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I. INTRODUCTION

The use of maritime autonomous vehicles (MAVs) is increasing for a variety of ocean activities, which raises challenging questions about how these crafts fit within existing ocean governance. Most importantly, we need to consider the consequences for international law if we are to maintain a rules-based order on the oceans. The significance of MAVs for international law has already become a focal point for the International Maritime Organization (IMO) in relation to maritime safety.[1] Likewise, numerous scholars have examined MAVs in relation to the law of armed conflict.[2]

By contrast, the potential use (and abuse) of MAVs with regard to maritime security has not yet been greatly scrutinized.[3] Accordingly, this article provides a preliminary assessment of how international law relating to maritime security can account for the operations of MAVs. As the use of MAVs increase, it is apparent that there will also be repercussions for the international legal framework in place to promote maritime security. For example, in January 2019, Singapore, Japan, and South Korea announced their plans to use MAVs for activities such as surveillance, coastal border patrols, search and rescue, and mine detection.[4] Such examples suggest that the difficult legal questions that MAVs raise will become more significant as use increases.

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1. *See* International Maritime Organization [IMO], *Regulatory Scoping Exercise for the Use of Maritime Autonomous Surface Ships (MASS): Work Conducted by the CMI International Working Group on Unmanned Ships*, I.M.O. Doc. MSC 99/INF.8 (Feb. 13, 2018); Comité Maritime International, *International Working Group Position Paper on Unmanned Ships and the International Regulatory Framework* (Mar. 29, 2017), https://comitemaritime.org/wp-content/uploads/2018/05/CMI-Position-Paper-on-Unmanned-Ships.pdf.

2. *See, e.g.*, Rob McLaughlin, *Unmanned Naval Vehicles at Sea: USVs, UUVs and the Adequacy of the Law*, 21 JOURNAL OF LAW, INFORMATION AND SCIENCE 100, 103–08 (2011) [hereinafter McLaughlin, *Unmanned Naval Vehicles at Sea*; Michael N. Schmitt & David S. Goddard, *International Law and the Military Use of Unmanned Maritime Systems,* 98 INTERNATIONAL REVIEW OF THE RED CROSS 567 (2016); Erich D. Grome, *Spectres of the Sea: The United States Navy's Autonomous Ghost Fleet, its Capabilities and Impacts, and the Legal Ethical Issues that Surround*, 49 JOURNAL OF MARITIME LAW AND COMMERCE 31 (2018); Robert McLaughlin, *Unmanned Naval Vehicles and the Law of Naval Warfare, in* NEW TECHNOLOGIES AND THE LAW OF ARMED CONFLICT 229 (Hitoshi Nasu & Robert McLaughlin eds., 2014).

3. Within the existing literature, if addressed at all, the common approach is to raise questions without delving into possible answers.

4. Tom Abke, *Indo-Pacific Countries Turn to Unmanned Vessels to Patrol Region's Waters*, INDO-PACIFIC DEFENCE FORUM (Jan. 25, 2019), http://apdf-magazine.com/indo-pacific-countries-turn-to-unmanned-vessels-to-patrol-regions-waters/.

The appeal of MAVs for maritime security purposes is clear. As Pedrozo has noted, "because they reduce risk to human life, unmanned systems are becoming the preferred alternative for dull, dirty or dangerous missions."[5] Moreover, MAVs can stay at sea for longer periods than vessels with crews, may expand the areas of operation, and could potentially fill capacity gaps and reduce costs.[6] All of these features may prove advantageous to States as they consider what additional tools can be used to enhance maritime security, especially in relation to maritime domain awareness or surveillance, as well as in relation to law enforcement efforts. Thus, there is an expectation that MAVs will be used in peacetime maritime security operations,[7] but there is also room to consider how that use might be regulated under the existing legal architecture and where gaps or ambiguities might be revealed.

The legal regime relevant to MAVs is the regime used by navies for peacetime operations. The application of this regime has led to discussions about the status of MAVs as warships and their possible immunities.[8] Commentators have already canvassed the rights of navigation that might apply in relation to MAVs, including whether they enjoy the right of innocent passage and what might constitute "normal mode" in the context of transit passage.[9] These questions are pertinent to the deployment of MAVs for surveillance and other information-gathering exercises. Some analysis of the use of MAVs for intelligence gathering was triggered by the Chinese Navy's seizure of the MAV launched from the *USNS Bowditch* in the Philippines' exclusive economic zone (EEZ) in 2016.[10] However, our understanding of maritime

5. Raul (Pete) Pedrozo, Employment of Marine Unmanned Vehicles in the South China Sea 1 (unpublished manuscript) (on file with author); *see also* Andrew Norris, *Legal Issues Relating to Unmanned Maritime Systems Monograph* 2 (2013) (unpublished manuscript), https://www.hsdl.org/?view&did=731705.

6. Norris, *supra* note 5, at 6; Craig H. Allen, *Determining the Legal Status of Unmanned Maritime Vehicles: Formalism vs Functionalism*, 49 JOURNAL OF MARITIME LAW AND COMMERCE 477, 487 (2018) (noting that MAVs may increase productivity and quality control, and ultimately perform some tasks better than humans).

7. *See* James Kraska, *The Law of Unmanned Naval Systems in War and Peace*, 5 JOURNAL OF OCEAN TECHNOLOGY 44, 46 (2010) (stating that "the use of unmanned systems at sea is more likely to occur during routine naval activities, such as manoeuvres and exercises, or peacetime maritime security operations, such as counter-drug or shipping interdiction").

8. *See, e.g.*, McLaughlin, *Unmanned Naval Vehicles at Sea*, *supra* note 2, at 108–11.

9. *See, e.g.*, Kraska, *supra* note 7, at 54–55; *see also* Comité Maritime International, *supra* note 1, at 5; Leonida Giunta, *The Enigmatic Juridical Regime of Unmanned Maritime Systems*, *in* OCEANS 2015 – GENOVA 692, 694–95 (2015).

10. *See, e.g.*, Christopher C. Swain, *Towards Greater Certainty for Unmanned Navigation, a Recommended United States Military Perspective on Application of the "Rules of the Road" to Unmanned*

security encompasses more than the peacetime operation of navies and extends to diverse law enforcement activities in response to crimes at sea.[11]

MAVs may be relevant in relation to law enforcement in two contexts. First, States may wish to deploy MAVs to enhance their law enforcement capabilities, especially in the detection of illicit activity at sea. That is evident in the declared use of MAVs by Singapore, Japan, and South Korea mentioned above. Second, MAVs may be utilized by non-State actors to further their criminal activities. Remote-controlled vessels have already been used for terrorist purposes,[12] and it may be readily envisioned that smugglers will use MAVs as cost-efficient tools for transporting illicit goods at sea.[13] These different uses of MAVs prompt questions about the operation of international law and the extent that existing and future technology is accommodated within the international legal regime.

To address, albeit not fully resolve, these questions, this article assesses the possible interpretation of international law that may be applicable in different scenarios involving the use of MAVs. Consistent with the rules of treaty interpretation, regard must be had to the ordinary meaning of any treaty provision in its context and in the light of its object and purpose.[14] In this regard, it is important to recall the position of the International Court of Justice that any treaty must be "interpreted and applied within the framework of the entire legal system prevailing at the time of the interpretation."[15] Thus, while we might be facing disruptive technology, commentators have argued that we are not facing disruptive international law.[16] What seems apparent is

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Maritime Systems, 3 GEORGETOWN LAW TECHNOLOGY REVIEW 119, 124–25 (2018); Mark J. Valencia, *US-China Underwater Drone Incident: Legal Grey Areas*, THE DIPLOMAT (Jan. 11, 2017), https://thediplomat.com/2017/01/us-china-underwater-drone-incident-legal-grey-areas/.

11. This understanding could potentially extend even further under some definitions of maritime security. *See* Christian Bueger & Timothy Edmunds, *Beyond Sea Blindness: A New Agenda for Maritime Security Studies*, 93 INTERNATIONAL AFFAIRS 1293 (2017).

12. *See infra* notes 76–83 and accompanying text.

