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To cite this article: Xiao Liu (09 Jul 2023): Understanding sovereignty through meteorology: China, Japan, and the dispute over the Qingdao Observatory, 1918–1931, Annals of Science, DOI: [10.1080/00033790.2023.2231465](https://doi.org/10.1080/00033790.2023.2231465)

To link to this article: <https://doi.org/10.1080/00033790.2023.2231465>



Published online: 09 Jul 2023.



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RESEARCH ARTICLE



Understanding sovereignty through meteorology: China, Japan, and the dispute over the Qingdao Observatory, 1918–1931

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ABSTRACT

Concentrating on the Qingdao Observatory, this paper will explore the role of scientific facility in asserting China's sovereignty during the first half of the twentieth century. Although scholars have explained the efforts of China's internationalization in diplomacy through the perspectives of politics, economics and culture, they have not paid attention to science. Therefore, this paper aims to shed some light on how scientific issues were solved via diplomacy during the Republic of China, while further asserting that the focus in negotiations was not confined to science itself, but rather to sovereignty within a scientific context. In this process, the meaning of sovereignty has also been expanded basing on the improvement of nation's scientific capability. Besides, the participation of different actors involved in sovereignty assertion is investigated by this paper. Although the diplomatic negotiation was held at the international level, the local government and scientific community were main promoters in this case, which calls for attention on the various subjects in sovereignty issue. Consequently, this paper argues that Asian countries, such as Republic of China, could also employ science as a means to negotiate with foreign powers and claim their due rights.

ARTICLE HISTORY

Received 29 September 2022


Accepted 27 June 2023

KEYWORDS

Sino-Japanese relationship; assertion of sovereignty; history of modern meteorology; the Qingdao observatory

Introduction

In the first half of the twentieth century, China faced intense competition over national sovereignty with Japan. The Russo-Japanese War of 1904–1905 was a conflict between the two countries over the control of Northeast China. Later, the signing of a set of secret demands, the 'Twenty-One Demands' in 1915, served to strengthen Japan's influence on China, while the outbreak of the Second Sino-Japanese War marked the pinnacle of Japan's invasion of China's sovereignty.¹ However, when previous researches have laid emphasis

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¹Guoqi Xu, 'China and Empire', in *Empires at War: 1911-1923*, ed. by Robert Gerwarth and Erez Manela (Oxford: Oxford University Press, 2014), pp. 215–35. Akira Iriye, 'Japanese Aggression and China's International Position

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on Japan's threat to China's territorial and economic sovereignty, the sovereignty within scientific context was actually one of the focuses of contention between China and Japan, which has not received enough attention among scholarship. Regarding the definition of 'scientific sovereignty', this article intends to employ the meaning that Grégoire Mallard, Catherine Paradeise and Ashveen Peerbaye use in their book in 2009, which is the capacity that a nation-state could develop to ensure national autonomy on science from the hegemonic control of cosmopolitan leaders.² Early-twentieth-century Russia emphasized scientific sovereignty in chemistry to promote Russian identity and sovereignty and diminish Western influence.³ This article explains that similarly, the Republic of China in the same period urgently needed to reclaim scientific sovereignty to ensure the autonomous development of its science. Therefore, this article calls for attention on the dispute over Qingdao Observatory during 1918 and 1931, a case focusing on scientific sovereignty.

The Qingdao Observatory was a meteorological observatory built by Germany in 1898 in Qingdao, Shandong Province, whereas it was occupied by Japan during the First World War in 1914. As Qingdao was controlled by the Chinese authorities after the First World War, the Chinese government intended to control the Qingdao Observatory. Accordingly, Chinese employees were later permitted to enter the observatory, but Japanese staff still worked there, suggesting that the observatory *de facto* served two countries.⁴ Subsequently, the ownership of the Qingdao Observatory caused much debate between China and Japan for over a decade (1918–1931).

To understand the process of China's struggle to regain its sovereignty during the first half of the twentieth century, Wang Dong demonstrated that Chinese diplomats intended to utilize international conferences and treaties to claim China's due rights.⁵ William Kirby praised the stunning accomplishments made by diplomacy during the Republican era, which included defending its boundaries, recovering sovereignty and improving China's international position.⁶ Although diplomacy is the primary means of negotiating sovereignty between countries, the differences in the focus of debate have been largely ignored. Diplomacy in relation to scientific sovereignty has led to diplomats no longer being the sole significant factor in negotiations since scientific

1931–1949', in *The Cambridge History of China: Republican China 1912–1949, Part 2, Vol. 13*, ed. by John K. Fairbank and Albert Feuerwerker (Cambridge: Cambridge University Press, 1986), pp. 492–546.

²Grégoire Mallard and Catherine Paradeise, 'Global Science and National Sovereignty: A New Terrain for the Historical Sociology of Science', in *Global Science and National Sovereignty: Studies in Historical Sociology of Science*, ed. by Grégoire Mallard and others (New York: Routledge, 2009), pp. 11–13.

³Michael D. Gordin, 'Running in Circles: The Heidelberg Kruzhok and the Nationalization of Russian Chemistry', in *Global Science and National Sovereignty: Studies in Historical Sociology of Science*, ed. by Grégoire Mallard and others (New York: Routledge, 2009), pp. 40–63.

⁴*Shenbao*, 'Qingdao Cehousuo Tanpan [the Negotiation on Qingdao Observatory]', 17 November 1922, pp. 3.

⁵Dong Wang, *China's Unequal Treaties: Narrating National History* (Lexington Books, 2005), pp. 35–53.

⁶William C. Kirby, 'The Internationalization of China: Foreign Relations at Home and Abroad in the Republican Era', *The China Quarterly*, 150 (1997), 433–46.

infrastructures and instruments, along with technical personnel have become important links that could influence sovereignty. For example, Thomas Mullaney explained how telegraph code was developed in accordance with the Chinese language at the turn of the twentieth century, which provides some insight into the role of national sovereignty in relation to semiotics.⁷ Nevertheless, when scholars sought to understand the relationship between science and sovereignty, they did not carefully think about the development of sovereignty itself within the scientific context. Although this period has received comparatively little attention from scholars studying this topic, negotiations over the Qingdao Observatory in the 1920s provide a glimpse into Sino-Japanese relations and scientific sovereignty at the time. Therefore, drawing on previously unused archival materials and newspapers reports, this paper views the Qingdao Observatory as a ‘contested space’ for scientific sovereignty, arguing that the meaning of sovereignty was not static, but it was changed according to the national scientific development. In other words, the claim for scientific sovereignty was accompanied with the improvement of nation’s scientific capacity, and this was obvious through the Qingdao Observatory case.

The Shandong problem

Built by Germany in 1898, the Qingdao Observatory’s original purpose was to provide meteorological information to the German Navy stationed at Germany’s concession in Qingdao.⁸ Equipped with a spacious laboratory, a library, a constant-temperature basement, as well as a temperature coefficient measuring room with dual heating equipment, the Qingdao Observatory was considered one of the most advanced observatories in East Asia in the early twentieth century (Figure 1).⁹ To some extent, the well-equipped station was also regarded as a display of Germany’s state-of-the-art science and a piece of German civilization, established to strengthen the homeland’s presence and image abroad.¹⁰ In fact, the scientific development of colonial countries had been an area of focus of the foreign powers since the nineteenth century. The government of Germany, for example, was adamant that their scientific system be adopted over other foreign standards in order to ensure their superiority over their competitors. Hence, establishing their own scientific apparatus was a matter of prestige. In addition, under the guise of scientific proliferation,

⁷Thomas Mullaney, ‘Semiotic Sovereignty: The 1871 Chinese Telegraph Code in Historical Perspective’, in *Science and Technology in Modern China, 1880s-1940s*, ed. by Jing Tsu and Benjamin A. Elman (Leiden: Brill, 2014), pp. 153–79.

