

15

THE INVISIBLE AXIS

From Polar Media to Planetary Networks

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The polar regions of our planet were long considered inhospitable and inaccessible, but in the media age, they have become highly visible nonetheless. Representations of the Arctic and Antarctic provide us with historical, political, and ecological frames of reference for broader epistemological insights, from heroic seafaring to climate science, from *Nanook* (dir. Flaherty, 1922) or *Scott of the Antarctic* (dir. Freund, 1948) to works by DJ Spooky and Werner Herzog, and from travel documentaries in the era of adventurous exploration to installation art using live feed in the age of GPS and webcams.¹ While thinking in terms of globalization places the accent on how economic change brings about a homogenization that in turn impacts the cultural sphere, the concept of “the planetary” emphasizes constellations and positions that problematize knowledge of our whole world, with its rising sea levels, species extinctions, and climate change. This chapter traces the multiple cultural implications of two pivotal infrastructural shifts: a redeployment of military capacity towards exploration at the turn of the nineteenth to the twentieth century and, later, a shift from big science collaborations to using the power of the media to help foment a planetary perspective or world picture. Moreover, the sheer inaccessibility of the North and South Poles makes them a crucible for the persistent questions of access and data visualization that characterize the information age. Planetary discourse is thus neither simply the consequence nor a facile critique of the history of colonizing the planet; as its etymological roots suggest, the planetary is transient, capable of unmooring fixed positions but by the same token *expanding* the frame of reference.

It might seem that before we can discuss or even conceive of climate change, we need to be able to envision Earth as one habitat; that planetary consciousness only fully congeals with the availability of an image of our whole world from a distance. Taken on December 7, 1972, by the crew of Apollo 17 at a distance of about 28,000 miles, the so-called “Blue Marble” is one of the most trafficked

images in human history, from postcards to political posters and from postage stamps to book covers, not to mention its cinematic appearances. Remarkably, it prominently features Antarctica. But even before that historic photograph, as this chapter will discuss, the invisible axis of the North and South Poles galvanized media attention; over a century ago, Shackleton financed his expeditions by selling image rights.

In providing an invisible axis as a condition of possibility for our world picture, polar media challenge the scale and dimensionality of how we define and comprehend the planet, encompassing both spatial orders of magnitude (from the nanometric to the astronomic) and temporal scales (from the milliseconds of neurological apperception to the millennia of geologic and ecological structure). And yet, our ever more high-tech ways of envisioning and representing the planet are, at the same time, underpinned by colonial histories in ways that directly impinge on the fate of the world in the Anthropocene.² For example, the persistent attraction of the idea of a tunnel or axis connecting the north and south polar regions is a key trope in how we visualize and explore, represent and navigate the Earth: whether in terms of magnetism, without which Columbus or Magellan would not have achieved what either did; or in terms of radio waves; or indeed in the dense and global trafficking of images that seek to represent the extremes of the planet to those who are trying to comprehend their place on it.

What is at stake in media studies of the planetary—beyond the reductive media topoi of McLuhan's global village, Innis's trade routes, Chardin's noosphere, Castells's information society, or de Kerckhove's telepresence, and beyond the diagnosis of an expanded technical reach and shrinking in scale of our lived experience—is not simply globalization as enabled by a political and technical infrastructure of digital information and thus of capital flows among computers, satellites, and mobile phones. While we might observe that the history of exploration and colonization of the farthest reaches of the planet has led directly to the conditions of climate change we confront today, thinking about planetary infrastructure entails more than merely envisioning a globe with cultural and cosmic layers. Rather, a full-fledged planetary consciousness requires us to recognize the struggle between colonizing space on, inside, above, and around our planet through media-technical world images, and the pivotal insight that this very same high-tech human involvement on the planet makes an irrevocable difference in the ecosystem.³ To that extent, engaging with polar media is perhaps a little like falling down a rabbit hole that tunnels through the planet, traveling inexorably yet unpredictably along that invisible axis that promises to connect the far north and the most inaccessible south. Imagine Alice staring into the abyss of the rabbit hole, wondering not so much about orange marmalade, but about the time it takes to traverse the whole planet and pop out the other end.⁴ Camille Flammarion, as late as 1909, argued in his notorious essay "A Hole through the Earth" that "the inhabitants of the earth as still very far from a full knowledge of the planet on which they dwell." Pointing out that such a hole had been stipulated by Plutarch, Maupertuis, Voltaire, Dante, and others, Flammarion sought to debunk the notion

that the core of the planet is “liquid and incandescent,” and proposed drilling a tunnel right through the planet that would accelerate transportation and communication and also provide a source of geothermal energy.⁵

I have had the idea in mind for some time past of sinking a shaft into the earth for the express purpose of scientific exploration, descending as far below the surface as the utmost resources of modern science would permit.⁶

It is that colonial and entrepreneurial prospecting that this chapter seeks to describe before turning to a critical, reflexive notion of polar media and planetary networks.

