

LEGAL ASPECTS OF MENTAL AND PHYSICAL WORKLOAD OF ASTRONAUTS

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Abstract

The Space Treaty in its Article V establishes that astronauts are envoys of mankind. This provision has been emanated from the scientific legal structure of the Treaty, that among other merits, has created a new subject: mankind, and a new patrimony: the common heritage of mankind. The individual representative of this collective subject owner of the common heritage, is the astronaut, he is the representative of the human culture, not a political agent.

I. Different activities of astronauts in space and their consequences

Activities of astronauts in outer space and celestial bodies are increasing constantly, and particularly in international space missions. Most of these activities can produce medical or psychological, or both, consequences. The International Academy of Astronautics (IAA) and CNES organized the 11th Symposium Man in Space for Science and Technology Development, to be held in Toulouse from 27 to 31 March 1995. In the last ten years, France has developed a human flight program to conduct very important biomedical and microgravity scientific experiments, in view of the Hermes mission. The topics to be covered are: Space Physiology and Medicine Use of space environment for the understanding of physiological mechanisms (cardio-vascular neurosciences); musculoskeletal systems, etc. onboard health care: epidemiological, clinical and prophylactical aspects; ground simulation programs; specific aspects related to long duration flights. Gravitation and Radiation Biology: influence of gravity on cellular metabolism of single cells and multicellular living organisms; physical interaction between radiations and biological systems, microdosimetry and biological systems, microdo-

simetry, biological risks and biological protection; exobiology. Biotechnology and Life Support: Design, modelling and experimental studies on closed ecosystems; toxicology, waste management and processing, monitoring and control technology, habitat design. Human Factors: Psychology, human performance, stress, mental and physical workload; man-machine interface, compatibility and training, crew selection and training, telepresence and robotic. Medical and Psychological Aspects of EVA: Decompression, metabolic aspects, hyperoxia, hypercapnia; space suit pressure, advanced life support systems, health monitoring. Man in Space and Spinoff of Fundamental Research and Technology: Space experiments are leading to direct spinoffs related to fundamental knowledge as well as to related technology.

The enunciation of the precedent matters is quite illustrative of the scope of astronauts' activities today. From the unipersonal manned flight onboard a capsule to the large space vehicles of international missions, the field of human labour has enlarged extraordinary, but the right to protect, assure, and prevent damages to astronauts did not have experimented the same development.

From a technical point of view, the perspective is remarkable, if we take in consideration the European Manned Space Transportation Program (MSTP) of ESA, that can offer a wide range of logistic services to space stations for the regular transportation of space stations crews, resupply and removal of cargo, and manipulation of cargo and equipment outside space vehicles or space station elements. The main present field of application for this program is that of future space stations. The program elements can be grouped into transportation vehicles and means for external intervention: Transportation Vehicles: Crew Transport Vehicle (CTV), Automated Transfer Vehicle (ATV) and External Intervention Means: European Robotic Arm (ERA) and Extra-Vehicular Activity Space Suit (EVA 2000)¹.

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Flights in outer space produce serious physiological modifications. Some of these modifications are the direct result of weightlessness; other are due to the context in which these flights occur -psychological stress, for example².

In the Altair mission, the French astronaut Jean-Pierre Heigniere, engineer (CNES), made twelve experiments, among them: to observe the incidence of microgravity in the cardiovascular system or the distribution of fluids and hormones, utilizing an echograph. It was observed that the differences between blood pressure in space in standing up persons or laid down. Cognitive representations of space that a person makes in his/her mind when he/she is in orbit, as well as the notion of vertical or of simetrical fields, were also matter of work. The French phisician astronaut Claudie André-Deshays (CNES) shall go to space to study for the first time animal fecundation in microgravity conditions. She is responsible of the Program of Physiology and Medicine of Space of CNES³.

Exploration of space shall be the great task of next century. For these missions man and robot are complementary and shall coexist for a better efficiency of their efforts and of the results of the ventures. Man is intelligent enough to avoid going himself to see what he does not know⁴.

The Columbus Attached Laboratory is a pressurized cylinder which will house experimental facilities. Up to three astronauts will work there, operating experiments, talking to scientists to Earth, making minor repairs, etc. Because crew time will be relatively limited, many of the experiments will be operated either automatically or directly by the investigator himself from his home base thanks to telescience⁵.

