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## **THE EMERGENCE OF OCEAN CLIMATE GEOENGINEERING: INTERNATIONAL ENVIRONMENTAL LAW BETWEEN A ROCK AND A HARD PLACE**

Sophie GAMBARDELLA<sup>\*1</sup>

### **ABSTRACT**

The development of geo-engineering applied to the oceans - ocean fertilization, trapping and geological storage of CO<sub>2</sub> - has put two areas of international environmental law in tension: climate law and international law of the marine environment. This study aims to think about the role that the international environmental law could or should play toward the development of the geo-engineering. The discussions on geo-engineering that have taken place in international fora are rich in lessons about these rights themselves, with regard to their effectiveness and efficiency, but also to their articulation, and they allow to understand the position of the different organizations a front of these new techniques. Thus, the question of the "good governance" of this new challenge raises. It is therefore a question of presenting the various possibilities offered by international law to frame - even forbid - these new practices.

### **I. INTRODUCTION**

This paper was first presented at an October 2018 international conference held in Rennes (France), whose title roughly translated as ‘Storm alert for the planet: Rethinking climate and environmental engineering for the Anthropocene’.<sup>2</sup> Our lively scientific exchanges there reflected the environmental emergency we have been facing since the early twenty-first century. The IPCC’s Special Report on Global Warming of 1.5°C, published a few days earlier, had been an initial reminder of this emergency, which needed to be addressed without delay<sup>3</sup>, but how? The paradigm of diplomatic action on climate issues appears to have changed drastically in recent years. Indeed, plans to curb climate change are no longer only based on preventive efforts to reduce environmental damage risks, but increasingly count on a technological corrective feat – namely, climate geoengineering<sup>4</sup>. Large-scale geoengineering solutions have only reached at an experimental stage at this point, but the feasibility of their implementation in the medium-term is increasingly likely. Researchers in the prospective brainstorming workshops REAGIR have defined environmental geoengineering as ‘*all the technologies and*

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<sup>2</sup> In the original French: *Tempête sur la planète ! Penser le droit et les politiques de l’ingénierie climatique et environnementale à l’heure de l’anthropocène*.

<sup>3</sup> GIEC/IPCC, Global warming of 1,5°C, special report. Available at: <https://www.ipcc.ch/sr15/>

<sup>4</sup> We can quote two key books on the climate geoengineering: Burns Wil C. G., Strauss Andrew L. (Eds.), *Climate change geoengineering: philosophical perspectives, legal issues and governance frameworks*, (Cambridge University Press, 2013); Hamilton Clive, *Les apprentis sorciers du climat. Raisons et déraisons de la géo-ingénierie*, (Paris, Seuil, 2013).

*practices implemented or projected for the purposes of large-scale correction of effects resulting from anthropogenic pressure on the environment*.<sup>5</sup> Applied to the climate, these technologies and practices aim at correcting man-made climate change on a global scale – the definition of geoengineering adopted by the Royal Society of London is consistent with this: *‘deliberate large-scale intervention in the Earth’s climate system, in order to moderate global warming’*.<sup>6</sup> As the scope of these technologies is poised to extend beyond state borders, international law will have to address them, and provide a framework for their use. To consider the ways in which international law must and/or can tackle this new challenge, this contribution will combine two approaches: a milieu-based approach and a technology-based approach.

The milieu-based approach echoes the conference title ‘Storm alert for the planet’. Climate change indeed meets the Oxford American’s definition of ‘storm’ as a ‘violent disturbance of the atmosphere’. As the most prominent regulators of climate,<sup>7</sup> our seas and oceans are in the eye of the storm. I investigate the role of international law with respect to geoengineering by focusing on the specific case of ocean climate geoengineering<sup>8</sup>. In Resolution LP.4(8) of the International Maritime Organization (IMO) amending the 1972 London Protocol on the prevention of maritime pollution by dumping of wastes and other matter, marine geoengineering is defined as ‘a deliberate intervention in the marine environment to manipulate natural processes, including to counteract anthropogenic climate change and/or its impacts, and that has the potential to result in deleterious effects, especially where those effects may be widespread, long lasting or severe’ (IMO Resolution LP.4(8), 2013). Here I focus on one marine geoengineering technology in particular: ocean fertilization. This technology aims at artificially stimulating the biological carbon pump, particularly by seeding biomass-poor ocean areas with nutrients, generally iron. According to Resolution LP.4(8), ‘ocean fertilization is any activity undertaken by humans with the principal intention of stimulating primary productivity in the oceans. Ocean fertilization does not include conventional aquaculture, or mariculture, or the creation of artificial reefs.’ In practice, experiments with this technology have already taken place, some conducted officially by teams of scientists and others unofficially by industrials – these include the scientific experiments KEOPS (Kerguelen Ocean and Plateau compared Study)<sup>9</sup> and Lohafex,<sup>10</sup> carried out in 2005 and 2009 by international teams and Russ George’s illegal 2012 experiment in the Pacific. The latter experiment’s official purpose was to ‘restore the pink salmon population for the fishing

