Article I (1) (a) requires that no state may test nuclear weapon explosions or cause any nuclear explosion in outer space. Both China and the USA have yet to ratify the treaty, and it is not in effect.

The Environment Modification Convention⁹² has limited scope and only narrow application, but it still prohibits “military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe effects as the means of destruction, damage or injury to any other State Party”⁹³. This provision is qualified in Article II of the same convention when it gives a definition of “environmental modification techniques”⁹⁴ and, by so doing, extends the scope of the definition to include outer space.⁹⁵

The UN Charter stipulates that every state shall “refrain in their international relations from the threat or use of force”⁹⁶. This is confirmed in Article III of the Outer Space Treaty in which the applicability of International Law in the law of space is discussed. The general provisions of Article 4(2) of the UN Charter, along with Article IV of the Outer Space Treaty, should then be enough to curtail most military activities in space. The restriction on the use of force that we find in the UN Charter is, however, open to exceptions. These exceptions include self-defence⁹⁷ and the implementation of “Action with respect to Threats to the Peace, Breaches of the

⁹⁰Bin Cheng “Military Use of Outer Space: Article IV of the 1967 Space Treaty Revisited” in Cheng CJ and Kim DH (eds) “The Utilisation of the World’s Air Space and Free Outer Space in the 21st Century”.

⁹¹Supra fn 68.

⁹²Supra fn 69.

⁹³ Article I of the Environmental Modification Convention.

⁹⁴“As used in article 1, the term ‘environmental modification techniques’ refers to any technique for changing - through the deliberate manipulation of natural processes - the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space.” Article II of the Environmental Modification Convention

⁹⁵For a discussion on the application of the Environmental Modification Convention on the weaponisation of Space see Petras C “The Debate over the Weaponisation of Space – A Military – Legal Conspectus” 2003

⁹⁶Article 2(4) UN Charter

⁹⁷Article 51 UN Charter

Peace, and Acts of Aggression” by the Security Council.⁹⁸ It is unclear though whether attacks on space weapons systems would constitute the right of “self-defence.”⁹⁹

Scattered throughout the history of the drafting of the Outer Space Treaty, as well as subsequent to its enactment, are many bilateral treaties, mostly between the USA and the USSR, which indicate the trend at the time or support the terms of Article IV of the Outer Space Treaty. The bilateral agreement between the USA and USSR on the Limitation of Anti-Ballistic Missile Systems¹⁰⁰ (ABM Treaty) is an example of one such agreement. Although not in force, the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Strategic Offensive Arms¹⁰¹ (SALT II) should, nevertheless, not be forgotten.

Article V of the ABM Treaty prohibits the development, testing, or deployment of any space-based anti-ballistic missile.¹⁰² This, in itself, was a major step taken by the two space super powers during the cold war.

SALT II is broadly applicable to the military uses of outer space in that it limits the technology and applicability of certain objects that may be used for military purposes in outer space. In Article IX (1)(c), the treaty specifically states that both parties agree not to develop, test, or deploy “systems for placing into Earth orbit nuclear weapons or any other kind of weapons of mass destruction, including fractional orbital missiles”¹⁰³. The USA never ratified the treaty because six months after the signing of it the Soviet Union invaded Afghanistan, and the USA discovered that there was a Soviet combat brigade stationed in Cuba. This put a severe strain on the relationship between the two super powers, but they both, nevertheless, still honoured the provisions of the treaty until 1986 when President Reagan withdrew from the agreement after alleging Soviet Union violation of the pact.¹⁰⁴

⁹⁸Chapter VII UN Charter

⁹⁹Institute Of Air And Space Law, Faculty Of Law, McGill University “*Background Paper: Peaceful And Military Uses Of Outer Space: Law And Policy*” (2005).

¹⁰⁰Signed May 1972

¹⁰¹ Signed June 1979

¹⁰²Article V(1) ABM Treaty 1972

¹⁰³The provision contains the stipulation that Article IX (1) (c) of the Treaty does “not require the dismantling or destruction of any existing launchers of either Party”.