13. *See infra* notes 74–75 and accompanying text.

14. Vienna Convention on the Law of Treaties art. 31(1), May 23, 1969, 1155 U.N.T.S. 331.

15. Legal Consequences for States of the Continued Presence of South Africa in Namibia (South West Africa) Notwithstanding Security Council Resolution 276 (1970), Advisory Opinion, 1971 I.C.J. Rep. 16, ¶ 53 (June 21).

16. The preference espoused in this regard is that general principles or foundational constructs of the law of the sea can be relied upon to accommodate the changing technology. *See, e.g.*, Kraska, *supra* note 7; McLaughlin, *Unmanned Naval Vehicles at Sea*, *supra* note 2.

that shortcomings that exist in the international legal framework for maritime security are not obviated by the operation of MAVs, but rather the utility of the technology continues to be hampered by the operation of the law.

The article thus proceeds as follows. Part II briefly addresses the question of terminology, and contemplates why yet another acronym must be considered in the discussion of autonomous craft at sea. Part III turns to the question of status, reflecting on the existing analyses undertaken on this point, highlighting how this discussion has implications for maritime security. Parts IV, V, and VI consider different dimensions of law enforcement: hot pursuit, the right of visit, and specific law enforcement regimes. Part VII turns to surveillance and intelligence gathering, which are relevant for law enforcement, as well as the peacetime operations of navies. Part VIII concludes, underlining how MAVs can largely be seen to sit within the existing legal framework, and perhaps more interestingly, whether the use of MAVs can improve the implementation of the existing rules rather than prompting a need for new ones.

II. TERMINOLOGY

There has been a range of terminology used when discussing MAVs, often depending on the degree of autonomy the vehicle has, whether it is used in combat, and whether it is below, on, or above the surface of the water. The literature has revealed the use of the following terms:

UV	Unmanned Vehicle
MUV	Marine Unmanned Vehicle
UAV	Unmanned Aerial Vehicle
USV	Unmanned Surface Vehicle
UUV	Unmanned Underwater (or Undersea) Vehicle
UCUV	Unmanned Combat Underwater Vehicle
UCSV	Unmanned Combat Surface Vehicle
UCV	Unmanned Combat Vehicle
ROV	Remotely Operated Vehicle
MASS	Maritime Autonomous Surface Ship
UMV	Unmanned Maritime Vehicle
UMS	Unmanned Maritime System

By referencing "unmanned" vehicles, it is possible to elide the degrees of autonomy that exist in relation to vessels that do not have a crew on

board. Lloyd's Register has developed a definition of autonomy for ships that includes six levels of autonomy ranging from decision support on board to a fully autonomous vessel.[17] In the regulatory context, autonomy levels can be divided into four categories: "M: Manual navigation with automated processes and decision support," "R: Remote-controlled vessel with crew on board," "RU: Remote-controlled vessel without crew on board," and "A: Autonomous vessel."[18] The level of control may become relevant in assessing how regulations will operate in relation to MAVs in different contexts. In some instances, a "binary" distinction is drawn between autonomous and remotely-controlled vessels for regulatory compliance.[19] Pritchett has commented that the dominant structure of surface MAVs is likely to be a hybrid of remotely operated and autonomous vessels.[20]

The "unmanned" terminology may be useful to gloss over this distinction and encompass the varying degrees of autonomy. Certainly, the term is endemic throughout the literature and in Navy manuals.[21] The IMO has instead opted for the use of "autonomous" to encompass all levels of autonomy previously discussed and in its current work on the application of maritime safety laws to autonomous surface ships.[22] A similar approach to that of the IMO is taken here; this gendered term is not essential nor appropriate and it is not used in this article. Where necessary, the distinction will be made between "remote-controlled" and "fully autonomous" vessels.

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17. International Maritime Organization [IMO], *Final Report: Analysis of Regulatory Barriers to the Use of Autonomous Ships*, I.M.O. Doc. MSC 99/INF.3 (Jan. 18, 2018).

18. *Id.*

19. Comité Maritime International, *supra* note 1, at 1.

20. Paul W. Pritchett, *Ghost Ships: Why the Law Should Embrace Unmanned Vessel Technology*, 40 TULANE MARITIME LAW JOURNAL 197, 199 (2015).

21. *See, e.g.*, Allen, *supra* note 6, at 486

> The Navy master plans distinguish among three levels of UMV autonomy: (1) manual control (human in the loop continuously or near continuously); (2) semi-autonomous (some operations executed completely autonomously and some initiated or controlled by an operator); and (3) autonomous or fully autonomous (the vehicle governs and makes its own decisions throughout).

22. *See* International Maritime Organization [IMO], *Regulatory Scoping Exercise for the Use of Maritime Autonomous Surface Ships (MASS): Initial Review of IMO Instruments Under the Purview of MSC (Note by the Secretariat)*, I.M.O. Doc. MSC 100/INF.3 (Aug. 9, 2018). This approach aligns with industry practice as well, which uses "autonomous" to denote an absence of humans on board. *See* Kara Chadwick, *Unmanned Maritime Systems Will Shape the Future of Naval Operations: Is International Law Ready?*, *in* MARITIME SECURITY AND THE LAW OF THE SEA: HELP OR HINDRANCE? (Malcolm Evans & Sofia Galani eds., forthcoming 2019).

Significant discussion has also emerged around the word "vessel" or "ship,"[23] particularly given the varied definitions of ships that are found in different international instruments.[24] This may explain why the word "vehicle" has been preferred in the terminology. Most commonly, the definitions provided for ships and vessels do not address any issue as to whether there is a crew on board the ship or not.[25] The distinction has been relevant in the context of floats and gliders, which are autonomous vehicles or devices used for data collection. Some commentators have taken the view that small objects that float with currents with the sole purpose of collecting data and that are not subject to any navigation regime should be considered "equipment" under the regime for marine scientific research rather than as ships.[26] Yet the autonomous nature and operation of floats and gliders prompt questions as to the proper application of the marine scientific regime under the 1982 United Nations Convention on the Law of the Sea (UNCLOS).[27]

It is interesting to compare the maritime setting with aviation. In the latter context, every form of flying vehicle may be considered an "aircraft" for the purposes of regulation. The result of this approach in the United States is that aircraft ranging from recreational drones to commercial airliners fall within the regulatory authority of the Federal Aviation Authority.[28] In the military context, no distinction is usually drawn between aircraft with pilots and crew onboard and those without.[29] It begs the question as to whether we need to continue this discussion in the maritime context. If not,

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23. United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS]. The terms "ship" and "vessel" are used throughout UNCLOS, seemingly with the same meaning. *See* OFFICE FOR OCEAN AFFAIRS AND THE LAW OF THE SEA, UNITED NATIONS, NAVIGATION ON THE HIGH SEAS: LEGISLATIVE HISTORY OF PART VII, SECTION I (ARTICLES 87, 89, 90–94, 96–98) OF THE UNITED NATIONS CONVENTION ON THE LAW OF THE SEA 80 (1989).

24. *See* Allen, *supra* note 6 (discussing varying definitions of ships in different international legal instruments).

25. Comité Maritime International, *supra* note 1, at 3.

26. *See, e.g.*, Katharina Bork, Johannes Karstensen, Martin Visbeck & Andreas Zimmermann, *The Legal Regulation of Floats and Gliders – In Quest of a New Regime?*, 39 OCEAN DEVELOPMENT AND INTERNATIONAL LAW 298, 308–09 (2008); Tobias Hofmann & Alexander Proelss, *The Operation of Gliders Under the International Law of the Sea*, 46 OCEAN DEVELOPMENT AND INTERNATIONAL LAW 167, 177–78 (2015).

27. *See* Bork, Karstensen, Visbeck & Zimmermann, *supra* note 26, at 310–12.

28. Press Release, Federal Aviation Administration, Federal vs. Local Drone Authority (July 20, 2018), https://www.faa.gov/news/press_releases/news_story.cfm?newsId=22938.

