

## ***Game of Drones: Unmanned Maritime Vehicles and the Law of the Sea***

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*Unmanned maritime vehicles are revolutionising the navies of the world's most powerful states, as rapid scientific advances and prospective military advantages drive a global surge in 'roboticisation'. However, it is not clear how unmanned vehicles (also known as 'maritime drones') are governed by the Law of the Sea — or whether they are even regulated at all. This article will conduct a legal analysis of maritime drones and the United Nations Convention on the Law of the Sea (UNCLOS), along with supporting legal instruments. This analysis will suggest that there are serious ambiguities regarding the legal status of maritime drones. Most importantly, maritime drones may not fit the definition of "vessel" included in the text of UNCLOS and other instruments, meaning they are not covered by the vast majority of relevant provisions in the Law of the Sea. Even assuming maritime drones are vessels, there are other important provisions of the Law of the Sea regime that present difficulties for unmanned technology. In particular, many obligations imposed by instruments like UNCLOS, the International Regulations for Preventing Collisions at Sea (COLREGS) and the Safety of Life at Sea Convention (SOLAS) are specifically imposed on humans. Collectively, these ambiguities mean that the Law of the Sea regime does not govern maritime drones in a clear or predictable way. This article considers the risks of this legal uncertainty against a backdrop of ongoing technological advances and existing tensions in international relations. Particularly in the case of the South China Sea, misunderstandings and disagreements as to how maritime drones are governed by the Law of the Sea are inevitable. These misunderstandings risk destabilising maritime relations that are already fraught, especially as legal ambiguities undermine normal UNCLOS processes for dispute resolution. Given the seriousness and urgency of these risks, this article will argue for a new legal framework to provide clear rules for the use of maritime drones. Specifically, a formal convention and a less formal code of conduct are considered, along with the procedural*

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*barriers any new framework will have to overcome. While some of these barriers are considerable, it is clear that the existing Law of the Sea is unable to regulate maritime drones authoritatively. This raises timely and important questions about how international law should govern emerging technologies in the context of ongoing scientific advances and geopolitical instability.*

## I INTRODUCTION

15 December 2016 saw a small drone set off the most serious diplomatic incident caused by unmanned vehicles to date.<sup>1</sup> The small drone, deployed by United States Navy ship *Bowditch*, was a “wave glider”: a tiny object with technology allowing it to collect oceanographic information autonomously.<sup>2</sup> Chinese forces discovered the vehicle operating in the South China Sea close to the Philippines, and seized it. China accused the United States of aggressive reconnaissance in waters to which China lays claim, but otherwise did not give a legal basis for the seizure other than referring to the ambiguity around the legality and use of unmanned vehicles.<sup>3</sup> The United States rejected that claim, instead saying the wave glider was “conducting routine operations in accordance with international law”.<sup>4</sup> The American position was that China was the state breaking international law, because the seized drone was protected by sovereign immunity.<sup>5</sup> Despite these two diverging positions of law, after five days of intensive negotiations, China eventually returned the wave glider.<sup>6</sup>

Even this peaceful resolution lays bare the legal ambiguities and geopolitical tensions affected and aggravated by the increasing use of unmanned vehicles. Robotic technology is constantly undergoing transformative advances and states are increasingly using it. Consequently, future incidents involving drones will prove considerably more difficult to resolve and are more likely to induce dangerous military escalation.

The modern legal regime governing activities above and below the ocean, the Law of the Sea, took shape in the United Nations Convention on the Law of the Sea (UNCLOS).<sup>7</sup> Ambitiously seeking a comprehensive “legal order for the seas”, UNCLOS is nonetheless a product of its time and, as such, faces new interpretive challenges in the modern era.<sup>8</sup> This article looks at one

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1 Michael N Schmitt and David S Goddard “International law and the military use of unmanned maritime systems” (2016) 98 *International Review of the Red Cross* 567 at 568.

2 At 572–573.

3 Jane Perlez and Matthew Rosenberg “China Agrees to Return Seized Drone, Ending Standoff, Pentagon Says” *The New York Times* (online ed, New York, 17 December 2016).

4 Schmitt and Goddard, above n 1, at 568.

5 At 568.

6 Perlez and Rosenberg, above n 3.

7 United Nations Convention on the Law of the Sea 1833 UNTS 3 (opened for signature 10 December 1982, entered into force 16 November 1994) [UNCLOS].

8 Preamble.

in particular: unmanned maritime vehicles, also known as ‘maritime drones’. This article traverses, over four Parts, the context and impact of this technological development, which in 1982 only existed in the imagination of science fiction writers. Particularly in light of contemporary geopolitical developments, and similarly outside the possible foresight of the UNCLOS drafters, there is a strong argument that UNCLOS is unable to govern maritime drones predictably or effectively. The four Parts will consider collectively how this weakness in the Law of the Sea regime came to be, the extent of the problem and what can be done to redress it.

Part II will canvass the transformative evolution of unmanned maritime technology, ranging all the way from smart network-sensored mines to autonomous frigates. To assess the effectiveness of the current Law of the Sea regime, this article considers both the current and future state of unmanned maritime vehicles. Consideration of geopolitical tensions in the maritime sphere follows, with the South China Sea looming as the biggest area of conflict involving the Law of the Sea. Against this backdrop of technological development and turbulent geopolitics, Part III considers the accommodation of maritime drones in UNCLOS and other relevant bodies of law that make up the Law of the Sea. The legal analysis in this Part finds that maritime drones can only tenuously be included as “vessels” in UNCLOS, which is a requisite step for the application of nearly all the important operative provisions.<sup>9</sup> There are defensible arguments both in favour and against drones qualifying as “vessels”. This ambiguity, along with more specific issues with applying provisions to unmanned vehicles, leaves a state of considerable uncertainty as to the legal status of maritime drones.

This article concentrates on the issues presented by this lack of clarity, focusing at length on some of the possible strategic consequences of the existing maritime tensions explored in Part II. These concerns intersect a range of economic, scientific and environmental considerations, which Part IV considers in turn. As a whole, the risks posed by maritime drones operating in a state of legal uncertainty are unacceptably dangerous. They are particularly unsustainable in light of likely future technological advances. These problems necessitate a new legal framework for drones. Finally, Part V looks at what legal and political factors would need to be considered in the process of an alternative legal framework, and sketches out two possible alternatives to the status quo. While legal scholars to date have generally argued that the existing Law of the Sea is sufficient to regulate maritime drones, this article will explain why modern geopolitical factors make the existing regime increasingly ineffective. Given this urgency, states should be especially bold in tackling the current and future legal problems posed by maritime drones.

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9 Article 1.

## II TECHNOLOGICAL AND GEOSTRATEGIC CONTEXT

The technological reality in the modern era is that unmanned drones have already seen a global revolution, both in scientific capability and their use by states.<sup>10</sup> Unmanned technology offers a wide range of benefits to states that invest in it. Drones demand far less than humans, so they are able to operate in more extreme conditions and for much longer periods of time. Drones offer robotic precision, are not susceptible to human failings and, perhaps most importantly, are expendable.<sup>11</sup> The loss of a serviceperson exacts a great toll on their family and, to a lesser degree, their state, who is often held liable for the death of the person in their service. For these reasons, states have shown early interest in unmanned technology and have invested accordingly, which explains both why every major technological development in the field to date has come from state research and why robotic innovations are geared towards military use.<sup>12</sup> This is not to say that unmanned technology is deployed only in militaries; the civil sphere, particularly in sectors like mineral extraction and pipeline management, have been deploying their own maritime drones for decades.<sup>13</sup> For the most part, however, the unmanned technology revolution has not yet consumed the civil sphere.<sup>14</sup> This article consequently focuses on states' use of maritime drones for navies, where research, investment and deployment to date has been focused.<sup>15</sup>

Most people would likely associate drones with unmanned aerial vehicles, like the United States' Predator and Reaper drones used extensively over the skies of Iraq and Afghanistan.<sup>16</sup> Some commentators have noted that "aerial drones may have been hogging the limelight thus far when it comes to the military uses of robotics".<sup>17</sup> It is true that the perceived success of aerial drones has driven significant interest in the capabilities of unmanned technology, but the oceans have already seen some early maritime drones. In Operation Iraqi Freedom in 2003, underwater drones called "Remote Environmental Measurement Units Support" cleared mines from 2.5 million m<sup>2</sup> of ground.<sup>18</sup> While aerial drones have dominated media headlines, many military analysts now consider that operations at sea will be the main "frontier for the development and deployment of robotic weapons".<sup>19</sup> This new

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10 James Kraska "The Law of Unmanned Naval Systems in War and Peace" (2010) 5 *The Journal of Ocean Technology* 44 at 46.

