

# Currents and Oceanic Geographies of Japan's Unending Frontier

JONAS RÜEGG

## ABSTRACT

Pacific islands such as Japan are often unduly represented as isolated places. Land-centric biases in fact obscure the ocean's significance as an ecological connector and a catalyst of historical change. With prolific upwellings, seasonal winds, and fluctuating fishing grounds, the ocean consists of places and depths that attracted human interest at different times. An archipelago awash in nutrient-rich currents, Japan found itself amidst a contested frontier when international whalers in the 1820s ushered in competition over resources, islands, and dominion. To understand technology-driven expansion in its ecological dimension, historians need to adopt a *volumetric* understanding of the ocean. Analysing this process based on currents, migration routes and catchment areas brings transformations to the fore that are otherwise left out of context. It also helps dissect the economic and ideological structures that keep expanding resource frontiers vertically in the 21st century, towards ever-deeper deposits of fossil fuels and rare earth minerals.

**Key words:** Environmental history, oceanic history, spatial history, frontier studies, pelagic empire, whaling

A booming groan ran through the schooner *Kimizawa Number One* when a violent gust tore down its second mast, almost inclining the vessel to the point of capsizing. On that spring day of 1859, the crew of the first Western-style schooner of Japanese making escaped death by a hair's breadth. Nakahama Manjirō, captain at the order of the Tokugawa shogunate (1600–1868),<sup>1</sup> and his crew of coastal fishermen

**Jonas Rüegg** – Department of East Asian Languages and Civilizations, Harvard University, Cambridge, MA, USA. Email: [jonasruegg@g.harvard.edu](mailto:jonasruegg@g.harvard.edu)

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<sup>1</sup> Until the founding of a unitary state in the Meiji reform of 1868, Japan represented a patchwork of hereditary clan lands with the *shogun* or 'generalissimo' of the house Tokugawa in Edo (Tokyo) at the

had spent weeks jolted around by the waves of an unmapped sea in the attempt to explore a new and completely unfamiliar maritime territory just off their home shores. A few days earlier, Manjirō reported, the sailors had made landfall on an uncharted island where ‘a great number of people could be relocated and thrive for sure’.<sup>2</sup> Confident they would soon approach the famed whale ground around the Bonin Islands, some 1,000 km south of Japan, the men ‘steered farther onto the vast ocean where no object crossed their view but water and sky’.<sup>3</sup> The whims of the ocean that violently curtailed their daring venture into the maritime wilderness proved to the explorers that taming the Pacific required much broader appropriation of methods and technologies from those whalers who had come from half a globe away to turn the formerly ‘empty’ sea into a churning frontier.

The whaling boom of the 1820s had led ever more whalers to sail from their Atlantic harbours to the prolific Kuroshio current in the western Pacific, forcing Japan to reorient itself in what had suddenly become a contested frontier sea.<sup>4</sup> The shogunate, whose fisheries and shipping lanes hugged the shoreline, reacted initially with stepped-up seclusion policies. Since 1800, the shogunate had funded attempts to start whaling in Ezo (Hokkaido) to demarcate its territory against Russian incursions, and in the northeast, similar attempts were started when foreign traffic off the coasts became a constant source of concern in the 1820s.<sup>5</sup> Once the first Western whalers had reached the so-called ‘Japan Ground’, the number of Euro-American whale ships plying the Pacific grew fast, reaching 700 vessels in the 1840s that carried some 20,000 sailors across the seas at any given time.<sup>6</sup> In 1851, Herman Melville predicted that ‘if that double-bolted land, Japan, is ever to become hospitable, it is the whale-ship alone to whom the credit will be due; for already she is on the threshold’.<sup>7</sup> By mid-century, it had become clear to Japanese leaders as well that they were already caught up in an international competition over noticeably declining whale

apex, who directly controlled around one-third of the archipelago’s agrarian lands. As is common in the Japanese language, I introduce Japanese actors in the order family name–first name.

<sup>2</sup> *Ichiban kimisawa-gata o-fune kifu ni tsuki ...*, manuscript report by Nakahama Manjirō, dated 1859, in Egawa Family Papers, Egawa Mansion, Izunokuni City, acc. no. N101-20, 6, 8.

<sup>3</sup> *Ibid.*, 5, 7.

<sup>4</sup> As Kären Wigen’s forthcoming piece shows, the appearance of foreign vessels, depicted along with sea lanes and distance indications on Japanese world maps of the 1840s, illustrates a growing unease about foreigners that cruised in Japan’s vicinity. See Kären Wigen, ‘Picturing the Pacific: Seas on Japanese Maps 1600–1900’, in *Oceanic Japan*, ed. Nadin Heé, Stefan Huebner, Ian Miller, and Bill Tsutsui (Honolulu: University of Hawai‘i Press, 2022, forthcoming). (Early citation kindly granted by the author.)

<sup>5</sup> Jakobina K. Arch, *Bringing Whales Ashore: Oceans and the Environment of Early Modern Japan* (Seattle: University of Washington Press, 2018), 185–6. On whaling attempts in northeastern Japan, see Fynn Holm, ‘Living with the Gods of the Sea: Anti-Whaling Movements in Northeast Japan, 1600–1912’ (PhD diss., University of Zürich, 2020), 109–15.

<sup>6</sup> John R. McNeill, ‘Of Rats and Men: A Synoptic Environmental History of the Island Pacific’, *Journal of World History* 5, no. 2 (1994): 321.

<sup>7</sup> Herman Melville, *Moby-Dick* (New York: Bantam Classic, 2003 [1851]), 125.

stocks and security interests in the frontier.<sup>8</sup> As magistrate Egawa Tarōzaemon warned the shogunate:

95 The foreigners cruise Japan's seas without distinction between what  
is theirs and what belongs to others, and devour our national benefit  
(*kokueki*) in front of our eyes ... We should not lose a single day but  
learn the foreigners' methods and see whether we can start this  
business. I need not mention that this ... should be helpful to train  
[our men in] navigational skills and to keep away the hordes of  
100 foreign whalers.<sup>9</sup>

105 The shogunate's subsequent pivot to the Pacific, involving costly naval projects and a  
colonial venture to the Bonin Islands, set the stage for the expansionist thrust that  
would soon give rise to Japan's modern empire. Before century's end, Japan had  
gained control over a vast maritime territory, studded by minute colonies on formerly  
uninhabitable isles. As Catherine Phipps remarks, 'Japan holds a unique position in  
world history in that it added to its territorial holdings while its sovereignty was com-  
promised through asymmetrical treaties'.<sup>10</sup> Transcending the downfall of the Toku-  
gawa shogunate (1600–1868) and the collapse of Japan's modern empire (1945),  
110 Japan's vying for formal and informal influence over a vaguely defined maritime  
sphere of control and extraction expanded the archipelago's ecological resource  
base steadily over the course of two centuries.

115 I argue that studying this space of sea and islands – which I call the *Kuroshio  
Frontier*, after the abundant Kuroshio current that attracted whales and whalers to the  
region – reveals the ever-changing oceanic environment as a catalyst for Japan's  
radical geopolitical reorientation in the 19th century. The spatial development of  
marine industries shows that in order to analyse oceanic expansion in its ecological  
dimension, it is important to embrace a *volumetric* view of the ocean. Characterized  
by a fluid geography of prolific upwellings, seasonal winds, fluctuating currents,  
and migrating species, the ocean consists of a multitude of specific places that  
120 attracted human interest at different times. The expansion of the *pelagic empire* of Japa-  
nese fisheries that William Tsutsui identifies as stretching in the 1930s 'from the

125 <sup>8</sup> On whale produce markets and the impact of falling whale catch, see Arch, *Bringing Whales Ashore*,  
59–66, 101–3; Jakobina Arch, 'Whale Oil Pesticide: Natural History, Animal Resources, and Agri-  
culture in Early Modern Japan', in *New Perspectives on the History of Life Sciences and Agriculture*, ed.  
Denise Phillips and Sharon Kingsland (Cham: Springer, 2015), 104. Arne Kalland's study of Toku-  
gawa period fishing villages describes the commercial mechanisms that expanded the scope of  
trade in marine produce far beyond the markets that fishermen could reach directly. See Arne  
Kalland, *Fishing Villages in Tokugawa, Japan* (Honolulu: University of Hawai'i Press, 1995), 198–  
130 210. Note that not all marine products are perishable, for example, dried seaweed, fertilizers, or  
tools produced from whale bones and strings.

<sup>9</sup> *Kujira ryō goyō todome*, in Egawa Family Papers, acc. no. S 続 0008.

135 <sup>10</sup> Catherine Phipps, 'Sovereignty at Water's Edge: Japan's Opening as Coastal Encounter', in *A  
World at Sea*, ed. Lauren Benton and Nathan Perl-Rosenthal (Philadelphia: University of Pennsyl-  
vania Press, 2020), 149.

Bering Sea to the Antarctic and along the coastlines of virtually every Asian country, from the pearl beds off of Darwin, Australia, to the trawling grounds of the Gulf of California', in fact began with the gradual enlargement of the archipelago's marine catchment area in the 19th century.<sup>11</sup> As a source of protein, cash commodities, and ideological orientation, 'Japan's Pacific' has never been limited to the empire's formal boundaries, but expanded further with technological change, industrial policy, and ideological momentum, along currents and animal migration routes towards more remote ecosystems. Accordingly, an ecological perspective on this unending competition over a global commons complicates the political periodization of the empire's expansion and collapse, as the race keeps accelerating in the 21st century. Today, the Japanese government and corporations have joined forces to expand their frontier towards deeper and more remote deposits of fossil fuels and rare minerals, while a shifting focus from animate to inanimate resources inspires attempts to redefine the country's claims to a maritime jurisdiction 12 times as large as its landmass.<sup>12</sup>

### CENTRING THE OCEAN PROPER

Redefining frontier space in terms of oceanic ecosystems or catchment areas, along animal migration and material circulation routes, and taking into consideration the ocean's fluid, tridimensional capacity, is a way to overcome ahistorical units of analysis imposed by political geographies. Centring oceanic geographies helps to bring to the fore ecological transformations that are otherwise left out of context. Epeli Hau'ofa criticized the terracentric bias of imperial cartographies that belittle Pacific islands, instead suggesting that we speak of Oceania as a 'sea of islands' that accounts for the region's connectedness and expanse.<sup>13</sup> In Japan, conversely, an exceptionalist myth still holds that the country, allegedly isolated and poor in natural resources, developed a harmonious rapport with the natural environment.<sup>14</sup> As with Hau'ofa's Oceania, however, it is important to notice that Japan is not an *island* limited to a confined terrestrial world, but rather, an *archipelago* awash in the Pacific, with currents supplying nutrients not only through seafood, but also in the

<sup>11</sup> William Tsutsui, 'The Pelagic Empire: Reconsidering Japanese Expansion', in *Japan at Nature's Edge*, ed. Ian J. Miller, Brett Walker, and Julia Adeney Thomas (Honolulu: University of Hawai'i Press, 2013), 31.

