



The international legal status of the unmanned maritime vehicles

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ABSTRACT

Unmanned maritime vehicles have broad application in both military and civilian aspects. The legal status this concept, however, is still unclear, thus making them a controversial and 'sensitive area'. Defining the international legal status of unmanned maritime vehicles is a prerequisite to their protection and regulation. Based on an analysis of the international legal status that regulates different types of unmanned maritime vehicle, this paper discusses the legal implications of the craft in different situations, from the perspective of the law of the sea. The paper concludes by suggesting that, coastal States should promote the principle of safeguarding national security and interests, as well taking cognisance of existing international conventions, such as the 1982 United Nations Convention on the Law of the Sea and the 1972 International Regulations for Preventing Collisions at Sea, plus related domestic laws and regulations, in order to deal appropriately with foreign unmanned maritime vehicles.

1. Introduction

On December 16, 2016, the Chinese Navy captured an American, unmanned underwater vehicle in the South China Sea. The United States claimed that, the unmanned underwater vehicle was being used to monitor the salinity and temperature of the seawater, in order to draw a hydrographical map, whereas, China believed that its purpose was to gather military intelligence [1]. The Unmanned Maritime Vehicle (UMV), which includes Unmanned Surface Vehicles (USV) and Unmanned Underwater Vehicles (UUV), includes power plants that sail on the surface or underwater, with no direct human control but by autonomous control, remote control or pre-set programmes, which concepts have already been used in the military field of operations [2].

In recent years, new ideas and new technologies, such as big data, cloud computing and artificial intelligence have advanced rapidly and aspects of these have provided strong technical support, in the development of unmanned maritime vehicles, continually improving their level of autonomy, functionality and safety [3]. Unmanned maritime vehicles potentially have many uses, for both military civilian purposes. In the military field, unmanned maritime vehicles are widely used for a variety of purposes [4]. They are used to perform dangerous, time-consuming or labour-intensive tasks, as an alternative to direct,

human involvement, thus playing an important role in such as combating piracy, maritime reconnaissance and surveillance, anti-submarine activities and mine clearing. At present, these craft are employed in combat missions by a number of naval services [5]. In addition, they also play an increasingly important role in maritime search and rescue, maritime cruise supervision, marine data measurement and monitoring and meteorological support services [6]. They can effectively reduce unnecessary human exposure to danger and the associated costs, reduce accidents caused by human error, resulting from fatigue, lack of communication, attention deficit [7] and also improve safety in navigation [8].

In this context, States have increased their research into unmanned maritime vehicles, in order to seize the opportunities in this field, improve the level of marine development and safeguard national maritime home security. For example, in 2012, the 'MUNIN' (Maritime Unmanned Navigation through Intelligence in Networks) project, funded by the European Commission, used Autonomous Ships as a research object, in an attempt to navigate unmanned maritime vehicles, by means of network intelligence [9]. In 2016, the Defence Advanced Research Projects Agency (DARPA) of the United States Department of Defence claimed that, its unmanned maritime vehicle, Sea Hunter, could be used to successfully track enemy submarines [10]. The D3000, three-body

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unmanned warship, exhibited at the China Ocean Science and Technology Exhibition held in Qingdao in September 2017, is not only invisible to detection but also, can operate at sea for several months [11].

Due to the variety of unmanned maritime vehicles, however and their wide range of applications, the legal status of the different types of vehicle, involved in different operations, varies significantly [12]. In addition, as a product of new technology, unmanned maritime vehicles have, as yet, not been clearly defined and regulated, in terms of current domestic law or international conventions [13]. For this reason, in this field, the use of such may vary considerably, as may the application of the law. In addition, the use of unmanned maritime vehicles often involves relatively sensitive military issues and thus, the current legal ambiguity also threatens coastal States' national security.

