Autonomous Shipping: Some Reflections on Navigational Rights and Rescue at Sea

Autonomous Shipping: Navigational Rights and Rescue at Sea

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1 Introduction

Until recently, autonomous shipping seemed mostly a theoretical and futuristic vision of technical pioneers and innovative ship builders. However, technical landslides and major economic interests have contributed significantly to the prospect of autonomous shipping. The idea of autonomous and unmanned ships sailing on the seas raises several pertinent legal questions. Legal obstacles are also often said to exist in this area impeding the introduction of new technology. Consequently, in 2017 the International Maritime Organization (imo) decided to launch a ‘regulatory scoping exercise’ of the challenges linked to ‘Maritime Autonomous Surface Ships (mass)’.[[1]](#footnote-1) The scoping exercise aims to ‘determine how safe, secure and environmentally sound [mass] operations might be addressed in imo instruments’.[[2]](#footnote-2) While the scoping exercise was at the time of writing not yet finished, it clearly shows that there is a growing discussion about the legal prerequisites of autonomous shipping.

This chapter seeks to contribute to this discussion by addressing some key matters in this context, namely the regulation of navigational rights and rescue at sea under international law. While the imo’s scoping exercise is logically limited to ‘imo instruments’, the scope of the chapter is slightly different focusing mainly on the international law of the sea. Although the United Nations Convention on the Law of the Sea(unclos) may seem rigid and more closed to change or amendments than some of the relevant imo instruments, analysis of the law of the sea may still be valuable to better understand the legal prerequisites of autonomous shipping.[[3]](#footnote-3) In addition to the unclos, the discussion involves some more specific instruments such as the International Convention for the Safety of Life at Sea (solas Convention),[[4]](#footnote-4) the International Convention for Maritime Search and Rescue (sar Convention)[[5]](#footnote-5) and the International Convention on Salvage (Salvage Convention).[[6]](#footnote-6)

Drawing on an operative focus, the chapter examines some key rules and principles concerning navigational rights and rescue at sea in the context of autonomous and unmanned ships. Using a legal perspective, it deals with a number of questions taken to be of practical significance for the navigation of autonomous and unmanned ships – for example, whether such ships enjoy navigational rights in the same way as other ships and if coastal States are right to regulate their navigation differently from that of other ships.

In addition to such and other navigational issues, the chapter considers questions about rescue at sea and some other closely related matters in the context of autonomous shipping. For example, it discusses whether autonomous and unmanned ships are subject to the same international law requirements in respect of rescue at sea as other ships and whether flag States shall impose the same requirements to engage in rescue on autonomous and unmanned ships as on other ships. In addition to questions about assistance rendered *by* autonomous and unmanned ships, the chapter deals with questions about assistance rendered *to* such ships in distress. Are coastal States under the same obligations concerning maritime search and rescue in relation to autonomous and unmanned ships in danger compared to other ships in danger? And what about the rights of ships in distress: are autonomous and unmanned ships allowed to enter and seek shelter in ports and places of refuge?

The chapter deals with international law as understood in a classical sense as the system of legal norms that govern relations between independent States. It makes use of a conventional legal method, rooted in legal positivism, whereby the content of the law is taken as that which flows from its generally accepted sources.[[7]](#footnote-7) The term ‘autonomous and unmanned ships’ is used in a broad sense for ships with high levels of automated decision processes. Accordingly, it covers both ships that have no crew on board at all (constantly unmanned ships) as those that have a crew on-board but where this crew operates the ship only periodically (periodically unmanned ships).[[8]](#footnote-8)

Following this introduction, the chapter is organized into three sections. Section 2 (Navigational Rights) considers navigational rights in the context of autonomous shipping. Section 3 (Rescue at Sea) examines some key rules and principles concerning rescue at sea and a number of other closely related matters in the context of autonomous shipping. This examination concludes that autonomous and unmanned ships are in some respects outside the scope of international maritime rescue. In more conceptual terms, the chapter ends with the assertion that the regulation under international law of navigational rights seems mostly underpinned by machine/ship-oriented interests whereas that of rescue at sea seems more directed at human/seafarer-oriented interests (section 4 Closing Remarks).

2 Navigational Rights

This section considers some key rules and principles concerning navigational rights in the context of autonomous shipping. Questions dealt with include: ‘Do autonomous and unmanned ships enjoy navigational rights in the same way as other ships?’; ‘Are coastal States right to regulate foreign autonomous and unmanned ships different than other ships?’; ‘Do autonomous and unmanned ships enjoy innocent passage?’ and ‘What about passage through international straits?’.

In international waters, ships of all States enjoy freedom of navigation.[[9]](#footnote-9) In national waters, ships of all States enjoy the right of innocent passage through the territorial sea.[[10]](#footnote-10) Both the regime of freedom of navigation and that of innocent passage thus apply to ships – and not ’ships with a crew on-board’, ’manned ships’ or some other term presupposing an on-board crew. Assuming that autonomous and unmanned ships constitute ‘ships’ within the meaning of the unclos, it seems obvious they would enjoy freedom of navigation and innocent passage through the territorial sea in the same way as other ships.[[11]](#footnote-11) However, on closer reading a slightly more complex picture appears.

2.1 National Waters

Starting with national waters, coastal States are obliged not to hamper innocent passage.[[12]](#footnote-12) However, they remain entitled to adopt certain laws and regulations relating to innocent passage through the territorial sea. Such laws and regulations may concern, for example, ‘safety of navigation and the regulation of maritime traffic’ and ‘the preservation of the environment of the coastal State and the prevention, reduction and control of pollution thereof’.[[13]](#footnote-13) However, such rules and regulations shall not apply to the ‘design, construction, manning or equipment of foreign ships unless they are giving effect to generally accepted international rules and standards’, that is, those adopted by the imo.[[14]](#footnote-14)

Accordingly, with the exception of such global imo rules and standards coastal States have relatively few possibilities under international law to impose different requirements on autonomous and unmanned ships under innocent passage through the territorial sea compared to other ships under such passage. Hence, it seems that autonomous and unmanned ships are in a predominantly similar position as other ships when it comes to innocent passage through the territorial sea.