<sup>12</sup> Japan Coast Guard, 'Nihon no ryōkai nado gainenzu', Hydrographic and Oceanographic Department, [https://www1.kaiho.mlit.go.jp/JODC/ryokai/ryokai\\_setsuzoku.html](https://www1.kaiho.mlit.go.jp/JODC/ryokai/ryokai_setsuzoku.html) (accessed 30 Oct. 2020).

<sup>13</sup> Epeli Hau'ofa, 'Our Sea of Islands', *The Contemporary Pacific* 6, no. 1 (1994): 153.

<sup>14</sup> Attempts to explain the 'national character' of the Japanese culminated with Watsuji Tetsurō's *Climate and Culture* in the 1930s, but essentialist representations experienced a comeback during the bubble economy of the 1980s. See Watsuji Tetsurō, *Climate and Culture: A Philosophical Study* (New York: Greenwood Press, 1961).

form of fertilizers processed out of seaweed, fishmeal or whale bones.<sup>15</sup> Unsurprisingly, the archipelago's growing early modern economy boasting some of the largest cities in the world left a profound imprint on maritime ecosystems as its catchment area expanded into the migration routes of pelagic fishes and whales (see Figure 1).<sup>16</sup>

Japanese whaling businesses operated out of shore bases, chasing their prey with fleets counting dozens of rowing boats, often orchestrated with flag or smoke signs from a lookout on a high promontory.<sup>17</sup> Japan's inland whaling grounds by the late 17th century declined to the point that local whalers went out of business while new enterprises sprawled along the archipelago's southern and western fringes.<sup>18</sup> Looked at in isolation, the retreat of whales from shallower bays in the 17th century appears as a local effect of growing consumption, but seen in the big picture, it tells of anthropogenic change at an international scale. As Ōtsuki Heisen observed in his *Historia of Whales* of 1808, 'in the oceans, there seem to be paths along which whales migrate ... Since the whales of Tshushima, like those of Iki and Ikitsuki, migrate to the sea of Manchuria, they must be of the same [stock] as those in Korea'.<sup>19</sup> Though he may not have thought of this as a resource competition, Heisen understood the ocean to be a border-crossing system that humans harvested

<sup>15</sup> The idea of pristine environments or completely sustainable premodern economies has been complicated by environmental historians since William Cronon's 'The Trouble with Wilderness; Or, Getting Back to the Wrong Nature', *Environmental History* 1, no. 1 (1996): 7–28. Though myths of total isolation and ecological harmony in isolation have been corrected in the aftermath of Ronald Toby's works, insular views of Japan die hard. See Ronald P. Toby, *State and Diplomacy in Early Modern Japan: Asia in the Development of the Tokugawa Bakufu* (Princeton: Princeton University Press, 1984). For more recent contributions that reveal the true scale of Tokugawa Japan's commercial and political entanglement with the Asia-Pacific, see Robert I. Hellyer, *Defining Engagement: Japan and Global Contexts, 1640–1868* (Cambridge, MA: Harvard University Asia Center, 2009); Xing Hang, 'The Shogun's Chinese Partners: The Alliance between Tokugawa Japan and the Zheng Family in Seventeenth-Century Maritime East Asia', *Journal of Asian Studies* 75, no. 1 (2016): 111–36. We shall see that in an ecological context, entanglement is not limited to formal commercial or political intercourse.

<sup>16</sup> Arch, *Bringing Whales Ashore*, 78. In fact, as archaeologists point out, even though few extinctions of marine animals have been conclusively related to human impact, fishing and coastal foraging had a demonstrable impact on marine ecosystems for tens of thousands of years. See Torben C. Rick and Jon M. Erlandson, *Human Impacts on Ancient Marine Ecosystems: A Global Perspective* (Berkeley: University of California Press, 2008), 12–13.

<sup>17</sup> Amino Yoshihiko, *Amino Yoshihiko chosakushū*, vol. 2 (Tokyo: Iwanami Shoten, 2007), 170.

<sup>18</sup> A detailed account of the business's development in the 17th century can be found in *Geishikō*, manuscript book by Ōtsuki Heisen, 1808, in National Diet Library, Tokyo, acc. no. 130–72, vol. 4, 25–8.

<sup>19</sup> *Ibid.*, vol. 4, 21. Ōtsuki Heisen, a cousin of the renowned physician Ōtsuki Gentaku, and headmaster of a Confucian school sponsored by the *daimyo* of Sendai, moreover propagated the expansion of whaling to untapped frontiers in the north and east, though with little success. See Terrence Jackson, *Network of Knowledge: Western Science and the Tokugawa Information Revolution* (Honolulu: University of Hawai'i Press, 2016), 37.



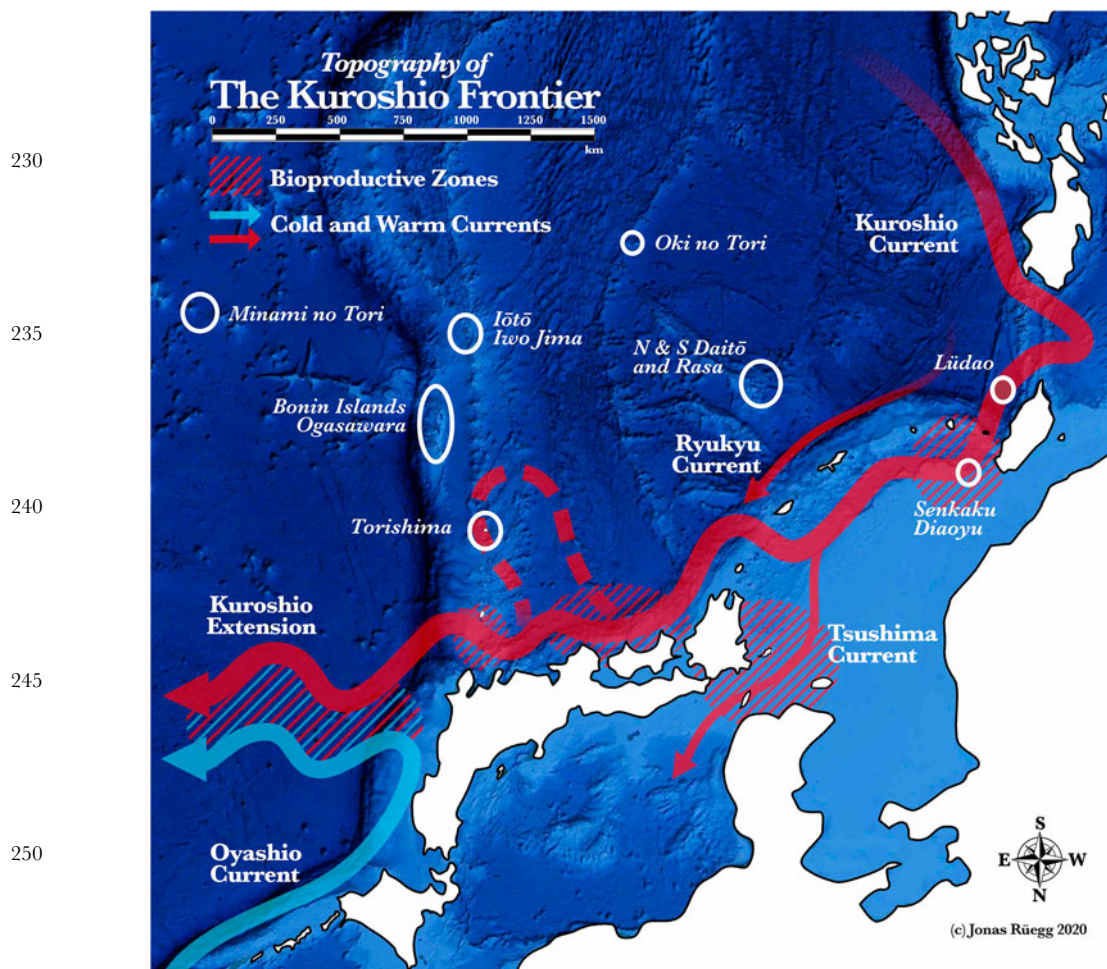


FIGURE 1: Upside-down? Bathymetric map of the Kuroshio Frontier, oriented with south at the top, showing major currents in their usual patterns. The warm and nutrient-rich Kuroshio current (red) creates a productive environment as it climbs over the continental shelf within the reach of sunlight. The current can shift its path over hundreds of kilometres within a few weeks, affecting the local climate and reshuffling the geography of fishing grounds (dotted line). Author's design, 2020.

over vast distances. With the onslaught of Atlantic whalers into the Kuroshio Frontier in the 1830s, catch rates along the Kuroshio and Tsushima currents shrank noticeably, a tendency that accelerated towards the mid-century.<sup>20</sup> Pacific and Atlantic whaling frontiers converged in the 1820s, when American whalers first reached the highly productive confluence zone between the Kuroshio Extension and the northerly Oyashio current east of Honshu, often mingling with Japanese fisherfolks that

<sup>20</sup> Arch, *Bringing Whales Ashore*, 71–3.

Q4 plied the same zones (see Figure 1).<sup>21</sup> The merging of global whaling frontiers ultimately turned into a scramble over resources that necessitated new definitions of sovereignty and national interest. The ideas crafted in the process informed Japan's subsequent mode of expansion, as we will see.