¹⁰⁴ See <http://www.nti.org/treaties-and-regimes/strategic-arms-limitation-talks-salt-ii>.

5.4 Practices

Upon reviewing the practices of states in conforming to Article IV of the Outer Space Treaty and the stipulations of other treaties concerning the military use of space, attention will be given to both the accepted practices that have developed and also the doctrines of some states.

Russia, the USA, China, as well as South Africa, will be considered in order to show the development of practices and the current viewpoints in relation to Article IV of the Outer Space Treaty.

Russia has always played a pivotal role in the development, testing, implementation, and active use of space technology and space objects. As the USSR, Russia was the first state to launch an ICBM, place an artificial satellite in orbit around the Earth, place an animal in orbit around the Earth, and launch a human being into orbit around the Earth. It has been one of the principle states in almost all space-related law making and it is still considered to be a major space super power. For many, a reason for the failure of the Moon Agreement is the lack of Russia's support.¹⁰⁵ Recently, Russia called for the total prohibition on the military use of outer space. In 2002, it proposed a new treaty dealing with international space law be drafted to include the complete cessation of the deployment of any weapons in outer space.¹⁰⁶

As with Russia, the USA has always been at the forefront of the space race and eventually managed to place a human being on the Moon. The USA is more reliant on the use of satellites for "navigation, weather forecasting, communications, mapping, geodetic measurement, nuclear explosion detection and monitoring, ballistic missile early warning, photo reconnaissance and surveillance"¹⁰⁷ as well as countless other purposes than any other country.¹⁰⁸ During the cold war, the USA attempted to station a defence system in outer space to aid in the protection against the USSR should missiles need to be engaged.¹⁰⁹ The militarisation of space

¹⁰⁵ See generally the Hobe S et al "Cologne Commentary On Space Law Volume II" (2011).

¹⁰⁶ UN Conference on Disarmament, Working Paper Presented by the Delegations of China, The Russian Federation, Vietnam, Indonesia, Belarus, Zimbabwe and Syrian Arab Republic: 'Possible Elements for a Future Legal Agreement on the Prevention of the Deployment of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects' (2002) UN Doc CD/1679.

¹⁰⁷ Morgan R "Military Use of Commercial Communication Satellites: A New Look at the Outer Space Treaty and "Peaceful Purposes" 1994.

¹⁰⁸ See *inter alia* US National Space Policy 2006 <https://www.fas.org/irp/offdocs/nspd/space.pdf> accessed 27.10.2013 and National Space Policy of the United States of America 2010 http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf.

¹⁰⁹ See Nolan C "The Greenwood Encyclopaedia of International Relations: S-Z" (2002) Greenwood Publishing at pg1600.

continued throughout the cold as the USA sought to control space for its own purposes.¹¹⁰

China is a recent power in the space law regime and it has also supported the proposal made by Russia regarding the complete cessation of the deployment of any weapons in outer space.¹¹¹ China has approached the development of its outer space potential as being an indication of its being a world power, and it has invested substantial resources in order to increase its prestige.¹¹² The Chinese are, thus, developing space objects in order to increase their status as a world super power.¹¹³

South Africa has, over the past few years, begun to develop and establish a more structured and effective space agency.¹¹⁴ During the 1980s, significant steps towards the development of objects that could be launched into space were made, but these were short-lived owing to pressure from the USA.¹¹⁵ Since the dissolution of apartheid and the government of that time, the space objects developed in South Africa have slowly but steadily increased until the culmination, in 1999, of the launching of South Africa's first satellite, Sunsat.¹¹⁶ The following year, Sumbandile, a larger satellite, was launched. The military use of these satellites is almost non-existent. South Africa never really managed to implement its military policies during the apartheid years, although a number of nuclear missiles were developed and the intention of launching a reconnaissance satellite was expressed.¹¹⁷ South Africa pursued a space programme then because it was concerned about the security threat posed by the USSR's influence in Africa and because it could not count on support from the USA or Europe.¹¹⁸

In the recent years, South Africa has passed two statutes which regulate the Space sector. Firstly, in 1993, the Space Affairs Act¹¹⁹ was enacted. This act established the

¹¹⁰Cf National Missile Defense Act 1999 (Public Law 106-38).