This view receives further support from the definition of passage which includes ‘stopping and anchoring, but only in so far the same are incidental to ordinary navigation or are rendered necessary by force majeure or distress or for the purpose of rendering assistance to persons, ships or aircraft in danger or distress’.[[15]](#footnote-15) An autonomous and unmanned ship under innocent passage through the territorial sea that needs to stop for some navigational reason – for example because of technical issues related to its automated decision processes or some other navigational limitation owing specifically to its high degree of self-operation – would thus normally remain under passage. While this exception to the basic requirement of passage as being ‘continuous and expeditious’ is not unique to autonomous and unmanned ships, it may be especially significant in that context because it allows necessary technical stops without the ship forfeiting its right to innocent passage.[[16]](#footnote-16) Although it is difficult to forecast the technological development of autonomous shipping, it seems reasonably safe to assume that also such ships will come with some navigational limitations and that some of these limitations will differ from those of other ships. The broad definition of passage seems important so as not to exclude such ships from the right of innocent passage. Given that many important navigational routes pass through the territorial seas of several States, this is a question of more than academic interest.

Internal waters are a different story. Like the territorial sea, internal waters are part of the territory of the coastal State and subject to its sovereignty.[[17]](#footnote-17) However, there is no general right to innocent passage through internal waters.[[18]](#footnote-18) Also, there is no general duty of coastal States to allow foreign ships entry into port.[[19]](#footnote-19) Rather, coastal States remain free under the law of the sea to make entry into its ports subject to requirements. A coastal State may for example impose special pilotage requirements on autonomous and unmanned ships or open only some ports to such ships.[[20]](#footnote-20) The readiness of coastal States to accept autonomous and unmanned ships into port therefore seems a key factor for the prospect of autonomous shipping.

2.2 International Waters

As for international waters, all States enjoy the freedom of navigation,[[21]](#footnote-21) that is, the right to sail ships flying their flag, which possess the nationality of the State whose flag they are entitled to fly.[[22]](#footnote-22) In the exclusive economic zone, the coastal State enjoys sovereign rights regarding natural resources and related jurisdictional rights[[23]](#footnote-23) and all other States enjoy freedom of navigation as well as a couple of other freedoms of the high seas.[[24]](#footnote-24) Besides with respect to living resources[[25]](#footnote-25) and artificial islands, installations and structures,[[26]](#footnote-26) coastal States have certain rights and duties in respect of the prevention, reduction and control of pollution of the marine environment.[[27]](#footnote-27) However, none of the relevant jurisdictional rights appears to provide for differentiation between autonomous and unmanned ships, on the one hand, and other ships, on the other hand.[[28]](#footnote-28) Instead, most of the relevant legal provisions use technologically neutral terms such as ‘ships’ and ‘vessels’ without any reference as to the degree of self-operation.[[29]](#footnote-29)

Further out at sea, on the high seas, ships are subject to the exclusive jurisdiction of the flag State.[[30]](#footnote-30) Consequently, in principle, no other State may exercise its jurisdiction over a ship on the high seas. However, the exclusive character of flag State jurisdiction is not without exceptions. For example, the rules on piracy allow any State to seize pirate ships and arrest the persons board.[[31]](#footnote-31) Ships intended to be used, or that have already been used, for piracy by the persons in dominant control are pirate ships.[[32]](#footnote-32) In short, piracy involves acts of violence or detention, or an act of depredation, committed for private ends by the crew or the passengers of a private ship directed against another ship on the high seas or outside the jurisdiction of any State.[[33]](#footnote-33) Accordingly, it seems that the definition of piracy requires either a crew or passengers – something that not all autonomous and unmanned ships may have. However, piracy also includes ‘any act of voluntary participation in the operation of a ship … with knowledge of facts making it *a pirate ship*’.[[34]](#footnote-34) While the notion of ‘participation in the operation of a ship’ appears broader than that of ‘crew’, it does not seem sufficiently broad to cover the situation when a ship with no one on-board is used for attacking another ship – the main reason being that the definition of a pirate ship relies on the ship being intended to be used, or already has been used, for piracy. Accordingly, at least some autonomous and unmanned ships are likely to be outside the scope of the definition of a pirate ship. Additionally, the right of visit allows government ships to visit and search ships suspected of certain activities (piracy, slave trade, unauthorized broadcasting) or whose nationality is unclear – seemingly without any distinction as to the ship’s degree of automation.[[35]](#footnote-35)

Flag States are not under the same limitations as other States when it comes to jurisdiction over ships. Rather, ships are generally subject to the rules and regulations imposed on it by the flag State.[[36]](#footnote-36) Every flag State is also under an obligation to effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag.[[37]](#footnote-37) As a result, flag State jurisdiction seems a workable alternative under existing law for meeting various special regulation needs brought about by the navigation of autonomous and unmanned ships.[[38]](#footnote-38)

2.3 International Straits

In international straits,[[39]](#footnote-39) all ships and aircraft enjoy the right of transit passage.[[40]](#footnote-40) States bordering straits shall not hamper transit passage[[41]](#footnote-41) but may adopt laws and regulations relating to transit passage through international straits in some specific respects.[[42]](#footnote-42) Such laws and regulations shall not discriminate ‘in form or in fact between foreign ships or in their application have the practical effect of denying, hampering or impairing the right of transit passage’.[[43]](#footnote-43) Also, States bordering straits may designate sea lanes and prescribe traffic separation schemes for the safety of navigation. Such sea lanes and traffic separation schemes shall conform to generally accepted rules and regulations and shall be referred for adoption within the competent international organization, that is, the imo.[[44]](#footnote-44) Accordingly, there seems to be no room for States bordering straits to differentiate between ships merely because of their autonomous and unmanned character.

