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Ice in Motion: Panoramic Perspectives and Moving Pictures

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ABSTRACT. The Arctic panorama has often been framed by conversations of the Victorian imperial imaginary and was originally conceived to showcase anglophone exploration, heroism, and scientific discovery. This paper explores the complementary and multifaceted visual representations of Arctic glacial ice, from the Victorian spectacle of the panorama to contemporary virtual reality technology. I look at how glaciers have been depicted, documented, and presented within panoramic media over the past two centuries. I explore how ice moves through both time and space, confronting climate histories within physical and spatiotemporal ideas of movement. Alongside the materiality of ice, I consider the modes of observation involved in creating and viewing these panoramic pictures. In making Arctic exploratory history tangible and visual, I do not seek to simply revive a sublime imaginary and document ice loss but look to the panorama as a method of engaging polar exploration and scientific discovery in the study of visual culture.

Keywords: Arctic; landscape painting; panoramas; ice; ecocritical art history

RÉSUMÉ. Le panorama arctique a souvent été représenté en fonction des conversations sur l'imaginaire impérial victorien et à l'origine, il visait à mettre en évidence l'exploration, l'héroïsme et les découvertes scientifiques anglophones. Cet article se penche sur les représentations visuelles multidimensionnelles et complémentaires de la glace de l'ère glaciaire de l'Arctique, allant de la présentation victorienne du panorama jusqu'à la technologie de réalité virtuelle contemporaine. J'examine la façon dont les glaciers ont été dépeints, décrits et présentés dans les médias panoramiques au cours des deux derniers siècles. J'explore comment la glace se déplace dans le temps et dans l'espace, tout en approfondissant les histoires du climat en tenant compte des idées du mouvement physique et spatiotemporel. En plus de la matérialité de la glace, j'étudie les modes d'observation qui entrent en jeu dans la création et la visualisation de ces images panoramiques. En conférant un caractère tangible et visuel à l'histoire de l'exploration de l'Arctique, je ne cherche pas simplement à redonner vie à l'imaginaire sublime et à consigner la perte de glace; je cherche à faire en sorte que le panorama joue un rôle dans l'étude de la culture visuelle par le biais de l'exploration polaire et des découvertes scientifiques.

Mots-clés : Arctique; peinture de paysages; panoramas; glace; histoire de l'art écocritique

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INTRODUCTION

Ice is a moving surface. It is forever in motion; glaciers expand and recede; icebergs and ice floes are carried downstream by the water upon which they travel; an icy surface crunches beneath your feet or under the pressure of the stern of an icebreaker ploughing into its fracturing mass; and its liminal state between liquid and solid is under constant seasonal flux. In Robert Burford's *View of the Polar Regions* (1850, Fig. 1) pinnacles and peaks of icebergs and glacial crevasses dominate the expanse of the Arctic summer panorama. Glaciers and icebergs have merged in a white and icy haze with, as Burford (1850:3) wrote, the "whole forming a sublime and splendid exhibition of icy grandeur." Along the horizon, the uneven surface of the coast of Greenland acts as a backdrop to what Burford (1850:12) described in a panorama booklet as "the manufactory of icebergs." Where the geographical location needed to be accurate in the panorama, scenes were otherwise embellished. The calving of icebergs from the "barrier of ice, a vast glacier" is shown as towering over the entrapped HMS *Investigator* to the left, hemmed in-between the face of the glacier and the "Enormous Iceberg," as it is written on the image, recently calved from its icy mass (Burford, 1850:3). The gathering of men spearing a polar bear out in the fjord, much like the calm sea, appear oblivious to the effects of the iceberg upon the water's surface. From the shock and awe of far-flung lands to the spectacle of large-scale calving events, the materiality of ice facilitates the modes of observation involved in creating and viewing these panoramic images at the centre of this paper. No longer is ice limited to a spectacularly sublime environment displayed for our delectation. While it performs this role in the nineteenth-century panorama,

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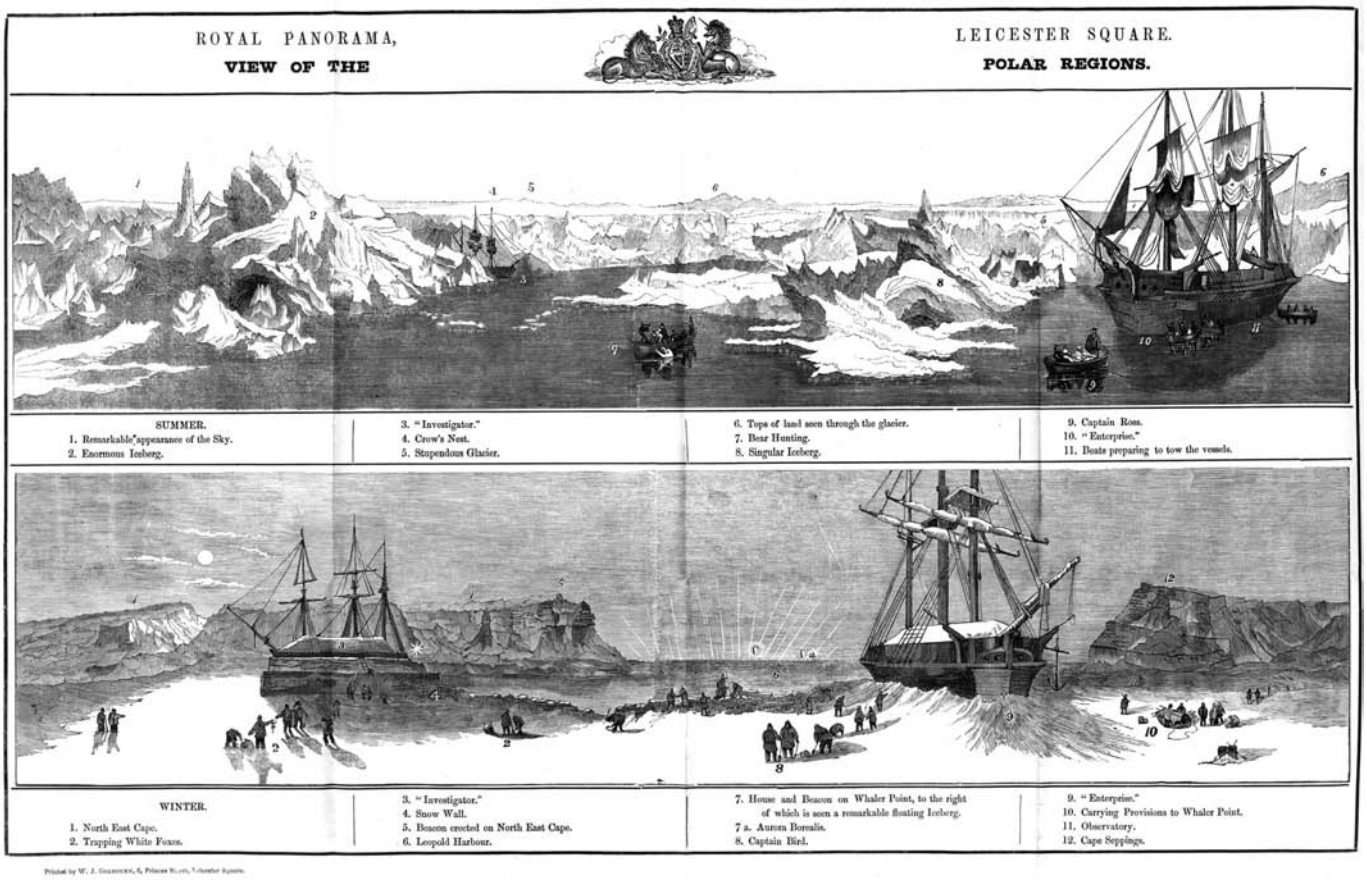


FIG. 1. Robert Burford, *View of the Polar Regions,* 1850. From the booklet entitled, *Description of Summer and Winter Views of the Polar Regions*. Image: Baldwin Collection of Canadiana, Toronto Public Library, Ontario, Canada. Public Domain.

it also renders both itself and the landscape portable, physically and thematically. Here, the crenelations of panoramic ice disrupt any boundaries between scientific observation, Arctic exploration, and artistic imaginaries. In making Arctic exploratory history tangible and visual, I do not seek to simply revive a sublime imaginary and document ice loss but look to the panorama as a method of engaging polar exploration and scientific discovery in the study of visual culture.

Originally conceived to showcase anglophone exploration, heroism, and imperialism, the Arctic panorama is often framed by conversations of a Victorian imperial imaginary. I identify the broader, complementary, and multifaceted visual representations of Arctic glacial ice from the Victorian spectacle of the panorama to contemporary panoramic repeat photography and virtual reality (VR) technology. Nancy Rose Marshall (2021:3) recalls an English scientist writing in 1875 that "science and art … act and react upon each other with an almost exchangeable importance. Science is theoretical art; art practical science." In the nineteenth century, state-sponsored and individual interest in cartography, meteorology, astronomy, mineralogy, and geology sought to provide a baseline history of the world. Understanding the connection between "vision, knowledge, and empiricism" was a goal shared by the sciences and the arts, with the nineteenth-century art critic John Ruskin advocating for artists to engage in unmediated, close encounters with nature (Marshall, 2021:12). Ruskin (1884) was one of the first to express a moral concern with industrial pollution and climate change, as it is now understood, both of which are topics of concern within studies of the Anthropocene. He also wrote in his autobiography *Praeterita* that upon visiting Milan, Burford's Leicester Square panorama had prepared him for "the view from the roof of Milan Cathedral, when I had no hope of ever seeing the reality" (Ruskin, 1907:168). Ruskin (1907:168) continued to describe how Burford's panorama "was an educational institution of the highest and purest value." Borrowing from the panorama's pedagogies, I argue that the historic panorama simultaneously visualised and communicated Arctic scientific discovery and its technologies, with an eye toward discussing the environmental and sublime visual histories of the cryosphere.