From Hollow Earth Visions to Planetary Prospecting

One trajectory of the historical logic of polar media along this invisible but powerful axis that we ought to be able to excavate is the shift from the nineteenth century’s pronounced emphasis on race to a growing concern with environmental factors—particularly with weather and the global meteorological consequences of melting polar ice caps in the course of the twentieth century and into the twenty-first. The racial tensions that used to be found in nearly every canonical text about the extreme North and far South now often yield to discussions foregrounding climate consciousness and global politics. In centuries past, racist conspiracy theories congealed around inchoate ideas of purity where the pole—elsewhere imagined as vortex, void, or whirlpool—was conceived as an entry point into a different realm: the geographical prize as a spiritual prize. Antarctica figured as a southern counterpart to the *Ultima Thule* of occult racist fantasies about the north. In 1818, John Cleves Symmes posited a tunnel from pole to pole. His search for *Symzonia*, the land of perfect whiteness and “abode of a race perfect in its kind” was held out in *Harper’s* magazine to be a great motivation for Antarctic exploration. “I declare the earth is hollow and habitable within,” Symmes asserted, arguing of the entire globe “that it is open at the poles.”⁷ In 1873, the *Atlantic Monthly* could still argue the feasibility of this theory; only the Amundsen and Scott expeditions in 1911–12 laid it to rest. Edgar Allan Poe was greatly fascinated with Symmes’s hollow Earth idea, and arguably in *The Narrative of Arthur Gordon Pym of Nantucket* (1839) projected onto that global scale the tensions between North and South in the United States. Furthermore, Poe ends Pym’s travel narrative with a fictive editor’s framing note that associates the whiteout of the South Pole with the black cavern of the inverted Eden he calls Tsalal, along with speculations on black-on-white scribbles that supposedly denote shade and darkness in esoteric languages. Beyond the model of *Gulliver’s Travels* or similar fare, darkness here is interpolated with and dissolved in snow and ice, reminiscent of the allegorical complications of the whiteness of Melville’s whale, or indeed of the albatross in nineteenth-century literature.⁸ At this intersection of the trajectories of race and

ecology we also find *Frankenstein*—where the hubris of creating life meets its double in Walton’s desire to “sate my curiosity with the sight of a part of the world never before visited.”⁹ As Shelley writes,

What may not be expected in a country of eternal light? I may there discover the wondrous power which attracts the needle and may regulate a thousand celestial observations that require only this voyage to render their seeming eccentricities consistent forever.¹⁰

Yet viewers of James Whale’s classic horror films based on Shelley’s *Frankenstein* realize that this landscape is, by the same token, one of eternal darkness, where proximity to one source of magnetism occludes the opposite, balancing pole.

If an emphasis on climate issues in planetary consciousness comes more to the fore as time goes on, this concentration must take into account the history of heroic exploration when the redeployment of military resources—from earlier seafaring explorations (particularly for the English Navy after the Napoleonic Wars) to the service of colonial and scientific expeditions—led to international collaborations on an unprecedented scale. The Austro-Hungarian expedition of 1872–74 led by Carl Weyprecht made some discoveries but lost the ship *Tegethoff*, although everyone on board was saved. Weyprecht saw that individual expeditions could only contribute in small ways and, at scientific conventions and conferences in 1875, he presented a more ambitious plan, proposing that polar research is of great importance for knowledge of nature and that expeditions have value only if they prepare the way for scientific exploration. He held that detailed topographic mapping is secondary, that the geographical pole has no more value than other high latitudes, and that—beyond isolated data series—the intensity of the phenomena to be studied should be the deciding factor on favorable places for observation.¹¹ Weyprecht promoted the idea of establishing stations for meteorological and magnetic measurements throughout a year. Around the same time, Georg von Neumann, director of the German Maritime Observatory, proposed similar ideas but focused on the Southern Hemisphere. After some discussion among meteorologists, an International Polar Commission was created in October 1879 at a meeting in Hamburg, in anticipation of the next major period of sunspot activity (1881–82). However, after only four countries signed up by August 1880, a meeting in Berne postponed investigation of solar-terrestrial relations. At a third meeting in St. Petersburg in August 1881, a research program including atmospheric electricity, meteorology, geomagnetism, and ocean currents was scheduled for the period from August 1882 through August 1883, with eleven nations supporting fourteen stations—twelve around the Arctic, one in South Georgia, and one at Cape Horn. Weyprecht died in 1881, but had inspired over seven hundred men to venture out on the largest coordinated series of scientific expeditions of the nineteenth century. Unfortunately the International Polar Commission dissolved, and each participating nation published its own results; the potential benefit of coordination

envisioned by Weyprecht was lost. Nonetheless it is worth mentioning that meteorological research received major impulses from Swedish, Scottish, and German expeditions to Antarctica early in the twentieth century, when balloons recorded different aerial temperatures at different altitudes and allowed the testing of thermodynamic theories.

During World War I, media technologies—including but not limited to telegraph, radio, telephone lines, and electric power lines—experienced unexplained interruptions and contaminations, and the rise of the airplane and of new instruments for ocean navigation renewed interest in magnetic research around the poles. After World War I, new meteorological measurements with radiosondes to investigate upper air motion reinvigorated these discussions, and interest in trans-Arctic air routes (as well as the discovery of the “jet stream”) created a demand for more detailed weather information. The organization of a second international polar year was suggested for 1932–33, and an international meteorological committee started working towards that goal in 1927.¹² A scientific conference in Copenhagen in 1929 pointed to expected practical applications in terrestrial magnetism, marine and aerial navigation, wireless telegraphy, and weather forecasts, resulting in the establishment of a Commission for the International Polar Year (IPY) and inviting the General Assembly of the International Union of Geodesy and Geophysics, who provided funding for instruments and publications.¹³ Despite the political upheavals of the early 1930s worldwide, the Second IPY was scheduled for a period of minimal solar activity between August 1932 and August 1933. At a convention in Locarno, Switzerland, in October 1931, it was decided to establish twenty-seven stations supported by forty-four nations, but none of them in the Antarctic due to fiscal restraints. The main US scientific contributions were led by Admiral Byrd.

