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Alexander James Kent
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Mapping Empires: Colonial Cartographies of Land and Sea

7th International Symposium of the ICA Commission on the History of Cartography, 2018

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Preface

This volume comprises a selection of research papers that were presented at the 7th International Symposium of the ICA Commission on the History of Cartography, which took place in Oxford, UK, from 13 to 15 September 2018. It is the fifth volume in a series of proceedings which has been made possible through the partnership between the International Cartographic Association (ICA) and Springer International Publishing.

The 7th International Symposium of the ICA Commission on the History of Cartography adopted the general theme of 'Mapping Empires: Colonial Cartographies of Land and Sea'. The event was jointly organized between the ICA Commission on the History of Cartography, the ICA Commission on Topographic Mapping and the Bodleian Libraries of the University of Oxford. All paper and poster sessions were held at the Bodleian's Weston Library that is situated in the heart of Oxford.

The chapters in this volume discuss the colonial mapping of various regions around the world (the Far East, the Middle East, India, Africa and the Americas), as influenced by cosmopolitan exploration and imperialistic activity during, but not limited to, the 'long nineteenth century' (mid-eighteenth to mid-twentieth centuries). They also provide a focus on some mapmakers of the period and on issues surrounding boundary mapping and toponymy (place names). The rise of European hegemony, which formed the overall historical and geopolitical context of the theme of the Symposium, coincided with a scientific turn that underpinned the evolution of topographic mapping and hydrographic charting. The colonial cartographies examined in the Symposium and discussed in this volume brought forth a rich legacy of mapping that continues to influence the aesthetics and authority of mapmaking today.

The Symposium could not have been possible without the generous support and assistance of staff at the Bodleian Libraries and at Canterbury Christ Church University. In particular, we extend our thanks to Richard Ovenden, Bodley's

Librarian; to Stuart Ackland, Debbie Hall, Peter Hawksworth and Peter Jolly of the Map Room; and to John Hills and Kathryn Roberts of the School of Human and Life Sciences at Canterbury Christ Church University.

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Brussels, Belgium — Soetkin Vervust
Arlington, TX, USA — Imre Josef Demhardt
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Editors and Contributors

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Alexander James Kent is Reader in Cartography and Geographic Information Science at Canterbury Christ Church University (UK), where he lectures on cartographic history and design, GIS, remote sensing and on European and political geography. His research explores the relationship between maps and society, particularly the intercultural aspects of topographic mapping and the aesthetics of cartography. He is also Editor of *The Cartographic Journal*, Immediate Past President of the British Cartographic Society, Chair of the ICA Commission on Topographic Mapping and Chair of the ICA World Cartographic Forum.

Soetkin Vervust is Postdoctoral Research Fellow at the Vrije Universiteit Brussel (Belgium) and Newcastle University (UK). Her research interests lie in eighteenth- and nineteenth-century military cartography, the use of digital techniques for the study of old maps and their applicability to historical geography and landscape archaeology. She has served as Executive Secretary of the ICA Commission on the History of Cartography since 2015.

Imre Josef Demhardt is interested in post-enlightenment cartography, colonialism and regional studies with a focus on Central Europe, sub-Saharan Africa and North America. Besides numerous articles and several books on these subjects, he is involved as Co-Editor of Vol. 5 (Nineteenth Century) in the encyclopedic project on the *History of Cartography*. He holds the Garrett Chair in the History of Cartography at the University of Texas at Arlington and currently serves as Chair of the ICA Commission on the History of Cartography.

Nick Millea has been Map Librarian at the Bodleian Library, University of Oxford, since 1992. He served as Bibliographer for *Imago Mundi* (2005–2010 and 2012–2015). He is also Founding Member and Co-Convenor of The Oxford

Seminars in Cartography (TOSCA). Most recently, he has co-curated the *Talking Maps* exhibit at the Bodleian Library and has written the exhibit's complementary books: *Talking Maps* and *Fifty Maps and the Stories They Tell*.

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The Far East

Sketching Layers in Japan: Mineral Wealth, Geo-bodies and Imperial Territory

Edward Boyle

Abstract In 1876, an American by the name of Benjamin Smith Lyman submitted to the Japanese government a geological map of 'Yesso', which had been compiled under his direction. This map displayed the assumed stratigraphy of Hokkaido, in northern Japan, and is considered the first modern geological map to be produced by an Asian state. This provided a new means of comprehending territory, at exactly the moment the land in question was being re-presented as Hokkaido. The strata exhumed in the course of mapping this land at depth were not limited to those under the Earth. The map was assembled atop a history of Japanese control over the region, one which accounted for the precocious presence of an earlier American survey, conducted under the previous Tokugawa government, which had sought to map mineral deposits in this land of Yesso. These in turn reflected a longer history of mineral extraction, present in the earliest accounts of *Ezo*, and the motivation for Japan to have long 'held the reins' over this amorphous region. The 1876 geological map is a striking example of colonial modernity, through which we are able to observe the institutional mimicry characteristic to, and increasingly emphasized in the study of, late-nineteenth century inter-imperial society. The presence of this map challenges us to recover the various strata atop of which this imperial sociability was able to flourish, and examine the role of the map in incorporating a modernizing Japan within a globally-comprehensible means of territorial authority and control.

1 Introduction

On 10 May 1876, an American geologist, Benjamin Smith Lyman, submitted to his employers a striking map he had made showing the mineralogical make-up of a defined portion of the Earth. The map was intended to provide a summary to the work of the Geological Survey of Hokkaido, which for the previous five years had

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sought to acquire knowledge of this Japanese island. Entitled the 'Geological Sketch Map of the Island of Yesso', it represents the land which is today known as Hokkaido, the northernmost of the four main islands of Japan (Fig. 1). At the time Lyman was drafting his map, however, its status was not quite so secure: not even a decade had passed since the Japanese state had officially laid claim to the region and granted it the name by which it is now known. In August 1869, Japan's new Meiji government had proclaimed that this region, formerly referred to as Ezo, or barbarian land, would henceforth be known as Hokkaido, the 'North Sea Circuit'. This emphasized that the region was now as much a part of Japan as the other seven Imperial Circuits which had traditionally defined the geography of the Japanese state (Boyle 2016: 69–70).