By positioning ice as a material agent within its own exploratory and scientific history and narrative, I am less concerned with a human nostalgia for what has been lost or is being lost. Identifying the role of ice as an elemental matter in the panoramic image, I argue instead for an understanding of the liveliness of ice, grappling with its materiality, locality, and dynamic ability to inspire across spatial, temporal, and sensorial panoramic platforms.

The term cryosphere, coined by scientists to describe the frozen water parts of the Earth, has resulted in several subsequent typologies used to identify the cultural facets that exist within the world of ice. The emergent term and idea cryoscape was first used by Marcus Nüsser and Ravi Baghel (2014) to consider glaciers as more than a physical landscape and accounts for them within epistemic, social, and cultural practices. More historically specific, Sverker Sörlin (2015) looks to cryo-history to denote the historical role of humans in determining the fate of ice in the Anthropocene, while Elizabeth Leane (2021) suggests the term cryo-narratives as a reference point for broader and more discursive studies surrounding the cultural history of ice. Klaus Dodds and Sörlin (2022), moreover, position such interdisciplinary discussions within the new field of ice humanities. With over 200,000 glaciers and ice caps situated around the globe, accounting (at the time of writing) for over 5.8 million square miles of ice (National Snow and Ice Data Center, 2013), it is no wonder that these icy environments continue to hold such an allure. Of these, fifty percent of the world's glaciers are located within the Arctic. Thus, by viewing historic panoramic imagery alongside contemporary panoramic or wide lens repeat photography, I foreground the interactions between art, science, and the sublime. Writing on the performative qualities of ice in both the Arctic and Antarctic, Leane et al. (2020:7) identify their "icy commonalities" while remaining "alert to their heterogeneity." Although no literary study nor visual analysis can hope to recognise the full extent of our planet's icy surface, I shift focus from art history's fixation on romanticized accounts of the Arctic, Antarctic, and Alpine sublime by centering the globalizing agency of ice (Potter, 2007; Hansson, 2015; Cao, 2017). Where the Arctic sublime implies a romantic and imperial aesthetic of imposing and dangerous landscapes, "thinking after the Arctic sublime," as Benjamin Morgan frames it in the title of his 2016 paper, accounts for the environmental and scientific histories of the panorama, aesthetic experience, and polar exploration.

Ben Orlove et al. (2008:3) note how "the nineteenth century picture of an earth whose surface is continually being modified by very slow natural processes is being replaced by the image of a planet that is being altered by rapid processes caused by humans." A scholarly preoccupation with climate change and a so-called ruins fetishism as regards the study of ice continues to argue that "icescapes are inhospitable places where the only things alive are invasive or on the brink of collapse. And, where consequently, Indigenous cultures risk being 'frozen' into static histories of survival amidst trackless waste" (Duckert, 2013:69). Considering glaciers in the context of early modernity and an "elemental ecocriticism," Jeffrey Jerome Cohen and Lowell Duckert (2015) acknowledge the implicit relationship between humans and the frozen environment. Duckert (2013:69) further argues that "Humans exist in an icescape that they must master, exploit or escape." As the panorama was frequently used to justify colonial expansion and ratify feelings of national pride and identity, frozen environments were thus perceived as desolate wastelands awaiting colonisation, blatantly removing any populated communities from written and visual narratives. Leane et al. (2020:16) write of the "tendency in Western thinking to empty out icescapes as non-human or inorganic environments." This tendency was, and still is, a prevalent trend among Western artists and art historians, particularly as they construe the circumpolar North and leave its many Indigenous communities absent from their work. It is worth mentioning at the outset, that in this instance, this paper does not rectify the comment made by Leane et al. (2020), but rather in acknowledging the absence of the human and non-human in the ensuing works, focuses instead on the agency of ice.

By recognising how Arctic glaciers and sea ice have been depicted, documented, and presented within panoramic media over the past two centuries, this paper contrasts how the panoramic image was used in its nineteenth-century circular and moving form, and subsequently as a tool for communicating global environmental change. I account for variable modes of movement, accounting for the mobility of subject matter, of the panorama, and of the spectators. My analysis encompasses Burford's large-scale circular panoramas and the subsequent moving panoramas of Messrs. Marshall, alongside the inspirational expeditionary watercolours of Lieutenant Frederick William Beechey. These works are not limited by national boundaries but move across landscapes around the circumpolar North, including Svalbard, Greenland, and the Canadian Arctic. I explore how ice moves through time, space, and medium, and how it confronts and affects climate histories within physical and spatiotemporal ideas of movement (Salazar, 2018; Simonetti and Ingold, 2018). In turn, I recognise the quiddity of ice, from its colour to its behaviour; a melting, shifting, sliding, and cracking surface, which humans have explored, documented, painted, and transformed.

THE SENSORIAL SPECTATOR

Until the mid-nineteenth century, visual representations of the Arctic were frequently reliant on naval expeditions and officers. Coastal delineation was a skill taught at the Royal Naval Academy and other military colleges, yet these profiles contrast with the notably frequent omission of ice in Arctic maps and charts which otherwise noted water currents, the northernmost tree line, and other pertinent, yet equally variable, environmental information (Gapp, 2021a). Images of charted spaces often failed to note the substance that, ironically, hindered and prevented colonial expansion and exploration, but which remains crucial for Inuit hunters and Arctic wildlife (Krupnik et al., 2010). Often charts, maps, and sketches by said officers and artists were later converted to life-size panoramas. This can be said of the inspirational drawings made by Lieutenant William Henry Browne that inspired Burford's *View of the Polar Regions.*

The same can be said of mountain cartography which often consolidated geology and glaciology in the panoramic format. Where ice is often notable in its omission from cartographic visualisations of the search for the Northwest Passage, in Burford's accompanying description for *View of the Polar Regions*, as in the panorama itself, ice is very much central to Sir James Clark Ross's (nephew of Sir John Ross) 1848–49 expeditionary account and the ensuing visual narrative. Through the shading of the fragmented faces of fractured ice, the sea and icebergs begin to merge, casting shadows over a topographically undefined landscape. While visually static, the implied mobility of the ice renders the landscape indeterminable, despite Burford localizing the scenes in "Glacier Harbour" (annotation on image) on Greenland's west coast. As Eavan O'Dochartaigh (2022:123) writes, "The reader is placed firstly within seasons—times rather than places—and secondly within 'polar regions,' a term so vague it could apply to anywhere within the Arctic and Antarctic Circles." In addition to the icy imagery of the panorama, ice, and the modes by which the panorama could be viewed, offered a sensory and expansive experience of the Arctic, one that manifested expeditionary accounts of and scientific interest in the northern cryosphere.

Where the moving panorama regularly travelled from town to town, with a static audience seated in an auditorium as a long roll-painting was moved before them, panoramas such as Burford's *View of the Polar Regions* in the Leicester Square rotunda were made of a large circular canvas displayed in a specially designed structure and viewed from a central, double viewing platform. The viewing platform centred the viewer in an immersive and totalising, three-dimensional bodily experience (della Dora, 2007). The combination of the panorama and viewing platform achieved the effect of transporting the viewer to another world, to "landmarks alive in their geographical imagination only" (della Dora, 2007:288), places they would likely never be in the position to visit but which the panorama allowed them to become familiar with nonetheless. It allowed for a "phantasmagorical juxtaposition of 'here' and 'there'" (Barringer, 2020:83). While circular panoramas were known to travel on occasion, these objects often deteriorated in the course of being transported, hence their disappearance from the material record of the period. Veronica della Dora (2007:288) writes how the panoramas were "often changing their meaning and form during their journeys," much like the icy landscapes the Arctic panoramas sought to present. The panorama captured an imagined and momentary instance of a fleeting substance and took it on an international journey. Touring panoramas around Britain helped audiences attain a sense of national belonging through witnessing landscapes and locations reached by British explorers, settlers, and colonizers.

Della Dora (2007) argues that panoramas were movable objects that put the world into a box and, as such, rendered the landscape portable. The content of panoramic images often held a stake in the public dissemination of colonial narratives, as Laurie Garrison clearly articulates in relation to *View of the Polar Regions*. The first Arctic panorama, *The North Coast of Spitzbergen* (Fig. 2), was staged by Henry Aston Barker in 1819 at the Leicester Square Panorama and was associated with an admiralty-sponsored expedition led by Sir John Ross in 1818, though the latter was not formally written about until 1843 (Garrison, 2009). Barker was both a panoramic painter and the son of Robert Barker, inventor of the panorama in 1785, whose business he continued before transferring management to Burford in 1826. Burford's *View of the Polar Regions* similarly received the support and approval from the admiralty to adapt Browne's sketches from the 1848 voyage. As no account of James Clark Ross's failed attempt to find Franklin was ever formally published, Burford's panorama was "almost single-handedly responsible for narrating this voyage to the public" (Garrison, 2009:10). Despite the scientific contributions made by James Ross's expedition—mapping an additional 150 miles and making continuous meteorological observations over 18 months—the controversy surrounding his choice in vessels (which drew too much water) and rumours that he had planned to disregard orders meant that no formal written account was ever made (Jones, 1971; Dodge, 1973; McCorristine, 2018; Blum, 2019). As the nineteenth century marked the heyday of British Arctic exploration, with the disappearance of Franklin and his crew in 1845–47 sparking dozens of expeditions to locate the missing HMS *Erebus* and *Terror* and the long-sought for Northwest Passage, the Arctic panorama represented an opportunity to both disseminate and commemorate events and so-called discoveries of national interest.