The aviator and naval officer Richard E. Byrd had long been a polar explorer. His controversial claim to have reached the North Pole from Spitsbergen (in the Svalbard archipelago) by airplane in 1926 may not be verifiable, since his typewritten report of June 22, 1926, to the National Geographic Society is not corroborated by sextant data from his journal entry of May 9, 1926 (which was erased yet still legible). But on November 28, 1929, he flew from the Ross Ice Shelf over the South Pole in a Ford Trimotor. Byrd shrewdly harnessed media popularity for his polar adventures. An eighty-two-minute (mostly silent) documentary film about this quest, *With Byrd at the South Pole* (1930) won best cinematography at the third Academy Awards—the first-ever Oscar for a documentary. Based on the acclaim that mission received, Byrd went on to lead four later Antarctic missions. As his autobiography documents, during his second sojourn he barely survived an extended polar winter, from March 22 to October 14, 1934, at an advance weather station where he lived alone for nineteen weeks.¹⁴ His third expedition during 1939–40 had the full backing of the US government, and he was recalled into active military duty in 1940. Right after World War II, Byrd was chosen to lead what may still be the largest Antarctic expedition to date, Operation Highjump.

The US Navy assembled over forty-seven hundred men, a flagship and an aircraft carrier, thirteen support ships, six helicopters, six amphibious planes, two seaplane tenders, and fifteen other aircraft. This contingent arrived in Antarctica at the end of 1946 to carry out aerial surveys, train personnel and test equipment in low temperature conditions, and develop techniques for establishing, maintaining, and utilizing bases on ice.

After Operation Highjump, Byrd famously warned the media that the world was shrinking rapidly, that an attack on the United States over either of the poles by fast airplanes was possible, and that isolation or distance are no longer guarantees of safety.¹⁵ Conspiracy theories have made much of the fact that early in 1939, a German expedition visited Dronning Maud Land (an Antarctic region claimed by Norway) to establish a base, and that between 1943 and 1945 Britain ran a Special Air Service Regiment (SAS) operation, code named Tabarin, against Germans on Antarctica. Given that much of Operation Highjump was classified, it is hardly surprising that science fiction and thriller writers and filmmakers should spin yarns about secret Antarctic Nazi bases, UFOs from the pole, and the like.¹⁶ One extant conspiracy theory maintains that “Germany lost the European war in 1945 in order to win the South Polar one in 1947.”¹⁷ Some even believe that purportedly observed UFOs are not actually alien vessels but Nazi flying saucers. Indeed some advanced German aircraft designs did reach prototype stage in 1944 and 1945. However, it does not follow, as conspiracy theorists continue to allege, that leading Nazis were “able to escape the ruins of the Third Reich and continue their nefarious plans for world domination in the icy fastnesses of the Arctic and Antarctic.”¹⁸ By the same token, there can be no doubt that the power of flight changed not only the conduct of warfare but also the very accessibility of the polar regions, as well as their visibility and traversability.

It is true that a German expedition under Alfred Ritschler in 1938 and 1939 viewed 230,000 square miles of Antarctica from the air and photomapped 135,000. But it is not verifiable that Operation Highjump or, for that matter, Operation Argus (three 1958 nuclear tests on Antarctica, yet nowhere near where the Germans had landed two decades earlier) were directed against any military targets on Antarctica. Nonetheless, the Byrd expedition revived hollow Earth fantasies in novels and movies.¹⁹ To this day, cinema and literature enjoy propagating the fantasy that German U-boats and flying saucers were stationed in Antarctica. As historians point out, “activities that were classified have subsequently been declassified and it is no longer difficult to separate fact from fancy, despite the fact that many find it attractive not to do so.”²⁰ Aside from using Antarctica (as well as Greenland) to stage training exercises for a possible conflict with the Soviet Union in the high Arctic, Operation Highjump was mainly about cartography, geology, meteorology, and the hydrological and electromagnetic conditions in the area. Nonetheless the topos remains popular, particularly in conjunction with Americans fighting Nazis. For instance, in Michael Chabon’s 2000 novel *The Amazing Adventures of Kavalier & Clay*, Joe Kavalier joins the US Navy in December 1941,

is stationed as a radioman at Kelvinator Station in Antarctica, and monitors the Germans in Queen Maud Land.²¹ An Antarctic-German World War II connection is also perpetuated in numerous works of science fiction.²² One of the most curious examples may be the 1934 German science fiction novel *A Star Fell from the Sky*, in which a German expedition to Antarctica deploys advanced technologies including jet propulsion and automatic steering to discover a meteorite full of gold, thus again giving rise to the suggestion that a secret Nazi base near the South Pole could be feasible.²³ Another remarkable novel from the year 1939 sends its protagonist five millennia back in time, where he meets “Antarkans”—it is unusual for pre-World War II stories to mention atomic bombs, as this one does well before the first such bomb was built. Presumably the US government ignored this science fiction so that the Manhattan Project could continue in secrecy.²⁴

After World War II spurred the development of computational weather models and simulations that aided the nondestructive development and testing of explosives and rockets, discussions soon emerged about prospective internationally coordinated investigations to take place during a period of maximum solar activity from 1957–58. Ionospheric probes and rocket launches were proposed at a meeting of the Joint Commission of the Ionosphere of the International Council of Scientific Unions at Brussels in September 1950, and the World Meteorological Organization was invited to collaborate. The third polar year became the International Geophysical Year, facilitating investigations into solar radiation, aurora and cosmic radiation, geomagnetism, glaciology, gravity, ionospheric physics, meteorology, and seismology. During this year, measurements were taken not only in the Arctic and Antarctic, but also on the equator and in North America, Europe, and Oceania, with sixty-seven nations participating and about four thousand stations, many of which were newly set up for the occasion.

