

Global Perspectives on Science Diplomacy: Exploring the diplomacy-knowledge nexus in contemporary histories of science

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# Global perspectives on science diplomacy: Exploring the diplomacy-knowledge nexus in contemporary histories of science

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## SPECIAL ISSUE

Global Perspectives on Science Diplomacy

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Matthew Adamson and Roberto Lalli

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## Abstract

Contemporary scholarship concerning science diplomacy is increasingly taking a historical approach. In our introduction to this special issue, we argue that this approach promises insight into science diplomacy because of the tools historians of science bring to their work. In particular, we observe that not only are historians of science currently poised to chart the diplomatic aspects involved in the transnational circulation of technoscientific knowledge, materials, and expertise. They are ready to bring critical global analysis to an important phenomenon that has too often been treated as a benign diplomacy device deployed by the Global North without equal reference to the Global South. Through cases discussed in the articles of the special issue, however, we see that historically, in the Global South as well as the Global North, science diplomacy has often functioned to mediate the circulation of technoscientific knowledge and materials, and its historical study helps to better illuminate the resulting knowledge-power nexus.

## KEYWORDS

Cold War, global history, knowledge-power nexus, non-state agents, science diplomacy

## 1 | INTRODUCTION

At the time of writing, the world is confronting the COVID-19 pandemic. As the European Union strains at its seams, as the incoming Biden administration considers how to reestablish U.S. ties to international organizations and networks, as borders close around the globe and populations shelter in place, science diplomacy—the main topic of this special issue—might appear a peculiarly well-suited international tool for coming to grips with this unprecedented situation. While this introduction and the articles within cannot confirm or deny the efficacy of science diplomacy in the face of COVID-19, they do suggest something else. The health, economic, and political crises resulting from the SARS-CoV-2 pandemic have triggered a worldwide reconfiguration of how historians and other scholars in the humanities teach, and conduct and communicate research. It has also triggered a reconfiguration of what they understand to be their social role and the import of their work.<sup>1</sup> For those who study the history and nature of science diplomacy, these reconfigurations oblige them to dig more deeply for science diplomacy's roots in order to better reckon with its potential and promise.

Of course, interest in science diplomacy precedes the COVID-19 crisis. Practicing diplomats and scientists, scholars of international relations, and historians of science have in the last years exhibited visible energy in appraising the practices of science diplomacy and their history. Notably, this energy has recently taken institutional form. The European Union has sponsored important collective research efforts, such as the S4D4C and InsSciDE projects. Meanwhile, the Division of History of Science and Technology of the International Union of History and Philosophy of Science and Technology (IUHPST) has created a Commission on Science, Technology, and Diplomacy, to which the editors of this special issue belong.<sup>2</sup> These institutions and projects not only demonstrate the interest which the European Union and other supranational and international organizations have in stimulating reflection on science diplomacy, they also manifest the growing concern of scholars to connect their historical interest with science policy circles and to engage with contemporary science policy debates.

Therefore, the time is ripe for an examination of the historical roots of global science diplomacy. Contemporary international relations research and science diplomacy studies are blossoming, meaning more cases are being explored.<sup>3</sup> Meanwhile, the work of science diplomacy is underway in numerous regional and global networks and forums. However, historical investigation of science diplomacy is still in its early stages. We lack a common understanding of what science diplomacy is historically, and of how it should be investigated methodologically. There are at present a wide variety of approaches and research questions wielded by historians and other scholars in their examinations of science diplomacy. While this should be taken as a positive sign, it begs some questions. Is science diplomacy in need of a unifying definition in historical research? Is one even possible? And what is the significance of the new intellectual and social connections that otherwise dispersed literatures and groups of scholars are forming for the analysis of science diplomacy? Our introduction aims to consider these questions and give context to the articles within, articles that also shed light on these questions as well as articulate a global history of science diplomacy.

## 2 | NAVIGATIONAL TOOLS FOR A HISTORY OF SCIENCE DIPLOMACY

An influential conceptual framework for understanding science diplomacy has been with us since 2010, when a joint meeting of the American Association for the Advancement of Science (AAAS) and the Royal Society resulted in a three-pronged characterization, now oft-repeated. It conceives of science diplomacy as occurring in three manners:

<sup>1</sup>See, for example, the *Centaurus* special issue *Histories of Epidemics in the Time of COVID-19* (Charters & Vermeir, 2020; Vermeir, 2020); the MPIWG project *History of Science on Call* (<https://www.mpiwg-berlin.mpg.de/research/projects/history-science-on-call>); *Pandemic Oral Histories* (<https://moderncity.georgetown.domains/oral-history-project/>); Langstaff (2020). A collection of references to education and scholarship is also available from MPIWG (<https://www.mpiwg-berlin.mpg.de/research/projects/education-scholarship>).

<sup>2</sup>InsSciDE (<https://www.insscide.eu/>); S4D4C (<https://www.s4d4c.eu/>); IUHPST Commission on Science, Technology, and Diplomacy (<https://sciencediplomacyhistory.org/>). One of the authors (Adamson) is also a case study author in the InsSciDE project.

<sup>3</sup>For example, the November 2018 special issue of *Global Policy* was devoted to science diplomacy (Caltofen, Acuto & Balckstock, 2018).