2.4 Similar Positions

This section has asserted that autonomous and unmanned ships are in a predominately similar position as other ships when it comes to navigational rights under international law. Accordingly, the basic international legal framework for navigational rights seems mainly technologically neutral and not destined to pose a serious obstacle for the development of autonomous and unmanned ships.[[45]](#footnote-45) Rather, it seems more likely that such obstacles would arise from regulations of more specific character, for example requirements resulting from flag State jurisdiction or coastal States’ conditions for entry into ports.[[46]](#footnote-46) The focus of the imo’s scoping exercise on ‘imo instruments’ therefore seems overall reasonable not only for institutional reasons but also because these instruments may well be the most important in practice when it comes to harmonizing the conditions of shipping. The same seems true with respect to rescue at sea, which is the concern of the next section.

3 Rescue at Sea

This section deals with some key rules and principles of international law concerning rescue at sea and other closely related matters in the context of autonomous shipping. Questions dealt with include ‘Are autonomous and unmanned ships subject to the same requirements under international law concerning rescue at sea as other ships?’; ’Are flag States obliged to impose the same requirements to engage in rescue at sea on an autonomous and unmanned ship as on other ships?’. In addition to questions about assistance rendered *by* autonomous and unmanned ships, the section deals with questions about assistance rendered *to* such ships in danger – are coastal States under the same obligations concerning maritime search and rescue in relation to autonomous and unmanned ships as they are in relation to other ships?

As a matter of basic importance, the section begins with a general introduction to the concept of distress under international law. After having reached a certain degree of understanding of this fundamental concept of international maritime rescue law, the discussion proceeds to an examination of some central obligations concerning rescue at sea. In short, the section explains that autonomous and unmanned ships are in some respects beyond the scope of international maritime recue law. The focus on distress and rescue at sea is motivated primarily by the fact that these are issues that may be of real and practical significance for the development of autonomous shipping, for example due to close links to insurance policies, technical requirements and similar matters, but also because an increasing use of autonomous and unmanned ships could affect the general availability of rescue resources at sea. If autonomous and unmanned ships are not available for rescue purposes to the same extent as other ships, an increasing use of autonomous and unmanned ships could have serious consequences for the overall efficiency of the maritime search and rescue system. The availability of autonomous and unmanned ships for rescue purposes is further commented on below.

To begin with, international law provides a duty to rescue at sea. This is a central and well-established duty under international law, ‘accepted from time immemorial’.[[47]](#footnote-47) Technically speaking, the duty to rescue involves several different obligations of international law. Flag States, for example, are under an obligation to require shipmasters to assist people in distress at sea. Coastal States shall promote the establishment, operation and maintenance of search and rescue services.[[48]](#footnote-48) While the different obligations are mainly separable, a couple of features are of general character such as the concept of distress and the prohibition of discrimination.[[49]](#footnote-49) While the non-discrimination element is crucial in some contexts, it is primarily the concept of distress that demands special attention in the context of autonomous shipping.[[50]](#footnote-50) The reason is that the prohibition of discrimination does not target differentiation among different types of ships but among people in distress (and perhaps also States) – as such, it is not very likely to trigger special difficulties in the context of autonomous shipping.[[51]](#footnote-51) By contrast, the concept of distress – and the question whether situations that only involve risks to the vessel itself are covered – is thought to be of concrete relevance in the context of autonomous shipping.

3.1 Concept of Distress

The concept of distress is of fundamental meaning for the duty to rescue at sea: most of the obligations only applies in the presence of distress. The concept appears in slightly different formulations in the relevant instruments. While the unclos refers to ‘any person found at sea in danger of being lost’, ‘persons in distress’ and ‘after a collision … the other ship, its crew and its passengers’,[[52]](#footnote-52) the solas Convention refers to ‘person in distress at sea’[[53]](#footnote-53) and the sar Convention both to ‘person in distress at sea’ and ‘[the] situation wherein … a person, a vessel or other craft is threatened by grave and imminent danger and requires immediate assistance’.[[54]](#footnote-54) Consequently, it cannot be precluded that the concept of distress under article 98.1 of the unclos is different from the corresponding concepts under the solas Convention and the sar Convention. While this difference is often mainly theoretical – primarily because most parties to the unclos are parties also to the solas Convention and/or the sar Convention, and because of the customary status of the relevant duty – it may be significant in the context of autonomous and unmanned ships as it opens up for a possible difference in scope of the various instruments.

The ordinary meaning of ‘distress’ is something like ‘[t]he overpowering pressure of some adverse force, such as anger, hunger, bad weather’ or ‘when a ship requires immediate assistance from unlooked-for damage or danger’.[[55]](#footnote-55) While the unclos does not define the term, the sar Convention defines ‘distress phase’ as the ‘situation wherein there is a reasonable certainty that a person, a vessel or other craft is threatened by grave and imminent danger and requires immediate assistance’.[[56]](#footnote-56) Although this definition is more precise than its counterpart under the unclos, it still leaves some room for States to determine when a situation amounts to distress. This discretionary power also seems to some extent essential. Because not all potential distress situations are identical, the assessment of what amounts to distress seems feasible only on a case-by-case basis. To assist in determining the appropriate operating procedures, the sar Convention sets out three different phases: ‘Uncertainty phase’, ‘Alert phase’ and ‘Distress phase’. Importantly for the present purposes, all these phases cover not only life-threatening situations but also those that only involve ‘a vessel or other craft’.[[57]](#footnote-57) Hence, it seems that the notion of ‘distress’ is broader than that of ‘person in distress’ in the sar Convention.[[58]](#footnote-58)