<sup>5</sup> Our translation. Atelier de réflexion prospective de l’ANR REAGIR, 2014, « Réflexion systémique sur les enjeux et méthodes de la géo-ingénierie de l’environnement », Document de synthèse, available at:

<http://www.agence-nationale-recherche.fr/fileadmin/documents/2016/ARP-REAGIR-avril-2014.pdf>

<sup>6</sup> The Royal Society, 2009, *Geoengineering the Climate: Science, governance and uncertainty*, available at:

[https://royalsociety.org/~media/royal\\_society\\_content/policy/publications/2009/8693.pdf](https://royalsociety.org/~media/royal_society_content/policy/publications/2009/8693.pdf)

<sup>7</sup> Oceans play a key role in climate regulation. The deep sea is considered as the largest carbon sink. Oceans stock fifty times more carbon than the atmosphere because they are home to two carbon pumps: a biological and a physical one. The physical carbon pump allows denser water to sink toward the depths and drag dissolved carbon with it. The biological carbon pump enables the transfer of carbon from the surface to the seabed via the food chain, resulting in long-term carbon storage.

<sup>8</sup> According to Chiara Armeni “Among the variety of geoengineering concepts, ocean fertilization has received greatest attention in the international legal literature” but it is paradoxically not that frequent in the french legal literature. Armeni Chiara, 2015, « Global experimentalist governance, international law and climate change technologies », (2015) 64(4) ICLQ, 875.

<sup>9</sup> The KEOPS experiment was performed off the coasts of the Kerguelen Islands, within the framework of the PROOF program of the French National Institute of Universal Sciences (CNRS) and under the supervision of Stéphane Blain.

<sup>10</sup> The Lohafex experiment was carried out jointly by the Indian Council of Scientific and Industrial Research (CSIR) and the Helmholtz Foundation (Germany).

community of the Canadian archipelago of Haida Gwaii by triggering blooms of the phytoplankton consumed by these animals. Unofficially, the operation aimed at experimenting with CO<sub>2</sub> sequestration on the ocean floor to acquire carbon credits whose resale would provide a return on investment'.<sup>11</sup> These experiments produced very mixed results in terms of impacts on CO<sub>2</sub> reduction, and there is considerable uncertainty as to their long-term large-scale impacts on marine biodiversity. Yet, the climate emergency reasserted by the IPCC on 8 October 2018 and the technical feasibility of geoengineering scenarios have made resorting to these technologies a plausible prospect, in the sense that they are acceptable by all. While scholarly institutions such as the UK's Royal Society (2008, 2009), the US's National Academy of Sciences (2012) and the University of Oxford (2009) have tackled this question, international environmental law, and marine environmental law in particular, have also examined the matter.