(a) science in diplomacy (scientific experts and data relevant to diplomatic action); (b) science for diplomacy (using science to foster diplomatic initiatives and relations); and (c) diplomacy for science (diplomacy and diplomatic practices deployed to encourage international scientific cooperation).<sup>4</sup> By now, many observers have noted the shortcomings of this typology.<sup>5</sup> Even if one were to accept it, one would be forced to admit that, awkwardly enough, one type appears to be missing (“diplomacy in science”), and, more crucially, that actual science diplomacy activities usually have multiple purposes and, as a consequence, the boundaries between the three kinds of science diplomacy as given here are quite blurred—so blurred that the definition itself is problematic. And significantly, the problem is not a semantic one but rather one that involves decisions on funding and organization, as well as official and informal relations between different agencies and institutions.<sup>6</sup>

Given the great weight the Anglo-Saxon view has had up to this point in determining how we study science diplomacy, it is no coincidence that it was a meeting of U.S. and UK science diplomacy practitioners that generated this triple definition.<sup>7</sup> The view itself has tended to equate science diplomacy with “soft power” approaches in international relations, an equivalency not borne out in all cases of science diplomacy (including cases presented here).<sup>8</sup> More significantly, the initial impetus to make science diplomacy a subject of scholarly discussion came mainly from practitioners interested in stimulating science diplomacy in foreign offices and international institutions. These practitioners were preoccupied both with better describing and understanding the kinds of activities in which their scientific and diplomatic circles were engaged and with advocating for more of them.<sup>9</sup> The results are narratives that at times are as performative as they are analytical. Some scholars have so identified this initial wave of science diplomacy scholarship with its advocates that they claim science diplomacy, like international relations, to be two things at once—a phenomenon, and the field of study of that phenomenon. Indeed, the meaning given to “science diplomacy” in the content of the advocates’ principal journal, *Science and Diplomacy* edited by the AAAS Center for Science Diplomacy, alternates between these two senses of the term.<sup>10</sup> Within this context it comes as no surprise that history is mostly employed as a repository of successful cases of proto-science-diplomacy endeavors.<sup>11</sup> Successful historical cases are used by practitioners as an “imagined past”—a rhetorically construed genealogy of science diplomacy—to support current promotion of science diplomacy.<sup>12</sup>

One reason for the prevalence of these performative rather than analytical case studies could lie in the positivistic view of science held by the framers of the Royal Society/AAAS definition. It is a view of scientific practice and results built exclusively on evidence-based, rationally-sought scientific researches resistant to intrusion from outside the scientific community (that is, they characterize science at one point as based on “values of rationality, transparency and universality ... the same the world over”).<sup>13</sup> Another reason is that, with their message aimed at policy-makers and for the sake of policy-making, the influence of diplomatic practices and diplomacy initiatives on scientific outcomes seemed of secondary interest at best. The Royal Society/AAAS writers admonish policy-makers that “it is important that scientific goals remain clearly defined, to avoid the undue politicization of science.”<sup>14</sup> What emerges in the Royal Society/AAAS pamphlet is a science diplomacy discourse depicting science as a symbolic good via the

<sup>4</sup>Royal Society & AAAS (2010).

<sup>5</sup>See, for example, Copeland (2016); Flink & Ruffin (2019); Penca (2018); F. Smith (2014).

<sup>6</sup>Gluckman, Turekian, Grimes, & Kishi (2017).

<sup>7</sup>Turchetti, Adamson, Rispoli, Olšáková, & Robinson (2020).

<sup>8</sup>For the concept of “soft power,” see Nye (2004).

<sup>9</sup>Turekian & Neureiter (2012); Turekian et al. (2015); Turekian (2018).

<sup>10</sup>See the website of the online journal *Science and Diplomacy* (<https://www.sciencediplomacy.org/>).

<sup>11</sup>An emblematic example is the use of CERN in the science diplomacy discourse, where different phases of CERN are interpreted as successful implementations of diplomacy for science and science for diplomacy. See Royal Society & AAAS (2010). See also, for example, Moedas (2016); Ruffini (2017). CERN has, in fact, been described in recent years as a model of science diplomacy; see Höne & Kurbalija (2018), as well as the UNESCO 2015 workshop *The CERN Model, United Nations and Global Public Goods: Addressing Global Challenges* (UNESCO, n.d.).

<sup>12</sup>For the notion of “imagined past” in the sciences, see Wilson (2017).

<sup>13</sup>Royal Society & AAAS (2010, p. vi).

<sup>14</sup>Royal Society & AAAS (2010, p. vi).

echoing of three main ideas about science: namely, the view that science is inherently well-intended, apolitical and non-normative, and universal.<sup>15</sup>

Rather than struggle to put forth a different definition of science diplomacy based on a less positivistic reading of science, we prefer to note that an indestructible, unifying definition of science diplomacy is simply not possible.<sup>16</sup> Instead, with this special issue, we suggest that rather than a reductive approach, the study of science diplomacy—which we find most certainly and particularly is accessible to historical analysis—requires an expansive, exploratory approach, where many overlapping areas of research combine to build a dynamic, multi-hued map of cases, practices, research questions, and historical sources. As this map undergoes further elaboration, we are already benefitting from historical scholarship that de-idealizes science diplomacy, a process that ultimately serves the nobler ambitions of science diplomacy's practitioners and advocates by exposing the potential risks and miscalculations of their work.<sup>17</sup> Moreover, as the literature on science diplomacy has grown, the number of scholars from different backgrounds and disciplines connected under the same edifice of cases and questions has increased, creating vital new opportunities for knowledge-building and socio-intellectual exploration.<sup>18</sup>