11 At 44.

12 Brendan Gogarty and Meredith Hagger "The Laws of Man over Vehicles Unmanned: The Legal Response to Robotic Revolution on Sea, Land and Air" (2008) 19 *JLIS* 73 at 94.

13 At 103–104.

14 At 103.

15 Robert Sparrow and George Lucas "When Robots Rule the Waves" (2016) 69(4) *Naval War Coll Rev* 49 at 53.

16 At 49.

17 At 51.

18 Andrew H Henderson "Murky Waters: The Legal Status of Undermanned Undersea Vehicles" (2006) 53 *Naval L Rev* 55 at 58.

19 Sparrow and Lucas, above n 15, at 52.

prioritisation is well illustrated by the spending patterns of the global leader in unmanned technology: the United States. The Department of Defence has allocated funding of USD 982 million for unmanned maritime technology in the 2019 financial year, up from USD 524 million in the 2017 financial year.<sup>20</sup> There are two major drivers of this pivot towards maritime technology. First, the oceans are more tractable than air or land.<sup>21</sup> Remaining afloat on the waves or submerged beneath them is less technically difficult than remaining airborne. Furthermore, vessels that operate on the surface only need to move in two dimensions rather than three.<sup>22</sup> There is much less traffic on the water, and essentially no traffic beneath the sea.<sup>23</sup> Second, there are powerful operational incentives to develop capabilities of drones in the water as opposed to the air or ground.<sup>24</sup> Operations at sea are almost always “dirty, dangerous or dull” — the perfect scenarios to deploy robots rather than humans.<sup>25</sup>

These significant drivers help explain why the trend towards unmanned maritime technology is global and accelerating. Almost all states with significant navies are now developing and investing in unmanned maritime technology, producing separate technological breakthroughs.<sup>26</sup> One example is the Haiyan, a maritime drone developed by China that can operate at depths of 1,000 m, sustain operations for a month and engage in minesweeping.<sup>27</sup> Another example comes from Russian navy scientists, who have reportedly developed a “nuclear delivery drone” capable of launching a nuclear payload from deep underwater.<sup>28</sup> Investment in, and development of, unmanned technology is not limited to global powers either. Smaller states with maritime interests, like Iran, Georgia and Belarus, are also orienting their navies towards robotic technology.<sup>29</sup> At this stage, at least 40 countries have unmanned vehicle programmes.<sup>30</sup> This intense and increasing competition between states for technological and market dominance of drones is accelerating the rate of scientific innovation, making for what in effect is an unspoken modern arms race.<sup>31</sup> The need to keep up with the leaders of this ‘drone arms race’ naturally drives more and more states towards the ‘roboticisation’ of their navies.

This ‘drone arms race’ has many ramifications, both for geopolitics and for international law. But as a precursor to such analysis, it is important

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20 Dan Gettinger *Summary of Drone Spending in the FY 2019 Defense Budget Request* (Center for the Study of the Drone, April 2018) at 8.

21 Sparrow and Lucas, above n 15, at 52.

22 At 52.

23 Rob McLaughlin “Unmanned Naval Vehicles at Sea: USVs, UUVs, and the Adequacy of the Law” (2011) 21(2) *JLIS* 100 at 111.

24 See Gogarty and Hagger, above n 12.

25 At 104.

26 Kraska, above n 10, at 46.

27 Schmitt and Goddard, above n 1, at 575.

28 At 575.

29 Gogarty and Hagger, above n 12, at 135.

30 At 135.

31 At 136.

to fully consider the technological consequences. Scientific experts think that the arms race towards technological dominance in drones will, sooner or later, realise the potential for robots to be fully autonomous.<sup>32</sup> At present, unmanned vehicles have varying capacities to operate without supervision, but all require some degree of human involvement — whether it be programming or controllers assuming command in certain situations.<sup>33</sup> For instance, an Israeli patrol vessel with a machine gun navigates the harbour by itself, but the weapon is solely operated by a controller at a naval headquarters who ‘loops in’ to control the vehicle.<sup>34</sup> Such a drone is *semi-autonomous*. On the other hand, autonomous drones in the future will be able to make those decisions to use force by themselves. Analysts predict that autonomous drones will be able to learn and react to changes in the environment at tremendous speed, with overwhelming military and technological advantages compared to semi-autonomous drones.<sup>35</sup> Those advantages are what make the march to robotic autonomy so inevitable. Battles between drones are likely to be decided by which side has the more powerful software and faster decision-making.<sup>36</sup> It follows that drones that are able to ‘think’ and react on their own accord are likely to prevail against slower drones, let alone sluggish humans.<sup>37</sup> A world of fully autonomous drones may not be far away. Since the invention of computers, computing technology has generally doubled in power every 18 months.<sup>38</sup> This is a remarkably consistent trend known as “Moore’s Law”, which to date has held true for artificial intelligence as well.<sup>39</sup> While current drone artificial intelligence appears still to be some way away from autonomy, Moore’s Law suggests that drones will eventually surpass human intelligence.<sup>40</sup> This eventuality makes the regulation of drones even more urgent.

Because the technological revolution has been driven by the strategic interests of states, it follows that geopolitical considerations are important for whatever legal regimes operate on this new and rapidly developing technology, much like they mattered for past technological developments from landmines to laser weapons. The way international law developed for these historical developments is instructive. The Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects, for instance, took care to restrict the particular kinds of landmines and laser

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32 Markus Wagner “Taking Humans Out of the Loop: Implications for International Humanitarian Law” (2011) 21(2) *JLIS* 156 at 158.

33 At 156.

34 Gogarty and Hagger, above n 12, at 92.

35 See Craig H Allen “The Seabots are Coming Here: Should they be Treated as ‘Vessels’?” (2012) 65 *The Journal of Navigation* 749 at 750.

36 Gogarty and Hagger, above n 12, at 136.

37 At 136.

38 At 137.

39 At 137.

40 Wagner, above n 32, at 156.

weapons that had proven to be particularly indiscriminate in state practice.<sup>41</sup> Unlike those examples, it is difficult to pinpoint the ways in which maritime drones will be used by states. This is both because unmanned technology has the potential to revolutionise essentially every function of a normal navy, and because it is so new that state practice is discernible but still evolving. The geopolitical context is also important for understanding the incentives acting on states in an international legal context. States — particularly powerful states like America and China, who have already invested heavily in maritime drones — will be less likely to agree to new international rules on drone use if they believe that technology is vital to their strategic objectives. Similarly, by investing more into drones, and ‘roboticising’ more of their navy functions, unmanned technology becomes increasingly embedded in the operational thinking of states. It follows that considering geopolitical factors and the likely strategic objectives of states is important for assessing not just the effectiveness of the existing legal regime but the likelihood of a new framework being adopted.