Ocean climate geoengineering has been put on the agenda of three sites of international environmental governance: the International Maritime Organization (IMO), the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC). The IMO was the first organization to address ocean fertilization in 1999, spurred on by the NGO Greenpeace. Yet, it only adopted a statement of concern in 2007, after the states party to the Protocol to the London Convention eventually agreed that the scope of the text covered ocean fertilization. In 2008, following a decision of the Conference of the Parties to the CBD, the IMO adopted Resolution LC-LP.1, which states that ocean fertilization activities other than legitimate small-scale research endeavors should not be allowed. Since then, scientific studies have been conducted within the IMO to draft a new Annex 4 to the Protocol to the London Convention establishing a legal framework for the assessment of scientific research involving ocean fertilization. The amendments to the Protocol were adopted in 2013 but have yet to enter into force to this day. During its ninth Conference of the Parties, the CBD adopted Decision IX/16, which calls for a moratorium on large-scale ocean fertilization in accordance with the precautionary approach. The Conference of Parties to the CBD also consolidated its position on the matter in Decisions X/29 and XI/20. Lastly, regarding the legal framework on climate, ocean fertilization was the subject of a 2005 IPCC study that directly influences decisions taken within that framework, and of a 2011 study by the International Geosphere-Biosphere Program (IGBP). The two reports point out that ocean fertilization involves unresolved scientific problems such as the effectiveness and permanence of carbon sequestration, the effects of possible increased ocean acidification, the possible increase in the amount of methane and nitrous oxide in mid- and deep water, as well as issues pertaining to verification, risks, political acceptability, governance and costs. Ocean fertilization is thus considered to have high leverage effects. Yet, the Paris agreement, while noting in its preamble the 'importance of ensuring the integrity of all ecosystems, including oceans (...)', calls, in Article 4, States to 'achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century'. This means that the international legal climate regime leaves the door open to the use of climate geoengineering as a negative emissions technology.

This brief overview of the normative framework on ocean geoengineering provides further evidence of the fragmented nature of international environmental governance. Each island of governance appears to function autonomously, but also exclusively of other islands, seemingly resulting in normative inconsistency. However, as previous studies have already

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<sup>11</sup> Bastien Alex, 2014, « Géo-ingénierie marine. Des risques climatiques aux risques géopolitiques », (2014), 3(95) RIS, 135.

demonstrated<sup>12</sup>, the apparent institutional fragmentation of international law conceals circulations of actors and scientific and legal norms that contribute to giving international environmental law consistency and to ‘defragmenting’ it. Concerning ocean fertilization, a genuine circulation of actors and scientific research between international arenas can be observed. For instance, in 2009, when the IMO started working on ocean fertilization, the study by the secretariat of the CBD and the UNESCO/COI document entitled ‘Ocean Fertilization’ were both examined. Cooperation between the IMO, the CBD and UNESCO is still underway in this field. Likewise, the secretariat of the UNFCCC has been cooperating with the IMO on this matter since 1999 (IMO, Report of the Twenty-Second Meeting of the Scientific Group, 10-14 May 1999, LC/SG 22/13). However, the legal regimes on climate and marine environmental law have very different positions on geoengineering. While the climate regime is somewhat open to the use of these technologies, those aimed at protecting the marine environment and biodiversity adopt a more cautious stance. This causes tension between the sites of governance of international environmental law, with concerns that what is being constructed in one arena may be deconstructed in another. To consider the ways in which international environmental law’s approach to geoengineering may achieve more consistency, this paper will first briefly outline the lessons of the inclusion of climate geoengineering on the international agenda for international law (1). It will then suggest a few avenues for an international-level legal approach to ocean geoengineering by examining both climate law and marine environmental law (2).

## II. INTERNATIONAL MARINE ENVIRONMENTAL LAW AND THE PROPOSALS OF RECOURSE TO CLIMATE GEOENGINEERING

In the following, two approaches to the significance of the emergence of geoengineering on the international agenda for international law are outlined. The first is a somewhat critical approach to international environmental law and answers the question ‘Why?’. Why is geoengineering on the agenda of international marine environmental law (a.)? The second is a more reflexive approach, which calls for investigating the way in which international marine environmental law has tackled climate geoengineering and answers the question ‘How?’ How does international marine environmental law frame climate geoengineering practices (b.)?

### 1. THE REASONS FOR THE INCLUSION OF CLIMATE GEOENGINEERING ON THE AGENDA OF INTERNATIONAL MARINE ENVIRONMENTAL LAW

The first question ‘Why is geoengineering on the agenda of international environmental law?’ has already been addressed in terms of legal doctrine, particularly from the perspective of climate law, as I will briefly recount. However, it has elicited less attention from the perspective of international marine environmental law.