⁸John E. Schrecker, *Imperialism and Chinese Nationalism: Germany in Shantung* (Cambridge: Harvard University Press, 1971), p. 59–62.

⁹Shen Bingbing and others, ‘Qingdao Guanxiangtai de Lishi Yange yu Gongxian Yanjiu, 1898–1949 [Qingdao Observatory’s Historical Development and Contribution, 1898-1949]’, *Qixiang Keji Jinzhan*, 6.4 (2016), 44–46.

¹⁰Lewis Pyenson, ‘Cultural Imperialism and Exact Sciences: German Expansion Overseas 1900–1930’, *History of Science*, 20.1 (1982), 9–19.



Figure 1. The Qingdao Observatory (1929).¹²

foreign powers could circumvent the use of force and gain influence over others' cultural identity through the use of soft power.¹¹

¹¹Pyenson, 'Cultural Imperialism and Exact Sciences', pp. 23–26.

¹²Xu Huijun, 'The Qingdao Observatory', *Huabei Huabao* 40.2 (1929), 3.

After the First World War, Germany, defeated, was forced to withdraw from China, and so abandoned its rights and interests in Qingdao.¹³ Accordingly, the Republic of China, as one of the victorious Allied Powers, was supposed to take over the Qingdao Observatory; however, Japan captured and claimed Qingdao during the wartime, thereby refusing to return it to China. As a result, ‘The Shandong Problem’ discussed at the Paris Peace Conference in 1919 was China’s first attempt to regain Qingdao, especially on its sovereignty. During the Paris Peace Conference, the Japanese delegation claimed that Japan, as a victorious country, should inherit Germany’s rights and interests in Shandong Province, especially Jiaozhou Bay, which belonged to Qingdao. This proposal was strongly opposed by Chinese diplomats, who thought that China should regain jurisdiction over Jiaozhou Bay, given that this area had been occupied by Germany in the pre-war period.¹⁴ At this point, the principal dispute between China and Japan was sovereignty over the territory of Qingdao, which was mainly manifested in their political control over the region. As a result, the efforts of the Chinese delegation were in vain; with the support of most of the European powers, the Treaty of Versailles transferred the German concession in Jiaozhou Bay to Japan rather than returning sovereign authority to China. However, what the foreign powers did not anticipate was that this diplomatic failure of China’s negotiations at the Paris Peace Conference would trigger the May Fourth Movement (*Wusi Yundong*). On 4 May 1919, influenced by nationalism, Chinese students in Beijing held a demonstration to criticize the Chinese government’s decision to allow Japan to retain territories in Shandong. The May Fourth Movement rapidly developed into nationwide protests.¹⁵

The Shandong Problem did not end with the Paris Conference. The dispute was discussed again during the Washington Naval Conference in 1921–1922, when Japan finally agreed to return Qingdao to China. The Qingdao Observatory, however, was not included in this agreement.¹⁶ One possible reason may be that the Beiyang Government was more focused on regaining their economic rights, as Chinese businessmen had formed an influential community.¹⁷ The Chinese scientific community was still in the process of forming at that time and there was an insufficient understanding of modern science, as well as

¹³Leonard V. Smith, *Sovereignty at the Paris Peace Conference of 1919* (Oxford: Oxford University Press, 2018), pp. 82–101. See also Chow Tse-Tsung, *The May Fourth Movement: Intellectual Revolution in Modern China* (Cambridge: Harvard University Press, 1960), pp. 84–117.

¹⁴Chow, *The May Fourth Movement*, pp. 85–89. See also Rana Mitter, *A Bitter Revolution: China’s Struggle with the Modern World* (Oxford: Oxford University Press, 2004), pp. 3–6.

¹⁵Vera Schwarcz, *The Chinese Enlightenment: Intellectuals and the Legacy of the May Fourth Movement of 1919*, (Berkeley: University of California Press, 1986). See also Chow, *The May Fourth Movement*, pp. 99–168.

¹⁶Frederick R. Dickinson, ‘The Japanese Empire’, in *Empires at War: 1911–1923*, ed. by Robert Gerwarth and Erez Manela (Oxford: Oxford University Press, 2014), pp. 197–213. See also *Wajijiao Gongbao*, ‘Luan Xieding Ximu Zhongri Lianhe Weiyuanhui Huiyijilu [Details of the agreement on Shandong Problem: Minutes of the Joint Commission between China and Japan]’, January 1923.

¹⁷Yu Heping, *Brief History of Chambers of Commerce in China* (London: Paths International Ltd, 2013), pp. 94–106.

scientific facilities.¹⁸ It should be noted that although Chinese diplomats made some achievements at this conference, they still made considerable compromises in exchange for China's jurisdiction over Shandong. For instance, the Chinese government needed to pay more than 50 million Chinese yuan to Japan as compensation for the reestablishment of their sovereignty of Qingdao and the Jiaoji Railway.¹⁹ Moreover, the ownership of the Qingdao Observatory was still in question, thus this paper will use this case to illustrate the process of the Republic of China's struggle to reclaim sovereignty within the scientific context.

Meteorological development in China

The Qingdao Observatory, as a piece of scientific infrastructure, was a fundamental part of the development of modern Chinese meteorology. Historians of science have discussed that China developed ancient meteorology, or at least sophisticated weather-related knowledge, quite successfully for more than two thousand years, but it lagged behind foreign powers in terms of modern meteorology.²⁰ The systematic study of modern meteorology was introduced by the West starting in the nineteenth century. Early meteorological stations in China were principally built by foreign powers and Western missionaries, with the aim of observing weather changes as well as facilitating the shipping trade. As been discussed above, the well-equipped Qingdao Observatory was one of the few advanced meteorological stations in the Far East. Other influential stations in this area included the Zikawei Observatory and the Hong Kong Royal Observatory. The Zikawei Observatory, built by a French Jesuit society in 1872, collected weather information for the treaty port in Shanghai and meteorological information for East Asia more generally in the early twentieth century.²¹ Founded by the Governor of Hong Kong in 1883, the Hong Kong Royal Observatory also occupied an important position in the meteorological development of East Asia by providing meteorological services and conducting research.²² As a number of meteorological stations built in China were not controlled by the local authorities, their impact was not confined to the mere collection of meteorological information; they also influenced Chinese society by disseminating Western culture.²³ Through the

¹⁸Chen Xiangyu, 'A Study on the Development of the Science Society of China (1914-1949)', (Doctoral dissertation, Xiamen University, 2019), pp. 8–12.

¹⁹*Waijiao Gongbao*, 'Luan Xieding Ximu Zhongri Lianhe Weiyuanhui Huiyijilu'.