Unfortunately, the drone revolution has arrived at a period of intense maritime tension between several states. This context is particularly true in the South China Sea, where the UNCLOS regime increasingly serves as a battleground itself between states driven by resource, trade and security interests.<sup>42</sup> Specifically, whether maritime states have the freedom to carry out military activities in the Exclusive Economic Zones (EEZ) of coastal states is a highly controversial issue, as well as how a “military activit[y]” is defined in the first instance.<sup>43</sup> Despite not being a signatory to UNCLOS, the United States insists on the freedom to carry out military activities in EEZs — a freedom critical to the ability of American navies and air forces to project power globally.<sup>44</sup> This freedom is opposed by certain maritime states in Asia, such as India, Pakistan and Malaysia. Those states say that other states cannot carry out military exercises or manoeuvres in their EEZs without consent.<sup>45</sup> Significantly, China has recently adopted the same position, challenging American maritime pre-eminence.<sup>46</sup> The *Bowditch* incident is an example of China acting in accordance with this stance. UNCLOS, attempting to balance the interests of coastal and maritime states, is essentially silent on this issue.<sup>47</sup> Consequently, the legal status of military activities in EEZs remains unclear and the potential for hostilities is high. This is especially so in the South China Sea. The economies and security of coastal states in South-East Asia rely on

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41 Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects 1342 UNTS 137 (opened for signature 10 October 1980, entered into force 2 December 1983).

42 Mark J Valencia “Foreign Military Activities in Asian EEZs: Conflict Ahead?” (2011) 27 National Bureau of Asian Research 1 at 5.

43 At 4.

44 At 4.

45 At 3.

46 Perlez and Rosenberg, above n 3.

47 Jing Geng “The Legality of Foreign Military Activities in the Exclusive Economic Zone under UNCLOS” (2012) 28(74) *Utrecht Journal of International and European Law* 22 at 23–24.

the safety and stability of ocean trade lines. Maritime trade through the South China Sea constitutes USD 3.37 trillion a year, or 21 per cent of global trade.<sup>48</sup> Vietnam, Indonesia, Thailand, Singapore and Malaysia all rely on the South China Sea for the majority of their total trade, with China and United States also having significant trade interests.<sup>49</sup> Those states therefore all have powerful incentives to defend their interests in this ocean, which raises the stakes of diverging interpretations of the Law of the Sea.

The insertion of maritime drones in this highly charged geopolitical context, in which there are long-standing disagreements as to the Law of the Sea, threatens to destabilise international relations further. The deployment of maritime drones to date has already aggravated coastal states in the South China Sea, and the ongoing ‘drone arms race’ and uptake of unmanned technology will only exaggerate these tensions further.<sup>50</sup> Valencia argued that the deployment of maritime drones by China and the United States has been viewed as provocative and dangerous by coastal states because they do not have the technology or means to acquire it.<sup>51</sup> As unmanned technology continues to advance, the number of misunderstandings between states in terms of military and intelligence activities in EEZs is certain to increase.<sup>52</sup> Given the inability of international law to decide the legality of such activities, and the fundamental importance of maritime interests in the South China Sea to the states involved, it does not seem like an exaggeration to predict that misunderstandings could quickly escalate into conflict or hostilities. While maritime drones have shown the capacity to revolutionise navies, the South China Sea is an urgent case study in the risks this new technology poses to tense geopolitical situations. The fact that new technological advances are essentially assured by an escalating ‘drone arms race’ means these geopolitical aspects are increasingly urgent. Some commentators have gone so far as to say that the tensions in the South China Sea, brought about to some extent by differing interpretations of UNCLOS, suggest a need to reform the Law of the Sea altogether.<sup>53</sup> For the purposes of this article, understanding this turbulent geopolitical context is critical to assess the need for a legal regime for maritime drones.

This Part has covered two key areas of context for this article. Technologically, maritime drones have already begun to render manned functions of navies redundant. This scientific revolution is set to continue, expanding the capabilities of maritime drones even further. Incentives for states to secure those technological benefits have brought about a ‘drone arms race’, where navies are both progressively ‘roboticising’ existing functions and heavily investing in research to gain a technological advantage over other

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48 Ankit Panda “How Much Trade Transits the South China Sea?: Not \$5.3 Trillion a Year” (7 August 2017) The Diplomat <[www.thediplomat.com](http://www.thediplomat.com)>.

49 Panda, above n 48.

50 United Nations Institute for Disarmament Research [UNIDIR] *The Weaponization of Increasingly Autonomous Technologies in the Maritime Environment: Testing the Waters* (2015) at 9.

51 Valencia, above n 42, at 3.

52 At 4.

53 At 5.



states. Against this backdrop of ongoing scientific breakthroughs is a set of geopolitical dynamics that complicates the deployment of drones. Maritime interests have escalated tensions in the geopolitical arenas where drones offer the biggest military advantages. The most important example of these tensions is the South China Sea, where powerful states with *existing* differences of legal opinion about the Law of the Sea are deploying maritime drones to gain military advantages. Overall, it is clear that the emergence of maritime drones has considerable potential to be a destabilising force in global affairs. Part III will look at the legal implications of this new technology.

### III THE LAW OF THE SEA AND MARITIME DRONES

This Part conducts an original analysis of the legal position of unmanned maritime technology in the Law of the Sea. Other areas of law that are relevant to the operation of maritime drones, like International Humanitarian Law, are excluded in order to assess the specific ways in which drones fit within the Law of the Sea. Having this specific focus is appropriate for unmanned maritime technology as maritime drones, by definition, all operate in the ocean.<sup>54</sup> This is also appropriate given that UNCLOS as a legal regime aims to establish the basic principles and rules for “the problems of ocean space ... as a whole”.<sup>55</sup> On that basis, this Part begins with an analysis of whether maritime drones are vessels. It is useful to consider the positions taken by legal analysts to date on which laws apply to maritime drones, especially the arguments most often used to reconcile those drones as vessels. This Part also looks at areas of potential difficulty even on the assumption that drones *are* vessels for the purposes of the Law of the Sea. Importantly, agreements other than UNCLOS may have different applications to maritime drones. This Part considers the main bodies of law and what the discrepancies between those bodies may mean for the broader inclusion of maritime drones in the Law of the Sea.

As indicated, the first step of legal analysis for UNCLOS and the other major bodies of law making up the Law of the Sea is to consider whether maritime drones should be considered vessels or not. This distinction is of momentous importance as vessels are the fundamental legal atoms of the Law of the Sea — the entities that enjoy certain rights and shoulder different obligations.<sup>56</sup> There is no precise, comprehensive or authoritative definition of what a “vessel” is within the Law of the Sea, or international law generally. This complicates the necessary analysis of whether maritime drones qualify for the various rights and obligations imposed on ships.<sup>57</sup> It is worth noting that “ships” and “vessels” both appear in the Law of the Sea, evidently

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54 Kraska, above n 10, at 46.

55 UNCLOS, preamble.

56 Schmitt and Goddard, above n 1, at 575–576.

57 Kraska, above n 10, at 51.

interchangeably as in the case of UNCLOS.<sup>58</sup> The question of whether maritime drones should be classified as ships has already vexed a series of theorists and legal authorities, with a tentative consensus building that they should indeed be classed as vessels.<sup>59</sup> This consensus would appear to rely more on implication and state practice than the text of any treaty or convention. Older conventions, such as UNCLOS, predate the technological development of maritime drones altogether. However, newer conventions do not refer to unmanned vehicles either.<sup>60</sup> At the time of writing, no treaty or convention has any reference to unmanned vehicles at sea. This textual vacuum essentially leaves the legal status of maritime drones in flux, with public international lawyers relying on relatively creative solutions to reconcile maritime drones within the Law of the Sea.<sup>61</sup>

Supporting multilateral conventions offer a conflicted picture, with evidence pointing both towards and against maritime drones counting as vessels. The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter defines a “vessel” as any “waterborne or airborne craft of any type whatsoever. This expression includes air cushioned craft and floating craft, whether self-propelled or not”.<sup>62</sup> The International Regulations for Preventing Collisions at Sea (COLREGS) define vessels as “every description of water craft, including non-displacement craft, WIG [wing-in-ground] craft and seaplanes, used or capable of being used as a means of transportation on water”.<sup>63</sup> The International Convention for the Prevention of Pollution from Ships takes the definition of ships as “vessel[s] of any type whatsoever operating in the marine environment ... [including] hydrofoil boats, air-cushion vehicles, submersibles, floating craft and fixed or floating platforms”.<sup>64</sup> To some extent, these differing approaches make sense, given that the definitions advance the purposes of the particular instrument. Pollution conventions adopt a broad definitional approach to further their purpose of limiting pollution at sea to the greatest degree possible, whereas the COLREGS are intended to regulate navigation on the surface of the water and so do not define “vessels” to include underwater vehicles.<sup>65</sup> While commentators have drawn on individual treaties, particularly the COLREGS, to show that maritime drones can fit into existing definitions of vessels, these

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58 Schmitt and Goddard, above n 1, at 575.

