PLANETARY PROTECTION: LESSONS LEARNED

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ABSTRACT

Planetary protection is a very wide subject because of the variety of physical conditions on individual planets and their moons. At present, we have good photographs or imagery, as well as other evidence, from most planets and from a selection of their moons. The most important factor is the presence or absence of any form of life. Material samples are available from the Moon and possibly, in the form of a few meteorites, from Mars. The danger of contamination has been recognized in the past and it became clear that some measures would have to be taken. The adoption of measures will have to be universal in missions to planets and their moons because for an undesirable contamination to occur, one failed measure of protection may be enough. The question is, if we can learn from experience gained in the last forty years in adopting laws, rules or unbinding recommendations for space activities. Several examples will be discussed, such as the amount of knowledge at a time when international treaties on space law were adopted, the consequences of the failed discussion at the United Nations on the definition of outer space, or of the break-up of Cosmos 954. Special attention will be devoted to the ongoing discussion of space debris in the UN Committee on the Peaceful Uses of Outer Space and its relevance for planetary protection, to the general compliance with the Registration Convention and to the experience gained with the recommendation to re-orbit geostationary satellites.

POLITICAL WILL

Political will to establish rules for space activities was very strong in the first years after the launch of the first satellite. The UN General Assembly decided to establish an ad hoc Committee on the Peaceful Uses of Outer Space already in 1958[1]. The committee was directed to consider (a) the activities and resources of the UN system of organizations relating to the peaceful uses of outer space, (b) international cooperation and programs, (c) organizational arrangements to facilitate international cooperation, and (d) legal problems that might arise. That decision shows that the international community realized from the beginning that space activities have a global character requiring international cooperation and that legal problems are likely to arise and will have to be considered and ultimately solved. The COPUOS was converted into a standing committee in 1959[2].

In the course of the following years, a number of international organizations, intergovernmental as well as non-governmental, have been granted observer status, among them COSPAR, IAF, IAA, the European Space Agency, the International Astronomical Union, the International Law Association and several others. The Committee and its two Subcommittees, Scientific and Technical, and Legal, work on the principle of consensus.

Already in 1963, the committee adopted a Declaration of Legal Principles Governing the Activities of States[3] in the Exploration and Use of Outer Space. Among the principles are:

- Freedom of exploration and use by States,
- Non-appropriation of outer space by any country,
- Liability for damage caused by space objects,
- Safety and rescue of astronauts,
- Notification of registration of space objects.

It has to be realized that in the years 1958-1963, between the start and completion of the work, there were in space only a few scientific satellites, there was no experience with space applications and no experience with the reaction of non- space-faring countries to space activities. Yet the political will was so strong that a list of important principles of very high moral value was set up and adopted. In the following years, five international

treaties were elaborated[4], transforming the principles into legally binding language. Never again was such a miracle performed.

During the 1960's, the Committee discussed also the question of adopting a definition or delimitation of outer space. In that instance, no strong political will appeared and the discussion were concluded in the Scientific and Technical Subcommittee in 1967[5] by stating that it was not possible at that time to identify scientific and technical criteria which would permit a precise and lasting definition of outer space. Such an argument is not logical because it is not the task of scientific and technical consideration to derive a "precise" limit between airspace and outer space. Scientific considerations can lead only to suggesting a certain range in altitudes where a legal limit would not be in conflict with scientific or technical facts. The "precise" value is needed only in application of legal rules. The Scientific and Technical Subcommittee just had no political will to adopt a fixed value of the limit.

Political will, in particular in a committee working on the principle of consensus, is of prime importance for reaching any result, be it the adoption of basic principles for space activities, be it the question of the delimitation of outer space, or be it the question of adopting rules for planetary protection.

FACTS

The latin saying, *Ex facto sequitur lex,* suggests that some facts require regulation by law. The saying does not elaborate on the nature and amount of facts needed before a regulation is desirable. That decision is left to lawmakers.

When the Principles Governing Space Activities were adopted in 1963, the need for more detailed knowledge was overrun by the political will to regulate the newly emerged field of activities by principles of a high moral value.