Based on an analysis of the international legal status concerning the different types of the unmanned maritime vehicle, this paper discusses the legal implications of such vehicles in different situations, from the perspective of the law of the sea and it proposes responsive measures that coastal States might assume, to deal with foreign unmanned maritime vehicles. The paper concludes that, as there is still no consensus on issues concerning the application of international conventions, such as the United Nations Convention on the Law of the Sea¹ (hereafter 'UNCLOS') concerning unmanned maritime vehicles, when foreign versions operate in coastal waters, which may pose a threat to coastal States' national security and interests. In this situation, the provisions of UNCLOS should be reemphasised, in order to maintain national security and the interests of coastal States. In addition, whether unmanned maritime vehicles should be regarded as ships, is subject to definition by the flag State's national laws and, any interpretation will be binding on other States. It is, therefore, suggested that, only in this way can the activities of unmanned maritime vehicles be suitably constrained and developed in an orderly manner, within the current legal framework.

2. Types of unmanned maritime vehicle and their legal implications

Most of the literature divides unmanned maritime vehicles into three types, according to the degree of autonomy: remote control type, autonomous navigation type and combined mode of remote control and autonomous navigation [8,14,15]. In order to study the legal nature of unmanned maritime vehicles, according to their control means, this paper divides the vehicles into four types: autonomous navigation type, programme control type, remote control type and weapon type. The autonomous navigation type has the capabilities of independent planning, autonomous navigation and autonomous environment awareness [6]. The programme-controlled vehicles are controlled by a pre-built programme, navigate and perform tasks according to an inbuilt programme. The remote-controlled vehicles use telecommunication technology, to relay information between the unmanned maritime vehicles and the onshore control centre or the working mother ship, that releases the vehicles and for the purpose of remotely manoeuvring the vehicles [16]. The weapon-type unmanned vehicles are designed to attack and damage targets. They may, themselves, be weapons or can transport and launch weapons underwater [17]. It is important to note that, the weapon-type unmanned vehicles can have the characteristics of the first three other types. It is, however, a different type not because of how it operates but the uses to which it can be applied. It must be clarified that, 'ship', is the adjustment object of the international law of the sea, therefore, whether an unmanned maritime vehicle should be classified as a 'ship', is a key factor in measuring the applicability of relevant international conventions, such as UNCLOS [18].

¹ United Nations Convention on the Law of the Sea, opened for signature 10 December 1982, 1833 U.N.T.S. 397 (entered into force 16 November 1994).

2.1. Should an unmanned maritime vehicle be classified as a 'ship', in the sense of the law of the sea?

2.1.1. Should such craft be classified as a 'ship' in the sense of the international law of the sea

There are few provisions in the relevant international conventions regarding the definition or criteria for the determination of what precisely constitutes a 'ship'. Although the terms 'vessel' and 'ship' are often used in UNCLOS, their meaning is not clearly defined and they are merely a precondition for the treaty. This lack of definition seems to provide the possibility of considering the unmanned maritime vehicle as a 'ship'. Few international conventions and national legal documents provide any definition a 'ship' and there is no uniform standard. In addition, there is no universally accepted definition of a 'ship' in customary international law.² This paper will, thus, examine the definition of a 'ship' in relevant legal instruments, in order to extract the core judgment criteria.

According to Article 3 of the 1972 International Regulations for Preventing Collisions at Sea,³ "vessel" includes every description of water craft, including non-displacement craft, wing-in-ground-effect vehicles, and seaplanes, used or capable of being used as a means of transportation on water." This definition confirms the man-made nature of the ship and focuses on the basic characteristics of the ship as a mode of transportation [13]. According to Article 2 of the 1986 United Nations Convention on Conditions for Registration of Ships,⁴ "Ship" means any self-propelled sea-going vessel used in international seaborne trade for the transport of goods, passengers, or both with the exception of vessels of less than 500 gross registered tons." This definition regulates the objects of ship transportation and the minimum size restrictions applicable. Compared to the abovementioned definitions, the definition given by the International Law Association's American Branch (ABILA) is more concise: ships are defined as, artificial devices capable of sailing at sea, including submersibles [19]. According to this definition, the most important feature of a ship is its ability to sail on and in the water [20].