It is important to add that lack of a definition does not imply a lack of guiding principles behind the legend that denotes the features of the science diplomacy map. First, we find that research concerning the history of science diplomacy must be globally cast (as are the contributions in this issue). This starts with transcending the Anglo-Saxon origins of study and seeking historical cases and archival sources worldwide. This is something that, in effect, advocates of science diplomacy effusively agree on, given the potential science diplomacy holds to delineate and contribute to the solution of global challenges.<sup>19</sup> As depicted for instance by Rungius, Flink, and Degelsegger-Márquez, the “global challenges narrative” might well be seen as the unifying feature of the discourse concerning science diplomacy in the 21st century.<sup>20</sup>

Second, historical descriptions of science diplomacy should reveal the transnational nature of scientific knowledge and consider the problem of the circulation of that knowledge.<sup>21</sup> John Krige, interested in going beyond the problem of knowledge production and investigating knowledge circulation, has pronounced that the movement of scientific knowledge should be regarded as a “social accomplishment.”<sup>22</sup> While that is true, we argue that it should nevertheless be amended: such circulation is very often a *diplomatic* accomplishment as well. Study of the history of science diplomacy can further illuminate the institutions, networks, and practices that permit (and sometimes impede) movement of scientific knowledge, as will be explored below.

Third, as Kaltofen and Acuto have noted, to study effectively what is “international” about international science diplomacy practices, those practices should be traced to their (paradoxically) local manifestations. Indeed, all the practices of science diplomacy, including those regarded by historical actors or historians as “international,” are bound locally and temporally.<sup>23</sup> They are therefore uniquely accessible subjects to the tools of the historian.<sup>24</sup> In this way, history of science, a pluralistic discipline well-equipped to trace technoscientific objects and data-keeping practices, is particularly apt to contribute to the study of science diplomacy.

This pursuit of the local and temporal will, naturally, vary considerably over different locations and historical periods. As we range over these various subjects and contexts, Kaltofen and Acuto urge us not to make a priori

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<sup>15</sup>Rungius, Flink, & Degelsegger-Márquez (2018).

<sup>16</sup>In this we agree with Rungius et al. (2018), who argue that there is no unambiguous definition of science diplomacy, which rather includes a great variety of practices and perspectives united by the fact that the discourse over the relations of science, foreign policy, and science policy has reached a new level in attempting a global and systematic perspective.

<sup>17</sup>See, for example, Adamson (2016); F. Smith (2014); Turchetti et al. (2020). Many of the papers in this volume also contribute to this revisiting of the notion of science diplomacy as a benign force in international relations.

<sup>18</sup>Some examples are in Berg (2010); Fähnrich (2017); Young, Flink, & Dall (2020).

<sup>19</sup>Berkman (2019).

<sup>20</sup>Rungius, Flink, & Degelsegger-Márquez (2018, p. 4).

<sup>21</sup>Krige (2019a); Turchetti, Herran, & Boudia (2012).

<sup>22</sup>Krige (2019b, p. 5).

<sup>23</sup>Kaltofen & Acuto (2018).

<sup>24</sup>For historiographical reflection on locality in the history of science, see Chambers & Gillespie (2000); Nappi (2013). For some particularly apt examples of the study of local practices in the history of modern physics, see Galison (1997); Kaiser (2005); Warwick (2003).

distinctions between historical practices that are diplomatic and practices that are epistemic. In fact, historians of science and technology have already been doing this for many years, repeatedly determining that practices involving circulation of scientific knowledge and generation of technoscientific objects fuse what historical actors might hold (or at least claim) to be distinctly scientific on the one hand or diplomatic (political) on the other.<sup>25</sup> Here, we argue for a *coproduction of the diplomatic and the epistemic*.<sup>26</sup>

Below we explore some of the intricacies of our conceptualization of science diplomacy to better elucidate why we believe that, while a tight definition of science diplomacy is not achievable, a conceptual framework is possible. Such a framework should be based on researches that identify examples around the globe, ranging widely in the Global South and North. It should be based on transnational movements and transformations of scientific and diplomatic practices that are locally distinguishable. Examination of these coproduced sets of science diplomacy practices and networks will produce a novel and far-reaching vector of scholarship, especially with the contribution of historians of science.

### 3 | HISTORIANS OF SCIENCE AND SCIENCE DIPLOMACY

Historians of science stand to gain from the study of science diplomacy. The first reason for this is because of the role they can play in tackling one of science diplomacy's fundamental ambiguities. As an object of study, science diplomacy has most often been understood as something historians aim to explain by looking at the historical unfolding and transformation of the relations between scientific and diplomatic activities—in other words, as an *explanandum* of historical analyses. But, for the historian, especially if we consider the potential for identifying and analyzing the diplomatic frameworks in which scientific work has been undertaken, science diplomacy shifts to become the driver of an approach that directs our interpretation of historical cases—which is to say, science diplomacy becomes the *explanans* to guide our work.