Lyman's reference to the 'Island of Yesso' in the map's title implicitly draws a distinction between the land of Yesso, or Ezo, and the new administrative geography of Hokkaido that would overlay it in the service and interests of Japan. While the notion of Ezo's geography already existed, with the topography of the region having for several centuries been traced out upon layers and layers of paper, a new administrative entity of Hokkaido would be actively brought into existence by the state through the incorporation and exploitation of Hokkaido's territory as another part of Japan. A month prior to the change in the region's administrative designation, the Meiji government had established the *Kaitakushi*, the administrative body responsible for opening up this land and encouraging its utilization in the interests of the Japanese state.[1] It was to the *Kaitakushi* that Lyman submitted his map, and their employment of geologists like Lyman is indicative of the new state's determination to exploit this territory to the full, not only at its surface, but deep within the bowels of the Earth.

This geological sketch is representative of a new vision for the territory, one made possible by the global circulation of a form of geological knowledge able to be represented on the map. This was knowledge with obvious applicability for the ability of the Meiji state to extract resources from its territory. The 'Geological Sketch Map of the Island of Yesso' showed the state's ambition to exploit its territory to a greater depth than before, with the map crucial for connecting 'the territory with what comes with it' (Wood and Fels 1992: 195). The map offered the Meiji government a valuable means of representing its knowledge regarding the qualities of a portion of its territorial body. This chapter will excavate and bring to light the conditions under which this new means of mapping territory became possible for Japan.

[1]There are numerous translations, such as Development Commission, Colonial Office, or Colonization Board, reflecting the name's meaning of 'office for opening the land'. This chapter will continue to refer it as the *Kaitakushi*, which is becoming more common in English-language histories.

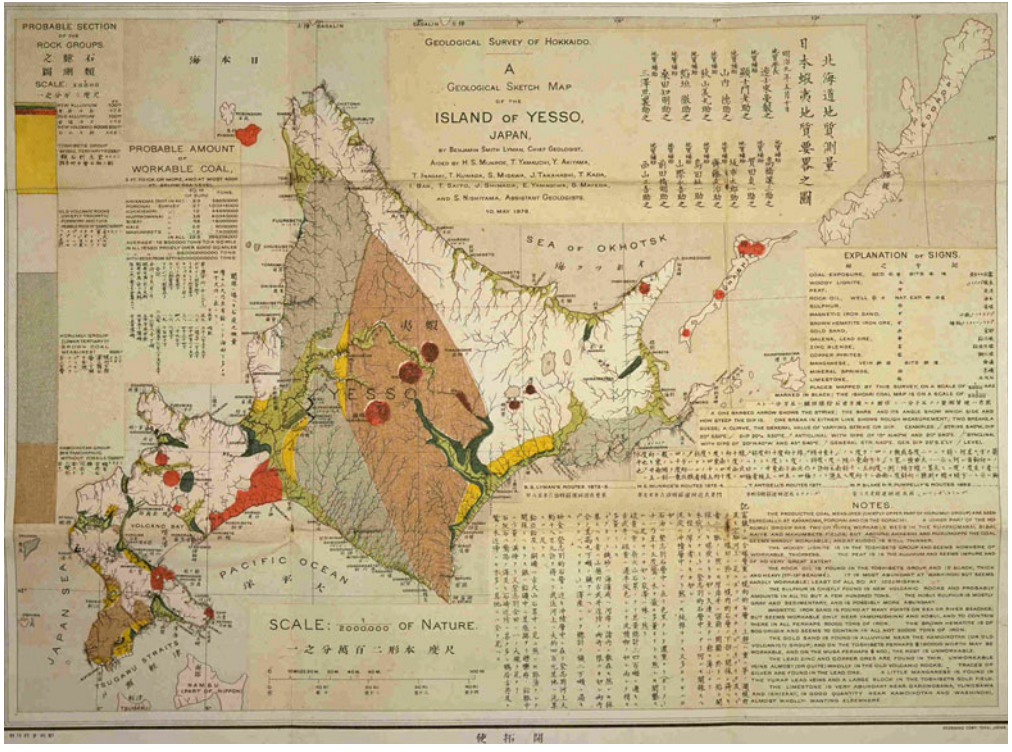

Fig. 1 A Geological Sketch Map of the Island of Yesso, Japan. Drawn at a scale of 1:2,000,000, the map is a coloured lithograph of 1.3 feet long × 0.9 feet wide, or 39 cm × 27 cm. Folds to 21 cm × 14 cm. The map shows the main island of Hokkaido and its surrounding islands. Those off Hokkaido's eastern coast out to Edorop (Etorofu, Iturup in Russian) are today known in Japan as the Northern Territories and are currently disputed with Russia. The map is dense with text in English and Japanese. It lists all the members of the Geological Survey of Hokkaido, and includes geological survey notes, tables showing the amount of coal, and a legend. Published in Tokei (Tokyo) by the *Kaitakushi*. Hokkaido University Northern Studies Collection, map 973 (Courtesy of Hokkaido University Library)

2 Representing Authority

2.1 Ezo on Maps of Japan

The rhetorical power inherent in graphical representations of a state's territory was brilliantly captured in Thongchai Winichakul's notion of the 'geo-body'. This is the state's cartographic claim to sovereign territorial authority that emerges in association with, and response to, the geometrical surveying conducted by European explorers and empires, able to lay down linear boundaries on the map (Winichakul 1994). Prior to this, he argues, Asian states had a much more fluid conception of the boundaries of their polities. In Japan, however, perhaps due to the inherent insularity of island governance, there emerges a stable and replicable representation of the state's geo-body at a much earlier date, in which the national body, while not geometrically-determined, was defined by islands. By the late thirteenth century, we already see the development of a graphic representation of territorial authority through the so-called *gyoki* maps, which offered a map of the provinces and circuits that constituted the administrative ideal of Japan associated with the seventh-century state. This representation displayed the extent of the known world, and covered the main islands of Honshu, Shikoku and Kyushu, as well as a number of outlying islands (Unno 1994: 366–371).

This early modern Japanese geobody did not, however, extend to showing the island known as Hokkaido today, which existed out beyond the administrative reach of the Japanese state, and thus beyond the boundaries of the known world. This was despite the presence of an extensive trade between Japan and the mysterious world of its north, which was known as the 'thousand isles of Ezo', after the 'barbarian' population resident there. By the fifteenth century, Ezo was recognized as a foreign yet actual place, and thus open to political claims, with rulers in northern Japan seeking recognition as governors of this amorphous Ezo region (Howell 1994: 78). The value of such a claim was managing trade with this mysterious northern land, which had assumed almost legendary status by this period. This is shown in the reports of a Japanese from the southern island of Kyushu, who in 1541 told the Jesuits in Goa about the country of 'Gsoo' (Ezo) north of Japan, overflowing with gold and inhabited by huge bearded natives (Boscaro and Walter 1994: 84). Ezo was thus positioned in relation to Japan even prior to Europeans arriving in the country.

