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Chapter 5

Empires of Science, Science of Empires

Mapping, Centres of Calculation and the Making of Imperial Spaces in Nineteenth-Century Germany

Filipe dos Reis

INTRODUCTION

In the years around 1850, an ongoing tragedy caught the attention of the British public. Two ships, the *Erebus* and the *Terror*, had left Britain in May 1845 for an Arctic exploration under the command of Captain Sir John Franklin to sail, chart and map the North-West Passage. A navigable North-West Passage, it was believed, would not only shorten the distance between Asia and Europe but also provide Britain with a monopoly on this sea route, and thereby facilitate trade within the British Empire. Consequently, the expedition's departure was accompanied by major ceremonies and became a mass spectacle. Although the journey was planned meticulously – with the crew well equipped and with Franklin being one of the most experienced Polar navigators of the Royal Navy, who had served on three previous Arctic expeditions – the two ships were seen by Europeans for the last time in July 1845. As no new information arrived, the British public became increasingly concerned with the fate of the two ships and, initiated by Franklin's wife Lady Jane, the 'search for Franklin' turned into an unprecedented media event, in the course of which the British Admiralty offered a reward of £20,000, and numerous government-sponsored search missions departed over the years. These missions collected significant information about the geographical condition of the Arctic. What they could not find, however, was any information about Franklin and his crew. The fate of the *Erebus* and the *Terror* remained untraceable. It was only in 1854, almost a decade after the ships had disappeared, that a search mission received information from local Inuits that the ships and their crews must have been lost near King William Island in the

Canadian Arctic. Finally, in 1857 first relics were found in this area. As we know today, the two ships must have frozen unprepared in the ice near King William Island during the first year of their expedition, where Franklin died in 1847 and all members of his crew, nearly 130 men, in the coming years, turning this episode in the end into a ‘lost passage’ (Hill 2008, 3).¹

Yet, at the beginning of the 1850s, when the fate of Franklin and his crew was still unknown, many theories circulated in the British public speculating about the exact position of the two ships. The most ‘spectacular and far-reaching’ (Felsch 2010, 102) of these theories came from August Petermann (1822–1878), a young German cartographer who lived in London at the time and worked closely with the Royal Geographical Society, where he was awarded the honorary title of a ‘Physical Geographer to the Queen’ in 1852. August – or Augustus, as he called himself at the time in order to anglicize his name – Petermann was one of the leading representatives of the theory of an Open Polar Sea. In January 1852, Petermann presented this theory for the first time in a letter to the British Admiralty. He also passed it on to the newspaper *The Athenaeum* (Petermann 1852c). In the months that followed, more letters, speeches to the Royal Geographical Society and publications were circulated. Petermann used these publications to further substantiate his theory and, finally, develop a concrete plan to set up a mission to ‘search for Franklin’ (Petermann 1852a, 1852b, 1853).

In Petermann’s view, it was ‘a well-known fact that there exists to the north of the Siberian coast, and, at a comparatively short distance from it, a sea open at all seasons; it is beyond doubt that a similar open sea exists on the American side to the north of the Parry group; it is very probable that these two open seas form a navigable Arctic ocean’ (Petermann 1852c, 82). The ‘Polar is open and free from ice. It *never freezes*’ (Petermann 1852b, 11; emphasis in the original). Petermann based his theory on two – already for his contemporaries counterintuitive – assumptions. Firstly, the temperatures near the North Pole are significantly warmer as commonly assumed. As Petermann wrote, it ‘has been a too common error, in matters regarding the natural features of the Arctic Regions, to take into account the lines of latitude only, and to disregard the lines of temperature altogether; *the equator and the poles are too frequently considered the centres of the greatest heat and the greatest cold*. In no other regions are the inferences drawn from such views more mischievous than in the Arctic Regions, where the temperature corresponds less with latitude than in any other part of the globe, and where . . . the temperature chiefly depends on the currents and the drift ice, the influence of which is remarkable’ (Petermann 1852b, 18–19; emphasis added). Thus, the temperature in the Arctic is warmer as believed and, as a result, for example, the number of animals, which could serve as food, increases toward the poles (Petermann 1852a). Secondly, it is possible to access the Open Polar Sea. The commonly held assumption of an ‘impenetrable ice-barrier across

the sea' needs to be considered as 'groundless, and as resting on prejudice' (Petermann 1853, 131); there exists only an 'imaginary barrier', which is 'even in these our enlightened days held up, by some' (Petermann 1853, 133). However, according to Petermann, the ice-barrier is open only during a few months. The access points are not navigable during the summer and autumn as they are blocked by 'floating ice which in the preceding months breaks loose from the *Siberian* coasts' (Petermann 1853, 11; emphasis in the original) but only during winter and spring. Petermann deduced from these assumptions that Franklin and his crew must have accessed the Open Polar Sea and must still be alive. Therefore, a rescue mission should not depart during the summer months (as other missions before) but during winter or spring, and it should not sail north-west to the Canadian Arctic (as other missions before) but north-east, where at the Siberian coast access to the Polar basin would be easier. Petermann came to these conclusions in a particular way. Unlike many contemporary commentators of the fate of the Franklin Expedition, Petermann himself had never sailed to the Polar regions. Instead, he had assembled 'facts . . . derived as they are from high authorities' (Petermann 1852b, 13) – in particular, reports of the explorations of the Dutch captain Willem Barents in the late sixteenth century and the Baltic German navigator Baron Ferdinand von Wrangel in the 1820s – and merged them with theories about ice-drift, currents and temperature. As it is summarized in the introduction to Petermann's letter in *The Athenaeum*, this approach is solely based on 'physical data' and 'scientific reasoning' (Petermann 1852c, 82).

However, at least for the meantime, Petermann's plan for a Polar expedition was not realized. No ships were sent out. Instead, Petermann left London in 1854 and moved to Gotha, a minor capital in Germany, where he started to work for the publishing house of *Justus Perthes*. In the following decades, *Justus Perthes* developed into the leading German-language press when it comes to the mapping of non-European territories. As I will advance in this chapter, it rapidly turned into what Bruno Latour describes as a 'center of calculation' (Latour 1987). Petermann, in turn, became not only one of the most-renowned cartographers of his time, but also an 'organizer of discoveries', the prototype of an 'armchair geographer' or, as one biographer puts it, a 'spider in the world-wide grid web of cartography' (Felsch 2010, 141), whose main interest was to fill the 'blank spaces' on maps, in particular when it came to Central Africa and the Polar regions. As we will see, the 'search for Franklin' remained an important underlying *leitmotif* in these endeavours. By reconstructing the role of the *Justus Perthes* press and the work of August Petermann, this chapter seeks to reflect upon important epistemological conditions of possibility of the German imperial and colonial discourse in the nineteenth century.² In particular, I am interested in how an Enlightenment-driven, seemingly innocent cartography of exploration in the

Humboldtian tradition created, often unintentionally, some of the epistemological conditions of possibility for later imperial and colonial imaginations in Germany. Here, my main focus is on the use (and production) of ‘blank spaces’ (or ‘silences’) on maps. This cartographic technique creates, inter alia, the ‘promise of free and apparently virgin land – an empty space for Europeans to partition and fill’ (Harley 1988b, 70). As we have seen earlier, this was very much Petermann’s own imagination of the Arctic region. Blank spaces, however, should not be perceived as ‘passive’ spaces of non-knowledge but rather seen as actively produced by incorporating certain sources (or ‘authorities’) and silencing others. Before investigating this, it is important to address two points.

First, in line with the overall theme of this volume, the chapter enquires into the intimate relationship between mapping and the making of European imperial projects. As, for example, Mark Neocleous notes, maps have a ‘pre-disposition towards colonialism and imperialism’ (Neocleous 2003, 419) and, as J. B. Harley claims, they even served as ‘weapons of imperialism’ (Harley 1988a, 282). More precisely, maps have not only been mirrors and records of European expansionism but became core devices and instruments in the creation and imagination of these imperial and colonial projects; rather than operating as their ‘cameras’, they should be understood as their ‘engines’.³ This echoes, of course, the idea of the ‘performativity’ of maps and mapping, introduced by Harley some three decades ago (Harley 1989) and since then well established in the history of cartography and beyond. Therefore, it is important for those studying current and past developments in world politics to be aware of, as Jeppe Strandsbjerg has put it, the ‘cartographic reality of space’ of one’s own object of study as the ‘spatial reality underwriting state territory, globalization and the conduct of international relations is assembled through cartographic practices historically’ (Strandsbjerg 2010, 4).

Second, these imperial projects have developed differently across Europe. This is particularly so when we look at the example of German cartography and its connection to imperialism. In contrast to the empires of the first wave of European expansionism, Portugal and Spain (Lobo-Guerrero, this volume), or later, France and Britain (Le Douarin and Goettlich, this volume), Germany became an imperial power relatively late as German ‘unification’, under Prussian leadership, occurred only in 1871 and was seen by many as ‘incomplete’ as the German-speaking parts of the Austro-Hungarian Empire were not included in the German Empire (*Deutsches Reich*). As such, the German *Reich* was part of a number of – connected – ‘positioning games’ (Çapan and dos Reis 2019): first, it was in search of its own place in Europe, involving not only discussions on whether or not to include the German-speaking parts of the Austro-Hungarian Empire but also the Netherlands or parts of Central and Eastern Europe in a larger sphere of German influence – as it happened in particular in discussions in the context of the concept of *Mitteleuropa* (Central Europe); second, it was

in search of its own geopolitical take, which revolved around notions such as *Weltpolitik* (world politics) or *Lebensraum* (living space); and third, it was in search of colonial spaces outside of Europe.⁴ In other words, empire-building and nation-building are closely intertwined.

In order to develop my argument, this chapter is organized as follows. First, I present Latour's notion of 'centers of calculation' and introduce three such centres on different scales, namely the town of Gotha as a scientific centre in the scattered environment of mid-nineteenth-century Germany, the *Justus Perthes* publishing house as a hybrid between commercial firm and scientific enterprise and August Petermann and his journal *Petermanns Geographische Mitteilungen* (Petermann's Geographical Messages). Second, I discuss the idea of blank spaces on maps by embedding it in broader transformations of spatial imaginaries as well as tying it to a Humboldtian ideal of cartography. Third, I retrace two projects of explorations – the 'German Inner-Africa expedition' (1860–1863) and the first two 'German North Pole expeditions' (1866–1870) – which were organized by Petermann and the *Justus Perthes* publishing house. I conclude by further problematizing the link between mapping and empire-making by highlighting the role of centres of calculation in the distribution of geographical knowledge and the production of imperial spaces.