In recent years, 'oceanic history' has come to describe a field at the intersection of maritime and environmental history, interested in regions beyond Hau'ofa's Oceania.<sup>22</sup> As Ryan Tucker Jones has shown in this journal, expanding 'Oceania' as an analytical framework to encompass coastal peoples of the North Pacific helps to break up national divisions and connect local experiences with colonization, commercial expansion, and environmental change to the greater currents of Pacific history.<sup>23</sup> As opposed to the Braudelian and harbour-centric maritime histories brought to Asia-Pacific settings by economic historians such as François Gipouloux and Haneda Masashi, the focus of oceanic history is directed at human-environmental co-transformation at and beyond the rims of the human realm.<sup>24</sup> Jeffrey W. Bolster, criticizing the millennia-old idea that the ocean existed 'outside of time', describes the attractive power of still-abundant fish stocks for settlers in colonial New England, to show that the 'shifting baseline syndrome' of falling catch already accelerated the decline of marine fauna centuries ago.<sup>25</sup> Jones, likewise, complicates anthropocentric paradigms and calls for a 'new species of oceanic history', 'one attuned to the specificities of discrete locations

<sup>21</sup> 'Kuroshio Extension' describes the Kuroshio current after its passage over the Izu ridge in eastern Japan. On the open Pacific, the current's latitudinal position fluctuates around 35.5° N. See Bo Qiu and Shuiming Chen, 'Variability of the Kuroshio Extension Jet, Recirculation Gyre, and Mesoscale Eddies on Decadal Time Scales', *Journal of Physical Oceanography* 35, no. 11 (2005): 2095. In this 'mixed water region', the Oyashio current replenishes nutrients from the north Pacific, creating abundant fish and whale grounds east of Honshu. See Sakurai Yasunori, 'An Overview of the Oyashio Ecosystem', *Deep Sea Research Part II: Topical Studies in Oceanography* 54, no. 23 (2007): 2532–8. David Howell has shown that offshore encounters in this convergence zone triggered changes at the highest level to Japan's maritime policies. See David L. Howell, 'Foreign Encounters and Informal Diplomacy in Early Modern Japan', *Journal of Japanese Studies* 40, no. 2 (2014): 298.

<sup>22</sup> David Armitage, Alison Bashford and Sujit Sivasundaram, for example, speak of one 'world ocean' to understand the marine realm as a global commons in a truly trans-regional perspective. See David Armitage, Alison Bashford, and Sujit Sivasundaram, eds, *Oceanic Histories* (Cambridge: Cambridge University Press, 2018), 26.

<sup>23</sup> Ryan Tucker Jones, 'Kelp Highways, Siberian Girls in Maui, and Nuclear Walruses: The North Pacific in a Sea of Islands', *Journal of Pacific History* 49, no. 4 (2014): 373–95.

<sup>24</sup> Haneda Masashi and Oka Mihoko, eds, *A Maritime History of East Asia* (Kyoto: Kyoto University Press, 2019); François Gipouloux, *La Méditerranée asiatique: villes portuaires et réseaux marchands en Chine, au Japon et en Asie du sud-est, XVIe–XXIe siècle* (Paris: CNRS, 2009).

<sup>25</sup> The 'shifting baseline syndrome' describes the phenomenon that each generation takes the contemporary state of marine fauna, or a subtle generational decline, for granted, therefore overlooking the extreme decline over centuries. See Jeffrey W. Bolster, 'Putting the Ocean in Atlantic History: Maritime Communities and Marine Ecology in the Northwest Atlantic, 1500–1800', *American Historical Review* 113, no. 1 (2008): 33, 46–7.

in the ocean, both across horizontal space and through the water column'.<sup>26</sup> Beyond purely ecological transformations, Jones is interested in the 'ways in which marine animal and marine human communities are structured, how they change, and how they change each other'.<sup>27</sup> Like fisheries science in its early phase, oceanic history is faced with the danger of transporting terrestrial models into the ocean, failing to account for the historically and biologically specific behaviour of marine ecosystems.<sup>28</sup> Without falling to overly positivist trends, oceanic history needs to constitute itself as a field that pays close attention to the workings of the ocean as a world distinct from grasslands, forests, or deserts, yet affected by the same ideological precepts that inform human interventions.

The contingency of this human-environmental interaction is of particular significance. Bathsheba Demuth, likewise an advocate of Arctic perspectives on the Pacific, states that 'modern, growth-oriented states do not just change or provoke nature. They themselves function ecologically, sunk into and thus governed by the distributed agency of entire ecosystems'.<sup>29</sup> Human exceptionalism and the firm modernist belief in the planned engineerability of mechanical environments crumbles in view of the unpredictable environmental transformations witnessed by this new generation of historians. As Bruno Latour puts it, 'the Earth has now taken back all the characteristics of a full-fledged *actor*'.<sup>30</sup> In the accelerating and largely chaotic transformations of the earth system, oceans have gained power both as geological forces that revise coastal and oceanic geographies, and as carriers of accumulated energy released in violent storms.<sup>31</sup> Given these realizations, it will become imperative for scholars who study an oceanic region to pay heightened attention to the ocean proper as a source of historical change. One essential way of doing so is to expand Hau'ofa's 'sea of islands' by two crucial aspects: fluidity and geological time.

<sup>26</sup> Ryan Tucker Jones, 'Running into Whales: The History of the North Pacific from below the Waves', *American Historical Review* 118, no. 2 (2013): 352.

<sup>27</sup> *Ibid.*

<sup>28</sup> Agrarian analogies, just as much as the shallow historical focus of policy makers and resource managers – usually a few decades at best – misguide technocratic approaches to the ocean's crises. See Jennifer Hubbard, 'Mediating the North Atlantic Environment: Fisheries Biologists, Technology, and Marine Spaces', *Environmental History* 18, no. 1 (2013): 88–100; Rick and Erlandson, *Human Impacts on Ancient Marine Ecosystems*, 1–14.

<sup>29</sup> Bathsheba Demuth, 'The Walrus and the Bureaucrat: Energy, Ecology, and Making the State in the Russian and American Arctic, 1870–1950', *American Historical Review* 124, no. 2 (2019): 487.

<sup>30</sup> Bruno Latour, 'Agency at the Time of the Anthropocene', *New Literary History* 45, no. 1 (2014): 3, 5.

<sup>31</sup> Increased temperatures in the upper layers of the ocean cause more intense storms. While the number of tropical cyclones is expected to decrease overall, the particularly violent ones will strike more frequently. See Ove Hoegh-Guldberg et al., 'Impacts of 1.5°C of Global Warming on Natural and Human Systems', in *Global Warming of 1.5°C. An IPCC Special Report...*, ed. V. Masson-Delmotte et al. (IPCC, 2018), 178, 203–5, available online at <https://www.ipcc.ch/sr15/chapter/chapter-3/> (accessed 18 Sept. 2020).



## THREE-DIMENSIONAL FRONTIERS

Dynamic environments beyond the boundaries of the human habitat, oceans remain frontier regions hard to control and police. While some historians fear the frontier concept could reproduce the teleological assumptions and ethnocentric biases of its 19th-century origins, frontier studies have come a long way since Frederick Jackson Turner's day and are now thriving across disciplines, areas, and eras.<sup>32</sup> For Peter Perdue, writing about Inner Asia under the Qing empire, the frontier is both a spatial concept and an actor category to study subversion and subaltern agency.<sup>33</sup> Likewise, James Scott observes that in the Southeast Asian uplands, 'the existence of an open frontier operated like an automatic brake on what the state could extract', as 'mobility allowed farmers to escape the impositions of states and their wars'.<sup>34</sup> Dissecting the relationship between a vaguely defined, borderless frontier region and an extractive metropole has proven especially useful for analysing environmental transformations at an imperial scale.<sup>35</sup> In the process, the frontier has been 'extricated from the Turnerian tradition', and recast as a tool to investigate the cultural problems behind ecologically unsustainable practices.<sup>36</sup>

Whereas terrestrial borderlands in many places may be said to represent a post-frontier stage after 'fluid and "inclusive" intercultural frontiers yielded to hardened and more "exclusive" hierarchies',<sup>37</sup> oceanic borders remain fluid and resources hard to divide. In that sense, oceanic frontiers have mostly evaded closure, remaining geographically and historically open-ended.<sup>38</sup> While strongly

<sup>32</sup> Donald Worster et al., "'The Legacy of Conquest'", by Patricia Nelson Limerick: A Panel of Appraisal', *Western Historical Quarterly* 20, no. 3 (1989): 317. For a compendium of frontier applications to the non-Western world, see Bradley J. Parker and Lars Rodseth, eds, *Untaming the Frontier in Anthropology, Archaeology, and History* (Tucson: University of Arizona Press, 2005).

<sup>33</sup> Peter Perdue, 'From Turfan to Taiwan: Trade and War on Two Chinese Frontiers', in *Untaming the Frontier*, ed. Parker and Rodseth, 27–51. Also see Mark Elliott, 'Frontier Stories: Periphery as Center in Qing History', *Frontiers of History in China* 9, no. 3 (2014): 336–60.

<sup>34</sup> James C. Scott, *The Art of Not Being Governed: An Anarchist History of Upland Southeast Asia* (New Haven: Yale University Press, 2009), 4, 37.

<sup>35</sup> John Richards, for example, finds the modern rejection of growth limits rooted in an age of frontier expansion between 1500 and 1800. See John F. Richards, *The Unending Frontier: An Environmental History of the Early Modern World* (Berkeley: University of California Press, 2003). Jason Moore's Marxist analysis of the commodity frontier, again, sees the unsustainable shifting from resource to resource in the process of incorporation as formative for capitalism. See Jason W. Moore, 'Sugar and the Expansion of the Early Modern World-Economy: Commodity Frontiers, Ecological Transformation, and Industrialization', *Review (Fernand Braudel Center)* 23, no. 3 (2000): 409–33.

<sup>36</sup> Lars Rodseth and Bradley J. Parker, 'Introduction: Theoretical Considerations in the Study of Frontiers', in *Untaming the Frontier*, ed. Parker and Rodseth, 3.

<sup>37</sup> Jeremy Adelman and Stephen Aron, 'From Borderlands to Borders: Empires, Nation-States, and the Peoples in Between in North American History', *American Historical Review* 104, no. 3 (1999): 816.

<sup>38</sup> Noticeably, frontier closure has come to mean both depletion of frontier resources, and the solidification of national borders in the context of accentuating competition over those resources, as

patrolled waters may communicate the solidification of borders, the discrepancy between territorial legislation, applied to the sea by the 1982 UN Convention on the Law of the Sea (UNCLOS) in the form of exclusive economic zones (EEZ), and the fluid connectedness of oceanic environments keeps confounding the attempts of bureaucratic states to pin down and inventory people, animals, and resources. On the contrary, as Carmel Finley argues, governments, chiefly the United States, Japan, and, most recently, China, obstruct international attempts to tackle the ‘tragedy of the oceanic commons’ in a territorial manner by subsidizing fisheries beyond their EEZ for naval strategy and as bargaining chips.<sup>39</sup>

To compete over fluid or migrating resources, or to pollute a liquid or gaseous commons is to exert *volumetric* power – a concept explored recently in the field of security studies that also proves productive in the analysis of oceanic expansion.<sup>40</sup> The expansion of oceanic frontiers in the pursuit of new resources is not limited to a ‘surface’, horizontal plane. Rather, these shifts also involve a vertical move to encompass insular, pelagic, and aerial resources. The overarching process of oceanic frontier expansion transcended the decline of the whaling industry, the near extermination of North Pacific albatrosses, or the depletion of guano mines. In the 19th century, the shift from coastal to pelagic whale species that feed up to two kilometres beneath the surface allowed whalers to tap into deeper ecosystems. Likewise, vertical frontier expansion today is oriented at ever-deeper deposits of petroleum, methane hydrate, and rare earth metals.<sup>41</sup> While industry interests that shift to specific regions of the ocean continue to invite inter-imperial tensions over the EEZ, frontier expansion below the surface calls for a three-dimensional understanding of the global commons.