On one of the earliest European maps showing the geography of 'Iapam' in detail, a 1585 Portuguese copy of a Japanese *gyoki*-type map, the Japanese geobody is shown as consisting of three main islands. There is no representation of Ezo, but the map, which is orientated to the south, does note the presence of a 'yezoga xima' (*Ezo-ga-shima*, or thousand isles of Ezo) to the east of Japan (Cattaneo 2014, Plate 1). This lack of representation indicates the amorphous character of Ezo in Japan at the time. While the existence of Ezo was dimly perceived, its actual geography remained obscure at the outset of Japan's early modern era, as reflected in both European maps and the Japanese materials on which they were based.

Nevertheless, the connection of Ezo with both strangeness and immense wealth was to be an enduring one, and was sufficient to bring it onto both maps of Japan and Japan's map over the course of the seventeenth century.

2.2 *Securing Precious Metals*

A key reason why Ezo came onto Europe's map of Japan in the seventeenth century is because of its connection with mineral wealth. Together with the search to control the supply of other valuable commodities, like spice, it was a desire to seize control of gold, silver, and other minerals that drove the expansion of European empires (Frank 1998). Visions of gold, in particular, drove a competitive imperialism which gave rise to much European exploration, including of Japan itself, the fabulous wealth of which had been reported to Europe by Marco Polo and others. Consequently, early Western visitors to Japan believed that they had come across a country with significant and easily mined mineral resources. One Spanish trader writing in 1594 believed that Japan was rich in gold, silver, copper, and iron, that mines were found throughout the country, and that ore was extracted with ease (Wittner 2008).

The tales that circulated within and beyond Japan of Ezo's immense wealth led to interest in the region being aroused abroad. European representatives in Japan sought out Ezo in order to secure this famed supply of precious metals. In 1609, Sebastian Vizcaino, an ambassador sent by the viceroy of New Spain to thank the shogunate for aiding the shipwrecked governor of the Philippines, was also charged with finding the truth with regards Ezo's rich gold and silver reserves (Oka 2016: 23). The head of the English factory at Hirado, John Saris, was noting in 1613 that the inhabitants of Yedzo 'have much silver and sand-gold' (Purchas 1905: 488). A desire to attempt to locate this place is visible in the way in which maps of Japan made in Europe did come to feature an island with designations referring to Ezo ('Jezo', 'Jedso', 'Yesso', and so forth), with the earliest extant being the 1617 map of Christophorus Blancus, almost certainly based upon an original map by Ignacio Moreira (Schütte 1962). The famous VOC voyage under Maerten Gerritsz. Vries in 1643 was motivated by a desire to gain access to Ezo's mineral wealth (Hesselink 2002; for more on early European understandings of Ezo, see Boyle forthcoming).

Yet this concern with seeking out and securing sources of gold was not solely the preserve of European states. The arrival of Europeans to Japan coincided with an intense internal struggle for political supremacy, which fuelled the country's first mining boom (Sippel 2006). The massive expansion in output resulted from the desire of domestic political actors to both control mineral resources and foreign trade. The years prior to 1600 saw the opening of numerous new gold, silver, and copper mines, which continued into the early part of the Tokugawa era (1603–1868). The new rulers sought to control the flow of minerals into and out of the country, money supply, and production, with many of the mines, including the famous gold and silver mines on Sado Island, being managed directly by the Tokugawa state itself (Morris-Suzuki 1994: 43–49).

This was the political context within which the isles of Ezo began to be mapped, as part of a general concern of state entities in Japan with the acquisition and management of mineral wealth. The founder of the Tokugawa shogunate, Tokugawa Ieyasu, in 1604 allegedly suggested to Matsumae Yoshihiro, ruler of the Matsumae family ensconced at the southern tip of Ezo, that he should be placed in charge of managing gold mining in Ezo. This expanded the Matsumae's existing monopoly over shipping dues, conferred on the Matsumae family by Ieyasu's predecessor, Toyotomi Hideyoshi (Walker 2001: 36). Gold was therefore crucial to the expansion of Japan's political engagement with this mysterious land of Ezo.

While the story of Ieyasu's suggestion is first recorded in a Matsumae family history from the 1640s, and so may well be apocryphal, it does show the importance of mineral wealth for Ezo by this later date. The Spanish Jesuit Diego Carvalho, visiting Ezo in 1621, has left an account of the placer mining operations being conducted there at the time, through which the rights to utilize sections of the river to pan for gold were effectively rented from the Matsumae (Cooper 1965: 235–236). By 1635, a gold rush, which had begun in 1617 with the licensing of mining at two sites near to the Matsumae's base at the southern tip of the island, had expanded to include at least ten locations much further north, with miners from all over Japan involved in the mining and panning for gold (Kikuchi 2003: 234–238). Consequently, some of the earliest cartographic material that we have of Ezo itself appear to have been privately-made manuscripts illustrating the location at which resources were able to be found. Maps such as the *Matsumae Ezochi ezu* (Map of Matsumae and Ezo) offer a sprawling representation of the region, upon which mountains of gold marked in several places, and may have been made either by or for gold prospectors (Akitsuki 1999: 23, Fig. I-6). Their effect was to show the entire expanse of this mysterious northern land as the source of great wealth, with Ezo represented as a space of extraction, of precious metals, furs and skins, and goods from the continent.

It seems to have been the disruption caused by Japanese gold miners penetrating further and further into Ezo that resulted in the most significant threat to the Matsumae's claim to manage Japan's interests in the region. The Shakushain Disturbance of 1669 at least partly stems from the impact these miners had on Ainu society, due to the disruption of traditional Ainu fishing practices caused by placer mining, which necessitated the demining and diversion of rivers (Walker 2001: 82–84). Intra-Ainu disputes were likely sharpened by conflict over who possessed the right to rent out these sections of the river to Japanese miners, who formed a significant proportion of the Japanese victims of the conflict. A number of maps were produced in the conflict's aftermath, including that reproduced here (Fig. 2). From today's perspective, these show an exceedingly limited grasp of the region's geography, but provide an image of Ezo as a space of extraction, including of precious metals.