As previously noted, the human involvement with the icescape was one founded on the need to "master, exploit or escape" (Duckert, 2013:69). The participation of the viewer in the experience of the landscape similarly offered "a sensory immersion in the scene" that evoked comparable feelings to those endured by Arctic naval officers and explorers (Plunkett, 2013:25). Duckert (2013:77) notes that for the officer's, or in this case the viewer's, "Arctic dreams are really Arctic nightmares." John Plunkett (2013:3) writes further that panoramas also created a "modern sensorium" in which the viewer not only became engrossed in the visual environment on display but also in the sounds, emotions, and physical responses that accompanied such an individual yet immersive experience. The purposefully dimly lit space, illuminated by a semi-transparent roof, was itself heightened through darkened corridors and passageways connected to the galleries. Of Burford's earlier (1834) panorama, *A View of the Continent of Boothia*, one critic writing for the *Dover Telegraph* (18 January 1834) described how "It is, however, hardly possible to describe the extraordinary effect of the whole scene upon the beholder, so admirable is the verisimilitude throughout." Writing on the psychology of the panoramic observer, however, Jonathan Crary (2002:23) suggests that this new visual medium "coincided with new forms

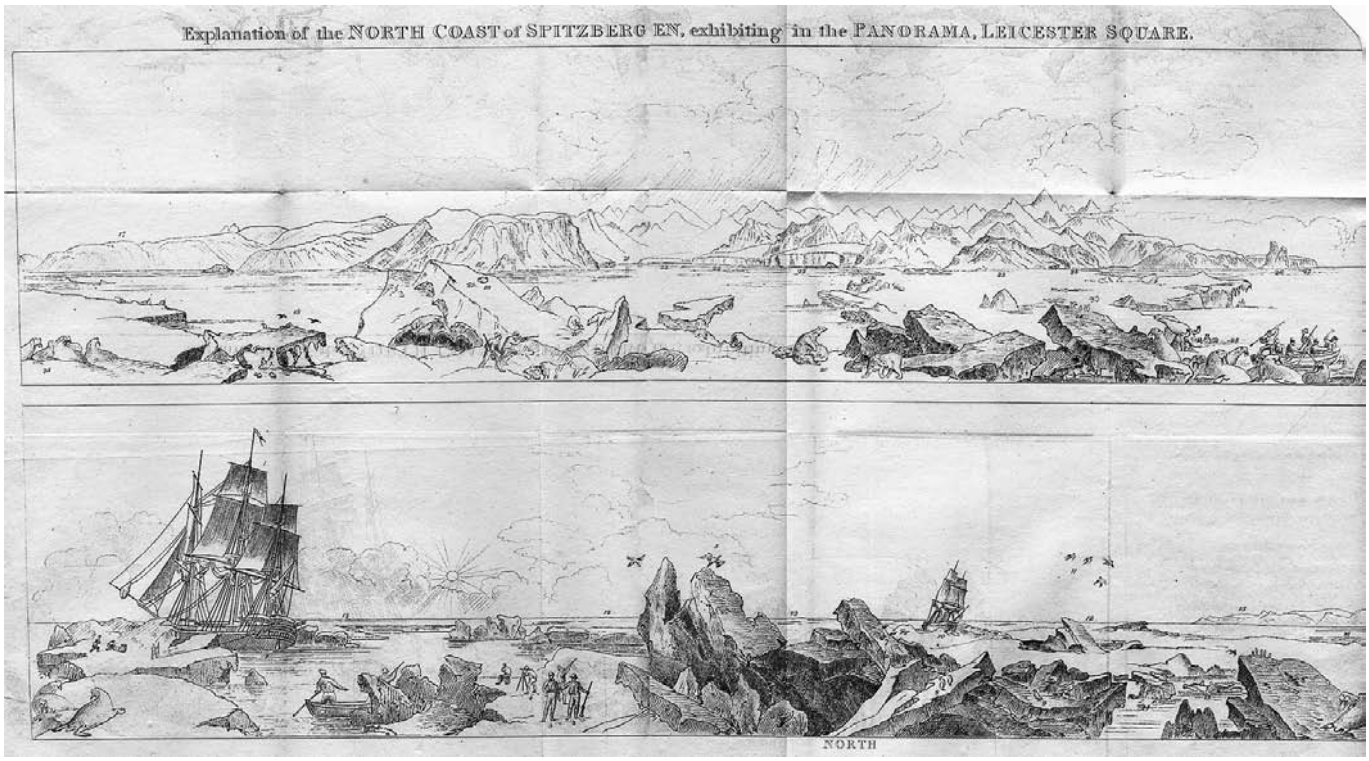
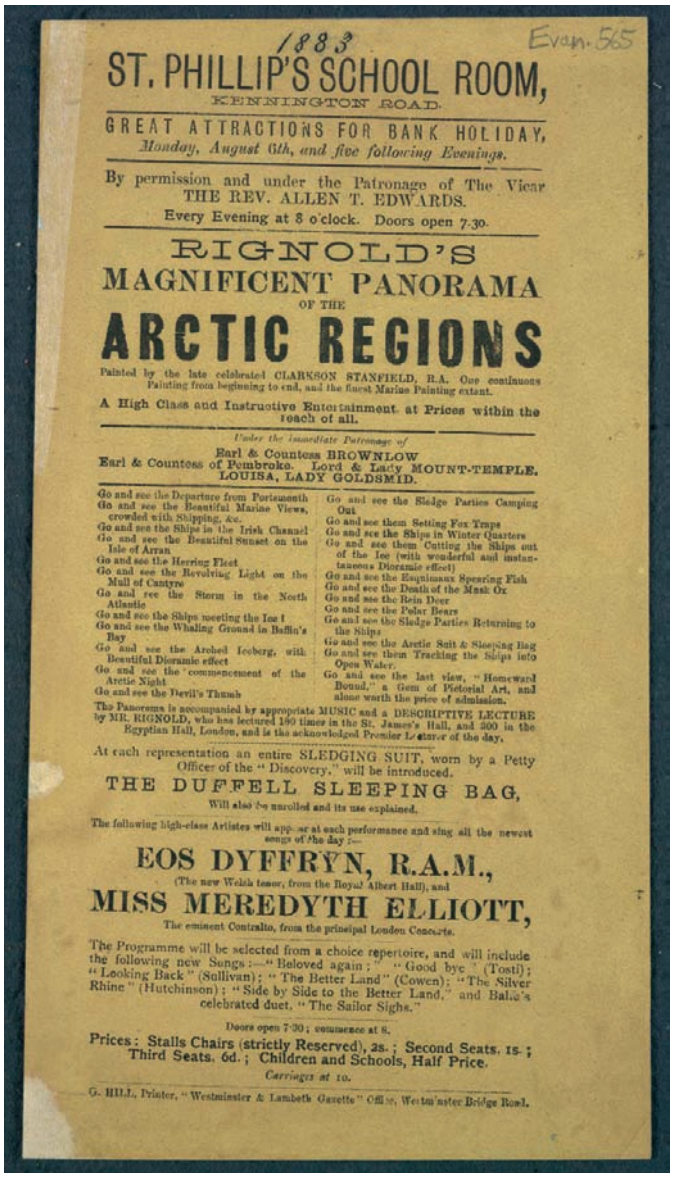


FIG. 2. Henry Aston Barker, *Description of a View of The North Coast of Spitzbergen,* 1820. Leaf of folded plates, etched by R. and E. Williamson. London. Image credit: Russell A. Potter.

of subjective isolation, of a sensory impoverishment and emotional privatization." Laurie Garrison records a passage from the *Literary Gazette* that followed Burford's *View of the Polar Regions*. Its author reported that the "terrible and fantastic icebergs, the dreariness of the whole scene, and the Sunshine and Aurora appearing as if to mock the sterility and utter coldness of the world, fill the mind with anxious, almost painful emotions" (as cited in Garrison, 2009:19). Meanwhile in another article written for *John Bull Magazine* (1850:107), the critic remarked: "You cannot help feeling that this wonder and this beauty must aid the feeling of hardships overcome in supporting the fortitude of the adventurers." Beyond a personal response to the panorama, viewers experienced the melancholic memory of the hardships endured by polar explorers, notably "Franklin and his companions, still lost in that drear desert!" (John Bull Magazine, 1850:107).

Experiencing the hyperrealism of the icy Arctic panorama could produce an emotional and sensory overload. The circular panorama at the Leicester Square rotunda was known to have disorientated its viewers through the overwhelming false reality of the display. As Tim Barringer (2020:105) writes, the panorama provided an "experiential equivalent—a sublime simulacrum—of distant events, experienced in the round." Heightening reality, the circular canvas of the *View of the Polar Regions* panorama, for example, paradoxically created a total environment within a confined and limited space. The space between the display and the audience was restricted, making the viewer more intimately involved in the agency and materiality of the ice and the actions being carried out upon its frozen surface. As the *John Bull Magazine* (1850:107) critic wrote, "the sense of space is not wanting." Trumpener and Barringer (2020:9) propose that the panorama was an early version of installation art, and that "Three-hundred-sixty-degree panoramic paintings constitute a pioneering, paradigmatic, visual manifestation of modernity." Here, comparison is made between the panorama and the performativity embodied in installation works such as Olafur Eliasson's 360-degree *Room for All Colours* installed in 2002. Ice as the performing agent, however, is not alluded to here. We might therefore extend this line of thinking to Eliasson's and Minik Rosing's cyclical *Ice Watch* first displayed in 2015. As Eliasson and Rosing position blocks of ice retrieved from the Greenland ice sheet in the orientation of a clock face, the same effect is achieved as in the *A View of the Continent of Boothia* panorama, as I discuss later, and which encircles the viewer with unfamiliar icy formations, on both the printed page and in the rotunda. Peter Otto suggests we consider the panorama as an example of the "technological sublime" (Otto, 2007: para. 49). The panorama becomes one of the many technologies of polar voyaging. By simulating an experience, the panorama created a virtual reality through which to communicate larger ideas of progress, science, and empire, and offer a sensorium of sounds, lights, sights, and emotions. The mobility of the panorama also presumed a mobile gaze; viewer, composition, and location moving synchronously with one another; perhaps not as technological as it might be conceived today, but



1883 Evan. 565

ST. PHILLIP'S SCHOOL ROOM,
KENNINGTON ROAD.