For international climate law, the recourse to geoengineering is the result of a failure and a double abdication. It is, first, the result of the failure of multilateralism. Due to the combination of bogged down climate negotiations and weak state commitments, responsibility for action has tended to be passed down from the states to the private spheres.<sup>13</sup> The Paris Agreement is in that sense a case in point of the struggles of multilateralism. While pundits

<sup>12</sup> Sandrine Maljean-Dubois (Dir.), *Circulations de normes et réseaux d’acteurs dans la gouvernance internationale de l’environnement*, (Aix-en-Provence, collection Confluence des droits, 2016) available at: [https://dice.univ-amu.fr/sites/dice.univ-amu.fr/files/public/ouvrage\\_circulex\\_2017.pdf](https://dice.univ-amu.fr/sites/dice.univ-amu.fr/files/public/ouvrage_circulex_2017.pdf)

<sup>13</sup> Marie-Pierre Blin-Franchomme, 2017, « Quel rôle pour l’entreprise après l’Accord de Paris ? », (2017), RJE 119.

welcomed the fact that there was an agreement at all, it is worth recalling that no quantified greenhouse gas emission reduction objectives were set, and that the agreement relies on voluntary state commitments. Multilateralism has therefore been sidelined in favor of unilateralism, which remains unconvincing itself. The step toward geoengineering made in Article 4 of the Agreement is for instance strong evidence of a shift from negotiated law to a law imposed by industrialists. The inclusion of geoengineering on the international agenda is also the symptom of a abdication. Whereas ideally climate geoengineering should be considered as a last-ditch solution, it seems to be increasingly prevailing as the only solution, to the detriment of an actual effort by states to reduce their emissions. The first form of abdication is the shift away from the very spirit of the climate regime, whose objective was to ‘allow ecosystems to adapt naturally to climate change’ (United Nations Framework Convention on Climate Change, Article 2). Ocean fertilization, while it ostensibly reinforces a natural phenomenon – the biological carbon pump in oceans – remains an artificial technology for reducing greenhouse gas emissions. Such ‘corrective geoengineering’ blurs the ‘boundary between the Natural and the Artificial’.<sup>14</sup> Ecosystems are now expected to adjust to climate change artificially. As I noted in the introduction, the philosophy underlying current international climate governance does not consist in preventing greenhouse gas emissions, but in correcting the situation through geoengineering. The response no longer occurs preventively, but rather after environmental damage has occurred. The second form of abdication reflected by the recourse to geoengineering has consisted in giving up efforts to define acceptable risk under the climate regime. Nobody is denying that geoengineering poses risks, but the negotiators of the climate legal regime, by abstaining from taking a firm stance on the question, have effectively refused to settle the question of whether the environmental risks of geoengineering are acceptable. The climate regime has not subjected geoengineering to a benefit-risk approach, and has effectively left the question to be addressed by other international environmental governance bodies, whose assessment of benefits and risks will be very different.

For international marine environmental law, the inclusion of geoengineering on the IMO’s agenda cemented that organization’s role as a network leader of sorts in the international management of the relations between oceans and climate change and its ties with the other concerned international bodies. Geoengineering is ultimately a characteristic example of the relationship of the international climate regime to ocean management. Indeed, regarding the reduction of maritime greenhouse gas emissions, the Kyoto Protocol had already delegated authority to the IMO, effectively taking oceans out of the legal climate regime.<sup>15</sup> It is therefore not surprising that the IMO has taken over on the question of ocean climate geoengineering, especially as meanwhile, the NGOs have failed to have oceans taken into consideration in climate negotiations. Additionally, the IMO, which already had close ties with the UNCCC, has merely been continuing its dialogue with the climate regime on the question of geoengineering – part of a broader regime complex here, since there have also been numerous exchanges with the CBD on this matter. Lastly, the IMO’s role as a network leader has also been supported by the United Nations General Assembly, which in its Resolution 63/111 of 2009, welcomed the positions adopted by the two international organizations (UNGA Resolution 63/111; §115 and 116). From an institutional standpoint, it appears that the legal

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<sup>14</sup> Our translation. Amy Dahan et Mieke Van Hemert, « Gouverner la recherche en géoingénierie et/ou gouverner le déploiement des techniques : comment définir des limites ? », (Colloque du Comets, 8 Janvier 2014) available at: [http://www.cnrs.fr/comets/IMG/pdf/gouverner\\_la\\_recherche\\_en\\_gei\\_oing.2014\\_.pdf](http://www.cnrs.fr/comets/IMG/pdf/gouverner_la_recherche_en_gei_oing.2014_.pdf)

<sup>15</sup> Sophie Gambardella, « La stratégie de réduction des émissions maritimes internationales de gaz à effet de serre après l’Accord de Paris », RJE, (2017), 201.

framing of ocean climate geoengineering falls to the ‘regime complex’ of international marine environmental law.<sup>16</sup> How do these regimes approach geoengineering?

