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DES ARMÉES

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# DEFENCE ETHICS COMMITTEE

# OPINION ON ETHICS OF SPACE DEFENCE

**29 September 2022**

# Executive Summary

(1) Since the beginning of space exploration, space has been an ambivalent environment for mankind. From the late 1950s onwards, space programmes were factors of international prestige and strategic levers, enabling major military powers to assert their capabilities (launch vehicles, satellites, probes), to develop new weapon systems (ballistic missiles) and to implement new observation equipment (satellites). At the same time, under the auspices of the United Nations, the international community successfully defined common, humanist-inspired principles and rules that are on a par, as stated in the Preamble to the 1967 Treaty, with the "great prospects opening up before mankind as a result of man's entry into outer space" and the "common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes". These provisions are still in force today.

(2) The dual nature of space activities is today more marked. Space has become a new dimension of globalisation and an economic playing field where public and private actors compete and develop commercial activities. A large part of the world's human population now uses the "space services" provided by satellites owned by a considerable number of countries. There is also extensive scientific research and international cooperation (e.g. the International Space Station). Some twenty countries operate satellites and, in 2022, approximately 13,000 operational satellites are in orbit around Earth. Militarisation of space is also growing. Many commercial satellites have a dual purpose (civilian and military). New state and private actors with ambitions for space and the capacities to achieve them have appeared. Finally, some space powers harbour overtly aggressive ambitions. In fact, outer space has become an environment of demonstration and confrontation in the same way as land, sea, air and cyberspace.

(3) This opinion on the ethics of space defence identifies six guiding principles and sets out eight guidelines:

Guiding Principles

P1 The implementation of space defence by France is necessary, legitimate and compatible with ethics of public interest and with action in favour of peace and stability.

P2 The defence of the Nation can legitimately be conducted in, through, to and from space, on the understanding that, in space as elsewhere, this defence must be carried out in strict compliance with the law of armed conflict (necessity, proportionality, discrimination).

P3 Although the space environment brings new problems and constraints, it must not lead to disregarding the fundamental principles governing the use of armed force.

P4 Military operations that could avoid using force (avoidance) or which lead to using armed force in, through, to and from space may only be conducted under military command and implemented by active military personnel or the operational reserve. In peacetime and all the more during wartime, the control of military space operations requires an ongoing assessment of the situation and the ensuing decisions (situation monitoring, classification, reconnaissance, targeting, neutralisation) by the military command and under its responsibility.

P5 In the event of war, combat in, through, to and from space must comply with the law of armed conflict. Space warfare, in and to space, should be understood as all military actions targeting a military space object, whether or not it is manned, in strict compliance with the law of armed conflict.

P6 The legitimacy of space defence policy has as a corollary the legitimacy of scientific and technical research aiming to develop the necessary military space capabilities.

Guidelines

G1 Promote rules of good conduct necessary for the responsible and reasonable use of space by all actors.

G2 Limit the impact of military actions in space on the space environment, notably by striving to avoid the creation of space debris, particularly long-lived debris.

G3 Ensure that the persons responsible for military actions in space are aware of the risks of misunderstandings over the attribution and characterisations of such actions.

G4 Study the benefits, in the short to medium term, of establishing a conventional boundary between outer space and national airspace in order to guarantee legal certainty for users of outer space.

G5 Take the psychological dimension of space-based remote warfare into account.

G6 In accordance with the requirements inherent in the conduct of military operations, define the necessary points of doctrine in order to be able to use services provided by trusted civilian operators (such as the supply of images, energy, telecommunications), given the needs and circumstances, and obviously without delegating armed force or general administrative policing powers inherent in the exercise of public force.

G7 Foster the emergence of academic expertise on space defence strategy.

G8 Encourage states to declare the purposes pursued by satellites launched with their authorisation.

# Contents

## Table of Contents

## Preamble

(4) The Defence Ethics Committee has been asked by the French Minister for the Armed Forces to give an opinion on “Ethics of Space Defence”.

(5) To conduct its work, the Committee consulted numerous key figures, both civilians and military, and visited units and organisations involved in space defence strategy. It therefore met representatives from the Direction Générale de l’Armement (DGA, French defence procurement agency), the Centre National d’Etudes Spatiales (CNES, French space agency), the Commandement de l’Espace (CDE, French space command), the Direction Générale des Relations Internationales et de la Stratégie (DGRIS, Directorate General for International Relations and Strategy), the Direction des Affaires Juridiques (DAJ, Legal Affairs Directorate), the Fondation pour la Recherche Stratégique (FRS, Foundation for Strategic Research) and a private corporation.

(6) In accordance with its mission, the Committee refrained from directly addressing the political and diplomatic aspects of space activities, as well as issues pertaining to international and scientific cooperation and to restraint in space. However, the Committee was required to take some of these questions into account, where it considered them to have a definite connection with defence.