29. *See* Kraska, *supra* note 7, at 61–62.

the regulatory framework could have a functional focus.[30] One consequence of treating all aircraft as such is that the rules relevant to aerial MAVs should be largely understood as aligned with the rules relevant to overflight and international aviation law. In the maritime context, the overflight of aerial MAVs will still be relevant in assessing the legality of passage over a coastal State's territorial sea or over an international strait subject to the transit passage regime.

At present, whether a surface MAV is a ship or a vessel may well be a threshold question to determine which legal regime is applicable for the regulation of its actions under international law.[31] For the purposes of this article, this issue will be most pertinent in relation to intelligence gathering and surveillance and is discussed in Part VII below. It must be anticipated that the variety of MAVs means that a definitive answer on whether one is a ship or not is elusive. It may be a question of interpretation in each instance and will need to be assessed on a case-by-case basis considering the characteristics and the activities in which the MAV is involved, as well as the objects and purposes of the treaty at issue.[32]

III. LEGAL STATUS OF MAVS

The general expectation appears to be that rules relating to surface vessels, submarines, and aircraft apply regardless of whether there are humans on board or not. As with other issues under the law of the sea, when a challenge to the legality of certain actions arises, the preliminary questions remain: where is it happening and what is happening? It is in the latter setting that we start asking whether a MAV is a ship or a vessel in relation to the activities being undertaken. Who is on board may become relevant once we start articulating the rights and duties that adhere to different actors depending on where something is happening and what is happening.

30. *See* Hofmann & Proelss, *supra* note 26, at 175. Hofmann & Proelss note that in the instances where ship or vessel are defined, the definitions "are characterized by their purposive nature." *Id.*

31. Allen, *supra* note 6, at 480.

32. *See id.* Allen also supports a specific examination for the particular MAV, arguing "[g]iven the diversity in UMV designs and operating modes, a single characterization that would apply to the entire class of unmanned surface and undersea vehicles, both existing and those yet to be developed, is at best premature and almost certainly unwise." *Id.* at 493.

In discussions on the application of the law of armed conflict to MAVs, commentators have observed that MAVs will potentially fit within the definition of warships under Article 29 of UNCLOS,[33] especially where there is some remote control rather than fully autonomous operation. This interpretation fits with the MAV being "under the command of an officer" and/or potentially "manned by a crew." Moreover, a MAV launched from a warship could be viewed as a system of that ship rather than having an independent status.[34] Even if there is disagreement around these points, MAVs that are government-owned and used for non-commercial purposes will largely enjoy sovereign immunity comparable to warships.[35]

One difference that may emerge in a peacetime context concerns the right of innocent passage. Under Article 30, a coastal State may require a warship to leave immediately if it does not comply with the coastal State's laws and regulations,[36] whereas under Article 25(1), a coastal State "may take the necessary steps in its territorial sea to prevent passage which is not innocent."[37] Although this distinction suggests more action might be taken against vessels that are not classed as warships, coastal State "steps" would

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33. UNCLOS, *supra* note 23, art. 29

> For the purposes of this Convention, '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.

This definition is well established under international law, drawing from the 1907 Hague Convention No. VII. Relating to the Conversion of Merchant Ships into War-ships arts. 2–6, Oct 18, 1907, 205 Consol. T.S. 319.

34. McLaughlin, *Unmanned Naval Vehicles at Sea*, *supra* note 2, at 109.

35. This immunity is set out in Article 32 of UNCLOS. UNCLOS, *supra* note 23, art. 32. Such immunity has also been claimed in manuals of the German Navy and the U.S. Navy. *See* GERMAN NAVY, COMMANDER'S HANDBOOK: LEGAL BASES FOR THE OPERATIONS OF NAVAL FORCES § 2.1.1 (2002); U.S. NAVY, U.S. MARINE CORPS & U.S. COAST GUARD, NWP 1-14M/MCTP 11-10B/COMDTPUB P5800.7A, THE COMMANDER'S HANDBOOK ON THE LAW OF NAVAL OPERATIONS § 2.3.6 (2017); *see also* McLaughlin, *Unmanned Naval Vehicles at Sea*, *supra* note 2, at 110.

36. UNCLOS, *supra* note 23, art. 30.

37. *Id.* The status of a MAV as a warship is also an issue in the law of armed conflict in relation to the exercise of belligerent rights. Only warships have those rights, including the right to conduct offensive attacks. *See* Pedrozo, *supra* note 5, at 7 ("Naval auxiliaries, merchant vessels, and presumably [MAV] crafts may only defend themselves from enemy attacks—they may not conduct attacks in offensive combat operations in an international armed conflict.").

still need to account for the sovereign immunities enjoyed by MAVs that are government vessels operated for non-commercial purposes.

Ultimately, as noted in relation to terminology, the legal status of MAVs will depend on a contextual analysis when considering the ordinary meaning of references to ships, vessels, or warships. In relation to the use of MAVs in law enforcement and the applicability of international law to their operations, Norris has correctly observed that "it is important to distinguish the vessel-like components for these maritime functions from the crew-like components."[38] The following parts address different law enforcement activities and consider the implications for existing international legal frameworks if a MAV is engaged either by a State to facilitate law enforcement or by a non-State actor to enhance criminal activity.

IV. RIGHT OF HOT PURSUIT

The right of hot pursuit has been codified in Article 111 of UNCLOS.[39] This right provides a basis for warships, military aircraft, "or other ships or aircraft clearly marked and identifiable as being on government service and authorized to that effect" to exercise enforcement jurisdiction over a "foreign ship" that is fleeing or has fled from maritime zones under the sovereignty or jurisdiction of the coastal State.[40] The right of hot pursuit is an exception to the exclusive jurisdiction of the flag State over its vessels on the high seas.[41] Such jurisdiction may be exercised where there is good reason to believe that a foreign ship has violated the laws and regulations of the pursuing State.[42] The pursuit of that ship must commence "when the foreign ship or one of its boats is within the internal waters, the archipelagic waters, the territorial sea or the contiguous zone of the pursuing State, and may only be continued outside the territorial sea or the contiguous zone if the pursuit has not been interrupted."[43]

From this, it is apparent that a MAV could be used for initial surveillance to detect vessels that may be undertaking illicit activities in the relevant mar-

38. Norris, *supra* note 5, at 47.

39. UNCLOS, *supra* note 23, art. 111.

40. *See id.* arts. 111(5), 111(1).

41. *See generally* NATALIE KLEIN, MARITIME SECURITY AND THE LAW OF THE SEA 109–14 (2011).

42. UNCLOS, *supra* note 23, art. 111(1).

43. *Id.*

itime zones of the coastal State. The MAV could have the capability, especially if remote-controlled, to send an order to the offending vessel to stop. UNCLOS anticipates that pursuit only begins after "a visual or auditory signal to stop . . . at a distance which enables it to be seen or heard by the foreign ship."[44] This signal requirement has been understood to incorporate subsequent technological developments whereby the signal may be given via radio broadcast.[45] MAVs could also meet this requirement through other more modern means. Indeed, the technology on board the MAV may allow for a suitable communication with the foreign ship. Alternatively, if remotely controlled, the MAV could deliver a signal given from its home base.

After a signal to stop, a MAV could pursue the vessel continuously until it stops and allows possible boarding. At this point, a crew is needed to board and inspect the vessel (until robots or perhaps even smaller remote-controlled drones have that capability).[46] Otherwise, the MAV pursues the suspect ship until a boarding party on another vessel arrives.

UNCLOS anticipates that another vessel may take over the boarding phase when there is an aircraft that has undertaken the pursuit,[47] so on this basis it could be argued that there would be no legal barrier to a crewed vessel taking over the pursuit or visit function.[48] States have already undertaken and further anticipate that multilateral hot pursuits might occur whereby the pursuing vessel is replaced by another in the course of the pursuit.[49] The jurisdictional challenges that might emerge where the pursuing ships are from different States would not arise where the MAV is from the same State as the ship that ultimately undertakes the boarding.[50] Given the

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44. *Id.* art. 111(4).

45. *See* Rachel Baird, *Illegal, Unreported and Unregulated Fishing: An Analysis of the Legal, Economic and Historical Factors Relevant to its Development and Persistence*, 5 MELBOURNE JOURNAL OF INTERNATIONAL LAW 299, 328 (2004); KLEIN, *supra* note 41, at 110.