## GEOGRAPHY OF THE KUROSHIO FRONTIER

The Kuroshio or ‘black tide’, named after its dark colour, is a cohesive mass of sea water that differs from its surroundings in temperature, density, and salinity. An

demonstrated in John G. Butcher, *The Closing of the Frontier: A History of the Marine Fisheries of Southeast Asia, c.1850–2000* (Singapore: ISEAS–Yusof Ishak Institute, 2004). See also Carmel Finley, ‘Global Borders and the Fish That Ignore Them: The Cold War Roots of Overfishing’, in *Nation States and the Global Environment: New Approaches to International Environmental History*, ed. Erika Marie Bsumek, David Kinkela, and Mark Atwood Lawrence (New York: Oxford University Press, 2013), 62–75.<sup>39</sup> Finley, ‘Global Borders’, 63–4. Kurk Dorsey shows how the regulation of international whaling struggled similarly with the limited reach of international agreements and national control. See Kurkpatrick Dorsey, *Whales and Nations: Environmental Diplomacy on the High Seas* (Seattle: University of Washington Press, 2014).

<sup>40</sup> Stuart Elden, ‘Secure the Volume: Vertical Geopolitics and the Depth of Power’, *Political Geography* 34 (2013): 36–7.

<sup>41</sup> The notorious dispute over the Senkaku/Diaoyu islands in the East China Sea between China, Japan and Taiwan, for instance, started immediately after the discovery of fossil fuel deposits in 1970. See Reinhard Drifte, ‘The Japan–China Confrontation over the Senkaku/Diaoyu Islands – Between “Shelving” and “Dispute Escalation”’, *Asia-Pacific Journal* 12, issue 30, no. 3 (2014): 1–61.

extension of the westward-flowing North Equatorial current, the Kuroshio is  
 Q5 deflected north to become part of the North Pacific's subtropical gyre.<sup>42</sup> From  
 where the current hits the shore of Luzon, it acts like an enormous pipeline or  
 'nutrient stream' that transports energy in the form of warm and salty water rich  
 455 in phosphate and nitrate to northerly climes. The nutrients are consumed by  
 plankton and attract fishes of all sorts wherever the current climbs over underwater  
 ridges or on the continental shelf into the photic zone, within the reach of solar rays  
 (as is visualized in Figure 1). West of Kyushu, the current splits, with one branch  
 heading across the shallow Tsushima Strait and over the colder masses of the  
 460 Sea of Japan basin. The main branch of the Kuroshio crosses the Tokara Strait  
 to converge with the deep and still-plentiful Ryukyu current that replenishes  
 nitrate as it climbs to the shallower zones.<sup>43</sup> At times redirecting its path over hun-  
 dreds of kilometres within a few weeks to perform a 'large meander', the current has  
 the power to abruptly reshuffle fishing grounds across the region.<sup>44</sup> The phenom-  
 465 enon of this sudden deviation was unknown until 1935, when the current's unan-  
 ticipated fluctuation hampered a Japanese navy manoeuvre. Subsequent research  
 led to the insight that 'currents influence weather and climate, thereby affecting  
 not only commercial shipping, but also boosting or ruining marine and terrestrial  
 harvest. Their fluctuations exert the utmost influence upon society'.<sup>45</sup> In fact, the  
 470 current had long been shaping maritime customs and institutions. Until the mid-  
 19th century, local elites in the outlying islands of eastern Japan had based  
 status and autonomy on their mastery of navigation through the current.<sup>46</sup> Mean-  
 while, daring traders along the coast of Honshu used the current's eastward pro-  
 pulsion to accelerate their journey to the capital, as did the Spanish galleons  
 475 crossing from Manila to Acapulco.<sup>47</sup> Besides a lively economy in the harbour  
 towns of Honshu's southern shores, growing transport volumes guaranteed an

42 Lynne D. Talley et al., *Descriptive Physical Oceanography: An Introduction*, 6th ed. (London: Academic Press, 2011), 304.

43 Oceanographers have shown that the confluence of the deep Ryukyu current east of Okinawa contributes a significant quantity of nitrate to the Kuroshio which, having left the shallow East China Sea, has lost some of its original nutrient content. See X.Y. Guo et al., 'Spatial Variations in the Kuroshio Nutrient Transport from the East China Sea to South of Japan', *Biogeosciences* 10, no. 10 (2013): 6404, 6412.

44 Morioka Yushi, Sergey Varlamov, and Miyazawa Yasumasa, 'Role of Kuroshio Current in Fish Resource Variability off Southwest Japan', *Scientific Reports* 9, no. 1 (2019): 17942. On Kuroshio path fluctuations, see Qiu and Chen, 'Variability of the Kuroshio Extension Jet', 2096–7.

45 *Kaishō ihō*, Japanese Imperial Navy document, 1937, cited in Kawai Hideo, *Kuroshio sōgū to ninchi no rekishi* (Kyoto: Kyoto University Press, 1997), 298–9.

46 Tokyo Prefecture, ed., *Edojidai no Hachijōjima* (Tokyo: Tōkyō-to, 1964), 147.

47 Maps designed in Japan's urban centres underrepresent such practical navigational knowledge, as local documents from Hachijō island suggest. See Kondō Tomizō, *Hachijō jikki*, ed. Kobayashi Hideo, 8 vols (Tokyo: Ryokuchisha, 1964), vol. 1, 30. On the routes of the Manila galleons, see William Lytle Schurz, *The Manila Galleon*, rev. ed. (New York: Dutton & Co, 1985), 199.

ongoing influx of castaways and flotsam that became an integral part of local economies along the current.<sup>48</sup>

The Kuroshio's steady supply of nutrients made for resilient whale and fish grounds, and delayed the need to move to pelagic waters, despite sharply growing market demand over the early modern period. Maritime prohibitions stipulated in the 1630s tied Japanese seafarers to coastal bases, so that whaling businesses, mostly staffed with former sea rovers pinned down on shore when Toyotomi Hideyoshi unified the realm at the close of the 16th century, were left with few possibilities to pursue whales offshore.<sup>49</sup> Yet, by the late 17th century, whalers had shifted their activities into the Kuroshio and Tsushima currents. Although the currents represented a more resilient hunting ground, the whalers had to keep enhancing their methods and strategies to adapt to reduced abundance. Around 1670, nets were first used to chase, trap and harpoon whales.<sup>50</sup> To sustain earlier catch rates, by the 1830s, experiments were undertaken to hunt whales with firearms, anticipating a technology which Euro-American whalers only explored decades later, when spatial expansion ceased to make up for declining catch.<sup>51</sup> Although they had to cope without pelagic fleets that expanded their frontier to increasingly remote waters, Japan's early modern maritime industries were by no means sustainable.

Just like Japanese whalers, Atlantic whaling businesses – an early example of large-scale corporate capitalism – depended on the continued expansion of new frontiers, but at a faster pace.<sup>52</sup> Basque whalers had first moved to Newfoundland and Labrador in the 16th century, where export-oriented whaling was replaced by cod fishing within just 70 years. The Dutch industry that stepped in exhausted its whale grounds near Spitzbergen at a similarly breathtaking speed, expanding across the North Atlantic around 1640, and to the Davis Strait west of Greenland by 1720. With the end of the Dutch golden age, subsidized British whalers took over the lead and expanded the whaling frontier further, first entering the Pacific

<sup>48</sup> Most significantly so in Hachijō, as well as on the western coast of the Izu peninsula. See Tokyo Prefecture, *Edojidai no Hachijōjima*, 157–61; Masayuki Nakada, *Izu to Kuroshio no michi* (Tokyo: Yoshikawa Kōbunkan, 2001), 50, 81–3.

<sup>49</sup> Amino Yoshihiko, 'Les Japonais et la mer', *Annales* 50, no. 2 (1995): 256–7.

<sup>50</sup> *Geishikō*, vol. 4, 27.

<sup>51</sup> Svend Foyn's famous Norwegian whale gun, first used in 1864, had been predated by more rudimentary British and American prototypes that, by 1862, were in use in the seas around Japan. See J.N. Tønnessen, *The History of Modern Whaling* (Berkeley: University of California Press, 1982), 18–19. On earlier Japanese experiments with whale guns, see Holm, 'Living with the Gods of the Sea', 109–15.

<sup>52</sup> As Jakobina Arch's work shows, Japanese whaling enterprises by the 1830s were full-fledged capital enterprises that sold shares on future catch and figured as investment objects embedded in a greater market economy. See Arch, *Bringing Whales Ashore*, 85–7. On the development of early capitalist practices in New England whaling and its effect on indentured native labour, see Nancy Shoemaker, *Living with Whales: Documents and Oral Histories of Native New England Whaling History* (Amherst: University of Massachusetts Press, 2014).

in 1789.<sup>53</sup> In New England, where coastal whale populations had declined noticeably by the 1740s, the move offshore began in 1762, when whale blubber could first be tried out at sea. Thereafter, the scope of voyages expanded rapidly, first to the Caribbean and the Cape Verdes, then to South America and into the Pacific, while the nearer whale grounds declined.<sup>54</sup>

Georeferenced logbook data of American vessels give a clear picture of the frontier's rapid spatial development.<sup>55</sup> Figures 2a–c show that the whalers who had first reached the Kuroshio Extension in the previous decade gravitated towards the Bonin Islands over the 1830s. For over a decade before the establishment of formal diplomatic relations with Japan in the 1850s, Americans were hunting whales all around the archipelago, including the Sea of Japan and the Sea of Okhotsk. Especially near the Ryukyus (Okinawa), as well as in the Tsushima and Tsugaru straits, American whalers frequently cruised within sight of shore. David Howell has shown how the discovery of offshore peddling with British whalers in 1824 triggered a shogunal edict to 'not think twice but shell and repel' any foreign vessel that approached Japanese shores.<sup>56</sup> Despite Japan's decision to keep the foreigners at a distance – in fact, the logbook data corroborate that the coasts of the Japanese heartlands were actively avoided – the ocean had become a site of geopolitical confrontation.