Although groups of miners rapidly resumed their travels to Ezo following the Disturbance, however, the place of gold in the region's economy declined rapidly. By the end of the eighteenth century the proceeds from 'the gold-mine taxes fell off so that the continually prospering Ezo trade became the main source of Matsumae

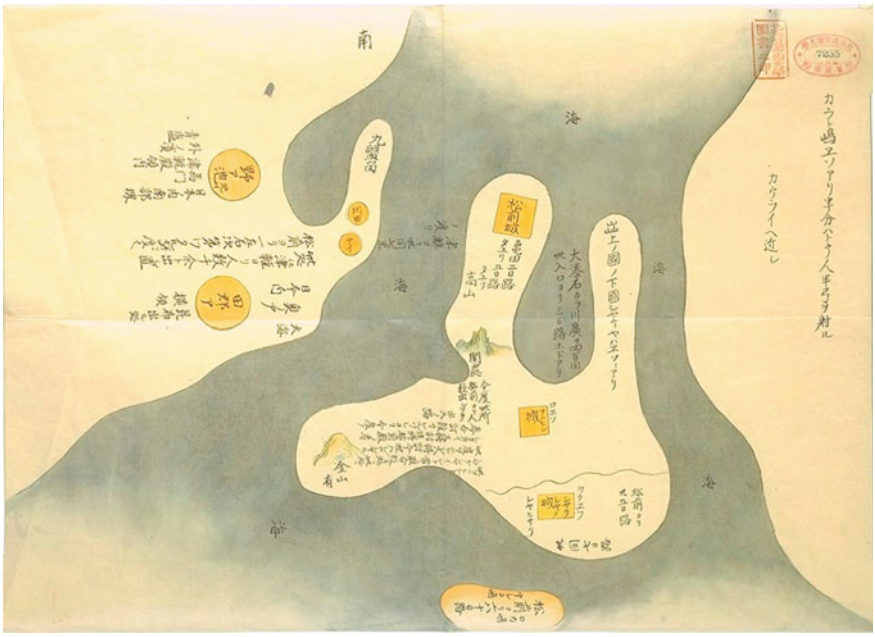

Fig. 2 Ezo Matsumae Nihon no zu [Map of Japan, Matsumae and Ezo]. Anonymous, original c. 1670s. Reproduction of a manuscript map in the possession of Koreto Ashida. 50 cm × 40 cm. Hand-drawn and coloured. Oriented broadly to the West, although it states to the south, Matsumae Castle is in the yellow box at the map's centre. To the left is northern Honshu, to the right is *Karato (Karafuto)*, today's Sakhalin, shown here as part of the continent. The Kuril Islands, whose Ainu inhabitants came to trade fur with the Japanese at Matsumae, are amalgamated as a single 'Roka' (Rakko–Sea Otter) Island at the bottom of the map, sixty days travel from Matsumae. The map offers a schematic (and illusory) political outline of the main island of Ezo divided into three areas, Matsumae, Kuchi-Ezo (Inner Ezo) ruled by Onibishi, and Oku-Ezo (Anterior Ezo) ruled by Shakushain. It was conflict between these two Ainu chieftains which precipitated the Shakushain Disturbance. The 'mountains of gold' are located in Onibishi's territory of Kuchi-Ezo, in the south-east corner of the island. Hokkaido University Northern Studies Collection, map 871 (Courtesy of Hokkaido University Library)

income' (Takakura 1960: 26). Rather than roving Japanese miners, the Japanese presence in Ezo came to be characterized by 'trade fiefs' contracted out to merchant operators under the 'contract fishery system'. The role of the Matsumae continued to be the management of this system of extraction, and their own mapping of Ezo would reflect their claims to the entirety of this space (for an overview of this administrative cartography, see Boyle 2018). Due to the changing economic structure that underpinned the Matsumae's claims to political authority, the presence of gold largely disappears from maps of Ezo, even as Ezo itself comes to be increasingly represented as part of Japan's map.

In the nineteenth century, the representation of Ezo on maps of Japan indicated an expansion in the state's geo-body, and by the time of Benjamin Smith Lyman's appointment, the representation of the island as a 'large frying pan with a short

crocked handle' (Lyman 1877: 2) had been traced out upon layers and layers of paper. For both Japanese and those further afield, the space of Ezo was partially defined by its association with the extraction of precious metals. As in Europe, state expansion and consolidation were associated with territorial control over areas of production, and indeed the wealth and health of the state was explicitly connected to the production and circulation of minerals within it. Governance of the earth's surface could not be separated from activity beneath the soil, as shown by the efforts to administer and control such spaces of extraction. Nevertheless, the representation of such spaces remained at the planar surface of the map itself, making a visual claim to the horizontal extent of the state's authority. Until the nineteenth century, the nation's geo-body was a distinctly flat one.

3 Embodying the Earth

3.1 The Development of Geological Mapping

The rise of geological surveying in the nineteenth century is a notable development in extending the territorial control of the state along a vertical, as well as horizontal, axis. This was obviously an outgrowth of the industrial revolution, literally fuelled by resources extracted from beneath the Earth's crust, as the world's powers began their transition to an 'inorganic' economy (Wrigley 2016). The desire of governments and industrialists to develop mineral resources encouraged a growing reliance upon those specialists able to decipher the world beneath their feet. In response emerged the science of geology, an empirical system of field observation that focussed its attention on the three-dimensional structure of the Earth in order to 'rationalize the search for minerals demanded by industry' (Stafford 1984: 6). The most important means of representing this structure was the geological map, which sought to locate and 'order' the positions of distinct rock formations on a flat topographical surface.

The possibility of representing the positions of these formations across wide areas was demonstrated by William Smith's beautiful geological map of England and Wales of 1815, showing the stratigraphy, the order of distinct mineral strata, of this section of the earth (Winchester 2001). This style of mapping provided the means through which spatial relations in the world below were brought to order and represented in their proper positions, as cartography would the world above (Rudwick 1982). From its inception, the new geological mapping was driven by a belief in the possibility of its universal application. The concern with classifying the various strata being uncovered through the process of mapping led to geology becoming 'a science concerned with correlation of strata across space, leading […] to attempts to develop an internationally accepted nomenclature of strata that could be applied globally' (Braun 2000: 22).

This cemented the importance of such stratigraphic representations to nineteenth century geology, which became a territorial science [with] its essence […] embodied in maps' (Secord 1982). By 1835, the Geological Society of London had persuaded the British government to undertake the geological mapping of the entire country, with the Geological Survey of Great Britain emerging as a branch of the Ordnance Survey and utilizing the latter's material as base maps upon which to evaluate the nation's mineral wealth. A shared concern with territory and extraction meant that colonial geological mapping emerged essentially in tandem with its national equivalent, and thus came to be reflected in a parallel process of institutional development. Already in the year of its founding, the Geological Survey of Great Britain organized its first overseas expedition, to Mesopotamia, and conducted more than 40 overseas geological surveys sponsored by the imperial government prior to the death of its second Director-General in 1871 (Stafford 1984).