46. This dimension of MAVs and boarding is discussed further in the next Part concerning the right of visit. *See infra* notes 54–64 and accompanying text.

47. UNCLOS, *supra* note 23, art. 111(6).

48. *See* Douglas Guilfoyle, *Article 111*, *in* UNITED NATIONS CONVENTION ON THE LAW OF THE SEA: A COMMENTARY 778 (Alexander Proelss ed., 2017); *see also* Craig H. Allen, *The Doctrine of Hot Pursuit: A Functional Interpretation Adaptable to Emerging Maritime Law Enforcement*, 20 OCEAN DEVELOPMENT AND INTERNATIONAL LAW 309, 320 (1989).

49. *See* Warwick Gullett & Clive Schofield, *Pushing the Limits of the Law of the Sea Convention: Australian and French Cooperative Surveillance and Enforcement in the South Ocean*, 22 INTERNATIONAL JOURNAL OF MARITIME AND COASTAL LAW 545 (2007).

50. *See generally* Erik J. Molenaar, *Multilateral Hot Pursuit and Illegal Fishing in the Southern Ocean: The Pursuits of the* Viarsa 1 *and the* South Tomi, 19 INTERNATIONAL JOURNAL OF MARINE AND COASTAL LAW 19 (2004).

increasing reliance on MAVs for surveillance, it could well be foreseen that they will be used for this particular enforcement activity. Indeed, MAVs may be better equipped to do so when it is recalled that some hot pursuits have lasted over days and caused difficulties for crew and supplies in these circumstances.[51]

The alternative scenario to consider would be where the foreign ship is a MAV and there are reasons to believe that the operation of the MAV violates the laws and regulations of a pursuing State. Given that there is a reference to a foreign ship being subject to the right of hot pursuit, it may be necessary to re-engage on the debate of whether any particular MAV is a ship or not. Does the right of hot pursuit not emerge if there is no "ship" to pursue? This outcome may seem unlikely when it is recalled that UNCLOS already anticipates the setting where there is a so-called "mother ship" that has "boats or other craft working as a team."[52] However, Article 111(4) projects a scenario where the mother ship may be pursued rather than the boats or other craft; the mother ship having constructive presence within the relevant maritime zones of the coastal State. Factually, the mother ship that operates the MAV may be the more desirable objective for law enforcement purposes than the MAV.

Yet, there appears to be a gap in the text of UNCLOS in relation to the permissible pursuit of "other craft." It may be argued that it is implicit that boats or other craft working as a team are also subject to enforcement powers arising from hot pursuit. This interpretation could be reinforced by considering whether other craft may be validly arrested or seized on the high seas. If the MAV is not State-owned, but constitutes another craft that is engaged in illicit activity and not registered to a State, it does not enjoy the protection of a flag State. Then, if there is not a crew on board that may be protected by their individual States of nationality, the MAV seemingly could be seized by State authorities on the high seas regardless of any hot pursuit.[53]

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51. The twenty-one day pursuit of the *Viarsa 1* ultimately involved enforcement authorities from Australia, South Africa, and the United Kingdom. *See* Guilfoyle, *supra* note 48, ¶ 11.

52. UNCLOS, *supra* note 23, art. 111(4).

53. The scenario that might then emerge is whether there would be a domestic court action for private individuals to recover property seized by the government. Such action would presumably only be undertaken if the MAV was not engaged in unlawful activity.

V. RIGHT OF VISIT

Under UNCLOS, Article 110 allows for "a warship which encounters on the high seas a foreign ship, other than a ship entitled to complete immunity in accordance with articles 95 and 96" to board that foreign ship if there are reasonable grounds for suspecting the ship is engaged in piracy, the maritime slave trade, or unauthorized broadcasting.[54] Likewise, boarding is permissible if the ship is without nationality or "though flying a foreign flag or refusing to show its flag, the ship is, in reality, of the same nationality as the warship."[55] The right of visit may also be performed by "any other duly authorized ships or aircraft clearly marked and identifiable as being on government service."[56] Hence, as an initial matter, a MAV does not need to meet the criteria of being a warship to exercise a right of visit.

As indicated in Article 110, and as discussed in the academic literature,[57] the right of visit comprises different stages. First, a warship "may proceed to verify the ship's right to fly its flag."[58] To verify the ship's flag, UNCLOS anticipates that "a boat under the command of an officer" will be sent to the suspected ship. However, sending a boat with an officer on board is not required under UNCLOS, but is only one option that could be pursued to verify a ship's right to fly its flag.[59]

Even if not legally required, the possible availability and use of MAVs may prompt the question of whether a physical inspection is necessary for the purposes of verifying a flag. Would it be possible for cameras to note the ship's markings, to send the images to a home base where authorities there could contact the relevant flag-State authorities to confirm the nationality or registration of the vessel? Or even automatically contact State authorities based on the IMO number of the vessel or its identifying marks? It may be the case that suspicions are resolved through this preliminary intervention by the MAV without the need for further engagement by the authorities from the visiting State. However, the external indications, or the amount of time involved in dealing with flag authorities, may mean that the inspection

54. And the flag State of the warship has jurisdiction under UNCLOS Article 109. UNCLOS, *supra* note 23, art. 109.

55. *Id.* art. 110(1).

56. *Id.* art. 110(5).

57. *See, e.g.*, Douglas Guilfoyle, *Maritime Interdiction of Weapons of Mass Destruction*, 12 JOURNAL OF CONFLICT AND SECURITY LAW 1, 4 (2007).

58. UNCLOS, *supra* note 23, art. 110(2).

59. *Id.* ("To this end, it may send a boat under the command of an officer to the suspected ship.").

of the physical registration papers of the vessel is needed. At this point, this process can only be undertaken if persons board the suspect vessel and conduct the necessary visual inspection.[60]

In the next stage of the right of visit, UNCLOS provides: "If suspicion remains after the documents have been checked, it may proceed to a further examination on board the ship, which must be carried out with all possible consideration."[61] The assumption in this provision is that the inspection can only be done through physical inspection. Perhaps a future can be imagined where an aerial drone will collect information about the vessel that is sufficient for identifying that an offense has been committed. Yet inspection within the vessel may be needed and such access would more likely be accorded to a visiting party, rather than a visiting MAV. The engagement of relevant officials would be important at this point in the event that an offense has been committed and it is necessary to collect evidence of any crime for future prosecution. At present, it is apparent that MAVs are only relevant for the first stage of the right of visit.

What if the suspect ship is a MAV? We again would need to determine if the MAV is a "ship" that is flagged to a State and, if so, that State's consent must be sought for any possible boarding. It falls within the exclusive jurisdiction of each State to determine the conditions for registration of a vessel, as international law only requires that there is a genuine link between the vessel and the State in question.[62] If a MAV is registered to a State, then it would need to bear the markings or fly the flag of that State. Yet, how to proceed with a boarding remains problematic. Allen has observed the difficulty of "how to conduct a boarding when there is no master or crew to answer questions regarding the craft's nationality, to maneuver the craft to accommodate the boarding, or to present the necessary documents once the boarding team is on board."[63] Without any markings or a flag, a MAV might be considered as stateless and treated as such under Article 110 of UNCLOS, hence obviating any flag-State authority in relation to the MAV.[64] However,

60. It could be anticipated that the papers physically held on ships could be switched to a digitized form and so potentially accessed remotely. For a discussion on this point, see Eric Van Hooydonk, *The Law of Unmanned Merchant Shipping – An Exploration*, 20 JOURNAL OF INTERNATIONAL MARITIME LAW 403, 415 (2014).

61. UNCLOS, *supra* note 23, art. 110(2).

62. *See id.* art. 91(1).

63. Allen, *supra* note 6, at 491.

64. *See* UNCLOS, *supra* note 23, art. 110.

the same practical difficulties of boarding the MAV and checking registration papers again emerge.