59 Sparrow and Lucas, above n 15, at 59.

60 Kraska, above n 10, at 51.

61 At 52.

62 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1046 UNTS 120 (opened for signature 29 December 1972, entered into force 30 August 1975), art 3.

63 International Regulations for Preventing Collisions at Sea 1050 UNTS 16 (opened for signature 20 October 1972, entered into force 15 July 1977) [COLREGS], r 3.

64 International Convention for the Prevention of Pollution from Ships 1340 UNTS 184 (signed 2 November 1973, never entered into force), art 2 as modified by the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships 1340 UNTS 61 (signed 17 February 1978, entered into force 2 October 1983).

65 Stephanie Showalter and Justin Manley “Legal and Engineering Challenges to Widespread Adoption of Unmanned Maritime Vehicles” (paper presented to Marine Technology for Our Future: Global and Local Challenges, Biloxi (MS), October 2009) at 1; and Schmitt and Goddard, above n 1, at 577.

arguments ignore the definitions of other multilateral conventions that would exclude unmanned vehicles.<sup>66</sup>

Particularly in light of these inconsistent supporting agreements, per art 31 of the Vienna Convention on the Law of Treaties (Vienna Convention) it is necessary to read UNCLOS in the context of the “ordinary meaning” of the text.<sup>67</sup> A plain reading of UNCLOS would indicate that the drafters consider vessels to be manned. For instance, art 94 instructs that the flag state must ensure that a vessel flying its flag “is in the charge of a master and officers who possess appropriate qualifications”. On the other hand, the Vienna Convention also provides that instruments should be read in the context of their objective and purpose.<sup>68</sup> The preamble of UNCLOS states an objective to “settle ... all issues relating to the law of the sea”, while being “conscious that the problems of ocean space are closely interrelated and need to be considered as a whole”.<sup>69</sup> Given the scale, size and capabilities of maritime drones, it would seem contrary to those stated objectives to define a vessel in a way that excludes drones from the legal regime altogether. Michael Schmitt and David Goddard advance an alternative argument relying on the basis that states broadly accept that UNCLOS represents customary international law, and as such shifts and develops over time through state practice.<sup>70</sup> They propose a “colourable” argument where, irrespective of how UNCLOS is interpreted, maritime drones should be considered vessels because of customary international law. Accordingly, they should enjoy the rights and obligations of other vessels.<sup>71</sup> For the purposes of this article, it is sufficient simply to highlight the difficulties of interpreting UNCLOS to include maritime drones as vessels, particularly in light of textual obstacles. Rather than take a position on the particular definitional merits, this article simply notes that arguments can be validly made in either direction.

Assuming, as most scholars have done, that maritime drones are likely to be classed as vessels in the existing Law of the Sea, important questions remain about the application of UNCLOS to unmanned vehicles. Two of the most important are the right of navigation and sovereign immunity. The long-established right of vessels to navigate freely is affected by the technological capabilities of maritime drones in some interesting ways. For instance, in the territorial sea that UNCLOS delineates for coastal states, vessels generally “enjoy the right of innocent passage” and the “continuous and expeditious” traversing of the water.<sup>72</sup> “Innocent” is defined in UNCLOS as navigation “not prejudicial to the peace, good order, or security of the coastal” nation, with art 19 containing a list of activities that are considered prejudicial. Some writers,

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66 See Schmitt and Goddard, above n 1, at 575.

67 Vienna Convention on the Law of Treaties 1155 UNTS 331 (opened for signature 23 May 1969, entered into force 27 January 1980) [Vienna Convention], art 31.

68 Vienna Convention, art 31.

69 UNCLOS, preamble.

70 Schmitt and Goddard, above n 1, at 577.

71 At 577.

72 UNCLOS, arts 17 and 18.

like Stephanie Showalter and Justin Manley, argue that “most [drone] operations would be considered prejudicial”.<sup>73</sup> Maritime drones tend to carry out activities related to military reconnaissance or direct conflict, or at least are equipped so they have the capacity to execute those activities. These activities are included explicitly in art 19 of UNCLOS among a list of prejudicial activities. Those writers therefore make the point that maritime drones are almost always engaged in prejudicial activities, which according to art 30 of UNCLOS allows coastal states to evict the drones from their territorial seas. This raises an additional question for states using maritime drones: how responsive would their drone technology need to be to coastal states attempting to expel them from the territorial sea, particularly for those maritime drones designed to be stealthy and to avoid communications? Ironically, stealthy drones may be the most likely to be considered as threatening by coastal states. Similar questions arise in the EEZ, where coastal states have jurisdiction, in terms of maritime drones conducting marine scientific research.<sup>74</sup> As noted earlier in this article, UNCLOS is silent on the question of military activities conducted by vessels in the EEZ. Whether armed maritime drones can legally manoeuvre in foreign EEZs is therefore a double quandary, where the Law of the Sea does not have a clear answer for the legal question of drones qualifying as vessels *or* the legality of their manoeuvres in EEZs if they are indeed vessels.

Another area of potential confusion for maritime drones concerns sovereign immunity, which is granted to both warships and non-commercial government vessels.<sup>75</sup> The question of sovereign immunity is an important one for maritime drones, as it would protect them from seizure by foreign states.<sup>76</sup> Given the valuable technology and investment from states in maritime drones, it is clear why states have an interest in their maritime drones obtaining sovereign immune status under the Law of the Sea. Putting the legal analysis simply, maritime drones are highly unlikely to qualify as warships, but they should obtain sovereign immune status regardless because of their status as government service vehicles — at least when used by state navies.<sup>77</sup> Consequently, civil maritime drones will not enjoy that status. The traditional legal test for whether a vessel is a “warship”, replicated by art 29 of UNCLOS, is whether the vessel bears “the external marks” that distinguish nationality, is “under the command of an officer” in the service of state, and has a crew under “regular armed forces discipline”. The obvious difficulties for unmanned vehicles arise in the conditions requiring people on board. While the need for a “command ... officer” could possibly be stretched to allow remote command, when read together with the crew requirement this barrier becomes close to insurmountable for unmanned drones.<sup>78</sup> On the other hand,

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73 Showalter and Manley, above n 65, at 3.

74 UNCLOS, art 246.

75 Article 29.

76 McLaughlin, above n 23, at 111.

77 UNCLOS, art 32.

78 See McLaughlin, above n 23, at 107.

the test for sovereign immunity for government vessels simply requires maritime drones to be “clearly marked and identifiable as being on government service and authorised to that effect”, presenting few issues.<sup>79</sup> Maritime drones in the service of navies therefore have similar rights to warships, including the ability to seize pirate ships, visit a vessel on the High Seas suspected of piracy or conduct hot pursuit.<sup>80</sup> Commercial maritime drones, on the other hand, do not enjoy sovereign immune status and so do not have those rights. While this distinction appears fairly clear, the warship test requiring a crew is characteristic of the broader legal problem for maritime drones: no part of the Law of the Sea was written with a view as to whether to include drones.