GREAT ATTRACTIONS FOR BANK HOLIDAY,
Monday, August 6th, and five following Evenings.

By permission and under the Patronage of The Vicar
THE REV. ALLEN T. EDWARDS.
Every Evening at 8 o'clock. Doors open 7.30.

RIGNOLD'S
MAGNIFICENT PANORAMA
OF THE
ARCTIC REGIONS

Painted by the late celebrated CLARKSON STANFIELD, R.A. One continuous Painting from beginning to end, and the finest Marine Painting extant.

A High Class and Instructive Entertainment at Prices within the reach of all.

Under the Immediate Patronage of
Earl & Countess BROWNLOW
Earl & Countess of Pembroke. Lord & Lady MOUNT-TEMPLE.
LOUISA, LADY GOLDSMID.

Go and see the Departure from Portsmouth
Go and see the Beautiful Marine Views, crowded with Shipping, &c.
Go and see the Ships in the Irish Channel
Go and see the Beautiful Sunset on the Isle of Arran
Go and see the Herring Fleet
Go and see the Revolving Light on the Mull of Cantyre
Go and see the Storm in the North Atlantic
Go and see the Ships meeting the Ice!
Go and see the Whaling Ground in Baffin's Bay
Go and see the Arched Iceberg, with Beautiful Dioramic effect
Go and see the commencement of the Arctic Night
Go and see the Devil's Thumb
Go and see the Sledge Parties Camping Out
Go and see them Setting Fox Traps
Go and see the Ships in Winter Quarters
Go and see them Cutting the Ships out of the Ice (with wonderful and instantaneous Dioramic effect)
Go and see the Esquimaux Spearing Fish
Go and see the Death of the Musk Ox
Go and see the Rein Deer
Go and see the Polar Bears
Go and see the Sledge Parties Returning to the Ships
Go and see the Arctic Suit & Sleeping Bag
Go and see them Tracking the Ships into Open Water.
Go and see the last view, "Homeward Bound," a Gem of Pictorial Art, and alone worth the price of admission.

The Panorama is accompanied by appropriate MUSIC and a DESCRIPTIVE LECTURE by MR. RIGNOLD, who has lectured 180 times in the St. James's Hall, and 300 in the Egyptian Hall, London, and is the acknowledged Premier Lecturer of the day.

At each representation an entire SLEDGING SUIT, worn by a Petty Officer of the "Discovery," will be introduced.

THE DUFFELL SLEEPING BAG,
Will also be unrolled and its use explained.

The following high-class Artistes will appear at each performance and sing all the newest songs of the day:—

EOS DYFFRYN, R.A.M.,
(The new Welsh tenor, from the Royal Albert Hall), and
MISS MEREDYTH ELLIOTT,
The eminent Contralto, from the principal London Concerts.

The Programme will be selected from a choice repertoire, and will include the following new Songs:—"Beloved again;" "Good bye" (Tosti); "Looking Back" (Sullivan); "The Better Land" (Cowen); "The Silver Rhine" (Hutchinson); "Side by Side to the Better Land," and Balfe's celebrated duet, "The Sailor Sighs."

Doors open 7.30; commence at 8.

Prices: Stalls Chairs (strictly Reserved), 2s.; Second Seats, 1s.; Third Seats, 6d.; Children and Schools, Half Price.
Carriages at 10.

G. HILL, Printer, "Westminster & Lambeth Gazette" Office, Westminster Bridge Road.

FIG. 3. St. Phillip's School Room, Kensington Road, 1883. The British Library Board.

equally applicable to the panoramic scope of contemporary visual culture which clings to ideas of a nostalgic sublime icescape.

The panoramic sensorium went beyond personal and collective emotions, lighting, and space, and was often enlivened by sounds as part of a cumulative experience. In a playbill for Mr. Rignold's late-Victorian *Magnificent Panorama of the Arctic Regions* (1883; Fig. 3), painted by celebrated panoramic painter Clarkson Stanfield, the sensory experience of the panorama, by now commonly referred to as the "cyclorama" (Miller, 1996), is advertised and promoted above the visual details of the display. Accompanied by music and a descriptive lecture, Rignold emphasised the all-inclusive experience of the panorama beyond the strictly visual. Described is a repertoire of new songs to be sung by the tenor Eos Dyffryn and contralto Miss Meredyth Elliott, which included Michael William Balfe's duet, "The Sailor Sighs as Sinks his Native Shore." The latter, derived from an eighteenth-century poem by Samuel Rogers, narrates a sailor's longing for his home and native shore, describing those stormy seas and tropical lands he encountered (Balfe and Rogers, pre-1863). There is no Arctic landscape figured here but rather, as Rogers (1801:157) writes: "In many a spicy grove / In many a plantain forest waving wide / Where dusky youths in painted plumage rove / And giant palms overarch the golden tide." This naval narrative does, however, conform to the prevalent maritime focus at play in Rignold's and other Arctic panoramas.

The advertisement also highlighted how Rignold, who would be delivering the lecture, had given a total of over 480 similar lectures at the St. James Hall and Egyptian Hall in London, and consequently considered himself to be the "Premier Lecturer" of the time. A petty officer's sledging suit on the HMS *Discovery* was also to be introduced as part of the show, alongside a show-and-tell of the duffel sleeping bag, a necessary piece of equipment on a polar expedition. Earlier panoramas went further and employed faux terrain, and in the case of *View of the Polar Regions* various furs, to add three-dimensional depth to the painted image (Burford, 1850:15).

A decade later at the World's Columbian Exposition in Chicago in 1893, the tableau *Farthest North* (Fig. 4) built on the familiarity of the cyclorama. It portrayed a scene from the fateful Lady Franklin Bay Expedition (1881–84) which, led by Adolphus Greely (1886), intended to establish a meteorological observation station as part of the First International Polar Year and set the then record of farthest north (83˚24′ N). Here, the panoramic painting of the base camp at Fort Conger, a U.S.-operated exploration camp in the Qikiqtaaluk region of Nunavut, served as a backdrop to life-size wax figures of an Inuit guide, taxidermy dogs, and army officers in winter garments. Meanwhile, plaster snow drifts, icicles, and icebergs created "a realistic Arctic scene with its bleak desolation of tumultuous ice packs and boundless fields of snow glaring under a sun that dazzles but does not heat" (Buel, 1894:39).

In the brief descriptions of the scenes embodied within Rignold's (1883) panorama, the cutting of the ships from the ice is described on the flyer as being accompanied by "wonderful and instantaneous dioramic effect." This recognises the influence of Louis Daguerre's dioramas, among other sources of inspiration, on the nineteenth-century panorama and other forms of performative visual media (Daguerre, [1839] 1989). Through lighting, sound effects, and the occasional "wind, steam, and mist, even mechanically rotating platforms," Daguerre's dioramas closely figured sound and movement in the dioramic experience (Trumpener and Barringer, 2020:3). Writing about the dioramas staged by the German theatrical painter Carl Wilhelm Gropius in the late 1820s, Helmut and Alison Gernsheim (1956:45) noted how a "view of Grindelwald glacier was accompanied by the sound of cracking ice, splashing water, and the rumbling of distant avalanches."

FIG. 4. *Diorama of the Greely Expedition, at the 1893 Chicago World's Columbian Exposition, Showing Lt. A.W. Greely, U.S. Army, Welcoming Lt. Lockwood and Sgt. Brainard Back to Ft. Conger* (1893). Library of Congress Prints and Photographs Division, Washington, D.C.

Comparison might also be drawn with lantern slides and the panorama's predecessor the eidophusikon, both predicated on the use of sound and light effects in their staging (Leighton, 1984; Huhtamo, 2012; Bermingham, 2016). Philippe-Jacques Loutherbourg's eidophusikon, first exhibited in London in 1781, was essentially a very large, theatre-size, peepshow that employed three-dimensional models, sound, light, and cloud effects to create the illusion of perspective and depth. Given the prevalent descriptions of icy sounds in earlier panorama and diorama booklets, it is possible that Rignold recreated the shifting, cracking, fragmenting, and overturning of ice that so often noisily permeated the Arctic landscape, largely thought of as sublimely silent. Or that he employed mist and steam to create the effect of the prevalent Arctic fogs that often hung over the sea, land, and ice and stymied polar exploration. Meanwhile, mirrors and artificial light helped communicate the *Farthest North* tableau (Pacific Commercial Advertiser, 1893). Leane et al. (2020:14) writes that given their many sounds and noises, "icescapes have long been described in the language of liveliness." Ice itself is a "lively composer," creating its own sound effects in lieu of any human involvement (Duckert, 2013:76). Julie Cruikshank further argues for the agency of glaciers in her book *Do Glaciers Listen?* (2005:8), writing "Glaciers engage all the senses." In his seminal work, R. Murray Schafer (1993:8) wrote more broadly on soundscapes as "events heard not objects seen." The panorama achieves both. Schafer (1993) also noted how soundscape studies could exist at the intersection of science, society, and the visual and performing arts. Through the sounds and effects used to accompany the panorama the audience is exposed to a transcendent and totalising spectatorial and sensorial experience.