In Antarctica, fifty-five stations were set up by twelve nations, and the Commonwealth Trans-Antarctic Expedition (led by Vivian Fuchs and Edmund Hillary) crossed the continent by tractor via the South Pole, traversing 2,158 miles from Shackleton station in ninety-nine days and arriving at Scott station on March 2, 1958. This was the first expedition to reach the South Pole in forty-six years, preceded only by Amundsen and Scott’s respective achievements in 1911 and 1912; it remained the only crossing of the Antarctic continent until Ranulph Fiennes matched it in 1981. Right after the end of the third International Polar Year, the Soviets also drove a tractor exploration from Komsomolskaya base 1,142 miles to the South Pole, arriving on December 26, 1959. Admiral Byrd once again commanded a US Navy operation in Antarctica during the International Geophysical Year, called Operation Deep Freeze I, establishing permanent bases at McMurdo Sound, the Bay of Whales, and the South Pole. Operation Deep Freeze I also established five new stations fronting the Indian, Pacific, and Atlantic oceans, having explored over a million square miles of unknown territory in Wilkes Land—the vast area of Antarctica where the US Exploring Expedition under Lt. Charles Wilkes had reported land in longitude 158° degree east on January 16, 1840,

and then skirted the coast for 1,500 miles, thus establishing the existence of the Antarctic continent.

In this zeal for exploration and mapping, it is easy to lose sight of the fact that the geographically meaningful axis for South and North Polar adventures is also imaginary, ambiguous, and shifting. For one thing, the magnetic poles (and the magnetic north-south axis) are distinct from the more familiar geographic poles, inclining at roughly 12° from the geographic axis and therefore lying almost eight hundred miles from the geographic poles. Moreover, the South Magnetic Pole, where the magnetic field lines point vertically, continues to shift several miles northwest each year; while Shackleton's expedition in 1909 located it in the highlands of Victoria Land, in 1962 it was near the Adélie Coast, and by 2010 it was actually off the coast of Antarctica—continually over sixteen hundred miles away from the geographic pole.²⁵ Because this axis inclines at roughly 12° from the geographic axis, the geomagnetic poles lie almost eight hundred miles from the geographic poles. The fact that the South Geomagnetic Pole is very close to Vostok, the Russian Antarctic base—where a record low temperature of -127°F (-89°C) was recorded on August 24, 1960—has given rise to speculation (and some scientific experiments) regarding what might be buried there under 12,140 feet of ice.

While science fiction and fantasy literature as well as movies indulge in tales of bacterial or alien life under the ice, one of the most globally influential effects of Antarctic exploration in the Cold War period, amid all the highly telegenic media campaigns around heroic military and scientific exploits, turned out to be the decision to set aside territorial claims in Antarctica. Of course, it proved consequential for media history when the Soviet *Sputnik* satellite was launched on October 4, 1957, right when the Scientific Committee on Antarctic Research conference on rockets and satellites took place in Washington DC, triggering a Cold War arms race. Nevertheless, the third IPY also resulted in an international peace treaty, albeit one restricted to Antarctica. On December 1, 1959, the twelve countries whose scientists participated in the polar year signed the Antarctic Treaty, which entered into force in 1961, and has since been acceded to by many other nations; currently fifty nations have signed on. Providing that Antarctica shall be used for peaceful purposes only, and prohibiting territorial claims to all the land and ice south of latitude 60° south, the Treaty upholds freedom of scientific exploration and the exchange of observations and results.

A fourth, expanded International Polar Year (March 2007 through March 2009) was again an interdisciplinary initiative devoted mainly to the effects of climate change. It also marked the 125th anniversary of the first IPY, the 75th anniversary of the second IPY, and the 50th anniversary of the third IPY, and involved over sixty thousand scientists from sixty-six nations. This history of the IPY goes hand in hand with milestones in polar and scientific media, from the heroic age of exploration to the launch of the global space age with *Sputnik* and *Vanguard*.

Tracing the history of the IPY also raises questions of scale in the context of communications media and collaborative initiatives. As Ray and Charles Eames

demonstrated in their classic short *Powers of Ten* (1977), the translatability of abstract (but calculable and measurable) into concrete sensory data allows us to comprehend and incorporate conceptions of scale that are otherwise beneath or above the thresholds of our natural perception. This sort of scaling up or down is how microscopic, but also satellite and space imagery, can become appropriated and understood. And it is how we apprehend representations of the polar regions that would be otherwise invisible, inaccessible, and unimaginable.

Planetary Networks

The development of the “cybercartographic atlas” of Antarctica—a web-based reference for the entire Antarctic region—is an interesting example for the challenges and attractions that are part and parcel of a project to visualize and catalogue an entire continent for the productive use by people who, for the most part, have not been there and may not expect to set foot there.²⁶ The project encompasses not only online interactive visualization of maps built from distributed sources and updated with real-time data, but also collaborative maps use via telepresence.²⁷ Instead of topographic surveys and census information—both of which are hard to acquire for a vast ice desert of over five million square miles—the atlas amasses data from distributed networks of GPS and other sensor inputs.²⁸ In the context of this history and the laborious constitution of the cybercartographic atlas, we might perceive Google Earth as a step towards commodification and trivialization of the hard-won insights that, in the heroic and military ages of exploration, were paid with many deaths, and that were no easier to come by in the periods of polar exploration enhanced by science and media. The comparison sends us back to fundamental questions about the role of maps, not merely in exploring or navigating, nor even in establishing and disputing territorial claims, but as media that query the representation of the unknown defining our comprehension of the history and culture of Antarctica. Instead of seeing the continent merely as a giant science lab, thinking through the polar imaginary may help us understand broader ecosystemic interrelationships, including the hydrosphere of global ocean currents and the atmosphere, as we come to terms with climate change.