## FRONTIER TECHNOLOGIES

International economic activities across the western Pacific discomfited Japanese leaders. Moving quickly to build a fleet of sailing boats according to pirated Russian construction plans in 1854–56, the shogunate then hired the former castaway Nakahama Manjirō, who had trained aboard an American whaling vessel before his return to Japan, and dispatched him to explore the oceanic whaling grounds. This was a move into unfamiliar territory: pelagic whaling techniques as practised aboard Western vessels were different from coastal whaling in the manner a whale

<sup>53</sup> Selma Huxley Barkham, 'The Basque Whaling Establishments in Labrador 1536–1632 – A Summary', *Arctic* 37, no. 4 (1984): 516; Brad Loewen and Vincent Delmas, 'The Basques in the Gulf of St. Lawrence and Adjacent Shores', *Canadian Journal of Archaeology / Journal Canadien d'Archéologie* 36, no. 2 (2012): 213–66; Joost C.A. Schokkenbroek, *Trying-out: An Anatomy of Dutch Whaling and Sealing in the Nineteenth Century, 1815–1885* (Amsterdam: Aksant, 2008), 29–36, 45–8.

<sup>54</sup> Jeffrey W. Bolster, 'Putting the Ocean in Atlantic History: Maritime Communities and Marine Ecology in the Northwest Atlantic, 1500–1800', *American Historical Review* 113, no. 1 (2008), 33; Judith H. Lund et al., *American Offshore Whaling Voyages, 1667–1927* (New Bedford, MA: Old Dartmouth Historical Society – New Bedford Whaling Museum, 2010), 1.

<sup>55</sup> The *American Offshore Whaling Logbook* database published by the New Bedford Whaling Museum is a dataset of 466,136 digitized logbook entries from between 1784 and 1920. See *American Offshore Whaling Logbook* database, ed. New Bedford Whaling Museum (2020), <https://whalinghistory.org/> (accessed 7 June 2021). In the mid-19th century, American voyages represented around 70 per cent of all international whaling voyages. See Lund et al., *American Offshore Whaling Voyages*, 2.

<sup>56</sup> Howell, 'Foreign Encounters and Informal Diplomacy', 298.



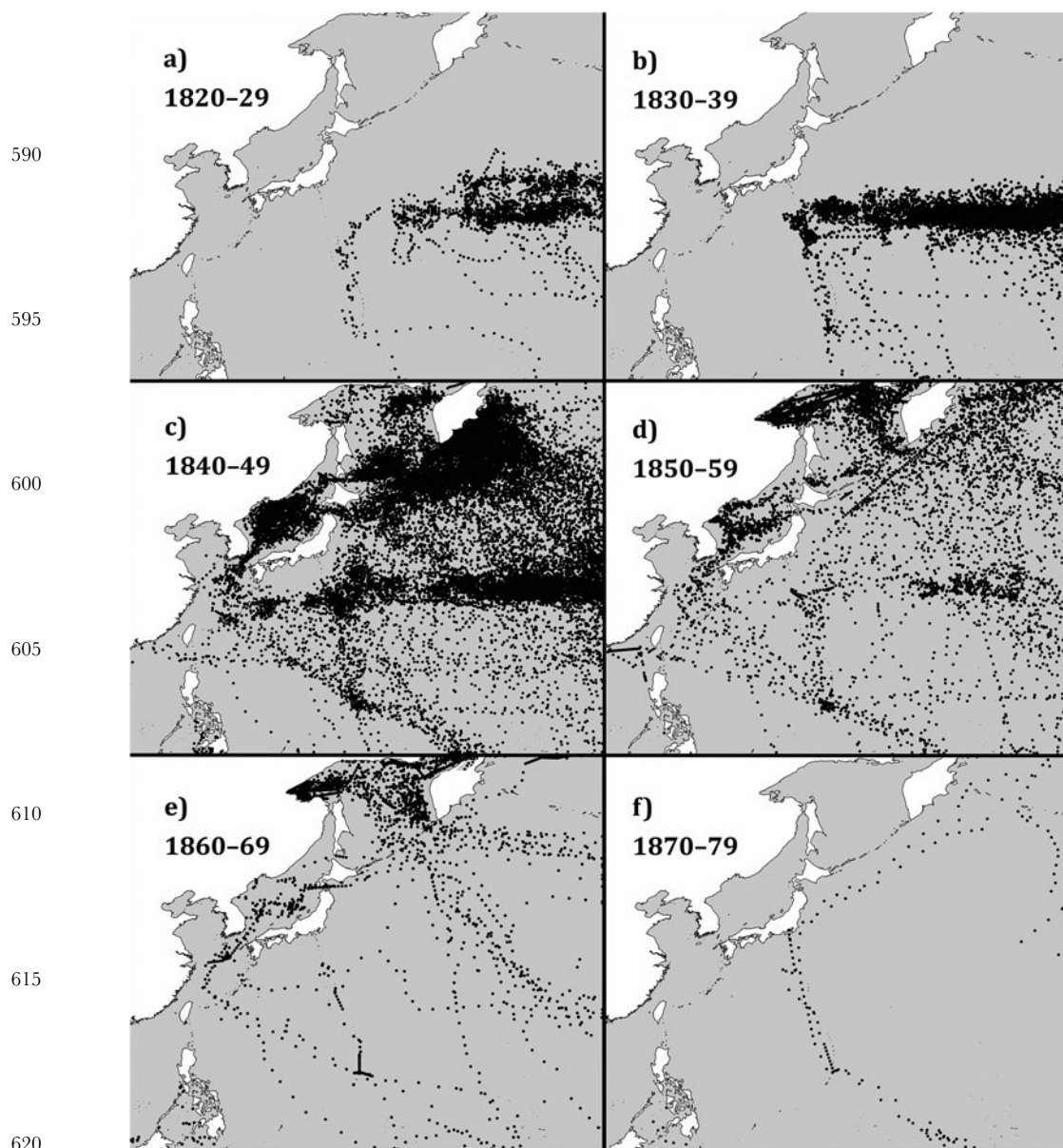


FIGURE 2 a-f. Georeferenced positions of American whaling vessels between 1820 and 1879. Notice the explosion of whaling activity all around Japan in the 1840s, and the quick shift from the Kuroshio Extension to the Sea of Okhotsk after 1850. Author's design, based on the *American Offshore Whaling Logbook* database published by the New Bedford Whaling Museum.

was killed and harvested. The hunt also targeted different animals and catered to different markets. Coastal whalers of Japan had a strong preference for the North Pacific right whale, a slow-swimming baleen whale that feeds on zooplankton of the photic zone, within a few dozen metres of the surface. The sperm whales that were targeted by pelagic whalers, on the other hand, were mostly fast swimmers

Q6 and deep divers.<sup>57</sup> These animals' deep feeding, shallow defecating, and ultimate decomposition in the deep sea perform an ecologically significant vertical transportation of nutrients and carbon, a cycle marine biologists call 'whale pump' and 'whale fall'.<sup>58</sup> In the last quarter of the 19th century, fisherfolks used to fishing in the prolific convergence and upwelling zones of the Kuroshio broke new grounds in the Bonin Islands and later, in the Senkaku Islands, where rising currents continually replenish surface nutrients. The use of deep-sea circulations expanded in the 20th century with the empire's strategic emphasis on tuna, when scientific fisheries began to chase the migration of the deep-swimming fish.<sup>59</sup> By targeting species that fed on plankton, squid and fishes from deeper layers of the oceans, pelagic whaling and fishing had begun in the mid-19th century already to expand the terrestrial economy's catchment area more systematically toward the sea floor.

In pursuit of the latest harpooning methods and intelligence about the workings of international whaling businesses, the shogunate looked to the whaling entrepôt in the Bonin Islands, just a few days off Edo (Tokyo) bay under steam, which they had brought under their control in 1862. A hypermodern steamboat – ordered from the Netherlands, and staffed with the best navigators and cartographers in the shogunate's service – had entered the islands initially to forestall the establishment of a foreign navy base.<sup>60</sup> Since the first settlers had arrived in the Bonin Islands from Hawai'i in 1830, the archipelago had become the most central port of call for whalers in the Kuroshio region, though the opening of treaty ports in Japan in 1859, and the quick decline of the Euro-American whaling industry around the same time, had begun to deflect traffic from the islands.<sup>61</sup>

<sup>57</sup> Arch, *Bringing Whales Ashore*, 25. The *American Offshore Whaling Logbook* database shows that the vast majority of whales caught on offshore voyages were sperm whales.

<sup>58</sup> Roman and McCarthy find that even after the collapse of whale populations since the nineteenth century, cetaceans account for approximately 77 per cent of nutrients delivered by animals to surface waters of the Gulf of Maine, suggesting a much higher overall productivity in the past. See Joe Roman and James J. McCarthy, 'The Whale Pump: Marine Mammals Enhance Primary Productivity in a Coastal Basin', *PLoS One* 5, no. 10 (2010): e13255, 2–3.

<sup>59</sup> Nadin Heé, 'Negotiating Migratory Tuna: Territorialization of the Oceans, Trans-War Knowledge and Fisheries Diplomacy', *Diplomatic History* 44, no. 3 (2020): 418–19. On tuna fisheries in the Senkaku/Diaoyu islands, see Hiraoka Akitoshi, *Japanese Advance into the Pacific Ocean: The Albatross and the Great Bird Rush* (Singapore: Springer, 2018), 32–4.

<sup>60</sup> I have elaborated on the scientific momentum gained from this colonial experiment in an earlier publication, Jonas Rüegg, 'Mapping the Forgotten Colony: The Ogasawara Islands and the Tokugawa Pivot to the Pacific', *Cross-Currents: East Asian History and Culture Review* 6, no. 2 (2017): 440–90.

<sup>61</sup> Though the original colonization was planned and financed by a small group of European and American entrepreneurs, most of the original settlers in the Bonin Islands were Native Hawaiians. The community fluctuated as settlers joined from various Pacific islands. Many immigrants were retired whalers, a few had been dropped off after falling ill at sea, others had abandoned their ships to evade the harsh conditions of life aboard a whaler. On these Bonin Islanders, see David Chapman, *The Bonin Islanders, 1830 to the Present: Narrating Japanese Nationality* (Lanham: Lexington Books, 2016). On expansion and decline in the American whaling industry, see Lund et al., *American Offshore Whaling Voyages*.

Whaling methods were indeed changing fast: to counteract declining catch rates, Westerners had developed more effective techniques killing whales with explosive harpoons. This so-called ‘bomb-lance’ method had been patented in the United States just two seasons earlier (see Figure 3).<sup>62</sup> In the Bonin Islands, captain Manjirō hired a group of Pacific immigrants as whaling experts, and he purchased a ‘bomb-lance’ harpoon from a foreign vessel. The explosive harpoon was fired at the whale and exploded after penetrating the animal’s flesh. It was a technique efficient at killing, but the danger of losing the quickly sinking prey was considerable. Yet, within a month, the crew of hired foreigners, Japanese settlers, and Manjirō’s disciples caught two sperm whales and harvested 96 barrels of oil.<sup>63</sup> A letter to the shogunal department of finance (*go-kanjōsho*) in which Manjirō inquired what to do with the harvested whale oil evidences the experimental character of this expedition, as plans for further developments in the pelagic industry were yet to be drafted.<sup>64</sup> Though welcoming the commercial benefits of whaling, the shogunate was mainly interested in the technology and navigational know-how linked to the industry.