## 2. THE INTERNATIONAL MARINE ENVIRONMENTAL LAW APPROACH THROUGH THE LENS OF THE PRECAUTIONARY PRINCIPLE

When we consider the question of ‘how’, we appear to be dealing with a completely reversed equation from the ‘why’ angle. It may seem that causes are to be found in the climate regime, and solutions in the international marine environmental law. In practice, the equation is arguably more complex. Comparative analysis of the two regimes suggests that a variable-geometry precautionary principle is applied.

The 2005 IPCC special report and the 2017 UNEP report are both cautious about geoengineering. While they do emphasize the possible risks of resorting to these practices, these reports encourage states to conduct further research in the field, and crucially, they do not call for a ban on the large-scale use of these practices. While all the climatologists involved in the reports, including those of the ICPP, do not appear to fully embrace these technologies, the Conference of the Parties that gave way to the Paris Agreement has been less reluctant about the possibility of resorting to geoengineering. Considering that scientists point to uncertainties surrounding the use of geoengineering and by extension environmental risks while the policy-makers who adopted the Paris Agreement by consensus ignore these uncertainties, we might ask ourselves how these policy-makers implement the precautionary principle to achieve such a consensus. Within the framework of the climate regime, the precautionary principle actually appears not to be applied to geoengineering. Indeed, the scientific uncertainties that tend to trigger the implementation of the precautionary principle in this regime are those pertaining to the very consequences of climate change, beginning with the 2° average temperature increase from pre-industrial levels. Thus, the precautionary principle requires policy-makers to take all measures necessary to prevent this temperature increase, including geoengineering. Here, the application of the precautionary principle relates to the lack of certainty as to the consequences of climate change, as opposed to the additional risk that the use of geoengineering might pose – an additional risk that would also require the adoption of preventive measures.

Conversely, in international marine environmental law, the precautionary principle is applied to curb the additional environmental risk posed by geoengineering. The moratorium on the large-scale use of ocean fertilization technologies and related commercial activities is based on the precautionary principle. Uncertainties as to the effect of large-scale recourse to geoengineering on marine diversity and the risk of irreversible damage to the marine environment have indeed led policy-makers within the IMO and the CBD to prohibit the large-scale use of these practices as a precautionary measure. On the other hand, small-scale research activities are allowed. The distinguishing criterion that applies, then, is spatial scale. While cross-territorial geoengineering experiments are prohibited, those performed on the territorial scale as well as confined experiments are allowed by international environmental law. Climate geoengineering is thus approached very differently by law depending on the body that produces this law. Stakeholders and goals differ in all international organizations. Whereas in international climate law, geoengineering has been perceived as a liberating development, in international environmental law, it is considered as potentially harmful for the marine environment. In its Decision IX/16, adopted in 2008, the Conference of Parties to the CBD requests that ‘ocean fertilization activities [...] not take place until there is an adequate scientific

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<sup>16</sup> Kal Raustalia, David G. Victor, (2004), « The Regime Complex for Plant Genetic Resources », (2004) 58(2) International Organization, 277.

basis on which to justify such activities, including assessing associated risks, and a global, transparent and effective control and regulatory mechanism is in place for these activities'. How such a regulatory mechanism can be set up on the international level remains to be seen.

### **III. LEGALLY DESIRABLE INTERNATIONAL MARINE ENVIRONMENTAL LAW RESPONSES TO PROPOSED USES OF CLIMATE GEOENGINEERING**

Although the IMO has largely taken up the topic of ocean fertilization, whether it is pertinent to entrust this organization with authority on the matter remains an open question considering its institutional limitations (a). Other international organizations, such as the Conference of the Parties to the CBD, have also been addressing ocean climate geoengineering, which raises the question of the nature of the relation between the resulting different norms to achieve consistency in international environment law (b).