Antarctica is the planet’s highest continent, averaging more than a mile above sea level, with the Vinson Massif in the Ellsworth Mountains its highest peak at 16,860 feet. The continent stores seventy percent of the planet’s fresh water—an estimated seven million cubic miles of ice, most of the world’s supply, up to 14,000 feet thick on the Hollick-Kenyon plateau, pressing the continent down (as it does in Greenland). As *National Geographic* magazine calculated in 1963, if all the ice were to melt, it would raise sea levels globally by two hundred fifty feet.²⁹ Consulting the *RealClimate* website, browsing data compiled by the World Meteorological Organization, or consulting NASA reports, it becomes plain that the ice changes around Earth’s frozen caps, and that sea levels are rising.³⁰ The United Nations Educational, Scientific and Cultural Organization (UNESCO)

urges us to consider species extinction, referring to its universal declaration on cultural diversity.³¹ This concern for life on the planet should not merely extend to husky heroics, melodrama displaced upon the sacrifice or consumption of man's best friend, or the chronicling of the humanoid waddling of penguins. The past hundred years saw such a radical transformation in life on the planet's crust, with extreme climates, population growth, deforestation, ocean acidification, and species extinction, that another geologic era has been established: what ecologist Eugene Stoermer and atmospheric chemist Paul Crutzen in 2000 called the Anthropocene.³²

In the face of such massive geological features and dramatic changes, we may ask: at what scale is Earth understood, at what scale are Antarctica and the high Arctic comprehensible, and how do we visualize and narrate their appeal? Umberto Eco discussed the theoretical possibility of a 1:1 map—it would need to be coextensive, yet not transparently covering the territory; it would need to faithfully reproduce all features, functioning as a semiotic tool:

The map cannot be a transparent sheet in any way fixed over the territory on which the reliefs of the territory itself are projected point by point; for in that case any extrapolation carried out on the map would be carried out at the same time on the territory beneath it, and the map would lose its function as a maximum existential graph.³³

In this extended meditation upon Borges's celebrated short story, "On Exactitude in Science," Eco concludes that an opaque map covering the territory would necessarily change the ecological equilibrium of the territory itself, thus depicting the territory differently from its actual state. Suspending the map does not solve the issue, since it would have an atmospheric impact. Yet a transparent, permeable, extended, and adjustable map would eliminate the semiotic function Eco requires: "It would be functional as sign only in the presence of its own referent: residing on the map, the subjects could not tend the territory, which would deteriorate, making the map unfaithful."³⁴

One might argue that this "deterioration" of the territory is indeed already in progress in the way our mediascape in the Northern Hemisphere has been representing Antarctica. Not even the cybercartographic project can circumvent the paradox of Eco's essay: a cybercartographic data feed that fully shows what Antarctica is would need to include the sources of such data as they are acquired and compiled, since the remote sensing, weather stations, vehicles, and settlements that produce the data points are all part of Antarctica.³⁵ This would invite a bad infinity of representing the territory and its maps. Following Eco, a 1:1 map inevitably reproduces the territory unfaithfully; or, in the very realization of the map, the territory becomes irreproducible. At its point of maximum representation in interactive multimedia, cinema, literature, photography, data visualizations, and so forth, Antarctica itself becomes imperceptible. This is the problem facing

Buckminster Fuller's fluid geography kit; his "dymaxion projection" world map so prominently featured Antarctica, but none of his clients knew what to do with that "empty" continent.

This conundrum of irreproducibility may also become a challenge or inspiration for works of art and data-rich media representations. The Pavilion of the Bahamas at the 2013 Venice Biennial, for instance, took up the ineffability of the poles as a theme. Artist Tavares Strachan, who in 2006 had FedEx ship a 4.5-ton block of ice from a subarctic river in Alaska to a primary school in the Bahamas, where solar energy was used to keep it frozen, has also developed what he calls the "Bahamas Aerospace and Sea Exploration Center" in Nassau. For "Polar Eclipse," his 2013 installation in Venice, he refers to Matthew Alexander Henson's 1912 autobiography, which recounts the role Henson (1866–1955) and four Inuit guides played in Robert Peary's "discovery" of the North Pole on 6 April 1909. The African American Henson explored the Arctic with Peary for twenty-two years, but Peary credited neither him nor the mission's Inuit members with significant contributions. However, Inuit oral tradition accords the guides a crucial role in the historical exploits of Peary, and posterity also honored Henson's contributions. Henson died in 1955 at the age of eighty-eight and was buried at Woodlawn Cemetery (a National Historic Landmark in The Bronx, New York), but in 1988, his remains were exhumed and reburied at Arlington National Cemetery, near the grave of Admiral Peary. The Matthew Henson Earth Conservation Center in Washington, DC, is named for him. Tavares Strachan's fourteen-channel video installation "Standing Alone" (2013) reenacts Peary and Henson's 1909 expedition while simultaneously exploring issues of identity, belonging, and globalization:

Instead of aggrandizing himself as a victorious explorer able to reenact Matthew Henson's presumed 1909 "discovery" of the North Pole, which in reality is only a conceptual point, Strachan highlights the absurdity and even the impossibility of doing so. While his flag in "Standing Alone" might appear to be demarcating the North Pole, it is only connected to the constantly moving ice shelf covering portions of the Arctic Ocean, and thus is as unanchored as the artist standing beside it.³⁶

Documenting the difficulty of putting any marker on the "conceptual point" that is the North Pole (the ice shelf covering it sometimes moves miles within minutes), Strachan also invited forty Bahamian children to Venice where they performed a traditional Inuit song, which Strachan claims is "untranslatable." The Biennial exhibit also featured a block of North Pole ice as well as a "cloned" block of ice (fabricated to contain a similar composition of chloride, sodium, sulfate, magnesium, calcium, potassium, bromide, zinc, etc.), displayed alongside and inviting reflection about their relation to each other as well as the viewer's relation to either of them.