The results of this duality—science diplomacy as both an object of investigation for historical scrutiny and a perspective that redirects historical research—are clear when we consider how the investigation of new sources has in turn led to new historical accounts.<sup>27</sup> One might start with Maria Rentetzi's work on the rise of the International Atomic Energy Agency (IAEA) as the dominant institution in international radiation dosimetry. By examining IAEA sources issuing from the Agency administration and steering committee, we can observe the key role of diplomacy in making the IAEA the dominant institution in radiation protection. Rentetzi notes in such a case, “global diplomacy [becomes] a means to understand historical processes in science and technology, thereby dramatically affecting our understanding of the latter.”<sup>28</sup> Likewise, Simone Turchetti's examination of NATO records has shed light on how it was *diplomatic* conditions that stimulated the creation of the alliance's scientific programs, and ultimately how science came to be a diplomatic tool in ameliorating the relationship between NATO member-states.<sup>29</sup>

On a practical level, treating scientific diplomacy as a framework for historical research invites us to seek out new primary sources and to be innovative in examining them. Two recent, influential histories spell this out explicitly, each carefully detailing archival practices. In the closing pages of *Freedom's Laboratory*, Audra Wolfe describes in detail the methods she used to build what she calls “a personalized database of the United States' attempts to use science as a form of cultural diplomacy during the Cold War.” This “database,” a massive, cross-referenced assembly of documents from the U.S. State Department and intelligence community, permitted Wolfe to detect crucial links between individuals, administrations, and institutions, and to construct a narrative of how scientists and the values

<sup>25</sup>See, for instance, Creager (2009, 2013); Doel & Harper (2006); Hecht (2011); Oreskes & Krige (2014); Rentetzi (2017a).

<sup>26</sup>We would like to acknowledge the fruitful conversations organized in the context of the InSciDE project by Nina Wormbs and Katharina Paul, in which the possibility of the coproduction of this sort was voiced by a number of scholars. For the concept of coproduction, see Jasanoff (2004). For examples of its application to science studies, see Pickersgill (2012) and Lachmund (2013).

<sup>27</sup>For an introduction of a similar duality in global history see Conrad (2017, pp. 1-16).

<sup>28</sup>Rentetzi (2017b, p. 22). See also Rentetzi (2018).

<sup>29</sup>Turchetti (2019).

of scientific freedom and scientific internationalism they espoused became a fundamental aspect of U.S. Cold War cultural diplomacy.<sup>30</sup> Gabrielle Hecht also devotes valuable space in her work to open discussion of archival methodology. In the final section of *Being Nuclear*, she discusses her attempt to combine the limited sources of national nuclear institutional archives with the documentation of uranium company depositories as well as interviews with hundreds of former miners, managers, health workers, and community members in Gabon, Namibia, South Africa, and Madagascar.<sup>31</sup> With these innovative sources, Hecht makes visible the global nuclear order represented by Africa's uranium mines and the inequalities and harm that come from varying treatment of uranium and the radiation hazards of mining uranium in Africa. Or, in other words, Hecht has given us an account of the interplay of mining companies, government administrations, and national and international health regulators involved in a history where diplomacy is very present in geological and radiological science as well as raw materials valuation.

Besides the potential science diplomacy has to guide historians of science to new sources and to find innovative ways of crafting narratives that incorporate them, there is a second way in which historians of science can profit from science diplomacy: they are uniquely positioned among scholars to contribute to its study, with deep implications for history of diplomacy and global geopolitics. In this regard, it is worth revisiting the arguments made a decade ago by Jeff Hughes about the proficiencies historians of science bring to the related area of policy studies. As Hughes noted, historians of science have built a range of methods for contextualizing the practices and spaces of science to reveal their historical contingency—their rootedness, not in a permanent, universal, unchanging method, but in the institutional, national, commercial, military, and personal interests and circumstances that drive research agendas and shape their execution.<sup>32</sup> These historical contingencies create the possibility of new narratives in diplomacy, ones that turn on the science historians' discerning identification of the local, specific details that contextualize the scientific activity in question.

Furthermore, historians of science (and of technology) are particularly sensitive to the *materiality* of their subject. This sensitivity to materiality provides them insight not only into the material circumstances under which scientific researches are carried out and evaluated. Historians of science, naturally, have an intense interest in the instruments and machines of science—and in the disparities in power and influence embedded in those machines and the technoscientific systems they are a part of.<sup>33</sup> In affairs involving the earth sciences, instrumentation and technique can have profound repercussions on the accessibility of strategic resources and those resources' geopolitical control and distribution.<sup>34</sup> In the history of big science and space science projects, power and political disparities inform the construction of machines, the composition of the teams using them, and the direction of their output. Given the potent political symbolism of the multi-national unions created to facilitate such projects, historians of science are especially well-positioned to observe the intricacies of the coproduction of science and diplomacy in such cases.<sup>35</sup>

However, given the stakes and scale of resources involved, the consequences of these manifestations of science diplomacy are not just symbolic. John Krige has noted in the 20th century the nature of the transnational movement of scientific knowledge that science diplomacy brings (or at times inhibits):

Global inequalities in the production and appropriation of science and technology demand that we imagine networks as lumpy, three-dimensional structures made up of hierarchical interpersonal encounters. Transnational actors [including, we would add, scientist-diplomats] do not simply travel from one place to another; their knowledge is an asset that they deploy to reconfigure existing spaces and themselves and what they know.<sup>36</sup>

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<sup>30</sup>Wolfe (2018, pp. 215–220). For the subject of science and the CIA, see also Doel & Needell (1997).