The accompanying portrayal of the "stupendous glacier," (annotated on image), featured in the summer scene of Burford's *View of the Polar Regions* makes mention of how "Soundings were taken from the ships to the depth of 150 fathoms without finding the bottom" (Burford, 1850:12). Referring to the geographical and not acoustic meaning of sound, soundings proved an instrumental part of polar expeditions, with John Ross being ordered to take soundings of the sea as part of his 1818 voyage to probe

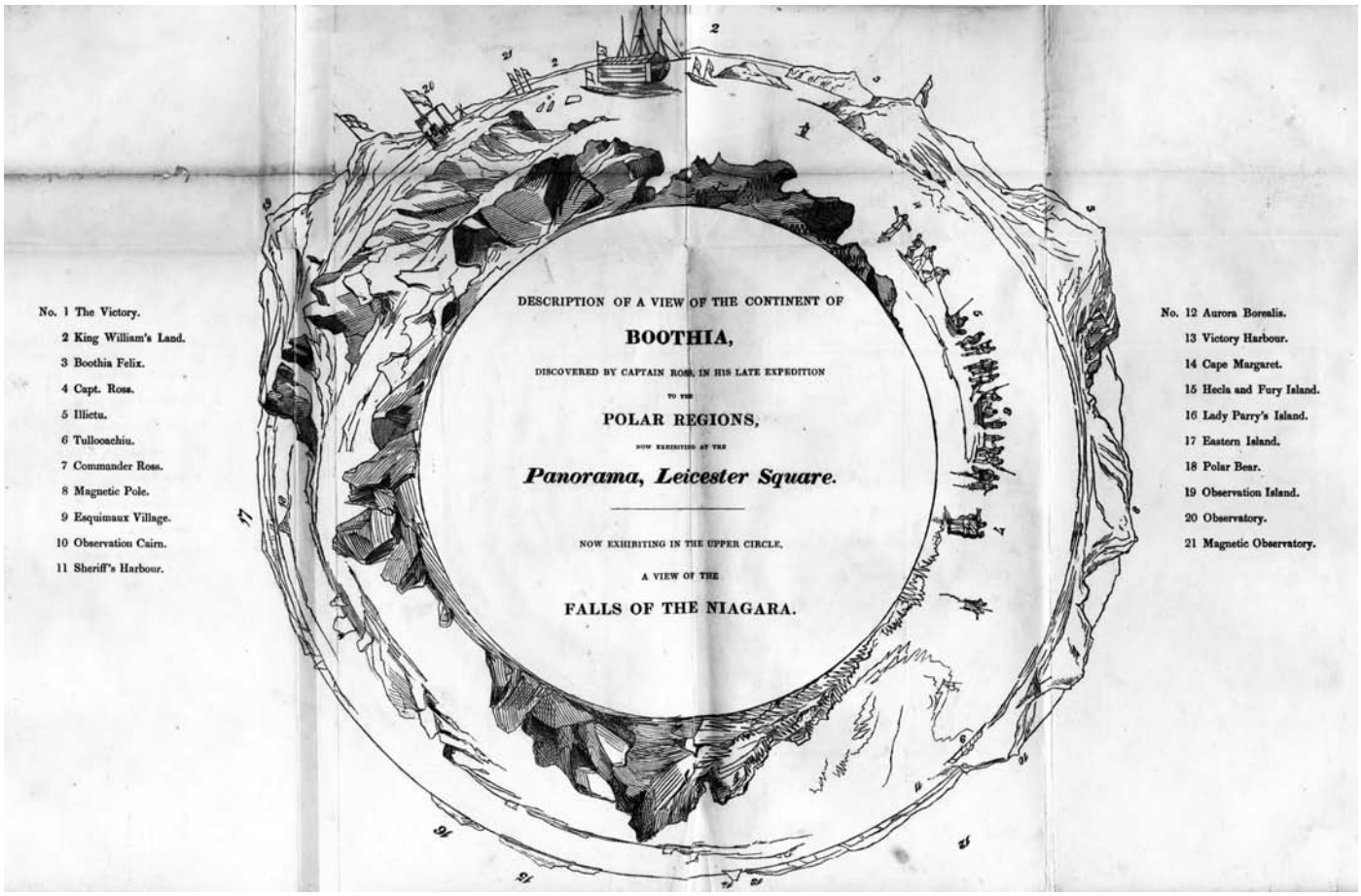


FIG. 5. Robert Burford, *A View of the Continent of Boothia*, 1834. From *Description of a View of the Continent of Boothia*. Baldwin Collection of Canadian, Toronto Public Library, Ontario, Canada. Public Domain.

the possibility of a Northwest Passage (Ross, 1819). As Sarah Louise Millar (2013:80) writes, "the impression of the sea in the early nineteenth century was one of a known layer at the surface, with an unfamiliar abyss below." By recognising the scientific observations that took place alongside the emotional responses to the sounds and sights of the Arctic, Burford drew attention to ice as both a scientific and sublime substance in the aesthetic sense. Conversely, written accounts described the astonishing sound of ice experienced by those who travelled through the cryosphere. An emphasis on sound reappears throughout Burford's curation and description of the *View of the Polar Regions*. He wrote, "no sound breaking the universal monotony, but the roaring of the tempest, or the occasional cracking of the ice" (Burford, 1850:7). As ice melts, noises from beneath and within the ice are released with the escaping air. "Icescapes—glaciers, bergs, floes, ice sheets, ice shelves—are thus places of paradox and contradiction," writes Leane et al. (2020:9). Ice is not a sterile and inactive surface, instead as ice moves and shifts, its liquid depths reveal the surface to be alive, cracking, and constantly transforming—a mobile site of contradiction. While the cryoscape might be imagined as a vast and expansive void, it is in fact teeming with life, colours, and sounds. The role of sound and movement, therefore, only adds to an immersive experience of ice and modernity and looks to the future of the panorama and analogous forms of panoramic imagery.

SUBLIME SCIENCE IN THE ARCTIC

Mark Cheetham (2021:15) writes how "Arctic voyages functioned fully only when the circle was complete, when voyagers return and recount their exploits, when images of the Arctic are disseminated, and when scientific data are presented and discussed." The cyclical, 360-degree nature of the panorama, therefore, might be seen as being the culminative point for certain Arctic expeditions and scientific achievements. Viewers complete the journey. In the publication accompanying Burford's earlier panorama *A View of the Continent of Boothia* (1834, Fig. 5), the panoramic image is reproduced as a complete circle. The Boothia Peninsula, named after the expeditions patron Sir Felix Booth by Captain John Ross following his Arctic voyage of 1829, is situated within Nunavut in the Canadian Arctic (Ross, 1835). The northernmost reaches of the peninsula run parallel to the corridor that would later be recognised as the Northwest Passage. The *A View of the Continent of Boothia* panorama presents the winter quarters of the HMS *Victory* in 1830, accounting for the locations

and local Inuit they came into contact with, as well as the Magnetic North Pole, which James Ross was responsible for determining in 1831 as a member of his uncle's expedition. Unlike *View of the Polar Regions*, which was politically motivated given the support of the admiralty, *A View of the Continent of Boothia* and Messrs. Marshall's *Grand Peristrephic Panorama of the Polar Regions* were intended to primarily communicate geographic and scientific discovery. With these images I consider how ice is integral to panoramic imagery and offers an alternative way to visually communicate scientific discovery and history from nineteenth-century polar expeditions across the Arctic Circle.

Looking at the *A View of the Continent of Boothia* panorama projected onto the fold-out pages of the book the effect is akin to looking into a kaleidoscope. Ice hummocks are shaded into geometric and refracted forms around the central circle and appear to break through the frozen sea upon which men from Ross's expedition stand and a vessel is caught in the ice. The surrounding peaks and mountains merge out towards the edges, becoming more distorted and elongated as the cyclical horizon fades away. Ice itself takes on a kaleidoscopic character as its surface is fragmented, and as I discuss below, the complexities of its colour are revealed. The printed image of *A View of the Continent of Boothia* further recalls the fisheye lens, itself a method of distorting a panoramic image. With no defined horizon or endpoint, the ice appears as a never-ending and all-surrounding environment; undulating as the surface of the water below forces the frozen mass upwards. "The sea presents one continued field of ice," wrote Burford (1834:5). Unlike the mountains beyond, which are largely static and reaffirm the long timescales of geological history, ice enables a more dynamic picture. Here, the spectators were informed that they were viewing the surrounding panorama from the perspective of the tent Captain John Ross slept in during his polar journey (Burford, 1834). While physically located at the centre of the panorama, the spectator is left to envisage themselves in the Arctic, surrounded by circumambient ice, vessels encased in frozen matter, and against a backdrop of far-rising, snow-encrusted mountains. This infinite impression might also be reframed to suggest the finite future of ice in the Anthropocene.