DJ Spooky's *Terra Nova: The Antarctic Suite*, a multimedia performance work commissioned by German National Radio, transforms his encounter with a rapidly changing continent in December 2007 and January 2008 into seventy minutes of music compiled from field recordings. Grounded in "music composed from the different geographies that make up the land mass" and his DJ craft, the project seeks to reflect an environment that is only minimally illustrated by the accompanying visuals from the Getty collection of Antarctic images.³⁷ It differs in its reflexivity from what might be the world's most widely seen PowerPoint presentation, namely Al Gore's *An Inconvenient Truth* (2006). As Kathryn Yusoff states, an "increasing vigilance and reflexivity to representational and metaphoric practices in the constructions of environments" is necessary to cope with the technological commodification of ecosystem services.³⁸

And of course, the ultimate irony of our remote-sensing data center world is that the huge server farms for our planetary cloud-computing providers are among the biggest culprits of heat dissipation and energy consumption (see Brennan in this volume). Or as Thomas Pynchon's latest protagonist, Gabriel Ice, has it in *Bleeding Edge* (2013):

"More and more servers together in the same place putting out levels of heat that quickly become problematic unless you spend the budget on A/C. Thing to do," Ice proclaims, "is to go north, set up server farms where heat dissipation won't be so much of a problem, take your power from renewables like hydro or sunlight, use surplus heat to help sustain whatever communities grow up around the data centers. Dome communities across the Arctic tundra. My geek brothers! the tropics may be OK for cheap labor and sex tours, but the future is out there on the permafrost, a new geopolitical imperative—gain control of the supply of cold as a natural resource of incomputable worth, with global warming, even more crucial."

Notably, Pynchon's narrative voice contextualizes right away:

There is something creepily familiar about this go-north argument. By a corollary of Godwin's law valid only on the Upper West Side, Stalin's name, like Hitler's, is 100% certain to enter a discussion of any length, and Maxine now recalls Ernie telling her about the genocidal Georgian and his plans back in the 1930s for colonizing the Arctic with domed cities and armies of young technicians, otherwise known, Ernie was always careful to point out, as forced labor, bringing out the multimedia emphasis his 78 rpm album of *The Attractive Schoolgirl of Zazhopinsk*, an obscure opera from the purge era, strangled Russian bass-tenor duets invoking steppes of ice, thermodynamic night.³⁹

As always, fiction never lags far behind the facts, and indeed often forms the leading edge. In April 2007, Internet pioneer Vint Cerf (in the 1970s co-designer of

the TCP/IP protocol, and more recently Google's "chief Internet evangelist") appeared at the University of California, Irvine (where I work), and explicitly called for data centers in the polar regions. Speaking to audiences at Calit2, a state-funded Institute for Science and Innovation focused on Telecommunications and Information Technology, Cerf pointed out that in terms of infrastructure, the North and South Poles are well situated to connect via satellite relays or ocean cable to areas of the globe that have not been fully connected to the Internet. And indeed, earlier in 2013 it was revealed that there may well be a chain of data centers and listening posts all along the coast of Antarctica, as marked on a map featuring one of the PowerPoint slides that National Security Agency (NSA) contractor Edward Snowden took and allowed the news media to publish.⁴⁰

Technologies of measuring and representing, exploring and navigating, remote sensing and telecommunication have produced a planetary imaginary in the high-tech crucible of polar media. The very remoteness and darkness of the Arctic and Antarctic is pictured, broadcast, webcast . . . and former Soviet icebreakers that threatened to become unsupportable on dwindling budgets are turned over to private enterprise as lucrative tourist vessels venturing into extreme regions. Indeed, media mogul Howard Hughes's obsession with the Cold War thriller *Ice Station Zebra* (1968) still looms large: the US National Academy of Sciences maintained as recently as 2008 that "polar regions play key roles in understanding impacts of ever-changing space weather on technologies for modern communication and power distribution."⁴¹ While the most remote polar regions become convenient nodes for planetary networks, the abstraction of the planet as infrastructure shifts the register of observation and representation. The famous blue marble photo features prominently not only on the cover of the 1969 *Whole Earth Catalog*, but also on the report from the famous 1972 report on *The Limits to Growth* by the pioneering think tank, the Club of Rome, as well as in Al Gore's famous slides from 2006. As astronaut Eugene Cernan, the last human to walk on the moon, mused:

When you get 250,000 miles from earth and look back, the earth is really beautiful. You can see the roundness, you can see from the snowcap of the North Pole to the ice caps of the South Pole. You can see across continents. You look for the strings that are holding this earth up and you look for the fulcrum and it doesn't exist.⁴²