<sup>31</sup>Hecht (2012, pp. 341–350).

<sup>32</sup>Hughes (2004).

<sup>33</sup>Krige (2012); Åberg (in press).

<sup>34</sup>Cantoni (2017); Hecht (2012); Roberts & Turchetti (2014).

<sup>35</sup>See, for example, Galison & Hevly (1992); Hermann, Belloni, Mersits, Pestre, & Krige (1987); Hermann, Weiss, Pestre, Mersits, & Krige (1990); Krige (1993); Krige & Russo (2000); Roqué (2016).

<sup>36</sup>Krige (2019b, p. 9).

In other words, what Pierre-Bruno Ruffini calls the “science diplomacy nexus” is equally a knowledge-power nexus.<sup>37</sup> In this nexus, the coproduction of science and diplomacy enacts foreign policies and asserts hierarchies. In the science diplomacy/knowledge-power nexus, scientific knowledge can be wielded as an economic and cultural instrument as countries and institutions assert epistemic hegemony. (One can see an example of this in the case explored by Castelo and Ágoas in this volume, in which Portugal attempted to control the production of social science knowledge in order to maintain its postwar colonial status in Africa.)<sup>38</sup> Even the seemingly simple matter of the language in which scientific results are reported (not to mention the languages used in diplomatic encounters) speaks to the strong currents of power visible in this knowledge-power nexus.<sup>39</sup>

Science diplomacy, in other words, is historically a mediating factor in the production of global inequalities. To better understand how this has come to be, historians of science must call upon the pluralistic nature of their discipline. The sociological, philosophical, political, economic, and cultural approaches important in the history of science serve as strengths when contemplating science diplomacy, as historians of science can reach for the tools most appropriate for studies that vary widely in terms of archival and other evidences available. This quality should not be overlooked, as science diplomacy evidently overlaps a great deal with other important areas of research. Exploration of new archives around the globe permits historians to better perceive how science diplomacy has worked to mediate the transnational circulation of knowledge through various institutional-diplomatic frameworks and contexts. Potentially, this could mean new audiences as historians of science consider new forces of contingency in how science is organized and practiced. History of science can in this way be seen to intersect and interact not only with history of diplomacy, but also the history of development, the history of globalization, and the history of decolonization.<sup>40</sup>

Historians of science have shown enormous innovation and tenacity in the study of specific, locally situated instrumentation, experimental programs, laboratory environments, field work and expeditions, meetings, conferences, and so on. Careful study of science diplomacy invites us to consider as well specific local manifestations of the diplomatic aspects of globally networked science: negotiations, public appearances, exhibitions, honorary visits, embassy correspondence, and an array of *pourparlers*. This focus on locality and specificity is, in a sense, simple expediency, as our sources call upon us to chart specifics. But it is also a deliberate effort to tease out the means by which scientific work and diplomatic outcomes are coproduced. And this, in turn, reveals the finer details of the hierarchies and inequalities involved, differences in power between individuals, institutions, professional disciplines, countries, and blocs based on access to and control of flows of knowledge, mediated by science diplomacy.

The ideas behind the science-as-symbolic-good mode of the science diplomacy discourse have been refuted by decades of historical scholarship informed by sociological and cultural approaches.<sup>41</sup> We propose to build an innovative new scholarship of science diplomacy based on the methodologies of the critical, specific study of the sciences, with a global spread of research topics and sources to draw a rich, inclusive depiction of the full range of science diplomacy scenarios that have historically occurred. We do not only wish to encourage a global range of cases at the intersection of crucial areas of technoscience and geopolitics, such as nuclear energy and nuclear weaponry, the earth sciences, and the environmental sciences.<sup>42</sup> In addition to these domains, we are also interested in the processes through which seemingly less sensitive areas of scientific activities in physics, chemistry, the social sciences, and so on are transformed into realms where knowledge transfer, networks, and inequalities can be seen for what they are: manifestations of geopolitical agendas. Future science diplomacy initiatives can only benefit from this careful, inclusive reckoning with science diplomacy's past.

<sup>37</sup>Ruffini (2018). Cases investigating the relation between knowledge and power in international relations are in Krige & Barth (2006a).

<sup>38</sup>Castelo & Ágoas (2021).

<sup>39</sup>Gordin (2015).

<sup>40</sup>Mateos & Suárez-Díaz (2015); St Clair (2006); Whitesides (2019).

<sup>41</sup>The literature is enormous; see, for example, Golinski (1998) for an introduction of the impact of the constructivist approach in the history of science.

<sup>42</sup>See, for example, Brain (2016); Flippen (2008); Gaddis, Gordon, May, & Rosenberg (2004); Kohl (1972); Krige & Barth (2006b); Manzione (2000); Camprubí (2020); Colby (2020); Heé (2020); Rispoli & Olsáková (2020).

This is an especially exciting prospect at a time when relations between countries are rapidly changing, and when multiple publics clamor not only for solutions to crises but for a better understanding of what the nature and depth of those crises mean in the international arena—especially when those crises are ultimately a matter of the relationship of the human species with the planet. History of science, through a global study of science diplomacy, can contribute to backgrounding this moment by producing rich, new narratives. Below, we examine how the articles in this special issue do just that.