ON CENTRES OF CALCULATION AND EARLY SCIENTIFIC MANAGEMENT OF CARTOGRAPHY

Drawing upon some of the recent literature in the post-representational tradition of cartography, this chapter argues that maps and mapping were historically often embedded in what Bruno Latour describes as 'centers of calculation' (Latour 1987; cf. Turnbull 2000, chap. 3; Pickles 2004, chap. 3; Strandsbjerg 2010, 58–62; Jöns 2011; Edney 2019, 94). According to Turnbull (1996, 22), the *Casa da Índia* in Lisbon and the *Casa de la Contratación* in Seville developed during the sixteenth century into centres of calculation, serving as main sites for the accumulation and distribution of geographical knowledge and thereby essentially enabling the expansion of the Portuguese and Spanish empires. Similarly, in the late-eighteenth and particularly during the nineteenth century, large private publishing houses such as *Hachette* in France, *Murray* in Britain and *Perthes* in Germany 'played a primary role in the shaping of geographical knowledge' as they were the 'first agencies for the production of scholarly geography in those countries before the institutionalization of geography in universities' (Ferretti 2019, 23).

Latour advanced the notion of 'centers of calculation' in his seminal study *Science in Action: How to Follow Scientists and Engineers through Society*, published in 1987. According to Latour, knowledge, which is the building

block of the modern sciences, ‘cannot be defined without understanding what *gaining* knowledge means’ (Latour 1987, 220; emphasis in the original). Neither can it be grasped by opposing it to concepts such as ‘belief’ or ‘ignorance’, nor does it ‘sit’ in the ‘mind’ of scientists. Instead, knowledge is produced, mobilized, combined and stabilized in and through networks, including human and non-human resources. Thus, to study knowledge properly one has to consider ‘a whole cycle of accumulation: how to bring things back to a place for someone to see it for the first time so that others might be sent to bring other things back. How to be familiar with things, people and events, which are *distant*’ (Latour 1987, 220; emphasis in the original). These circular processes are tied to centres of calculation, where human and non-human resources are ‘combined and make possible a type of calculation’ (Latour 1999, 304).

In order to function, these centres are organized (and govern at a distance) through ‘immutable mobiles’ (Latour 1987, 1990). For Latour, immutable mobiles have three characteristics: first, they have to be mobile ‘so that they can be brought back’; second, they have to be kept stable ‘so that they can be moved back and forth without additional distortion, corruption or decay’; and finally, they have to be combinable ‘so that whatever stuff they are made of, they can be cumulated, aggregated, or shuffled like a pack of cards’ (Latour 1987, 223). In other words, centres of calculation and immutable mobiles are closely linked to questions of connectivity. Maps are prime examples of immutable mobiles as they, in the words of David Turnbull, ‘allow for enhanced connectivity’ (Turnbull 2000, 92). Maps are small enough that they can be brought to the centre but also taken to the field; they can easily be standardized and commensurated by introducing a common metric; based on this, they are easily ‘readable’ when ‘map literacy’ (Jacob 2006) among all members of the network (including experts and laypersons) is high, something which became the case increasingly during the nineteenth century; and they can permanently be adapted, reworked and superimposed.

However, Latour’s conceptualization of maps as immutable mobiles has recently given rise to some criticism. For example, Matthew Edney argued that maps should be considered *mutable*, that is, ‘active and dynamic’, rather than immutable mobiles as ‘people are always undertaking mappy acts: making maps, circulating them, using them, ignoring them’; and, even ‘the storage and destruction of maps are dynamic processes’, which signifies that in the end also ‘archives and libraries are not just places of storage but are sites of further knowledge production’ (Edney 2019, 48). One promising avenue to unpack this tension between mutability and immutability (as well as mobility and immobility) has been suggested by John Law and Annemarie Mol in their discussion of the link between scientific and technological objects, for example, a map, a vessel for exploration or an instrument to

survey a territory, and (the making of) spatialities. According to Law and Mol (2001, 619–20), these objects might have different characteristics *at the same time*. A map, for example, can be an *immutable immobile* in a first instance. As such, it might be situated within a local context where it is drawn on the working desk of a map-maker. But when it starts moving to other locations, it can turn into an *immutable mobile* in the Latourian sense. This means that it circulates within the space of a network, where it is kept mostly stable. In this sense, it might travel as a supplement of a journal to readers or be used as a standardized object to survey a territory. Yet, maps move not only within the space of this network as they enact, simultaneously, a specific understanding of spatiality – modern European maps, for example, share the same notion of (Euclidean/Cartesian) geometry. Moreover, a map can become a *mutable mobile*. To speak of it as a mutable mobile emphasizes the fluidity rather than the stability of the object. Readers might interpret it in a different way, or ‘newly discovered’ territories might be mapped during an exploration. Finally, a map can be a *mutable immobile*, when, for example, readers write to the editor of a journal or the most recent information from field work arrives at the centre of calculation, where it is added and edited to the initial map and where then, ‘paradoxically, the global is already included in the local’ (Law and Mol 2001, 619).

This signifies that mapping needs to be grasped as a dynamic process of circulation and translation, where both circulation and translation are understood as contested, non-linear, contingent and transformative endeavours (cf. Çapan, dos Reis, and Grasten 2021) – and where both circulation and translation can always fail (see Callon 1984). Such a process-focused understanding of mapping was, at least to some degree, already shared by Petermann in 1866: ‘If our first and best explorer-travellers touch one and the same area, the same thing on the map becomes a true *perpetuum mobile*, as with each traveller the map gets a more or less different depiction, and it is often even impossible to judge which is the more correct one’ (Petermann 1866, 588–89).

Moreover, the notion of centres of calculation raises two important points for the conceptualization of empire in this chapter. First, mirroring one of the commonplaces of actor-network theory (ANT), namely that society cannot explain but needs to be explained in the first place (Latour 2005; see also dos Reis 2019, 155), empires cannot explain but are in need of explanation in the first place. To reconstruct the work of and within centres of calculations helps, then, to understand how empires are invented, fabricated, formed, articulated, mobilized and stabilized. Empires are always empires in the making, they are never fixed. As a corollary, there cannot be a trans-historically and inter-imperially valid fit-it-all concept of empire, but it should be understood rather as a ‘language game’ connected through ‘family resemblances’ in the Wittgensteinian sense (Wittgenstein 1953). Second, centres of

calculation might be located remotely and unremarkably far away from imperial metropolises. As Latour points out, they might be ‘a small provincial town, or an obscure laboratory, or any puny little company in a garage, that were first as weak as any other place [and] become centers dominating at a distance many other places’ (Latour 1987, 223). We can find centres of calculation on different scales. These centres of calculation are empires of science. If we take the nexus between power and knowledge seriously, however, empires of science might produce the science of empire. In this chapter, I focus not only on one centre of calculation, however, but on three – intertwined and interwoven – centres operating on different scales, namely the ‘small provincial town’ of Gotha, the ‘puny little company’ of *Justus Perthes* and August Petermann as an ‘armchair geographer’ and, with the help of his journal, ‘organizer of discoveries’.

When Petermann joined *Justus Perthes* in 1854, Gotha was a minor capital located in central Germany. It is important to remember that at this time Germany did not constitute a nation-state yet but was composed of the German Confederation (*Deutscher Bund*), an association of thirty-nine mainly German-speaking states, which was established at the Congress of Vienna in 1815 in the aftermath of the Napoleonic Wars and replaced the former Holy Roman Empire. As the patriotic and liberal revolution of 1848 failed, it was not until 1871 that the German Empire (*Deutsches Reich*) was founded, which became a German nation-state under Prussian leadership and was created without the German-speaking parts of Austria-Hungary – disappointing many who had hoped for a ‘greater German’ (*großdeutsch*) solution including the latter. Moreover, as the German Empire was created rather late, there were for a long time no official state-run German colonies. It was only in the 1880s that the *Reich* began to hold official colonies. Nevertheless, the far-right of the German Empire started to claim in the 1890s a German colonial pre-history in Eastern Europe dating back to the Teutonic Order of the Middle Ages (Çapan and dos Reis 2019). Apart from these claims, there had been a variety of sporadic mercantilist colonial enterprises, such as, for example, the Welser between 1528 and 1556 in South America. This Augsburg-based family of merchants had lent money to the Spanish emperor Charles V and received in return colonial rights over a territory in Venezuela, which the Welser used for exploitation and as a trading post. Another example is the private initiative of the ‘Texas Society’ (*Texasverein*) in the 1840s, which was an attempt by aristocratic army officers to buy land in Texas to establish a German colony. However, this endeavour had to be abandoned after the annexation of Texas into the United States in 1845. In general, these were privately run and rather scattered enterprises, which lacked any organization and support from a central German government. Therefore, it ‘is important to recognize’, as Sebastian Conrad summarizes, ‘that the active

phase of German colonialism, from 1880 onwards, did not develop in linear fashion, out of such episodes' (Conrad 2012, 16). Nevertheless, as we will see, colonial imaginaries developed already during the mid-nineteenth century. These were also linked to ideas of German nation-building.

The German Confederation was divided into smaller states, mostly duchies, which did not form a nation-state or empire but a confederation of sovereign states. These states were often in competition with each other. In particular, the rivalry between the Kingdom of Prussia and the Austrian Empire complicated further integration. Even though Gotha was a small town, it was the capital of the northern part of the Duchy of Saxe-Coburg and Gotha. The current Duke was Ernst II, a liberal monarch, who had supported the 1848 revolution. His younger brother was Prince Albert, the husband of the British monarch Queen Victoria. Already at the turn of the nineteenth century, Ernst II's predecessor had developed Gotha into a centre of the natural sciences – the 'Weimar of the natural sciences' (Felsch 2010, 136) – including an observatory and one of the largest libraries in Germany (cf. Brogiato 2008). As Schelhaas summarizes, Gotha was 'since the eighteenth century a scientific center of international significance, a creative space for the production, collection and communication of scientific knowledge' (Schelhaas 2009, 229). This scientific environment facilitated a variety of entrepreneurial projects. For example, Ernst-Wilhelm Arnoldi founded the first German insurance company in the 1820s, which specialized in fire and life insurances.

It was in this environment that the *Justus Perthes* publishing house was established in September 1785 by Johann Georg Justus Perthes (see Smits 2004, 23–26; Demhardt 2015a). A larger success was, around 1800 onwards, from the publication of the famous *Almanach de Gotha*, or, *Gothaischer Hofkalender*, a directory of Europe's nobility, published on a yearly basis in German and French, which developed during the nineteenth century into, what could be called today, a 'logbook of governmentality' for European rulers as the *Almanach* assembled not only genealogical material about European dynasties and nobility but also began to include gradually a collection of detailed statistical data covering all countries of the world. From 1815 onwards *Justus Perthes* started to specialize in scientific maps and atlases, which led to the breakthrough of the press. In line with this new branch of its business, it adjusted its official name to *Justus Perthes Geographische Anstalt* (Justus Perthes's Geographical Institute).