In contrast to the continuous, 360-degree panorama, the moving panorama more broadly facilitated public dissemination, reaching wider audiences beyond urban and emergent industrial centres. The provinciality of moving panorama locations, as Plunkett (2013:7) recognises, offered "an experience of inhabiting a simultaneity of spaces." Much like Frederic Edwin Church's touring painting *The Icebergs* (1861) which was modified for the destinations in which it was exhibited, New York, Boston, and London, the "translation and transformation" of panoramic images for local, regional, and international audiences offered a way of participating in the experiences of colonial voyages and expeditions to far-flung destinations (Plunkett, 2013:6). In 1863 in London, Church's painting was given a new title and a fragmented ship's mast was added to the foreground. However, unlike Church's painting, which involved a static spectacle as framed by the viewer, the Arctic panorama contrasts the mobility of the ice with the mobility of the panorama or the mobility of the viewer. Messrs. Marshall adapted panoramas to a movable and regional exhibition model, exhibiting in larger cities as well as smaller and more provincial locations, allowing several shows to take place simultaneously. Their moving panoramas were often described as peristrephic, which, unlike the 360-degree panorama, signified a large, convex, and semi-circular image composed as a sequence of tableaux. These could be presented one after the other in "narrative succession" (Plunkett, 2013:7). In 1820–21, the *Grand Peristrephic Panorama of the Polar Regions* travelled to locations including Glasgow, Nottingham, Leeds, Hull, and Bristol (see Huhtamo, 2012). It was also shown at the Leicester Square rotunda. Despite no surviving visual record of the *Grand Peristrephic Panorama of the Polar Regions*, for a sense of what visitors saw, the visual key for Barker's earlier and inspirational *The North Coast of Spitzbergen* (Fig. 2) and watercolours made by Lieutenant Frederick William Beechey give some indication.

The accompanying pamphlet for the *Grand Peristrephic Panorama of the Polar Regions*, itself based on Barker's 1819 description, notes that it depicts the North Coast of Spitsbergen (Svalbard), Baffin's Bay (between Canada and Greenland), and the so-called Arctic Highlands. Barker's image was painted from drawings and watercolours by Beechey, who accompanied Captain Buchan on his 1818 expedition seeking the North Pole. This was part of a twin expedition, with Buchan's voyage centred on scientific discovery and observation, and that of Ross on imperial exploration and expansion (Beechey, 1843). The title page of the pamphlet (Beechey, 1821:1) opens with an excerpt from the Scottish poet James Thomson's first sublime seasonal poem, "Winter," published in 1726:

> Where undissolving from the first of time,
> Snows swell on snows amazing to the sky;
> And icy mountains high on mountains piled,
> Seem to the shivering sailor from afar.
> Shapeless and white, an atmosphere of clouds,
> Projected huge and horrid o'er the surge.

Conflating the nature of winter across "sublimely vast geographic spaces" with ice and ideas of the North (Gottlieb, 2001:46), Thomson's poem, in part, recounted attempts by British explorers to locate the fabled Northwest Passage. Writing on the British sublime and Thomson's poem, Evan Gottlieb (2001:46) describes the "oscillation between microscopic and macroscopic perspectives" as the poem moves beyond the confines of Britain "to circumscribe more of the globe." In the excerpt included here, the celebration of British imperialism and heroism is shrouded by the effects of the cryosphere, turning the vastness of the landscape into something shapeless yet

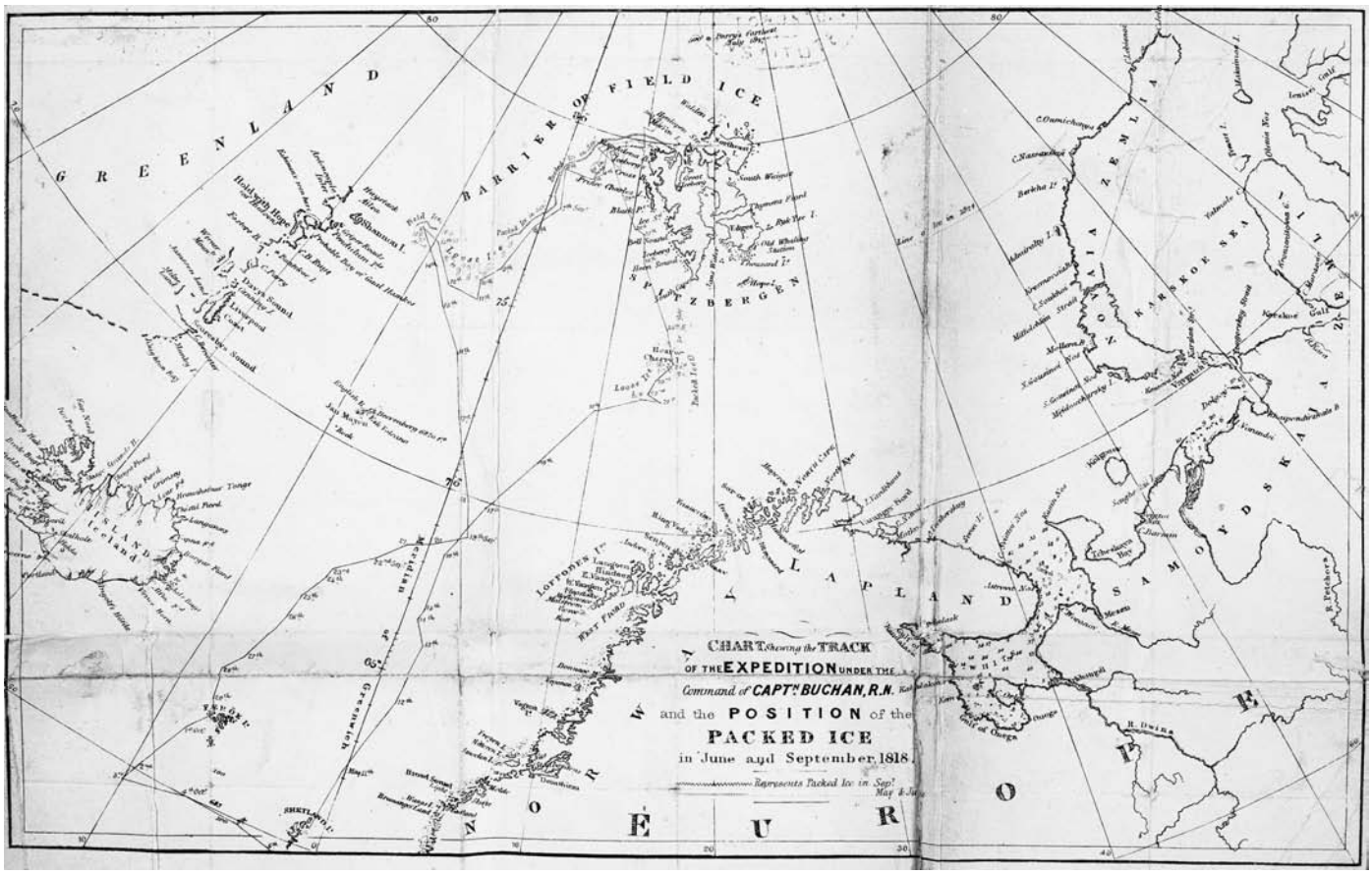


FIG. 6. *A Chart Showing the Track of the Expedition Under the Command of Captn. Buchan, R.N. and the Position of the Packed Ice in June and September, 1818*. New Burlington, London. Image: Baldwin Collection of Canadian, Toronto Public Library, Ontario, Canada. Public Domain.

undissolving. The formlessness of the icy mountains that confront the polar explorer is a view that persists throughout the accompanying description of the *Grand Peristrephic Panorama of the Polar Regions*.These emotional pointers are, however, interspersed with scientific information including latitude and longitude, the "variation of the compass and dip of the needle" (Beechey, 1821:3), and descriptions of the climatic effects such as the aurora and ice blink. The author, presumably Beechey, wrote that "the yellow tint over the horizon, … is intended to represent the Ice Blink, a phenomenon always seen over any compact aggregation of ice, whenever the horizon is tolerably free from clouds" (Beechey, 1821:4). In other words, a white glare at the horizon, often reflected off the ice and onto the underside of low-hanging clouds. At this point the author directed the intended audience to William Scoresby's (1820) contemporaneous publication *Arctic Regions and the Northern Whale-Fishery* and his thoughts on polar ice. Scientific discovery is fundamental to how panoramas might be understood beyond a preoccupation with heroism and exploration.

A map included at the beginning of Beechey's later published account, *A Voyage of Discovery Towards the North Pole* (Beechey, 1843), demarcates a "barrier of field ice" within the cartographic space north of Svalbard (Fig. 6). Latitudinal coordinates are similarly marked across the map's surface, alongside additional fields, barriers, and packs of ice that hindered the HMS *Dorothea* and *Trent* on their journey north. Ice is visibly demarcated on the map unlike many cartographic manifestations of the Arctic. This barrier of ice that Beechey also makes frequent mention of throughout the panoramic booklet is in fact the frozen Arctic Sea. Earlier expeditionary accounts, including *A Map Showing the Situation of the Ice in the Greenland Sea during the Summer of the Years 1806, 1817 and 1818* (1820, Royal Museums Greenwich), also envisaged the sea as a solid wall of ice beyond which fields of packed ice extended. It is worth noting here what else is not shown in these images. While historically ice is often narrated as preventing movement, often visualised as static, choking, and encasing ships, it later became a resource that could facilitate mobility. The Norwegian explorer Fridtjof Nansen, following three years aboard his ship the *Fram* (1893–96), confirmed what is known as Transpolar Drift, and more recently the multi-national MOSAiC expedition, imitating Nansen's endeavour, spent a year drifting northward through the ice to better study global climate change (Nicolaus et al., 2022). Barker's key exaggerates the scale of the ice, with vast, protruding fragments in the foreground reaffirming the never-ending "barrier of ice" (Burford, 1850:3; Fig. 2), in contrast to Beechey's softly painted watercolour of *Red Hill, S. by E.*

FIG. 7. Frederick William Beechey, *Red Hill, S. by E. ¾ E. on 15th June 1818*. Watercolour. Rex Nan Kivell Collection, National Library of Australia.