# I. Outer Space: an ambivalent environment for mankind

(7) Due to the particular conditions prevailing in outer space, it constitutes in military doctrines, in particular in French doctrine, an environment in its own right, even though no physical boundary is established in law between outer space and airspace or the earth's atmosphere. It has also been considered an "operational domain" in its own right by NATO since November 2019[1]. The Kármán line (i.e. 100 km) is the lower limit of outer space accepted by the International Aeronautical Federation (i.e. the limit above which air is so scarce that an aircraft can no longer fly unless it reaches a speed that puts it into orbit). However, this position is not an international convention and has no binding force.

(8) Outer space can be divided into two zones: circumterrestrial space and the zone beyond, called deep space. Circumterrestrial space is expected to remain the space of interest to armed forces until 2040[2].

(9) Circumterrestrial space is sub-divided into three principal orbital zones:

- Low Earth Orbits (LEO), at an altitude of less than 2,000 km, mainly used to place observation and communication satellites;
- Medium Earth Orbits (MEO), between 2,000 and 35,786 km, mainly used to place radio navigation satellites (GPS, Galileo, etc.);
- Geostationary Orbit (GEO), at approximately 36,500 km, is a special case of geosynchronous orbits, of great interest for many civilian and military uses (telecommunications and early-warning satellites) as a satellite is then "stationary" in relation to Earth.

(10) The conquest of space began after World War II and the first man was sent into space less than 65 years ago (cf. Appendix I). Military purpose was the initial reason for the development of space activities but not the only one and civilian research was involved from the outset. In fact, space has been and remains an ambivalent environment for mankind.

(11) Today, space is cluttered with 9,000 tonnes of debris, including 36,500 items measuring more than 10 cm in diameter and over a million of more than 1 cm.

## A. Since the beginning of its exploration, space has been an ambivalent environment for mankind.

(12) Space programmes, which were factors of international prestige and strategic levers, enabled major military powers to assert their capabilities (launch vehicles, satellites, probes), develop new weapon systems (ballistic missiles) and obtain new observation equipment (satellites).

(13) At the same time, under the auspices of the United Nations, via the Committee on the Peaceful Use of Outer Space (COPUOS), the international community successfully defined common, humanist-inspired principles and rules that are on a par, as stated in the Preamble to the 1967 Treaty, with the "great prospects opening up before mankind as a result of man's entry into outer space" and the "common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes". These provisions are still in force today.

[1] https://www.nato.int/cps/en/natohq/topics_175419.htm At the December 2019 Leaders' Meeting in London, Allies declared space a fifth operational domain, alongside air, land, sea and cyberspace. In their declaration, NATO Leaders stated: "We have declared space an operational domain for NATO, recognising its importance in keeping us safe and tackling security challenges, while upholding international law."

[2] Space Defence Strategy https://www.vie-publique.fr/sites/default/files/rapport/pdf/194000642.pdf

(14) Thus, at the international level, space law consists essentially of five Treaties or Agreements negotiated, remarkably, during the Cold War:

- The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (which came into force on 10 October 1967);
- The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (which came into force on 3 December 1968);
- The Convention on International Liability for Damage Caused by Space Objects (which came into force on 1 September 1972);
- The Convention on Registration of Objects Launched into Outer Space (which came into force on 15 September 1976);
- The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (which came into force on 1 July 1984; not ratified by France).

(15) Within outer space, these treaties guarantee:

- Freedom of exploration and use;
- Freedom of scientific research;
- Equality among all states;
- Applicability of international law including the Charter of the United Nations;
- The principle of non-appropriation by any country;
- The ban on placing weapons of mass destruction in space;
- Use of the Moon and other celestial bodies for exclusively peaceful purposes;
- Mutual cooperation and assistance, astronauts being deemed "envoys of mankind".

(16) Guidelines such as those issued by the IADC (Inter-Agency Space Debris Coordination)[3] for the management of space debris or by the United Nations Committee on the Peaceful Use of Outer Space concerning the long-term sustainability of outer space activities [4] supplement the abovementioned treaties and agreements, although they are not of a universal nature. There are also initiatives such as the ARTEMIS Agreements[5] of 13 October 2020 signed by twelve countries, including France, laying down the principles of cooperation for the civilian exploration and use of the Moon, Mars, comets and asteroids for peaceful purposes. The legal references taken into account in this opinion, including domestic provisions and particularly the French Space Operations Act of 3 June 2008 completed by the Ordinance of 23 February 2022, are listed in Appendix 2.

## B. The dual nature of space activities is today more marked

### a) Space has become an economic playing field and a new dimension of globalisation

(17) Today, space is an arena for extensive scientific research and international cooperation (e.g. the International Space Station). However, there is also economic competition between public and private actors who have developed commercial activities to the point of creating what is now known as "New Space". And launch sites, such as Kourou and Baikonur, are used by operators other than the national entities.

(18) Finally, a large part of the world's human population now uses the "space services" provided by satellites owned by a considerable number of countries. According to the Union of Concerned

[3] https://www.iadc-home.org/what_iadc

[4] https://www.unoosa.org/oosa/en/ourwork/topics/long-term-sustainability-of-outer-space-activities.html

[5] https://www.state.gov/france-becomes-twentieth-nation-to-sign-the-artemis-accords/

Scientists (UCS)[6], approximately 13,000 operational satellites are in orbit around Earth in 2022. Some twenty countries (including the European Space Agency) or multinational projects operate satellites for purposes of:

- Telecommunications;
- Television broadcasting;
- Earth observation;
- Observing and measuring space (telescopes);
- Meteorology;
- Locating.