The COLREGS further illustrate some of these difficulties, with respect to applying different parts of the Law of the Sea to the regulation and governance of maritime drones. As previously mentioned, the COLREGS use one of the broadest definitions of “vessel”, where they include “every description of water craft, including non-displacement craft, WIG [wing-in-ground] craft and seaplanes, used or capable of being used as a means of transportation on water”.<sup>81</sup> Despite this wide range, it is not at all clear whether maritime drones qualify. The “on water” qualifier *prima facie* excludes maritime drones operating under the water. It is also difficult to state generally whether surface drones would be governed by COLREGS due to the prescribed need for capability as transport. Theorists have reached different conclusions regarding whether “transportation on the water” should be read solely to include transportation of goods and people, or whether it should be read more inclusively.<sup>82</sup> Large drones designed for the ocean’s surface may fit this definition, but small drones like the glider at issue in the *Bowditch* incident almost certainly do not. This is not necessarily as problematic as it might seem. The COLREGS are designed to minimise risk of collision, where large surface drones represent a significantly greater and more damaging threat than small drones. Nonetheless, ambiguity as to which surface drones are subject to the COLREGS causes other issues for navies. The United States Navy, for instance, is ensuring that large drones conform as much as possible to the COLREGS. It may be that medium-sized drones are also subject to those regulations, and should also be designed with conformity in mind, but no clear legal answer is forthcoming at present.<sup>83</sup>

Similar to UNCLOS, even if maritime drones are classified as vessels according to the COLREGS, there are still specific areas of confusion in terms of drones actually complying with the regime. Rule 5 of COLREGS, for instance, states:

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79 UNCLOS, art 107.

80 Articles 107, 110 and 224.

81 COLREGS, r 3.

82 Kraska, above n 10, at 52.

83 At 52.

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.

A “look-out”, according to the COLREGS, is an “individual” who must have “suitable experience, be properly stationed and be ‘vigilantly employed’ in the performance of their duty”.<sup>84</sup> Like the rest of the COLREGS, vehicles classified as “vessels” must comply with Rule 5.<sup>85</sup> Unmanned drones, given their nature, cannot comply with the text of Rule 5. This issue has been written about at length by COLREG experts, some of whom consider that Rule 5 should still prove no barrier to maritime drones.<sup>86</sup> They argue that, with the requisite sensors and programming, maritime drones have a significantly higher level of awareness and responsiveness than traditional look-outs would offer.<sup>87</sup> Rob McLaughlin has also posited that because maritime drones travel at higher speeds than most manned vessels, they are less likely to be in danger of crashing.<sup>88</sup> This is due to the concept of relative velocity, which holds that vessels travelling at significantly higher speeds than other vessels in the same area will only risk a collision situation within an extremely narrow arc.<sup>89</sup> These solutions bring maritime drones within a regulatory regime that operates on virtually every other large vehicle in the ocean, and so better fit the objectives of the COLREGS. But, like UNCLOS, some creativity is required: some states may well claim that their maritime drones are *not* subject to the COLREGS and have a fair legal basis on which to rest those claims. This has prospective ripples for the civil sphere as well. Commercial shipping operators embracing unmanned technology stand to gain a significant commercial advantage if their drones do not need to comply with COLREGS and its provisions on traffic and speed.

It is also important to touch on other treaties and conventions to consider whether maritime drones pose specific issues in regimes other than UNCLOS and the COLREGS. Leonida Giunta writes about the difficulties involved in applying the International Convention for the Safety of Life at Sea (SOLAS) to drones.<sup>90</sup> In this case, it would seem at first that maritime drones face little definitional barrier and so should theoretically be subject to SOLAS. But Giunta writes that the entire tone and examples of the Convention “seem to rest on the presence of a direct human intervention”.<sup>91</sup> As such, while maritime drones may technically be regulated by SOLAS, they are unable to

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84 Showalter and Manley, above n 65, at 1.

85 COLREGS, r 1.

86 McLaughlin, above n 23, at 111.

87 Allen, above n 41, at 751.

88 McLaughlin, above n 23, at 111.

89 At 111.

90 International Convention for the Safety of Life at Sea 1184 UNTS 278 (opened for signature 1 November 1974, entered into force 25 May 1980) [SOLAS]. Pursuant to art 2, this Convention applies to “ships entitled to fly the flag of States” party to the Convention.

91 Leonida Giunta “The Enigmatic Juridical Regime of Unmanned Maritime Systems” (paper presented to Oceans Conference, Geneva, May 2015) at [III.C].

comply with many of the Convention's rules. Clearly, unmanned drones have less of a need for life-saving precautions than other vehicles. But other rules, like the SOLAS provisions for regulating high-speed vehicles,<sup>92</sup> have clearer applications for maritime drones. Despite this, maritime drones are probably unable to comply with those provisions given the human-centred obligations. This points towards a missed opportunity. On the other hand, one convention easily applied to drones is the Nairobi International Convention on the Removal of Wrecks, which entered into force in 2015.<sup>93</sup> This Convention exemplifies a broad spectrum approach, with art 1 recognising a ship as a "seagoing vessel of any type whatsoever". Even more broadly, the Convention specifies that a wreck can be not only "a sunken or stranded ship" but "any part of a sunken or stranded ship, including any object that [was] on board such a ship".<sup>94</sup> The broad language of the Convention indicates how the Law of the Sea *could* include maritime drones through sufficiently broad parameters. The analysis in this Part suggests overall that examples of the Law of the Sea clearly applying to drones are rare indeed.

The collective legal ambiguity explored in this Part has not, of course, slowed the inexorable rise of maritime drones in the world's largest navies in the slightest. Maritime drones will continue to outperform manned vessels across an ever-increasing variety of functions, and navies will correspondingly invest in them irrespective of the position of the law. In this regard, maritime drones clearly resemble other innovative technologies: Markus Wagner notes that "technological advances generally outpace the generation of rules pertaining" to them.<sup>95</sup> Nonetheless, this article posits that the relationship between maritime drones and the Law of the Sea should be of real concern to states. It is of real concern that the existing legal regime *may* or *may not* apply to maritime drones in its current state. This Part has seen some of the legal problems that maritime drones are likely to encounter as a result of this legal flux. The problems of an unclear legal regime, however, go much further than theoretical questions of law. Part IV will look at broader consequences of this unclear picture.

#### IV IMPLICATIONS OF LEGAL UNCERTAINTY

This Part will consider the likely consequences for international relations, commerce and the environment if the legal position of maritime drones remains unclear. Given the future-focused nature of this analysis, and the significant uncertainty with making predictions in areas as dynamic as foreign affairs, these consequences are by no means assured or inevitable. Nonetheless, taking the legal uncertainties with the technological and

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92 SOLAS, ch X.

93 Nairobi International Convention on the Removal of Wrecks (signed 18 May 2007, entered into force 14 April 2015).

94 Article 1.

95 Wagner, above n 32, at 157.

geopolitical context in 2018 produces a range of plausible scenarios with severe consequences for states. The first set of risks concern international relations, particularly in terms of security. This article takes the position that it is vital to consider the legal uncertainty from the perspective of the central actors involved in drone deployment to better engage with the incentives acting on those states. The practical examples of the United States and China in the South China Sea therefore serve as a realistic way to work through the strategic consequences of legal ambiguity. Focusing on the perspective of those powerful states also illustrates how the ‘drone arms race’ is characterised by incentives resembling a high-stakes prisoner’s dilemma.<sup>96</sup> Of course, the geostrategic consequences also intersect with economic and environmental concerns. This Part considers how those areas are impacted by the legal ambiguity of drones in the Law of the Sea, both in the present and into the future. Considering these scenarios and risks together paints a concerning picture of escalating tension and risks to economies and the environment.