¾ E. on 15th June 1818 (Fig. 7). Geographical descriptors of Red Hill (Raudkollen) are also noted in the margin: "S. by E. ¾ E." Here, the *Dorothea* and *Trent* are trapped in the ice, corresponding with elements of the *Grand Peristrephic Panorama of the Polar Regions* description. Both ships are attached by ropes lassoed to ice anchors, or large mounds of ice, stabilising the vessels in the sea ice where they were beset for 13 days. Patches of water are seen in between the "circumambient" ice, a term employed by Beechey in his description, and one which most certainly warrants reviving (Beechey, 1821:9). The extent and scope of the landscape is particularly suited to the panoramic image, utilising the material benefits of the fold-out paper as well as accommodating the vast sweep of glaciers that terminate at the fjord. Icebergs, glaciers, and sea ice therefore exist at the intersection of multiple conceptual frameworks.

In *Red Hill, S. by E. ¾ E. on 15th June 1818*, the figures in the foreground of both ships appear to be participating in the many activities involved in an Arctic voyage, with the panorama allowing for these activities to occur simultaneously. The clearing of ships' decks, the gathering of ice for water, and the washing line resplendent with the brightly coloured laundry of the officers (Fig. 8), all signify a domestic Arctic in contrast to the scientific and geographic focus of the expedition (Cheetham, 2020). Robert Peck writes "domesticity defies the unfathomable immensity and unsettling chaos of the polar regions" (Peck, 2012:72). The same effect is achieved in *A View of the Continent of Boothia* with the viewer centred in John Ross's tent. Ice "resembling white sugar, and incapable of being slid on like the British ice," as Beechey described it, characterised this Arctic panoramic environment (Beechey, 1821:9). The moveability of the ice and landscape, not staying put in one location but rather moving from one temporary state to another, is further evoked by the panorama as a visual medium which allowed for the movement of places beyond their physical borders. The conflation of different Arctic landscapes in one panorama is especially suited to the multiple scenes accommodated by such technology and evokes Huhtamo's suggestion of "nationalistic wishful thinking" (Huhtamo, 2012:109). In other words, the construction of the multi-national panoramic image had the tendency to slip into the fantastical. "The pantomimic imagination had no scruples about converting facts into patriotic fairytales," writes Huhtamo (2012:110) in relation to the *Moving Diorama of the Polar Expedition, being a series of views representing the progress of His Majesty's ships the Hecla and Fury in their endeavours to discover a North-West Passage from the Atlantic to the Pacific Ocean* (1829–30). In the case of Messrs. Marshall's *Grand Peristrephic Panorama of the Polar Regions*, and Barker's earlier iteration, the inclusion of a territory beyond British imperial control, that of Svalbard, looks back to centuries of colonial history, primarily that of whaling in and around the Norwegian Arctic Archipelago.

The performance and circulation of ice within Arctic panoramas inspired both awe and terror. Beechey (1821:8) described how:

> masses have been seen assuming the shape of a Gothic church **…** composed of crystal of the richest sapphirine blue, tables of one or more feet; and often immense flat-roofed temples, like those of Luxor or the Nile, supported by round transparent columns of cerulean hue, float by the astonished spectator.

There is a lot to unpack in this description. Beyond the religious iconography, both ancient and medieval, the emphasis on the "cerulean" and "sapphirine" blue encourages a discussion of the colour of ice that moves away from an assumed Arctic whiteness. The title of Beechey's watercolour *Red Hill, S. by E. ¾ E. on 15th June 1818* might also draw attention to the geological composition of the hill, or perhaps refers to the effects of algal blooms, *Chlamydomonas nivalis*, which turns snow pink. This is commonly referred to as watermelon snow (Quarmby, 2020). Artistic representations of ice in Norway's Arctic Engabreen and Øksfjordjøkelen Glaciers consider a prismatic Arctic as opposed to the white Arctic that prevails in art historical scholarship:

> the blues and greens that refract and reflect off the snow, ice and water indicate the ecocritical possibilities of colour. They offer an understanding of the Arctic as not merely a white, snow-covered space, but embrace the effects of light in the polar climate.
>
> (Gapp, 2021b:90)

FIG. 8. Detail from Frederick William Beechey, *Red Hill, S. by E. ¾ E. on 15th June 1818*. Watercolour. Rex Nan Kivell Collection, National Library of Australia.

Seen alongside Duckert and Cohen's elemental ecocriticism, a tonal ecocriticism looks further to the intrinsic characteristics of ice. As only Beechey's watercolour *Red Hill, S. by E. ¾ E. on 15th June 1818* offers any indication of the colour the panorama might have been adorned with, the limited palette draws focus to the blue of the sky, water, and ice. A faint cerulean tinge is cast over the hills beyond the entrapped vessels, reflected from either the sky or circumambient ice. Up close the protruding ice hummocks in *Red Hill, S. by E. ¾ E. on 15th June 1818*, are shaded blue along the ice-face with the shadowing grey recalling the dirt and dust gathering upon the icy surface. As light is absorbed by these darker patches the ice would melt.

Looking back to Beechey's description of the ice, who is he referring to when he addresses the "astonished spectator?" Is it the panoramic audience witnessing this spectacle from a fixed theatrical space in Britain or a naval officer aboard the *Dorothea* and *Trent* moving through the Arctic landscape? Beechey's narrative implies both. Throughout the panoramas identified here, ice is fundamental to the human experience of the Arctic—itself a spectator to human endeavour, exploration, and expansion—and yet the European narrative surrounding ice in the nineteenth century is one of constant and lingering threat. By writing about the cryosphere and looking at its icy characteristics, ice is given a language that, unlike today, exists beyond a climate change narrative.

THE PHOTOGRAPHIC PEREGRINATIONS OF ICE

No longer centred on large-scale panoramas, glaciers and icescapes became the domain of science as the immediacy of photography allowed for faster and more varied forms of dissemination, including lantern slides, stereographs, glass plates, and albumen prints. The first attempts to recreate the panoramic projection in photography, however, overlapped with the popularity of the 360-degree and moving panorama. These were made in 1846 by Friedrich von Martens, although the limitations in altering and retouching the perspective left the image disjointed and lacking in seamless continuity. Despite photographic panoramas gaining traction in the late nineteenth century, aided by technological advancements including the invention of celluloid film in 1888, the commercial desire for the panoramic photograph did not take hold. David Clark and Marcus Doel (2005:53) write, "Although both turn away from the Ideal, panoramic space still totalizes, while photography returns to the particular." Nevertheless, the genealogy between panoramic imagery and photography remains underdeveloped. The panorama is often regarded as abstracting the visual time/space continuum; I have proposed that the mutability of ice offers a symbiotic abstraction of spatiotemporal movement. Documentary mediums and processes, including re-photography, or repeat photography, were developed as a method of chronicling global glacial change and now extend to a wide variety of landscapes and ecosystem changes and processes (Webb et al., 2010). The re-photographer must account for seasonal and climatic variations, as well as light conditions, to best create the original image. By reoccupying the original vantage points, the contemporary photographer can shed light on the historical image, and in this case, panorama. Comparison might be found in Diane Burko's work of the cryosphere, where her paintings, made after satellite photography and recessional maps, recall the process of repeat photography (Cheetham 2018; Garrard and Broude, 2022). Looking at the panoramic and wide-lens photographs made by environmental re-photographer Tyrone Martinsson alongside his most recent work in recreating the panoramic experience through VR technology, I indicate an analogous interest in the visual history of glaciological expansion and retreat that provides a framework for the recreation of panoramic imagery at the intersection of art, science, and exploration.

Since 2011, Martinsson, in collaboration with the glaciologist Per Holmlund and a team of geologists, has conducted photographic research into the history of Svalbard's glaciers as it pertains to visual records. Through the North West Spitsbergen Glacier Record Project, Martinsson has created a visual mapping of Svalbard's glacial and visual history, "telling its story and setting up a survey system for photography-based glacier monitoring" (Klett and Martinsson, 2016:134; see also Frank and Jakobsen, 2019). Ice is adapted to an archival role with environmental re-photography creating a digital research archive from "the complexity of [its] beauty" (Klett and Martinsson, 2016:121). Martinsson's panoramic glacial photography records these landscapes as humans irrevocably change or destroy them. His documentary images are rooted in a historical understanding of Svalbard's glaciers, utilising archival and visual material to account for glacial change on a local and regional scale. Contrasting aesthetics in the collage layout of many of his compositions, Martinsson draws upon expeditionary and scientific imagery and accounts to trace glacial history and anticipate our glacial future.