(19) Many human activities on land, at sea, in the air and in cyberspace have become entirely dependent on the space sector and its capabilities. The benefits of using space to deploy these services are fourfold:

- Permanent access to the service by use of a geostationary position or constellations;
- Reduced costs (for certain missions, an observation satellite is more cost-effective than several reconnaissance flights by aircraft);
- Access to remote parts of Earth or space;
- No sovereignty in space, and therefore the freedom to observe and fly over any territory without the prior consent of the relevant states.

(20) Finally, in the context of scientific programmes, space exploration or measurement probes are sent from Earth and travel through near outer space to reach distant objects. The remote controls and telemetry of these vehicles are sent from Earth to space. They are transmitted and received from a series of ground stations and control centres.

## b) Militarisation of space is growing

(21) On the one hand, commercial exploitation has not come with a regression of military space: many commercial satellites are of dual (civilian and military) interest. On the other hand, new public and private actors with ambitions for space and the capabilities to achieve them have emerged and there could come a time when terrorist groups gain access to space. Consequently, it is not unreasonable to think that there could be a risk of sabotage, hijacking or theft of space objects, beyond cyberattacks on control stations, which are today within their reach.

(22) Finally, some space powers harbour overtly aggressive ambitions and, as a result, outer space has become a zone of confrontation in the same way as land, sea, air and cyberspace.

(23) A growing number of states are deploying communication, observation, listening or locating satellites for military purposes, enabling them to develop knowledge and foresight capabilities, project and command forces several thousand kilometres away and provide them with operating aids (GPS, COMINT, observation). A number of satellites that can be described as dual-use, although they are not always identified as such, also provide services to the armed forces, whether they are clients or owners. While these services provide additional operational capabilities, they also serve to prevent conflicts (including through climate and migration monitoring), ensure compliance with international humanitarian law (damage assessment), and impose a sort of transparency obligation since the actions undertaken by one state can be observed by other third states or non-state organisations or groups. The development of space law during the Cold War also

[6] https://www.unoosa.org/oosa/osoindex/search-ng.jspx?lf_id=

targeted "arms control", with satellites representing a valuable tool for verification measures under the major disarmament treaties.

(24) Furthermore, the show-of-force strategies pursued by certain unrestrained powers are now being deployed in space, generating mounting tension (risks of unfriendly manoeuvres, anti-satellite missile launches (ASAT systems), jamming of electronic components or remote control or telemetry frequencies, lasers)[7]. The example of the Luch Olymp 'stalker' satellite which came close to France's Athena-Fidus telecommunications satellite in 2018, or the destruction by certain states of one of their satellites for testing purposes from Earth (Chinese launch in 2007, American launches in 1985 and 2008, Indian launch in 2019, Russian launch in 2021), bear witness to this aggressiveness. In a general context of heightened power relationships within the 'competition, contestation, confrontation' continuum, space is becoming the object of rival ambitions and a scene of growing tension.

(25) After long being reserved for a handful of states, access to space is now possible for emerging powers and private actors. While the opening up of space brings opportunities for the French armed forces (telecommunications, observation, locating), it also comes with risks for France's interests.

(26) Non-state armed groups can also use assets deployed in space (for telecommunications, positioning, etc.).

(27) The militarisation of space takes different forms:

- Satellites exclusively intended for military purposes;
- Native hybrid satellites: e.g. communications satellites carrying both civilian and military transponders;
- Commercial satellites with a customer that is an overt military actor;
- Commercial satellites used by a customer for military purposes;
- Satellite infrastructure;
- Command and control infrastructure.

### C. Development of the use of space for military purposes raises new questions

(28) While the 1967 Outer Space Treaty stipulates that space activities must be carried out in accordance with international law, including the United Nations Charter, with a view to maintaining international peace and security, and that the parties shall use the Moon and other celestial bodies exclusively for peaceful purposes, the same international law recognises the right of states to defend themselves and also authorises enforcement measures decided by the United Nations Security Council. How do these two principles fit together?

(29) Can space be considered an environment of conflict like any other or should more restrictive conditions than those resulting from the law of armed conflict be imposed in view of the physical characteristics of space[8]?

[7] It should be noted that Fractional Orbital Bombardment Systems (FOBS) which include orbital hypersonic gliders are not space objects within the meaning of the Outer Space Treaty. They are ballistic devices that do not complete a full orbit.

[8] Radically inhospitable environment for humans, speed of travel of space objects, satellites or debris, extreme danger of impacts and collisions, very long life span in orbit.

(30) Should the right to self-defence in space be limited to attacks from space and those targeting our interests in space? Or can it more broadly cover responses to attacks in the air, on land, at sea or in cyberspace?

(31) Does the concern to minimise space debris, which can very quickly and significantly increase in number and make it impossible to use several orbits for many years, mean that French satellites should not be destroyed or neutralised for testing purposes? Or enemy satellites in the event of conflict?