In the United States, meanwhile, the efforts of a number of individual American states in the 1820s to conduct geological surveys of their own territory would come to be developed as part of an expansionary national enterprise. The geological survey became another means by which a territory would come to be known, with the geologist expected to locate exploitable mineral resources as sources of wealth (Hendrickson 1961: 358). 'The scientific establishment [was] instrumental in emphasizing to the federal government the importance of the scientific information these expeditions would produce' as federally funded geological expeditions came to be attached to private enterprise's opening of the American West (Kues 2008: 103).

By the mid-nineteenth century, then, geological mapping had emerged as both a universally-applicable means of representing territorial order, and one that would evaluate the extractive potential of that territory. It was a form of knowledge that circulated worldwide, able to be applied in different parts of the world in developing knowledge about territory. It was for this purpose Benjamin Smith Lyman was appointed Chief Geologist and Mining Engineer for the Geological Survey of Hokkaido in 1873, which resulted in the presentation of such knowledge upon the 'Geological Sketch Map of the Island of Yesso' three years later. Lyman's work was part of a new state working to 'state' itself into existence upon layers and layers of paper. The land upon which it was seeking to do so was not, though, a blank canvas atop which a new geological map could be unrolled. While the designation Hokkaido was a mere five years old when Lyman was appointed, it referred to a region which had been constituted on the map through the extraction, of labour, of wealth, and of mineral resources. Although the latter were no longer generally shown on maps of Ezo, they remained present in mental maps of the region.

3.2 Sketching Layers

Initially absent from Japan's geo-body, by the mid-nineteenth century, Ezo had come to exist on Japan's map as an extractive space. The importance of minerals and precious metals in the constitution and condition of the state was an ongoing

concern throughout the Tokugawa period, and the marginal and barbarous space of Ezo was understood as possessing the potential for further precious metal extraction. This provided a policy response able to be advocated in response to a variety of crises. This is visible in the proposals of successive administrators and intellectuals, who put forward gold-mining in Ezo as a policy response to the political problems of the day. In the *Hokkai Zuihitsu* of 1739, for example, Sakakura Genjiro argued for mining Ezo's mineral wealth as an alternative to a previous administration's devaluation of the currency (Stephan 1969: 31–33). Fifty years later, in the midst of increasing concern over the threat offered by Russia to Japan's position in Ezo, the Sendai physician Kudo Heisuke argued that 'Trade with Russia will be a good way to help foster the development of Ezo. If Ezo can be brought under Japanese control, all of Ezo's products including precious metals will be available to us' (Keene 1969: 108). These abstract proposals had occasionally been supplemented by more empirical investigation, such as in 1766 when a prospector from Edo, Yamashiroya Yasuemon, reportedly crossed over to Ezo to investigate these famous gold fields, and returned home disappointed. Despite this absence of actual gold production, Ezo was retained as a space of precious metal extraction on the mental maps of Japanese, as well as Europeans.

In the political confusion that gripped Japan in the aftermath of the arrival of Commodore Perry's 'Black Ships' and the Tokugawa Shogunate's reluctant agreement to 'open' the country, advocating for the exploitation of Ezo as a source of precious metal emerged once again as a policy option. This is shown in the Tokugawa government's engagement of a pair of American geologists in the early 1860s. The central government had assumed responsibility for most of Ezo from the Matsumae family in 1855, and administered the region from Hakodate, which was also declared a Treaty Port in 1858. The plan to hire the two Americans appears to have originated with Muragaki Norimasa, who in 1860 served as Vice-Ambassador on the Japanese Embassy to the United States. Upon his return to Japan in 1861, he was appointed as one of the two governors of Hakodate responsible for the administration of Ezo. On 23 April 1861, the American Consul, Townsend Harris, was instructed by Norimasa to write to C. Walcott Brooks, a commercial agent employed by the Japanese government. Brooks was commissioned to 'engage two gentlemen who are thorough Mineralogists and practical Mining Engineers to examine their mines of Gold, Silver, Copper and Lead, and give them instructions as to the best manner of working them […] they will be conveyed to Hakodada [Hakodate]' (Hasegawa 1986: 99). One of them later noted that 'the object of our engagement with the Government was the exploration of its lands on the island of Yesso, and the introduction, if found advisable, of foreign methods of mining and working metals' (Pumpelly 1869: 144).

The biographies of the two men selected for this task reveals how surveying the state's subsoil had become a global phenomenon by the mid-nineteenth century. The senior of the two, William Phipps Blake, had graduated from Yale in 1846, served as official government geologist on the Pacific Railroad Surveys in the American southwest from 1853–1855 (the surveys of Whipple and Williamson) and investigated mining resources in Carolina. Returning to California to seek the

position of state geologist, he lost out to a rival, Josiah Whitney, and surveyed the California gold fields before agreeing to go to Japan (Testa 2002). A prolific author of over 200 articles, a review of his work in the year of his death noted that he made significant contributions to the geology of Arizona, California, Utah and Wisconsin, and of Mexico, Alaska and England, in addition to his work in Ezo (University of Arizona 1910). His junior colleague, Raphael Pumpelly was a fellow New Yorker who had travelled to Europe rather than attending Yale, graduating from the Freiberg University of Mining and Technology in 1859, before returning to the United States and being employed as a mining engineer in Arizona in 1860–1861. While his own notes suggest he was busier fighting off Apaches than collecting samples, he presented his studies at the California Academy of Sciences in August of 1861, prior to heading to Japan (Kues 2008). Following the conclusion of his work there, he conducted a survey of northern China and went on to lead a distinguished career, as a nominal Harvard Professor and leader of archaeological expeditions to Central Asia.

Blake and Pumpelly left San Francisco on 23 November 1861, landed in Yokohama on 21 February 1862, and in Hakodate on 5 May that year. They established the School of Mines and Applied Science in the town, which they struggled to equip in order to instruct their five students. Blake offered instruction in gold mining, metallurgy and chemistry, while Pumpelly taught geology, mining, blasting and surveying. Their employment may be seen as a perfect example of colonial modernity, with a series of practices unable to be carried out in the metropole, due to the opposition they would arouse, being displaced to marginal areas. It was from this marginal Ezo region that certain of these practices were transmitted back to the rest of the country. A notable example of this was Pumpelly's powder blasting, which he recorded '[…] was so successful that before I left Japan I was told that several princes had sent men to Yurup [in Ezo] to learn the new process' (Pumpelly 1869: 190). Here, we see the movement of a particular practice that has first occurred in Ezo to the rest of Japan, and consequently this marginal and barbarian space comes to serve as a contact zone (Pratt 1992) able to mediate between Japan and the world. In that respect, Ezo continued to serve as the margins of Japan.