¹¹¹Fn 97 supra.

¹¹²Annual Report to Congress "Military Power of the People's Republic of China" chapter three (2007) US Office of the Secretary of Defence.

¹¹³*Id.*

¹¹⁴South African National Space Agency Act 36 of 2008.

¹¹⁵Gottschalk K "South Africa's space programme – Past, present, future", *Astropolitics*, 8 (1): 35-48.

¹¹⁶*Id.*

¹¹⁷Chris Alden, "South Africa's Space Programme: Past and Present", *Strategic Review for Southern Africa XXIX* (May 2007):42.

¹¹⁸SOUTH AFRICA'S TECHNOLOGY SECTOR: A Report Prepared by the Federal Research Division, Library of Congress under an Interagency Agreement with the Director of Defence Research and Engineering, Office of the Secretary of Defence (August 2007).

¹¹⁹Act 84 of 1993.

South African Council for Space Affairs.¹²⁰ Secondly, in 2008, the South African National Space Agency Act was enacted.¹²¹ In section 4 of this Act, it is mentioned that one object of the Agency is to “promote the peaceful use of space”¹²² and “foster international co-operation in space-related activities”¹²³. These provisions are both in line with the Outer Space Treaty and its Article IV. The “peaceful use of space” in the Outer Space Treaty is echoed in the South African National Space Agency Act.

The South African National Space Policy¹²⁴ makes no mention of any intention to operate any military activities or place any weapons in space. Indeed, it has become a trend among states to forgo the military aspects of outer space in order to obtain commercial, communication, and technological advantages.¹²⁵ The Policy makes specific mention that South Africa conforms to Article IV of the Outer Space Treaty as it “is committed to utilising outer space for peaceful purposes and the benefit of all humankind.”¹²⁶ The Policy also confirms the application of International Law practices and treaties and South Africa’s intention to conform to their provisions when it states that “South Africa is committed to being a responsible user of the space environment and will ensure that all public and private sector activities are conducted in accordance with national legislation and appropriate international best practices, in addition to relevant international treaties.”¹²⁷

5.5 Conclusion

The peaceful use of outer space is a commonly accepted practice by all space faring nations, albeit to rather varying degrees. Russia and China recently prepared a draft Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects¹²⁸ which shows their intentions relating to space. Both nations seem to be unsatisfied with the scope and protection of the Outer Space Treaty. This position is echoed by the previous proposal of the Working Paper Presented by the Delegations of China, The Russian Federation, Vietnam, Indonesia, Belarus, Zimbabwe, and Syrian Arab Republic entitled ‘Possible Elements for a Future Legal Agreement on the Prevention of the Deployment of Weapons in

¹²⁰Space Affairs Act section 4.

¹²¹*Supra*fn104.

¹²²Section 4(a) South African National Space Agency Act.

¹²³*Ibid* at Section 4(e).

¹²⁴South African National Space Policy (2008).

¹²⁵*Ibid* pg11.

¹²⁶*Id.*

¹²⁷*Id.*

¹²⁸CD/1839 29 February 2008

Outer Space, the Threat or Use of Force against Outer Space Objects'.¹²⁹ It would appear, though, that the lack of support from the USA regarding these proposals indicates that the USA is perfectly happy with the extent of the Outer Space Treaty. The USA has always been a staunch advocate of the non-sovereignty of Outer Space, but as it relies increasingly on the use of space for military and everyday purposes, it becomes more reluctant to effect changes to the current Outer Space law regime.¹³⁰

¹²⁹Supra fn 105

¹³⁰See for instance Hitchens T 'Engaging the Reluctant Superpower: Practical Measures for Ensuring Space Security' in Safeguarding Space Security: Prevention of an Arms Race in Outer Space: Conference Report 21-22 March 2005 / UNIDIR, United Nations Institute for Disarmament Research.