#### **1. OVERCOMING THE INSTITUTIONAL LIMITATIONS OF INTERNATIONAL MARINE ENVIRONMENTAL GOVERNANCE**

The voluntarist character of international law remains a major obstacle to the adoption of binding legislation, considering the considerable stakes in play. Yet, the toolbox of international law already contains a vast array of tools to legally frame future developments using existing texts, if we prove able to use them accordingly.

Within the IMO, the management of ocean fertilization comes up against a major structural issue. The legal framework of marine geoengineering was defined within the organization by amendments to the 1972 Protocol to the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter. However, the Protocol was only ratified by fifty state parties, and only three state parties adopted the 2013 amendment: the United Kingdom (2016); Finland (2017); and the Netherlands (2018). As a result, the amendment to the Protocol, which includes Annex 4 on ocean fertilization, has not entered into force – this would require adoption by two thirds of the contracting parties. A legal framework exists, but so far it has no binding power and mass ratification of the 2013 amendments remains an unlikely prospect. Likewise, the decisions adopted by the Conference of the Parties to the CBD have no binding force; they are considered as recommendations. Still, they remain legal acts that trigger strong reactions by states in cases of non-compliance. For instance, in 2012, when Canada turned a blind eye to Russ George's large-scale fertilization experiment in the Pacific, the state parties to the CBD immediately reacted during the eleventh Conference of the Parties in Hyderabad, India. All states strongly condemned Canada's attitude and the fact that the experiment took place despite the moratorium. However, the adoption of a binding legal framework for the regulation of these activities remains quite unlikely, especially considering that many states would like the moratorium on ocean fertilization to be relaxed. In light of this institutional deadlock, what are the solutions offered by international marine environmental law to frame these practices?

While the 1982 United Nations Convention on the Law of the Sea does not include the term 'geoengineering', its Article 1§4 defines pollution of the marine environment as 'the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health [...]'. Ocean fertilization undeniably falls within the scope of the Convention, whose Article 196 stipulates: 'States shall take all measures necessary to prevent, reduce and control pollution of the marine environment



resulting from the use of technologies under their jurisdiction or control, or the intentional or accidental introduction of species, alien or new, to a particular part of the marine environment, which may cause significant and harmful changes thereto'. Were this to be applied strictly, states might be expected to impose a ban on geoengineering. However, the obligation established by Article 196 is only an obligation of means, which calls on states to monitor activities that might result in pollution of the marine environment – a requirement far lower than those a moratorium. Still, this Article sets an obligation of due diligence, for the states, under the definition given by the International Tribunal for the Law of the Sea in its Advisory Opinion of 1 February 2011 on the responsibilities of obligations of states sponsoring persons and entities with respect to activities in the Area. Thus, in the event of pollution of the marine environment caused by a geoengineering activity, state responsibility might be engaged if the state failed to take all necessary measures to avoid pollution in light of all available scientific knowledge. This is cold comfort considering that the implementation of existing law can only be triggered in the case of an effective pollution of the marine environment.

The current state of international marine environmental law ultimately yields a paradox. On the one hand, the climate emergency makes ocean climate geoengineering an increasingly viable option for some policy-makers despite the alarming state of marine biodiversity. On the other, international environmental law has made unsuccessful attempts at enforcing the precautionary principle to delay recourse to these technologies, which could further damage the marine environment. Might it still be possible to reconcile these approaches and achieve consistency between the different areas of international law?

## 2. IMPROVING THE CONSISTENCY OF LEGAL FRAMEWORKS ON OCEAN GEOENGINEERING

The interrelationship of international law regimes is a somewhat classic conundrum, which undoubtedly reflects the institutional and material fragmentation of this law. In 2013, the International Law Commission (ILC) decided to include the topic 'Protection of the Atmosphere' in its program of work. Since then, four reports have been submitted (the latest in 2017), leading to the adoption of several sets of draft guidelines. Upon reviewing the fourth report on the protection of the atmosphere by the Special Rapporteur during its sixty-ninth session (2017), the ILC provisionally adopted draft guidelines on the relations between relevant rules, providing avenues for conceiving the interaction of the legal regimes framing geoengineering or expected to be framing it. The report analyzes the interrelationship between the international law on the protection of the atmosphere and other relevant international laws, such as trade, investment, the sea, and human rights.