However, the practices which the two men brought with them to Ezo did not only work to define it in relation to Japan, but the rest of the world, as well. This is shown in their geological investigations, which signified the incorporation of this region within a globalizing geological science, in which all of the Earth's subsurface would be correlated and represented upon paper. This was a form of knowledge with a global reach, through which Pumpelly's experience of Corsica and Vesuvius would 'enable him to distinguish the foundation rocks of the island, a sequence of metamorphosed sediments penetrated by granitic and basic eruptives, and the superjacent volcanic deposits of various kinds' (Willis 1925: 37). This ability to relate the subterranean territory of Ezo to elsewhere in the world enabled the two American geologists to seek to decipher its stratigraphy, and to communicate that knowledge through the sketching of geological maps.

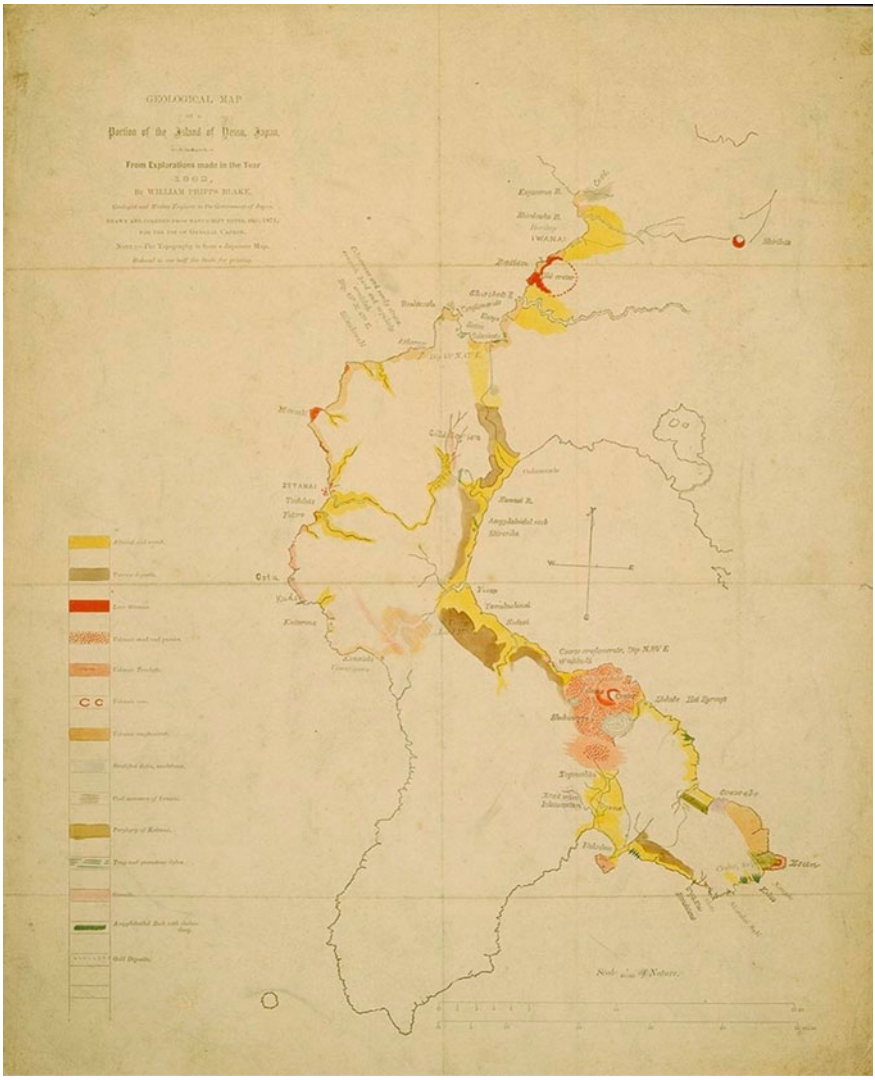

Fig. 3 Geological Map of a Portion of the Island of Yesso, Japan by William Phipps Blake. Scale 1:460,000. 56 cm × 44 cm. Lithograph printed, hand-coloured. Made for the use of the *Kaitakushi*'s General Capron in 1871, this map accompanied the report on the 1862 survey, which he submitted to the *Kaitakushi* in that year. As with Pumpelly's map, it sketched the stratigraphy of the 'short crocked handle' of Hokkaido, the Oshima Peninsula, where Japan's control of Ezo was formalized and long-established. The presence of gold was noted near Kunni, reflecting his and Pumpelly's surveys of the old workings there. Hokkaido University Northern Studies Collection, map 895 (Courtesy of Hokkaido University Library)

The experiences of Blake and Pumpelly in Ezo were summarized on the maps that they produced. Each of Pumpelly's three books that mentioned his engagement in Yesso, which were published over more than thirty years, incorporated the same map of the Oshima Peninsula in southwest Hokkaido, entitled a 'Geological Route-Sketch, Southern Yesso, Japan' (Pumpelly 1866: 159–160, Plate 8; Pumpelly 1869: 143; Pumpelly 1918: 307). This was based on the three expeditions that himself and Blake were able to conduct over the course of the year they were employed. Blake, the senior of the two men, did not append a map to his only published report on the Yesso Expedition (Blake 1874), but was able to supply a 'Geological Map of a Portion of the Island of Yezo, Japan' when requested a decade later. The copy of this map made by Benjamin Smith Lyman still exists in the latter's papers in Amherst (Kim 2009: 49). In addition, Hokkaido University Library holds eight copies of Blake's map, 'drawn and colored from manuscript notes' by Benjamin Smith Lyman, and printed by the *Kaitakushi*. It is this map which is reproduced here (Fig. 3).

These maps made by Blake and Pumpelly share two notable characteristics; acknowledgements of their limitations, and that their representation is literally dependent upon topography 'from a Japanese map'. The two geologists both took pains to emphasize the preliminary nature of their findings, emphasizing that their maps were mere sketches. Their ability to produce such sketches, though, stemmed from the partial incorporation of Ezo into Japan's geobody, which furnished the two geologists with the cartographic material atop which Ezo's body was able to be fleshed out. 'The geographical basis of this map is taken mainly from an unpublished Japanese survey of Yesso, in the Imperial archives of the vice-royalty of Yesso' (Pumpelly 1866), access to which provided the two geologists with the means to construct this composite image of Ezo's stratigraphical layers. This process of constructing a picture of Ezo's territory at depth was one that would continue apace a decade later.

