

PROTECTION OF THE SPACE ENVIRONMENT UNDER THE OUTER SPACE TREATY

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ABSTRACT

Space development requires the institution of many safeguards, not least the protection of the space environment for the use of future generations. This paper analyses the relevant articles of the Outer Space Treaty and concludes that it should be amended, supplemented or otherwise reinforced to offer a degree of environmental protection that is currently lacking. It is argued that, as the expected development of Moon and Mars bases is pursued in the 21st century, this aspect of space law will become equally as important as the current formative measures regarding orbital debris.

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INTRODUCTION

Mankind has spent some 40 years exploring the solar system, beginning with near-Earth space and the Moon, then extending its reach to the rest of the planets. Although much has been achieved by remote sensing, for example using the Hubble Space Telescope, by far the most detailed information has been gained by sending spacecraft to the planetary bodies in question and using what, in medical terminology, would be described as invasive techniques.

The first stage of lunar 'exploration', for example, involved launching hardware to impact on the Moon, an occupation in which success was measured by how close the spacecraft got to the target. It was only later that the techniques for orbiting and landing were perfected.

This led to the surface of the Moon being littered with spacecraft debris and spent rocket stages - ostensibly in the name of space science. Even the Apollo lunar seismic experiments involved purposely crashing Saturn V third stages onto the surface, so that previously sited seismometers could detect the resulting lunar reverberations. The practice of

utilising what could be termed 'disposable spacecraft' was subsequently extended to some of the planets and their moons...and continues today.

In an era of growing global consciousness, in which protection of the Earth's environment is a key concern, should we not extend that concern to outer space? After all, on a universal scale the solar system is our own back yard. As a new phase of scientific and commercial development begins, with the expected Moon and Mars bases of the 21st century, should we not begin to develop guidelines for its protection, or at least an awareness of the importance of keeping it tidy? We have already begun the discussion as far as orbital debris is concerned, but what of the debris that already litters the surfaces of the planetary bodies?

ROLE OF THE OUTER SPACE TREATY

It has often been the case that resource development here on Earth has led to the degradation of the natural environment, which in some cases has encouraged the formulation of legislation to guard against it. The Outer Space Treaty of 1967 encapsulates mankind's main attempt to guard against such degradation in space through its basic principles of "common interest to all mankind" and "benefit of all peoples", as stated in the preamble to the Treaty.

Space exploration and development has evolved considerably since the introduction of the Outer Space Treaty and will continue to evolve in the early years of the 21st century. The Treaty must therefore be continually reviewed

and updated to take this evolution into account, since where the articles of law may be content to remain unchanged for centuries, the 'articles of space technology' are not!

The following section analyses the relevant Articles of the Outer Space Treaty to identify the parts of the Treaty which are currently lacking and suggests potential areas for improvement.

ANALYSING THE OUTER SPACE TREATY

Title

It is evident from the official title of the Outer Space Treaty -

"Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies"

- that it is intended to cover much more than is currently of direct commercial or scientific interest. The use of the term "other celestial bodies", which includes the other planets of the Solar System and their moons as well as comets and asteroids, indicates the intended all-inclusive nature of the Treaty.

Since the Treaty was written, commercial space endeavours have been concentrated in various orbits around the Earth, largely in geostationary orbit (GEO) where the majority of communications satellite reside. Scientific endeavours have reached further into the Solar System, but since these have been pursued in a piecemeal fashion (compared to the

commercial explosion of space-based communications systems) they have not attracted the same attention in terms of potential harm.

We are now familiar with the potential for orbital debris to restrict access to some of the low Earth orbits and cause damage to comsats in GEO, but there has been very little publicity attached to the environmental damage caused by scientific spacecraft. This is probably because these spacecraft are seen as benevolent and because they are not part of a coordinated effort in exploration, exploitation or colonisation. The spacecraft debris which already litters the lunar surface provides evidence against this rather rose-tinted view.

Furthermore, if mankind decides to mine the Moon or colonise Mars, the environmental impact will increase by at least an order of magnitude. As terrestrial experience has shown, when exploration becomes exploitation the environment tends to suffer.

The title of the Treaty is all-inclusive and, as such, cannot be improved. There is, however, ample scope (allowed by the title) to develop the content of the Treaty itself.