Although the definition of a ship is not uniform in relevant international conventions or legal instruments [21], the judgment of what constitutes a ship needs to be determined, according to the specific circumstances. It can be seen, nonetheless, from the above analysis that, there are still some basic features mentioned in most definitions. Unmanned maritime vehicles can, thus, only be classified as ships, if they have these features. On this basis, three necessary conditions for constituting a 'ship' can be condensed as follows. Firstly, the equipment must be 'artificial'. Secondly, the equipment must be capable of being used for navigation but does not include situations where equipment was used or planned to be used for navigation but is no longer so used [22]. Thirdly, the equipment should have a transportation function or be used for such operations.⁵

Based on the above discussion, it remains a difficult task to seek consensus among the international community, regarding the definition of a 'ship'. It is, therefore, fair to suggest that, whether unmanned maritime vehicles should be regarded as ships is subject to be defined in the flag State's national laws and such an interpretation will be binding on other States. The legal authority of the above argument is based on

² For the prerequisites of customary international law, see ICJ, North Sea Continental Shelf Cases, Judgment of 20 February 1969, ICJ Rep. 1969, p. 3, 43 et seq., paras. 75 et seq.

³ Convention on the International Regulations for Preventing Collisions at Sea, 20 October 1972, 1977 U.K.T.S. (entered into force 15 July 1977).

⁴ United Nations Convention on Conditions for Registration of Ships, 7 February 1986, 26 I.L.M. 1229 (not yet in force).

⁵ The above conclusion was drawn from the current available international legal instruments, although, the authors will not deny the fact that a 'ship', can be used for exploration purposes, such as hydrographical surveys or oceanography surveys.

Article 91 of UNCLOS, which provides that, “Every State shall fix the conditions for the grant of its nationality to ships, for the registration of ships in its territory, and for the right to fly its flag.” As the objective of UNCLOS is to provide an ocean governance legal framework, including the operations of ships that are nationally defined by flag States, in areas under the jurisdiction of other States or in areas beyond national jurisdiction [23]. Thus, the nationally defined unmanned maritime vehicles comply with both the object and the purpose of UNCLOS [2]. It is, therefore, fair to suggest that the term ‘ship’ under UNCLOS, can include new types of ship, such as unmanned maritime vehicles, provided that a State designates them as such. Once the flag State has determined the status of a craft being a ‘ship’, other States have to accept that the specific craft deployed by the flag State is entitled to exercise navigational and other rights granted to ships. Thus, it is perceived that, UNCLOS regulates how each State uses its ships but leaves the question of what constitutes a ship to be determined by national law [2].

2.1.2. *The characteristics of unmanned surface vehicles*

The autonomous navigation type, the programme-controlled type and the remote-controlled type of unmanned surface vehicles controlled by an onshore control centre, all have independent legal status, while obviously conforming to the man-made standard, can sail on the surface and have a transportation function or can be used for operations. The weapon-type unmanned surface vehicles are closer in definition and usage to weapons, than they are to ships, due to their potential for combat purposes.

Whether unmanned surface vehicles released or controlled by the working mother ship should be categorised as ships, is controversial. One view is that, such craft do not have an independent legal status and do not constitute ‘ships’ but they meet the necessary standards for ship attachments, so their nature is as attachments to a mother ship [22]. Another view is that, factors such as the lack of self-propelled facilities, restricted navigation functions or dependence on external energy supply and communication systems, may not be a hindrance in categorising them as being a ship. Unmanned maritime vehicles are a component part of a mother ship and are an extension of the mother ship and can, thus, obtain ‘indirect’ ship status from the mother ship, therefore, all unmanned maritime vehicles should be considered as ships, regardless of their size or mission [17]. This issue will be further analysed, in conjunction with the following issues.