The most assured outcome of the legal ambiguity is that states will seek to utilise the uncertainty where they believe they can advance their strategic interests. One example is the United States in the South China Sea and their well-known interest in Chinese submarine development and deployment.<sup>97</sup> American unmanned technology has already enabled the use of vehicles like the Cyro jellyfish, a small submersible drone with sensors and stealth capabilities intended to be deployed in significant numbers.<sup>98</sup> Importantly, these drones would be able to ‘talk’ with each other and form wide-reaching integrated networks.<sup>99</sup> This technology is overwhelmingly superior to any existing form of intelligence gathering, prospectively giving the United States an information advantage over China and other states.<sup>100</sup> In the context of such an attractive military incentive, it would take a powerful deterrent to dissuade the United States from mass deployment of these maritime drones in the Chinese EEZ where they suspect military activities. The Law of the Sea at present fails to provide any such deterrent, and more concerningly fails to provide a legal framework for states to work through drone-related disputes. If the deployment of these Cyro jellyfish drones was discovered by China, the United States would be able to claim either that surveillance activities are allowed in foreign EEZs by UNCLOS, or that the drones are vessels of the state and accordingly enjoy sovereign immunity. Under either prospective legal argument, it would be a breach of the Law of the Sea for China to seize or deter the drones. Naturally, China would dispute both grounds. The Law of the Sea has no definitive answer to these questions, as both interpretations are arguable. Any attempt by UNCLOS dispute resolution processes, like the International Tribunal for the Law of the Sea, to resolve this issue one way or the other would face justifiable criticism of

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96 Gogarty and Hagger, above n 12, at 135.

97 Perlez and Rosenberg, above n 3.

98 Sparrow and Lucas, above n 15, at 54.

99 At 54.

100 At 54.



judicial overreach given the textual discrepancies. This threatens the legitimacy and neutrality of those processes in a way that might affect state trust in the UNCLOS dispute resolution systems generally. While there would undoubtedly be some risk of damage to America's standing in the world should a secret drone operation be discovered, the United States leadership would be able to insist on the legality of their actions. The Law of the Sea accordingly serves as a tool for states to legitimise their own actions in terms of maritime drones, rather than as the comprehensive and predictable system of laws envisaged in the preamble of UNCLOS.<sup>101</sup>

However, the legal uncertainty for drones presented by UNCLOS poses dangers as well as benefits for the users of unmanned technology. As the legal status of drones as vessels is unclear, so too are the benefits accorded to certain kinds of vessels. In particular, vehicles can only claim sovereign immune status if the Law of the Sea considers them to be vessels in the first instance.<sup>102</sup> In practice, this means that a state could seize a maritime drone belonging to another nation and have a defensible legal claim that the seizure was legal according to the Law of the Sea, given that drones may not qualify as vessels. The *Bowditch* incident was an example of this exact chain of events, with China claiming that the wave-glider drone they seized could enjoy sovereign immunity.<sup>103</sup> In that case, despite opposing legal positions, China and the United States came to a swift peaceful arrangement. This outcome suggests that the issues created by the legal ambiguity, like uncertainty over sovereign immunity, could perhaps be resolved amicably between states. However, the *Bowditch* incident may not represent an accurate picture of how other incidents may unfold. American military leaders acknowledged after the *Bowditch* incident that the wave-glider drone was relatively old technology.<sup>104</sup> As such, China had little to gain from possessing the drone and America had little to fear with its technology in the hands of a geopolitical rival. However, the situation may have been very different if China had seized a state-of-the-art maritime drone, like the Cyro jellyfish drone described earlier. The United States would face the very real threat of Chinese scientists dissecting the drone and stealing the technology advances in computing, robotics or engineering. Particularly given the wider context of America and China as two major players in a technological 'drone arms race', the stakes of a drone seizure would escalate drastically and dangerously. Again, the lack of clarity in UNCLOS leaves the two parties at a risky impasse.

As these scenarios have illustrated, the current state of the UNCLOS regime places unclear parameters around states using unmanned technologies, meaning that in most cases they will disregard the potential impact of international law. Clearer regulation of maritime drones, however, would strengthen the incentive to adhere to international law. Consider the earlier example of a prospective American drone intelligence collection operation in

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101 UNCLOS, preamble.

102 Article 32.

103 Perlez and Rosenberg, above n 3.

104 Mark J Valencia "US China Underwater Drone Incident: Legal Grey Areas" *The Diplomat* (online ed, Tokyo, 11 January 2007) at 5.

China's EEZ, assuming instead that the Law of the Sea made clear that drones *were* vessels, but were *not* allowed to gather any kind of non-scientific research in a coastal state's EEZ without that state's permission. Of course, the military benefit for the United States of new intelligence on China may mean they would still proceed with the drone deployment. However, if the American operation was discovered, they would be unable to assert the legality of their actions and would consequently face more reputational harm. China could seek amends through the legal channels that UNCLOS provides for such breaches and disputes, and would be likely to succeed given the clearer position of the law. As a result, having a clear and predictable legal regime for drones would strengthen the legal framework for addressing and resolving issues that arise involving drones and, as a consequence, states like the United States may be less likely to begin drone operation in the first instance. The Chinese leadership, who would face immense political pressure to react to an American spying operation in the Chinese EEZ, would have the option of dispute resolution via UNCLOS.<sup>105</sup> This does not negate the possibility of military or economic reprisals altogether, but having an effective legal framework gives states a way of resolving conflicts without needing to resort to options that escalate the dispute. As earlier scenarios demonstrate, the present legal ambiguity for drones undermines the normal UNCLOS framework for dispute resolution, which increases the likelihood of escalation and further conflict.

The legal uncertainties around unmanned maritime technology are also likely to contribute to geopolitical instability even without an actual deployment or incident involving drones. The United Nations report *The Weaponization of Increasingly Autonomous Technologies in the Maritime Environment: Testing the Waters* considers that maritime drones threaten "proliferation flashpoints".<sup>106</sup> Specifically, the report argues that the deployment of maritime drones "might be perceived as more threatening than the deployment of manned vessels".<sup>107</sup> Because the use of maritime drones is perceived to be less risky for the deploying state, that state is seen as more likely to engage in more aggressive behaviour, creating "proliferation flashpoints" and causing further tension between states.<sup>108</sup> In addition, while manoeuvres of vehicles on land and even satellites in space are relatively easy to trace using a variety of human and technical means, underwater operations are typically characterised by minimal transparency.<sup>109</sup> This means that in geopolitical arenas like the South China Sea with relations between states that are already tense, the very threat of maritime drones may destabilise relations further. That the Law of the Sea is unclear on the status or legal use of drones can only amplify existing concerns that states will deploy maritime drones

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105 UNCLOS, arts 186–191.

106 UNIDIR, above n 50, at 9.

107 At 9.

108 At 9.

109 Schmitt and Goddard, above n 1, at 572.

aggressively through contributing to the uncertainty. These concerns would seem well founded in the case of smaller coastal states, who do not have the resources to take part in the ‘drone arms race’ while large states, like America and China, roll out increasingly more sophisticated technology.<sup>110</sup> The threat of “proliferation flashpoints” is compounded by the fact that smaller states will not even be aware of the capabilities of new drones or how they will be deployed.<sup>111</sup> Overall, it seems entirely rational for states to be wary of the development and use of maritime drones even without an incident or conflict occurring. While the Law of the Sea could ameliorate this uncertainty to some extent by providing guidelines on how the new technology can legally be used, it is not clear whether drones are even subject to existing laws.

The lack of clear regulation or rules for drones is also likely to contribute to economic instability, again even without an incident or accident that would exaggerate concerns even further. Specifically, maritime drones threaten to create a chilling effect on commercial shipping, particularly in strategic areas like the South China Sea where drone deployment will be concentrated. Robotics experts Robert Sparrow and George Lucas have written at length on the likely unwillingness of commercial vessels to navigate through areas where drones are known to operate.<sup>112</sup> This is primarily due to subjective assessments of the risk posed by armed drones, and in particular the odds of an accidental attack. These subjective assessments are notoriously complex and difficult to assess because they are usually based on hidden value judgments. In the case of maritime drones, for instance, Sparrow and Lucas note a distinct unease already displayed by commercial shipping operators towards autonomous vehicles having access to weapons at all.<sup>113</sup> The likely future prospect of autonomous drones making their own decisions about when to use those weapons will only exacerbate these fears. Accordingly, shipping operators may refuse to operate on trade routes where it is known that drones have been deployed.<sup>114</sup> While fears of an accidental attack by a maritime drone might seem irrational, particularly compared with the very real risks posed by normal vessels and the fallible humans who operate them, the cognitive biases of commercial operators may well result in drone-heavy areas like the South China Sea being seen as more risky and consequently less attractive for investment. While anti-robot fears will undoubtedly persist no matter how international law regulates drones, the fact that drones face such little concrete regulation by the Law of the Sea will exacerbate these fears. To give one example, commercial shipping operators are particularly invested in compliance with the COLREGS, which may or may not apply to drones. This legal uncertainty can only compound broader fears of the reliability of drones, particularly when armed. Even if only a few operators divest from the South China Sea as a result, the economic consequences for coastal states would be

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110 Valencia, above n 104, at 3.