Article I

Article I states that:

“The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries...and shall be the province of all mankind.”

In view of the developments that have taken place, the question arises: can the littering of planetary surfaces with discarded rocket stages and disused spaceprobes be defined as “for the benefit...of all mankind”? The question is akin to those concerning the exploration of the further reaches of the Earth’s surface, for example whether the littering of the slopes of Mount Everest with discarded oxygen cylinders is an acceptable sacrifice to the altar of man’s continual battle with nature. The discussion is a philosophical one, but no less important for that!

Article I goes on to state that:

“...there shall be free access to all areas of celestial bodies.”

Unfortunately, the deposition of manmade debris on various celestial bodies (mainly the Moon) has made access to certain areas difficult, if not dangerous. Although no-one has personally surveyed the sites of the crash-landings, one can safely assume that there will be shards of metal and other materials surrounding the impact craters. A future ‘Users’ Guide to the Outer Space Treaty’ might therefore include the warning that this free access is granted ‘at one’s own risk’!

The problem with the Article rests with its (admittedly inescapable and laudable) democratic nature, which demands the “freedom of scientific investigation in outer space”. Perhaps, in future revisions, a proviso should be attached, stating that this freedom is allowed only if it does not, thereafter, limit the freedom of later investigators. In other

words, you may visit if you tidy up afterwards.

Article IV

A similar proviso would be a useful addition to Article IV, which states:

“The use of any equipment or facility necessary for peaceful exploration of the Moon and other celestial bodies shall...not be prohibited.”

The problem with the Article as it stands is the potentially broad interpretation of the phrase “peaceful exploration”. It was certainly not considered at all ‘warlike’, during the Apollo programme, to cause Saturn V third stage boosters to impact the Moon as part of a seismology experiment; it was simply an element of the peaceful investigation of the internal structure of our nearest celestial body.

Many aspects of life which were considered acceptable and harmless during the 1960s and 1970s have since become unacceptable and harmful - and surely impacting large rocket stages on the Moon is a part of that evolution - but Article IV’s broad acceptance of “any equipment or facility necessary” is rather too broad a definition. Not only does this Article allow a broad interpretation of the word “peaceful”, it also begs the definition of “necessary”. Do we allow, for example, the operation of mining equipment which permanently disfigures the lunar surface? And, if so, to what extent: as viewed with the average naked eye; through the average amateur telescope; or from a 100km lunar orbit?

Article VI

The matter of which activities are allowed is closely connected to who is responsible for sanctioning those activities. The matter of responsibility is addressed, to some extent, in Article VI:

“States Parties to the Treaty shall bear international responsibility for national activities in outer space...whether such activities are carried out by governmental agencies or non-governmental entities, and for assuring that national activities are carried out in conformity with the...present Treaty.”

This is good in theory, but only to the same extent that the International Telecommunications Union (ITU) is *responsible* for the administration of radio frequencies; it has no powers to stop ‘rogue users’ causing harmful interference, for example. Moreover, if particular States have had *responsibility* for their national activities since 1967, when the Treaty was enacted, does this mean that the relevant States are responsible for the ‘space debris’ deposited on the Moon and other planetary bodies - and are they therefore responsible for clearing it up?

Of course this begs several questions, among them: is this ‘space debris’ actually ‘unwanted’ in the eyes of the international space community and is there actually a requirement to clear it up? As with all environmental legislation, a sufficiently common understanding of ‘undesirability’ must be arrived at before a given type of pollution

can be outlawed. Obvious terrestrial analogies are the undesirability of smoking and of the lead content of vehicle exhaust emissions, both of which have taken many years to be recognised as deserving of legislation.

To give this Article any real meaning, the implications of “responsibility” need to be discussed, agreed and spelled out in an appendix to the Treaty.

Article VII

The matter of responsibility, indeed liability, is further addressed in Article VII:

“Each State Party...that launches or procures the launching of an object into outer space..., and...from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the Moon and other celestial bodies.”

Although this covers liability for damage to other States and their citizens, no responsibility for damage to the natural environment is included. Perhaps it is as difficult to legislate for damage to the space environment as it is for damage to an undeveloped part of the *terrestrial* environment. For example, is the agency responsible for the impact of a spacecraft on a planetary body (intentionally or otherwise) any more liable for the resultant environmental damage than a

pilot who crashes his aircraft in a barren desert?