(32) In the event of a conflict with a state, are civilian satellites used for military purposes by that state lawful targets? To what extent and by what characterisation procedures? In any event, would it not be appropriate to establish an international rule requiring the identification of satellites in order to distinguish between military and civilian objects, bearing in mind that there are dual-use satellites?

(33) Shouldn't the uncertainty as to the physical boundary between airspace and outer space be dispelled, given that this boundary serves not only to define the scope of application of different legal systems but may also lead to characterising a violation or non-violation of national airspace?

(34) Given the inherent difficulties of space situational awareness due to the limits of technology currently available, what measures can be taken to limit the risks of accidents, incidents, or misinterpretation?

(35) What missions or services can the French military authorities legitimately entrust to or request from national civilian operators?

# II. Towards ethics of military space defence

## A. The need to promote responsible behaviour in space

(36) The treaties and principles governing the activities of states in the exploration and use of outer space, including the Moon and other celestial bodies, are still fully relevant:

- State activities must comply with international law;
- States are free to explore and use outer space;
- States are free to conduct scientific research and should encourage international cooperation;
- States may not subject space and celestial bodies to any form of national appropriation by proclaiming sovereignty, or by use, occupation or any other means;
- States are under an obligation to assist astronauts in difficulty;
- States are prohibited from placing in orbit objects carrying nuclear weapons or any other type of weapons of mass destruction and from placing such weapons on celestial bodies or in outer space;
- States are prohibited from establishing military bases, installations or fortifications and from performing military tests or manoeuvres on celestial bodies;
- States have international responsibility for national actions undertaken by public or private, governmental or non-governmental organisations within their jurisdiction;
- States must respect the principle of cooperation and mutual assistance.

(37) In addition to the letter of these stipulations and principles, it is important to promote the spirit thereof, as widely as possible, in the general interest of mankind: free access, use for peaceful purposes, international cooperation, pursuit of the good of all people. In this regard, Articles VI, VII, VIII and IX of the 1967 Outer Space Treaty laying down both the principle of international

responsibility of states and the ambition of the States Parties to prevent or reduce the negative impacts of certain space activities set the example.

(38) While it is not for the Ethics Committee to take a stand on the conclusion of new international treaties or agreements, it does consider it essential to promote rules of good conduct necessary to ensure the responsible and reasonable use of space by all the actors involved. As mankind becomes increasingly dependent on services provided from space, it must do its utmost to preserve the integrity of space over the long term and to avoid any misunderstanding or risk of an incident, which could potentially generate tensions or even conflicts. Furthermore, space traffic should be regulated, the nature of services provided to or from space should be defined and orbit pollution should be reduced by means of an operational space traffic regulation system.

G1: Promote rules of good conduct necessary for the responsible and reasonable use of space by all actors.

(39) Responsible and reasonable use of space should foster:

- Trust and transparency by sharing as much information as possible about launches, orbital data and potential anomalies and purposes, within the limits of operational requirements;

- The preservation of the space environment and safety of space traffic by:

  - minimising the creation of long-lived space debris and agreeing not to destroy satellites, particularly in the context of tests;
  - refraining from any manoeuvre likely to create accidents or collisions between space objects, other than to gain a proportionate operational advantage, in particular to avoid a dangerous or non-cooperative manoeuvre by another satellite.

- Reinforced legal certainty for users of outer space and, more broadly, the prevention of any risk of incidents; to this end, the benefits, in the short or medium term, of establishing a conventional boundary between outer space and national airspace should be assessed;

- In-orbit cooperation between space stakeholders consisting of scientists, New Space actors, space agencies and the International Telecommunications Union in the regulation of the spectrum/orbit resource.

## B. Legitimacy of space defence

(40) The implementation of space defence by France is compatible with ethics of public interest and with action in favour of peace and stability. France can legitimately be present in space to ensure its defence. Using space as a high ground for operations conducted on Earth does not preclude the pursuit of the general interest of mankind as long as such use complies with international law and the UN Charter (action in the event of a threat to peace, breach of the peace or act of aggression; individual or collective self-defence).

P1: The implementation of space defence by France is necessary, legitimate and compatible with ethics of public interest and with action in favour of peace and stability.

(41) Through French military presence in space, France can:

- Prevent, by monitoring space activities and observing the Earth from space;
- Protect the interests and activities of all French space operators;
- Participate in land, sea and air operations that France may be required to conduct in the context of its defence, its alliances or pursuant to Chapter VII of the United Nations Charter.

P2: The defence of the Nation can legitimately be conducted in, through, to and from space, on the understanding that, in space as elsewhere, this defence must be carried out in strict compliance with the law of armed conflict (necessity, proportionality, discrimination).

(42) Space warfare, in and to space, can be defined as all military actions targeting a space object, whether or not it is manned.

P5: In the event of war, combat in, through, to and from space must comply with the law of armed conflict. Space warfare, in and to space, should be understood as all military actions targeting a military space object, whether or not it is manned, in strict compliance with the law of armed conflict.

(43) However, in space, respecting the principles of the law of armed conflict involves making particularly difficult assessments.