VI. LAW ENFORCEMENT REGIMES: MAVS IN CONTEXT

The right of visit may be granted in bilateral or multilateral treaties that address different maritime crimes. In some respects, the core issues that were highlighted in relation to the right of visit will be replayed in these other regimes, especially in relation to expectations around a physical boarding and inspection of a suspect ship. Accordingly, this Part considers some of the distinct features of various boarding regimes that may be implicated through the use of MAVs, again either by State authorities or by non-State actors (criminals). It does so by considering three examples: drug trafficking, terrorism, and migrant smuggling.[65] The latter example also considers the corresponding issue of search and rescue.

A. Drug Trafficking

Kraska described the "first ever drug bust" by a MAV in 2010 as follows:

> Launched from the frigate, which was on patrol in the Eastern Pacific, the [Fire Scout] UAV was engaged in a routine test flight. The Fire Scout's radar acquired a suspected narcotics go-fast boat making its way northward. The UAV tracked the go-fast for hours, and a law enforcement boarding team from the frigate interdicted the small vessel after it rendezvoused with a mother ship. Sixty kilograms of cocaine were seized.[66]

What is unknown from this account is the location of the go-fast boat when the MAV started tracking it and where the interdiction finally occurred. What is most relevant for present purposes, however, is the use to which the MAV was put in detecting the go-fast boat, tracking it, and feeding back location data to law enforcement officials. The MAV thus performed a critical law enforcement role in this example.

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65. For a discussion of MAVs in relation to the UNCLOS provisions on piracy, see Anna Petrig, *The Commission of Maritime Crimes with Unmanned Systems: An Interpretive Challenge for UNCLOS*, *in* MARITIME SECURITY AND THE LAW OF THE SEA: HELP OR HINDRANCE?, *supra* note 22.

66. Kraska, *supra* note 7, at 49.

UNCLOS establishes an obligation on all State parties to cooperate in the suppression of illicit traffic in narcotic drugs and psychotropic substances on the high seas.[67] This cooperation for law enforcement purposes was elaborated on in the 1988 Drugs Convention.[68] Article 17 of that treaty sets out requirements in relation to conducting the right of visit where it is suspected that a vessel is engaged in illicit trafficking of drugs. In addition to cooperating, parties are to "render such assistance within the means available to them."[69] If a State party has a MAV in the vicinity it could therefore fulfill its obligation to assist by deploying the MAV to monitor the suspect ship or, if possible, to gather further information about the ship. A State would likely still be meeting its obligations under Article 17 even if the MAV could not proceed to a visit of the suspect vessel since the assistance is limited to the "means available."

As with the right of visit, a MAV may be remotely controlled and/or otherwise have the capacity to notify the flag State and request confirmation of registry in relation to a suspect vessel in accordance with Article 17. A MAV undertaking these responsibilities must still be one that is "clearly marked and identifiable as being on government service and authorized to that effect."[70] It could further be anticipated that the operation of the MAV should meet safeguards associated with the right of visit, which, under the Drugs Convention, include "tak[ing] due account of the need not to endanger the safety of life at sea, the security of the vessel and the cargo or to prejudice the commercial and legal interests of the flag State or any other interested State."[71] Moreover, any MAV would need to ensure its actions in suppressing illicit drug trafficking "take due account of the need not to interfere with or affect the rights and obligations and the exercise of jurisdiction of coastal States in accordance with the international law of the sea."[72] The current limitations to the use of MAVs for these law enforcement purposes again relate to the inability to board or search another vessel and undertake an arrest or seizure of evidence as may be needed for the purposes of prosecution.[73]

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67. UNCLOS, *supra* note 23, art. 108.

68. United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, Dec. 20, 1988, 1582 U.N.T.S. 95 [hereinafter Drugs Convention].

69. *Id.* art. 17(2).

70. *Id.* art. 17(10).

71. *Id.* art. 17(5).

72. *Id.* art. 17(11).

73. As anticipated under the Drugs Convention. *See id.* art. 17(4).

It must also be anticipated that MAVs will be used by criminal organizations for smuggling purposes. Given that semi-submersible vessels with crews are already being used for this purpose, it would seem a natural progression to deploy underwater MAVs for similar purposes.[74] If the MAV in question is a ship, it would need to be determined if it is registered to a State that has exclusive jurisdiction over that MAV. If so, the boarding could only proceed consistent with Article 17 of the 1988 Drugs Convention. If the MAV is a vessel without nationality, the Drugs Convention does not explicitly provide for a right of visit, although all parties must render assistance in suppressing the vessel's use for illicit drug trafficking.

Yet in the context of drug trafficking, a question may again emerge as to whether the MAV is a "ship" or not. It may be argued that a MAV used for the smuggling of any goods will always be considered a ship because it is engaged in transportation.[75] Or, could the crafts be small enough and of such rudimentary design that they resemble "boats" or "objects" or "devices"? The result of the latter would be that a State seeking to prevent the movement of a MAV laden with drugs could seize the MAV on the high seas claiming it is not a vessel and so does not receive any possible protections or assumptions that arise in the treatment of stateless vessels. If the ownership of the "object" is unknown and cannot be ascertained through any markings seemingly no violation of the freedoms of the high seas would occur.

B. Terrorism

The use of drones on land, particularly in the context of targeted attacks on terrorist leadership locations, has already prompted questions regarding their use as a weapon under the law of armed conflict,[76] and similar considerations would emerge for the use of MAVs for the same purpose. Yet additional factors would also need to be considered in relation to the location at sea and possibly the relevant laws of naval warfare. For current purposes, I will address terrorism within the context of a law enforcement operation and put aside other questions that could validly emerge under the law of armed conflict, including whether that legal regime is applicable or not.

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74. *See* Allen, *supra* note 6, at 478 n.1.

75. For a discussion on the relevance of the "transportation" criterion, *see* Swain, *supra* note 10, at 130–34.

76. *See, e.g.*, Kraska, *supra* note 7, at 47; *see generally* Raul A. "Pete" Pedrozo, *Use of Unmanned Systems to Combat Terrorism*, 87 INTERNATIONAL LAW STUDIES 217 (2015).

The key multilateral treaty relating to maritime terrorism is the 2005 Suppression of Unlawful Acts (SUA) Convention, which comprises the 1988 Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation and its 2005 Protocol.[77] The latter instrument extended the list of offenses to be criminalized in national legislation and enhanced the enforcement regime for the suppression of these acts.[78] As an initial matter, it can be noted that warships or "ship[s] owned or operated by a State when being used as a naval auxiliary or for customs or for policy purposes" are outside the scope of the Convention.[79] Moreover, the immunities enjoyed by MAVs when government-owned and operated for non-commercial purposes are preserved under the SUA Convention.[80]

However, what if a non-State actor uses a MAV to commit a crime? For example, a MAV could be used for a terrorist attack against subsea infrastructures, including oil and natural gas pipelines or telecommunication cables, or for the shipment of illicit cargo across national boundaries. On January 30, 2017, Houthi militants used a remote-controlled boat full of explosives to attack a Saudi frigate in the Red Sea.[81] Before this attack, Saudi forces intercepted another remote-controlled boat carrying explosives attempting to target an oil depot and distribution station in Yemen.[82] More recently, on September 8, 2018, a remote-controlled boat with explosives onboard was found near an island on the western coast of Yemen.[83] As these examples demonstrate, the use of MAVs in important shipping lanes poses a significant threat to the freedom of navigation and commercial shipping interests.

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77. Convention for the Suppression of Unlawful Acts of Violence against the Safety of Maritime Navigation, Mar. 10, 1988, 1678 U.N.T.S. 221; International Maritime Organization [IMO], *Protocol of 2005 to the Convention for the Suppression of Unlawful Acts of Violence against the Safety of Maritime Navigation*, IMO Doc. LEG/CONF.15/21 (Nov. 1, 2005) [hereinafter SUA Convention].

78. For discussion of this treaty, *see* KLEIN, *supra* note 41, at 170–84; DOUGLAS GUILFOYLE, SHIPPING INTERDICTION AND THE LAW OF THE SEA 254–59 (2009); JAMES KRASKA & RAUL PEDROZO, INTERNATIONAL MARITIME SECURITY LAW 820–53 (2013).