²⁰Wen Kegang, ed., *Zhongguo Qixiangshi* [History of Meteorology in China] (Beijing: Qixiang Press, 2003), pp. 140–70.

²¹Lewis Pyenson, *Civilizing Mission: Exact Sciences and French Overseas Expansion, 1830-1940* (Baltimore; London: Johns Hopkins University Press, 1993), pp. 157–206.

²²P. Kevin MacKeown, *Early China Coast Meteorology: The Role of Hong Kong* (Hong Kong: Hong Kong University Press, 2011), pp. 42–65. See also Marlon Zhu, 'Typhoons, Meteorological Intelligence, and the Inter-Port Mercantile Community in Nineteenth-Century China' (Doctoral dissertation, Binghamton University, State University of New York, 2012), pp. 178–238.

²³Pyenson, 'Cultural Imperialism and Exact Sciences', pp. 2–11.

Zikawei Observatory, France obtained an opportunity to demonstrate its advanced level of meteorological research to neighbouring countries, thus expanding its scientific influence.²⁴ To some extent, the Chinese authorities indeed had made attempts in the development of meteorology so as to get rid of the situation controlled by the West, the Chinese Maritime Customs Service (CMCS) established its own meteorological network along China's coastline, providing meteorological information for shipping starting since the 1880s. However, as the organization was founded by foreigners, the CMCS was headed by foreign inspectors general until 1949, and thus the data was also accessible to foreign powers.²⁵ Therefore, if the Qingdao Observatory could be controlled by the Republic of China, it would greatly enhance China's influence in meteorology in the Far East region.

It seems that although nearly dozens of foreign meteorological station was founded in China by early 1910s, the Chinese authorities did not regard it as a problem, or at least took it seriously.²⁶ This paper argues that China lacked professional meteorological personnel at that time, leading to a poor understanding of the role of modern meteorology among policymakers. This meant that even if China opposed Western observatories, their lack of knowledge and poor abilities meant that they could not afford to build their own, and subsequent cases proved that they encountered problems with construction funds as well.²⁷ As a result, with the ignorance of the relationship between modern meteorology and sovereignty, the Chinese authorities adopted a neutral attitude towards foreign weather stations that provided valuable weather services to local society.²⁸ The neglect of the concept of scientific sovereignty also occurred in the field of scientific investigation. At the turn of the twentieth century, Western scientists organized several field trips to China and obtained a huge amount of geographical information about the country, but the Chinese government failed to connect this with the issue of national scientific sovereignty.²⁹

However, such circumstances changed rapidly after the first generation of Chinese scientists emerged in the late 1910s. Most of them had received a Western education and mastered scientific knowledge, such as meteorologists Zhu Kezhen and Jiang Bingran.³⁰ These Western-trained Chinese scientists

²⁴Pyenson, *Civilizing Mission*, pp. 180–203.

²⁵Robert Bickers, 'Throwing Light on Natural Laws: Meteorology on the China Coast, 1869–1912', in *Treaty Ports in Modern China: Law, Land and Power*, ed. by Robert Bickers and Isabella Jackson (Abingdon: Routledge, 2016), pp. 180–193.

²⁶Wu Zengxiang, *Zhongguo Jindai Qixiang Taizhan* [Meteorological Stations in Modern China] (Beijing: Qixiang Press, 2007), pp. 12–23.

²⁷Clark L. Alejandrino, 'Weathering History: Storms, State, and Society in South China since the Fifth Century CE' (Doctoral dissertation, Georgetown University, 2019), pp. 166–74.

²⁸Wu, *Zhongguo Jindai Qixiang Taizhan*, pp. 12–62.

²⁹Du Yilun, 'The Research of German Explorer Albert Tafel's Investigation in Western China in the Late Qing Dynasty and its Significance in Geography', *Xizang Daxue Xuebao*, 33.1 (2018), 58–65.

³⁰Zuoyue Wang, 'Saving China through Science: The Science Society of China, Scientific Nationalism, and Civil Society in Republican China', *Osiris*, 17.1 (2002), 291–322.

were eager to develop China's own meteorology based on their professional knowledge since existing foreign meteorological stations clearly hindered their development. For instance, Zhu Kezhen had mentioned the problem of over-reliance on the Zikawei Observatory in 1916, calling on the development of Chinese led science, such enthusiasm persisted even after 1949.³¹ Subsequently, they appealed to recover the foreign-established meteorological stations, for the reason that this was not only conducive to the security of China's meteorological information, but also enabled the Chinese Republican State to promote its own civilization.³² The right for cultural dissemination was valued by the Chinese government to contest with the foreign powers in various aspects. In response to Western missionary colleges opening in China, the Kuomintang Party founded the Sun Yat-sen University in 1925 so that students could be educated in science and technology while also being influenced by the 'party-prescribed pedagogy'.³³ Consequently, whether the Qingdao Observatory could be recovered was of great import as it was related to both the Chinese meteorological practices and the capacity for developing localized science from foreign influence. Furthermore, with Chinese developing its own modern meteorology, they requested to protect national scientific sovereignty. It should be noted that protecting scientific sovereignty was not confined to foreign-established observatories, Clark Alejandrino's research suggested that even in Canton where was controlled by the Chinese Republican state, constructing an observatory was also connected with enforcing China's sovereignty because it could take responsibility for providing local meteorological information, and thus weaken the impact of foreign meteorological observatories on this region, such as the Hong Kong Royal Observatory by Britain.³⁴

Negotiation on the Qingdao observatory

Negotiations over the Qingdao Observatory between China and Japan were divided into two periods corresponding to 1928 regime change: the Beiyang Government (1912–1928) and the National Government (1928–1949). This section will focus on measures adopted by the former Beiyang Government, while the latter will be discussed in the subsequent section.

The initial stage of negotiations over the Qingdao Observatory between China and Japan started in 1922. During the 34th Meeting of the Joint

³¹Zhu Kezhen, 'Zhongguo zhi Yuliang ji Fengbao Shuo [Rainfall and Storm Theory in China]', *Kexue*, 2.2 (1916), 206–16. See also Zuoyue Wang, 'Zheda and Beyond: Zhu Kezhen and China's Science and Technology', *Zheda Xuebao*, 12.1 (2016), 17–22.

³²Zhu Kezhen, 'Lun Woguo Yingduoshe Qixiangtai [Discussing the Request for Establishing Meteorological Stations in China]', *Dongfang Zazhi*, 18.15 (1921), 37–39.

³³The Kuomintang Party, also known as the Chinese Nationalist Party, is a political party which initiated the establishment of National Government. Wen-Hsin Yeh, *The Alienated Academy: Culture and Politics in Republican China, 1919–1937* (Harvard University Press, 1990), pp. 3–4, 129–67.

³⁴Alejandrino, 'Weathering History', pp. 154–73.

Committee of China and Japan about the Shandong Problem, the Japanese diplomatic envoy, Obata Yūkichi, emphasized Qingdao's relevance to Japan as 'a large number of Japanese lived there and frequent shipping took place between the two areas'. Therefore, they intended to keep the Qingdao Observatory to meet the needs of local expatriates.³⁵ It should be noted that the Japanese government and military department often held divergent opinions towards their foreign policies, but were fairly unanimous on this issue.³⁶ According to the correspondence of the Japanese Undersecretary of the Qingdao Garrison, they also considered whether to return the observatory to the Chinese, given that the observatory was important for the development of Japanese meteorology.³⁷ The Chinese, nevertheless, asserted that since the Qingdao Observatory was located on territory which was now under Chinese jurisdiction, it was Chinese property.³⁸ Apparently, China's emphasis on sovereignty at this time was based on territory, and they did not realize that scientific facility *per se* also had the meaning of sovereignty.