111 UNIDIR, above n 50, at 9.

112 See Sparrow and Lucas, above n 15, at 52.

113 At 54.

114 At 55.

severe. As outlined earlier, many states are very reliant on the commercial traffic of the South China Sea trade routes.

A final area of concern caused by this legal uncertainty is environmental protection. Maritime drones operating for long periods of time, especially underwater, will require long-lasting energy sources. Small drones with limited capabilities, like the wave-glider in the *Bowditch* incident, require much less energy so can operate on sustainable energy sources like the ocean's currents.<sup>115</sup> More advanced drones, however — particularly larger vehicles operating as highly manoeuvrable weapons platforms — will require huge energy resources, likely from batteries, diesel or nuclear engines.<sup>116</sup> The use of these resources comes with corresponding risks to the environment, particularly in the case of nuclear power, which has the potential for catastrophic environmental consequences. The Law of the Sea would appear to create obligations on states that cover such issues, by requiring states to “protect and preserve the marine environment”,<sup>117</sup> and to “take measures to prevent, reduce and control pollution of the marine environment from any source”.<sup>118</sup> To some degree, this compels states to ensure their maritime drones do not harm the environment. However, some of the unique aspects of unmanned technology complicate these obligations. The United Nations report raises several environmental questions that are currently unanswered.<sup>119</sup> Depending on their energy source and payload, should drones be required to return to base immediately if they malfunction in such a way that threatens power leakage or pollution? If drones are left to drift to the ocean's depths at the end of their useful life, does that constitute marine pollution? Given the consequences of malfunction for nuclear-powered drones, should environmental concerns mean they are banned altogether? At present, the Law of the Sea is silent on all these important questions.<sup>120</sup> While environmental concerns resulting from legal uncertainty may seem less pressing than the security factors considered above, every state has a strategic interest in a healthy marine environment and so would stand to gain from dedicated environmental regulations for drones.

As can be seen, the unclear legal position of drones in the Law of the Sea gives rise to a series of serious concerns for states across politics, economics and the environment. The potential for deployment of maritime drones to destabilise tense security relationships between states, in particular, is a very real danger of continuing with the existing legal regime without change. Nonetheless, it must be said that the majority of journal articles written about drones and the Law of the Sea have concluded that existing legal regimes are sufficient to regulate maritime drones into the future.<sup>121</sup> While

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115 Schmitt and Goddard, above n 1, at 572–573.

116 UNIDIR, above n 50, at 9.

117 UNCLOS, art 192

118 Article 194.

119 See UNIDIR, above n 50, at 9.

120 At 10.

121 See Henderson, above n 18, at 72.

some bodies like the United Nations Institute for Disarmament Research propose changes to the legal framework,<sup>122</sup> most authors argue that judicial economy and normative structures render such changes unnecessary or even unhelpful.<sup>123</sup> James Kraska, for instance, asserts that creating a new regime for maritime drones would be “the very type of superfluous over lawyering that weakens the maintenance of stability and good order at sea”.<sup>124</sup> There are undoubtedly some advantages of staying with the current regime. State practice on the use of maritime drones is still hard to discern at this stage, and any new agreement between states is likely to be politically fraught. This article takes the position, however, that trying to apply the existing Law of the Sea to drones is unclear, unsustainable and unacceptably dangerous. The risks covered in this Part will only multiply in the immediate future, with the ongoing ‘drone arms race’ promising further technological revolutions and increased state deployment of maritime drones. On that basis, Part V will close this article with an assessment of the options and process for a new legal framework.

## V ALTERNATIVE LEGAL FRAMEWORKS

The main focus of this article is to analyse how the existing UNCLOS regime could be applied to maritime drones. However, with the conclusion that the legal status of unmanned vehicles is deeply unclear and that this uncertainty poses dangerous risks to states, a high-level overview of possible legal alternatives is appropriate. Part V considers two possible alternatives to the status quo: first, a formal treaty regulating maritime drones; and secondly, a less formal Code of Conduct sketching out principles of agreement between states on how drones should be used. These two alternatives seem the most likely options should the international community decide that the uncertain legal status of maritime drones needs to be addressed. Other options, like formally amending UNCLOS, are also possible. Article 312 allows states to propose amendments, but also requires at least half the total states party to UNCLOS to agree to the proposal for an amendment conference even to be convened. Given that any prospective framework for maritime drones is likely to be contentious, an amendment to UNCLOS appears very unlikely. On that basis, this Part will focus on the formal and informal options for a new legal framework. The possibility of amending UNCLOS to clarify the position of unmanned vehicles is one of many questions left open by this article.

Before outlining specific alternatives, it is worth considering some of the significant obstacles faced by any agreement on maritime drones. Unmanned technology is constantly evolving, meaning that the capabilities of maritime drones are continuously expanding. State practice and the specific

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122 See *Increasing Transparency, Oversight and Accountability of Armed Unmanned Aerial Vehicles* (UNIDIR, 2017) at 1.

123 Kraska, above n 10, at 64.

124 At 64.

ways in which the technology will be deployed are consequently difficult to discern. By contrast, other attempts in international law to restrict types of technology have been able to use state practice as an evidential base. The Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction, for instance, crafted a ban on chemical weapons and a framework around their control on the basis of previous state practice.<sup>125</sup> There are also complicating geopolitical factors like the ongoing technological and military advantages for those states deploying unmanned technology. In the context of powerful states obtaining significant advantages by using drones, a legal framework potentially curtailing the use of drones may be seen as hostile. This is particularly problematic given that any prospective agreement will need approval from those states at the forefront of the drone revolution in order to be effective. Without the agreement of at least some of the states in the ‘drone arms race’, particularly the United States, China and Russia, smaller states will perceive any legal framework as impotent and may not support it either. A final geopolitical complication is that powerful states are only likely to agree on a framework that constrains their deployment of maritime drones if their geopolitical rivals also agree to be bound by the framework. This means that any legal framework will have to sufficiently balance the concerns of different powerful states, even where those views might be polarised.

On the other hand, states both interested and uninterested in drones have good reason to clarify the legal position of maritime drones in the Law of the Sea. There are several examples of how the present uncertainty threatens to destabilise tense international relations. All states have an incentive to ensure predictability, at a minimum, in order to avoid situations where misunderstandings risk escalation into hostilities. Similarly, all states have an interest in economic stability. Clarifying the regulations and rules that apply to unmanned vehicles will help mollify nervous commercial shipping operators in strategically important oceans where drones are likely to be deployed. Finally, all states have a strategic incentive to preserve the marine environment, and consequently stand to gain from a framework establishing environmental obligations for states using drones. Collectively, this article takes the position that the advantages outweigh the disadvantages for states in signing onto a legal framework for drones. While undoubtedly some states will hold out, achieving a sufficient consensus could bring about uniform state practice in enough states to create customary international law. Much like the United States did not originally agree to be (and is currently still not) a party to UNCLOS, but still considers itself bound by UNCLOS as customary law, any state that does not join the framework for drones when it is originally signed may eventually be bound by the rules of that text.<sup>126</sup> In that way, the

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125 Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction 1974 UNTS 45 (opened for signature 13 January 1993, entered into force 29 April 1997).

126 Geng, above n 47, at 27.

malleable nature of customary international law will help to entrench a legal framework for maritime drones if some kind of consensus can be reached.