Chapter Six: General Conclusion and Recommendations

6.1 Summary of findings

Since its implementation over forty five years ago, the Outer Space Treaty has been influential and of paramount importance in the maintenance of all activities conducted in outer space. From the stipulations on the freedom of exploration and scientific discovery to the limitations on the military uses of outer space, the Outer Space Treaty has regulated all areas of activity in outer space of outer space. One of the few provisions to have been dishonoured concerns the debris and environmental pollution of outer space by the 2007 Chinese ASAT test. Outrage regarding this matter was centred not on the use of outer space but on the creation of debris and the possible implications for the safety and quality of the orbital plane.¹³¹

As indicated by the historical evaluation of the Treaty, as well as by the interpretation of the provisions in the Outer Space Treaty and related legal instruments, the primary purposes of the Outer Space Treaty was the regulation of the military use of outer space.¹³² This and the protection of the right of states to explore and use space peacefully are the essential concepts of the Outer Space Treaty. One of the mechanisms employed by the Outer Space Treaty to achieve this goal is Article IV, wherein it attempts to limit the military uses of outer space to such a degree that states are obligated to maintain and protect space as a free and equal province of mankind, excluded from any appropriation claims of any state.

Article IV was drafted to contain two paragraphs, one that deals with the placement of nuclear, or other, weapons of mass destruction in orbit around the Earth, and the other that deals with the fortification or establishment of military bases on the Moon. These provisions have been successful and have not once been transgressed. Not once has a weapon of mass destruction been placed in orbit around the Earth nor have the few visits to the Moon been anything but peaceful and explorative.

Article IV, and indeed the entire Outer Space Treaty, contains no definitions of terms. The interpretive freedom that this affords the state parties means that,

¹³¹Baker H “Space Debris: Legal and Policy Implications” 1988

¹³²See *inter alia* Kopel V “*Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space*” (2008) United Nations Audiovisual Library of International Law Including The Moon And Other Celestial Bodies

amongst other provisions, the concept of ‘peaceful purposes’ differs. There are generally two interpretations on this phrase: firstly, the USA interpretation where ‘peaceful purposes’ is said to mean ‘non aggressive’; and, secondly, the Russian interpretation where the phrase is said to mean ‘non-military’.

It should be remembered that, although many attempts to clarify the interpretation of the Outer Space Treaty have been made, no unambiguous definition of ‘peaceful purposes’ has been established. One can hope only that states will interpret the provisions of any treaty in a manner that best suits the purpose, goals, and ideals enshrined in the treaty.

Article IV is, therefore, not without its defects as it also fails to address the problem of conventional weapons and fractional orbital weapons.

6.2 Additional Instruments to assist Article IV

The Outer Space Treaty specifically bans states from placing any Nuclear weapons or other Weapons of Mass Destruction in orbit around the Earth. The purpose of this was essentially self-defence when formulated as there would be almost no way of defending oneself from such an attack. It has now, however, been upheld as a valuable indication of the curtailing of the testing of and research relative to nuclear weapons, The concept is confirmed and supported in the Partial Test Ban Treaty and the Moon Agreement. The Moon Agreement attempted to rectify the defects of the Outer Space Treaty, but it has yet to obtain a sufficiently large ratification pool to be considered significant.

The Moon Agreement, Partial Test Ban Treaty, the ABM Treaty, and SALT II all inform the Outer Space Treaty and are attempts to remove or fill the gaps left open by it.

It has been revealed that internal or municipal law regarding space activities usually lag behind the regulations made by the UNGA. South Africa promulgated its first statute only in 1993, and formed the South African Space Agency only in 2008.