#### 4 | GLOBAL PERSPECTIVES ON SCIENCE DIPLOMACY: THE ARTICLES IN THE SPECIAL ISSUE

But how do we assess the meaning of these inequalities? One way of understanding them is to inspect them through a framework which is global. Such a framework decentres typical Europe-centered or, for the Cold War era, superpower-centered narratives, and better exposes how scientific knowledge is conceived of in the Global South. We seek answers to how scientific practices are mutated and valued in different specific localities and knowledge environments, and how science diplomacy institutions and routines mediate the circulation and transmutation of those practices. In addition, utilizing science diplomacy as *explanans* and seeking out local manifestations of the coproduction of science and diplomacy provides historians of science with a novel means of examining international institutions, networks, and databases. A set of interesting questions emerges. What draws international institutions and their technoscientific activities and expertise to specific, local technoscientific and geopolitical environments? How are science diplomacy practices part of this process? When science diplomacy mediates the circulation of international technoscientific knowledge, what specific, local material forms and data-keeping practices does that knowledge, transformed by that mediation, take?

As noted above, diplomacy—the maintenance of relations between countries, the institution and management of international organizations, the day-to-day business of embassies and consulates—is central to the circulation of knowledge and the examination of transnational scientific networks. Shining a brighter light on science diplomacy in our historical scholarship means making this crucial role of diplomacy more explicit. Historians of science can describe the coproduction of science and diplomacy in novel, globally diverse narratives that can innovate via new attention to specific moments involving the negotiation and execution of geopolitical relations and affairs that ultimately impact technoscientific practice and order. The articles in this special issue contribute to doing this because of the geographic range of science diplomacy instances considered: Europe (Lalli, Janáč and Olšáková), Africa (Castelo and Ágoas, Sam Robinson), the Americas (Adamson and Turchetti, Zaidi), East Asia (Zhang and Zhu), the world's oceans (Sam Robinson), and Cold War East and West (Ann Robinson). Moreover, these articles explore power relations, including Global South–North, in several crucial realms of technoscience.

It is no coincidence that our special issue focuses on the period from the end of World War II until the last decade of the Cold War, given the outsized influence of that period on the current science diplomacy narrative.<sup>43</sup> This is in part a well-documented matter of the increasingly important role of science and technology in geopolitical affairs during this period, due to “the dramatic expansion of science and engineering supported by national governments and the relations of governmental support for science and engineering to geopolitical conflict and ambition.”<sup>44</sup> In other words, science during the Cold War was tied ever closer to the state and to statecraft. Furthermore, certain areas of technoscience—nuclear energy, space technology—comprised important parts of the security state, and featured in symbolic public Cold War competition for technological supremacy.<sup>45</sup>

<sup>43</sup>Which is not to say that examples of pre-Second World War science diplomacy cases cannot be identified. For recent publications, see Aubin (2020); Burigana (2020); Gamito-Marques (2020); Somsen (2020).

<sup>44</sup>Oreskes (2014, p. 1).

<sup>45</sup>In the last two decades, a great deal of attention has come to science and technology in the Cold War. The literature is almost too vast to enumerate. As starting points, see Hecht (2011); Oreskes & Krige (2014); Suárez-Díaz, Mateos, & Barahona (2015).

All this might give the impression that the conditions of the Cold War resulted in the elucidation and spread of science diplomacy. And, indeed, the Cold War witnessed a notable development in science- and technology-linked positions in foreign services (for example, science attachés became commonplace in many foreign services; in the French foreign service, one even finds *attachés nucléaires*).<sup>46</sup> However, we would like to explore here the possibility that just as the Cold War shaped science diplomacy, the contrary was also the case: science diplomacy shaped the Cold War and its characteristic geopolitical activities in a way that can be captured by new narratives, such as the ones presented here. Put another way, we find that for the Cold War period, science diplomacy is not just an *explanandum* but an *explanans*, a crucial factor driving larger Cold War-era narratives.<sup>47</sup> These narratives are informed by analytical approaches from transnational and global history. We arrive at a multipolar approach that acknowledges historical trends, such as decolonization and “the great acceleration,” that put emphasis on the diverse geopolitical environments of the Global South and their interactions with the Global North. Such trends have come to supersede the simple bipolar (that is, East–West superpower) model of the second half of the 20th century—a shift that has considerably influenced scholarship in the history of science and technology during the Cold War.<sup>48</sup>

Several of the articles in this special issue contribute to the multiplication of narrative approaches to the Cold War period. They describe a variety of geopolitical fault lines, shifting alliances, and novel attempts at coalition-building characteristic of the global Cold War. The articles by Adamson and Turchetti and by Janáč and Olšáková shed light on inter-alliance tensions and fractures in, respectively, the Western alliance (nuclear technoscience opening up a deep rift) and the Warsaw Pact (environmental concerns raised by one partner and shut down by another).<sup>49</sup> In both cases, science diplomacy activities have the appearance of *Realpolitik* actions intended to remind unruly allies of their place, a far cry from a benign depiction.