79. SUA Convention, *supra* note 77, art. 2(1).

80. *Id.* art. 2(2).

81. Christopher P. Cavas, *New Houthi Weapon Emerges: A Drone Boat*, DEFENSENEWS (Feb. 19, 2017), https://www.defensenews.com/digital-show-dailies/idex/2017/02/19/new-houthi-weapon-emerges-a-drone-boat/.

82. Marco Olimpio, *Remote Controlled Terror: Houthi Suicide Boats*, EUROPEAN EYE ON RADICALIZATION (Sept. 27, 2018), https://eeradicalization.com/remote-controlled-terror-houthi-suicide-boats/.

83. *Id.*

The MAVs used in these examples would constitute "ships" as defined in the SUA Convention to cover all vessels "of any type whatsoever not permanently attached to the sea-bed, including dynamically supported craft, submersibles or other floating craft."[84] This definition of ships would likely encompass all varieties of MAVs.

A review of the offenses listed in Article 3 reveals that the use of MAVs in these contexts would readily fall within the scope of the SUA Convention. For example, Houthi militants reportedly seized a MAV belonging to the U.S. Navy off the coast of Yemen in 2018.[85] This act would fall within Article 3(1)(a) as it involves the seizure of a ship (interpreted broadly as noted previously) by force.[86] The person who remotely controls a MAV to explode when attacking another ship would also commit an offense under the convention.[87] Indeed, under the SUA Convention, using "a ship in a manner that causes death or serious injury or damage" when the person intends "to intimidate a population, or to compel a government or an international organization to do or to abstain from doing any act" is an offense.[88] This certainly applies to Houthi militants using explosive-laden MAVs to target coastal infrastructure. Moreover, even the transportation of explosives by MAVs that are intended to be used "for the purpose of intimidating a population, or compelling a government or an international organization to do or to abstain from doing any act" constitutes an offense under the convention.[89]

From a cybersecurity perspective, questions have been raised about criminal elements taking control of the electronics of a MAV. While this question emerges in the context of vessels with crews as well, in that situation, presumably human intervention would be available to restore control or correct changes that are made to the ship's operation. Does this constitute an act of terrorism, or perhaps even piracy?[90] The SUA Convention may well remain applicable if the intention in taking control of the MAV is to cause death, serious injury, or damage.[91]

The international legal framework for the suppression of offenses involving MAVs is solid inasmuch as the definition of "ship" is inclusive of

84. SUA Convention, *supra* note 77, art. 1.
85. *See* Swain, *supra* note 10, at 120.
86. SUA Convention, *supra* note 77, art. 3(1).
87. *Id.* art. 3(1)(c)–(e).
88. *Id.* art. 3 *bis* (1)(a)(iii).
89. *Id.* art. 3 *bis* (1)(b)(i).
90. The latter is discussed in Pritchett, *supra* note 20, at 212–15.
91. SUA Convention, *supra* note 77, art. 3(1)(a).

MAVs and the variety of offenses envisaged encompasses the different ways that MAVs could potentially be used to advance terrorist goals. The challenge in this setting is more that the number of States party to the 2005 SUA Convention is low, standing at forty-eight as of time of writing.[92] Moreover, even once a State becomes party; it must ensure proper domestic implementation of the necessary legislation to criminalize the listed offenses to allow for prosecution or assistance to another State party seeking prosecution.

C. Migrant Smuggling and Search and Rescue

Law enforcement efforts against migrant smuggling and human trafficking frequently interface with search and rescue obligations given the condition of the vessels by which irregular migrants seek to move (or are moved) from one location to another. While it is important to understand the interaction between the different legal regimes for overall adherence to international obligations in these settings,[93] for the purposes of understanding the role of MAVs in relation to migrant smuggling and search and rescue the two regimes are considered separately in this section.

For law enforcement efforts against migrant smuggling, States will rely on the authority they exercise as coastal States over their territorial seas and contiguous zones to prevent illegal migration. Beyond the contiguous zone, the 2000 Migrant Smuggling Protocol provides for a right of visit under Article 8.[94] Similar considerations arise as discussed above in terms of a MAV identification of a suspect vessel, and potentially undertaking an initial confirmation of registry, but being unable to complete a physical boarding to inspect documents, secure evidence, arrest the smugglers, or address the needs of the migrants on board consistent with flag-State consent.

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92. *Status of Treaties,* INTERNATIONAL MARITIME ORGANIZATION, http://www.imo.org/en/About/Conventions/StatusOfConventions/Documents/StatusOfTreaties.pdf (last visited Aug. 5, 2019).

93. *See, e.g.*, Natalie Klein, *A Case for Harmonizing Laws on Maritime Interceptions of Irregular Migrants*, 63 INTERNATIONAL AND COMPARATIVE LAW QUARTERLY 787 (2014); Violeta Moreno-Lax, *Seeking Asylum in the Mediterranean: Against a Fragmentary Reading of EU Member States' Obligations Accruing at Sea*, 23 INTERNATIONAL JOURNAL OF REFUGEE LAW 174 (2011); Daniel Ghezelbash, Violeta Moreno-Lax, Natalie Klein & Brian Opeskin, *Securitization of Search and Rescue at Sea: The Response to Boat Migration in the Mediterranean and Offshore Australia*, 67 INTERNATIONAL AND COMPARATIVE LAW QUARTERLY 315 (2018).

94. Protocol against the Smuggling of Migrants by Land, Sea and Air, supplementing the United Nations Convention against Transnational Organized Crime art. 8, Nov. 15, 2000, 2241 U.N.T.S. 507.

Using MAVs for surveillance purposes may assist State parties to the Migrant Smuggling Protocol to meet obligations to exchange information about routes of smugglers and means of transportation.[95] Interestingly, there is an obligation to exchange information, albeit subject to domestic law constraints, concerning "[s]cientific and technological information useful to law enforcement, so as to enhance each other's ability to prevent, detect and investigate . . . conduct . . . and to prosecute those involved."[96] The caveat on this obligation is no doubt significant in the context of sharing commercial or military information about available MAVs, but a State party may well seek information about MAVs or the surveillance data collected under Article 10 from another State party if the MAVs are perceived as enhancing positive law enforcement outcomes against migrant smuggling.[97]

If smugglers were using MAVs to transport irregular migrants, these vehicles would presumably be of a size and functionality to constitute a "vessel" or "ship." Under Article 8(7) of the Migrant Smuggling Protocol, a MAV suspected of migrant smuggling could be "assimilated to a vessel without nationality" and subjected to boarding and search by State authorities consistent with the existing legal regime.[98] The difficulty for law enforcement officials would be operational in terms of their likely ability to board a vessel that is remotely controlled or autonomously programmed and cannot be readily incapacitated for boarding purposes.

The core search and rescue obligation, as enshrined in UNCLOS, the International Convention for the Safety of Life at Sea (SOLAS Convention), and the International Convention on Maritime Search and Rescue (Search and Rescue Convention), is that assistance must be rendered to persons in distress or in danger of being lost at sea.[99] Under UNCLOS and the SOLAS

95. *See id.* arts. 10(1)(a), 10(1)(d).

96. *Id.* art. 10(1)(f).

97. This obligation could be coupled with requirements relating to training and technical cooperation that are set out in the 2000 Migrant Smuggling Protocol. *See id.* art. 14.

98. *Id.* art. 8(7).

99. UNCLOS, *supra* note 23, art. 98(1); International Convention for the Safety of Life at Sea annex, ch. 5 reg. 10(a), Nov. 1, 1974, 32 U.S.T. 47, 1184 U.N.T.S. 3 [hereinafter SOLAS Convention]; International Convention on Maritime Search and Rescue annex, ¶ 1.3, Apr. 27, 1979, 1405 U.N.T.S. 97 [hereinafter SAR Convention]. The SOLAS Convention may not be applicable to all MAVs since the treaty exempts cargo ships below certain tonnages, as well as excluding warships. Further, the SOLAS Convention only applies to ships engaged in international voyages.