In long-term manned space flight, human factors are becoming specially significant because of the exceptional living condition. As space stations like Mir and Freedom become established, space flight will emerge from a phase of spectacular, heroic missions to one involving more sustained operations. Proper handling of related problems has become imperative⁶.

The most significant Shuttle flight that demonstrated Space Station hardware took place in May 1992. On it, astronauts will demonstrate Station EVA methods, conducting three EVAs in a row using a total crew of 4⁷.

Two astronauts of the Shuttle Discovery made an espectacular sideral walk to verify the effi-

ciency of an autonomous propulsion system fixed on thir backs. Astronauts Mark Lee and Carl Meade did it with out any link to the vehicle and alternate to probe the device designed to rescue astronauts that could accidentally separate in future space stations and be left floating in open space without possibility to return to their base.

Several factors may affect psychomotor performance in space: sensory-motor changes, sleep disturbances, pychological modifications induced by the social isolation and confinement. However, psychomotor performance is difficult to assess. A battery of standardized and computerized tests, so-called Automated Portable Test System was devised to ascertain the cognitive, perceptive and motor abilities and their fluctuations according to environ-mental effects⁸.

Prolonged restriction of motor activity induced a significant increase in renal excretion of fluid and electrolytes in endurance trained subject regardless to their body position and duration thereof per day⁹.

The last three years, several manned space missions were performed on the Mir orbital station and the Space Shuttle. The maximum length of each Mir crew mission was six months. During that mission men in space enjoyed good health and maintained high operational performance due to medical preventive measures and adequate sanitary conditions aboard the transport vehicles and in orbit.

On 11 December 1992 NASA signed an agreement with Russia's NPO Energiya confirming the suitability of the Soyuz TM as a crew rescue vehicle for the international space station, stimulating cooperative activity between NASA's industrial contractors and Russian companies. Outstanding issues include increasing Soyuz's service life from 6 months to three years, eventually increasing Soyuz capacity to safely evacuate a crew of 8, and defining suitable landing sites for the Soyuz vehicle.

The United States and the Russian Federation signed an agreement on 2 September 1993 to merge the United States/ESA/Japan/Canada station with the Russian Federation Mir-2. Space Station Freedom underwent several major reviews and programmme reorientations¹⁰.

2. The Legal International Estructure

In the frame of the United Nations: The 1967 Space Treaty, the 1972 Convention on Internatio-

nal Liability for Damage Caused by Space Objects, the 1976 Convention on the Registration of Objects Launched into Outer Space, the 1979 Moon Agreement. Another relevant international instruments are the 1975 ESA Convention, the 1976 Intercosmos Agreement, and the 1988 Space Station International Agreement. There are several bilateral agreements, contracts and special arrangements.

Human flight in outer space demands substantial technological sophistication, a degree of training, crew capacity to withstand some physical and psychological stress, on a complex network for communication, tracking, and telemetry, in order to monitor from the ground what is actually happening in space. Flight in space demands a considerable recurring costs associated with the launch and provision of life support for each person on such flight. Estimations have been made that it costs as much as \$ 25,000 an hour to maintain one human life in Earth orbit¹¹.

The Russian Federation offers since August 1993 a comprehensive regulation named Law of the Russian Federation Space Activities.

In the American law, NAS Act assigns to NASA diverse powers and functions. NASA has established the rules to govern the station and training of astronauts, the conduct of astronauts, the provision for flight on non-US personnel on spacecraft of the US operated by NASA. There has never been doubt about NASA's legal capacity to arrange and conduct crewed spaceflights pursuant to provisions of the NAS Act. Through an exchange of letters between NASA and ESA, the first non-US citizen to fly aboard a US spacecraft was an ESA sponsored German payload specialist Ulf Merbold, who flew on the Space-lab-1 mission in November-December 1983. Another Collection of Rules addresses the Mission Critical Space System Personnel Reliability Program, in 14 CFB ch V, 1214.5. And, in addition to the NAS Act, the relevant portions of Title 14 of CFR, and in 14 CFR ch V, part 12-Extraterrestrial Exposure. The provisions of this part apply to all NASA crewed and uncrewed space missions establishing physical extraterrestrial contact. The US Congress has adopted law applying to invention in space¹².

