Constructing a Red Meteorological Network: The Production and Utilization of Meteorological Knowledge in Yan'an During WWII

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Introduction

On December 21, 1950, the Xinhua news agency of the Communist Party of China (CPC),[1] published an editorial titled "The Situation of U.S. Imperialists Plundering China's Meteorological Data." The opening sentence stated, *"During the War of Resistance Against Japan, U.S. imperialists established the Fourteenth Air Force and simultaneously set up meteorological stations in China. This marked the beginning of U.S. imperialist aggression against China's meteorology."*[2] This statement, issued after the "Iron Curtain" of the Cold War had descended and Chinese troops were actively engaged against U.S. forces on the Korean Peninsula, reflects the prevailing narrative of intense Sino-American confrontation that defined the early Cold War era. However, a closer examination of the history of meteorology under the CPC reveals a far more nuanced and complex trajectory than the simplified antagonistic framing presented in the editorial.

In fact, in 1944, a U.S. military observation group known as the "Dixie Mission" was stationed in Yan'an. While this mission carried out its activities amidst complex political objectives, the CPC permitted U.S. military forces to establish meteorological stations in Yan'an. These stations transmitted weather data from northern China to the meteorological center in Chongqing, contributing to anti-Japanese military operations. Notably, the CPC's military forces received meteorological training from U.S. personnel during this collaboration,

[1] Another commonly used term for the party in English-language literature is the **Chinese Communist Party (CCP)**. However, this paper adopts the party's official name, the **Communist Party of China (CPC)**, to align with the terminology used in its official documents and historical narratives.

[2] Xinhua News Agency, "The U.S. Empire's Seizure of Our Meteorological Data (美帝攫夺我国气象资料情形)". *Science Bulletin* (科学通报), no. 2 (1951): 157.

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providing the foundation for the development of the CPC's earliest meteorological stations. [3] This cooperation highlights the dynamics of the relationship between the CPC and the United States on the eve of the Cold War, despite their ideological differences. It also uncovers an important yet often overlooked episode and a significant early foundation in the history of meteorology during the People's Republic of China era.

This paper focuses on the construction of what U.S. meteorologists referred to as the "Red Network" and examines the processes of knowledge transfer and application of U.S. military meteorological expertise within Yan'an. It argues that the interactions between the Communist Party of China and the United States in the 1940s present a narrative distinct from the later Cold War confrontations dominated by ideological divisions. Focusing on meteorological science as a case study, it illustrates how these exchanges, though driven by specific military and diplomatic imperatives, broaden our understanding of the transnational circulation of knowledge and its localization within specific contexts.

In Chinese scholarship, the interactions between the CPC and American delegations are often regarded as a significant diplomatic achievement, drawing considerable attention from scholars in mainland China.[4] In the English-language literature, Carolle J. Carter's *Mission to Yenan: American Liaison with the Chinese Communists 1944–1947* stands as a seminal work on this historical period[5]. Additionally, firsthand accounts by members of the Dixie Mission, such as former mission leader David D. Barret, and his successor Wilbur J. Peterkin, and diplomatic attaché John P. Davies offer valuable memoirs. However, these works predominantly focus on the political and military interactions among the three key players—the CPC, the Nationalist government, and the U.S. government—highlighting episodes of both cooperation and conflict. While meteorological collaboration is occasionally mentioned, it often becomes overshadowed by the grand narratives centered on prominent figures and high-level diplomacy.

This paper adopts a meteorological perspective, illustrating how a series of diplomatic activities facilitated the application of American meteorological knowledge in territories under CPC's control. Indeed, without diplomatic consensus, establishing meteorological stations in Communist-held areas would likely have been unfeasible.[6] By focusing on this case, the study contributes to the burgeoning field of science diplomacy history.[7] Although it aligns with some classical frameworks in this field, the specificity of the Communist-controlled areas challenges

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[3] John F. Fuller, *Thor's Legions: Weather Support to the U. S. Air Force and Army, 1937-1987* (American Meteorological Society, 1990), 118.