6.3 Permissibility of Military Activities in Outer Space

In 1966, Article IV of the Outer Space Treaty was formulated as the states at the time did not want to allow either the threat of nuclear weapons being placed in orbit around the Earth or the possibility of a state fortifying the Moon.

The Partial Test Ban Treaty prohibits nuclear explosions in outer space. This ban existed before Article IV was formulated, and it still applies even after the enactment of the Outer Space Treaty. The Outer Space Treaty protects space against the placement of weapons of mass destruction in space, and it also allows for the absolute neutrality and non-militarisation of the Moon. Additionally, the ABM Treaty prohibits the development, testing, or deployment of any space-based anti-ballistic missile.¹³³

Military bases, installations, and fortifications may be constructed on satellites as long as they do not contain any weapons of mass destruction. ASAT weapons are also not specifically banned and may be used successfully, as China did in 2007.

The Moon Agreement is a failed treaty as fifteen signatories to the treaty only have been obtained¹³⁴, but the agreement does, nevertheless, contain some valuable provisions which would significantly reduce military activity in outer space. The most important of these are the prohibitions on the placement of nuclear weapons in orbit around the Moon and the reaffirmation that the Moon may be used exclusively for peaceful purposes.¹³⁵

6.4 Conclusion

With Article IV and the other applicable treaties ensuring the weapon-free status of outer space and the Moon, it is worrying that so many military activities in outer space continue to develop and evolve every day. Although the military protection of outer space is far from perfect, it nevertheless does exist and should be more strictly interpreted and monitored. The proposal by the Russians and Chinese in 2007 should be considered. Without a total ban on military activities, states may always find a way around the provisions.

The real need in International Space Law lies not in military regulation but in environmental protection and debris mitigation. With the rapid increase of technology and the ever increasing needs of society, more and more satellites and space objects are being employed. Although many satellites may orbit the Earth at any position, only a set number of Geostationary Orbital slots exist. These slots are highly sought after as they are the points where the satellite and the Earth rotate at

¹³³Article V (1) ABM Treaty 1972.

¹³⁴Hobe S et al CoCoSL 2009 pg 16.

¹³⁵Article 3 Moon Agreement.

the same speed and so the satellite appears to remain motionless above the point of choice. The benefit of this is that a country or area may need only one overhead satellite that will remain active. This is especially helpful for broadcasting information.

The Registration Convention was an attempt to curtail the excessive launching of satellites as well as regulating the purpose of the satellite and the disclosure of the exact intentions of the parties regarding the space object. No space object may now be launched without first being registered. This procedure has also assisted in the regulation of space objects and the control of the available outer space area as all states are now obliged to disclose the purpose of the space object. This assists in the determination of whether or not a nuclear-powered satellite should be permitted into orbit.

Once a hub of drafting activity, it seems as if space law drafters and custodians are content with the current situation and the stagnation of treaties and regulations. Five international agreements were adopted between 1967 and 1979 but since then no further international treaties have been formulated or enacted. It also appears more and more normal that UNGA Resolutions, which are not binding in nature, are used to update or create stipulations on the use of outer space. The obvious weakness of this is that the resolutions are not binding on member states. In essence, then, this does little to develop existing Space Law.

What is required is a newer, more specifically drafted and carefully phrased, outer space treaty, which has little or no ambiguity or allowance for interpretations, that regulates all spheres of space activity from commercial to military, and which contains better environmental considerations. If a new space treaty is formulated which considers all the defects of its predecessors and incorporates the continual development of technology, then the ideas and dreams of private space travel and the demilitarisation of outer space may become reachable realities.