The specialization in cartographic material was made possible through an important transformation in the production of geographical knowledge in continental Europe after the Napoleonic Wars. While geographical knowledge was, for centuries, often under a (quasi-)monopoly of the state and, here, particularly the military, the cartographic publishing market for private companies started to expand at the turn of the nineteenth century. For

example, the King of Prussia, Frederick II, lifted the ban on the publication of cartographic products in 1783 (Felsch 2010, 37). As a consequence of this transformation, centres of geographical knowledge production were no longer located in the state or military, and as universities established chairs of geography only slowly during the nineteenth century, private companies became main hubs for geographical knowledge. In order to understand how geographical knowledge was shaped during this period, it is thus important to analyse the role and the ‘geographies of knowledge’ of large publishing houses and their editorial networks. Companies such as *Hachette*, *Murray* or *Perthes* did not limit themselves to the publication of existing geographical knowledge but created a market for private explorations, discoveries and travel literature. For example, *Perthes* would become a “Central Bureau” for surveying the world’ (‘*Zentralbüro*’ für die Vermessung der Welt’; Felsch 2010, 138). These private mapping agencies turned geography into a public and popular topic as they were able to communicate and disseminate this kind of knowledge to a growing readership in the expanding bourgeoisie. Thereby, maps started to become a mass product and to circulate among a broader audience, making them affordable beyond the political, military and professional elites. In turn, however, this led to the commodification of geographical knowledge as these publishing houses still had to operate on the basis of economic needs (see also Lo Presti’s chapter in this volume).

A good illustration of the working processes at *Justus Perthes* is provided by the *Stielers Hand-Atlas*, one of the first cartographic publications of *Justus Perthes*. This world atlas was initially edited by Adolf Stieler (1775–1836), a self-taught cartographer. The first edition was published in various instalments between 1817 and 1823. The *Stielers Hand-Atlas* became a major success. It ran eventually through eleven editions and has been translated into many languages, becoming, for example, the first significant atlas for a major public in Italian (Boria 2007, 66–69). It ‘inaugurated what became known as the Gotha School’ of cartography, which, as Demhardt summarizes, was ‘characterized by an exclusive reliance on verified data, the courage to concede uncertainty rather than print questionable details, and the meticulous documentation of all sources’ (Demhardt 2015a, 721). One of the main features of this atlas was the inclusion of large ‘blank spaces’ of the ‘unknown parts’ of the world – yet, as we will see in the following, they did *not* always rely on verified data. By combining different instalments of different editions of the *Stielers Hand-Atlas* the reader could participate in the ‘discovery’ and ‘exploration’ of these parts. An imaginary of ‘cartographic progress’ (Edney 1993) became visible in the shrinking of ‘blank spaces’. This was made possible through the standardization of scale for most of the cartographic publications at the *Perthes* firm, which increased the combinability of different (editions of) maps and atlases.

The main success of *Justus Perthes* was, however, the publication of the flagship journal *Petermanns Geographische Mitteilungen*. As the title indicates, it was a journal created by and around August Petermann. Petermann started this geographical journal in 1855, one year after he had left London and joined *Justus Perthes* in Gotha. Within a short period of time, the journal developed into one of the world's leading periodicals for the scientific study of geography – a status it was able to obtain from the second part of the nineteenth to the first part of the twentieth century (cf. Smits 2004; Lentz and Ormeling 2008; Demhardt 2015b). The success of the *Mitteilungen* had several reasons. Firstly, the journal was issued on an approximately monthly basis. Thereby it was possible to publish the latest research results and permanently update news from ongoing explorations. Information about explorations, for example, were often released in the fashion of a serialized novel. This provided the reader with the impression of not only having access to the most recent information but also of being directly involved in the progress of geography, which was understood as an 'unveiling of the world' (Schelhaas 2009, 230). Secondly, as Smits argues, the 'greatest strength' (Smits 2004, 37) of the journal was its emphasis on maps, and at least a couple of coloured maps were included in every number. As Petermann explained in the journal's inaugural editorial, 'Our "*Mitteilungen*" should differ from all similar journals in that carefully edited and neatly executed maps are used as the end result to summarize the latest geographic research and graphically illustrate' (Petermann 1855b, 2). A decade later, Petermann added that 'the end result and the final goal of all geographical research, exploration and surveying is, first of all, the depiction of the surface of the earth: the map. The map is the basis of geography. The map shows us in the best, most precise and most exact way what we know about our earth' (Petermann 1866, 581).

From a commercial point of view, maps helped to reach a broad readership among the interested public as they can be considered as means of communication, which are relatively easy to access in an 'age hungry of adventure, but not yet totally scientifically literate' (Smits 2004, 37). In addition, the maps in the *Mitteilungen* were often taken from other cartographic products from *Justus Perthes*, which facilitated the promotion, for example, of the newest edition of the *Stielers Hand-Atlas* to possible customers. Thirdly, Petermann operated as a kind of 'scientific manager'. He brought a large network of contacts, which he had established in Britain, to Gotha and made frequent use of this for the journal, for example, by acquiring authors or presenting novel material. As we saw in the introduction, Petermann had been an active member of the *Royal Geographical Society*, where he was in contact with a number of most renowned explorers of his time. Prior to this, he had also worked with Alexander Keith Johnston in Edinburgh on a translation of

Heinrich Berghaus's *Physikalischer Atlas* (*Physical Atlas*) from German to English. The German original of this atlas was commissioned and published by *Justus Perthes* as the official 'cartographic translation' of Alexander von Humboldt's late magnum opus *Kosmos*. Based on this variety of contacts, the *Mitteilungen* published in its first years, for example, letters from Alexander von Humboldt to Petermann and it held exclusive publishing rights (at least for the German market) for travelogues and the most recent information of some well-known explorers of that period such as Eduard Vogel, Heinrich Barth or David Livingstone. And, finally, Petermann started organizing his own explorations through the journal. These journeys were intended to 'discover' the last 'unknown territories' on earth, which were often depicted as blank spaces on maps, and concerned mainly two regions: in the 1850s and in the first half of the 1860s the inner regions of Africa, and from the mid-1860s onwards Petermann turned to his earlier interest in the North Pole. For this reason, Petermann has been named the founder of both 'German Africa cartography' (Demhardt 2000) and 'German Polar research' (Krause 1993, 7). Before I reconstruct two expeditions, which were initiated by Petermann, namely the 'German Expedition to Inner-Africa' and the 'German North Pole Expedition', I discuss in the next section the role of 'blank spaces' for mapping.

BLANK SPACES, SILENCES AND GERMAN IMPERIAL ASPIRATIONS

How was it possible to think of blank spaces on maps? What are the underlying epistemological operations at stake that make such spatial thinking possible? And, where is this operated? I argue that two epistemological shifts, which occurred over a long period and ended only in the nineteenth century, were of particular importance. The first shift concerns the emergence of the notion of globality. The idea that the planet has the form of a globe is far from natural and needs to be understood rather as the product of a long transformation in the way space has been imagined (see Bartelson 2010; Ramaswamy 2017). Importantly, the notion of globality is, as, for instance, Latour points out, deeply embedded in modern European thinking, and it brings Latour to the conclusion that if 'there is one thing to provincialise, in addition to Europe, it is the idea of a natural globe' (Latour 2016, 308; cf. dos Reis 2019). From the moment onwards from which the planet has been conceived as a globe, it became possible for Europeans to speculate about regions which they had not fully explored yet – but where they now 'knew' that there must be 'something'. In the case of Africa, for example, Europeans had, after the first wave of European expansion, a more or less accurate picture of the coastal lines of the African continent – and could start to imagine its interior. Second,

and related to this, is the emergence of the idea of empty and extended space, an idea which is usually attributed to Leibniz and (or) Descartes.⁵ Now, it became possible, for instance, to divide space, whereby maps started to play a pivotal role in this process as they could depict abstract spaces where the struggle over ‘empty space’ (imagined as ‘no man’s land’) could take place. Importantly, such operations do not take place *in abstracto*, but are often fabricated in centres of calculations and mobilized through devices such as maps. This means that centres of calculations are not only located (and situated) in space (and time) but produce space (and time) as concrete reality (Latour 1987, 228–32; Strandsbjerg 2010, chap. 3). Similarly, maps and other devices are not just ‘*observations* of the global’ but on top of that always ‘*operations* of the global’ (Staeheli 2012, 233; emphasis added).

Petermann’s fascination for the ‘blank spaces’ on maps, which he shared with most cartographers of his time, became already visible in the short episode at the outset of this chapter. The northern polar region, which was one of the biggest ‘unknown’ swathes on nineteenth-century maps, was in Petermann’s theory not a hostile environment but consisted of a navigable Open Polar Sea, rich in animals and plants. According to Petermann, the situation was similar in other regions of the world, and it was the task of the cartographer to uncover this:

In fact, our geographical knowledge of the territories of the earth is far less than it is generally assumed. . . . We see on our maps the whole of Europe, the whole of Asia, the whole of North America and the whole of South America, including rivers and mountains, places and roads, all of it cleanly engraved in copper and the boundaries of states and peoples sharply defined by coloured lines. Even the African and Australian *terrae incognitae* are shrinking progressively, and there are only some white spots, maybe ‘desert areas’ where there seems to be ‘nothing’. In reality, however, everything we see on these maps is only the first step, the beginning of more accurate knowledge of our earth’s surface. . . . Where we suspected absolutely nothing, where we felt completely satisfied, for example, with the monotonously dotted sand desert on the map and where we were happy with the notion of a sea of vast sand, there was only one single traveller needed . . . to create a different image of this part of the Sahara: instead of areas of a sandy lowland without life, as we have seen on earlier maps, we find now . . . an extensive hydrographic network of periodic rivers and rainwater basin, with a vast number of caravan routes, villages and fountains, which, even though they are not populated by farmers, have a widespread nomadic life.