The two sides did achieve a consensus through this meeting, albeit not on ownership. The agreement was reached on two aspects:

First, on condition that the Japanese staff were not paid by the Chinese, the Japanese could still maintain and operate the Qingdao Observatory, with their duties remaining the same as before. Furthermore, the Chinese government should facilitate the exchange of telegrams between the Qingdao Observatory and Japanese weather stations. Second, when the Chinese staff of the observatory completed their training and intended to replace the Japanese staff in the future, the Chinese should propose a plan about meteorological data exchanging methods between the Qingdao Observatory and Japanese weather stations.³⁹

In addition to these practical arrangements, Japan demanded compensation for their monetary investments in instruments for the observatory during the First World War.⁴⁰ Although it is not clear whether China actually paid such remunerations, it showed that China encountered various points of resistance in taking over the observatory. Such resistance shed light on the methods the Japanese used to maintain and defend their standing on the issue. When the Japanese could not guarantee their continued interest through a political

³⁵Luan Zhongri Lianhe Weiyuanhui Diyibu Di Sanshisi Ci Huiyilu [The Minutes of the 34th Meeting of the Joint Committee of China and Japan about Shandong Problem], 16 November 1922: Academia Historica, 020/010106/0002.

³⁶Chen Taiyong, 'The Track of Japan's Policy of Invading China During WWI & WWII (1919-1929)' (Doctoral dissertation, Wuhan University, 2017), pp. 135-40.

³⁷Letter from Undersecretary of the Qingdao Garrison to the Undersecretary of the Japanese Ministry of Foreign Affairs, 19 June 1922: Japan Center for Asian Historical Records, C03025345600.

³⁸Luan Zhongri Lianhe Weiyuanhui Diyibu Di Sanshisi Ci Huiyilu [The Minutes of the 34th Meeting of the Joint Committee of China and Japan about Shandong Problem], 16 November 1922: Academia Historica, 020/010106/0002.

³⁹Due to the availability of materials, the only document about the agreement in 1922 obtained was recorded in a subsequent government report in 1931. See 'Guanyu Chetui Qingdao Guanxiangtai Liutai Riyuanan [On the Case of Withdrawing the Japanese Members from the Qingdao Observatory]', *Guoli Zhongyang Yanjiuyuan Yuanwu Yuebao*, 2.8 (1931), 34.

⁴⁰'Qingdao Guanxiangtai zhi Jieshou [Take Over the Qingdao Observatory]', *Shidi Xuebao*, 2.3 (1923), 12-13.

approach, scientific methods were utilized, though neither were particularly successful in the end. This issue of Japanese expansion in China demonstrated how science served both sides and the level to which said science was at the heart of the contest between sovereignty and imperialism.⁴¹

Following these initial negotiations, the Chinese personnel formally worked in the observatory after 1922, though the Japanese employees continued to maintain the normal operation of the observatory, contending that their Chinese counterparts did not possess the necessary professional knowledge.⁴² It appeared that both China and Japan had ensured their own interests to a certain extent. However, according to the agreement, Japanese staff were responsible for the technical affairs of the observatory, and therefore the observatory was largely controlled by the Japanese, leaving China in a relatively passive position.⁴³ The Japanese indeed found a reasonable pretext to maintain their position in this affair. To some extent, the argument was logical, given that its emphasis on professional capability exploited a key weakness inherent to Chinese meteorology, due to its relatively late development. Moreover, this argument also presented an obstacle to subsequent negotiations. The issue lay in the fact that the question of professionalism constituted a vague standard. It was difficult to ascertain to what degree of expertise the Chinese employees needed to achieve, thus leaving room for further debate regarding this matter.

By 1924, the Chinese staff were comparable in professional qualifications to their Japanese counterparts. Jiang Bingran, the director of the observatory, was one of the Chinese meteorologists who was present at that time. Having completed his doctoral study of meteorology at the Gembloux Agro-Bio Tech in Belgium in 1912, Jiang had been engaged in Chinese meteorological work for a decade and was more than competent for this position.⁴⁴ Apart from Jiang, other Chinese employees had undergone professional training and acquired rich working experience in meteorological stations. Even the interns, who had only recently joined the observatory were trained for two years, covering advanced mathematics and physics as well as theoretical meteorology studies, a training period which was much more extensive than the three-month internship at the Tokyo Central Meteorological Station.⁴⁵ This suggests that the rigorous mandatory training which took place at the Qingdao Observatory could ensure the professional ability of the staff.

⁴¹Bernd Martin, *Japan and Germany in the Modern World* (Providence: Berghahn Books, 1995), pp. 68–102.

⁴²Letter from Qingdaoshi Zhengfu [Qingdao Municipal Government] to Waijiaobu [Ministry of Foreign Affairs ('MFA')] about taking over the Qingdao Observatory, 19 July 1929: *Academia Historica*, 020/010106/0002.

⁴³Luan Zhongri Lianhe Weiyuanhui Diyibu Di Sanshisi Ci Huiyilu [The Minutes of the 34th Meeting of the Joint Committee of China and Japan about Shandong Problem], 16 November 1922: *Academia Historica*, 020/010106/0002.

⁴⁴Wang Xiuqin, 'Zhongguo Jindai Qixiang Shiye Xianqu-Jiang Bingran [the Pioneer of Modern Meteorological Affairs in China - Jiang Bingran]', *Zhongguo Keji Shiliao*, 11.1 (1990), 41–54.

⁴⁵Letter from Qingdaoshi Zhengfu [Qingdao Municipal Government] to Waijiaobu [MFA], 6 February 1930: *Academia Historica*, 020/010106/0002.

Hence, in 1924 and 1925, the Chinese Ministry of Foreign Affairs (MFA) asked the Japanese authorities about the resumption of negotiations twice annually. On 26 September 1924, the Jiaoao Commercial Port Supervision Office (*Jiaoao Shangbu Bangongshu*, JCPSO), the administrative department of Qingdao, asked the MFA about withdrawing all Japanese staff in order to recover ownership of the observatory. According to the letter from the JCPSO to the MFA:

Due to the large number of foreign ships berthed at the Qingdao port, meteorological reports are taken seriously by the countries who are connected with [it ...]. Therefore, the meteorological work of the Qingdao Observatory is closely related to international credit and national interests.⁴⁶

The correspondence between the Qingdao local government and the MFA showed that local politicians were the main promoters calling for the Chinese diplomats' involvement in this affair. Although the New Culture Movement initiated in late 1910s had enlightened Chinese intellectuals to the importance of science, Chinese diplomats lacked experience in debate over scientific matters, thus the Qingdao Observatory case illuminated how science was gradually revalued in international negotiations.⁴⁷ In view of the demands of Chinese diplomats, the Japanese delegates procrastinated repeatedly under the pretext of the supposed lack of professionalism of the Chinese employees.⁴⁸ In fact, in contrast to China's ignorance, the Japanese, especially the meteorological community, had already paid significantly more attention to utilizing scientific means to consolidate their interest in China's territory. By occupying the observatory, Japanese personnel designed their own signals for early storm warnings, thus forcing Western ships and China more broadly to adopt Japan's weather signals, indirectly promoting Japan's scientific and cultural influence. Moreover, the application of Japanese signals also led people, both Chinese or foreigners who utilized the information generated by the observatory, to believe that the Qingdao Observatory was controlled by Japan, thereby conflating the issue of rightful ownership of the observatory.⁴⁹ Such activities demonstrated that Japan intended to improve their imperial influence, both scientifically and economically, through the observatory in Qingdao.