2.1.3. *The characteristics of unmanned submersibles*

When an unmanned submersible sails on the surface, its legal status is consistent with that of an unmanned surface vehicle [23]. When, however, an unmanned submersible is submerged, there are few legal documents specifically focusing on underwater maritime vehicles that can be referred to, in determining their legal status. This matter is only mentioned in some international conventions and the provisions are similar to those of ships navigating on the surface. For example, Article 2 (4) of the 1973 International Convention for the Prevention of Pollution from Ships⁶ provides that, “[s]hip means a vessel of any type whatsoever operating in the marine environment and includes hydrofoil boats, air-cushion vehicles, submersibles, floating craft and fixed or floating platforms.” This convention treats submersibles in the same way as surface vessels. Another example is the Law of the People’s Republic of China on Maritime Traffic Safety, which incorporates submersibles into the scope of the ships regulated by this legislation. Article 50 of this

⁶ International Convention for the Prevention of Pollution from Ships, 2 November 1973, 1340 U.N.T.S. 61 (enter into force 2 October 1983).

legislation provides that, ‘ships’ include all types of drainage or non-drainage vessels,⁷ rafts, seaplanes, submersibles and mobile platforms. The result of this is that, the criteria for the determination of ‘ships’, are equally applicable to unmanned submersibles and their legal status is the same as those of unmanned surface vehicles of the same type.

2.2. *Whether military unmanned maritime vehicles belong to ‘warships’?*

At present, unmanned maritime vehicles are increasingly being used in the military field and their use is prone to causing disputes. Since UNCLOS has different provisions on ‘warships’ from those of other ships, whether the non-weapon-type of military unmanned maritime vehicles belong to ‘warships’ in the international law of the sea, is related to issues concerning sovereign immunity and is closely related to national interests. This issue is still controversial and subject to further debate.

According to Article 29 of UNCLOS, “warship means a ship belonging to the armed forces of a State bearing the external marks distinguishing such ships of its nationality, under the command of an officer duly commissioned by the government of the State and whose name appears in the appropriate service list or its equivalent, and manned by a crew which is under regular armed forces discipline.” According to this definition, a warship should first be considered as a ‘ship’. An unmanned maritime vehicle, that does not have a ship status, thus, should not be considered as a warship. Even if an unmanned maritime vehicle has ship status, it does not belong to the warship category, as its ‘no man’ feature does not conform to the requirement that a warship must be commanded by a military officer and manned by a crew [13]. Customary international law has, so far, not extended the definition of warships to include military unmanned maritime vehicles [24]. Based on the above-mentioned controversy concerning unmanned maritime vehicles launched or controlled by the mother ship, however, some scholars believe that, their legal status should be categorised as being ‘warship attachments’, while others hold the opinion that this type of unmanned maritime vehicle is an extension of its mother ship and belongs to the mother ship, in terms of its category. In the latter situation, its warship status is directly ‘inherited’ from its mother ship, so it is not constrained by the ‘unmanned’ factor and can enjoy the same sovereign immunity as its mother ship [13].

3. *Unmanned maritime vehicles from the perspective of the law of the sea*

This section discusses two important law of the sea treaties, namely, UNCLOS and the 1972 International Regulations for Preventing Collisions at Sea (hereafter COLREGS), to see whether they might apply to unmanned maritime vehicles that have independent ship legal status.

3.1. *UNCLOS*

UNCLOS is not rigid or unchanging. By interpreting the relevant provisions, it can adapt to changing and new circumstances and maintain its vitality within a certain context. UNCLOS is, thus, a convention amenable to coping with new technologies. As discussed earlier, since a significant proportion of the unmanned maritime vehicles enjoy legal status as ships, UNCLOS can, therefore, be applied to such vehicles. Aspects of UNCLOS that can be interpreted as being closely related to the unmanned maritime vehicles include marine jurisdiction systems, varying degrees of navigation rights and marine scientific research.

⁷ Drainage or non-drainage vessels are the terms adopted by Law of the People’s Republic of China on Maritime Traffic Safety. Drainage vessels are ships that support their weight by the static buoyancy of water. Non-drainage vessels are opposite to that of drainage vessels, including planning boats, hydrofoil boats, hovercrafts, and ground-effect wing ships.