(Petermann 1866, 582–83; emphasis added)

As it was the case with several other themes in the context of the post-representational tradition in cartography, it was the historiographer of cartography John Brian Harley, who drew, in his eclectic style, our attention to the important role of blank spaces on maps. For Harley, ‘There is no such thing

as an empty space on a map' (Harley 1988b, 71). Instead, Harley argues that 'blank spaces' or ('silences', as he prefers to call them in a Foucauldian vernacular) are 'positive statements' and not 'merely passive gaps in the flow of language': they are 'active human performances' (Harley 1988b, 58). In European medieval maps, blank spaces were used, as Hiatt explains, to depict 'the land that was rather a product of hypothesis rather than exploration'; in later periods these blank spaces were replaced with longer texts or 'pseudo-topography' such as 'speculative mountain ranges, vegetation and rivers'; the technique of blank spaces was reintroduced in 1749 in a map of Africa by the cartographer Jean Baptiste Bourguignon d'Anville, and, finally, by the 'mid-nineteenth century the blank interior of Africa – marked, if at all, with captions such as "unexplored", "unknown interior", "unexplored by Europeans" – was a fairly standard feature of maps of the continent' (Hiatt 2002, 230, 244, 245). By this time, blank spaces figured prominently as well in maps of Australia and the Polar regions.⁶

In general, the technique of using blank spaces was central for European imperial mapping and imagination. While, as Matthew Edney stresses, the cartographic discourse around the 'state' was mainly driven by the idea that its 'participants inhabit, or at least own, the lands being mapped', the discourse on 'empire', in turn, is 'constructed through cartographic discourse that represent a territory for the benefit of one group but that exclude the inhabitants of the territories represented. "Imperial mapping" is thus an ironic act', Edney continues, 'postulating as it does a double audience: the population in the mapped territories remains ignorant while another population is actively enabled and empowered to know the mapped territories' (Edney 2009, 13). In other words, maps produce hierarchies of knowledge. While, for example, European sources (or, 'authorities' as they were called) are regarded as reliable and scientific, local geographies, cosmologies and maps are often silenced. This does not mean that European map-makers and travellers did not rely on indigenous information – quite the opposite was the case. But this kind of information was always in need of translation by Europeans in order to become trustworthy, valid and authoritative (Jones and Voigt 2012, 18). Moreover, in line with (and reinforcing) the 'empiricist' (or 'scientific') world view of this time, blank spaces produce the image that those parts on a map, which are filled with, for example, topographical details, are composed of objective and scientific knowledge. They become validated because non-knowledge seems to be excluded. What is depicted must be true and everything that seems to be speculative becomes 'unknown' territory marked as 'blank' or 'empty'; either something is known, or it is unknown; no third possibility is given (*tertium non datur*). Ironically, this grounding in 'scientific data' and mostly Western 'authorities' often produced highly problematic 'facts'. We have seen this at the outset of the chapter when reliance on

Inuit sources would have helped to clarify the fate of the Franklin Expedition from early onwards. The most familiar example is, however, the Mountains of the Kong, which figured prominently in many nineteenth-century maps of Africa – including the *Stielers Hand-Atlas* – as a great mountain chain in Western Africa, but which never existed outside of the imagination of European map-makers (Bassett and Porter 1991).

Finally, ‘maps anticipated empire’ (Harley 1988a, 282; see also Bassett 1994, 326). It became possible, through blank spaces, to claim or promote land before it was effectively occupied and the ‘promise of free and apparently virgin land – an empty space for Europeans to partition and fill –’ (Harley 1988b, 70) is created. Thereby, the landscape becomes ‘de-socialized’ and even ‘de-humanized’ (Bassett 1994, 326; Harley 1988a, 303). According to Pickles, such an imaginary can be found prominently in Alexander von Humboldt’s geographical work on South America, as ‘von Humboldt mapped the contact zones of the “new world” by erasing local peoples and their histories and inscribing maps and geographies of primal nature in their place’ (Pickles 2004, 119).

Petermann, as many of his contemporaries, shared this Humboldtian imaginary. As Petermann writes in the first editorial of the *Mitteilungen*:

Without rest and against all diseases and dangers, humans wander to the unexplored interior of long known continents; without fear of hostile nature they uncover the secrets of the permanently iced ends of the globe; they have a desire to measure the highest peaks of the sky-striving mountains, and with their meter-long plumb bob they have to capture the ground of the sea, where it is the deepest. The phenomena of the air, the flood tide, the interior of the earth they have to explore and reduce to its most simple laws of nature; they have to announce the spots where one could find the yellow metal, which rules the world, as they have to lay grid-lines over the whole earth to depict the natural spots of the for them indispensable plants and animals. This is the empire of today’s Geographical Science, the wonderfully large world of human knowledge, of which our fathers couldn’t ever have an imagine.

(Petermann 1855b, 1)

According to Petermann, this ‘empire of today’s Geographical Science’ stands in the tradition of Alexander von Humboldt, who ‘300 years after Columbus, as a second Columbus, . . . discovered the New World again’ (Petermann 1855b, 1). Although conceptualized as a journal covering all regions of the world – carrying in its initial phase the slogan *Ubique Terrarum* (everywhere in the world) – the ‘discovery’ of two regions stand out in the first decades of the *Mitteilungen*. On the one hand, and mainly in the 1850s and 1860s, the journal focused on the exploration of Central Africa; on the other hand, the Polar regions, and here first and foremost the North Pole, started to play an important role from the mid-1860s onwards.

SEARCHING FOR THE GERMAN 'FRANKLIN' – THE 'GERMAN INNER-AFRICA EXPEDITION', 1860–1863

Already the first article of the *Mitteilungen* gives a good impression of the central role which the exploration of the last 'blank spaces' in Central Africa played during the first years of the journal. It is a report of Heinrich Barth's expedition to this region, more precisely from Kuka to Timbuktu, the latter described as the 'most famous city of Inner-Africa' (Petermann 1855a, 3). The report includes several letters of Barth, which are written as travelogues. These travelogues are then further contextualized by Petermann. The expedition was organized on British initiative and started in 1849. It was led by James Richardson, a missionary and abolitionist. The aim was to travel from the northern coast of Africa through the Sahara to Sudan. Petermann, who lived in London at the time, was able to include, with Heinrich Barth and Adolf Overweg, two German explorers in the mission. As both Richardson and Overweg died in the first years of the expedition, Barth became its new leader. Barth continued to travel to Timbuktu. Toward the end of Petermann's article, the reader is informed that Barth, after travelling through 'countries never before visited by Europeans' (Petermann 1855a, 13) and after successfully arriving in Timbuktu, was then missing and presumed dead.

In the meantime, Eduard Vogel, another German explorer, was sent, again on British initiative, to join the expedition. Vogel's mission was to compensate for the loss of Richardson and Overweg, and clarify Barth's fate. As it turned out quickly, Barth was still alive, and the two met briefly at Lake Chad, from where Barth travelled back to Europe. Vogel decided to stay in the region and explore the Wadai Empire (located in present-day Chad). Since 1856, however, there was no news about Vogel, with some reports claiming that he had been murdered in Wadai, while others assuming that he was still alive but held captured in its capital Wara. There were even some voices in Germany who believed that he might have abandoned the British expedition out of German patriotic sentiments. Vogel's fate started to concern the German public and, as Franklin for the British, Vogel became the ideal-typical figure of the missing (or 'lost') explorer (Kuhn and Struck 2019). In 1862, the national liberal German newspaper *Die Gartenlaube* (Garden Arbor) even presented Vogel as 'our Franklin' (*Die Gartenlaube* 1862, 72). It was under these circumstances that a search mission for Vogel was launched, the *Deutsche Expedition nach Inner-Afrika* ('German Inner-Africa Expedition'), which was initiated, advertised and organized largely by Petermann. As it was the case with Barth, Petermann had been in contact with Vogel through the Royal Geographical Society in London and had been publishing Vogel's travelogues in the *Mitteilungen* since 1855.

Petermann started to work on a plan for the German Inner-Africa Expedition in 1860. From the very beginning, Petermann designed the expedition not only as a search mission for Vogel but saw it also – as the name ‘*German Inner-Africa Expeditions*’ already indicates – as an opportunity to unite those voices which wanted to overcome the particularism of the German Confederation and advocated instead a unified German nation-state.

Broadly speaking, Petermann initiated the mission on two intersecting levels. The first level concerns the creation of a committee. In July 1860, the *Comité für die Expedition nach Inner-Afrika* (‘Committee for the Expedition to Inner-Africa’), or shorter the *Wadai-Comité* (‘Wadai-Committee’), was established in Gotha, with Ernst II, Duke of Saxe-Coburg-Gotha, as its president, Justus Perthes, director of the publishing house of the same name, as its treasurer and Petermann as its secretary. Among others, Heinrich Barth figured as a founding member. In August 1860, the committee published an exposé for an ‘Expedition to Inner-Africa’, in which it presented a detailed plan for the endeavour. Theodor von Heuglin, an ornithologist and explorer, who had previously served for seven years as Austrian consul in Khartoum, was selected as its leader. According to the *Exposé*, the mission should ‘clarify’ Vogel’s fate and ‘complete’ Vogel’s work as a researcher. The latter was mainly understood as exploring the last blank spaces of the Wadai Empire. As the *Comité* summarizes in the *Exposé*, ‘As far as all credible reports received until 1860 reveal, with the exception of Vogel on his journey to Wadai, no European has ever entered this great *terra incognita* at any point’ (Wadai-Comité 1860a, 7; emphasis in the original). The lack of knowledge about the Wadai Empire stands however in contrast to the possible role that it could play in geopolitical terms as it ‘is a rich land, with a wide variety of different peoples, and as it is located in the center of Africa it links its West and East, North and South’ (Wadai-Comité 1860a, 8). Overall, the *Exposé* frames the enterprise as a ‘patriotic task’ to which everyone could contribute by signing up for a subscription. In December 1860, that is, four months after publishing the *Exposé*, the *Comité* issued detailed instructions for the journey, consisting of fifteen paragraphs (Wadai-Comité 1860b). These paragraphs covered, among other things, the purpose of the journey, namely ‘to clarify the fate of Vogel, save his research papers and complete his scientific mission’ (§2); the route of the journey, namely to ‘spend all power and energy’ to reach Wadai as fast as possible (§9); the financial resources of the mission of up to 15,000 Thaler (§5); but also the obligation to send ‘from time to time . . . completed diaries, albums, maps, itineraries as well as astronomical, meteorological and physical observations to the Comité’ (§12); and a clarification of the copyright of these notes and materials (§15). The instructions were accompanied by a small booklet with instructions from various scientists and experts, as well as by a map of Africa (figure 5.1). This map depicts Africa with large blank

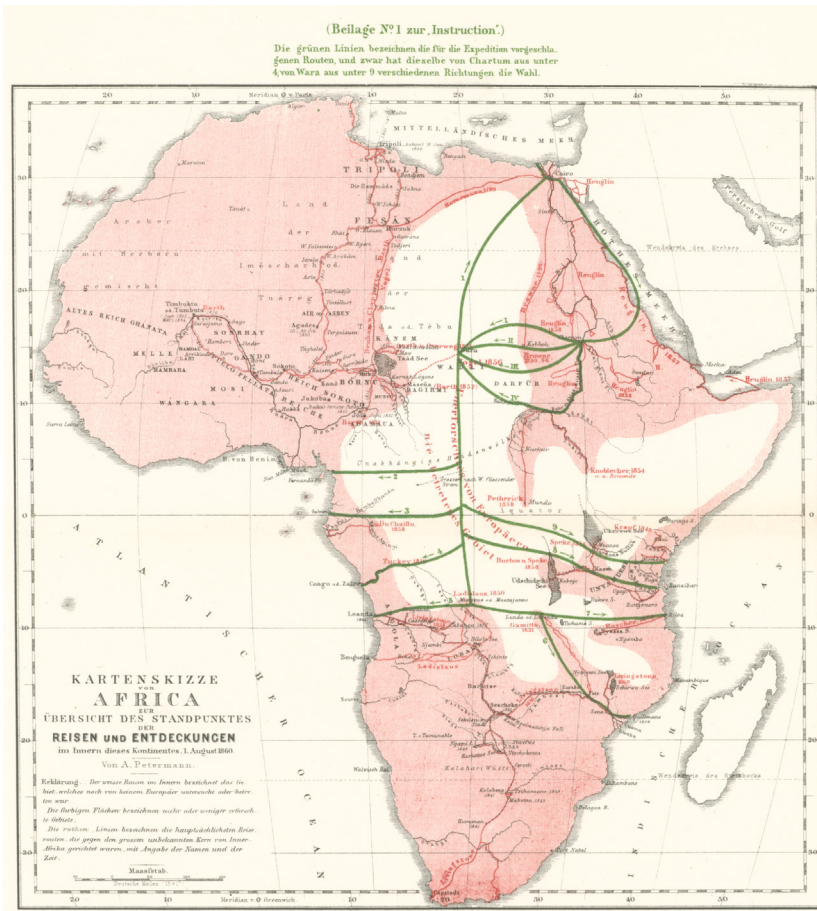


Figure 5.1. Map of Africa including itineraries for the ‘German Expedition to Inner Africa’, Justus Perthes Gotha 1861.

areas in its centre and includes possible travel routes for the expedition. The expedition is supposed to start in Alexandria and travel along the Red Sea to Khartoum. From there the map includes four different routes (I–IV) to the ‘unknown’ land of the Wadaï Empire and its capital Wara, as well as nine options (1–9) for the way back. A similar map was included in the earlier *Exposé* – the only difference was that it did not include the itineraries.