(44) Some space objects are exclusively military. Others are civilian and provide useful, or even necessary services to populations and civilian activities. Other objects, referred to as dual-use, may provide vital services for the survival of populations while being objects of military interest by offering the possibility of retaliating or contributing to an attack, defending another space object, attacking a terrestrial target or providing support for a land-based military operation. Civilian and dual-use space objects can be designed to detect, identify and respond to the approach of another object or to the knowledge of an intention to attack them. Assessing the situation is a fundamental stage in the decision-making process to ensure compliance with the law of armed conflict. This assessment must therefore be fully mastered by the military chain of command.

(45) Finally, space is becoming increasingly crowded (multiplication of state and commercial actors, multiplication of objects, debris, etc.) and has become an environment where there is a genuine risk of collisions with consequences for objects (destruction of satellites), humans (death of astronauts) or even chain reactions with disastrous consequences for all or part of mankind, such as a possible “digital winter”. Therefore, owing to the characteristics of space, careful attention must be paid to the possible impacts of actions undertaken in this environment and, in any event, our armed forces must avoid creating space debris, particularly long-lived debris. Efforts should be made to promote the adoption of a standard relative to this duration.

G2: Limit the impact of military actions in space on the space environment, notably by striving to avoid the creation of space debris, particularly long-lived debris.

(46) Another area of concern is lethality because, although a space object is most often unmanned, an action against the integrity or availability of a space service (e.g. a GPS constellation or the observation or telecommunication satellites used by emergency services) could have very negative impacts on the activities involved, and could even endanger human lives.

(47) According to the October 2017 Strategic Review, space has characteristics that "are particularly prone to clandestine action and manipulation.[9]" In view of the surveillance resources available and the possibility of changing the orbit of space objects, the question now arises of attribution[10] and characterisation[11] of actions, as in cyberdefence. The detection of a potentially dual-use object approaching another object cannot constitute proof of an attack or intrusion unless technical means are available to precisely identify it[12].

G3: Ensure that the persons responsible for military actions in space are aware of the risks of misunderstandings over the attribution and characterisations of such actions.

(48) As in the case of the law of the sea and the territorial limits at sea and on the high seas, the question of the boundary between two spaces, one standardised, i.e. airspace, and the other unregulated, i.e. outer space, could be a source of dispute. In particular, disputes or incidents could arise if there is no consensus on this boundary.

G4: Study the benefits, in the short to medium term, of establishing a conventional boundary between outer space and national airspace in order to guarantee legal certainty for users of outer space.

(49) As with drones, the question of the ethics of remote warfare arises. Via the space environment, a strike can be organised, ordered and carried out from space in compliance with the treaties (provided that no weapon of mass destruction is used). The psychological impact on the human operators who implement such a remote strike should be taken into account.

G5: Take the psychological dimension of space-based remote warfare into account.

C. The need to respect the military nature of French space defence

P3: Although the space environment brings new problems and constraints, it must not lead to disregarding the fundamental principles governing the use of armed force.

(50) These principles have been reiterated by the Defence Ethics Committee in its previous opinions and are firmly rooted in the military status, i.e. the unique legal regime governing the general status of military personnel and the ensuing obligations, as well as in the normative framework of domestic or international law that governs the use of force by our armed forces.

[9] French Ministry of the Armed Forces, Defence and National Security Strategic Review, October 2017, p. 72.

[10] Here, the Committee defines attribution as publicly linking an action to an actor.

[11] The Committee defines characterisation as formally describing an action observed.

[12] The Committee defines identification as the successful recognition of an actor.

(51) This uniqueness is primarily related to the mission of the armed forces and the resulting obligations, namely:

- The constitutional nature of the armed forces' mission, which contributes to safeguarding the fundamental interests of the Nation, including its independence and territorial integrity;
- The constitutional principle of having armed force at disposal, pursuant to Articles 5, 15, 20 and 21 of the French Constitution;
- Military status and the general statute of the military[13], which govern the military function and form a unique legal system, notably with the primacy of the mission and exceptional ordinary law constraints, including Articles:
- L 4111-1 of the French Defence Code: "The armed forces of the Republic serve the Nation. Their mission is to prepare and ensure the defence of the homeland and its best interests by armed force. Status as a member of the armed forces requires under all circumstances a spirit of sacrifice, which may include the ultimate sacrifice, discipline, availability, loyalty and neutrality."
- L 4122-1: Soldiers have a duty to obey the orders of their superiors and are responsible for the execution of missions with which they are entrusted.