The examination of the role of science, via diplomacy, in connecting geographically distant places by addressing a number of different global diplomatic constellations brings greater focus to the Cold War Global South–Global North divide, often as important in Cold War affairs as the better-documented East–West division. Here, Zhang and Zhu reveal for us how U.S. science diplomacy endeavors, linked to claims of cultural hegemony, were rejected by a Chinese government that was only willing to accept technical aid within the framework of Chinese–U.S. scientific and technological cooperation during World War II.<sup>50</sup> Castelo and Ágoas provide an example of how science diplomacy could be used to assert an imperial agenda in 1950s Africa, in this case by the late colonial Portuguese regime.<sup>51</sup> Sam Robinson's study, meanwhile, reveals how science diplomacy and the sociotechnical imaginaries driving Law of the Sea negotiations in the late 1960s and early 1970s raised suspicions and intensified tensions between the Global North and the Group of 77.<sup>52</sup>

Additionally, exploration of science diplomacy further exposes the degree to which the Cold War and European integration were deeply intertwined historical processes. While traditional historiography has analyzed the two separately, the role of U.S. support in sparking and promoting Western European integration in the first two decades after World War II has been a matter of lively debate among historians of international relations.<sup>53</sup> John Krige's analysis of European scientific elites' role in what he calls the coproduction of American hegemony in the postwar reconstruction of European science suggests the importance of these debates for the history of science, and recent scholarship has gone substantially further in exploring the interconnections between the Cold War and the

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<sup>46</sup>There is increasing reference within the literature on science diplomacy to this growing link between science and foreign affairs during the Cold War. See, for example, Ruffini (2017). See also Inserra (2017).

<sup>47</sup>This should not imply that we are engaging in the contemporary debate on whether the Cold War era represents a golden age of science diplomacy. See Copeland (2016).

<sup>48</sup>T. Smith (2000); Westad (2017); Leffler & Westad (2010); Hilton, & Mitter (2013). For influence on histories of science and technology, see van Dongen, Hoeneveld, & Streefland (2015); Heyck & Kaiser (2010); McNeill & Engelke (2016); Oreskes & Krige (2014).

<sup>49</sup>Adamson & Turchetti (2021); Janáč & Olšáková (2021).

<sup>50</sup>Zhang & Zhu (2021).

<sup>51</sup>Castelo & Ágoas (2021).

<sup>52</sup>S. Robinson (2021).

<sup>53</sup>For a summary of the debate, see Lundestad (1998, pp. 126–146).

European integration by identifying other themes beyond the role of U.S. support.<sup>54</sup> The articles in this special issue further articulate this increasingly complex interpretation of the interplay of the Cold War and the European integration, showing how scientists used scientific networks to pursue political goals, in this case a closer European integration in explicit competition with the US (Lalli) and the renegotiation of power relations in the Eastern Bloc (Janáč and Olšáková).

In other words, these studies illuminate the role science diplomacy played in efforts either to maintain existing hegemonic relations or to create new power relations within various geopolitical networks. They portray changes in global power relations in the context of broad historical processes such as decolonization, European integration, and the circulation of postwar technoscience. These studies do so by mapping out the complex relations connecting archival sources found in scientific institutions, personal papers, and governmental and non-governmental agencies, relations that ultimately bear on the balance of influence in the knowledge-power nexus. In the remainder of this section, we wish to focus on three analytical points that further inform our understanding of this nexus: the role of non-state agents in world affairs, the diversification of disciplinary domains belonging within the rubric of science diplomacy, and science diplomacy analyses leading to the reinterpretation of historical events in light of global science diplomacy.

Through science diplomacy, non-state actors repeatedly appear as relevant players in world affairs.<sup>55</sup> Sometimes explicitly, sometimes implicitly, scientists present themselves as diplomatic actors without the state being directly involved. Waqar Zaidi analyzes how, in the immediate post-World War II period, U.S. atomic scientists employed various rhetorical tools to position themselves as experts not only in science but in international relations, most famously in the area of nuclear disarmament.<sup>56</sup> Meanwhile, Ann Robinson shows that scientific committees of international unions involved in the resolution of priority disputes in the production of transuranic elements understood their activities as an attempt to achieve geopolitical neutrality.<sup>57</sup> In this case, a diplomatic imperative stemming from Cold War rivalry shaped the negotiations of international institutions and, in turn, the scientific outcomes shared by an international community of practitioners. Similarly, Robert Lalli observes how European physicists involved in the creation of the European Physical Society identified the promotion of international scientific cooperation as a tool to influence international relations, in this case, promoting greater European political integration via cultural integration.<sup>58</sup>

In the three above cases, the available sources show that the involved actors aimed at actions independent of their states' interests. But, as Li Zhang and Yanmei Zhu demonstrate, even when scientists endeavor to act as diplomats in alignment with their country's interests, as was the case of U.S. geographer George Cressey during his World War II mission to China, this alignment with the agenda of the state may not materialize. With varying end results, the cases in this volume suggest the importance of focusing on non-state agents with agendas not necessarily aligned with that of their own nation-state. By highlighting the crucial role of non-state agents in science diplomacy exercises, these historical narratives directly challenge the widespread view that what differentiates science diplomacy from international scientific cooperation is the centrality of nation-state actors and representatives of supranational entities.<sup>59</sup>

This special edition also proposes to enlarge the range of scientific disciplines considered central in diplomatic matters. The nuclear and environmental sciences are the most frequent object of investigation for the study of science diplomacy, hence the distinctive labels they have gained (nuclear diplomacy and environmental diplomacy). In fact, articles in this special issue confirm the relevance of these core areas for exploring the global science diplomacy knowledge-power nexus. The articles by Adamson and Turchetti and Janáč and Olšáková show precisely how

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<sup>54</sup>Krige (2006); Ludlow (2010).