On a second level, Petermann used the *Mitteilungen* to promote the search mission. As previously mentioned, the journal had published Vogel’s travels in the mid-1850s. It stopped, however, giving much attention to the topic in the upcoming years. This changed again in 1860 when it began to speculate first in a couple of short notes about Vogel’s fate and

later announced the plan of the *Wadai-Comité* for the ‘German Inner-Africa Expedition’ under the lead of Theodor von Heuglin. As the *Mitteilungen* informed its readers: ‘Loud and urgent goes a call for humanness and honour to the German Nation in the name of Eduard Vogel, the traveller who has disappeared in the distant interior of Africa while serving German science’ (Anonymous 1860, 318). The fact that this was supposed to be a distinctively ‘German’ expedition was further highlighted: ‘What has been started by German travellers, what had cost German sacrifice, must be completed by German travellers’ (Anonymous 1860, 318). Moreover, the ‘general participation of the audience is requested’ (Anonymous 1860, 318): by donating for the enterprise, every patriotic German could become part of the exploration. Petermann continued the campaign for the mission in the following issues of the journal with more articles introducing and advertising it. This included the publication of parts of the *Exposé* of the *Wadai-Comité* and further initiatives for fund-raising. With regard to the latter, the *Mitteilungen* started to list the exact financial contribution of each monarch of the German-speaking countries – including those who had not donated. In the end, twenty-one out of thirty-three monarchs, who had been contacted – including Prince Albert, the husband of the English Queen Victoria and brother of Ernst II of Saxe-Coburg and Gotha – contributed financially to the ‘German Inner-Africa Expedition’. In a similar way, the journal listed the donations of scientific institutions, such as the Leopoldina, and of several private individuals from all parts of the German Confederation. The fund-raising campaign was accompanied by reports that Vogel might be alive after all. And, finally, the *Mitteilungen* published travelogues of Heuglin’s previous explorations in order to prove his scientific expertise. To make it short, Petermann used a number of channels to promote the ‘German Inner-Africa Expedition’, and to provide it with sufficient financial means. Moreover, the reader was given the impression of becoming part of a greater patriotic joint venture.

In the end, the fundraising campaign was a huge success, and Heuglin and the other members of the expedition arrived in Alexandria in March 1861. Heuglin, however, would have preferred a later date of arrival to prepare the scientific part of the mission more carefully. Yet, the *Wadai-Comité* was not willing to take this concern into account as patriotic voices in the German public pushed for an early departure as they were convinced that Vogel was still alive. After arrival, Heuglin and the other members of the expedition started to send various letters and notes to Gotha. This material contained mostly topographical, ethnographical, zoological and botanical information. The *Mitteilungen* compiled the arriving information into various reports, often accompanied by carefully arranged maps, which were supposed to show the progress of the expedition. Additional material was published in supplementary volumes. During the first months, the ‘German Inner-Africa Expedition’

took the route as planned, including stops, among others, in Cairo and Suez along the Red Sea. However, the mission made much slower progress than initially expected, and as the *Comité* was to find out in August 1861, it was not only delayed, but Heuglin had decided to take a different route in the meantime. Instead of travelling from the coast to Khartoum and then directly to Wadai as set in the instructions of the mission, the expedition was taking a detour through Abyssinia. Knowing the region well, Heuglin had realized that Wadai was not accessible because of the outbreak of local conflicts; apart from that, it was also too hot during the summer months to travel up-country. Nevertheless, the *Comité* could not accept the deviation from the planned route, as pressure from the public remained high. As a consequence, it announced its disapproval of the independent change of the route in a letter to the expedition, which was sent on 12 August 1861. Yet, Heuglin did not react to this request and kept sending letters with zoological and botanical observations to Gotha. In short, the *Comité's* attempts to 'govern at a distance' did not work anymore.

In December 1861, the *Comité* decided to send a second mission to Wadai, which was led by the former military officer Moritz von Beurmann. However, it was only in March 1862, after several months without publishing substantial articles on the 'German Inner-Africa Expedition', that the *Mitteilungen* started to inform its readers about the current state of the mission. The *Mitteilungen* announced that the *Comité* had revoked Heuglin as the leader of the 'German Inner-Africa Expedition' because he had 'acted against the instructions [*instruktionswidrig*]', and had asked Heuglin additionally to send back 'the equipment, provisions, etc' (Anonymous 1862, 98, 99). The *Mitteilungen* reported further that another member of the expedition, Werner Munzinger, was appointed its new leader. Munzinger was instructed to travel directly from Khartoum, where he had arrived already, to Wadai; at the same time, Beurmann headed into the same direction by taking a northern route through the Sahara; and, in the meantime, Heuglin had reached Khartoum as well, where he was accompanied by Hermann Steudner, another member of the initial mission. In other words, the 'German Inner-Africa Expedition' had split into three different expeditions. However, none of them was successful in the end. Munzinger decided to return to Europe after he had received reliable information from a former servant of Vogel, who confirmed that Vogel had been murdered in 1856. Moreover it still seemed to be too dangerous to enter the Wadai Empire. Moritz von Beurmann, however, tried to advance to Wadai and was killed in this attempt in April 1863. Finally, Heuglin and Steudner decided to join the expedition of the Dutch baroness Alexine Tinné to explore the White Nile in Sudan. When Steudner died of Malaria in 1863, Heuglin returned to Europe where he arrived in 1864.

In the aftermath of the ‘German Inner-Africa Expedition’, Petermann tried to turn the obvious failure of the mission into a partial success. First, Petermann emphasized the *patriotic* achievement of the journey. When Beurmann died, the *Mitteilungen* published an obituary, which also included Overweg, Vogel and Steudner. Despite the fact that Overweg and Vogel were part of the British exploration led by Richardson, and that only Steudner and Beurmann were members of the ‘German Inner-Africa Expedition’, all four were ‘intimately connected’ because they ‘worked on the same task and [. . .] are all buried deep inside the African continent, victims of climate and barbarism, they are martyrs of German science’ (Anonymous 1864, 27). The article is accompanied by a map of the itineraries depicting the routes of the ‘four martyrs of German science’ (figure 5.2). Second, Petermann foregrounded the *scientific* value of the journey, in particular its contribution to filling the last ‘blank spaces’ of the map of Africa. In this context, Petermann published a large map of Eastern Africa to summarize the results of the expedition. The map came in several instalments, which were added to supplementary volumes of the *Mitteilungen*. This large map could also be combined with maps previously published in the *Mitteilungen* or other cartographic products at

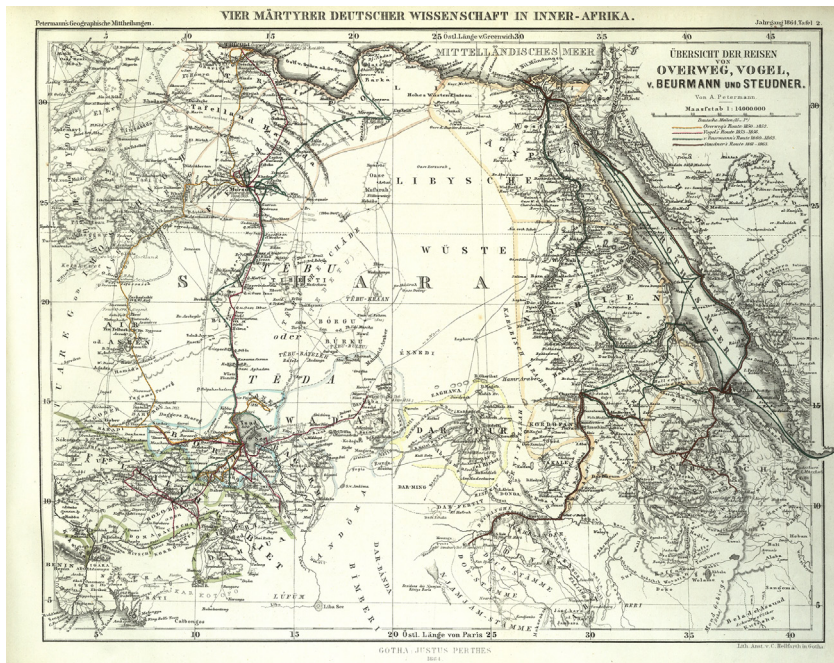


Figure 5.2. Map of ‘Four Martyrs of German Science in Inner-Africa’ in *Petermanns Geographische Mitteilungen*, Justus Perthes Gotha 1864.

Justus Perthes. Such a collage of different maps is included, for example, in a register volume published in 1865. Its map of Africa is intended as a ‘summary’ of the maps published during the first decade of the *Mitteilungen* on the continent (figure 5.3). Third, Petermann praised the mission as a foundation for future European *imperial* ambitions. For Petermann, the ‘German Inner-Africa Expedition’ has shown that areas it travelled ‘deserve a special interest; they are not deadly African swamps or sandy deserts that would deserve to be visited only every 100 years by a geographical traveller, but areas that have a history and a purpose, . . . and which are an El Dorado when it comes to their nature’ (Petermann 1864, ii). Despite these ‘favorable natural conditions, these areas are a kind of “no man’s land” to which any European power could extend its hand’ (Petermann 1864, ii).