(52) Secondly, this uniqueness is expressed in the armed forces' general rules of discipline, codified in Articles D.4122-1 to D.4122-11, and entirely focused on excellence and exemplary behaviour and action. These provisions particularly stipulate:

- on the one hand, the obligations attaching to military duty, namely:
- honour and dignity,
- obedience to orders received,
- full responsibility of the command for orders given,
- primacy of the mission and the engagement of all in action against the enemy, conducted with energy and self-sacrifice, including risking one's life, until success is achieved or all means of action are exhausted;
- on the other hand, rules governing the use of armed force and combat actions, including in particular:
- the prohibition placed on superiors or subordinates to give or execute orders that are contrary to French or international laws,
- the subjection of soldiers to the obligations arising under international law applicable to armed conflict and the obligation to train them in understanding and complying with such law: the distinction between combatant and non-combatant, proportionality, caution, the ban on causing unnecessary suffering and the principle of humanity,
- the obligation to direct attacks exclusively against military targets or targets of military significance and the requirement of proportionality between the violent action and the expected military advantage,
- the sole use of force required for the mission,
- the duty placed on a military leader to ensure their subordinates are trained and prepared for active service,
- the legitimacy of means employed, stemming from exemplary behaviour, discipline and rigorous execution.

[13] As a reminder, military statute, which is both legislative and regulatory, stems from the constitutional foundations of military status. These foundations govern the military function consisting of the men and women who are governed by this status and statute.

(53) Military status is also unique in that the general rules of discipline directly refer to the principles of necessity, proportionality, humanity and distinction between combatants and non-combatants laid down by the law of armed conflict, which are incorporated into French military conduct guidelines[14].

(54) Lastly, while the mission of soldiers is to defend France by armed force and therefore represents "legislative permission" to inflict death on our enemies in combat actions carried out by our forces, this special immunity from criminal liability does not carry immunity from the provisions of the French Penal Code punishing war crimes and offences committed during an international or non-international armed conflict (Articles 461-1 to 462-11 of the Penal Code) no more than, and unlike other countries, from Articles 25, 28, 30, 31, 32 and 33 of the Rome Statute of the International Criminal Court. These provisions are reproduced in Appendix 2.

(55) In all these cases, military leaders and those executing their decisions may incur liability. This principle is a cornerstone of military ethics and is therefore fully enshrined in substantive law.

P4: Military operations that could avoid using force (avoidance) or which lead to using armed force in, through, to and from space may only be conducted under military command and implemented by active military personnel or the operational reserve.

In peacetime and all the more during wartime, the control of military space operations requires an ongoing assessment of the situation and the ensuing decisions (situation monitoring, classification, reconnaissance, targeting, neutralisation) by the military command and under its responsibility.

(56) French Act No. 2008-518 of 3 June 2008 on space operations, as amended by Ordinance No. 2022-232 of 23 February 2022 and clarified by Decree No. 2022-235 of 24 February 2022 on the requisitioning of space goods and services, provides the necessary legal basis to secure the assistance of private operators. It enables the government to enter into agreements providing for a temporary transfer to it, in the interests of national defence, of control over a satellite of which the state is neither the owner nor the operator, or the priority supply of services based on direct use of such a satellite. In addition, in the event of an emergency and where no other means are available, provision is made for the transfer of control or the supply of the necessary services by means of requisition. The conditions of use of this system must comply with the general framework governing the action of the French armed forces.

G6: In accordance with the requirements inherent in the conduct of military operations, define the necessary points of doctrine in order to be able to use services provided by trusted civilian operators (such as the supply of images, energy, telecommunications), given the needs and circumstances, and obviously without delegating armed force or general administrative policing powers inherent in the exercise of public force.

(57) An adversary who conceals military capabilities in a civilian object may be considered to have feigned "civilian or non-combatant status" within the meaning of Article 37(c) of the First Additional Protocol to the Geneva Conventions and to have committed an act of perfidy.

(58) Dual-use satellites would become potential military targets, subject to case-by-case assessments of the situation having regard to the effects of military action under the law of armed conflict.

[14] General rules of discipline of the armed forces codified in Articles D4122-1 to D4122-11 of the French Defence Code.

(59) French academic research, in particular multidisciplinary research, on the strategic and legal aspects of the new challenges of space should therefore be developed and supported.

G7: Foster the emergence of academic expertise on space defence strategy.

(60) In addition, outside the national territory, other actors could soon play a role in space. For example, private New Space actors aim, in essence, to secure a certain form of independence for their commercial action. They may cooperate with military powers or act on their own behalf. Their status under the law of armed conflict should therefore be clarified. Finally, even in a context of self-defence, in an intrinsically dual environment, it must be possible to characterise aggression and to define conditions for the response (countermeasures/retaliatory measures, including in other areas of combat, etc.), while integrating the need to attribute the act.

P6: The legitimacy of space defence policy has as a corollary the legitimacy of scientific and technical research aiming to develop the necessary military space capabilities.

G8: Encourage states to declare the purposes pursued by satellites launched with their authorisation.

# III. Appendices

## Appendix 1: Key Dates in Space History

(61) Competition in the race to outer space began at the end of World War II, with the launch of the German V2 on 20 June 1944, the first missile to reach an altitude of 100 km.