[4] Jun Niu, From Yan' an to the World: The Origins of the CPC' s Foreign Relations（从延安走向世界：中国共产党对外关系的起源）(Beijing: CPC Party History Press, 2008).

[5] Carolle J. Carter, *Mission to Yenan: American Liaison with the Chinese Communists 1944-1947*, Illustrated edition (Lexington, KY: University Press of Kentucky, 1997).

[6] Although traditional diplomatic cases define diplomacy as activities between sovereign states, during the Second World War, China was in a situation where two different regimes coexisted. Considering that the People's Republic of China eventually replaced the Republic of China, this paper will regard the activities of CPC in Yan'an as a form of diplomatic activity.

[7] In 2010, the Royal Society of the United Kingdom and the American Association for the Advancement of Science (AAAS) jointly published "New Frontiers in Science Diplomacy," which is considered a milestone event in the study of science diplomacy. In this report, the concept's scope was formally defined through descriptions of three relationships between diplomacy and science: (1). Science in diplomacy emphasizes enhancing the effectiveness of diplomatic activities through specialized scientific knowledge. (2). Science for diplomacy highlights the use of scientific cooperation in international relations to improve or strengthen relations between countries. (3). Diplomacy for science refers to using diplomatic means to promote scientific cooperation between nations. For more details, please refer to: The Royal Society and American Association for the Advancement of Science, *New Frontiers in Science Diplomacy: Navigating the Changing Balance of Power* (London: The Royal Society, 2010).

the enduring positivist imagination of science as inherently objective, neutral, and benevolent.[8] As this study will show, the diverse interests of the various actors involved gave rise to a data network shaped by unequal power dynamics.

Moreover, existing research on the history of meteorology in the Republic of China (ROC) has yielded a substantial body of work in both Chinese and English. These studies often focus on the meteorological institutions within the Nationalist government's administrative framework and their collaboration with the U.S. government. For instance, Fangyu Liu has highlighted the critical applications of meteorology during World War II, emphasizing the value of meteorological intelligence networks in the Sino-Japanese War and the history of the Sino-American Special Technical Cooperation Office.[9] Similarly, Xiao Liu has explored how the Nationalist weather network served as a tool for constructing national sovereignty.[10]

However, little attention has been paid in the English-language literature to the unique role of the meteorological intelligence network in Yan'an. Existing narratives often emphasize the contributions of highly educated meteorologists and engineers, who constructed meteorological systems that served the Nationalist government. In contrast, the CPC-controlled areas operated under much harsher conditions, with limited equipment and personnel who lacked formal training. This paper argues that the details of meteorological cooperation between U.S. forces and CPC soldiers reveal that the generation, dissemination, and application of meteorological knowledge were not solely the domain of elite, formally trained scientists or engineers. The Yan'an case offers insights into the localization of meteorological knowledge through grassroots practices. Furthermore, the long-term impact of this collaboration can be traced to the meteorological system of the People's Republic of China, as many meteorologists trained during this period became core technical bureaucrats in the country's future meteorological infrastructure.

With the recent publication of Chinese archives in the past few years, this paper has access to a wealth of primary sources. [11] Additionally, I will utilize memoirs and reminiscences published by Chinese individuals, [12] as well as members of the "Dixie Mission" such as David

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[8] Matthew Adamson and Roberto Lalli, "Global Perspectives on Science Diplomacy: Exploring the Diplomacy-Knowledge Nexus in Contemporary Histories of Science", *Centaurus* 63, no. 1 (2021): 1–16. And, J Lif Lund Jacobsen and Doubravka Olšáková, "Diplomats in Science Diplomacy: Promoting Scientific and Technological Collaboration in International Relations", *Berichte Zur Wissenschaftsgeschichte* 43, no. 4 (2020): 465–72.