4 Finding Value

4.1 Institutional Depth

The *Kaitakushi* was the institutional vehicle through which the new Meiji government would officially incorporate Ezo into Japan, and through which Ezo's colonially-modern status would be formalized. Hokkaido would subsequently become Japan's 'internal colony' (Imanishi 2008), serving as an experimental station from which experiences and administrators would be subsequently exported to other Japanese colonies elsewhere in Asia. In that sense, as has been widely recognized in recent years, Hokkaido needs to be seen as part of the history of the Japanese empire (Oguma 1998). Hokkaido was also, however, imperial in another sense; with its territory being drawn into intra-imperial networks of production and

circulation, of knowledge, personnel, and materials. The employment of foreigners by the new Meiji government in its first fifteen years is much commented upon, both at the time and today, with numerous British, French, German and American advisors attached to various ministries (perhaps 220 individuals in 1872, for example). The circulation of these men (and they were exclusively men) from other countries into Japanese government service was crucial to Japan's recognition as a 'sovereign' nation and later accession to the hallowed ranks of 'international society' (Gong 1984; Suzuki 2009).

While an earlier era of scholarship perceived development through a national lens, however, the fact that this society consisted of expansionist powers whose relations were characterized by intra-imperial cooperation as well as competition has increasingly come into focus over the past two decades. The role of such administrators and technicians in aiding the establishment of a modern, expansionist imperial state is visible in its most concentrated form in the activities of the *Kaitakushi* in Hokkaido. Its Commissioner, Kuroda Kiyotaka, decided that the experience of the American West offered the most obvious parallels for Japan's efforts to colonize this territory, and in January 1871 went to the United States in order to consult with President Ulysses Grant about hiring experts to assist in Japan's mission. At Grant's recommendation, the Commissioner of Agriculture, Horace Capron, was put in charge of this search, before ultimately taking the job himself. Capron initially travelled to Japan with three assistants, one of whom, Thomas Antisell, was responsible for geology.

Antisell was born in Dublin, trained as a surgeon there and in London, before studying chemistry in Paris and Berlin, returning to Dublin in 1844 and lecturing in botany whilst contributing to the geological mapping of Ireland. Having been forced to emigrate to the United States in 1848 for his role in publishing a Republican newspaper, Antisell opened a clinic in New York while lecturing on chemistry. He then served, like William Blake, as official geologist to a Pacific Railroad Survey, that of Parkes, which surveyed those parts of southern Arizona, New Mexico, and California lying along one of four proposed routes for the so-called Southern Pacific railroad. 'Antisell's report is the first detailed description and interpretation of the geology of southwestern and south-central New Mexico' (Kues 2008: 92), and was to be the only other geological survey with which he was involved. Antisell subsequently became the chief examiner of the US Patent Office, a lecturer in chemistry at Georgetown University, and, from 1866, chief chemist to the Department of Agriculture. It was through this connection that he was taken to Japan.

While Capron remained in Tokyo after arriving in August 1871, it was Antisell and Major Warfield, a civil engineer, who were initially sent to Hokkaido later that year, where they spent two months surveying the southwest of the island. In addition to reporting on soils, flora, topography, possibilities for water power and the climate, Antisell undertook what he termed a 'geological reconnaissance of Hokkaido'. It appears that Antisell's pessimism regarding Hokkaido's development prospects led to conflict between Capron and himself, and his removal as geologist. Relations between the two men deteriorated to the extent that Antisell's reports were excised from those that Capron submitted at the end of his term, in the *Reports*

and Official Letters to the Kaitakushi (Capron 1875), where they were replaced by the 'Abstract of the Report of W. P. Blake'. By this time, Antisell had left the *Kaitakushi* and was working as a chemist for the Ministry of Finance, before leaving Japan in 1876. Although Antisell's contribution was largely excised from the official record, his surveys and maps did end up in the hands of his successor as geologist, Benjamin Smith Lyman. Lyman's papers at the University of Massachusetts in Amherst contain a copy of Antisell's own geological sketch map of the Oshima peninsula (Kim 2009: 50, Fig. 12), where their presence shows how successive rounds of geological investigation overlaid one another in the creation of Hokkaido's stratigraphical map.

4.2 The Value of Representation

Benjamin Smith Lyman arrived in Japan with an Assistant, Henry Smith Munroe, in January 1873. Lyman had been born in Massachusetts in 1835 and graduated from Harvard two decades later. He did some work for geological surveys being conducted by his wife's uncle, J. Peter Lesley, and went to study in Paris at Ecole Imperiale des Mines in 1859. He then, as Raphael Pumpelly had, attended the Freiberg University of Mining and Technology, the world's oldest mining school, in 1861–1862. Returning to the United States, he began working as a consulting mining engineer, and conducted surveys in Pennsylvania and Nova Scotia, as well as also experiencing the US frontier in Arizona and California. In 1869, he was hired by the British government to evaluate the oil lands of the Punjab. He returned to the United States in mid-1871, advocated for the importance of surveying in geological expeditions (Lyman 1873), and was hired by the Japanese government at the end of the following year.

Lyman conducted geological surveys of Yesso in 1873, 1874, and 1875. The 1873 expedition was undertaken with Munroe and six students, who split up and conducted geological surveys at a number of mountains and oil fields on the island's south-western peninsula. Lyman here was following Kuroda's initial instructions, in which the survey was to confine itself to the 'four southwestern provinces', or about one-third of the island (Lyman 1874: 3). In addition to this, Lyman also ventured forth to investigate locations like Shakotan, Jozankei, Noboribetsu and Esan. The following year saw the ten students split into two parties, with half surveying gold fields under Munroe, and the other half investigating the geology of what would become the coal fields of Horonai, Ishikari, and Sorachi. Lyman himself, with one translator and ten assistants, made a virtual circumnavigation of the island in the course of a 150-day long journey that lasted from May to October. This was his only opportunity to gather data for much of the territory he was charged with mapping. The 1875 survey ran for about 100 days between June and October, and was primarily for the close investigation of coal fields around Onuma and Sorachi (Imai 1965).

During the winter, the members of the survey spent their time at the *Kaitakushi*'s school in Tokyo, and engaged in producing the results of this surveying work in material form. As Lyman's final report made clear, the production of these materials also involved the students and was considered part of their training. By the conclusion of the survey, the *Kaitakushi*'s press in Tokyo had produced over 900 pages of reports, together with numerous small-scale maps of various coal fields 'well lithographed and photographed', if rather crowded as a result of giving all the information in both English and Japanese (W 1877: 523). The *Geological Sketch Map of the Island of Yesso* was intended to provide a synoptic overview of the entire survey, even though, as Lyman himself admitted, in many places 'it cannot lay claim to much exactness' (Lyman 1877: 102).