(62) The launch of Sputnik into orbit on 4 October 1957 then heightened the Americans' ambition to be the first to land on the Moon and triggered an international competition:

- First orbital flight of an American satellite launched by an American launch vehicle: 1 February 1958;
- First manned orbital flight (the Soviet Yuri Gagarin): 12 April 1961;
- First complete manned space mission (the American Alan Shepard): 5 May 1961;
- First spacewalk by an astronaut (the Soviet Alexis Leonov): 18 March 1965;
- First French satellite (Asterix) launched by a French launch vehicle (Diamant), making France the world's third largest space power: 26 November 1965;
- First (and only) nuclear test in space (Strafish prime) highlighting the deadly dangers for astronauts and the effects on equipment in orbit: 9 July 1962;
- First flight over another planet (Venus) by an American probe: 14 December 1962;
- Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water; adopted: 5 August 1963; entry into force: 10 October 1963;
- First rendezvous between two (American) spacecraft: 15 December 1965;
- First landing of a (Soviet) space probe on the Moon: 3 February 1966;
- Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies; adopted: 19 December 1966; entry into force: 10 October 1967;
- Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space; adopted: 19 December 1967; entry into force: 3 December 1968;
- First (Soviet) space shuttle to make a return trip from space to earth: 7 July 1969;
- Man's first step on the moon (Apollo II mission by the Americans Neil Armstrong and Buzz Aldrin): 21 July 1969.

(63) The end of the 20th century can be defined as the period of launch vehicles, space stations, growing international cooperation and a limitation on manned travel following space shuttle accidents:

- First (Soviet) manned space station: 19 April 1971;
- Convention on International Liability for Damage Caused by Space Objects; adopted: 29 November 1971; entry into force: 1 September 1972;
- Launch of the US space station: 14 May 1973;
- Creation of the European Space Agency: 30 May 1975;
- Convention on Registration of Objects Launched into Outer Space; adopted 12 November 1974; entry into force: 15 September 1976;
- Agreement Governing the Activities of States on the Moon and Other Celestial Bodies; adopted: 5 December 1979; entry into force: 1 July 1984;
- Launch of the first European satellite by a European launch vehicle (Ariane I): 19 June 1981;
- First successful launch of an American anti-satellite missile (ASAT) against a satellite of the same nationality: 13 September 1985;
- Space shuttle Challenger astronautical accident: 28 January 1986;
- Launch of the Russian space station into orbit: 19 February 1986;

- Launch of the HUBBLE telescope: 24 April 1990;
- Launch of the first French reconnaissance satellite Helios 1A: 7 July 1995;
- Start of in-orbit assembly of the International Space Station (ISS): 1998;
- Start of permanent human presence in space on the ISS: 31 October 2000;
- Space shuttle Columbia astronautical accident: 1 February 2003;
- First Chinese orbital flight: 15 October 2003.

(64) Despite some beginnings in the 20th century (e.g. Starfish in 1967 or the first ASAT firing in 1985), an increase in "unfriendly" activities or demonstrations of power can be noted from the 2000s onwards:

- First successful firing of a Chinese ASAT missile against a satellite of the same nationality: 11 January 2007;
- Another successful firing of an American ASAT missile against a satellite of the same nationality: 21 February 2008;
- First Chinese space station: 29 September 2011;
- Another successful firing of a Chinese ASAT missile against a satellite of the same nationality: 30 October 2015;
- First successful firing of a Russian ASAT missile against a satellite of the same nationality: 18 November 2015;
- Manoeuvre of the Luch Olymp satellite close to the Athena-Fidus satellite in 2018;
- First successful firing of an Indian ASAT missile against a satellite of the same nationality: 27 March 2019;
- Creation of the United States Space Command: 29 August 2019;
- Creation of the French Space Command: 3 September 2019;
- First manned space flight operated by a private company (Space X): 30 May 2020;
- Artemis Agreements between the countries participating in the Artemis Programme and setting out the principles of cooperation for the peaceful exploration and use of the Moon, Mars, comets and asteroids; signed: 13 October 2020;
- New successful firing of a Russian ASAT missile against a satellite of the same nationality: 16 November 2021;
- French Ordinance of 23 February 2022 on the protection of national defence interests in the conduct of space operations and the exploitation of space data;
- Signature of the Artemis agreements by France: 7 June 2022.

(65) In recent years, the space race, particularly to Mars, has been revived by sending robots to celestial bodies. Returning to the Moon is being considered. The major powers are stating their aims for the use of space. Furthermore, there is a growing awareness of the risks of regional or global disasters for mankind due to the impact of a near-Earth object (asteroid or comet):

- 27 September 2022: impact (11 million km from Earth) between the American probe DART and the asteroid DIMORPHOS (satellite of the asteroid DIDYMOS), aiming to deflect the latter from its trajectory. This was the first mission of what could become planetary defence against the threat of NEOs.

## Appendix 2: Legal Corpus in Force

(66) In legal matters, beyond the four Geneva Conventions and their additional protocols, the main treaties date back to the Cold War:

- Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water; adopted: 5 August 1963; entry into force: 10 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; adopted: 19 December 1966; entry into force: 10 October 1967;
- Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space; adopted: 19 December 1967; entry into force: 3 December 1968;
- Convention on International Liability for Damage Caused by Space Objects; adopted: 29 November 1971; entry into force: 1 September 1972;
- Convention on Registration of Objects Launched into Outer Space; adopted 12 November 1974; entry into force: 15 September 1976;
- Agreement Governing the Activities of States on the Moon and Other Celestial Bodies; adopted: 5 December 1979; entry into force: 1 July 1984;

(67) China and Russia have officially proposed a space disarmament treaty. Entitled Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects (PPWT), the second version (2014) was proposed to the Conference on Disarmament.