[9] See: Fangyu Liu. *Weather and Warfare: Chinese Meteorology during the Second Sino-Japanese War* (风云起：抗战时期中国的气象事业) (Taipei: Republic of China History and Culture Society Limited, 2022). And Fangyu Liu, "Wartime Sino-US military-technical co-operation: The case of the Min-Zhe-Wan meteorological network (战时中美军事技术合作：以闽浙皖气象网设置为例)," *Archives Biannual* (档案半年刊) 20, no. 1 (1 June 2021): 38-51. And Fangyu Liu, "The Establishment and Effectiveness of the China-U.S. Special Technical Co-operation in China's Meteorological Intelligence Network (1942-1947) (中美特种技术合作所在华气象情报网的建置与成效)," *Institute of Modern History* (近代史研究所集刊), no. 114 (1 December 2021): 83-129.

[10] Xiao Liu, "Meteorology and Politics in Republican China, 1912-1949" (Phd Dissertation, The University of Bristol, 2021).

[11] China Central Archives, *Compilation of U.S. Army Observer Group files in the Central Archives* (中央档案馆藏美军观察组档案汇编), (Shanghai: Shanghai Far East Publishing House, 2018).

[12] Heng Wu ed., *Historical Materials on the Development of Science and Technology in the Liberated Areas during the War of Resistance Against Japanese Aggression: 4th Series* (抗日战争时期解放区科学技术发展史资料: 第 4 辑) (Beijing: China Academic Press, 1985). And Meteorology in the Yan'an Era Compilation Committee, *Meteorology in the Yan'an Era*(延安时代的气象事业) (Beijing: Meteorological Publishing House, 1995).

D. Barret, [13] his successor Wilbur J. Peterkin, [14] and diplomatic attaché John P. Davies, [15] who facilitated this process. These accounts will be cross-verified with official publications such as Air Force chronicles from both sides, forming the basis of reference for this paper.[16]

Considering the points outlined above, this paper will be structured into three specific parts. The first part will focus on the process of the United States' decision to send a delegation to Yan'an, the capital of the Communist-led Red regime, amid various political considerations. This part will delve into the establishment of meteorological observations and the formation of a meteorological data network. The second part will highlight the demands of the Communist Party of China and the process of training Communist cadres by the United States, aiming to demonstrate the integration of meteorological knowledge with local experiences. The third part will discuss the intensified contradictions between the two regimes following Japan's surrender, examining the contemporary significance and subsequent impacts of meteorological cooperation in the context of the flow of meteorological knowledge.

Entering Yan'an: A Missing Piece of the Pacific Theater Meteorological Data Network

Before the outbreak of World War II, a group of meteorologists serving the Nationalist Government had already proposed the establishment of a nationwide network of meteorological stations for weather observation. For instance, meteorologist Zhu Kezhen (竺可桢) spearheaded efforts in 1928 by drafting the "National Plan for Establishing Meteorological Observatories" (《全国设立气象测候所计划书》), which outlined a vision for a meteorological observation network. Over the following decade, Zhu played a pivotal role in realizing this vision, leading the Meteorological Institute of the Academia Sinica in its implementation.[17]

With the outbreak of the Second Sino-Japanese War, the Nationalist Government increasingly emphasized the military applications of meteorological observation. In 1941, it established the Central Meteorological Bureau. However, the organizational structure of China's meteorological institutions at the time was fragmented. Key entities, such as the Aeronautical Committee and the Central Meteorological Bureau, operated independently of each other, each establishing their own observation networks without centralized coordination. [18] Furthermore, the Meteorological Institute of the Academia Sinica faced significant resource constraints, including a shortage of trained personnel, fully equipped base stations, and adequate instruments for meteorological observation.

Before the Nationalist Government entered into an alliance with the United States, official statistics indicated that the Aeronautical Committee operated approximately 30 meteorological stations, while the Central Meteorological Bureau had established 46

[13] David D. Barrett, *Dixie Mission: The United States Army Observer Group in Yenan, 1944*, First Edition (Berkeley: Center for Chinese Studies, University of California, 1970).