One potential framework is a formal agreement between states, in the form of an open multilateral treaty: this article proposes a Treaty on the Use of Unmanned Maritime Vehicles. The object and purpose of the Treaty could commit states to peaceful use of unmanned technology and transparency in all deployments. This Treaty could clarify that maritime drones should be considered vessels by the Law of the Sea, and that parties to the Treaty agree to treat them accordingly. Additionally, the Treaty could oblige states to program drones in such a way that they can respond to foreign communications, like whether to leave an area like the Territorial Sea or to be aware of incoming commercial shipping traffic. These binding provisions would bring the use of drones more in line with the Law of the Sea, and also ameliorate tense relations between drone operators, coastal states and commercial shipping operators. Other provisions could provide for stronger environmental regulations, like a requirement for states to recover post-deployment drones rather than leave them to rest on the ocean's floor. The detail of the provisions will clearly depend on what balance can be achieved between the negotiators of the various states involved in drafting the proposed treaty. The suggested provisions above are simply to give an idea of some of the points of common ground between the parties that might form some of the Treaty's provisions.

In terms of the design and legal framework around the proposed Treaty, elements could be taken from the recently signed Treaty on the Prohibition of Nuclear Weapons.<sup>127</sup> For instance, the proposed Treaty could provide for a review of the operation of the Treaty every five years to ensure it will cover future drone capabilities. There could even be an independent safeguards body, similar to the International Atomic Energy Agency, whose job would be to ensure that drones in deployment have the programming they would be obliged to have under the proposed Treaty.<sup>128</sup> Even more ambitiously, elements could be taken from the International Treaty on Plant Genetic Resources for Food and Agriculture, analogous with the proposed Treaty insofar as both cover new advances in science.<sup>129</sup> Specifically, the proposed Treaty could establish a "multilateral system" where states agree to make some of their robotic technology available to all parties to the treaty.<sup>130</sup> This would facilitate research and innovation, encourage the application of modern drone technology to the civil sphere with corresponding economic gains, and de-escalate the modern 'drone arms race'. While at first glance this might seem at odds with the strategic interests of states like the United States and China, they arguably both stand to gain if they decide to cease the

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127 Treaty on the Prohibition of Nuclear Weapons (opened for signature 20 September 2017, not yet in force).

128 Article 3.

129 International Treaty on Plant Genetic Resources for Food and Agriculture 2400 UNTS 303 (opened for signature 3 November 2001, entered into force 29 June 2004).

130 Article 10.

development of unmanned technology for military purposes and focus on economic applications instead.<sup>131</sup>

A second potential framework is a less formal agreement: perhaps, a Code of Conduct for the Responsible Use of Unmanned Maritime Vehicles (Drone Code). The Drone Code would cover similar areas to the proposed treaty, with the main difference being that the Code would be non-binding on parties. The provisions of a Drone Code would likely be broader than those of the proposed Treaty, with the intent to help ensure a certain desirable conduct on the part of drone operators. While the Drone Code could still provide that Parties recognise maritime drones as vessels according to the Law of the Sea, other provisions might include general guidelines for how unmanned technology should be deployed in the High Seas and foreign EEZs. These guidelines, for instance, could provide that those deployments require the drone's flag state to make nearby states aware of the drone's presence, without saying if such deployments are legal or illegal. A series of similar incrementalist principles could achieve a broader base of support from states than a stricter, binding agreement like the proposed Treaty. The principle-based guidelines of a Drone Code might also mean negotiations between states could be more straightforward than a complicated treaty, which could increase the chances of a successful negotiation and a widely-supported final agreement. The Law of the Sea offers an analogous example in the existing *Code of Conduct for Responsible Fisheries (Fisheries Code)*, an explicitly voluntary code that is based on and incorporates binding rules of the Law of the Sea regardless of whether the parties have ratified UNCLOS.<sup>132</sup> The *Fisheries Code* has been further supplemented by technical guidelines and international plans of action that give it additional flexibility and utility. Similarly, the Drone Code could build upon binding rules of the Law of the Sea and also provide a framework that states can use for future international plans for more specific actions on maritime drones. This flexibility may be particularly attractive in the context of unmanned maritime technology, which is seeing both ongoing technological evolution and evolving state practice. States may feel that the prospect of full robotic autonomy, for instance, could form the basis of a specific plan of action that builds on the broader principles and guidelines of the Drone Code.

This article does not take a position on which of the two legal alternatives — the formal Treaty or the less formal Code of Conduct — should be preferred. Any conclusion on that point should be the topic of a dedicated study, with all the various factors explored in much more depth than this article could allow. More importantly, any agreement is dependent on states being able to reach a consensus on a series of difficult points of law and policy where their interests may diverge significantly. Even if a treaty would likely provide for stronger regulation, more stringent environmental measures and a more robust framework to ensure compliance, it would achieve nothing at all

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131 Gogarty and Hagger, above n 12, at 121.

132 *Code of Conduct for Responsible Fisheries* (Food and Agriculture Organisation of the United Nations, Rome, 1995)



if states cannot even come to a final agreement. In those circumstances, a Code of Conduct may be preferable, with incremental steps in the direction of cooperation and transparency on drone-related issues. Further technological revolutions for drones and the need to prevent large-scale geopolitical incidents may drive states to the negotiating table and help press for a strong multilateral approach, or they may keep strong states away from any agreement in order to preserve a technological and military edge they feel they cannot make any compromises on.<sup>133</sup> At this point in time, it is unclear how any negotiations would proceed. This Part has sought simply to sketch out some examples of how a legal framework for maritime drones might look, and what considerations are likely to bear on states in those processes.

## VI CONCLUSION

This article has referenced several writers who have addressed the legal status of maritime drones in the Law of the Sea, most of whom have concluded that the existing regime is entirely satisfactory for regulating maritime drones. Clearly, this article's conclusions diverge from that orthodoxy. To generalise broadly, there are two key reasons for this divergence. The first is that this article has emphasised the modern technological context of maritime drones, where contemporary innovations in unmanned technology constitute a technological revolution. This means both that states are likely to deploy maritime drones in exponentially increasing numbers and that the capabilities of those drones are increasing at a rapid pace. It follows that any existing ambiguities in international law, like those that exist in the Law of the Sea, will be exploited on a massive scale by states at the forefront of this drone revolution. This makes the correction of any ambiguities necessary and urgent. The second way this article has departed from previous studies is by emphasising the tense geopolitical backdrop for this drone revolution, particularly in the South China Sea. Again, these aspects make a new framework for maritime drones and the Law of the Ocean more pressing. No piece of writing to date has emphasised these pieces of context — they are only partially explained by many of those written five or more years ago, when the technological revolution for maritime drones was not as obvious and the South China Sea was less of a geopolitical quagmire.<sup>134</sup>

Grounding this article's assessment of the legal regime for maritime drones in a modern technological and geopolitical context points strongly towards the need for a new legal regime. Part II examined the geopolitics driving the technological revolution of maritime drones and how scientific advances like robotic autonomy threaten to make existing technology redundant altogether. With technology evolving at such a rapid pace, a legal regime seeking to regulate drones needs to be predictable, flexible and effective. Part III made clear that UNCLOS has none of those qualities and

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133 UNIDIR, above n 50, at 9

134 See, for example, Gogarty and Hagger, above n 12, at 73, which was published in 2008.

may not apply to maritime drones at all given the ambiguity over the definition of vessel. Part IV explored why that ambiguity is so consequential for states, impacting on strategic interests like geopolitical stability and the marine environment. Closing with Part V, this article has established that a new legal framework is necessary and has indicated how international law-making could improve different aspects of drone usage through imposing positive obligations. While it is worth thinking about what such a framework should look like, this article acknowledges that states will ultimately decide what framework is acceptable. Equally, however, the reality is that the present legal dynamic is unsustainable and dangerous. States should act proactively to impose clear rules for maritime drones and take a step further towards realising a “legal order for the seas”.<sup>135</sup>

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135 UNCLOS, preamble.