3.1.1. When unmanned maritime vehicles navigate in the territorial waters of other states

Article 17 of UNCLOS provides for the innocent passage of ships in the territorial sea of a coastal State, in order to balance the interests of navigation and the security interests of the coastal State and it allows ships to proceed continuously and expeditiously, so long as, “it is not prejudicial to the peace, good order or security of the coastal State”.⁸ In reality, however, according to Article 19 of UNCLOS, many of the conventional activities of unmanned maritime vehicles are considered to be “prejudicial to the peace, good order or security of the coastal State”, such as weapons exercises, research or measurement activities, launches on board ships, landing or picking up of military equipment, etc. The result is that, unmanned maritime vehicles navigating in the territorial waters of other States are extremely prone to causing disputes. It is, therefore, suggested that, the coastal State may adopt laws to regulate the exercise of the right of innocent passage through its territorial waters to the extent that, they conform to the provisions of UNCLOS and rules of international law. These include laws to ensure the safety of navigation and the regulation of maritime traffic. Unmanned maritime vehicles have to exercise the right of innocent passage in compliance with these laws [2], however, such laws must not concern the, “design, construction, manning or equipment of foreign ships unless they are giving effect to generally accepted international rules or standards.”⁹ In addition, for the purpose of protecting the security of the coastal State, unmanned submersibles are required to navigate on the surface and display their flag, when navigating in the territorial waters of other States.¹⁰ Since, however, unmanned submersibles are still a product of new technology, their functions are not yet fully developed, meaning that, obligations will arise, as further development and functional purposes appear. Whether all unmanned submersibles can meet this requirement, are still subject to further and future development and consideration [13].

3.1.2. When unmanned maritime vehicles navigate through straits used for international navigation

Article 38 of UNCLOS provides for the right to transit passage of ships to navigate straits used for international navigation, which allows ships to exercise their freedom of navigation, for the purpose of continuous and rapid transit. Accordingly, those unmanned maritime vehicles that enjoy the legal status of ships utilise this right, which is less onerously defined than is innocent passage and the unmanned submersibles do not need to navigate on the surface [25]. Unmanned ships must, however, comply with international regulations, procedures and practices concerning maritime safety and must not pose any threat or use force against the sovereignty, territorial integrity or political independence of the coastal States bordering the strait, nor violate any of the principles of international law embodied in the 1945 Charter of the United Nations.¹¹ In addition, a large number of unmanned maritime vehicles are used for marine, scientific research and hydrological surveys. According to Article 40 of UNCLOS, transit of such unmanned ships must be permitted by States bordering the straits before the start of passage, when they travel through straits used for international navigation.

3.1.3. When unmanned maritime vehicles navigate in the EEZ of other states

UNCLOS provides ships a similar freedom of navigation in the EEZ of other States, to the freedom on the high seas but these ships should have due regard to the rights and obligations of the coastal State and must comply with the legislation of the coastal State adopted in accordance with UNCLOS and other rules of international law that are not

inconsistent with UNCLOS.¹² Under UNCLOS, the coastal State has jurisdiction over marine scientific research in its EEZ.¹³ Coastal States may approve the conducting of marine scientific research by ships of other States in its EEZ, within the limits of its laws and regulations, where appropriate.¹⁴ When an unmanned maritime vehicle is navigating in the EEZ of another State for the conducting of marine scientific research activities, it must obtain prior approval from that coastal State.

3.1.4. When unmanned maritime vehicles navigate on the high seas

Article 87 of UNCLOS provides that, “[t]he high seas are open to all States, whether coastal or land-locked.” Freedom of the high seas, including freedom of navigation, must be exercised under the conditions provided for in UNCLOS and other rules of international law, with due regard to the interests of other States in the exercise of freedom of the high seas and with due regard to the rights concerning activities in the international seabed area, as provided for by UNCLOS. Ships of any State enjoy freedom of navigation on the high seas and unmanned maritime vehicles, with the legal status of ships, also enjoy this right. Military unmanned ships can enjoy freedom of navigation, so long as they do not engage in any military exercises and activities that violate the 1945 United Nations Charter [26]. When, however, unmanned ships are navigating and operating on the high seas, due regard must be given to the rights of other States, in the exercising of their freedom of the high seas.