Bibliography

Primary sources

Treaties, Conventions and Resolutions

- Antarctic Treaty December 1959.
- Charter of the United Nations and Statute of the International Court of Justice, 1945.
- Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques signed 18 May 1977.
- RES 1962 (XVIII) Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space.
- The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space 1968.
- The Convention on International Liability for Damage Caused by Space Objects 1972.
- The Convention on Registration of Objects Launched into Outer Space; Agreement Governing the Activities of States on the Moon and Other Celestial Bodies 1975.
- Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water adopted 5 August 1963.
- Treaty Banning Nuclear Weapon Tests in the Atmosphere, Outer Space and Under Water effective October 1963.
- Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies.
- Treaty on the Limitation of Anti-Ballistic Missile Systems signed between the USA and USSR 1972.
- UNGA 1499th plenary meeting, 19 December 1966.
- UNGA resolution 1348 (XIII) of 13 December 1958.
- UNGA resolution 1472 (XIV) of 12 December 1959.
- UNGA resolution 2222 (XXI) of 19 December 1966.
- United Nations Committee on the Peaceful Uses of Outer Space “Draft Treaty Governing the Exploration of the Moon and Other Celestial Bodies”.
- Vienna Convention on the Law of Treaties 1969.

UN Conferences

- UN Conference on Disarmament, Working Paper Presented by the Delegations of China, The Russian Federation, Vietnam, Indonesia, Belarus, Zimbabwe, and the Syrian Arab Republic: 'Possible Elements for a Future Legal Agreement on the Prevention of the Deployment of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects' (2002). UN Doc CD/1679.
- UN Conference on Disarmament, 'Draft Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects' introduced by the Russian Federation and China 29 February 2008, CD/1839 GE.08-60402 (E) 230408.

Foreign Policies and Laws

- National Missile Defense Act 1999 (Public Law 106-38).
- National Space Policy of the United States of America 2010 http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf.
- US National Space Policy 2006 <https://www.fas.org/irp/offdocs/nspd/space.pdf> accessed 27.10.2013.

Domestic Policies and Legislations

- National Space Policy 2008: <http://www.oosa.unvienna.org/pdf/spacelaw/national/safrica/nat-policyE.pdf> accessed 25.10.2013.
- South African National Space Agency Act 36 of 2008.
- Space Affairs Act 84 of 1993.

Secondary sources

Books

- Bender R, "Launching and Operating Satellites: Legal Issues" 1998 Kluwer Law International.
- Cheng Chia Jui& Kim Doo Hwan, "The Utilisation of the World's Air Space and Free Outer Space in the 21st Century", 2000, Kluwer Law International.

- Erickson L, "Space Flight: History, Technology and Operations", 2010, Rowman&Littlefield.
- Gaddis JL, "The Cold War: A New History", 2005, Penguin Press.
- Hobe S, Schmidt-Tedd B, Schrogl K, "Cologne Commentary on Space Law (Volume I): Outer Space Treaty", 2009, HeymannsVerlag GmbH.
- Hobe S, Schmidt-Tedd B, Schrogl K, "Cologne Commentary on Space Law (Volume II): Rescue Agreement, Liability Convention, Registration Convention, Moon Agreement", 2009, HeymannsVerlag GmbH.
- Institute Of Air and Space Law, Faculty of Law, McGill University, "Background Paper: Peaceful and Military Uses Of Outer Space: Law And Policy" (2005).
- Nolan C "The Greenwood Encyclopaedia of International Relations: S-Z" (2002) Greenwood Publishing at pg1600.
- Siddiqi, AA, "Challenge to Apollo: The Soviet Union and the Space Race, 1945–1974", (2000) Washington, D.C.: NASA.
- Stares PB, "The Militarization of Space: U.S. Policy 1945 – 1984, 1985" (1985), Cornell University Press.