⁴⁶Jiaoao Shangbu Duban Gongshu Zi Di Yishiqihao [The Jiaoao Commercial Port Supervision Office's Order, No. 17], *Jiaoao Gongbao*, 204 (1925), 6–7.

⁴⁷Elisabeth Forster, *1919 - the Year That Changed China: A New History of the New Culture Movement* (Berlin: Walter de Gruyter GmbH, 2018), pp. 27–58.

⁴⁸Letter from Qingdaoshi Zhengfu [Qingdao Municipal Government] to Waijiaobu [MFA] about taking over the Qingdao Observatory, 19 July 1929: Academia Historica, 020/010106/0002. See also *Shenbao*, 'Waijiaobu Han Rishi Cusu Jiaohuan Qingdao Cehousuo [The Ministry of Foreign Affairs Urged the Japanese to Return the Qingdao Observatory]', 29 September 1926, pp. 4.

⁴⁹Letter from Qingdaoshi Zhengfu [Qingdao Municipal Government] to Waijiaobu [MFA] about the negotiation with the Japanese on the observatory, 1 April 1930: Academia Historica, 020/010106/0002.

One point that needs to be noted is that, according to previous research, the Japanese claimed to hand over the Qingdao Observatory to China in 1924, with the directorship of the observatory solely held by Chinese meteorologist Jiang Bingran after that date.⁵⁰ However, the Japanese staff, in fact, even built a station, or at least some houses, close to the Qingdao Observatory to conduct observation activities and continued to use the instruments of the observatory.⁵¹ This indicated that the location of the observatory was crucial for meteorological observation in Qingdao. One possible reason for the Japanese desire for continued control of observatory was that said control was strongly linked with their scientific research capability and international reputation, two aspects that were in fact valued by both China and Japan. The well-equipped Qingdao Observatory was crucial in promoting the regional meteorological development. It published weather charts every day which were sent to ships in Qingdao port for navigation safety. In addition, the observatory also issued weather forecasts and storm warnings.⁵² After the establishment of its radio short-wave station in 1926, the Qingdao Observatory could directly transmit weather information and accurate time, and exchange weather information with other influential weather stations in the Far East. In terms of publications, Qingdao Observatory published *Monthly Report of the Qingdao Observatory* (*Qingdaoshi Guangxiangtai Yuebao*) with analysing the meteorological data of Qingdao.⁵³ Since the Qingdao Observatory also included sections of astronomy and geomagnetism, it had made achievements in other aspects besides meteorology.⁵⁴

In view of the Japanese actions in China, the takeover of the observatory was considered a matter of protecting sovereignty by the Chinese observatory staff as well as the local government. The documents submitted to the MFA by the Qingdao Municipal Government included the words ‘cultural invasion (*wenhua qinlue*)’ to describe Japan’s behaviour, and expressed that ‘the situation should be resolved in a powerful fashion in order to prevent Japan’s behaviour from worsening’.⁵⁵ Similarly, the letter from the director of the observatory, Jiang Bingran, to the Qingdao Municipal Government also mentioned the term ‘cultural invasion’ while discussing Japan’s occupation.⁵⁶ The

⁵⁰Qingdaoshi Qixiangju, ed., ‘Qingdao Jindai Qixiang Gaishu [An Overview of Modern Meteorology in Qingdao]’, in *Zhongguo Jindai Qixiangshi Ziliao* [Resources for Meteorological History in China], ed. by Editorial Committee of Modern Meteorological Resource in China (Beijing: Qixiang Press, 1995), pp. 135–36.

⁵¹Qingdaoshi Qixiangju, ed., ‘Qingdao Jindai Qixiang Gaishu’, pp. 136.

⁵²Wu, *Zhongguo Jindai Qixiang Taizhan*, pp. 47–49.

⁵³*Monthly Report of the Qingdao Observatory*, Qingdao: Qingdao Observatory, 1927.

⁵⁴Chaoyang Liu, ‘Magnetic Storms Recorded at Tsingtao Observatory since 1924’, *Zhongguo Wuli Xuebao*, 2 (1936), 178–86. See also Niu Weixing, ‘Gao Pingzi de Tianwen Lixue Yanjiu [Astronomical Calendar Research Carried by Gao Pingzi]’, *Studies in the History of Natural Sciences*, 25.2 (2006), 183.

⁵⁵As the Japanese used the name ‘the Qingdao Observatory of Japan’ in the correspondence with Euro-American countries, the Qingdao Municipal Government considered the Japanese actions as ‘cultural invasion’. See Letter from Qingdaoshi Zhengfu [Qingdao Municipal Government] to Waijiaobu [MFA], 30 October 1929: *Academia Historica*, 020/010106/0002.

⁵⁶Letter from Jiang Bingran to the Qingdaoshi Zhengfu [Qingdao Municipal Government], 11 December 1929: *Academia Historica*, 020/010106/0002.

research for this paper uncovered that nearly two hundred articles in the *ShenBao*, one of the most influential newspapers during the Republican era, made mention of the term ‘cultural invasion’ while discussing the relationship between China and foreign powers, Japan in particular, from 1925 to 1930.⁵⁷ The frequent use of this term demonstrates the sense of crisis the Chinese people experienced at the time; this collective feeling was probably what drove director Jiang Bingran and the Qingdao Municipal Government to continuously request the MFA to pursue full control over the Qingdao Observatory. It should be noted that Chinese politicians were wary of any problems related to ‘cultural’ issues, a position analysed by Zhang Li and Zhu Yanmei where they found that the politicians were not willing to compromise Chinese culture for the sake of political gain.⁵⁸ During this period, the status of Chinese scientists had not yet received sufficient attention from the politics, thus they mainly play the roles of consultants and promoters in this scientific negotiation, whereas the leading role was taken by the Chinese authorities. For instance, meteorologists such as Jiang Bingran and Zhu Kezhen played the role of consultants, constantly providing information about the observatory.⁵⁹ Since constructing a national meteorological network required the contribution of the state, these Chinese meteorologists were quite active in participating in political affairs. Nevertheless, their weakness was the lack of an official scientific institution, an institution that could speak on their behalf and attract sufficient attention from the government. The lack of official scientific institutions was also an obstacle when the Chinese scientific community intended to join the third Pan-Pacific Science Congress in Tokyo in 1926.⁶⁰ Although the Science Society of China and the Chinese Meteorological Society had been established at that time, their influence was still insufficient.