However, the concept of distress is not the sole criterion for the applicability of the various obligations under the sar Convention. For example, the obligation to ‘participate in the development of search and rescue services’ seems limited to life-threatening situations,[[59]](#footnote-59) as does the basic obligations ‘to ensure that assistance is provided’[[60]](#footnote-60) and ‘[to] use search and rescue units and other available facilities for providing assistance’.[[61]](#footnote-61) So it seems that while the concept of distress under the sar Convention is sufficiently broad to cover both life-threatening situations and those that only involve risks to a ship or other craft, the concrete rescue obligations may be more limited in scope so that they only cover situations involving threats to human life. This means that an autonomous and unmanned ship in danger at sea could come within the concept of distress under the sar Convention but at the same time fail to trigger rescue obligations. While this difference in scope could seem contradictory and as a lacuna in the law, it may be understandable from an operational point of view: a rescue coordination center that receives information that a ship is in danger may not know if the situation involves threats to human life. The broader concept of distress can be a way to accommodate the need for further inquiries in such cases.[[62]](#footnote-62)

3.2 Assistance to Autonomous and Unmanned Ships

As already noted, the duty to render assistance at sea entails several obligations of both flag States and coastal States. Starting with the first category, the most authoritative expressions of flag State obligations pursuant to the duty to render assistance at sea appear in the solas Convention, the sar Convention, the Salvage Convention and the unclos. The relevant provisions are similar and provide a relatively coherent yet multifaceted picture. While the solas Convention requires shipmasters ‘on receiving information … that persons are in distress at sea … to proceed … to their assistance’,[[63]](#footnote-63) the sar Convention requires its parties to ensure ‘that assistance be provided to persons in distress at sea’.[[64]](#footnote-64) Similarly, the Salvage Convention requires ‘[e]very master … to render assistance to any person in danger of being lost at sea’.[[65]](#footnote-65) Finally, the unclos obliges

Every State … [to] require the master of a ship flying its flag …

a) to render assistance to any person found at sea in danger of being lost;

b) to proceed … to the rescue of persons in distress, if informed of their need of assistance …;

c) after a collision, to render assistance to the other ship, its crew and its passengers.[[66]](#footnote-66)

The duty to render assistance clearly applies to flag States. However, it does not require flag States to provide rescue themselves but merely to require masters of ships flying their flag do so. States in their capacity as flag States are simply expected to impose the duty on masters of ships. While this is expressly set out in the unclos and the Convention on the High Seas, the solas Convention and the Salvage Convention are not as clear on this point. Even though these latter conventions refer directly to shipmasters,[[67]](#footnote-67) the contexts of the relevant provisions make it reasonably clear that the flag State is merely expected to impose the duty on shipmasters.[[68]](#footnote-68) Consequently, it seems that shipmasters are not obliged directly by international law to engage in rescue at sea but that their obligation to do so arises as a result of implementation by the flag State or, as the case may be, the coastal State.

Importantly, all flag State obligations pursuant to the duty to render assistance at sea refer to the situation when a person is in distress at sea – and not when merely a ship, vessel or other craft is in danger. Accordingly, it seems reasonably clear that the obligations of flag States to require masters of ships flying their flags to render assistance at sea do not cover autonomous and unmanned ships in danger without there being real threats to human life. Even if international law does not prevent flag States from requiring shipmasters to engage in rescue also in such situations, the absence of clear obligations to do so means that an autonomous and unmanned ship in danger at sea cannot count on the masters of other ships to be legally obliged to come to its assistance.

In addition to flag State obligations, the duty to render assistance involves obligations of coastal States. Article 98.2 of the unclos requires coastal States to ‘promote the establishment, operation and maintenance of an adequate and effective search and rescue service regarding safety on and over the sea’.[[69]](#footnote-69) Similarly, the solas Convention requires its parties

to ensure that necessary arrangements are made for distress communication and co-ordination in their area of responsibility and for the rescue of persons in distress at sea around its coasts. These arrangements shall include the establishment, operation and maintenance of such search and rescue facilities as are deemed practicable and necessary, having regard to the density of the seagoing traffic and the navigational dangers, and shall, so far as possible, provide adequate means of locating and rescuing such persons[[70]](#footnote-70)

Notwithstanding the importance of the unclos and the solas Convention, the sar Convention stands as the main instrument concerning coastal State obligations for the duty to render assistance at sea. In addition to the basic obligations to provide assistance referred to above,[[71]](#footnote-71) the sar Convention requires its parties to ‘participate in the development of search and rescue services’ and to establish certain ‘basic elements of a search and rescue service: legal framework; … a responsible authority; organization of available resources; communication facilities; co-ordination and operational functions; … processes to improve the service’.[[72]](#footnote-72) They shall also ‘ensure that sufficient search and rescue regions are established’.[[73]](#footnote-73) Such regions shall be established by agreement.[[74]](#footnote-74) However, ‘[i]n case agreement on the exact dimensions of a … region is not reached … [the relevant] parties shall use their best endeavors to reach agreement upon appropriate arrangements under which the equivalent overall co-ordinate of search and rescue services is provided in the area’.[[75]](#footnote-75) In addition, there are several other obligations of coastal States set out by the relevant instruments.

Importantly, all the mentioned coastal State obligations under the duty to render assistance at sea refer to ‘search and rescue services’ and not ‘rescue of persons in distress’, ‘survivors’ or any similar term.[[76]](#footnote-76) Accordingly, it seems that some of these obligations are capable of covering situations that involve a ship or other craft in danger without there being any threat to human life. For example, the arrangements that a coastal State shall make for distress communication and coordination may be sufficiently expansive to cover also autonomous and unmanned ships in danger.[[77]](#footnote-77) The same holds true for the obligations to have plans of operation,[[78]](#footnote-78) to forward information concerning emergencies[[79]](#footnote-79) and to ‘evaluate such information and determine … the extent of operations required’.[[80]](#footnote-80) So, while autonomous and unmanned ships may not be covered by the basic rescue obligations of coastal States, they may still be covered by some obligations with respect to rescue.[[81]](#footnote-81) While this coverage may be incomplete and perhaps also insufficient in some respects, it clearly shows that the international legal framework for maritime search and rescue is not completely ignorant of the possible needs of assistance of *ships* in danger at sea.