3.2. COLREGS

COLREGS is a maritime traffic regulation formulated by the International Maritime Organisation (hereafter the IMO), designed to prevent and avoid collisions between ships at sea. The regulation makes navigation safer by establishing common maritime behaviour and regulating on board equipment, such as the use of lights. Undoubtedly, navigational safety is essential for ships but unmanned maritime vehicles have the characteristic of being ‘unmanned’, while the setting of COLREGS rules is mostly based on ‘human’ behaviour and ideas and relies heavily on human common sense being applied, when determining the applicability of the rules and their enforcement [14]. The result is, therefore, that there has been controversy over whether unmanned maritime vehicles can or should comply with COLREGS, especially those rules on driving and navigation. The design and construction of many unmanned maritime vehicles, however, takes into account the need for compliance with international conventions such as COLREGS. For example, Sea Hunter, developed by the Anti-Submarine Warfare Continuous Trail Unmanned Vessel (ACTUV) project of the DARPA in 2016, issued a number of technical measures, to ensure compliance with COLREGS regulations. The radar on the Sea Hunter and the automatic vessel identification system, ensure effective monitoring of the perimeter of the vehicle [27]. In addition, it is expected to take approximately two years for this warship to be tested, including confirmation that it can operate safely in compliance with the law of the sea and practices, such as COLREGS. In 2018, the IMO’s Maritime Safety Committee discussed the introduction and use of autonomous navigation vessels. According to Ghulam Hussain, of the Nautical Institute, all ships, whether navigating on their own or not, should comply with COLREGS. The IMO Maritime Safety Committee expressed its opinion that, ships that navigate autonomously should comply with relevant international rules, including COLREGS 28]. This paper suggests that, for the purposes of maritime safety, the navigation of unmanned maritime vehicles should comply with the provisions of COLREGS. Since many of COLREGS driving and navigation rules are, however, premised on the fact that ships are manned by a crew, unmanned maritime vehicles will face

⁸ UNCLOS, art 19.

⁹ UNCLOS, art 21(2).

¹⁰ UNCLOS, art 20.

¹¹ Charter of the United Nations, 26 June 1945, 1946 U.K.T.S. 67 (enter into force 24 October 1945).

¹² UNCLOS, art 58.

¹³ UNCLOS, art 56.

¹⁴ UNCLOS, art 246.

various technical tests, in order to comply with these rules. As Littlefield, the head of the Sea Hunter, said, “the establishment of such an automated system is probably the biggest technical challenge facing DARPA” [28].

3.2.1. Look-out

Article 5 of COLREGS provides that “every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.” With respect to this obligation, in the *Rosado v. Pilot Boat* case, the US court held that, the person responsible for look-out duties should be a crew member, with appropriate experience [8]. Such crew members are responsible for observing lights, sounds, echoes or any navigational obstacles and must diligently and vigilantly collect information about the environment surrounding the ship and report such information to those who can assess the situation and make decisions [8]. With respect to, ‘sight and hearing’, the requirement contemplates the exercise of human perception. Unmanned maritime vehicles that utilise control algorithms, do not satisfy the requirement of appraisal by sight and hearing.

Obviously, this provision was made on the premise that a ship is a manned ship but this does not mean that the unmanned ships could not and should not, comply with the clause. This obligation can be fulfilled through the design and improvement of unmanned ships’ look-out systems, to observe the lights, sounds, echoes or any navigation obstacles near the ships and then cameras or other equipment can be used to ‘report’ the situation to the people who control or monitor the unmanned ships, in real time. In addition, thanks to its, ‘unmanned’, characteristic, the unmanned ships’ look-out system can address certain issues, such as human fatigue, lack of concentration and other problems and thus, potentially better perform the task in hand. There are views that, the look-out system can compete with a crew with relevant experience, in fulfilling the ‘responsibility’. States are, thus, currently developing autonomous navigation systems, with appropriate look-out abilities [27]. For example, the US Navy has established a system for detecting objects at sea that uses electronic sensors to detect distant objects and record their position, in order to provide reference for its navigation programme, when determining a navigation route [8].