Convention, this obligation rests with the master of the vessel.[100] Obviously on a MAV there is no master on the actual vessel, which might well raise the question as to whether (or to whom) the duty to rescue could still adhere.[101] Where the MAV is remotely controlled, the duty could be deemed to rest with the operator as the functional equivalent to the master.[102] The operator may be in a position to communicate the location and need of a vessel in distress to the relevant rescue coordination center. This possibility would seemingly not exist with a fully autonomous vessel, although Pritchett has observed, "one could certainly make a compelling argument that the person who programmed the control system, the owner or charterer of the USV [Unmanned Surface Vehicle], or the vessel itself was 'in charge' and was thus the master who had an obligation to rescue."[103]

Even where the duty to rescue is understood as existing more broadly, rather than falling solely within the responsibilities of the master,[104] practical issues may emerge in terms of the capabilities of a MAV to take rescued individuals on board and provide the food, water, and/or medical supplies necessary for the situation. While it could be suggested that it is incumbent on the designers of MAVs to account for this obligation and design the vessels accordingly, the subjective elements of the duty must also be recalled. In particular, the obligation to render assistance is qualified in various ways: "in so far as he can do so without serious danger to the ship" and "in so far as such action can be reasonably expected of him."[105] While international law may provide sufficiently flexible parameters as to how the duty to rescue is met in the context of MAVs, the issue is more likely to be explored in domestic litigation if claims of negligence or other tortious conduct are alleged against a ship owner, charterer, or MAV designer, or MAV builder.[106]

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100. UNCLOS, *supra* note 23, art. 98(1); SOLAS Convention, *supra* note 99, annex, ch. 5 reg. 10(a).

101. *See* Pritchett, *supra* note 20, at 208.

102. See discussion in *id.* at 208–09.

103. *Id.* at 209.

104. As is anticipated under the SAR Convention. *See* SAR Convention, *supra* note 99, annex, ¶ 2.1.10.

105. UNCLOS, *supra* note 23, art. 98; *see also* Comité Maritime International, *supra* note 1, at 6.

106. *See* Pritchett, *supra* note 20.

VII. INTELLIGENCE GATHERING TO SUPPORT MARITIME SECURITY

Intelligence gathering and surveillance are key missions associated with MAVs, whether as part of defense planning or for law enforcement or environmental monitoring. For example, in listing the primary application of different types of MAVs, the U.S. Navy emphasized intelligence, surveillance, and reconnaissance.[107] The United States has deployed MAVs in diverse contexts, including as part of a remote mine-hunting system whereby an underwater MAV was used for identification of mines in Khawr Abd Allah channel in Iraq.[108] MAVs may therefore be relevant for core defense concerns, such as force protection, electronic warfare, anti-surface warfare, or for contemporary maritime security issues, such as counterterrorism or search and rescue.[109] McLaughlin has noted that the use of MAVs for surveillance may be advantageous from a political or strategic perspective as the stakes are much lower if a MAV is seized or sunk than if a submarine or warship is sunk with a large loss of life.[110] The demand of a national population for a response may be less if only an asset is lost rather than an asset, as well as the individuals on board, so the likelihood of escalation is reduced.[111] However, these dynamics may also serve to embolden States seeking to disrupt the operations of MAVs in their maritime zones.[112]

The type of MAV and where it is operating will determine to what regulation it is subject. Some distinction may be needed between different types of MAVs that gather data and other information, as floats and gliders have been considered as separate from ships. Floats have been defined as "[a]n autonomous vehicle used for collection of . . . data . . . and floating passively

107. *See* Tuneer Mukherjee, *Securing the Maritime Commons: The Role of Artificial Intelligence in Naval Operations* 6, 11 (Observer Research Foundation (ORF), ORF Occasional Paper No. 159, 2018), https://www.orfonline.org/research/42497-a-i-in-naval-operations-exploring-possibilities-debating-ethics/; *see also* Norris, *supra* note 5, at 9 (referring to the UUV Master Plan, which identifies intelligence, surveillance, and reconnaissance as the first priority mission for these MAVs).

108. Kraska, *supra* note 7, at 46; *see also* Andrew H. Anderson, *Murky Waters: The Legal Status of Unmanned Undersea Vehicles*, 53 NAVAL LAW REVIEW 55, 58 (2006) (discussing U.S. mine hunting and mine-clearing by underwater MAVs).

109. Kraska, *supra* note 7, at 49. The types of uses of MAVs may cross into important non-lethal uses in an armed conflict, including surveys of shallow waters, and mine detection and monitoring, as well as carrying out countermeasures against mines and jamming enemy communications.

110. McLaughlin, *Unmanned Naval Vehicles at Sea*, *supra* note 2, at 114.

111. *Id.*

112. *See* Chadwick, *supra* note 22.

at a preprogrammed pressure level until at predetermined time intervals rising to the ocean surface to broadcast its position and as the case may be, collected data to a satellite."[113] A glider is an autonomous underwater vehicle with a buoyancy engine, so that it can also change its depth but maintain a horizontal movement.[114]

Floats and gliders may be subject to the regime of marine scientific research as set out in Part XIII of UNCLOS,[115] but questions are prompted as to whether they are conducting marine scientific research or the data gathered is for defense or operational purposes. The reality of this conflict was evident at the end of 2016 when China seized a U.S. underwater MAV launched from the *USNS Bowditch*.[116] Pedrozo and Kraska have argued that China's actions were unlawful on the following bases:

> China's capture of the drone violates three norms embedded in international maritime law and reflected in the United Nations Convention on the Law of the Sea and other treaties. First, the drone is a "U.S. vessel," and its seizure shows a willingness to openly steal American property operating legitimately at sea. Second, China's action is all the more blatant because the U.S. "vessel" enjoys sovereign immune status. No foreign nation may purport to assert legal jurisdiction over it. Third, the capture is further evidence of China's penchant for disrupting freedom of navigation on the high seas, despite Beijing's repeated assertions that it has never interfered with freedom of navigation in the South China Sea.[117]

Their view is thus premised initially on the glider being considered a "vessel" or "ship" and, as such, the MAV in this scenario is also subject to sovereign

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113. Bork, Karstensen, Visbeck & Zimmermann, *supra* note 26, at 299 (citing Intergovernmental Oceanographic Commission, United Nations Educational, Scientific and Cultural Organization [UNESCO], *Draft [Practical] Guidelines of IOC, Within the Context of UNCLOS, for the Collection of Oceanographic Data by Specific Means*, IOC/ABE-LOS VII/7 (Feb. 19, 2007).

114. *Id.* at 300–01.

115. See discussion in *id.* at 303–05; *see also* Hofmann & Proelss, *supra* note 26, at 178–80.

116. *See* David Malakoff, *Q&A: China Just Seized a Research Robot from a U.S. Navy Ship. What Was it Doing?*, SCIENCE (Dec. 16, 2016), https://www.sciencemag.org/news/2016/12/qa-china-just-seized-research-robot-us-navy-ship-what-was-it-doing; *see also* Valencia, *supra* note 10.

117. James Kraska & Raul "Pete" Pedrozo, *China's Capture of U.S. Underwater Drone Violates Law of the Sea*, LAWFARE (Dec. 16, 2016), https://www.lawfareblog.com/chinas-capture-us-underwater-drone-violates-law-sea.

immunity as it was government-owned and being operated for non-commercial purposes. While differences of opinion may emerge on the vessel status of the MAV,[118] what remains pertinent under either analysis is that the United States enjoys the freedom of navigation on the high seas and within EEZs, as this freedom belongs to States rather than attaching to ships.[119] To deny this freedom to the United States through the seizure of its MAV could therefore be construed as a violation of international law irrespective of the status of the MAV as a ship or a device,[120] or whether there was a crew on board or not. Questions may further emerge in this regard as to whether the MAV was being deployed consistently with requirements of navigational safety,[121] and to what extent those rules apply to the MAV at issue.[122]

A navy's use of floats and gliders further challenges the nature of the research being conducted (that is, what is it doing, not just what is doing it), and whether it is subject to coastal State jurisdiction as a result. This debate has emerged even when a vessel is crewed,[123] so it is not the lack of a crew that makes a difference to the regulatory framework. Kraska and Pedrozo noted that the *USNS Bowditch* and its drones were engaged in military activities at the time of China's seizure of the MAV.[124] As such, we must be able to distinguish a MAV that is a ship from a MAV that is an object/device and further consider the type of activities in which it is engaged to assess the legality of State conduct in any given situation. In distinguishing between a ship and a device, it might be a question that is to be determined on the basis

118. *See* Valencia, *supra* note 10.