3.3 Assistance by Autonomous and Unmanned Ships

In addition to questions about assistance rendered *to* autonomous and unmanned ships, the duty to render assistance raises questions about assistance *by* such ships. It may, for example, be asked whether autonomous and unmanned ships are subject to the same requirements under international law concerning rescue at sea as other ships and whether flag States are obliged to impose the same requirements to engage in rescue at sea on autonomous and unmanned ships as on other ships.

Naturally, questions may be raised about the ability of autonomous and unmanned ships to assist others in distress at sea. Although it seems obvious that such ships may not have the same rescue capabilities as other ships, it needs to be noted that a variety of acts can constitute assistance, for example, recovery from the water, towing or simply standing by to calm the sea.[[82]](#footnote-82) Furthermore, the meanings of ‘assistance’ and ‘rescue’ are rather vague and the duty to render assistance leaves some discretionary room for shipmasters decide whether they are able to provide assistance.[[83]](#footnote-83)

To begin with, it needs to be recalled that the duty to render assistance applies to States – but that shipmasters generally are under such a duty as a result of implementation at national level.[[84]](#footnote-84) While the unclos obliges States to require ‘*the master of a ship* flying its flag’ to render assistance,[[85]](#footnote-85) the solas Convention uses similar terms when it stipulates that ‘[*t*]*he master of a ship* at sea which is in a position to be able to provide assistance, on receiving information from any source that persons are in distress at sea, is bound to proceed with all speed to their assistance’.[[86]](#footnote-86) In the context of autonomous shipping, it needs to be noted that the relevant flag State obligations are not limited to ‘masters of manned ships’, ‘masters on-board ships’ or the like but that they refer to ‘the master of a ship’. The notion of autonomous and unmanned ships obviously implies that certain ships can be operated either remotely or autonomously/by the ship itself, thus triggering the question whether such ships have a master or not.

While neither the unclos nor the solas Convention defines the term ‘master’, the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (stcw Convention) defines it as the person in command of the ship – seemingly presupposing that the master is on board the ship.[[87]](#footnote-87) Also, the unclos requires flag States to ensure that each ship under their flag is in the charge of a master.[[88]](#footnote-88) Numerous obligations attach to the shipmaster, many of which appears to presuppose that the master is on board the ship.[[89]](#footnote-89) As a result, States seem free to not impose special requirements on persons exercising control over an autonomous and unmanned ship compared with those on shipmasters – thus allowing autonomous and unmanned ships to fly their flag without being subject to the same requirements to render assistance as the masters of conventional ships. Given the important role of private ships in the global search and rescue system this seems a possible gap. Whether this means that the relevant law needs to be changed is, however, primarily a political matter. However, as noted by Schelin, to exempt ‘unmanned remotely controlled ships would seriously undermine the fundamental obligation to save lives at sea’.[[90]](#footnote-90)

While questions concerning entry into port of ships in distress may not fully match the title of the present section – Rescue at Sea – they still seem more related to rescue than to the title of the previous section – Navigational Rights. To begin with, there is no general right under international law for foreign ships to access ports. Because such a right would necessarily impinge upon the authority of a State over its territory, the non-existence of such a right is nothing but an aspect of the territorial sovereignty of the coastal State over its internal waters, including ports.[[91]](#footnote-91) Accordingly, in *Military and Paramilitary Activities in and against Nicaragua (Nicaragua v United States of America)*, the icj explained that ‘it is … by virtue of its sovereignty that the coastal State may regulate access to its ports’.[[92]](#footnote-92) However, there is wide acceptance that ships that enter a port in distress or because of force majeure are not subject to the jurisdiction of the coastal State. This exception to the main rule of the jurisdiction of the coastal State over its territory seems, on the other hand, to be motivated primarily by humanitarian considerations.[[93]](#footnote-93) Autonomous and unmanned ships in danger at sea may thus not be entitled to the same immunity against local law as other ships after having entered a port or a place of refuge in distress at sea.

4 Closing Remarks

This chapter has examined, albeit only briefly, some key rules and principles under international law concerning navigational rights and rescue at sea in the context of autonomous shipping. It has been asserted that autonomous and unmanned ships are in a predominately similar position as other ships when it comes to navigational rights and that autonomous and unmanned ships are in some respects outside the scope of international maritime rescue law. One way to understand this difference in scope is to draw on the different ‘ethe’ of the two regimes.[[94]](#footnote-94) While that of navigational rights appears to be mostly underpinned by machine or ship-oriented interests, that of rescue at sea seems mainly directed at human/sea-farer oriented considerations.[[95]](#footnote-95) While an autonomous and unmanned ship clearly remains a machine – irrespective of its degree of self-operation – the key concern of international maritime rescue law is the protection of human life at sea. Hence, it should be no surprise that autonomous and unmanned ships are not fully covered by international maritime rescue law. Whether this is a problem in need of a legal solution is primarily a political question. However, to equate autonomous and unmanned ships in danger with persons in distress at sea would be a clear break with the humanitarian underpinnings of international maritime rescue law. Whether this can be done without undermining the general respect for the duty to render assistance at sea, and thus for the safety of (human) life at sea, is not very easy to say.