According to draft guideline 7, which is directly relevant to geoengineering, 'activities aimed at intentional large-scale modification of the atmosphere should be conducted with prudence and caution, subject to any applicable rules of international law.' This means that the precautionary principle should apply to the establishment of a legal framework on large-scale geoengineering, in accordance with IMO and CBD practices. The draft guidelines also acknowledge the close interaction between climate and oceans, as well as the need to connect climate law with the law of the sea. Draft guideline 9 on the interrelationship between relevant rules defines the relations between international law rules on the protection of the atmosphere and other relevant international law rules. The report recommends extending the World Trade Organization's mutual supportiveness principle to other areas of international law, including the relationships between the law of the sea and climate law. This principle would be applied to orchestrate the fragmentation of international law so as to achieve a consistent whole. The

implementation of mutual supportiveness principle could be for instance embodied by the creation of a Committee on Climate and Oceans, mirroring the WTO's Committee on Trade and Environment, to coordinate policies on climate and oceans. This committee, whose composition would be hybrid, would act as an interface between climate law and marine environmental law. While the report submitted to the ILC appears relevant to the current context, the responses of states to the report have reflected existing political obstructions to improved consistency of international law.

South Korea, Cuba, Tonga, Chile, Indonesia, Malaysia, Thailand, New Zealand and Senegal have always supported the inclusion of the protection of the atmosphere on the ILC's agenda. These states were therefore satisfied with the mention of the close interaction between the atmosphere and the oceans in the preamble of draft guideline 9. On the other hand, the United States, France and the United Kingdom have been much more skeptical about these efforts. The US has even gone so far as to call on the Committee to cease its work on the protection of the atmosphere. France, for its part, has contended that that the ILC should proceed with much more caution on the topic. To Greece, the Czech Republic and Slovakia, matters pertaining to the law of the sea have no place in a set of directives on the protection of the atmosphere. These strong stances by states reveal a salient aspect of contemporary international law. States refuse to acknowledge the evident, scientifically established link between climate and the oceans. This denial actually reflects their eagerness to keep on making international law increasingly fragmented so that political negotiations take place in isolation in each international body. The question of whether an international body has legitimacy in addressing geoengineering is regularly raised by states in a bid to avoid regulation. For instance, during the 2012 Conference of the Parties, Latin American and Caribbean states challenged the CBD's legitimacy to serve as the framework for the consideration of a geoengineering regulation mechanism. As proposed above, setting up a Committee on Climate and Oceans, composed of the secretariats and scientific bodies of all the international organizations with a stake in the topic and representatives of the stakeholders, would effectively decompartmentalize international organizations and reduce the influence of political games in the negotiations. It would also make the question of which international organization should conceive a legal framework for geoengineering a moot point. How such a Committee could be brought to existence remains to be established, however.

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This examination of international legal approaches to ocean climate geoengineering has ultimately brought the ills of international law to the forefront. International law has been marred by the defiance of state actors, whose relationships to it have always been characterized by ups and downs, leading to a succession of periods of normative proliferation and strong decline of multilateralism. At this point, however, these political stalemates could have disastrous environmental consequences due to the emergency situation in which we find ourselves, 'on the edge of irreversibility'.<sup>17</sup> Despite ever more alarming reports, states refuse to take immediate action. Boggled down by economic models that are incompatible with the urgency of the environmental crisis, state actors appear to be at best stalling and at worst simply recklessly counting on the technological gambit of geoengineering. After the era of prevention, we have entered the era of correction. At the time of writing, nothing indicates that geoengineering will not be the expected miracle cure, but nothing assures us that it will not be

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<sup>17</sup> Francis Chateauraynaud, Joachim Debaz, *Au bord de l'irréversible. Sociologie pragmatique des transformations*, (Editions Petra, coll. Pragmatismes, 2017).

the cause of an even worse outcome than inaction. Humanity appears to be moving increasingly vertiginously towards the maximization of risk.