When the American minimalist composer Terry Riley was commissioned by the Kronos Quartet (and curator of the NASA Art Program Bertram Ulrich) to use audio tapes of cosmic phenomena recorded by the University of Iowa Physics Department, he also made use of a very similar quote from Neil Armstrong, the first astronaut to walk on the moon: "You see from pole to pole and across oceans and continents. You can watch it turn, and there's no strings holding it up. And it's moving in a blackness that is almost beyond conception."⁴³ In the original photo, the south polar ice cap appears on top and the north at the bottom because of

the orientation in which the astronauts were traveling. Stewart Brand, publisher of *The Whole Earth Catalog* between 1968 and 1972 and intermittently thereafter, had been lobbying NASA since 1966 to release a photograph of the entire Earth. But despite the fact that this photo features Antarctica so prominently, the desire for an emblematic image of planetary consciousness has not contributed as much as Brand and others had hoped to a changed attitude towards modifying the very industrial infrastructure that provides us with such images. The 1995 film *Apollo 13* (dir. Ron Howard) shows that same Apollo 17 photograph of Earth countless times, but every time Tom Hanks look out the window, he catches the same view of Antarctica; in Hollywood's safe vision, the planet does not even rotate around its invisible axis.

Notes

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- 1 Two recent books are great compendia of polar media. See Andrea Polli and Jane D. Marsching, *Far Field: Digital Culture, Climate Change, and the Poles* (New York, NY: Intellect Press, 2011), and E. Glasberg, *Antarctica as Cultural Critique: The Gendered Politics of Scientific Exploration and Climate Change* (London: Palgrave Macmillan, 2012).
- 2 Paul Crutzen and Eugene Stoermer, "The Anthropocene," *International Geosphere-Biosphere Programme Newsletter*, 41 (May 2000): 17–18, <http://www.igbp.net/publications/globalchangemagazine/globalchangemagazine/globalchangenewslettersno4159.5.5831d9ad13275d51c098000309.html>.
- 3 Mary Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation* (London: Routledge, 1992).
- 4 Lewis Carroll, *Alice's Adventures in Wonderland* (London: Macmillan, 1865).
- 5 Indeed, scientists in 2014 should not have been so surprised when satellite imagery and ice-penetrating radars pulled by snowmobiles aided them in the discovery of a hidden valley buried under West Antarctic ice that appears to be bigger than the Grand Canyon—two miles deep, two hundred miles long, and fifteen miles wide. See William Pentland, "Massive Hole Discovered under Antarctica, Bigger Than the Grand Canyon," *Forbes*, January 15, 2015, <http://www.forbes.com/sites/williampentland/2014/01/15/massive-hole-discovered-under-antarctica-bigger-than-the-grand-canyon/>.
- 6 Camille Flammarion, "A Hole through the Earth," *Strand Magazine*, 38 (1909): 349–355.
- 7 John Cleves Symmes, *Symzonia, A Voyage of Discovery* (London: J. Seymour, 1818). Compare J. McBride, *The Symmes Theory of Concentric Spheres* (Cincinnati, OH: Morgan Lodge and Fisher, 1828), and R. Rucker, *The Hollow Earth: The Narrative of Mason Algiers Reynolds of Virginia* (New York, NY: William Morrow, 1990).
- 8 Here one thinks first of Samuel Taylor Coleridge's poem *The Rime of the Ancient Mariner* (1798), but the albatross figures similarly in Mary Shelley's *Frankenstein* (1818) and Charles Baudelaire's *Les Fleurs du mal* (1857).
- 9 Mary Shelley, *Frankenstein, or the Modern Prometheus* (New York, NY: Signet, 1963), 194. Coleridge and Poe personify the pole as an animal lover, inhuman but nonetheless (selectively) protecting life.
- 10 Mary W. Shelley, *Frankenstein or, The Modern Prometheus* (Boston and Cambridge: Sever, Francis & Co., 1869), 15.
- 11 F.W.G. Baker, "The First International Polar Year, 1882–83," *Polar Record*, 21, no. 132 (1992): 275–285. Compare Carl Weyprecht, "Vortrag," in *Tageblatt der 48. Versammlung Deutscher Naturforscher und Ärzte zu Graz vom 18–24. September 1875* [Publications of the 48th Assembly of German Natural Scientists and Medical Researchers, September, 18–24, 1875]. Graz, 39–42.