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1. ‘Report of the Maritime Safety Committee on its Ninety-Eighth Session’, imo Doc msc 98/23 (28 June 2017) paras 20.1–20.2. [↑](#footnote-ref-1)
2. ‘Framework for the Regulatory Scoping Exercise for the Use of Maritime Autonomous Surface Ships (MASS)’, imo Doc msc 100/20/Add. 1 annex 2 (12 December 2018) para 1. [↑](#footnote-ref-2)
3. United Nations Convention on the Law of the Sea (opened for signature 10 December 1982, entered into force 16 November 1994) 1833 unts 3 (unclos). [↑](#footnote-ref-3)
4. International Convention for the Safety of Life at Sea (opened for signature 1 November 1974, entered into force 25 May 1980) 1184 unts 2 (solas Convention). [↑](#footnote-ref-4)
5. International Convention on Maritime Search and Rescue (opened for signature 1 November 1979, entered into force 22 June 1985) 1405 unts 97 (sar Convention). [↑](#footnote-ref-5)
6. International Convention on Salvage (opened for signature 1 July 1989, entered into force 14 July 1996) 1953 unts 165 (Salvage Convention). [↑](#footnote-ref-6)
7. Statute of the International Court of Justice art 38(1) directs the International Court Justice (icj), whose function is to decide disputes in accordance with international law, to international agreements, international custom, general principles of law and, as subsidiary sources, judicial decisions and legal scholarship. [↑](#footnote-ref-7)
8. See generally Henrik Ringbom, ‘Regulating Autonomous Ships: Concepts, Challenges and Precedents’, (2019) 50:2–3 Ocean Development & International Law 141; Robert Veal and Michael Tsimplis, ‘The Integration of Unmanned Ships into the *Lex Maritima*’ [2017] Lloyd’s Maritime & Commercial Law Quarterly 303. For a discussion of manning issues in the context of autonomous shipping, see Johan Schelin, ‘Manning of Unmanned Ships’ in Henrik Ringbom, Erik Røsæg and Trond Solvang (eds), *Autonomous ships and the Law* (Routledge 2021) 261. [↑](#footnote-ref-8)
9. See, eg, unclos arts 58.1, 87, 90. See also Convention on the High Seas (opened for signature 29 April 1958, entered into force 30 September 1962) 450 unts 11, art 2.1. [↑](#footnote-ref-9)
10. unclos art 17. See also Convention on the Territorial Sea and the Contiguous Zone (opened for signature 29 April 1958, entered into force 10 September 1964) 516 unts 205, art 14. There is no general right of innocent passage through internal waters: cf unclos art 8.2, Convention on the Territorial Sea and the Contiguous Zone art 5.2. [↑](#footnote-ref-10)
11. The unclos refers to both ‘ships’ and ‘vessels’ without defining them. However, it follows from ‘the nature of the activities carried out by the ships here under consideration that they would most likely be regarded as ships/vessels by virtue of their size, features, and functions.’: Ringbom (n 8) 169 fn 72. See also Veal and Tsimplis (n 8) 307–14. [↑](#footnote-ref-11)
12. unclos art 24.1. See also Convention on the Territorial Sea and the Contiguous Zone art 15.1. [↑](#footnote-ref-12)
13. unclos art 21.1. See also Convention on the Territorial Sea and the Contiguous Zone art 17. [↑](#footnote-ref-13)
14. unclos art 21.2. [↑](#footnote-ref-14)
15. ibid art 18.2. See also Convention on the Territorial Sea and the Contiguous Zone art 14.3. [↑](#footnote-ref-15)
16. unclos art 18.2. See also Convention on the Territorial Sea and the Contiguous Zone art 14.2. [↑](#footnote-ref-16)
17. unclos art 2.1. See also Convention on the Territorial Sea and the Contiguous Zone art 1.1. [↑](#footnote-ref-17)
18. But see unclos art 8.2 and Convention on the Territorial Sea and the Contiguous Zone art 5.2, recognizing a right to innocent passage in waters enclosed by straight baselines that previously were not considered internal waters: ‘Where the establishment of a straight baseline … has the effect of enclosing as internal waters areas which had not previously been considered as such, *a right of innocent passage* … shall exist in those waters’ (emphasis added). [↑](#footnote-ref-18)
19. Ships in distress is an important exception, which is further commented on below in Section iii Rescue at Sea. [↑](#footnote-ref-19)
20. For a similar note, see Veal and Tsimplis (n 8) 318: ‘effected by coastal States as a condition of entry of unmanned ships into their ports. An alternative would be that a master and possibly a small crew would embark with a pilot before entering port.’ [↑](#footnote-ref-20)
21. See, eg, unclos arts 58.1, 87.1.a. See also Convention on the High Seas art 2.1. [↑](#footnote-ref-21)
22. unclos arts 90–92. See also Convention on the High Seas arts 4–5. [↑](#footnote-ref-22)
23. See, eg, unclos art 56.1. [↑](#footnote-ref-23)
24. See, eg, ibid art 58.1. [↑](#footnote-ref-24)
25. ibid arts 61–67. [↑](#footnote-ref-25)
26. ibid art 60. [↑](#footnote-ref-26)
27. See, eg, ibid Part xii s 5. [↑](#footnote-ref-27)
28. See, eg, ibid art 211.5: ‘Coastal States … may in respect of their exclusive economic zones adopt laws and regulations for the prevention, reduction and control of pollution from *vessels*’ (emphasis added). [↑](#footnote-ref-28)
29. See, eg, ibid arts 60.6 (‘all ships’), 73.2 (‘arrested vessels’), 73.4 (‘foreign vessels’), 211 (‘vessels’), 220.5 (‘vessel navigating’). [↑](#footnote-ref-29)
30. See, eg, ibid art 92.1. See also Convention on the High Seas art 6.1. [↑](#footnote-ref-30)
31. unclos art 105. See also Convention on the High Seas art 19. [↑](#footnote-ref-31)
32. unclos art 103. See also Convention on the High Seas art 17. [↑](#footnote-ref-32)