Moreover, although the Chinese Republican State continuously negotiated the takeover of the Qingdao Observatory with Japan in order to assert its sovereignty, this process, due to political instability, had proven problematic. From 1925 to 1928, Shandong Province was under the control of army commander Zhang Zongchang.⁶¹ It was a period defined by Chinese warlords splintering into different fractions and controlling regional authorities. Given that the warlords needed military and financial support to maintain their influence, most sought foreign aid and in exchange, these foreign entities enjoyed great

⁵⁷*Shenbao*, ‘Jiangsu Sheng Jiaoyuhui Fandui Riben Wenhua Qinlue [Education Association of Jiangsu Province opposes Japanese cultural invasion]’, 10 November 1926, pp. 10. See Also *Shenbao*, ‘Dongbei de Riben Wenhua Qinlue [Japan’s Cultural Invasion in Northeast China]’, 10 October 1931, pp. 7.

⁵⁸Zhang Li and Zhu Yanmei, ‘Technical Assistance versus Cultural Export: George Cressey and the U.S. Cultural Relations Program in Wartime China, 1942–1946’, *Centaurus*, 63.1 (2020), pp. 35.

⁵⁹Wang Xiuqin, ‘Zhongguo Jindai Qixiang Shiye Xianqu-Jiang Bingran’, pp. 44.

⁶⁰Ren Hongjun, ‘Fantapingyan Xueshu Huiyi de Huigu [Review on the Pan-Pacific Science Congress]’, *Kexue*, 12.4 (1927), pp. 455–64.

⁶¹Zhang Zongchang was a Fengxi [a faction named Feng] militarist army commander, who controlled Shandong from 1925 to 1928. In order to strengthen his military force, Zhang cooperated with Japan when he was in charge of Shandong. See Lü Junwei, ‘Lunminguo Chuqi de Shandong Junfa [Analysis on the Warlords of Shandong in the Early Period of the Republic of China]’, *Wenshizhe*, 5.1 (1997), pp. 15–31.

privileges within the warlords' sphere of influence.⁶² Therefore, as Zhang's power depended on Japan's support, he protected the Japanese interests in Shandong between 1925 and 1928, causing a partial standstill in the Qingdao Observatory negotiations. To some extent, Zhang's actions surrendered parts of China's sovereignty, such as the observatory and Shandong Province, to Japan. With attention focused on the central government and the individuals, the role of local authorities has often been overlooked. In contrast with the Qingdao Municipal Government, who provided positive influence for China's diplomacy, Zhang's case suggested that when militarist army commanders controlled local authorities, they may hold different attitudes towards the issue of sovereignty, and these local actions impeded the recovery of national sovereign rights.

The new regime and the scientific community

After the establishment of the National Government in 1928, China experienced a short period of stability, and the new regime emphasized regaining national sovereignty. More importantly, the demands of Chinese intellectuals for political participation entered a new stage. Under the appeal of Chinese scientists, the Academia Sinica was founded in 1928, as the supreme official scientific institution in China, which allowed the scientific community to receive more support to fulfil their aim to regain scientific sovereignty.⁶³ In addition, since some political infrastructure, especially the MFA, did not change significantly in terms of personnel, many of the same Chinese diplomats continued the negotiations for the observatory.⁶⁴ The Qingdao Observatory issue again became a point of contention in the first few years of the new regime.

Subsequently, in 1928, the MFA was entrusted by the Qingdao Municipal Government and Jiang Bingran to request control of the observatory from the Japanese envoy. In order to be more persuasive, a consultation paper was enclosed in which one Japanese employee of the observatory, Takeshi Irimada, affirmed that 'the Chinese staff was competent for the work in the observatory', nevertheless emphasizing Japanese interests in Qingdao as well.⁶⁵ In view of this, Japan still refrained from offering a definitive solution,

⁶²Arthur Waldron, *From War to Nationalism: China's Turning Point, 1924-1925* (Cambridge: Cambridge University Press, 1995), pp. 128, 176-77. See also Edward L. Dreyer, *China at War, 1901-1949* (London; New York: Longman, 1995), pp. 74-82. Edward Allen McCord, *The Power of the Gun: The Emergence of Modern Chinese Warlordism* (Berkeley: University of California Press, 1993), pp. 308-14.

⁶³Qiu Longhu, 'The Analysis of Social Factors and the Influence Mechanism in the Establishment of Scientific Research Institutions - A Case Study of Previous Academia Sinica', *Science and Technology Management Research*, 35.14 (2015), 89-93.

⁶⁴Wang, *China's Unequal Treaties*, pp. 35-53, 87-92. See also Stephen G. Craft, V. K. Wellington Koo and the Emergence of Modern China (Lexington: The University Press of Kentucky, 2015), pp. 85-93.

⁶⁵Letter from Qingdaoshi Zhengfu [Qingdao Municipal Government] to Waijiaobu [MFA] about taking over the Qingdao Observatory, 19 July 1929: Academia Historica, 020/010106/0002.

and the Japanese staff remained present in the observatory. As this paper mainly consulted Chinese archives, it seems that the Japanese position was mainly expressed by Japanese diplomats, but it could be inferred that Japanese diplomats must have kept in touch with Japanese personnel in Qingdao. According to the professional issues they raised above, they probably grasped the situation of Qingdao Observatory clearly. Consequently, caution is also needed in analysing the motivation of Takeshi Irimada on writing the consultation paper. Later, in September of 1929, the Qingdao Observatory also worked out a plan for exchanging meteorological information between the Qingdao Observatory and Japanese weather stations, thereby meeting the terms of the original agreement reached at the negotiation in 1922, thus the MFA of the National Government negotiated with the Japanese with the aim to fully recovering ownership.⁶⁶ However, the Japanese side thought that the plan still needed to be supplemented, whilst they insisted that the Japanese staff should be in the charge of geomagnetic observation of the observatory.⁶⁷ It is apparent that Japan's proposal was contrary to the complete recovery advocated by China, so the two sides did not reach a consensus. To explain the Japanese refusal to withdraw personnel from the Qingdao Observatory, this paper argues that it was representative of Japan's expansionist agenda in China. During the first half of the twentieth century, the Japanese authorities intended to expand Japan's territory in East Asia, especially into China, and their previous actions in Northeast China had demonstrated these ambitions.⁶⁸ Correspondingly, continued control over the observatory was Japan's attempt to consolidate its imperial presence in the scientific sphere. Such behaviour could also be witnessed in the 1920s when Japanese government intended to set up research institutes in Beijing and Shanghai in the name of promoting academic development and cultural communication, whilst restricted Chinese domestic institutions.⁶⁹

The Republican era was a period when China engaged in several sovereignty disputes and struggled for international recognition, and this paper argues that China's development had expanded the connotation of sovereignty they understood. With the first generation of Chinese scientists emerging and promoting scientific progress in China, it became clear that foreign scientific facilities and activities had hindered China's ability to develop its own science. Therefore, the Chinese scientists' confrontation with foreign powers in the 1920s made the meaning of scientific sovereignty very different from that of the past,

⁶⁶'Guanyu Chetui Qingdao Guanxiangtai Liutai Riyuanan', pp. 37–38.

⁶⁷'Guanyu Chetui Qingdao Guanxiangtai Liutai Riyuanan', pp. 38.

⁶⁸S. C. M. Paine, *The Wars for Asia, 1911-1949* (New York: Cambridge University Press, 2012), pp. 14–25. See also Barbara J. Brooks, *Japan's Imperial Diplomacy: Consuls, Treaty Ports, and War in China, 1895-1938* (Honolulu: University of Hawai'i Press, 2000), pp. 117–60. Hsu Shu-hsi, 'Japan and Manchuria', *Pacific Affairs*, 3.9 (1930), 854–64.