This has not always been the case. The question of space debris came to the attention of the scientific and technical community in late 1970's. The UN Secretariat prepared a number of studies[6] for the UN COPUOS between 1979 and 1987 on various aspects of space debris. It was only in 1988-1990 when official studies were prepared, first by the ESA Space Debris Working Group[7], later by the US Interagency Group[8] and by the US Congress[9]. The International Academy of Astronautics prepared a Position Paper on Orbital Debris[10]. The ESA organized three international conferences on Space Debris in 1993, 1997, and 2001[11]. The proceedings of 700, 800, and 900 pages respectively, reflected the wealth of information presented by participants. A special periodical devoted to Space Debris started to appear in 1999. An Interagency Space Debris Coordinating Committee has been created by space-faring countries for the purpose of studying space debris. Yet, it took the years 1990 to 1994 to adopt an item on space debris to the agenda of the Scientific and Technical Subcommittee. A Technical Report[12] reflecting all the available knowledge on space debris was elaborated and adopted by the Subcommittee in 1999.

Compared to the knowledge of space activities available in 1959, which was deemed sufficient to start elaborating the main principles governing space activities, our present knowledge of space debris is orders of magnitude more extensive and detailed. But no consensus has been reached in 2002 in the Scientific and Technical Subcommittee[13] to start legal considerations on space debris.

It will be a long way between the start of legal considerations and the adoption of a decision on what to do on international level about space debris. Whether the fragile environment of the geostationary orbit, or possibly of other orbits, will absorb all the space debris produced and to be produced, is a question without an answer at present.

In the case of planetary protection, an important point will be to agree on specific facts needed to start meaningful discussions on general rules.

WIDE VIEW

On 24 January 1978, Cosmos 954 disintegrated over northwestern Canada and several radioactive fragments. The debris was located, collected and investigated. The specific aspect of radioactivity attracted more attention that the fact of danger posed by debris in general. The COPUOS and its Subcommittees started to discuss an item entitled "Nuclear Power Sources" and countries were exhorted to pay attention to collisions with radioactive fragments. From hindsight, it would have been logical to consider the topic of space debris in general, because some harmful effects can come from space debris, whether they are radioactive or not. Finally, in 1992, a set of Principles on Nuclear Power Sources[14] was adopted, while the topic of space debris appeared on the agenda of the Scientific and Technical Subcommittee as late as 1994.

Evidently, questions of environmental protection should be seen in a sufficiently wide context. This finding may be of consequence for future discussions of environmental protection of celestial bodies.

VOLUNTARY REGULATION

Voluntary regulation is, of course, preferable because it is inexpensive and can be changed flexibly in accordance with the facts and techniques of the day. As a necessary and sufficient condition of success, all participants have to implement what they have agreed on. They will do it either if the universal implementation of the regulation is in their interest, or if they wish to maintain their image as fair players.

An example of the first case is the voluntary use — by all operators of satellites – of communication frequencies and nominal orbital positions assigned by the International Telecommunication Union. It is in the interest of operators to avoid harmful interference in satellite communications by adhering to the results of the ITU coordinating process.

An example of the second case is the careful registering of objects launched into outer space in compliance with the Registration Convention by the two space superpowers and some other States.

On the other hand, there are several examples of failures of operators to comply with recommendations of a non-binding nature:

• In May 2002, it was found in the On-line Index of Objects Launched into Outer Space[15], that 30% of objects launched in the year 2000 have not been registered with the UN, in spite of Article XX of the Convention to register "as soon as feasible".

• The recommendation by the ITU of 1993, to re-orbit satellites approaching the end of their active lives into disposal orbits at least 300 km beyond the nominal geostationary orbit, has been complied with by only 2 out of 14 satellites, which approached the end of their active lives in 2001. In the four years, 1996-2000, the same picture emerged. Thus in the five last years, a total of 50 satellites was left in or near the nominal geostationary orbit, posing a risk of collision with one or other of the active satellites.

It seems that the international community would act in a foolish way if it always relied on voluntary compliance with non-binding regulation. In Planetary Protection, the situation will have to be considered carefully. If the club of Planetary Visitors has very few members, all of them fair players and reliable partners in international cooperation, voluntary arrangements will have a chance. If the club is opened widely, there will be no substitute for an efficient policeman in the background, ready to write stiff penalties to trespassers.

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[15] The index lists all functional objects launched into outer space. It contains data from governmental announcements made in compliance with the Registration Convention. Where such data are missing, other sources are quoted. Prepared by the UN Office of Outer Space Affairs, at the website registry.oosa.unvienna.org/oosa/index/index.stm.

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