33. unclos art 101. See also Convention on the High Seas art 15. [↑](#footnote-ref-33)
34. unclos art 101.1.b (emphasis added). See also Convention on the High Seas art 15.2. [↑](#footnote-ref-34)
35. unclos art 110. See also Convention on the High Seas art 22. [↑](#footnote-ref-35)
36. See, eg, unclos art 92. See also Convention on the High Seas art 6.1. [↑](#footnote-ref-36)
37. unclos art 94. See also Convention on the High Seas art 10. Ringbom (n 8) 161 notes that the obligation to ensure ‘that each ship is in the charge of a master and officers … and that the crew is appropriate in qualification and numbers‘, pursuant to unclos art 94.2.b, may prevent ‘the introduction of fully autonomous ships, but has less impact on remotely operated ships and even less so on periodically unmanned ships’. [↑](#footnote-ref-37)
38. See generally Ringbom (n 8) 161–62. [↑](#footnote-ref-38)
39. For the definition, see unclos art 37. See also Convention on the Territorial Sea and the Contiguous Zone art 16.4. [↑](#footnote-ref-39)
40. unclos art 38.1. See also Convention on the Territorial Sea and the Contiguous Zone art 16.4. [↑](#footnote-ref-40)
41. unclos art 44. See also Convention on the Territorial Sea and the Contiguous Zone art 16.4. [↑](#footnote-ref-41)
42. unclos art 42. [↑](#footnote-ref-42)
43. ibid art 42.2. [↑](#footnote-ref-43)
44. ibid art 41. [↑](#footnote-ref-44)
45. For further discussion on the need for special regulation for autonomous ships, see Jhonnie Kern’s chapter on autonomous wrecks in this book. [↑](#footnote-ref-45)
46. For a similar view, see Ringbom (n 8) 161: ‘the IMO can regulate the question of autonomous ships in its entirety … The wording of [UNCLOS], as a framework convention with “constitutional” objectives, should not be construed as preventing the introduction of new technologies for shipping’. [↑](#footnote-ref-46)
47. Djamchid Momtaz, ‘The High Seas’ in René-Jean Dupuy and Daniel Vignes (eds), *A Handbook on the New Law of the Sea* (Martinus Nijhoff 1991) 416. See generally Tullio Treves, ‘Navigation’ in René-Jean Dupuy and Daniel Vignes (eds), *A Handbook on the New Law of the Sea* (Martinus Nijhoff 1991) 857−62; Myron H Nordquist and others (eds), *United Nations Convention on the Law of the Sea 1982: A Commentary*, vol 3 (Martinus Nijhoff 1995) 170−78; Efthymios Papastavridis, *The Interception of Vessels on the High Seas* (Hart 2013) 294−300; Jean-Paul Pancracio, *Droit de la Mer* (Dalloz 2010) 113−15; Sir Robert Jennings and Sir Arthur Watts (eds), *Oppenheim’s International Law* (9th edn, oup 1992) 744; D P O’Connell, *The International Law of the Sea* (oup 1984) 813−14; Donald R Rothwell and Tim Stephens, *The International Law of the Sea* (Hart 2010) 161−62. See also Martin Ratcovich, *International Law and the Rescue of Refugees at Sea* (lld thesis, Department of Law, Stockholm University 2019) 75–98. [↑](#footnote-ref-47)
48. See, eg, unclos art 98.2. See also Convention on the High Seas art 12.2. [↑](#footnote-ref-48)
49. See, eg, unclos art 98.1: ‘Every State shall require the master of a ship … to render assistance to *any person* … in danger’ (emphasis added); Convention on the High Seas art 12.1; sar Convention annex para 2.1.10: ‘regardless of the nationality or status of such a person or the circumstances in which that person is found’; solas Convention annex ch v reg 33.1. See also Brussels Convention for the Unification of Certain Rules of Law Respecting Assistance and Salvage at Sea (adopted 23 September 1910, entered into force 1 March 1913) 1913 ukts 4 Cd.6677, which requires assistance to be rendered ‘to *everybody, even though an enemy*, … in danger’ (emphasis added). [↑](#footnote-ref-49)
50. Incidents involving refugees and migrants is a topical example: see generally Ratcovich (n 47). [↑](#footnote-ref-50)
51. See, eg, the references above n 49. See also unclos art 24.1.b: ‘The coastal State shall not hamper … innocent passage … In particular, in the application of this Convention … the coastal State shall *not* … *discriminate* … against the *ships of any State* or against ships carrying cargoes to, from or on behalf of any State (emphasis added)’. [↑](#footnote-ref-51)
52. unclos art 98.1. See also Convention on the High Seas art 12: ‘any person found at sea in danger of being lost’, ‘persons in distress’; Salvage Convention art 10.1: ‘any person in danger of being lost at sea’. [↑](#footnote-ref-52)
53. solas Convention annex ch v reg 33. [↑](#footnote-ref-53)
54. sar Convention annex paras 1.3.13, 2.1.1, 2.1.10. [↑](#footnote-ref-54)
55. *Oxford English Dictionary* (3rd edn, oup 2013) ‘distress’ (n, def 1b, 2c). [↑](#footnote-ref-55)
56. sar Convention annex para 1.3.13. [↑](#footnote-ref-56)
57. ibid annex para 4.4. [↑](#footnote-ref-57)
58. ibid annex para 2.1.1. For a similar discussion, see Ratcovich (n 47) 78–83. [↑](#footnote-ref-58)
59. sar Convention annex para 2.1.1: ‘Parties shall … participate in the development of search and rescue services to ensure that assistance is rendered *to any person* in distress at sea’ (emphasis added). [↑](#footnote-ref-59)
60. ibid annex para 2.1.1: ‘On receiving information that *any person* is, or appears to be, in distress at sea, the responsible authorities of a Party shall take urgent steps to ensure that the necessary assistance is provided’ (emphasis added). See also at para 2.1.9: ‘Parties shall ensure that assistance be provided to *any person* in distress at sea’ (emphasis added). [↑](#footnote-ref-60)