Further consideration of liability is covered in the Liability Convention of 1971, but this is beyond the remit of the current paper.

Article IX

With Article IX, we are at the nub of the environmental issue:

“States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination...”

Theoretically, this Article should provide the protection of the space environment called for in this paper. Unfortunately, the phrase “harmful contamination” is open to interpretation and argument: it is likely, in the context of the Treaty, that it means harmful to humans rather than harmful to the environment, but this is not clear.

Apart from that, what sort of contamination is classed as harmful and what is not? When space probes, such as Viking or Pathfinder, are sent to Mars to analyse the surface, it is assumed that they are analysing chemical constituents native to Mars, not contamination from Earth. If a future probe should crash, or break up as it de-orbits, and spread its debris over a wide area, it will contaminate the ‘pristine’ Martian environment. This will not immediately be harmful to humans, but it could prove extremely harmful to science.

Moreover, it is well known that whereas the Earth's environment has a natural ability to repair itself, the lunar environment has no such capability. Since the Moon has no atmosphere and no weather, it will bear the scars of man's intervention for the foreseeable future, a future which may be measured in hundreds of thousands of years. It was concern about the lunar environment, and the realisation that it should be protected, that produced the Moon Agreement of 1979.

Interestingly, the Moon Agreement contains what amounts to a rewrite of Article IX of the Outer Space Treaty (in Article 7, paragraph 1):

“In exploring and using the Moon, States Parties shall take measures to prevent the disruption of the existing balance of its environment, whether by introducing adverse changes in that environment, by its harmful contamination through the introduction of extra-environmental matter or otherwise.”

As with Article IX of the Outer Space Treaty, this is extremely well-intentioned, but avoids the important definition of “harmful”.

Further, in Article 7 paragraph 3 of the Moon Agreement, it is suggested that consideration be given to the designation of areas of special scientific interest, or “international scientific preserves”, which, it states, would require agreement “in consultation with the competent bodies of the United Nations”. This is not an end in itself because of the need

for further consultation, but, suitably extended to include other celestial bodies, would make a useful addition to the Outer Space Treaty.

CONCLUSIONS

Even a cursory analysis of the Outer Space Treaty shows that, while in general it is well-meaning and democratic, it provides insufficient protection for the space environment. In particular, it makes insufficient provision for the protection of the planetary bodies from the creation of further debris, which will undoubtedly accompany future development and exploitation. As the expected development of Moon and Mars bases is pursued in the 21st century, this aspect of space law will become equally as important as the current formative measures regarding orbital debris. The length of time it takes for legislation to become enacted suggests that we would be well advised not to wait until this development has begun.

This paper has indicated why the Outer Space Treaty - which is thirty years old this year - should be amended or supplemented. It will be up to legal practitioners, assuming they agree, to decide upon the form of words of the supplement; however, they would be well advised to consider the testimonies of science and technology practitioners in their deliberations. In this way they might be better assured of creating a Treaty that will be applicable thirty years hence.

The practical problem in the application of the Outer Space Treaty, of course, is one that is common to the body of Space Law - the relative lack of power - and it

is this, as much as any other matter, which deserves the attention of the space community. There is no practical use in a law, however well written, if it cannot be applied in a given situation, and unless all space-faring nations have signed up to the Treaty, it cannot be universally applied.

As far as protection of the space environment is concerned, two possible activities may help to lay the groundwork for improvement:

- a continual review of space missions to the planetary bodies to compile a catalogue of the debris from spacecraft impacts that may still be found on their surfaces
- consideration of the future of scientific and commercial exploration and exploitation of the planetary bodies, in both ethical and pragmatic terms, with a view to a sustainable balance between the productive activities of mankind and the desire to retain the purity of the space environment.

Eventually we shall have to decide whether Outer Space should be declared an 'International Park', in which all commercial and industrial development is prohibited, or whether the Planetary Bodies constitute a body of resources to plunder? The most likely outcome will be some combination of the two.

For those who prefer the concept of the International Park, a slogan used here on Earth seems apt:

Take only photographs, leave only footprints.