3. The Draft Convention on Manned Space Flight.

In 1988, a common research project was ini-

tiated aiming at drafting by the Institute of Air and Space Law of Cologne University, represented by Prof. Karl-Heinz Böckstiegel, the Institute of State and Law of the Academy of Sciences of the Russia, represented by Prof. Vladen Vereshchetin, and the Research and Study of Space Law and Policy Center of the University of Mississippi Law School, represented by Prof. Stephen Gorove.

In connection with this draft, Prof. Böckstiegel said that, from all the information available, it seems to be clear that -though opinions may vary with regard to specific uses- manned space flight is indispensable and cannot be replaced for many scientific and commercial uses of outer space at the medium and long term. In this context, to become prepared for the most efficient implementation of manned space flight, the scientific and technical development will need continuous scrutiny and re-examination as well as the legal aspect connected with it¹³.

In connection with the opportunity of this project it was rightly anticipated the need of a convention: "for many reasons any initiative to pave the way for a convention on manned space flight can only be welcomed, and is to be encouraged"¹⁴.

The diverse comments on this draft during the International Colloquium held in Cologne May 20-22, 1992 are very useful for any future task on the matter in view that, as it was recalled, a more elaborated inter-national legal framework is required¹⁵.

Besides the papers and contributions presented in this Colloquium, the debate showed the opinion of more than ten experts.

4. Envoy of Mankind.

According to Art. V of the Space Treaty, States Parties to the Treaty shall regard astronauts as envoys of mankind in outer space and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of another State Party or on the high seas. When astronauts make such a landing, they shall be safety and promptly returned to the State of registry of their space vehicles.

This provision of the Treaty considers the astronaut as a subject as well as a legal object. As a subject he is entitled with the most high hierarchy to which a representative may aim: to be the envoy of mankind. As any legal subject he

has rights and duties. From his character of envoy of mankind, derives the duty of States to give him assistance and to return him to the State of Registry. Since he is the envoy of mankind, he is a messenger, and representative of Earth's civilization, more precisely, of the human culture. That implies the duty of certain behaviour, and of the observance of legal and moral principles, besides his scientific or technological knowledge, because he is not a political agent. He is an envoy to outer space, and not at, as the diplomat is.

The astronaut does not benefit himself with any diplomatic immunity given by any superior authority which which restrains him from national laws on the basis on some international convention on diplomatic relationships, The duty of assistance and rescue belong to all nations as a whole, and it is not limited to the Parties to the Treaty, as a recognition to the fact that astronauts face danger conducting activities for the benefit of all mankind¹⁶.

It was affirmed that the privilege of "envoy of mankind" conferred to an astronaut shall be based on his participation on space missions conducted for the Good of all mankind. Under these conditions,

- a) Astronauts participating in military space missions should not be considered as "envoy of mankind" unless this mission is internationally recognized to be for the Benefit of all Peoples;
- b) Passengers in manned space flights should be considered as envoys of mankind only if their mission is conducted for the Common Interest of All Mankind;
- c) Passengers in future commercial transport with part of the journey in outer space should not be considered as envoys of mankind. However, "Non Envoys of Mankind" should still be assisted by the international community in the terms of art. V of the Space Treaty¹⁷.

It was also observed that a problem arises from the relation of powers of two personalities in a manned space flight, namely the Director of Manned Space Flight Operations and the Commander of the Manned Space Object. The same author recalled the legal functions relating to the status of persons on board, the objects and legal transactions during the flight, functions particularly important during the long missions¹⁸.

An omission was adverted: "It is advisable to include some provisions regarding inventions or discoveries in or on manned space objects, which affect vital interests of mankind. In these cases,

the right to secrecy should be restricted and licenses should be made available to third countries at a reasonable cost -even nominal, in extreme circumstances. Moreover, time-limits for protecting intellectual property should, as advocated before, be shortened."¹⁹

The qualification of the astronaut as envoy of mankind, though limited to a humanitarian aspect, represents the new expression of international cooperation in the benefit of all mankind²⁰.

The possibility of persons to go to space with different purposes than those entrusted to astronauts by the Space Treaty, do not modify the status of astronauts. There is not a second generation of space laws supposedly empowered to review the basic principles of the *corpus iuris spatialis*, as it was proposed²¹.