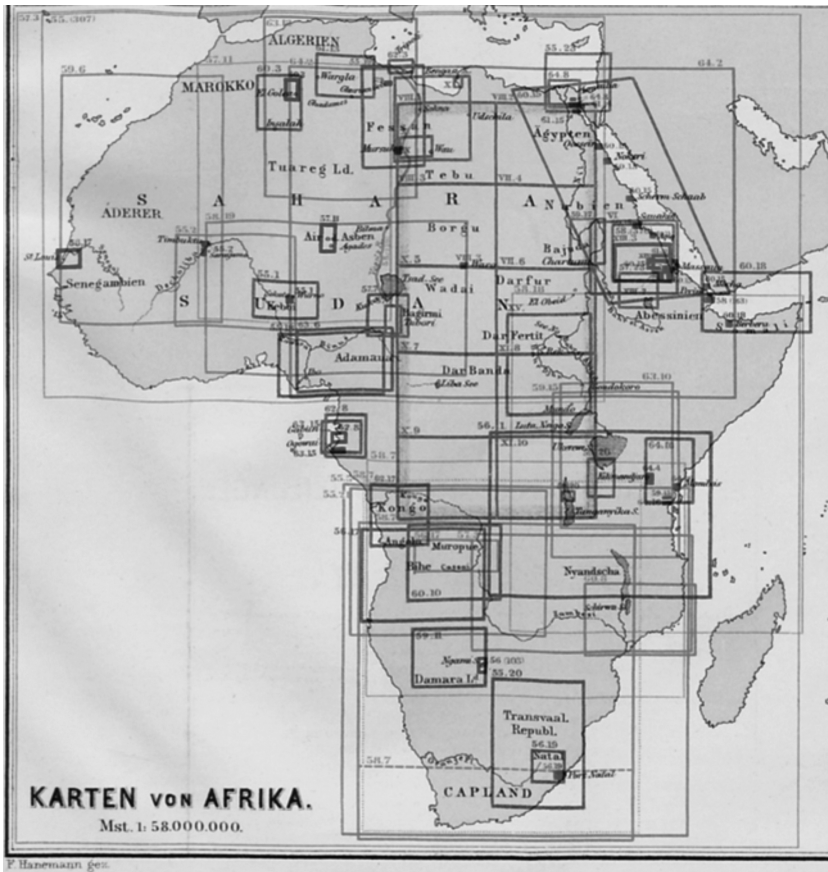


Figure 5.3. Map of Africa in Register Volume of *Petermanns Geographische Mitteilungen*, Justus Perthes Gotha 1865.

AN IMAGINED EMPIRE IN THE NORTH – THE ‘GERMAN NORTH POLE EXPEDITIONS’, 1866–1870

From 1865 onwards, that is, two years after the end of the ‘German Inner-Africa Mission’, Petermann started to return quite abruptly to his old passion of the hypothesized ice-free Open Polar Sea and the exploration of the North Pole, this time with the support of the *Justus Perthes* press. As we will see, Petermann was able – due to the infrastructure provided by the publishing house – to launch several initiatives, including two large polar expeditions. Importantly, these initiatives need to be situated in the context of two synchronous and connected developments, namely the process of German nation-building and empire-building.

Initially, however, Petermann’s revived interest in the Open Polar Sea was not triggered by patriotic feelings but by an emerging debate in Britain about the possibility of sending a new expedition to the North Pole. When the tragic outcome of the Franklin Expedition became evident in the mid-1850s, the British government had not made any new attempt to explore the Arctic. It was only in the spring of 1865 when a new effort was considered. Petermann was still a corresponding member of the Royal Geographical Society and, as such, started to interfere in the debate. He presented his plan for a polar mission, which very much resembled the one he had drafted fifteen years earlier to launch a search mission in order to find the *Erebus* and the *Terror*, in a talk to the Royal Geographical Society and in several letters to its president. Some of the material was then published in the *Mitteilungen*. Petermann explained the importance of launching a new polar mission in one of the letters: ‘Now that most mysteries of the interior of Africa and Australia have come to light, the exploration of the geography of the central polar regions as well as the task to reach the poles remain the most significant geographical problems to be solved, and it is my conviction that the English nation, before all others, would be able to achieve this great triumph which would offer it the crown of the discoveries of our planet’ (Petermann 1865b, 99). Petermann was still convinced that there must exist an Open Polar Sea, and according to his plan, the British initiative would arrive at it through a route between Spitzbergen and Nowaja Semlja from where it would reach, finally, the North Pole – all of this a ‘steamboat would travel within two to three months from the Thames to the North Pole and back’ (Petermann 1865b, 104). Moreover, Petermann published in the same year several articles and reports in the *Mitteilungen* and in one supplementary volume on ‘the Arctic Central Region’ in order to prove the existence of the Open Polar Sea. These publications were often accompanied by large coloured maps, which depicted the two poles as ‘blank spaces’ (e.g. figures 5.4 and 5.5).

In the end, however, a British initiative did not materialize in this form, and Petermann started to work on an alternative German polar mission from

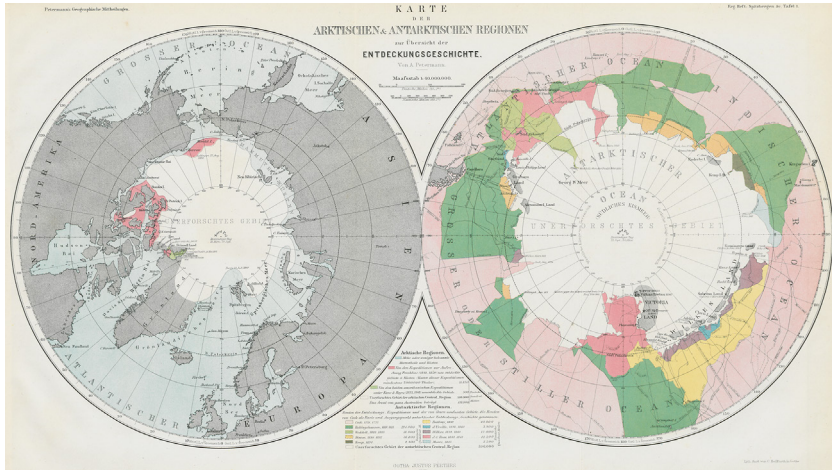


Figure 5.4. The History of the Discovery of the Arctic and Antarctic Regions in Supplementary Volume to *Petermanns Geographische Mitteilungen*, Justus Perthes Gotha 1865.

spring 1865 onwards. The whole endeavour started, however, with a minor accident as a small reconnaissance expedition, which Petermann had organized in the summer of 1865 to explore the region between Spitzbergen and Nowaja Semlja, failed due to problems with the ship's engine after only nine hours while being still in German waters. Nevertheless, Petermann continued the project and started to look for governmental support. German initiatives had a disadvantage in this regard when compared to France or Britain. The German Confederation was politically fragmented and lacked a central government or navy to support explorations in financial or organizational terms. This was the reason why Petermann turned directly to the governments of the two most powerful principalities of the German Confederation, Prussia and Austria. To secure Prussian support Petermann met in November 1865 with the Prussian Prime Minister Otto von Bismarck and the Prussian Minister of War and Navy Albrecht von Roon. At the same time, intermediaries reached out to the Austrian government. At first, both governments appeared very interested in supporting a joint German expedition to the North Pole for which they intended to use a ship under both Prussian and Austrian flags. This made the *Mitteilungen* announce that one of the main purposes of the endeavour was 'to act *together*, . . . to leave the particularistic envy and jealousy of the governments behind, and to join forces in the desire to honour the German name' (Petermann 1865a, 443; emphasis in the original). In other words, Petermann hoped that a German expedition to the North Pole would help to overcome the scattered regionalism (*Kleinstaaterie*) of the German Confederation and lead to a Greater German (*großdeutsch*) nation, which would include both Prussia and Austria.

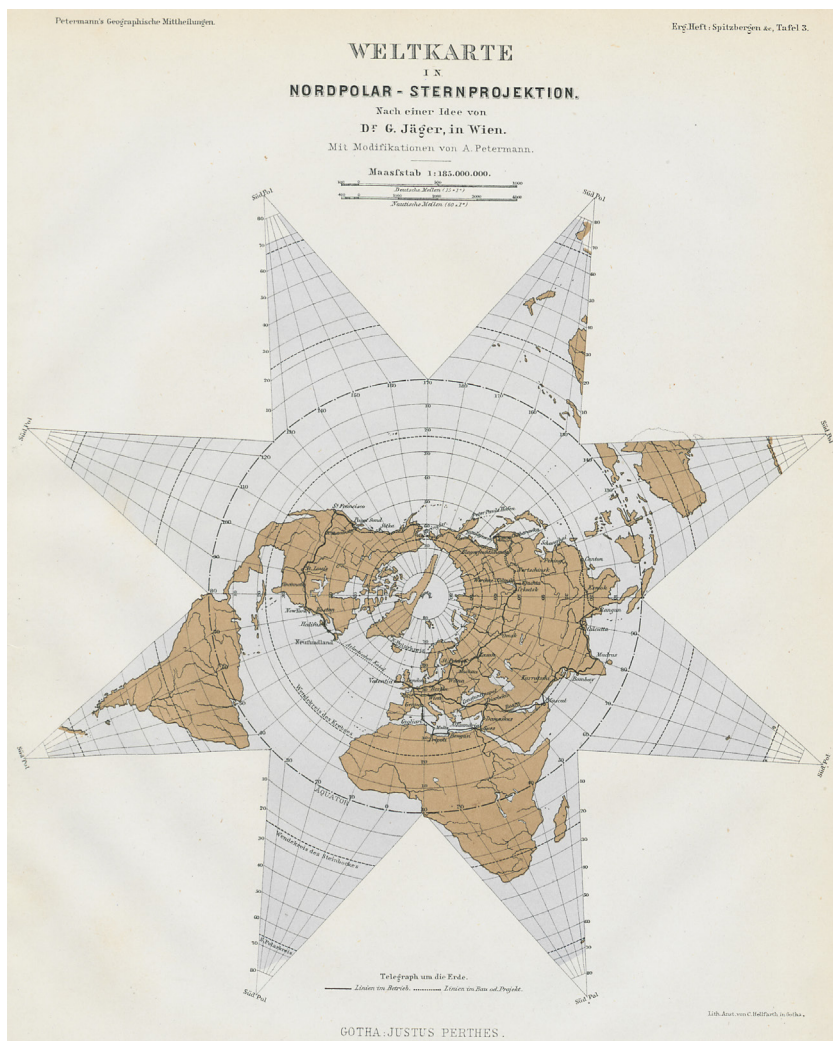


Figure 5.5. World Map with the North Pole in Its Centre in Supplementary Volume to Petermann's Geographische Mittheilungen, Justus Perthes Gotha 1865.

The *Mittheilungen* did, however, not only continue to publish articles addressing the ‘honour of the German nation’, but it started, as it had done earlier with the ‘German Inner-Africa Expedition’, to launch a large fundraising campaign. This was necessary as the sum of the expedition was estimated at 200,000 Thaler, a considerably high amount by the standards of the time. Unfortunately for Petermann, the joint initiative of Prussia and Austria did not happen in the

end as in June 1866 the German-German War between the two leading powers of the German Confederation broke out, which lasted until August of the same year. When the war was over, Petermann attempted to secure the exclusive support for a German North Pole expedition from the victorious Prussian government. It turned out, however, that its officials were hesitant as they did not want to equip one of its navy ships for the mission. Petermann started now to reach out to a number of merchants in Bremen such as H. H. Meier, the founder of *Norddeutsche Lloyd*. Finally, after launching another fundraising campaign, Petermann had secured sufficient funds for the mission that carried the official title of the ‘German North Pole Expedition’ (*Deutsche Nordpolar-Expedition*).