Journal Articles

- Alden C, "South Africa's Space Programme: Past and Present", Strategic Review for Southern Africa XXIX (May 2007):42.
- Bernhardt G, Gresko S, & Merry T, "Star Wars" versus Star Laws: Does SDI conform to Outer Space Law?, 15 J. Legis 251 1988-1989.
- Cheng B, "Military Use of Outer Space: Article IV of the 1967 Space Treaty Revisited" in Cheng CJ and Kim DH (eds), "The Utilisation of the World's Air Space and Free Outer Space in the 21st Century".
- Fidler D, "Weapons of Mass Destruction and International Law" (February 2003), American Society of International Law.
- Freeland S, "In Heaven as on Earth? The International legal regulation of the Military use of Outer Space", US-China Law Review 272 2011.
- Graham T, The Law and the Military use of Outer Space: http://kms2.isn.ethz.ch/serviceengine/Files/EINIRAS/109125/ichaptersection_singledocument/DB77CF37-5087-47ED-8CA9-C9DACFC182CE/Fen/Chap8.pdf accessed 10.04.13.

- Heintze HJ, “Peaceful Uses of Outer Space and International Law”, in B. Jasani (ed) “Peaceful and Non-Peaceful Uses of Space. Problems of Definition for the Prevention of an Arms Race” (1991) NY: Taylor & Francis, New York.
- Hylin CF, “Stemming the arms race in outer space; suggested revisions of the Outer Space Treaty based on three successful arms control measures”, 16 Cal. W. Int’l L.J. 118 1986.
- Jasentuliyana N, “Space Weapons and International: A Critique of Existing Treaties” 1985, in “An Arms Race in Outer Space: Could Treaties Prevent it?” McGill Centre for Research of Air & Space Law.
- Matte NM, “An arms race in Outer Space: Could Treaties Prevent it?” (1986), CRASL McGill University.
- Morgan R, “Military Use of Commercial Communication Satellites: A New Look at the Outer Space Treaty and ‘Peaceful Purposes’” 1994.
- Petras C, “The Debate over the Weaponisation of Space – A Military – Legal Conspectus”, 2003.
- Qizhi H, “The Outer Space Treaty in perspective”, 25 J. Space L. 93 1997.
- Schmitt MN, “International Law and Military Operations in Space” (2006), Max Planck Yearbook of United Nations Law, volume 10, 89.
- Vlastic I, “The Legal Aspects of Peaceful and Non-Peaceful Uses of Outer Space” in B. Jasani (ed) “Peaceful and Non-Peaceful Uses of Space. Problems of Definition for the Prevention of an Arms Race” (1991) NY: Taylor & Francis, New York.

Other

- Annual Report to Congress, “Military Power of the People’s Republic of China” chapter three (2007) US Office of the Secretary of Defence.
Commentary on “Emerging System of Property Rights in Outer Space”
<http://www.unoosa.org/pdf/sap/2003/repkorea/presentations/tennendoc.pdf>.
- Kopal V, “Treaty On Principles Governing The Activities Of States In The Exploration And Use Of Outer Space, Including The Moon And Other Celestial Bodies” http://legal.un.org/avl/pdf/ha/tos/tos_e.pdf accessed 22.10.2013.

- S.P. Korolev Rocket and Space Corporation: Energia
<http://www.energia.ru/english/energia/launchers/rocket-r7.html> accessed 22.10.2013.
- Sputnik I: <http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1957-001B> accessed 22.10.2013.
- Sieff M, “China Officially Announces Anti Satellites Test Successful” United Press International (Washington DC) 24 January 2007 at http://www.spacewar.com/reports/China_Officialy_Announces_Anti_Satellite_Test_Successful_999.html accessed 22.10.2013.
- SOUTH AFRICA’S TECHNOLOGY SECTOR: A Report Prepared by the Federal Research Division, Library of Congress under an Interagency Agreement with the Director of Defense Research and Engineering, Office of the Secretary of Defense(August 2007) at www.dtic.mil/get-tr-doc/pdf?AD=ADA516993 accessed 22.10.2013.
- Tennen L, “United Nations - Republic Of Korea Workshop on Space Law
- Weiss GW, “The Life and Death of Cosmos 954”.
<http://www.loyola.edu/departments/academics/political-science/strategic-intelligence/intel/cosmos954.pdf#search=%22cosmos%22> accessed 14.04.13
www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA516993 accessed 22.10.2013