Who affirms that the space provisions in force are not explicit enough when enshrining definitively mankind as a subject of law, think so because mankind is not a political unity. The political unity is not a prerequisite to be recognized as legal subject. This position is contradictory, thus these same authors recognize that the principle of envoy of mankind is a moral qualification; the result of this addition is a legal subject *par excellence*. No question about supranational status was posed. Nationality is a fundamental human right, that only its titular may change. There is no supranationality. Singular individuals, as persons, acquire the condition of natural subject of international law, without consideration of their nationality. The condition of natural subject embodies also *apatrides*.

5. Astronauts as subject and object of Space and International Law.

Traditionally, the concept of subjects of international law was understood as those endowed with international legal personality, that is to say the legal capacity to bear and to exercise rights and to incur, and to carry out obligations under international law. This concept is restrictive to individuals, because it was elaborated in favour of entities, like states and territorially organized entities, which are, and are recognized as sovereign and independent.

This concept confronts in the new international law, open by Space Law, where individuals, peoples and mankind, are primary subjects of international law, in the same sense that the new

constitutions have established that man is the primary subject of constitutional law.

In the restrictive sense, the individual is accepted in the quality of subject of international law. Bin Cheng, recalls that "even individuals and non governmental organizations, may also, by the consent of or recognition by existing international persons, be endowed with international legal personality and made subjects of international law²².

The humanist stream of doctrine in international law has had its most outstanding expression in Space Law, what benefits international law. This stream means a new Renaissance started this century and finds its roots in the legal field five centuries ago in the scientific international law of the School of Salamanca. It was born with the Discovery of America, that shows the bloom of the rights of man, of peoples and nations as meeting of individuals, as of mankind as a meeting of peoples²³.

If the individual is increasingly recognized as international legal subject, much more has been the astronaut who has been recognized with the peculiar and transcendent title of envoy of mankind. These words imply the recognition of two new legitimate subjects of international law, created by Space Law: the envoy is subject for his accomplish the functions of representative and, therefore, there cannot be any representation without an active subject; and mankind already enshrined as subject of international law in the United Nations Charter, as well that in an increasing number of international instruments elaborated therein, is ratified as passive subject represented by the astronaut. This recognition was given by all the members (international legal persons) of the General Assembly, that approved the respective text by unanimity and acclamation. Thus, there is only one representative of mankind in outer space and celestial bodies: the astronaut. No other legal subject may legally assume said mission.

The astronaut does not lose his nationality for being envoy of mankind. Because the right to a nationality is placed among the fundamental rights of the human person in accordance to the Universal Declaration of Human Rights. The most delicate issue to be considered, is to harmonize said character given by the community of nations and that nobody can deny in spite it could lack in the legal texts in force, with the necessary dependency with some government, international

organization, corporation or private person. The reasonable way is that employers recognize this fact and so limit their rights over other employees, rights that cannot be transferred without substantial modifications to the work of astronauts.

When these international instruments were elaborated, the idea of conquering space was among the major priorities of the defence ministries, and the concept that astronauts were and should be military personnel could not be put aside the mind, because of the secrecy imposed to all space activity, the risks of the space missions and the confidentiality of certain data, observations and registries. As this international tension lead to include space in every strategic plan has been overcome and nobody can think at the present in non pacific space activities, the moment has come to give the astronaut his own statute or charter.

The first regulations were given by NASA and are placed in the Code of Federal Regulations - Title 14, Chapter V NASA, Part 12-4, it refers from personal preference kit that astronauts may take to space up to the sanctions of prison.

From the individual astronaut of the beginnings there is an increasingly complex concept of crew. The domestic legislation of countries having astronauts, as the United States, differentiates the responsibilities of the commander onboard, superior authority leading the space vehicle, from the other members of the crew in accordance to their specialization. The commander decides any action on discipline and security, he takes any measure he considers necessary, uses any means he understands reasonable, including physical. His authority extends over any person onboard, independently of their nationality and including those persons that shall be transferred to other vehicle or base, or the astronauts who shall perform EVA missions. If necessary he is replaced by the pilot, who is a professional highly trained.

The specialists of the mission are astronauts trained on the operation of the space vehicle systems, linked to the payloads and familiarized with the needs and aims of these. He participates before the flight in the planification of the mission and is responsible of the global coordination between vehicles and payloads.