The expedition departed in May 1868 from Bergen, Norway. Its progress was accompanied by several articles in the regular issues of the *Mitteilungen*. Additional information was provided in a supplementary volume. These publications did not only stress the scientific and the ‘cultural-historical’ significance of the whole endeavour, but they also highlighted the ‘national-political’ importance of the expedition – the latter understood both in terms of inter-imperial rivalry in Europe and national unification in Germany. As Petermann claimed in one of his articles, ‘other less highly developed nations are in the process of getting ahead of us. We can already see that even France has taken up the idea of going north . . . ; it is time for us now to carry our national reputation into the world through this glorious enterprise. A German North Pole expedition would be the right opportunity to increase the German scientific impulse as well as its national spirit and to raise its self-esteem’ (Petermann 1868, 210).

To prepare the journey, Petermann had provided the official ‘commander-in-chief of the expedition’ (*Oberbefehlshaber der Expedition*) Karl Koldewey, who was an experienced navigator, with detailed instructions of thirty-eight paragraphs in total. According to the instructions, the aim of the expedition was to sail as north as possible ‘in honour of fatherland and science’ (Petermann 1868, 214). To achieve this, Petermann selected a route east of Greenland as he suspected that there might be an entry point to the Open Polar Sea. Moreover, as a way to motivate the crew – and to avoid problems as with Theodor von Heuglin earlier – a detailed bonus scheme had been included in the instructions, according to which an extra pay would be given for every degree of longitude with a maximal amount of 5,000 Thaler if the mission would reach the North Pole (at 90°N). Although the instructions were written in an authoritative tone, Koldewey did not comply entirely to them as he refused to rename the ship of the expedition from *Greenland* to *Germania* – as demanded by Petermann. Even though the name of the ship was actually another, Petermann still opened the supplementary volume to the ‘German North-Pole Expedition’ with a frontispiece of a ship named *Germania* (figure 5.6). While the expedition was able to collect valuable scientific information about currents and temperatures in the polar region, it did not pass 81°



Figure 5.6. The Ship *Germania* during the German North Pole Expedition in Supplementary Volume to *Petermann's Geographische Mittheilungen*, Justus Perthes Gotha 1868.

North in the end. Despite these mixed results, the crew was celebrated ‘enthusiastically’ (Krause 1993, 20) upon arrival in Germany, and Petermann was able to collect more than enough financial resources for a second expedition.

The financial situation was so comfortable that a ship with a steam engine was built for the expedition only. The name of the ship was finally *Germania*, and it was accompanied by a smaller vessel called *Hansa*. The two ships left Bremerhaven in June 1869 for the ‘Second German North Pole Expedition’ (*Zweite Deutsche Nordpolar-Expedition*). The departure was a major event in which both the Prussian King Wilhelm I and Prime Minister Otto von Bismarck participated. Again, Petermann provided the crew with extensive instructions. This time the main goal was to finally answer the ‘polar question’, that is, to clarify whether an ice-free sea exists in the Arctic (Petermann 1870, 224). Moreover, it was planned that the two ships spend the winter as north as possible and freeze in the Arctic ice. When arriving in the polar region, the ships lost contact with each other, however, and the *Hansa* had to be abandoned. Its crew survived on an ice floe for almost 200 days and drifted around 600 kilometres southwards before reaching safe land again. As planned, the *Germania* became icebound and stayed for the winter

in the polar region, where it was able to collect numerous scientific data. As the ship could not reach the pole and had to come back at 77°N, the polar question had to remain unsolved for now. When arriving in Bremerhaven in September 1870, there was no enthusiastic reception this time – as the Franco-Prussian War had broken out. After winning the war, Prussia founded the German *Reich* a few months later, in January 1871. Wilhelm I became the first German Emperor and Bismarck the Chancellor. A third German polar mission was not demanded anymore.

Yet, Petermann's attempt to find the Open Polar Sea would have one final twist. In 1874, Julius Payer, an Austro-Hungarian officer, polar explorer and cartographer who had participated in the 'Second German North-Polar Expedition' of 1869–1870, and who had joined the Austro-Hungarian North-Pole Expedition (1872–1874), advanced far north with a sledge ride. North of the Franz Josef Land, an archipelago which he had just named in honour of the Austro-Hungarian Emperor, he found a vast, seemingly endless sea and named the most distant point, which he could see, Petermann Land. Petermann himself was, of course, enthusiastic about this news, as it seemed to prove the theory of an Open Polar Sea. However, he should not receive final confirmation during his lifetime. Petermann died in 1878. It was only in 1892 that the Norwegian Fram Expedition, which would come later as close to the North Pole as no other before, and which was led by Fridtjof Nansen, who would receive three decades later the Nobel Peace Prize for his humanitarian work for refugees in the aftermath of World War I, found out that Payer's Open Polar Sea was only a larger opening in the ice and that Petermann Land was a phantom island, a reflection in the Nordic air.

CONCLUSION

This chapter has studied an important episode in German imperial mapping in the two decades preceding the proclamation of the German Empire in 1871 as it reconstructed the work of August Petermann, one of the leading cartographers of his time, and the role he played at *Justus Perthes* cartographic press in Gotha. For Petermann, as for many contemporaries, the geographical exploration of territories outside of Europe was intertwined with imaginaries of German empire-making and nation-building: imperial expansion was always seen as a catalyst to create cohesion in the scattered political landscape of the German Confederation. Petermann focused in particular on the exploration of the last blank spaces on maps. Blank spaces figured prominently in European cartographic products of the nineteenth century as they indicated unexplored and unknown territories. To fill these blank spaces became an aspiration for geographers such as Petermann, who was able to organize, with the infrastructural support of the *Justus Perthes* press, major

expeditions to two of the last ‘blank spaces’ of his time, namely the ‘German Inner-Africa Expedition’ (1860–1863) and the first two ‘German North Pole Expeditions’ (1866–1870).

By drawing on what Latour called centres of calculation, the chapter reconstructed attempts to fill the blank spaces on maps. Small towns with a scientific community such as Gotha, private publishing houses such as *Justus Perthes* and individual cartographers such as Petermann became such centres of calculation. Although these centres of geographical knowledge production were not located in the imperial metropole and organized by the state, they became nevertheless important sites in the creation of new forms of connectivity. They were able to connect such distinct regions as the North Pole and Central Africa and thereby created, mobilized and stabilized new networks. The circulation of objects as (im)mutable (im)mobiles plays a central role in these processes. Maps were highly successful devices in these processes as they could be combined, complemented and amplified when new information came in; but they could also be brought to the ‘field’ outside of Europe in order to guide explorers in their endeavours. Importantly, however, centres of calculations are not just located in space and time but produce – through the circulate of ideas, people and objects – space and time as concrete reality.

However, while Latour, and many following him, often turned to projects where connectivity was rather smooth and successful, some voices started to call for more attention to episodes of failure and disconnectivity.⁷ In the context of mapping, this resonates with Dodge, Perkins and Kitchen’s call to put greater emphasis on ‘moments of mapping failure’ (Dodge, Perkins, and Kitchen 2009, 234–35). As we have seen, failure has always been inherent in Petermann’s projects. In the case of the ‘German Inner-Africa Expedition’, Petermann was not able to govern at a distance when Theodor von Heuglin, the expedition’s leader on the ground, decided to take a different route, as set in the initial instructions; moreover, many members died during the expedition. In the case of the two ‘German North Pole Expeditions’, these expeditions never reached the North Pole and they never found the hypothesized Open Polar Sea. To foreground these episodes of failure, improves our understanding of (imperial) mapping better and helps us to leave the idea of a smooth, teleological and progressive imaginary of mapping behind. Rather, mapping can be conceptualized as a messy, contested and contingent process, often full of failure.

NOTES

1. The shipwrecks of the *Erebus* and *Terror* were discovered only in 2014 and 2016, respectively (*The Guardian* 2019). There seems to persist some fascination with this topic until the present day. For example, *Amazon Prime* produced in 2018 a new series on this failed endeavour, called *The Terror*.

2. On the relevance of early colonial fantasies in Germany, see Zantop (1997).
3. I borrow this formulation from Donald MacKenzie and his conceptualization of financial models (e.g. MacKenzie 2006).
4. For example, around 1900, German far-right circles of the ethnic-nationalistic *völkische Bewegung* created the idea of *Deutschtum* ('Germandom') to connect German emigration outside of Europe with the 'colonisation' of Eastern and Central Europe in order to create an imaginary of a larger German Empire. For a reconstruction of this episode of German geopolitical thinking, which focuses mainly on the use of maps and statistics, see Çapan and dos Reis (2019).
5. Alternative (and complementary) reconstructions of this spatial imaginary could emphasize either the role of the mathematical operation of zero (cf. Rotman 1996) or the void (cf. Shapin and Schaffer 1985).
6. For a comparison of the use of blank spaces in British cartography of Africa and Australia, see Kennedy (2013).
7. An important exception is Latour (1996). See also Callon (1984).

REFERENCES

- Anonymous. 1860. 'Th. von Heuglin's Expedition nach Wadai'. *Petermanns Geographische Mitteilungen* 6: 318.
- . 1862. 'Die Deutschen Expeditionen nach Wadai: Achter Bericht: Stand des Unternehmens am 1. März 1862'. *Petermanns Geographische Mitteilungen* 8: 98–102.
- . 1864. 'Moriz v. Beurmann's Tod nebst Übersicht seiner Reise (1861–1863) so wie derjenigen von Overweg (1850–1852), Vogel (1853–1856) und Steudner (1861–1863)'. *Petermanns Geographische Mitteilungen* 10: 25–30.
- Bartelson, Jens. 2010. 'The Social Construction of Globality'. *International Political Sociology* 4 (3): 219–35.
- Bassett, Thomas J. 1994. 'Cartography and Empire Building in Nineteenth-Century West Africa'. *Geographical Review* 84 (3): 316–35.
- Bassett, Thomas J., and Philip W. Porter. 1991. "'From the Best Authorities": The Mountains of Kong in the Cartography of West Africa'. *The Journal of African History* 32 (3): 367–413.
- Boria, Edoardo. 2007. *Cartografia e Potere: Segni e Rappresentazioni negli Atlanti Italiani del Novecento*. Torino: UTET.
- Brogiato, Heinz Peter. 2008. 'Gotha als Wissens-Raum'. In *Die Verräumlichung des Welt-Bildes: Petermanns Geographische Mitteilungen zwischen 'explorativer Geographie' und der 'Vermessenheit' europäischer Raumphantasien*, edited by Sebastian Lentz and Ferjan Ormeling, 16–29. Stuttgart: Franz Steiner.
- Callon, Michel. 1984. 'Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay'. *The Sociological Review* 32 (1 suppl): 196–233.
- Çapan, Zeynep Gülşah, and Filipe dos Reis. 2019. "'Making Up Germans": Colonialism, Cartography and Imaginaries of "Germandom"'. In *Imagaries of Connectivity: The Creation of Novel Spaces of Governance*, edited by Luis Lobo-Guerrero, Suvi Alt, and Maarten Meijer, 127–52. London: Rowman & Littlefield.