In Martinsson's re-photography, the panoramic medium moulds itself to the temporality of ice and the story of Svalbard's glaciers over time. "The story of ice is a vital part of the story of Spitsbergen," writes Klett and Martinsson (2016:132). In juxtaposing past and present images of Svalbard's glaciers, Martinsson's works are often composite images of photographs, old and new. *Panorama Fuglefjorden, 1873 – 2016* (Fig. 9) is one such example. The historic image of Fuglefjorden's largest glacier, Svitjodbreen, is a digitised version of Axel Enwall's glass plate negatives taken on 30 August 1872. Ice is captured and preserved in glass—fragile, mutable, and susceptible to changing climates—an analogous material. The first photographic record of Svalbard's glaciers was made by Axel Goës, as part of an 1858 scientific expedition led by the Swedish geologist Otto Torrell, and explorers Adolf Erik Nordenskiöld and August Quennerstedt. From 1872 – 73, Enwall was the physician and photographer for Nordenskiöld's overwintering expedition in northern Svalbard (Martinsson, 2021a). Beset by misfortune and bad luck, Nordenskiöld and Enwall were responsible for maintaining the health and hygiene of 65 men over the winter, after the two supply ships returning to Norway were frozen-in, leaving them with insufficient provisions (Kitsch, 1968). This was the only time Nordenskiöld wintered in Svalbard. In Enwall's photography, the effects of the cold climate do not materially manifest themselves. In his series of snapshots of Svitjodbreen, the landscape has been dismantled and anatomised, with five separate frames collated by Martinsson to create a panorama. "The lateral extension of the photographic field," write Trumpener and Barringer (2020:18), is achieved "by joining prints from different negatives and arranging them to give a single, unbroken panoramic image." In this instance, however, the implied continuity has been fragmented. When viewed in succession, Enwall's photographs create an imperfect panoramic image or photo-mosaic. An attempt to form a panorama had also been made in 1873 but notably involved retouching the frames to create a continuous image. What, therefore, does it mean to disjoint the continuity of the panorama and thus the glacier?

Numerous scientific and environmental sources cite the relevance of visual imagery, including paintings, photography, and maps in aiding the study of glacier velocities today (Steiner et al., 2008; Zumbühl et al., 2008; Curley et al., 2021). Martinsson has also argued that given

FIG. 9. Tyrone Martinsson and Axel Enwall, *Panorama Fuglefjorden, 1873 – 2016* (Axel Enwall, *Foulbay, Vestra Sidoglacieren, d. 30 Aug, 1872*, Digital file from glass-negative, Centrum för Vetenskapshistoria, Kungliga Vetenskapsakademin Stockholm. Tyrone Martinsson, *Från Enwalls Varde*, digital photograph, 2016. Artists Own Collection). Image credit: Tyrone Martinsson.

the production of historical Arctic imagery in the context of scientific expeditions, or as commissioned work as part of tourist cruises, they are increasingly relevant to research and science-specific roles. Like Enwall and Beechey, but unlike Burford and Rignold who staged the nineteenth-century panoramas, Martinsson achieves his images on expeditions to the Arctic. Often taken from a boat out in the fjord facing the glacial terminus front-on, in Martinsson's re-photographs the creator becomes the spectator, aware of the changes that have taken place between the historic and repeat image. These panoramic drawings, paintings, and photographs communicate changes within the environment through visual data and results. Martinsson (pers. comm., 2022) says "The panorama gives the opportunity to understand the scale and connections to glacial lands." The movement and liveliness of ice is the focus of this change. Unlike single-frame sources, the panoramic time series presents the opportunity to understand the scale and connections between glaciers and their surrounding environment. Historical, cultural, and scientific perspectives converge in the process of Martinsson's re-photography, drawing attention to art historical sources that have not previously been considered within such a context. The focus is no longer on narratives of Arctic exploration, imperialism, or the sublime, but rather of ice and its processes.

In 1807, the British Captain Philip Broke surveyed the area surrounding the Magdalenefjorden, recording the first comprehensive map of the bay, including the demarcation of glaciers and mountains and soundings for safe navigation within the cartographic space. Maps as corresponding visual documents also manifest themselves in other examples of Martinsson's work, where film-strip style composite images move from the map to the drawing to the re-photograph in its narrative of visual and glacial history. In another example work, *View of Magdalenefjorden* (Fig.10), the re-photograph is of a view illustrated by Beechey in 1818, perhaps indicating the position of Waggonwaybreen and Adambreen, and which was included as a fold-out in his subsequent publication of 1843. The perspective doesn't align in either image. Martinsson cannot fully recreate Beechey's composition, for it is a composite image of the glaciers of Magdalenefjorden. The idea of re-photography in this instance is ambiguous, as the two images seen in parallel with one another create an arguably false narrative of the status of Magdalenefjorden's nine glaciers. Focused studies on these glaciers, including Buchanbreen and Waggonwaybreen, are also found in Martinsson's initial 2012 archival expedition. While the use of historic imagery is prevalent in the study of re-photography and glacial change, the role of artistic license cannot be overlooked. The human distortion of the landscape, in both the photograph and painting, makes it difficult to accurately mirror and represent topographical environments. The comparison made with Enwall's *Panorama Fuglefjorden, 1873–2016* and other works do, however, more closely identify the glaciers under examination. In the dual images of Magdalenefjorden, Martinsson attempts to re-photograph and normalise Beechey's enmeshed glacial panorama; the transformation of the image closely resembles the transformation of ice.

Returning to Svitjodbreen, a ten-kilometre-long tidewater outlet glacier in northern Svalbard that calves into Fuglefjorden, Enwall's photographs and Martinsson's re-photograph piece together glacial panoramic histories, both literally and as perspectives on the passing of time,

FIG. 10. Tyrone Martinsson, *View of Magdalenefjorden*. Top image by Frederic William Beechey, 1818, bottom image by Tyrone Martinsson, 2016. Image: Tyrone Martinsson.

space, and ice. Whereas Enwall's photographs consider the "meshwork of connections that icescapes form," following the movement and topographical extent of the glacier across a series of frames (Duckert, 2013:76), Martinsson's re-photographs provide a point to consider the consequences of anthropogenic change. These glaciers are interstitial places, challenging a sea/land distinction, as they move across the liminal space of the coastline. Variably liquid and solid, ice allows for a dynamic discussion across temporal and spatial frameworks. Martinsson's re-photographic work grapples with the methodological model of the long story, exploring the visual mediation of multidisciplinary research. His images mark a contribution to glacier history and science and might be accommodated within art history as they draw attention to culturally, geographically, and anthropogenically significant glaciers and icescapes. The idea of the long story, in part inspired by Subhankar Banerjee's (206:62) "long environmentalism," uses photography to trace the story and passages of time. With photographs such as Enwall's Svitjodbreen series "laid out as a timeline" they reveal the consequences of change and the history of both ice and movement (Martinsson, 2021b:205). Where the ice once was and where it is now are inherent to Martinsson's compositional process. Re-photography itself is never a finished product, with the future need to adapt and re-photograph arising as the glaciers continue to evolve. "[Glaciers'] icy ability to 'freeze time' while simultaneously representing impermanence in their continual transformation from autonomous objects into undifferentiated liquid water," as Leane et al. (2020:6) write, is fundamental to the movement and evolution of glaciers throughout history and at a time of anthropogenic climate change. Time, as the process by which ice evolves and the narrative through which ice is communicated, is a key concept for understanding the role of ice in visual culture and panoramic imagery.

As a means by which to unify the panorama, the photograph, and the moving image, I want to conclude by proposing that VR technology exists, like ice, as an interstitial medium. It offers panoramic modes of seeing whereby a continuous image is captured and contained over time as well as space. Ongoing work by Martinsson, the filmmaker Gorki Glaser-Müller, and glaciologist Erik Mannerfelt, looks to create a virtual glacial environment through 3D-models, drone photogrammetry, and 180° and 360° stereo films, offering audiences the opportunity to interact with the landscape and archival sources at a distance (Dawson, 2018). The comparison between the panorama and motion picture is, however, not new (Miller, 1996; Clarke and Doel 2005; Griffiths 2008). And yet, much like the historic panorama, Martinsson's Expanded Rephotography Project will allow viewers "to 'visit' specific sites, navigate through immersive passages of time, and make their own 'observations' of the effects of a climate in transition" (Visual Arena, 2022). This will be accompanied by sounds of calving glaciers, tumbling

rocks, and the wind and sea, alongside drone footage, which provides an aerial perspective to the totalising experience of VR. As Martinsson shared with me, this project is also a part of the new visualisation dome, named Wisdome, being constructed at the Universeum in Göteborg, Sweden, scheduled to open in the summer of 2023. Where environmental re-photography looks to recreate and evaluate ecological and geological change in the landscape, experiencing Svalbard's glaciers through the expanded re-photography of VR offers a continuous panoramic image through time as well as space and communicates the same contemporary interest in documenting ice loss. Vance Byrd (2017:7) writes that "Panoramas encompassed a historical mode of vision, encouraged the investigation of present times, and made possible the articulation of visions for the future." The all-encompassing panoramic experience of VR transforms the movement of glacial ice from an otherwise static location and image, and dissolves both space and time as the glacier expands or recedes. The word panorama further implies the idea of totality, which is among the aims of ascertaining a long, visual history of glacial evolution, both past and present. Here, the idea of ice as a planetary traveller, as an impersonal agent that offers an alternative non-human object of attention, forces us to confront how we, humans, have impacted the Earth.

The vast glaciers and large icebergs of the Arctic and Antarctic (see the Larsen B and Larsen C ice shelves and calving events of recent years) are fundamentally not reducible to human scale, despite the best efforts of panoramas, photography, and contemporary technologies to bring these environments into a confined, man-made space. Regardless, can we as scholars only know the tracks of icebergs in the satellite age, the age of time-lapse and drone photography? Can we in fact understand the icebergs' journey before this? This is arguably where the panorama comes in. While sublime and fantastical, the circular and moving panorama, as well as contemporary panoramic modes of representation, present the opportunity to experience and interpret historic exploratory and scientific engagements with glaciers and icebergs. Through the movement of ice into the panoramic format, the iceberg's journey becomes even greater than before. It is not that "this wandering chunk of matter doomed human civilization to an inevitable collision course with the icescape" (Duckert, 2013:68), but rather that it gave humans the opportunity to experience the peregrinations of glaciers, icebergs, and sea ice in landscapes far-removed and distant. Rather than solely anticipating ice loss, art history and visual culture offer alternative icy imaginaries, histories, and environmental realities.

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