The specialist in payloads is considered by the American law as alien to the flight crew and does not need, as the other, to be an American citizen. He is encharged to put in motion and to operate a

particular instrument not of a mission, and he is not a professional astronaut. He is not able either to participate in EVA activities. We understand that all members of the space crew, independently of their functions and responsibilities are astronauts. From this principle of equality derives the same obligation to preserve their lives in all circumstance and moment of the space activity.

The crew of the Hermes air-space vehicle is integrated by only three astronauts, equally specialized because their functions were polyvalent. One of them assumed the commander function onboard, another was pilot able to replace him and the third was engineer onboard.

As there is not an international statute on the matter, Europeans proposed in their project of Intergovernmental Agreement, a Code of Conduct to be applied to all persons onboard a space station. It is a body of simple rules to govern life and work onboard an international space station.

The object of this code is to enunciate and define the framework of the commander authority who shall act not only in the name of the country from which he is citizen, but also on behalf the governs that have or may have personnel on board, as a whole. Among the rules established there are those related to the rotation of teams, procedures for official and private communications, time to rest, periods of physical training, behaviour in case of incidents, care of ill persons, rules to be observed in EVA activities, disciplinary power of the commander, eventual punishments and competent persons to apply them and in what cases, chain of commandment.

The code of conduct has the advantage of not needing a broad international text. Once established its content it can and must be inserted in the astronaut's contract.

Unfortunately there are many fatal victims in orbital flights for transport accidents. The biggest tragedy sawn by millions of persons was the Challenger's desintegration short after starting its mission.

Permanence in space has also risks. Sometimes only for the passing of time. Since the launching the astronaut's body is tortured for the terrible acceleration, and afterwards for the lack of gravity. In said environment man loses the feeling of equilibrium and his perception is modified. The blood mass goes to the head and most of them feel cardiac acceleration, neurosensorial difficulties, they suffer deorientation, there is no up and down, the motriz coordination is hard, lack or

hipersensibility of muscles reflex. It can be observed lesser mineral salts, calcium, that leads to great fragility in bones. The effects of cosmic radiation are stronger in higher altitudes. Out the natural protection of the Van Allen belt, that involves almost completely our planet at 500 km height, the risk increases beyond that height, particularly in EVA activities. Cosmic radiation greatly diminishes the immunity system of the astronaut and actives the bacterial development.

Furthermore, sometimes the astronaut is subject to all kinds of medical experiments. It has been rightly said that in space legs are not necessary, neither is the skeleton, but great brain and big eyes, in words of Heinze Oser, during the Colloquium organized by ESA and the European University of Philosophy in Paris (14 February 1987) on the Sociological Impact of the Space Conquest, recalled by G. Lafferranderie²⁴.

Activities already performed in space stations, made possible the reflection on the conditions of life and work in a multinational, multicultural, multiracial mini society in a hostile environment. Human factor shall be one of the reasons of success or failure of the inhabited space adventure. Whenever the manned space flights are longer, there are more human and social factors to be considered, they are the determinants of safety and of the pursuant goals. The individual psychological equilibrium, the quality of the interpersonal relationships are going to be decisive over the performances, making to forget safeguards, a lack of initiative, the refusal to phisical exercise or even the interruption of communications with Earth. It is important to create an amazing environment, stimulating remembering the natural cycle, the familiar and terrestrial media, letting the personalization of the "territory" of each astronaut onboard a space station. To study these phychological and phisiological aspects reference is often made to analog means as submarines, laboratories, mountain expeditions, speleology. But analogy has its limits as ingravity, mission duration, perceived risk level, number of persons, outside communications, international crews with differences in languages, cultures, religions. Besides this, the astronaut must be pilot, engineer and scientist, and be capable to accomplish a scientific experience, know his machine, and his own works as well as the work of his mates so to replace them eventually. He shall do different works, manipulate danger objects, toxins. He will live in a very limited space, permanently obser-

ved and heard from Earth, and receive instructions to work that shall ignore how hard movements in space are, movements that maybe he shall have to learn and forget those natural from Earth. A mistake in a manipulation, a wrong movement, a displacement wrongly controlled, a minor illness or a depressive feeling, or an excitement, shall be enough to put in danger the station as a whole. That is why law may and must make its own contribution to the astronaut's safety, in the specific life conditions and of work in space²⁵.