⁶⁹*Yishibao*, 'Riben Duihua Wenhua zhi Sheshi [Japanese Cultural Facilities in China]', 22 July 1924, pp. 3. See also *Yishibao*, 'Riben Jiangtianshe Zhongguo Wenhua Yanjiusuo [Japan Intends to Set up the Institute of Chinese Culture]', 9 December 1928, pp. 3.

meaning that the Qingdao Observatory case was gradually regarded as a sovereignty-related issue.⁷⁰ Besides controlling scientific facility, scientific investigations carried out by foreign scientists in the same period were also viewed differently. When Swedish scientist Sven Hedin prepared to conduct his fifth investigation in Northwest China in 1929, Chinese domestic academic circles strongly opposed it, taking a completely different attitude comparing to his previous investigation. They viewed this threatening the security of China's geographic information, and also, infringed upon China's sovereignty. Ultimately, Sven Hedin was only allowed to conduct his investigation under the agreement that all the historical relics collected during this trip would be brought back to Beijing by the accompanying Chinese scholars.⁷¹ As a direct result, scientific activities undertaken by foreigners were restricted in China from then on. The scientific method provided a novel solution to solving sovereignty issues for the Chinese authorities, especially those issues that were difficult to resolve through diplomacy.⁷² For instance, in the 1920s and 1930s, China was unable to take any substantial actions to consolidate its borders in the Southwestern region, leading to the Assam-Tibetan tribal territory being encroached upon by British India.⁷³ These circumstances were slightly improved when meteorological stations were built by the Chinese Central Meteorological Bureau in Tibet in the 1940s to consolidate the National Government's control of the territory.⁷⁴

According to Fu Banghong's research, in contrast to the Beiyang period, the Chinese scientific community seems to have been more actively involved in politics and became influential voices in debates about state planning, especially in regards to science, and the Qingdao Observatory case also illustrated that.⁷⁵ On 6 February 1931, the Academic Sinica, along with the Chinese Meteorological Society, asked the MFA to communicate with the Japanese government about withdrawing all Japanese staff from the Qingdao Observatory. They claimed that:

In recent years, Japanese employees have caused a lot of inconvenience in the operation of the observatory. It should be stressed that attention must be paid to the integrity of national sovereignty, and scientific research should be carried out in the spirit

⁷⁰Agreement between the Federation of Scientific Institutions of China and Dr. Sven Hedin for Organizing a Scientific Mission to North-Western China', *Zhongguo Tushuguan Xiehui Huibao*, 2.6 (1929), 7–10.

⁷¹*Dagongbao*, 'Siwen Heding Yuezhong Laiping [Sven Hedin Will Arrive at Beijing by the End of the Month]', 18 September 1929, pp. 4.

⁷²Shinkichi Etō, 'China's International Relations 1911–1931', in *The Cambridge History of China: Republican China 1912–1949, Part 2, Vol. 13*, ed. by John K. Fairbank and Albert Feuerwerker (Cambridge: Cambridge University Press, 1983), pp. 74–115.

⁷³Hsiao-Ting Lin, 'Boundary, Sovereignty, and Imagination: Reconsidering the Frontier Disputes between British India and Republican China, 1914–47', *The Journal of Imperial and Commonwealth History*, 32.3 (2004), 25–47.

⁷⁴Mark E. Frank, 'Frontier Atmosphere: Observation and Regret at Chinese Weather Stations in Tibet, 1939–1949', *The British Journal for the History of Science* (2021), 1–18.

⁷⁵Fu Banghong, *Minguo Shiqi de Kexue Jihua yu Jihua Kexue-Yi ZhongyangYanjiuyuan Weizhongxin de Kaocha (1927-1949)* [Scientific Planning and Planning Science in the Period of the Republic of China – An Investigation Centred on the Academia Sinica (1927-1949)] (Beijing: Zhongguo Kexue Jishu Chubanshe, 2015), pp. 112–56.

of independence. Therefore, Japan's behaviour to occupy the observatory wantonly in the name of academic research could be viewed as invading through imperialism.⁷⁶

Moreover, civil scientific organizations, such as the Science Society of China, also advocated in 1931 that 'although science has no national boundaries, all countries regarded the independence of science as the goal of enhancing their international status. Therefore, the Chinese authorities need to resolve the matter immediately'.⁷⁷

The understanding of the motivations behind Japan's action was further developed in 1931, a stance which was explained in a letter from Cai Yuanpei, the director of the Academia Sinica, to the MFA. He stated that:

It cost a huge amount of money for Japan to carry out meteorological observation in Qingdao, and they even built another observation site beside the Qingdao Observatory. Economically, this was clearly unwise. But the reason why Japan still did this was because they knew that cultural invasion could have a deeper impact than economic aggression.⁷⁸

Although the Qingdao Observatory was merely a weather station, the appeal for its recovery by the Chinese people, combined with the Japanese encroachment, clearly indicate that this issue was indeed a matter of national sovereignty and could not be ignored by the Republican State.

The prevalence of nationalism was actually a demand of the Chinese people to improve both their individual and national status. Affected by nationalism, the Chinese scientific community also tried to realize national salvation through the promotion of a more scientific approach.⁷⁹ Therefore, by frequently mentioning the issue of the Qingdao Observatory in journals and speeches, they hoped to arouse the public's interest in this matter; they knew that mass nationalism could urge the government to take it more seriously. The influence of nationalism had been witnessed by the Chinese politicians during the May Fourth Movement, who realized that the degree to which the will of the people could be satisfied would affect the regime's stability.⁸⁰ Consequently, regaining sovereignty was not merely the government's aim, but it also guaranteed the support of the masses, which constituted a significant power in Republican China.

However, when the Chinese decided to initiate a new round of negotiations on the Qingdao Observatory in 1931, the Japanese invasion of Manchuria suspended it indefinitely. Although the Qingdao Observatory had not been fully

⁷⁶Guanyu Chetui Qingdao Guanxiangtai Liutai Riyuanan', pp. 35.

⁷⁷Zhongguo Kexueshe wei Qingdao Guanxiangtai Riyuan Xuananshi Jinggao Zhengfu Dangju Ji Guonei Gexueshu Tuanti [The Science Society of China Informs the Government and Domestic Academic Organizations of the Case about the Japanese Members of the Qingdao Observatory]', *Shenyou*, 6 (10 February 1931), 1.

⁷⁸Guanyu Chetui Qingdao Guanxiangtai Liutai Riyuanan', pp. 36–37.

⁷⁹Wang, 'Saving China through Science', pp. 300–13.

⁸⁰Benjamin I. Schwartz, 'Themes in Intellectual History: May Fourth and After', in *The Cambridge History of China, Vol. 12, Republican China 1912-1949, Part 1*, ed. by Denis Twitchett and John King Fairbank (Cambridge: Cambridge University Press, 1986), pp. 409–30.

recovered by the Chinese at this time, almost ten years of efforts had led to it being mainly controlled by China, serving the development of Chinese meteorology. In 1932–1933, the Second International Polar Year, a global research programme on the polar regions that focused on collaborative and international cooperation, was held; the Asian-Pacific countries also played an important role in the meteorological observations of this study due to its terrain in the Eurasian Continent. As only a few meteorological stations in China could meet the contemporary international standards, the Qingdao Observatory offered high-quality data, contributing to the promotion of Chinese meteorology internationally.⁸¹ To some degree, this explains why the Japanese did not hand this observatory over to the Chinese, given its influence on international scientific community.