119. *See* UNCLOS, *supra* note 23, arts. 87, 58(1).

120. Arguably this debate would have been relevant if it was the Philippines that had seized the MAV in an exercise of coastal State authority over marine scientific research in its EEZ rather than China. China may hold the view that the *USNS Bowditch* and its MAVs were operating in China's EEZ, but the decisions of the South China Sea Tribunal denying small land features in the South China Sea an EEZ run counter to such a position. *See* South China Sea Arbitration (Phil. v. China), Case No. 2013-19, Award (Perm. Ct. Arb. 2016).

121. Valencia notes China's argument on this point as follows: "China's Defense Ministry said that its navy had taken an 'unidentified object' (the UUV) out of the water 'in order to prevent the device from causing harm to the safety of navigation and personnel of passing vessels' and that this is a duty of mariners." Valencia, *supra* note 10.

122. *See* Swain, *supra* note 10, at 124–25 (considering the application of the COLREGs to the incident).

123. *See* Norris, *supra* note 5, at 26.

124. Kraska & Pedrozo, *supra* note 117. *But see* Valencia, *supra* note 10.

of particular facts about a MAV (for example, its size, functions, and operating capability),[125] rather than formulating general principles that cannot necessarily predict all technological advances.

If a MAV is a vessel or a ship and engaged in surveillance, the diverse passage regimes under UNCLOS are then relevant.[126] An underwater MAV is required to surface in the territorial sea when exercising the right of innocent passage.[127] Ships engaged in innocent passage may not launch, land, or take on board any military device, which might include a MAV.[128] Surveillance by a MAV, whether underwater, surface, or aerial, would constitute a violation of the right of innocent passage under Article 19 of UNCLOS, as the lack of a master or commander and crew on board makes no difference in assessing the activities of a vessel and whether they prejudice the peace, good order, or security of the coastal State.[129] Equally, a coastal State could not prevent the passage of a MAV simply based on its lack of crew on board.

While navigational rights are greater for passage through international straits subject to the transit passage regime, especially for warships and other military vessels, the passage must still be continuous and expeditious.[130] Stopping to launch or recover a MAV would not on its face constitute one of the "normal modes of continuous and expeditious transit" of a vessel.[131] However, Dalton has argued that the use of a reconnaissance craft may not be inconsistent with the normal mode of the launching vessel if the reconnaissance or surveillance is needed to ensure force protection and navigational safety as it traverses the international strait.[132]

Some commentators have noted that research or survey activities would not be permitted during transit passage without the consent of the littoral States.[133] What would matter in this regard is what is consistent with the

125. For a discussion of varied criteria in the context of assessing the possible application of the COLREGS to MAVs, see Swain, *supra* note 10, at 132–36.

126. Norris concludes that objects and devices are not entitled to the rights of innocent passage and transit passage nor the right of archipelagic sea lanes passage. *See* Norris, *supra* note 5, at 31–40.

127. UNCLOS, *supra* note 23, art. 20.

128. *Id.* art. 19(2)(f).

129. *See id.* art. 19.

130. *Id.* art. 39.

131. *Id.* art. 39(2); *see* Anderson, *supra* note 108, at 69–70.

132. Jane G. Dalton, *Future Navies—Present Issues*, 82 INTERNATIONAL LAW STUDIES 297, 303 (2006).

133. Bernard H. Oxman, *The Regime of Warships under the United Nations Convention on the Law of the Sea*, 24 VIRGINIA JOURNAL OF INTERNATIONAL LAW 809, 846 (1984); Anderson, *supra* note 108, at 69.

"normal mode" of the vessel, and in this regard there is scope for difference in how this term is interpreted. The advantage of this inclusive wording is that MAVs can be deemed to have their own version of normal mode either in their own right or as auxiliaries in the operation of a warship or other vessel. Nonetheless, the context of the MAV's use will be important and it may be the case that the use of surveillance MAVs is construed as a threat of the use of force.[134] If the surveillance was undertaken for a defensive purpose, such as minesweeping, an argument could be made that this is consistent with the right of self-defense.[135] The validity of such a claim would again be context specific and depend at least to an extent on what events had preceded the minesweeping operation.[136]

In the EEZ, the long-standing debate between China and the United States as to the legality of surveillance activities by a foreign State in the EEZ of a coastal State remains apposite with MAVs.[137] Each State must conduct their activities with due regard for the other,[138] and not threaten the use of force or use force.[139] Consideration must be given as to the type of research undertaken and whether the research constitutes "military activities" or whether it might require coastal State consent if conducted in its EEZ.[140] China may ultimately decide to moderate its approaches to MAVs given that it is also "plac[ing] considerable emphasis on developing strategies and technologies suited to an AI-conducive battle environment."[141]

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134. This is prohibited in transit passage and innocent passage, as well as in international law more broadly. *See* U.N. Charter art. 2, ¶ 4.

135. Anderson, *supra* note 108, at 70.

136. It is worth recalling that such a claim was raised in the *Corfu Channel* case by the United Kingdom to justify its mine-sweeping activities following damage to British warships passing through the international strait. The United Kingdom argued that it was gathering evidence in exercising this right, but the Court rejected this argument, finding there was an unlawful intervention against Albania's sovereignty. *See* Corfu Channel (U.K. v. Alb.), Judgment, 1949 I.C.J. Rep. 4, ¶¶ 34–35 (Apr. 9).

137. *See* Erik Franckx, *American and Chinese Views on Navigational Rights of Warships*, 10 CHINESE JOURNAL OF INTERNATIONAL LAW 187 (2011); *see also* Raul (Pete) Pedrozo, *Preserving Navigational Rights and Freedoms: The Right to Conduct Military Activities in China's Exclusive Economic Zone*, 9 CHINESE JOURNAL OF INTERNATIONAL LAW 9 (2010); Li Guangyi, Wan Binhua & Zhu Hongjie, *On the Rights and Obligations of Military Activities in the Exclusive Economic Zone,* 13 CHINA OCEANS LAW REVIEW 134, 148 (2011).

138. UNCLOS, *supra* note 23, arts. 56(2), 58(3).

139. *Id.* art. 301; U.N. Charter art. 2, ¶ 4.

140. KLEIN, *supra* note 41, at 217–23.

141. Mukherjee, *supra* note 107, at 16.

VIII. CONCLUSION

McLaughlin has rightly noted that we should not underestimate "the power of general principles to offer sufficient governance during the inevitable hiatus that ensues whilst the impacts of a technological development are sorted through."[142] Kraska reinforces this view, stating, "the conclusion that the rules governing unmanned systems are derived from broader principles of international law designed for manned ships and aircraft is really the only realistic course."[143] The survey of international law relating to maritime security in this article has demonstrated that the existing principles can be applied to MAVs in diverse settings. Limitations in the legal framework that exist for crewed ships remain limitations when MAVs are involved.

The ship/vessel debate remains pertinent in the maritime security settings, raising a question of whether any floating craft should be deemed a ship in an approach similar to aviation. Nonetheless, the ability to interpret treaties pursuant to their ordinary meaning in context provides some scope to address situations on a case-by-case basis depending on the MAV's operations and capability. What might seem to be limitations on MAVs (such as physically boarding a vessel) may ultimately become things of the past as technology further advances. We will need to monitor continuously how well the international law framework stands the test of time.

142. McLaughlin, *Unmanned Naval Vehicles at Sea*, *supra* note 2, at 103; Kraska, *supra* note 7, at 64. Both McLaughlin and Kraska are concerned that efforts to revise the law, or to create new legal regimes, risk weakening the existing legal structure for the oceans.

143. Kraska, *supra* note 7, at 64.