There are some astronaut's preventive health regulations of domestic range. For example the Guidelines and General Procedures for the Conduct of Spacelab Experiments Using Humans as Test Subjects -ESA- SL 79-01, 12 March 1979 and NASA Human Research, Policy and Procedures NASA-NMI 7100, 1987. The joint flight Apollo-Soyuz of 17 July 1975 implied certain special rules, as well as the development of the aerospace vehicle Hermes is peculiar because all its astronauts are European but from four different nationalities: German, French, Italian and British.

6. Rights and duties of astronauts.

The multiplicity of functions on board result in an increasing number of rights and duties of astronauts. In the beginnings we could simplify rights and duties as ruled by the labour contract, with special characteristics because it must take into account the training inconveniences and difficulty, as well as, the risk of exploration itself. And the responsibilities of astronauts could be seen as a responsibility towards himself, the safety of the vehicle, and the transported instruments, and towards third persons. In the Grissom cases, his personal responsibility must be considered also in the face of the State's responsibility. With reference to the capsule which was not designed to float, in spite the descending in the sea was previewed, and the lack of automatic locking in his space suit, by other side, the rescue helicopter lacked floater to alight on the water.²⁶

Among the different categories of rights that the astronauts enjoy, these can be mentioned:

- Previous to the mission: to discuss the conditions of the contract;
- To maintain his nationality;
- A special medical care before, during and post flights;
- Special protection from environmental risks;

- Special protection from risky medical experiments;
- Special social security;
- Communication with family members;
- To enjoy of his human rights, including privacy.
- Intellectual property for scientific research.
- To receive the benefits of the contract;
- To obtain adequate compensation for all damages;
- To be respected in his decisions in charge of the spacecraft;
- To act as public officer in civil cases relating to the status of persons on board and legal transactions during the flight;
- To be rescued safely and promptly returned to his launching authority;
- Compensation for death;

Among the duties, we can mention the following:

- To conduct the spacecraft;
- As commander: to exercise authority onboard;
- To adopt the decision in case of incidents or accidents;
- To avoid harmful contamination and adverse changes in the environment of the Earth;
- To inform any phenomenon discovered in outer space or celestial bodies, which could endanger human life or health, as well as any indication of organic life;
- To answer all requirements from Earth Control concerning his activities onboard;
- To observe the clauses of the contract;
- To maintain the confidentiality of his mission, if any;
- To assist with all available means the personnel on board or working extravehicularly, in every circumstances;
- To conduct extravehicular activities.

7. Issues to regulate:

When human society goes to space, both to a space station or celestial body, many circumstances call for the application of a legal principle that, naturally was not thought to be applied of Earth.

In a very complete study it is proposed to meet them under the title of rights and duties: in first place, the right to security and successively a broad spectrum that comprehends the protection of frequencies, the rules to qualify the astronaut, the right to a private life; the information of the

commander of all onboard news to Earth, and of the governments to the international community of phenomena discovered in space that could endanger the life or health of astronauts; civil questions, law applicable to civil acts concluded onboard, what is related to residence and address; right to intellectual property of the results of the experiences performed onboard, the responsibility in case of damage to persons or things onboard. The death of a person, the loss of a satellite, the destruction of an experience. When a crime is committed, the accused must be sent to the launching State, the territory of return, to the State of which he is national or to his employer? The territorial competence is determined by the State of the victim, or by the State of the accused? And what to say in case the astronauts would be forced to sacrifice one of them to save the life of the others? The astronauts are obliged to return, their personal safety after the launching and of the return, rules on quarantine in previewed cases; sanctions, character of the economic, administrative and criminal sanction²⁷.

8. Jurisdiction and control

Several provisions of the *corpus iuris spatialis* are the basis for the astronaut's statute. Among them, Art. VIII of the Space Treaty. The State of Registry maintains its national laws over the personnel and the space object. Art. 2 of the Registration Convention offers the possibility to diverse parts, i.e. of a space station, to get an agree upon jurisdiction and control over the space object and personnel onboard. This agreement shall be the basis for the régime applicable to the personnel onboard, to the life and work onboard. As it was observed, the deep philosophy of the Space Treaty is to avoid the formation of "national territories" in space²⁸.

Conclusions

1. Independently of his nationality, the astronaut that do not perform any political function and does not represent to any body or political unity, is protected in his character of envoy of mankind.

2. The quality of envoy of mankind does not imply any supranational status nor privilege eit-

her. It is based on humanitarian reasons common to any human being facing the risks and hostile environment where he works.