61. ibid annex para 2.1.9: ‘Parties having accepted responsibility to provide search and rescue services for a specified area shall use search and rescue units and other available facilities for providing assistance to *a person* who is, or appears to be, in distress at sea.’ [↑](#footnote-ref-61)
62. See, eg, ibid annex paras 4.5.1, 4.5.2, concerning further inquiries, and para 4.8.1, concerning the termination of search and rescue operations ‘when … all reasonable hope of rescuing *survivors* has passed’ (emphasis added). [↑](#footnote-ref-62)
63. solas Convention annex ch v reg 33.1. [↑](#footnote-ref-63)
64. sar Convention annex para 2.1.10. [↑](#footnote-ref-64)
65. Salvage Convention art 10.1. [↑](#footnote-ref-65)
66. unclos art 98.1. See also Convention on the High Seas art 12.1. [↑](#footnote-ref-66)
67. solas Convention annex ch v reg 33.1: ‘*The master of a ship* … is bound to proceed … to … assistance’ (emphasis added); Salvage Convention art 10.1: ‘*Every master* is bound … to render assistance’ (emphasis added). [↑](#footnote-ref-67)
68. See, eg, solas Convention art 1: ‘The contracting governments undertake to give effect to … the present convention and the annex thereto … [and] to promulgate all laws, decrees, orders and regulations and to take all other steps which may be necessary to give the present Convention full and complete effect.’; Salvage Convention arts 2, 10.2. See generally Ratcovich (n 47) 88–89. [↑](#footnote-ref-68)
69. See also Convention on the High Seas art 12.2. [↑](#footnote-ref-69)
70. solas Convention annex ch v reg 33.1 (emphasis added). [↑](#footnote-ref-70)
71. See above nn 60–61. [↑](#footnote-ref-71)
72. sar Convention annex para 2.1.2. [↑](#footnote-ref-72)
73. ibid annex para 2.1.3. [↑](#footnote-ref-73)
74. ibid annex para 2.1.4. [↑](#footnote-ref-74)
75. ibid annex para 2.1.5. [↑](#footnote-ref-75)
76. solas Convention annex ch v reg 2.5 and sar Convention annex para 1.3.3 define ‘search and rescue services’ as ‘[t]he performance of distress monitoring, communication, coordination and search and rescue functions, including provision of medical advice, initial medical assistance, or medical evacuation, through the use of public and private resources including co-operating aircraft, ships, vessels and other craft and installations.’ [↑](#footnote-ref-76)
77. See, eg, solas Convention ch v reg 7.1; sar Convention annex paras 2.1.2.4, 2.3.2, 4.1.1, 4.2.1, 4.2.2; unclos art 98.2; Convention on the High Seas art 12.2. [↑](#footnote-ref-77)
78. See, eg, sar Convention annex para 4.1.3. [↑](#footnote-ref-78)
79. See, eg, ibid annex para 4.2.3. [↑](#footnote-ref-79)
80. ibid annex para 4.2.4. [↑](#footnote-ref-80)
81. See above nn 60–61. [↑](#footnote-ref-81)
82. See generally International Maritime Organization and International Civil Aviation Organization, ‘International Aeronautical and Maritime Search and Rescue Manual’, vol 3 (11th edn, 2019) (iamsar Manual). [↑](#footnote-ref-82)
83. See, eg, unclos art 98.1: ‘in so far as he can do so *without serious danger* to the ship, the crew or the passengers’ and ‘in so far as such action may *reasonably be expected*’ (emphasis added); solas Convention ch v reg 33.1: ‘The master of a ship which is *in a position to be able* to provide assistance’ (emphasis added). [↑](#footnote-ref-83)
84. See above nn 63–66. [↑](#footnote-ref-84)
85. unclos art 98.1. [↑](#footnote-ref-85)
86. Ratcovich (n 47) 89. [↑](#footnote-ref-86)
87. International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (opened for signature 7 July 1998, entered into force 28 April 1984) 1361 unts 2 (stcw Convention) reg I/1. See, eg, Schelin (n 8) 274. See also Ringbom (n 8) 158 noting that ‘the stcw Convention and the related stcw Code … represent the most direct legal hurdle for remote operations’. [↑](#footnote-ref-87)
88. unclos art 94.4.b. [↑](#footnote-ref-88)
89. See generally Schelin (n 8) 274–78. [↑](#footnote-ref-89)
90. ibid 277. But see Aristotelis Komianos, ‘The Autonomous Shipping Era: Operational, Regulatory, and Quality Challenges’ (2018) 12 International Journal on Marine Navigation and Safety of Sea Transportation 335, 343: ‘an [a]utonomous ship … most probably will not be able to provide … assistance … A proper adjustment or an exemption … from the [s]earch and [r]escue operations seems to be the most appropriate solution.’ [↑](#footnote-ref-90)
91. See, eg, R R Churchill and A V Lowe, *The Law of the Sea* (3rd edn, Manchester University Press 1999) 61; Henrik Ringbom, *The EU Maritime Safety Policy and International Law* (Brill 2008) 207. [↑](#footnote-ref-91)
92. *Military and Paramilitary Activities in and against Nicaragua (Nicaragua v United States of America)* (Merits) [1986] icj Rep 14, 111−12. [↑](#footnote-ref-92)
93. See, eg, Yoshifumi Tanaka, *The International Law of the Sea* (2nd edn, cup 2015) 84; Richard Barnes, ‘Refugee Law at Sea’ (2004) 53 International and Comparative Law Quarterly 47, 58; Douglas Guilfoyle, *Shipping Interdiction and the Law of the Sea* (cup 2009) 202. [↑](#footnote-ref-93)
94. ’Ethe’, ’ethea’ or ’ethoses’ is plural for ‘ethos’. [↑](#footnote-ref-94)
95. For a general discussion of the nature of the law of the sea in the context of protection of people at sea, see Irini Papanicolopulu, *International Law and the Protection of People at Sea* (oup 2018) 80–88, 187–90. For the humanitarian underpinnings of international maritime rescue law, see Ratcovich (n 47) 66–68. [↑](#footnote-ref-95)