Despite their alacrity to explore, the Japanese came too late to join the heyday of Pacific whaling. The crowd of Western vessels that had populated the frontier in the 1840s had been retreating noticeably since the 1850s, as the logbook data visualize (Figure 2c-f).<sup>65</sup> Competing over a dwindling number of cetaceans, Yankee whaling had been in decline for over a decade, and pressure on the industry increased with the commercial extraction of petroleum after 1857.<sup>66</sup> By the time the Japanese joined the scramble for the Pacific in the 1860s, the frontier of international whalers had moved on to the northern rims of the Sea of Okhotsk, leaving the Kuroshio region with a sharply decimated whale population.

<sup>62</sup> Arch, *Bringing Whales Ashore*, 73–5.

<sup>63</sup> Yoshihara Tomokichi, *Bōnan Hoge* (Ichikawa: Aizawa Bunko, 1982), 61. An eyewitness account of these experiments is given by physician Abe Rekisai in *Zusho kōki*, National Diet Library of Japan, acc. no. 特 1-2970, 38–48.

<sup>64</sup> *Geiyu sono hoka torihakaraikata no gi*, 05/1863, in Egawa Family Papers, acc. no. S00220.

<sup>65</sup> Based on the *American Offshore Whaling Logbook* database. Some caution is necessary in interpreting these data, as American whaling accounts for most, but not all pelagic whaling in the region. Especially after the mid-century, American vessels active in the Pacific changed their registration to Hawai‘i, thus falling off the US statistics. See Lund et al., *American Offshore Whaling Voyages*, 3. In 1862–63, 12 foreign whaling vessels visited the Bonin Islands, of which nine sailed under the American, two under the Hawaiian, and one under the Russian flag. See *Ogasawara-tō fūdo ryakki*, 58, acc. no. 173-0185, in National Archives of Japan, Tokyo.

<sup>66</sup> On the emergence of petroleum, see Brian Black, ‘Oil Creek as Industrial Apparatus: Re-Creating the Industrial Process through the Landscape of Pennsylvania’s Oil Boom’, *Environmental History* 3, no. 2 (1998): 210.

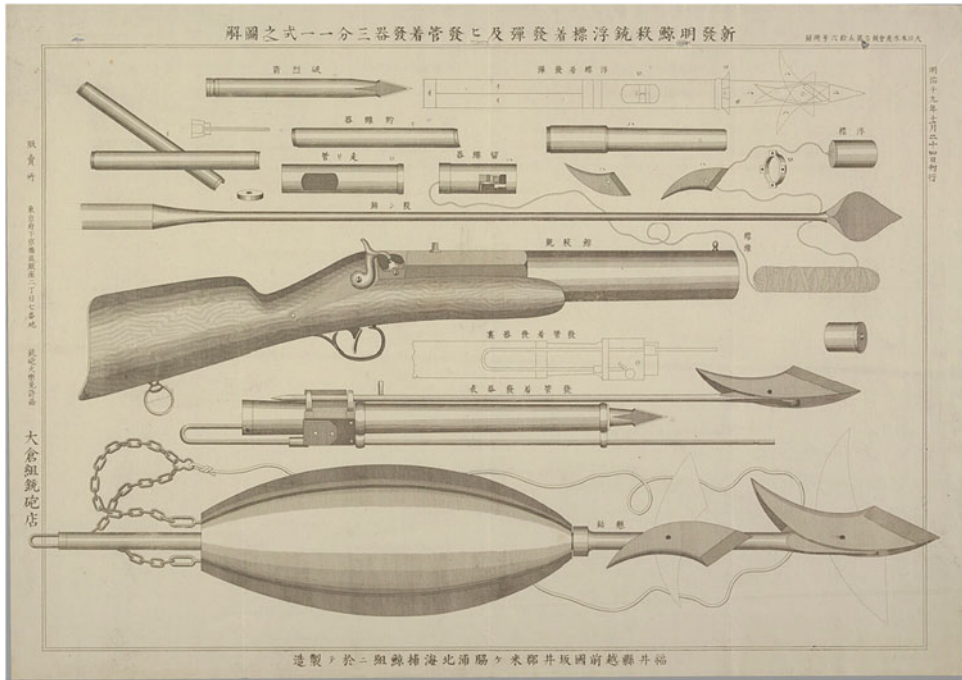


FIGURE 3: The explosive whale bomb-lance in a Japanese representation of 1886. *Shin hatsumei kujiragoroshi jū*, in 'Shinko ō-atsume jūjō', 165, Tokyo University General Library, Tanaka Yoshio Fund, acc. no. A00:6010, vol. 95.

## SCIENCE AND THE DISCOVERY OF DEPTH

At the imperial centres engaged in Pacific resource extraction, the quest for whale oil became a prompt to rationalize and structure the Pacific 'wilderness' – to use a common analogy at the time – and what lay beneath it. Helen Rozwadowski and Jennifer Hubbard have discussed the intellectual problems with terrestrial models in oceanic settings, but analogies with the charting and incorporation of a continental territory have pervaded oceanographic research and informed human use of the oceans since the emergence of industrial whaling.<sup>67</sup> Lieutenant Matthew Fontaine Maury, superintendent of the United States Naval Observatory and Hydrographical Office in Washington DC, had begun in 1844 to collect and compile data from hundreds of logbooks into a Whale Chart of the World (see Figure 4). Versions of his map, first distributed in 1852, combined the monthly varying captures and sightings of two preferred whale species from thousands of commercial voyages into a tidy picture of the frontier's winds, currents, and

<sup>67</sup> Helen M. Rozwadowski, 'Arthur C. Clarke and the Limitations of the Ocean as a Frontier', *Environmental History* 17, no. 3 (2012): 578–602; Hubbard, 'Mediating the North Atlantic Environment', 88–100.



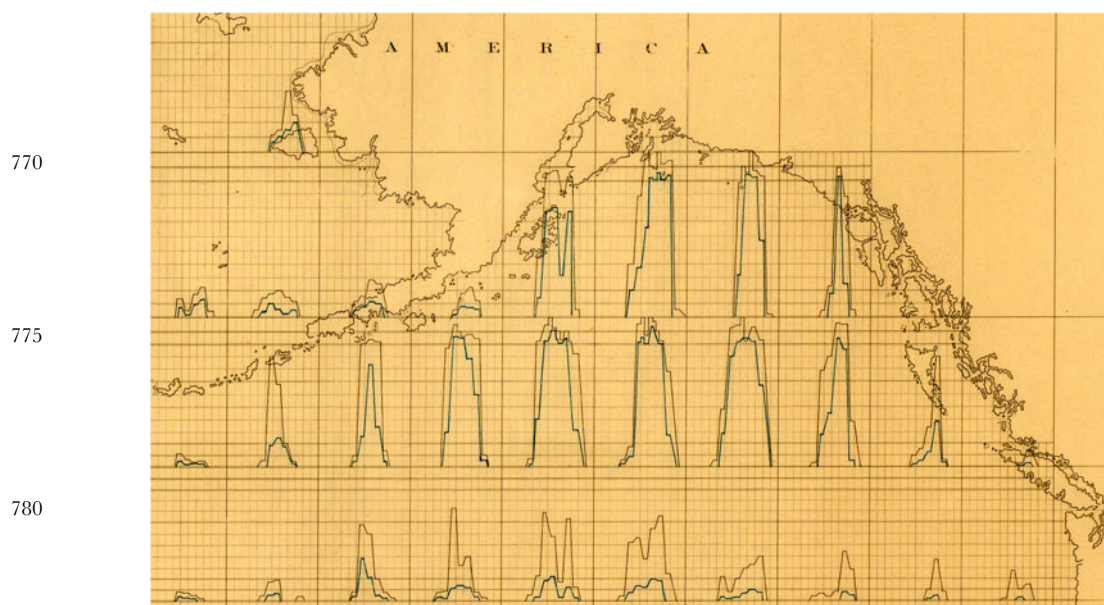


FIGURE 4: Detail of Matthew Fontaine Maury's statistical *Whale Chart of the World* of 1852. The blue and black lines represent the monthly availability of sperm and right whales found within each rectangle of the coordinate grid.

migrating resources that, Maury believed, circulated according to an immutable, faultless rhythm.<sup>68</sup>

The whaling boom first allowed Maury to inventory the open ocean according to empirical observations, but after the industry's collapse, deep-sea soundings for telegraph cables continued to inspire a broader fascination with subaqueous geographies.<sup>69</sup> The first underwater cables reached Japan in 1871, reducing the time a telegram employed from Nagasaki to Western Europe to around 12 hours. The fact that telecommunications between the United States and Japan had to be repeated by way of London underlined the geopolitical importance of deep-sea technology and infrastructure.<sup>70</sup>

Japanese cartographers had long charted hidden shoals and reefs in the vicinity of harbours, but with the routine presence of large international vessels by the 1860s, compiling precise bathymetric maps became a technological race.<sup>71</sup> The big picture of

<sup>68</sup> Matthew Fontaine Maury, *The Physical Geography of the Ocean* (New York: Harper, 1855), 50. Penelope Hardy has pointed out that Maury's work, saturated with biblical teleology and relying on non-academic collaborators, was contested in its own time. See Penelope K. Hardy, 'Matthew Fontaine Maury: Scientist', *International Journal of Maritime History* 28, no. 2 (2016): 407–9.

<sup>69</sup> Helen M. Rozwadowski, *Fathoming the Ocean: The Discovery and Exploration of the Deep Sea* (Cambridge, MA: Belknap Press of Harvard University Press, 2005), 13–17, 25–9, 76–9.

<sup>70</sup> Jack Nicholls, 'The Impact of the Telegraph on Anglo-Japanese Diplomacy during the Nineteenth Century', *New Voices* 3 (2009): 1–22.