(68) Some countries, including the United States and France, are opposed to it and consider the draft treaty to have serious flaws, be unverifiable and in contradiction with the actions undertaken by the states promoting it.

(69) The European Union has proposed a code of conduct on outer space activities (International Code of Conduct - ICoC) aiming, firstly, for international stability through transparency and confidence-building measures and, secondly, to secure space infrastructure through the adoption of responsible behaviour. This effort, of a non-legally binding, pragmatic and immediately applicable nature, is today embodied in the work of the Open-Ended Working Group (OEWG) set up through the UK's "Reducing Space Threats through Norms, Rules and Principles for Responsible Behaviours" initiative.

(70) In France, the Space Operations Act was enacted in 2008[15]. In accordance with international law, it aims to regulate the development of space activities in domestic law by subjecting space operations to prior authorisation and by guaranteeing the exploitation of data from space.

(71) French Ordinance no. 2022-232 of 23 February 2022[16] on the protection of national defence interests in the conduct of space operations and the use of space data:

[15] https://www.legifrance.gouv.fr/loda/id/JORFTEXT000018931380/

[16] Regulatory texts implementing the Ordinance of 23 February 2023:

- Decree No. 2022-233 of 24 February 2022 amending Decree No. 2009-640 of 9 June 2009 implementing the provisions of Title VII of Act No. 2008-518 of 3 June 2008 on space operations
- Decree No. 2022-234 of 24 February 2022 amending Decree No. 2009-643 of 9 June 2009 on authorisations issued pursuant to Act No. 2008-518 of 3 June 2008 on space operations
- Decree No. 2022-235 of 24 February 2022 on requisitions of space goods and services
- Order of 23 February 2022 on the contents of the three sections of the application file mentioned in Article 1 of Decree No. 2009-643 of 9 June 2009 on authorisations issued pursuant to Act No. 2008-518 of 3 June 2008, as amended, on space operations
- Order of 23 February 2022 amending the Order of 31 March 2011 on technical regulations implementing Decree No. 2009-643 of 9 June 2009 on authorisations issued pursuant to Act No. 2008-518 of 3 June 2008 on space operations

- supplements the existing legal framework applicable to space operations conducted in the interests of national defence;
- supplements the legal framework guaranteeing the safeguarding of national defence interests when implementing space operations and activities subject to authorisation;
- broadens the scope of the obligation to declare space data exploitation activities.

## Appendix 3: Reminder of Defence Ethics Committee Opinions

Opinion on the Augmented Soldier

Opinion on the Integration of Autonomy into Lethal Weapon Systems

Opinion on the Digital Environment of Soldiers

Opinion on Ethics in Military Training

## Mission and Members of the Defence Ethics Committee

The Defence Ethics Committee was established on 10 January 2020 by the French Minister for the Armed Forces. It is tasked with issuing opinions and recommendations to inform political and military authorities of the ethical issues raised by changes in the military function and scientific and technological innovations in defence. It comprises 18 qualified persons nominated by the Minister.

The Committee's members are:

| | |
|---|---|
| Bernard PECHEUR | Defence Ethics Committee Chair, Section President (h), Conseil d'État |
| Henri BENTEGEAT | Defence Ethics Committee Vice-Chair, Army General (2S), former Chief of Defence Staff |
| Rose-Marie ANTOINE | Honorary Chief Executive and former President of ONACVG from 2012 to 2019 |
| Christine BALAGUE | Professor at IMT-BS, holder of the Good in Tech Chair |
| Marie-Germaine BOUSSER | Professor emeritus of neurology, member of the Académie nationale de médecine |
| Frédérick DOUZET | Professor at the French Institute of Geopolitics (Paris VIII University) |
| Hervé DREVILLON | History Professor, Paris I University (Panthéon-Sorbonne) |
| Michel GOSTIAUX | Chief Defence Procurement Engineer |
| Laurent HERMANN | Rear-Admiral |
| Jean-Baptiste JEANGENE VILMER | Director of the Strategic Research Institute of the Ecole Militaire (IRSEM) |
| Aurélie LECAM | Commissioner for the Armed Forces, legal advisor |
| Bruno PAUPY | French Air and Space Force Colonel |
| Philippe ROUANET de BERCHOUX | General Medical Officer of the Armed Forces, head of the Armed Forces health department |
| Guillaume SCHLUMBERGER | General Controller on extraordinary mission |
| Catherine TESSIER | Director of Research and research integrity and research ethics officer at the French national aerospace research centre (Office national d'études et de recherches aérospatiales - ONERA) |
| Nicolas THERY | President of the Confédération Nationale du Crédit Mutuel |
| Cathy THILLY-SOUSSAN | Financial, legal and ethics advisor, Direction Générale de l'Armement (DGA) |
| Bernard THORETTE | Army General (2S), former Army Chief of Staff |