3.2.2. Navigation rules

COLREGS specifies the actions that ships can take to avoid collisions and the rules of action for ships in sight of one another.¹⁵ In these cases, a ship needs to take specific action in accordance with COLREGS, in order to avoid collisions. The problem is, however, that the current autonomous control systems of the unmanned ships are not yet capable of complying, in a comprehensive and effective way. The developers have tested the compliance of unmanned ships with the COLREGS navigation rules. To date, only a few models can act in accordance with the corresponding navigation rules, when encountering objects with which they might collide but the reaction process is very slow, making the adjustment of the route currently unacceptable [28]. Other objects being tested can act in accordance with COLREGS but only when they encounter static and individual objects. The reality is, however, that the marine environment is very complicated and unmanned ships that cannot comply with the navigation rules in a dynamic marine environment, are likely to collide with other objects at sea, causing potential property damage and casualties [29]. Given the current state of autonomous navigation systems, compared with those of autonomous unmanned ships, the remote-controlled, unmanned ships can better comply with COLREGS, due to the involvement of human factors [30].

3.2.3. Other rules

COLREGS also regulates issues such as lights and shapes,¹⁶ sounds and light signals¹⁷ and exemptions.¹⁸ It is a fact that, unmanned maritime vehicles are currently unable to fully comply with these rules but by upgrading their related systems and equipment, these difficulties may be overcome, thus ensuring their navigational safety, which situation is, thus, one of the current directions for the improvement of the vehicles.

4. Coastal states’ responses to foreign unmanned maritime vehicles

The determination of the status of unmanned maritime vehicles in international law is a prerequisite for their protection and regulation. Nowadays, States are highly invested in researching and developing unmanned maritime vehicles. On the one hand, attention is being devoted to technological innovations, in order to improve and upgrade such vehicles, on the premise of clarifying their status in international law. This should enable vehicles to better meet the requirements of relevant international conventions and domestic laws and ease tension between existing laws and new technologies. In addition, this should better safeguard the rights of the unmanned maritime vehicles in other States’ territorial seas and EEZs, straits used for international navigation and on the high seas, while respecting the legitimate interests of other States. On the other hand, as States have not yet reached a consensus on issues relating to the application of international conventions such as UNCLOS to these vehicles, when foreign vehicles navigate and operate in coastal States’ waters, they may pose a threat to coastal States’ national security and interests. Coastal States’ should, thus, strengthen their responsive measures to foreign unmanned maritime vehicles, in the following aspects.

Firstly, based on concern toward safeguarding national security and interests, coastal States should adopt UNCLOS and enhance its understanding and application. As mentioned above, existing international conventions, such as UNCLOS, can still, to some extent, regulate new situations, such as those involving unmanned maritime vehicles. By implementing the existing regulations in different maritime areas, such vehicles can be regulated and developed in an orderly manner, within the current legal framework. It is also suggested that, whether unmanned maritime vehicles should be regarded as ships is subject to be defined in the flag State’s national laws and such, any interpretation will be binding on other States.

Secondly, for a foreign unmanned maritime vehicle, with the legal status of an independent ship, the provisions of UNCLOS concerning ships in different maritime areas as discussed above and the COLREGS navigation rules can be used to regulate the ship’s navigation. Specifically, when unmanned ships are navigating on the high seas, they enjoy freedom of navigation, on the premise of considering the interests of other States, while exercising their freedom of the high seas. When unmanned ships enter coastal States’ EEZ for marine scientific research and other operations, they should accept coastal States’ jurisdiction. Foreign non-military unmanned maritime vehicles, with the legal status of ships, enjoy a right of innocent passage within coastal States’ territorial waters. Foreign military unmanned maritime vehicles, with the legal status of ships entering coastal States’ territorial waters, must do so with the approval of the coastal States. If they violate coastal States’ laws and regulations, the competent authorities have the right to order them to immediately leave territorial waters. The flag State should bear international responsibility for any losses caused by unmanned maritime vehicles. In addition, foreign unmanned submersibles have to navigate on the surface and show their flag, when navigating through coastal States’ territorial waters. Foreign non-military unmanned maritime

¹⁶ COLREGS, Part C.