<sup>71</sup> The systematic sounding of Port Lloyd in the Bonin Islands in 1863 was one of the first such projects undertaken by an exclusively Japanese team. See Rüegg, 'Mapping the Forgotten Colony', 440–90.



underwater geography evolved rapidly in the context of foreign sounding projects around Japan. The British sounding expedition *Challenger*, which landed in Yokohama in 1875, attracted major attention from the new Ministry for Waterways (*suïro kyoku*), and even from the emperor himself.<sup>72</sup> Their findings provided a new dimension for Japan's orientation to its oceanic environs. One textbook from 1891 stated:

We have gained general insight from the British *Challenger*, the German *Gazelle*, and the American *Tuscarora* expeditions that have thoroughly analysed the sea floor ... The contours (*chisei*) of our country arise on the peninsula of Kamchatka, where a mountain range enters the sea, rising and falling, thereby creating the Kuriles and reaching Hokkaido; they decline and next form Honshu, whence they meander westward in two waves. One becomes Shikoku, the other becomes the San'in and San'yō regions before they collide to form Kyushu. The remaining *momentum* disappears into the sea, becoming the Ryukyu Islands and ultimately continuing into the East-Indian Archipelago that runs parallel to the Asian continent's eastern shore.<sup>73</sup>

The entry of the deep sea into the geographical imaginary had set in motion a process of geological reorientation that allowed the emerging empire to position itself in the midst of an archipelagic Pacific. As a result, the empire's *metageographical determinism* developed a third dimension.<sup>74</sup>

To naturalize their territorial claims, the oligarchs who had come to rule Japan's young empire in the Meiji reform of 1868 began propagating malleable geographies that offered a transitional framework for gradual expansion. Whereas the shogunate had applied a strategy of gradual incorporation with compatible bodies when they relocated settlers from the nearest island within Japan to the Bonin Islands, the Meiji government chose topographical connections to substantiate expansionist claims. A stela erected in the Bonin Islands in 1880 claimed that the islands that 'spread out like stars' across the southern sea were a part of the subaqueous mountain range that runs off Mount Fuji, 'meandering down in wavelike movements ~~and ending here~~ – this is thus our southern gate!' [Strikethrough in the original].<sup>75</sup> To emphasize the malleability of such concepts, island governor Obana Sakunosuke, in whose honour the stela was erected, erased the words limiting Japan's claims. No longer a southern boundary, the southern islands were to become the empire's gateway to the vast Pacific.<sup>76</sup>

<sup>72</sup> Nishimura Saburō, *Challenger-gō tanken: kindai kaiyōgaku no makuake* (Tokyo: Chūō Kōronsha, 1992), 137–49; Ōshima Shōichi, 'Kaitei jigata chōsa no rekishi to genjō', *Chigaku Zasshi* 109, no. 3 (2000): 474–82.

<sup>73</sup> *Yochigaku kyōtei*, vol. 1, 38; vol. 2, 13–14, in Waseda University Library, acc. no. ㇿ 02\_01012.

<sup>74</sup> Martin W. Lewis and Kären Wigen, *The Myth of Continents: A Critique of Metageography* (Berkeley: University of California Press, 1997), 43–6.

<sup>75</sup> *Kaitaku Ogasawara no hi*, stone stela in Ōgiura hamlet, Ogasawara Village (Bonin Islands).

<sup>76</sup> I have previously discussed this stela in Rüegg, 'Mapping the Forgotten Colony', 142–4. See also Chapman, *The Bonin Islanders*, 94–5. The circumstances of the stela's erection and Obana's acts are recorded in *Ogasawara shima yōroku*, vol. 6 (1879–80), 409.

With Shiga Shigetaka's *Recent Developments in the South Sea*, a polemic work published in the aftermath of a government-sponsored expedition to the South Pacific in 1887, the widespread fascination with southern islands was moulded into a greater geographical entity called 'nan'yō' (lit. 'South Sea'), an archipelagic conception of a connected ocean spanning from Hawai'i to Southeast Asia, and as far south as Tasmania.<sup>77</sup> Romantic ideas about the 'South Sea's' conquest – enthusiastically propagated by elite strategists such as navy minister Enomoto Takeaki – redirected the momentum of domestic unrest into expansionism.<sup>78</sup> 'Our Japan', Shiga wrote, 'is towering above the Pacific, as it overlooks the islands of the South Sea on its sunny side'.<sup>79</sup> The parallel use of 'Pacific' (*taiheiyō*) and 'South Sea' (*nan'yō*) in the late 19th century expresses the unravelling of two diverging conceptions of the ocean as either a void space rimmed by terrestrial empires, or as a sea of islands in-between, an extension of archipelagic Japan.

Rudimentary settlements mushroomed across the frontier towards the close of the century, set up by breakneck entrepreneurs who were lured there by the prospect of quick fortunes. In Torishima, Minami no Tori, and even near Hawai'i, Japanese labourers began to hunt albatrosses in quasi-autonomous, but mostly short-lived corporate settlements that traded feathers, downs and bird-carcass fertilizers.<sup>80</sup> As can be observed in the history of sealing and whaling stations or guano mines around that time elsewhere, unsustainable practices necessitated continuous shifting from resource to resource, and from island to island.<sup>81</sup> In more stable settlements like the Senkaku Islands, the 'bird rush' was followed by bonito fishery, and in the Daitō

<sup>77</sup> Shiga Shigetaka, *Nan'yō Jiji* (1887). On Shiga's geographical imagination, see Kären Wigen, 'Discovering the Japanese Alps: Meiji Mountaineering and the Quest for Geographical Enlightenment', *Journal of Japanese Studies* 31, no. 1 (2005): 10–15. While the word *Tōnan Ajia* for 'Southeast Asia' has circulated since the 1910s, the term *Nan'yō* or 'South Sea' remained the standard reference for the region until the collapse of the Japanese empire. See Tsuchiya Shinobu, *Nan'yō bungaku no seisei: otozureru koto to omou koto* (Tokyo: Shintensha, 2013), 9. The Kingdom of Hawai'i figured prominently as a cornerstone of Japan's envisioned Oceanian sphere of influence, especially since King Kalākaua's visit to Japan in 1881. See Lorenz Gonschor, 'Ka Hoku o Osiania: Promoting the Hawaiian Kingdom as a Model for Political Transformation in Nineteenth-Century Oceania', in *Agents of Transculturation: Border-Crossers, Mediators, Go-Betweens*, ed. Sebastian Jobs and Gesa Mackenthun (Münster and New York: Waxmann, 2013), 163.

<sup>78</sup> Enomoto Takeaki propagated South Sea expansionism far beyond the intellectual elite. Hiraoka Akitoshi further points out that many of the novelists that propagated expansionism in their writing were former activists in the so-called popular rights movement of the 1870s. See Hiraoka Akitoshi, *Ahōdori o otta Nihonjin: ikkaku senkin no yume to Nan'yō shinshutsu* (Tokyo: Iwanami Shoten, 2015), 24–31; Mark R. Peattie, *Nan'yō: The Rise and Fall of the Japanese in Micronesia, 1885–1945* (Honolulu: University of Hawai'i Press, 1988), 7.

<sup>79</sup> Shiga Shigetaka, *Nan'yō Jiji* (Tokyo: Maruzen Shōsha, 1887), 11.

<sup>80</sup> Paul Kreitman, 'Feathers, Fertilizers, and States of Nature: Uses of Albatrosses in the U.S.–Japan Borderlands' (PhD diss., Princeton University, 2015), 56, 146–55; Hiraoka, *Ahōdori o otta Nihonjin*, 22, 143. On these frontier businesses, also see Hiraoka Akitoshi, *Ahōdori to teikoku nihon no kakudai: nan'yō no shimajima e no shinshutsu kara shinryaku e* (Tokyo: Akashishoten, 2012); Hiraoka, *Japanese Advance into the Pacific Ocean*.

Islands near Okinawa – a colony surviving down to the present – down production yielded to guano mining and sugar plantations.<sup>82</sup> To borrow Jason Moore's words, the shifting of businesses in the frontier due to unsustainable resource use gave birth to a 'frontier mode' of capitalist expansion that built on continued spatial expansion and paved the way to expand state control to the empire's maritime fringes.<sup>83</sup>

The steady expansion into the fluid commons of the Pacific continued independently of insular land bases. Tuna, a rare treat before 1900, was pursued over ever-greater distances and was celebrated as an essential resource to feed the imperial army. By the 1930s, writes Nadin Heé, the 'victory fish', or *katsu-uo*, represented 'symbolic capital' in an inter-imperial competition. Subsequently, the race for tuna in the 'South Sea' was portrayed in imperial propaganda as a race to drive out foreign fisheries. The search for ever-new fishing grounds had made the deep-diving fish both a major source of protein, and a cash commodity to quench the empire's thirst for imported fuel.<sup>84</sup> Despite a sharply decimated fleet after World War II, under the occupation forces' strategy of feeding Japan with 'domestic' resources, Japan's pelagic industries, chiefly whaling, were again boosted as producers of cheap protein.<sup>85</sup> In ways invisible to terracentric maps, the archipelago's resource base kept expanding horizontally and vertically, and beyond the caesura of the empire's collapse.

## THE UNENDING KUROSHIO FRONTIER

Japan's oceanic expansion bridges the conventional divides of early modern and modern, shogunal and imperial, insular and global. The object of historically changing corporate interests, oceanic frontiers remain a site of international resource competition and technology-driven expansion. Meanwhile, the landscape of Japan's 'pelagic empire' is in permanent transformation, though often confounding human plans. According to Stephen Gallagher et al., the Kuroshio current is expected to accelerate its flow by 30 cm/s under the impact of global warming. Changing speed and paths – the Kuroshio Extension is believed to have shifted north by half a degree in latitude over just the last century – also affect the local manifestation of sea level rise.<sup>86</sup> In the fluid environments of the ocean, physical geography is never

<sup>81</sup> M.W. Cawthorn, *Maori, Whales and "Whaling": An Ongoing Relationship* (Wellington: Department of Conservation, 2000), 1–17.

<sup>82</sup> The permanent bird-hunting colony in Torishima met an abrupt end in 1902, when a volcano eruption devastated the island, killing all its inhabitants. See 'Inhabitants of Island All Killed by Volcano', *New York Times*, 19 Aug. 1902, 1.

<sup>83</sup> Moore, 'Sugar and the Expansion of the Early Modern World-Economy', 411, 428–9.

<sup>84</sup> Nadin Heé, 'Tuna as an Economic Resource and Symbolic Capital in Japan's "Imperialism of the Sea"', in *Animals and Human Society in Asia: Historical, Cultural and Ethical Perspectives*, ed. Kowner Rotem et al. (Cham: Palgrave Macmillan, 2019), 215–18.

<sup>85</sup> Jakobina Arch, 'Whale Meat in Early Postwar Japan: Natural Resources and Food Culture', *Environmental History* 21, no. 3 (2016): 468–70; Finley, 'Global Borders', 66–7.

static. Rising sea levels are not only posing a real threat to coastal communities, they also challenge Japan's claims to some 410,000 km<sup>2</sup> of EEZ around Oki no Tori reef, 1,700 km south of Tokyo. The reef, which Japan claims is an inhabitable island, in fact reaches just a few centimetres above the surface in two locations and is certain to drown in the foreseeable future.