<sup>55</sup>For a definition of non-state actor, see Risse-Kappen (1995). For an example, see Kraft & Sachse (2020).

<sup>56</sup>Zaidi (2021).

<sup>57</sup>A. Robinson (2021).

<sup>58</sup>Lalli (2021).

<sup>59</sup>Rungius, Flink, & Degelsegger-Márquez (2018, p. 6). See also Copeland (2016); Turekian et al. (2015).

science diplomacy in these areas became an arena for asserting dominance. At the same time, the issue goes beyond these fields to explore other emergent scientific areas for negotiating power relations in specific historical contexts. Castelo and Ágoas show the crucial role that social sciences came to occupy in negotiations between late empires and newly independent countries in sub-Saharan Africa, further elucidating the controversial role of science diplomacy in decolonization. Likewise, geography emerges as an especially relevant area for science diplomacy studies in the form of George Cressey's deployment of the concept of "geostrategy" in his post-World War II vision of political relations between China and the United States. In this way, geography came to occupy a multiplicity of functions exactly in the science diplomacy perspective. As Zhang and Zhu note, the disciplinary lens through which Cressey observed China was also the disciplinary domain that directed his diplomatic agenda. Meanwhile, seemingly pure research with no technical application in chemistry and physics becomes in our special issue a new means of exploring the ramifications of science diplomacy in areas where, in fact, science and politics converge. In Ann Robinson's article, the discovery of transuranic elements in chemistry becomes an arena for negotiating power relations between Cold War superpowers. Similarly, in Lalli's article, the view of physics as a unifying cultural language in the European political landscape during the Cold War became a tool for scientists to engage in diplomatic actions.

In addition, methodologically, this special issue stresses the opportunity provided by the study of science diplomacy to reread well-known historical cases. For example, inter-allied support to China during World War II has received due attention from scholars, especially those investigating Joseph Needham's missions to China in the framework of his directorship of the Sino-British Science Cooperation Office during the war. Examination of George Cressey's parallel and largely unsuccessful attempt not only allows us to delve into the parallel U.S.–Chinese program, but, more crucially, provides us with a comparative perspective that leads to a more nuanced understanding of the specificities of Needham's diplomatic approach as the basis for his achievements. The episode of nuclear diplomacy explored by Adamson and Turchetti, in turn, adds a new dimension to previous historical work to chart postwar U.S.–Brazilian relations and U.S. efforts to maintain hemispheric hegemony. Likewise, while the 1968 invasion of Prague has been often subject to historical study, Lalli sheds new light on the events of the period by reinterpreting the debates and actions of a given scientific (physics) community as a response to the Prague invasion and a call for East–West unity in Europe.

This special issue provides historical rereadings of historical cases from the 1970s as well. The 1972 United Nations Conference on the Human Environment, organized in Stockholm, is held for good reason to be a crucial event in environmental history, pivotal in the development of national and international environmental agendas in spite of being boycotted by Eastern Bloc countries. Janáč and Olšáková put this event in a new light by viewing it in the context of Czechoslovakia's earlier failed attempt to promote a different kind of international environmental agenda in 1971. Both the Soviet rebuke of the Czechoslovak initiative and the Soviet boycott of the Stockholm conference reveal coercive intra-bloc diplomacy unfolding in the context of international environmental affairs of the early 1970s. Similarly, in the final article in this collection, Sam Robinson provides a novel view of the third Conference of the Law of the Sea by stressing the Global South–North tensions present therein, arguing that a predominant cause of these tensions came from visions of future developments in oceanic science and technology. The UNCLOS III negotiations cannot be understood without recognizing these tensions and their origins.

Finally, throughout the special issue we witness the coproduction of science and diplomacy. Zhang and Zhu reveal for us the exploration and articulation of China's geography—and an initiative to improve a wartime alliance—in a single diplomatic mission. Adamson and Turchetti uncover the conveyance of top-secret uranium-refining technology—and a challenge to U.S. hegemony—in the same French offer to Brazil. Ann Robinson describes the identification and naming of new transuranic elements—and a means of superpower compromise—in the same negotiation. Finally, Castelo and Ágoas depict an initiative to study African societies—and a postwar attempt to deflect the ambitions of decolonization—in the same social science program. These examples are suggestive of the analytical benefit of describing the inextricable linkage of science and diplomacy which the study of science diplomacy can elucidate as a coproduced historical outcome.

In conclusion, we would like to invite readers to view the articles that follow as just the sort of exploratory exercise called for above. Relying on sources from both sides of the former Iron Curtain, from the Eastern and Western Hemispheres, from the Global South and the Global North, our contributors add new specific locales, instances, and state and non-state actors to the growing map of the history of science diplomacy. They also show that the study of science diplomacy should endeavor not only to achieve a global range of subjects and sources, but it should comprise an observation of the social and diplomatic work involved in the movement and circulation (or, better put, the control of that circulation) of technoscientific knowledge. These examples demonstrate how science diplomacy, especially in its Cold War configurations, has functioned to mediate the transnational circulation of technoscientific knowledge, experts, and materials. Science diplomacy was never a benign force, a non-threatening soft power instrument. Rather, it creates a knowledge-power nexus, one in which current science diplomacy practitioners can invest more confidence the better they understand science diplomacy's rich, complex past.

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## CONFLICT OF INTEREST

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