Chapter 10

International Legal Challenges Concerning Marine Scientific Research in the Era of Climate Change

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I Introduction: Climate Engineering and International Law

In recent years, “climate engineering” (CE), or, alternatively, “geoengineering,” collective terms referring to large-scale technical interventions into the Earth’s climate system, have attracted widespread attention. Technologies covered by this concept aim at contributing to the fulfillment of the ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC) of May 9, 1992 to “achieve […] stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”. The debate on these technologies initially originated from the field of natural sciences, but has increasingly been taken up by State governments, international organizations and non-governmental organizations (NGOs). It was fostered by the failure of the community of States to agree on stricter and globally applicable emission reduction standards following the expiration of the commitment period of the 1997 Kyoto Protocol on December 31, 2012. As is well-known, the 17th Conference of the Parties (COP) to the UNFCCC held in Durban in 2011 could only agree on an interim continuation of the Kyoto Protocol of those State parties continuously willing to be bound by its terms, and, on a mandate for negotiating the terms of a comprehensive post-Kyoto treaty until 2015 that will become globally effective by 2020. This delay is frequently held to jeopardize the two degree Celsius target referred to by the Copenhagen Accord.

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1 1771 U.N.T.S. 107.
2 Id., Article 2.
According to a preliminary definition provided by the parties to the Convention on Biological Diversity of June 5, 1992 (CBD), geoengineering comprises "technologies that deliberately reduce solar insolation or increase carbon sequestration from the atmosphere on a large scale that may affect biodiversity (excluding carbon capture and storage from fossil fuels when it captures carbon dioxide before it is released into the atmosphere). This concept thus covers two categories of manipulation of the global climate system: (1) through interventions in the global carbon cycle (e.g., carbon dioxide removal—CDR), and (2) by shielding solar radiation (e.g., solar radiation management—SRM). Concerning marine climate engineering, most of the technologies that are presently debated aim at an increase of oceanic carbon uptake in upper seawater layers. This could be done (1) by fertilizing the water with iron to stimulate algal growth and intensify the biological carbon pump in areas of the ocean where algal growth is limited due to a lack of nutrients or trace elements such as nitrate or iron (ocean iron fertilization), (2) by way of dissolution of calcium-containing material (e.g., silicates and limestone), or through electrolytic removal of hydrochloric acid in special water treatment facilities (increasing ocean alkalinity), or (3) by the deployment of flap-valve operated ocean pipes that pump up cold deep seawater into less fertile waters at the surface (ocean upwelling). All of these CE methods intervene in the global carbon cycle and are thus qualified as CDR technologies.

In contrast, another marine CE technology presently discussed, the modification of marine stratus clouds, is to be attributed to the category of SRM, as it aims at shielding solar radiation. According to this technology, sea salt particles are emitted by unmanned ships in order to increase aerosol salt concentrations as a means of changing the albedo in marine boundary layer clouds. It has been estimated that a global total of 23 m³ of seawater per second would have to be atomized to achieve the desired effect of increasing the backscattering of shortwave radiation. Against this background, large fleets of ships

5 1760 U.N.T.S. 143.
6 The definition is contained in a footnote to Decision X/33 on Biological Diversity and Climate Change adopted by the 10th Conference of the Parties (COP) to the CBD, available at http://www.cbd.int决策/cop/?id=12299.
7 A detailed assessment of the scientific background and prospects of feasibility of these technologies is provided by Wilfried Rickels et al., Large-Scale Intentional Interventions into the Climate System? Assessing the Climate Engineering Debate (Kiel, 2011), 39–49. The study is available at http://www.kiel-earth-institute.de/scoping-report-climate-engineering.html.