In an age in which the oceans revise coastal geographies with growingly violent whims, expected environmental changes inspire governments to explore new strategies in claiming oceanic space. To prevent territorial loss, Tokyo University's Kayane Hajime calls to support the growth of corals '*naturally* rather than by constructing an island of concrete'.<sup>87</sup> According to various plans, cement tetrapods will help accumulate shoals of drifting corals to the point that palms can be grown and ultimately produce an inhabitable island.<sup>88</sup> This green-washed island construction is an attempt to keep with classical, coast-centric definitions of maritime claims as stipulated in the UNCLOS of 1982.<sup>89</sup> Other approaches include creatively redefining the continental shelf in one's favour, a strategy China is applying exemplarily in the East China Sea to expand its EEZ towards Japan.<sup>90</sup> Similarly, Turkey has recently filed provocative sovereignty claims over maritime space around Greek islands, based on a brazen redefinition of the continental shelf, and targeting large submarine gas deposits.<sup>91</sup> To secure control over deep-sea deposits of strategic resources, Japan, as well, is currently claiming 'extended continental shelf' privileges that extend its EEZ beyond the customary 200 nautical miles to rare earth fields between Okinawa and the Bonin Islands, west of Minami no Tori Island, as well as south of Oki no Tori reef (see [Figure. 5](#)).<sup>92</sup> In building artificial islands as much as in redefining the grounds for exclusive claims, engineering and legislation in maritime territories are now reactive *vis-à-vis* the vagaries of oceanic change.

To understand the historical processes that direct state and industry interests to specific places within the dynamic landscapes of currents, habitats, and mineral deposits, historians need to explore oceanic transformations in their *volumetric* dimension. Tridimensional landscapes of currents, catchment areas, and migrating fish, oceans with their depth and fluidity complicate territorial notions of sovereignty, empire, and historical change. As the arrival and disappearance of Atlantic whalers in the Kuroshio Extension in the 1830s, or the later mushrooming of

<sup>86</sup> Stephen J. Gallagher et al., 'The Pliocene to Recent History of the Kuroshio and Tsushima Currents: A Multi-Proxy Approach', *Progress in Earth and Planetary Science* 2, no. 1 (2015): 18.

<sup>87</sup> Tokyo University Ocean Alliance, ed., *Umi no daikoku Nippon* (Tokyo: Shōgakukan, 2011), 24.

<sup>88</sup> *Ibid.*

<sup>89</sup> UNCLOS III, Part V, Article 57.

<sup>90</sup> Drifte, 'The Japan–China Confrontation', 29.

<sup>91</sup> 'Erdgasstreit im östlichen Mittelmeer', *Neue Zürcher Zeitung*, 30 May 2021, <https://www.nzz.ch/international/tuerkei-griechenland-wettlauf-um-erdgas-im-mittelmeer-ld.1571955> (accessed 17 June 2021).

<sup>92</sup> 'Submissions to the Commission: Submission by Japan', in United Nations, *Oceans & Law of the Sea*, [https://www.un.org/Depts/los/clcs\\_new/submissions\\_files/jpn08/jpn\\_execsummary.pdf](https://www.un.org/Depts/los/clcs_new/submissions_files/jpn08/jpn_execsummary.pdf) (accessed 28 Aug. 2020); Tokyo University Ocean Alliance, *Umi no daikoku Nippon*, 28.

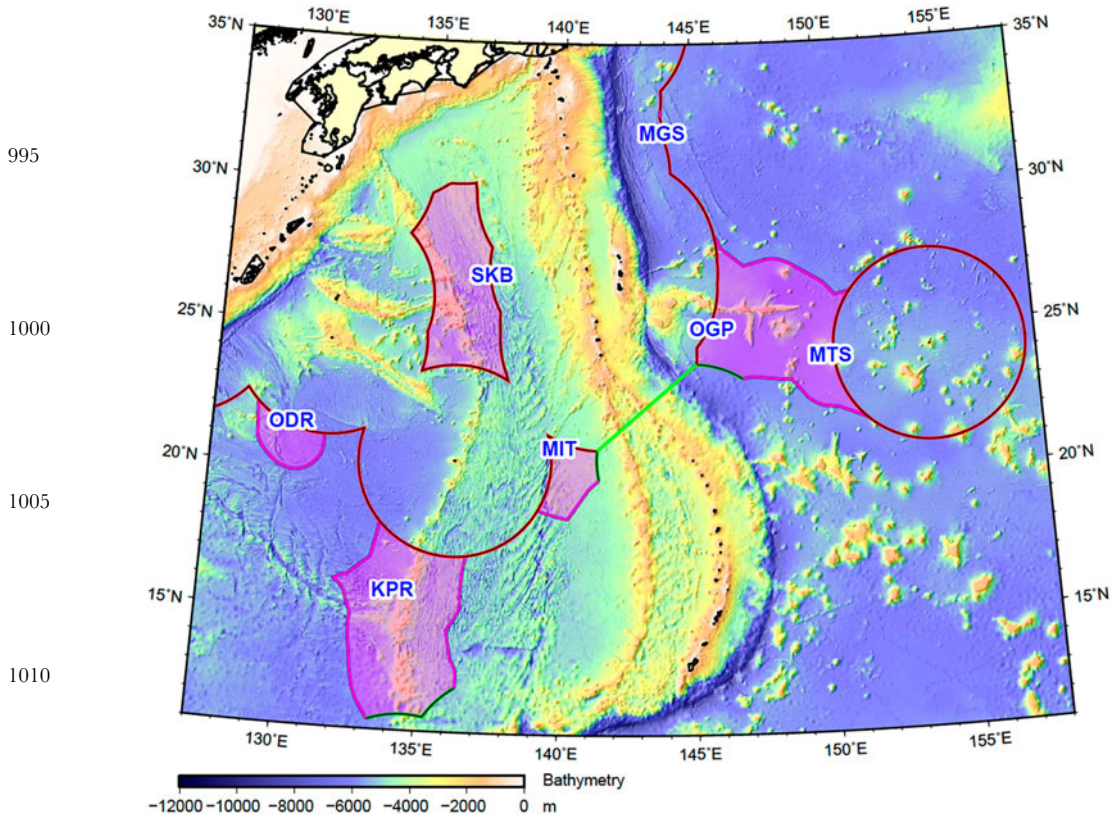


FIGURE 5: Map of Japan's pending application to the United Nations for an 'extended continental shelf' (in purple) beyond the customary 200 nautical mile zone stipulated by the United Nations Convention on the Law of the Seas, or UNCLOS. *Japan's Submission to the Commission on the Limits of the Continental Shelf*, [https://www.un.org/Depts/los/clcs\\_new/submissions\\_files/jpn08/jpn\\_execsummary.pdf](https://www.un.org/Depts/los/clcs_new/submissions_files/jpn08/jpn_execsummary.pdf) (accessed 2 Nov. 2020).

short-lived bird hunting colonies show, resource extraction proceeds in a spatially layered manner. These layers are being worked through one by one as a result of unsustainable practices offshore that rely on continued expansion and technological innovation. Like the 'bomb-lance' whale gun, frontier technologies have rarely enhanced sustainability, but mainly, they delayed the extractive industry's collapse while hurrying the decimation of stocks. With most living resources gone, the frontier is observing a shift towards inanimate resources. In the 21st century, it is a state-corporate partnership that targets deposits of methane ice, petroleum, and rare earth minerals, a strategic resource for IT infrastructure and export-oriented high-tech industries largely controlled by China so far.<sup>93</sup> The race for technological leadership

<sup>93</sup> China controls the vast majority of worldwide rare metal production, and it has a monopoly on separation and purification of rare mineral ores. As of 2018, 58 per cent of Japan's rare earth imports originated from China. See Andrew DeWit, 'Decarbonization and Critical Raw Materials: Some Issues for Japan', *Asia-Pacific Journal* 3 (2021): 13.



in mining deep-sea resources is further accentuated by the high demand for ‘critical rare minerals’ to implement the transition to renewable energies.<sup>94</sup> Once again, the vertical expansion of the oceanic resource frontier is closely tied to geopolitical interests of global significance.

To historicize the ocean proper as a site of resource competition and as a catalyst of anthropogenic change will necessitate a comprehensive methodology based on analytical categories that bypass the limitations of static geographies. ‘In the early twenty-first century’, wrote John F. Richards, ‘the frontier is no longer unending’.<sup>95</sup> While little of earth’s inhabitable space remains unused by humans indeed, the frontier persists as an economic and ideological structure, fundamental to the capitalist logic of continued growth indifferent to the idea of planetary boundaries.<sup>96</sup> The superficiality of human interaction with oceanic frontiers resonates with the capitalist alienation between centres of consumption and the subaqueous sites of extraction. Studying the effect of the ideological and economic mechanisms that drive this alienation can shed light on the cultural biases behind many a crisis of the dawning Anthropocene.

<sup>94</sup> METI, *Kaiyō energyū, kōbutsu shigen kaihatsu keikaku* (2019), 17–18, available online at <https://www.meti.go.jp/press/2018/02/20190215004/20190215004-2.pdf> (accessed 27 Mar. 2020). Noticeably, the quest for rare minerals, driven by conventional resource corporations such as Japan Oil, Gas and Metals National Corporation (JOGMEC), is inextricably tied to the exploration of subaqueous fossil fuels. See JOGMEC, ‘Corporate Profile’, April 2020, <http://www.jogmec.go.jp/content/300196198.pdf> (accessed 28 Apr. 2021). Bold estimates expect as much as 126 billion m<sup>3</sup> of methane ice and a value of around US\$100 billion in rare minerals within Japan’s EEZ. See Yamada Yoshihiko, *Kanzen zukai umi kara mita sekai keizai* (Tokyo: Daiyamondosha, 2016), 86, 98.

<sup>95</sup> Richards, *Unending Frontier*, 22.

<sup>96</sup> Planetary boundaries describe the ‘biophysical constraints to the growth of the economy’, based on the observation that passing certain thresholds of pressure upon the environment can trigger abrupt and chaotic transformations in the earth system. See Johan Rockström et al., ‘A Safe Operating Space for Humanity’, *Nature* 461, no. 7263 (2009): 472–5. On ecological issues around deep-sea mining, see Holly J. Niner et al., ‘Deep-Sea Mining with No Net Loss of Biodiversity – An Impossible Aim’, *Frontiers in Marine Science* 5, no. 53 (2018): 1–10.