- 12 V. Laursen, "The Second International Polar Year (1932/33)," *WMO Bulletin*, 31, no. 3 (1982): 214–222.
- 13 Henrik G. Cannegieter, "The History of the International Meteorological Organization 1872–1951," *Annalen der Meteorologie*, 1 (1963): 1–280.
- 14 Richard E. Byrd, *Alone* (New York, NY: G.P. Putnam, 1938). Byrd lived alone between March 28 and August 11.
- 15 David A. Kearns, "Operation Highjump: Task Force 68," in *Where Hell Freezes Over: A Story of Amazing Bravery and Survival* (New York, NY: Thomas Dunne, 2005). Compare with Halford Mackinder, "The Geographic Pivot of History," in *The Geopolitics Reader*, edited by Gearóid Ó. Tuathail, Simon Dalby, and Paul Routledge (London: Routledge, 1998), 27–31.
- 16 "Government Document Archive," The Black Vault, <http://www.theblackvault.com/m/articles/view/Operation-Highjump> (accessed February 2015).
- 17 "The Secret Expedition to the Nazi South Polar Base," German UFO Chatter, <http://www.germanufochatter.com/Nazi-South-Polar-Base/index.html>.
- 18 Alan Baker, *Invisible Eagle* (New York, NY: Virgin, 2000).
- 19 See, for instance, Raymond W. Bernard, *The Hollow Earth: The Greatest Geographical Discovery in History Made by Admiral Richard E. Byrd in the Mysterious Land beyond the Poles—The True Origin of the Flying Saucers* (New York, NY: Bell, 1964).
- 20 Colin Summerhayes and Peter Beeching, "Hitler's Antarctic Base: The Myth and the Reality," *Polar Record*, 43, no. 224 (2007): 1–21.
- 21 Michael Chabon, *The Amazing Adventures of Kavalier & Clay* (New York, NY: Random House, 2000).
- 22 See Clive Cussler, *Válhalla Rising* (New York, NY: Putnam, 2001), and several other titles by the same author. Other recent popular polar fiction deploying Nazi myths includes William Dietrich, *Ice Reich* (New York, NY: Warner, 1998), Mick Farren, *Underland* (New York, NY: Doherty, 2002), and Richard P. Henrick, *Ice Wolf* (New York, NY: Harper, 1994).
- 23 Hans Dominik, *A Star Fell from the Sky* (Leipzig: von Hase & Koehler, 1934). Coincidentally, Dominik was a boarding school student of science fiction pioneer Kurd Lasswitz; see Laurence Rickels, *Psy Fi* (Minneapolis: University of Minnesota Press, 2002), 179f., on Dominik's science fiction from the 1930s.
- 24 E. and O. Binder, *The Lords of Creation* (New York, NY: Munsey, 1939).
- 25 Calculations reveal that while the magnetic north pole is 380 miles from true north, the magnetic South Pole has moved up to eighteen hundred miles from true south.
- 26 Peter Pulsifer et al., "The Development of the Cybercartographic Atlas of Antarctica," *Cybercartography: Theory and Practice* (Amsterdam: Elsevier, 2005), 461–490.
- 27 See Glenn Brauen, "Designing Interactive Sound Maps Using Scalable Vector Graphics," *Cartographica* (special issue on cybercartography), 41, no. 1 (March 2006): 59–71; and Peter L. Pulsifer, Sébastien Caquard, and D.R. Fraser Taylor (eds.), *Toward A New Generation of Community Atlases—The Cybercartographic Atlas of Antarctica* (New York, NY: Springer, 2007).
- 28 An important extension of my argument here would need to pursue GIS-based knowledge politics, for instance along the lines of Sarah Elwood and Agnieszka Leszczynski, "New Spatial Media, New Knowledge Politics," *Transactions of the Institute of British Geographers* (Royal Geographical Society), 38 (2012): 544–559.
- 29 Atlas Plate 65, *National Geographic* magazine (February 1963).
- 30 The Center for Astrophysical Research in Antarctica offers a virtual tour of the South Pole at <http://astro.uchicago.edu/cara/vtour/pole>.
- 31 See the Arctic Climate Impact Assessment (ACIA), November 2004, <http://www.acia.uaf.edu> (accessed February 2015), as well as "Realclimate: Climate Science from Climate Scientists," <http://realclimate.org> (accessed February 2015); "NASA Eyes Ice Changes Around Earth's Frozen Caps," NASA, <http://www.nasa.gov/vision/earth/look-inside/earth/icecover.html>; "UNESCO Universal Declaration on Cultural Diversity,"

- (UNESCO, 2002), <http://unesdoc.unesco.org/images/0012/001271/127160m.pdf>; "Impacts of the Kyoto Protocol on U.S. Energy Markets & Economic Activity," Energy Information Administration (EIA), <http://www.eia.doe.gov/oiaf/kyoto/kyotorpt.html> (accessed February 2015); Fred Pearce, "Post-Kyoto Climate Negotiations Look Troubled," *New Scientist*, <http://www.newscientist.com/article.ns?id=dn6816>.
- 32 See note 2.
 - 33 Umberto Eco, "On the Impossibility of Drawing a Map of the Empire on a Scale of 1 to 1," *How to Travel with a Salmon and Other Essays* (New York, NY: Harcourt & Brace, 1982), 95–106.
 - 34 Ibid. See Jorge Luis Borges, "On Exactitude in Science," *A Universal History of Infamy* (London: Penguin, 1975), first published as "Del rigor en la ciencia," *Los Anales de Buenos Aires*, 1, no. 3 (March 1946): 53, which itself borrows its motif from Lewis Carroll's 1893 book *Sylvie and Bruno Concluded* (London: Macmillan), 169.
 - 35 The cybercartographic project has received more media attention after being mentioned by former US Vice President Al Gore in a speech on "The Digital Earth: Understanding Our Planet in the 21st Century," January 31, 1998, at the California Science Center in Los Angeles; see <http://www.digitalearth.gov/VP199B0131.html>.
 - 36 Strachan exhibition blurb, Venice Biennale 2013.
 - 37 See Paul D. Miller, *The Book of Ice* (New York, NY: Subliminal Kid, 2011).
 - 38 Kathryn Yusoff, "Excess, Catastrophe, and Climate Change," *Environment and Planning D: Society and Space*, 9 (2009): 1010–1029.
 - 39 Thomas Pynchon, *Bleeding Edge* (New York, NY: Penguin, 2013), 310–311.
 - 40 On Snowden and the materials he released to the public, see Luke Harding, *The Snowden Files: The Inside Story of the World's Most Wanted Man* (New York, NY: Vintage, 2014).
 - 41 ICSU, "A Framework for the International Polar Year 2007–2008," http://www.ipy.wnoz.us.edu.pl/stromy/IPY_framework.pdf.
 - 42 Eugene Cernan, "Apollo 17 Astronauts Weigh Space Challenge," *Lowell Sun* (March 29, 1973), 26.
 - 43 Terry Riley (2002). *Sun Rings*, http://kronosquartet.org/projects/detail/sun_rings.