The control of science could be regarded as a kind of soft power mechanism that facilitates the assertion of a very strong claim; a strategy that Republican China not only relied on in the Qingdao Observatory case but also continued to operate in the following decades. In 1932, when France threatened China's sovereignty over the Paracel Islands in the South China Sea, the National Government planned to build a meteorological station there to illustrate their control over this area.⁸² Although such a plan was not fully realized until 1947, it still indicated that the Republican State valued employing scientific methods to claim sovereignty.⁸³ In light of the ineffectiveness and weakness of China's central regime, the National Government was far from capable of exerting authority over remote districts of China. Nevertheless, instead of sending troops, the Chinese authorities chose to send scientific personnel. The Chinese politicians would claim, nominally, that the meteorological station served the international community, but what was really important was which state was in control.

Japanese staff continued working at the Qingdao Observatory until August 1937. With Japan's imminent attack on Qingdao during the Second Sino-Japanese War, all Japanese nationals were evacuated.⁸⁴ In December 1937, as the Japanese army threatened to enter Qingdao during the Second Sino-Japanese War, the Chinese Military Commission advised President Chiang Kai-Shek to take measures to delay the Japanese offensive and reduce Chinese losses.⁸⁵

⁸¹Zhu Kezhen, 'Zhongguo Qixiang Xuehui Dibajie Nianhui Jilue [Report on the Eighth Annual Meeting of Chinese Meteorological Society]', *Qixiang Zazhi*, 9.4 (1933), 133–35.

⁸²Guofang Weiyuanhui Dililushiqi Ci Huiyi Jilu [Minutes of the 67th Meeting of the National Defence Commission], 1 September 1933: Archives of Institute of Modern History, Academia Sinica, 20/049904/0002.

⁸³*Hong Kong Sunday Herald*, 'China and Paracels', 26 January 1947, pp. 1. See also *South China Morning Post*, 'Maumee Arrived', 4 January 1947, pp. 2.

⁸⁴*Shenbao*, 'Qingdao Riqiao Jijiang Quanche [All the Japanese Nationals in Qingdao Will be Evacuated]', 20 August 1937, pp. 5; *Shenbao*, 'Qingdao Riqiao Junjian Jijiang Quanche [Japanese Warships Evacuate All Nationals in Qingdao]', 2 September 1937, pp. 1.

⁸⁵Letter from Guomin Zhengfu Junshi Weiyuanhui [Military Committee of the National Government] to Chiang Kai-Shek advising the detonation of the Qingdao Observatory, 23 December 1937: Academia Historica, 002/090105/00001/008. One of the measures adopted by the National Government to prevent Japanese attacks was to detonate important facilities, such as the destruction of the Qiantang River Bridge, blocking the

Consequently, the bombing of the Qingdao Observatory to keep it out of enemy hands was recommended. In addition to being a fully equipped scientific centre, rich meteorological files were also kept in the Qingdao Observatory, which, if captured, would cause a serious blow to China's meteorological safety. Moreover, the meteorological information would help facilitate Japanese military action in the region. It seems that the importance of the Qingdao Observatory in science and sovereignty has been fully recognized at this time. In January of the following year, while the Japanese army occupied Qingdao, Japanese North China Area Army reported that the observatory was partly damaged during the attack and needed to be repaired.⁸⁶ To some extent, it is suggesting that the ruin plan was probably adopted by the Chinese side. The observatory came fully under Japanese control.⁸⁷ China did not regain control of the observatory until the end of the Second World War. In August of 1945, the Qingdao Observatory was recovered by the Chinese government, and Wang Wenhua was assigned as its director.⁸⁸ However, the relationship between Japan and the Qingdao Observatory was not immediately terminated. Three Japanese staff were retained to support the work of the observatory in the post-war years, which is similar to other cases where Japanese remained to serve in China in industrial and engineering projects.⁸⁹ When the sovereignty issue was solved, scientific cooperation was supported by the National Government.

Conclusion

Focusing on the case of the Qingdao Observatory, this paper investigates the role of a scientific facility of an Asian country in the context of scientific sovereignty during the first half of the twentieth century. First, through the Qingdao Observatory case, the tension between legal claims versus power on the ground could be seen as well as scientific impartiality versus standards recognized by international community. In other words, this paper sheds some light on ideas being pitted against the raw power of holding territory and forcing scientific standards onto others. Not only is the observatory a contested space in which 'doing' science is a key part of staking sovereignty, but also the location was paramount for both the science and the politics of doing that science.

march of the Japanese army. See Mao Yisheng, *Qiantangjian Zaoqiao Huiyi* [Memories of Qiantang River Bridge Construction] (Beijing: Literature and History Press, 1982), pp. 25–26.

⁸⁶Telegram from Chiefs of Staff of Japanese North China Area Army, to Undersecretary on Administration of the Qingdao Meteorological Observatory, 10 February 1938: Japan Center for Asian Historical Records, C04120236100.

⁸⁷*Shenbao*, 'Qingdao Lunxianhou Zhuanguang [The Situation after the Fall of Qingdao]', 9 December 1938, pp. 7.

⁸⁸Qingdaoshi Qixiangju, ed., 'Qingdao Jindai Qixiang Gaishu', pp. 138.

⁸⁹The Qingdao Observatory to the Qingdaoshi Riwei Jizhong Guanliju [Qingdao Municipal Administration of Japanese], 7 February 1946: Qingdao Municipal Archives, B0035/001/00095/0057. Regarding the Japanese who served in China in the post-war years, see Koji Hirata, 'From the Ashes of Empire: The Reconstruction of Manchukuo's Enterprises and the Making of China's Northeastern Industrial Base, 1948-1952', in *Overcoming Empire: Repatriation, Redress and Rebuilding in Post-Imperial East Asia*, ed. by Barak Kushner and Sherzod Muminov (London; New York: Bloomsbury Academic, 2019), pp. 147–62.

In terms of Sino-Japanese relations, this paper explains that negotiation between the two countries was not confined to territory or other such privileges, but also over control of scientific facilities. Besides this, the participation of sovereignty assertion involved a variety of different actors, rather than merely diplomats. The Qingdao Observatory case suggested that the local government and scientific community were the main promoters and contributors of the negotiations. Their continuous communication motivated the MFA to claim sovereignty over the observatory. Nevertheless, attention should also be paid to the local warlords, who had their own interests, which also affected the process of claiming sovereignty.

The opinions from various groups in both sides also shed some light on the boundary of sovereignty. Apparently, the meaning of sovereignty is not static, but has new connotations with the development of the country and the change of interests. This was not just happened in Republican China in early twentieth century, but still exists at present and reminds us to pay attention to it. Although the Qingdao Observatory was not effectively taken over by the Chinese, it is their early attempt to recognize scientific sovereignty that was key to this incident, and provides a prime example of international scientific diplomacy of the early twentieth century.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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