3. The quality of envoy of mankind is temporal; it lasts the mission in outer space or celestial bodies.

4. There is no envoy of mankind prior the launching or after the return to the launching State.

5. These two terms: envoy and mankind, embody two subjects. One active: the envoy in outer space or celestial bodies, as representative. The other, passive: mankind represented by the astronaut acting in outer space and celestial bodies.

6. As envoy of mankind he is an exponent of the human civilization, or more precisely, of the human culture.

7. The capacity of the envoy implies behaviour, observance of legal and moral principles and respectfulness to the command chain, besides of his scientific or technological goals and activities.

8. All members of the space crew are astronauts, independently the function they may accomplish on board or in EVA missions.

9. The provisions of the Space Treaty as *Charta Magna of Outer Space*, are international constitutional law, therefore, they have the inmutability of said principles.

10. It is necessary to continue the studies concerning the convention on human space flights by health professionals, psychologists, managers of projects, astronauts corps, and similar institutions with lawyers to endowe promptly an international legal statute to astronauts.

Notes

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¹² S. DOYLE, *op. cit., loc. cit.*, p. 43 to 54.

¹³ Karl-Heinz Böckstiegel, *Preface and Introduction, Manned Space Flight- Legal Aspects in the Light of Scientific and Technical Development*, Ed. K.H. Böckstiegel, The University of Cologne, 1993, p. 12.

¹⁴ Michel Bourély, *The legal status of personnel on international space station missions*, in *Manned space flight cit.*, p. 84. (See also, M. Bourély, *Toward a convention on the legal status of manned international space flights*, *Proceedings of the 20th Colloquium of the IISL*, Munich, 1979).

¹⁵ N. Jasentuliyana, *Legal aspects of human safety and rescue in space*, in *Manned Space Flight*, *cit.* p. 172.

¹⁶ G. Laferranderie, *op. cit., loc. cit.*, p.270.

¹⁷ Rafael Lorza Pitt, *Comments Regarding the Draft Convention*, in *Manned Space Flight*, *cit.*, p. 206-207.

¹⁸ Vladimir Kopal, *Some Problems Relating to the In Flight Personnel Régime of Manned Space Object*, *Manned Space Flight cit.*, p. 91.

¹⁹ Maureen Williams, *Benefit for third countries*, in *Manned Space Flight*, *cit.* p. 138-139.

²⁰ G. Lafferranderie, *op.cit., loc. cit.*, p. 278.

²¹ Yasuaki Hashimoto, *The status of astronauts toward the second generation of Space Law*, *Proceedings of the 36th Colloquium, Graz, 1993*, pub. by AIAA, Washington, 1994, p. 209.

²² Bin Cheng, *Nationality for spacecraft?*, in *Air and Space Law: De Lege Ferenda*, Leiden University, 1992, p. 203. See further B. Cheng, *Introduction Au Titre I Les Sujets du Droit International*, in *Droit International: Bilan et Perspectives*, N 23 M.Bediaoui, ed. 1991.

²³ See Aldo Armando Cocca, *V Centenario de los Derechos del Hombre, de los Pueblos, de las Naciones y de la Humanidad*, Ed. Consejo de Estudios Internacionales Avanzados, Buenos Aires, 1992.

²⁴ G. Lafferranderie, *Pour une Charte de l'Astronaute*, *Annals of Air and Space Law*, Montreal, 1988, Vol. XII, p. 266.

²⁵ G. Laferranderie, *G. op.cit, loc.cit.* .p. 266-267.

²⁶ G. Laferranderie, *op. cit., loc. cit.*, p. 272-274.

²⁷ Aldo Armando Cocca, *Legal status of the astronaut*, *Proceedings of the 4th Colloquium*, Washington 1961, pub. The University of Oklahoma 1963, p. 145-146. Further, *Los problemas de la responsabilidad ante la convivencia en estaciones espaciales*, *Boletín de la Facultad de Derecho y C. Sociales, Córdoba*, 1965, p. 81-94; *La representatividad acordada al cosmonauta por el Tratado del 27 de enero de 1967*, *Instituto Nacional de Derecho Aeronáutico y Espacial*, Buenos Aires, 1968, p. 359-375.

²⁸ G. Laferranderie, *op. cit., loc. cit.*, p. 275.