¹⁷ COLREGS, Part D.

¹⁸ COLREGS, Part E.

¹⁵ COLREGS, Article 8, Section 2, Chapter 2.

vehicles with the legal status of ships entering coastal States' internal waters and ports must be approved by the competent authority.

Thirdly, as mentioned earlier, the legal status of a foreign, unmanned maritime vehicle released or controlled by a working mother ship, is controversial. This paper argues that, since the operation of such vehicles often has military connotations, the determination of their status should be based on the principle of safeguarding coastal State's national security and interests. It is a pertinent fact that, maritime security is connected to the economic development of any coastal State. The importance of maritime trade has always been vital throughout history, since the majority of world trade travels along maritime routes. The commercial phase of this development contributes to additional revenue, given the significance of offshore resources, as well as coastline tourism. This strategic rationale offers, however, a noteworthy challenge as maritime traffic-flow is anticipated to increase significantly and maritime security is a dependent variable for the interests of coastal States. It is, therefore, suggested that a multi-dimensional approach necessitates addressing the challenges, to ensure the security of coastal States. This approach should include leading security guards, littoral exercises and appropriate law enforcement agencies, to enhance growing maritime awareness in the region [31]. Based on the above discussion, if the vehicle in question is determined to be a ship' attachment, when it enters a certain sea area, even if its mother ship is outside the sea area, it should comply with the regulations concerning a ship, as if it were located in the particular sea area. If the relevant regulations are violated, both the attachment and its mother ship are subject to corresponding punishment [32]. Obviously, when a foreign unmanned maritime vehicle is released or is being controlled by a working mother ship, enters coastal States' internal water, territorial sea, contiguous zone or EEZ, the subject being regulated is not limited to the unmanned maritime vehicle itself but also extends to include the mother ship. This regulation is more extensive and stricter and more conducive to safeguarding coastal States' national security and interests. Contrarily, if the vehicle is regarded as an extension of the mother ship but is considered to have an independent ship status, when it commits an act in violation of international conventions or coastal States' domestic laws and regulations then, the mother ship that launches and controls it can be considered as being uninvolved [33]. This paper, thus, suggests that foreign, unmanned maritime vehicles released or controlled by a working mother ship, should be considered to have the legal status of being the ship's attachment.

5. Conclusion

There are a variety of unmanned maritime vehicles and a wide range of applications, at this point in time. Different types of vehicle have different legal status, for different operations. Self-propelled, programme-controlled and remote-controlled unmanned maritime vehicles controlled by onshore control centres, all have independent legal status. The nature of weapons-type unmanned maritime vehicles is closer to that of being a weapon, rather than being a ship. The unmanned maritime vehicles released or controlled by the working mother ship have the legal status of being ship's attachments. Two important law of the sea conventions, UNCLOS and COLREGS, can be applied to unmanned maritime vehicles. Whether unmanned maritime vehicles should be regarded as ships, is subject to being defined in the flag State's national laws and such, any interpretation will be binding on other States. The practical benefits of adopting this interpretation are significant, since it is likely that operators will intend that the unmanned maritime vehicles will navigate outside a coastal State's territorial sea, even although the effect of taking such a view is that duties are also imposed. While intensifying research on unmanned maritime vehicles and promoting their innovation and development, coastal States are encouraged to make full use of existing international conventions, on the premise of safeguarding their safety and interests, in order to cope with the potential activities of various foreign unmanned maritime vehicles in

waters under their jurisdiction.

Declaration of competing interest

This is a short statement to confirm that there is no conflict of interest for this piece of work. All authors agree with the terms and the name order that places in the paper.

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