- Çapan, Zeynep Gülşah, Filipe dos Reis, and Maj Grasten, eds. 2021. *The Politics of Translation in International Relations*. Houndmills: Palgrave MacMillan.
- Conrad, Sebastian. 2012. *German Colonialism: A Short History*. Cambridge: Cambridge University Press.
- Demhardt, Imre Josef. 2000. *Die Entschleierung Afrikas: Deutsche Kartenbeiträge von August Petermann bis zum kolonialkartographischen Institut*. Gotha: Klett-Perthes.
- . 2015a. ‘Justus Perthes (Germany)’. In *The History of Cartography*, , vol. 6, edited by Mark Monmonier, 720–25. Chicago: The University of Chicago Press.
- . 2015b. ‘Petermanns Geographische Mitteilungen’. In *The History of Cartography*, vol. 6, edited by Mark Monmonier, 1095–99. Chicago: The Chicago University Press.
- Die Gartenlaube*. 1862. ‘Die Deutsche Expedition nach Mittelafrika und ihre Gegner’, 5: 72–74.
- Dodge, Martin, Chris Perkins, and Rob Kitchin. 2009. ‘Mapping Modes, Methods and Moments: A Manifesto for Map Studies’. In *Rethinking Maps*, edited by Dodge, Martin, Chris Perkins, and Rob Kitchin, 220–43. London: Routledge.
- dos Reis, Filipe. 2019. ‘Wir sind nie global gewesen. Latour, die Internationalen Beziehungen und die (Geo)Politik der Diplomatie’. In *Der große Leviathan und die Welt der Ameisen. Zum Staatsverständnis Bruno Latours und der Akteur-Netzwerk-Theorie*, edited by Hagen Schölzel, 155–74. Baden-Baden: Nomos.
- Edney, Matthew H. 1993. ‘Cartography without “Progress”: Reinterpreting the Nature and Historical Development of Mapmaking’. *Cartographica: The International Journal for Geographic Information and Geovisualization* 30 (2 & 3): 54–68.
- . 2009. ‘The Irony of Imperial Mapping’. In *The Imperial Map*, edited by James R. Akerman, 11–45. Chicago: The University of Chicago Press.
- . 2019. *Cartography: The Ideal and Its History*. Chicago: The University of Chicago Press.
- Felsch, Philipp. 2010. *Wie August Petermann den Nordpol erfand*. München: Luchterhand.
- Ferretti, Federico. 2019. ‘Networking Print Cultures: Reclus’ Nouvelle Géographie Universelle at the Hachette Publishing House’. *Journal of Historical Geography* 63: 23–33.
- The Guardian*. 2019. ‘“Frozen in Time” Wreck Sheds New Light on Franklin’s Ill-Fated 1845 Arctic Quest’, *The Guardian*. 28 August 2019. www.theguardian.com/world/2019/aug/28/hms-terror-sir-john-franklin-evidence-recovered-arctic-ocean.
- Harley, John Brian. 1988a. ‘Maps, Knowledge and Power’. In *The Iconography of Landscapes*, edited by Denis Cosgrove and Stephen Daniels, 277–312. Cambridge: Cambridge University Press.
- . 1988b. ‘Silences and Secrecy: The Hidden Agenda of Cartography in Early Modern Europe’. *Imago Mundi* 40 (1): 57–76.
- . 1989. ‘Deconstructing the Map’. *Cartographica* 26 (2): 1–20.
- Hiatt, Alfred. 2002. ‘Blank Spaces on the Earth’. *The Yale Journal of Criticism* 15 (2): 223–50.
- Hill, Jen. 2008. *White Horizon: The Arctic in the Nineteenth-Century British Imagination*. Albany: SUNY Press.

- Jacob, Christian. 2006. *The Sovereign Map: Theoretical Approaches in Cartography throughout History*. Chicago: The University of Chicago Press.
- Jones, Adam, and Isabel Voigt. 2012. ‘“Just a First Sketchy Makeshift”: German Travellers and Their Cartographic Encounters in Africa, 1850–1914’. *History in Africa* 39: 9–39.
- Jöns, Heike. 2011. ‘Centre of Calculation’. In *The SAGE Handbook of Geographical Knowledge*, edited by John A. Agnew and David N. Livingstone, 158–70. Los Angeles: SAGE.
- Kennedy, Dane Keith. 2013. *The Last Blank Spaces: Exploring Africa and Australia*. Cambridge, MA: Harvard University Press.
- Krause, Reinhard A. 1993. ‘Hintergründe der deutschen Polarforschung von den Anfängen bis heute’. *Deutsches Schiffsarchiv* 16: 7–70.
- Kuhn, Kristina, and Wolfgang Struck. 2019. *Aus der Welt gefallen: Die Geographie der Verschollenen*. Paderborn: Wilhelm Fink.
- Latour, Bruno. 1987. *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard University Press.
- . 1990. ‘Drawing Things Together’. In *Representation in Scientific Practice*, edited by Michael Lynch and Steve Woolgar, 19–68. Cambridge, MA: MIT Press.
- . 1996. *Aramis: On the Love to Technology*. Cambridge, MA: Harvard University Press.
- . 1999. *Pandora’s Hope: Essays on the Reality of Science Studies*. Cambridge, MA: Harvard University Press.
- . 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.
- . 2016. ‘*Onus Orbis Terrarum*: About a Possible Shift in the Definition of Sovereignty’. *Millennium* 44 (3): 305–20.
- Law, John, and Annemarie Mol. 2001. Situating Technoscience: An Inquiry into Spatialities. *Environment and Planning D: Society and Space* 19 (5): 609–21.
- Lentz, Sebastian, and Ferjan Ormeling, eds. 2008. *Die Verräumlichung des Welt-Bildes: Petermanns geographische Mitteilungen zwischen ‘explorativer Geographie’ und der ‘Vermessenheit’ europäischer Raumphantasien*. Stuttgart: Franz Steiner.
- MacKenzie, Donald A. 2006. *An Engine, Not a Camera: How Financial Models Shape Markets*. Cambridge, MA: MIT Press.
- Neocleous, Mark. 2003. ‘Off the Map: On Violence and Cartography’. *European Journal of Social Theory* 6 (4): 409–25.
- Petermann, August. 1852a. ‘Notes on the Distribution of Animals Available as Food in the Arctic Regions’. *Journal of the Royal Geographical Society of London* 22: 118–27.
- . 1852b. *The Search for Franklin: A Suggestion Submitted to the British Public*. London: Longman, Brown, Green, and Longmans.
- . 1852c. ‘The Arctic Expeditions’. *The Athenaeum*, 17 January 1852, 82–83.
- . 1853. ‘Sir John Franklin, the Sea of Spitzbergen, and Whale-Fisheries in the Arctic Regions’. *Journal of the Royal Geographical Society of London* 23: 129–36.
- . 1855a. ‘Die Expedition Nach Central-Afrika: I. Dr. H. Barth’s Reise von Kuka nach Timbuktu [November 1852 bis September 1853]’. *Petermanns Geographische Mitteilungen* 1: 3–14.

- . 1855b. ‘Vorwort’. *Petermanns Geographische Mitteilungen* 1: 1–2.
- . 1864. ‘Vorwort’. *Petermanns Geographische Mitteilungen* Supplement 13: i–ii.
- . 1865a. ‘Aphorismen über die projektierte Deutsche Nordfahrt’. *Petermanns Geographische Mitteilungen* 11: 442–45.
- . 1865b. ‘Die projektierte Englische Expedition nach dem Nordpol’. *Petermanns Geographische Mitteilungen* 11: 95–104.
- . 1866. ‘Notizen über den kartographischen Standpunkt der Erde’. *Geographisches Jahrbuch* 1: 581–600.
- . 1868. ‘Die Deutsche Nordpol-Expedition, 1868’. *Petermanns Geographische Mitteilungen* 14: 207–28.
- . 1870. ‘Instruktion für die zweite Deutsche Nordpolar-Expedition, 1869 bis 1870’. *Petermanns Geographische Mitteilungen* 16: 254–63.
- Pickles, John. 2004. *A History of Spaces: Cartographic Reason, Mapping, and the Geo-Coded World*. London: Routledge.
- Ramaswamy, Sumathi. 2017. *Terrestrial Lessons: The Conquest of the World as Globe*. Chicago: The University of Chicago Press.
- Rotman, Brian. 1996. *Signifying Nothing: The Semiotics of Zero*. Stanford: Stanford University Press.
- Schelhaas, Bruno. 2009. ‘Das “Wiederkehren des Fragezeichens in der Karte”. Gothaer Kartenproduktion im 19. Jahrhundert’. *Geographische Zeitschrift* 97 (4): 227–42.
- Shapin, Steven, and Simon Schaffer. 1985. *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*. Princeton: Princeton University Press.
- Smits, Jan. 2004. *Petermann’s Maps: Carto-Bibliography of the Maps in Petermanns Geographische Mitteilungen 1855–1945*. ’t Goy-Houten: Hes & de Graaf.
- Staheli, Urs. 2012. ‘Listing the Global: Dis/Connectivity beyond Representation?’ *Distinktion: Scandinavian Journal of Social Theory* 13 (3): 233–46.
- Strandsbjerg, Jeppe. 2010. *Territory, Globalization and International Relations: The Cartographic Reality of Space*. Houndmills: Palgrave Macmillan.
- Turnbull, David. 1996. ‘Cartography and Science in Early Modern Europe: Mapping the Construction of Knowledge Spaces’. *Imago Mundi* 48 (1): 5–24.
- . 2000. *Masons, Tricksters and Cartographers Comparative Studies in the Sociology of Scientific and Indigenous Knowledge*. London: Routledge.
- Wadai-Comité. 1860a. ‘Th. v. Heuglin’s Expedition nach Inner-Afrika, zur Aufhellung der Schicksale Dr. Eduard Vogel’s und zur Vollendung seines Forschungswerks’. Gotha.
- . 1860b. ‘Instruktionen für die Expedition nach Inner-Afrika zur Aufhellung der Schicksale Dr. Eduard Vogel’s und zur Vollendung seines Forschungswerks’. Gotha.
- Wittgenstein, Ludwig. 1953. *Philosophical Investigations*, translated by G. E. M. Anscombe. New York: Macmillan.
- Zantop, Susanne. 1997. *Colonial Fantasies: Conquest, Family, and Nations in Precolonial Germany, 1770–1870*. Durham: Duke University Press.