The map was drawn on the basis of the special surveys conducted by Lyman and his Assistant Geologists, together with 'hundreds of dips observed' outside of these. It also, though, laid claim to the earlier geological investigations which had been undertaken on the island, giving details of four separate routes of geological expeditions (Fig. 4). In adding those of Blake and Pumpelly in 1862 to the surveys of Antisell, Munroe, and Lyman himself, the map demonstrated how the institutional knowledge embodied on the map was more extensive than the institutional setting within which the map was made. Although the survey of Blake and Pumpelly preceded the establishment of the *Kaitakushi* by several years, the globalizing geological milieu within which the two American geologists operated meant that the knowledge they acquired was made available to and utilized by their successors. Yet the continuity demanded for the map's completion was more extensive than this, for as Lyman noted, the actual representation of territory was

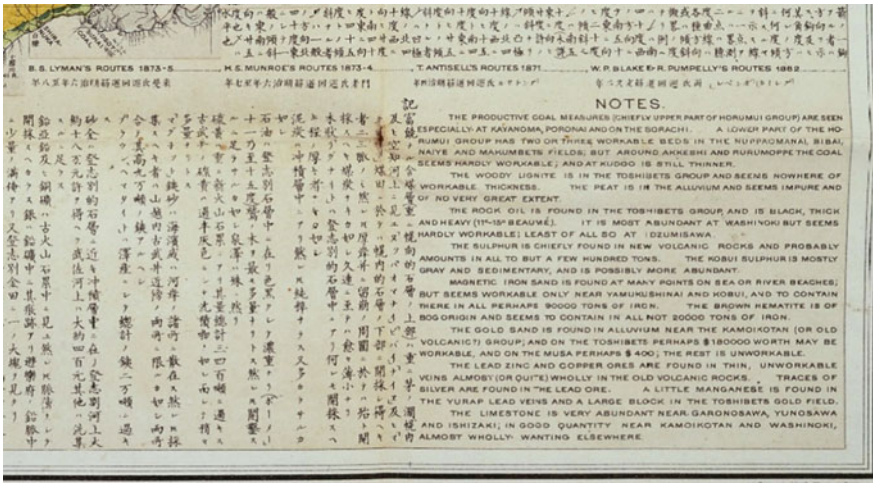

Fig. 4 Detail from *A Geological Sketch Map of the Island of Yesso, Japan*, bottom-right of the map. Shows the four separate surveying expeditions marked on the map, while below this are 'Notes on useful minerals present in Yesso', including those for 'gold sand'. Hokkaido University Northern Studies Collection, map 871 (Courtesy of Hokkaido University Library)

'copied from Matsuura's large map of 1860' that in turn based its representation of the coastline on the maps associated with Ino Tadataka's survey of 'nearly a hundred years ago' (Lyman 1877: 101). In this respect, his map overlays the same terrain as that of Blake and Pumpelly, while also incorporating the latter's discoveries.

The finished geological map by Lyman and his Assistant Geologists therefore provides us with a layered picture of the land of Hokkaido, one that emphasizes its incorporation within a global practice of geological surveying. An Ezo region that had been slowly and unevenly incorporated into Japan's geo-body over several centuries was resurveyed and remapped as a geological space. This served to grant Hokkaido corporeal form, in which the territory would be made useful to the state through the 'working of Yesso minerals'. Most significantly, it served to engender knowledge of the vast coal reserves in Ezo, a matter of 'great national importance' that would assure 'future great wealth to the empire'. The maps very existence, indeed, would improve the government's 'credit' (Lyman 1877: 107), providing it with a future revenue source against which to make loans. Yet this new mineral wealth, with the discovery of vast fields of coal, was in contrast to that of gold, whose extraction had been central to the emergence of Ezo on the map. Both the map and Lyman's report were unsparing, noting of the gold sands on the island that, with two partial exceptions, 'the rest is unworkable'. Under Lyman's unsparing gaze, Ezo had moved from a rich repository of precious metals to one whose wealth was bound up in its coal beds.

Two centuries earlier, maps made in Japan had represented Ezo as a region in which gold 'came with' the territory, its presence serving to justify the determination of Japanese mapmakers to incorporate this barbarian space within the nation's geobody. The globalizing practice of geological mapping in the mid-nineteenth century provided another means through which Ezo's place within this Japanese geobody was able to be represented. The presence of these geologists in Japan points to the emergence of a strata of specialists, able to circulate freely within not only national contexts, but one broadened into an intra-imperial web of knowledge that extended to a marginal, remote Ezo region, in order to provide depth to Japan's knowledge of its own geo-body. Through its ability to make visible knowledge regarding Ezo's subsurface composition, the representation of stratigraphic layers on the 'Geological Sketch Map of the Island of Yesso' granted literal depth to Hokkaido's incorporation into Japan's geobody.

5 Conclusion

The geological map produced by Benjamin Smith Lyman in 1876 represented a new form of stratigraphical knowledge, whereby different subsoil mineral formations were compared and correlated globally, in order to attempt to capture the value of a territory through discerning 'what comes with it'. The Sketch Map which brought this new, stratified body of Hokkaido into existence was not only

dependent upon the area's representation upon layers and layers of paper, but the ability to bring a particular form of knowledge to bear. It was this knowledge, enabling geological 'surveys and maps that will answer all practical mining requirements', that made it possible to draw the connection between the representation of territory on the surface and knowledge of its depths. This drew Hokkaido into a world of imperial competition that was dependent upon the control and exploitation of resources beneath the Earth's surface, while a state's control of territory was represented and demarcated across the flat planar surfaces of the map itself.

The map presaged the future value of the internal colony of Hokkaido to the Japanese state in important ways. The coal beds which Benjamin Smith Lyman saw layered into its territory would power the nation's inorganic economy for over a century, bringing fuel for the engine of progress with the territory represented on the map. These geological maps provided a different means of representing the wealth of Ezo to Japan, one which overwrote visions of gold with geological knowledge of this body of the Earth. In the event, Lyman's confident assertions regarding the 'unworkable' nature of Ezo's gold fields were to be undermined by a gold rush of the 1890 s and the 1915 discovery of the Konomai Mine, which remained in production until 1973. This did not, though, diminish the value of Lyman's Sketch Map for the state, which re-presented Ezo as an integral part of a modernizing Japan though the island's incorporation within a globally-applicable means of territorial representation.

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