[14] Col W. J. Peterkin and Wilbur J. Peterkin, *Inside China 1943-1945: An Eyewitness Account of America's Mission to Yenan* (Lexington, KY: Dixie Mission Books, 1992).

[15] John Paton Davies Jr, *Dragon by the Tail: American, British, Japanese, and Russian Encounters with China and One Another* (New York: W. W. Norton & Company, 1972).

[16] Liu, *Weather and Warfar*.

[17] Wen Kegang, ed., *History of Chinese Meteorology* (中国气象史) (Beijing: Meteorological Press, 2004): 330–341.

[18] Liu, "The Establishment and Effectiveness of the China-U.S. Special Technical Co-operation in China's Meteorological Intelligence Network (1942-1947)", 83-129.

observation posts. However, the slow transmission of meteorological data via wired telegraph systems severely limited its usefulness for military operations.[19]

In December 1941, following the attack on Pearl Harbor, the United States declared war on Japan, opening the Pacific theater of World War II. Weather information became critical for military operations against Japan, as adverse weather could result in substantial combat losses and affect the success of missions. At that time, the US military had only two radio stations in the Far East—one in Darwin, Australia, and the other in Batavia (modern-day Jakarta), Indonesia—providing limited meteorological data. [20] To support its operations in the Pacific, the US military urgently needed to establish communication stations across China to gather intelligence, particularly meteorological data, for its campaigns against Japan.

In April 1942, Lieutenant Colonel Milton E. Miles of the U.S. Navy visited Chongqing, seeking to collaborate with the Nationalist Government of China to establish an intelligence network that included meteorological intelligence. In April 1943, the two countries signed the "Sino-American Special Technical Cooperation Agreement" in Washington, formalizing plans to establish the "Sino-American Technical Cooperation Office" (SACO). Meteorology was designated as one of the core technical domains, tasked with collecting meteorological intelligence, facilitating the exchange of weather data, conducting meteorological research, and training personnel in this field.

Following the establishment of this Sino-American cooperation, Miles reached an agreement with Dai Li (戴笠), the head of the Nationalist Government's intelligence agency, granting SACO responsibility for overseeing the collection of meteorological intelligence within China.[21] Between 1943 and 1944, SACO set up 33 meteorological stations across the country. These included 10 tier-one stations, 6 tier-two stations, and 17 tier-three stations, with a notable concentration in the southeastern coastal regions and a smaller number in the northwest. By the end of World War II, the network had expanded to 37 meteorological stations, though their distribution remained heavily concentrated in southern China. [22]

By 1944, as the war against Japan intensified, the U.S. military gained significant momentum in the Pacific Theater, prompting Japan to withdraw forces to consolidate its occupation of Manchuria and northern China. During this period, the U.S. initiated airstrikes using B-29 bombers against Japanese-occupied territories and even the its mainland. In collaboration with the Nationalist government, some of the bomber bases were established in Chengdu and Kunming, located in southwestern China.

At the same time, the CPC controlled portions of northern China, with Yan'an in Shaanxi Province serving as its central hub. These territories, referred to by the CPC as the "Anti-Japanese Base Areas" (抗日根据地), encompassed regions such as Shaanxi-Gansu-Ningxia (陕甘宁) and Shanxi-Chahar-Hebei (晋察冀). The flight paths of U.S. bombers frequently traversed these CPC-controlled areas. However, the CPC lacked the equipment and capacity to establish meteorological stations in these regions, resulting in limited access for the U.S. military to weather intelligence crucial for its operations.[23]

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[19] ibid., 91-92.

[20] Fangyu Liu, *Weather and Warfare*, 199-200.

[21] Fangyu Liu, "The Establishment and Effectiveness of the China-U.S. Special Technical Co-operation in China's Meteorological Intelligence Network (1942-1947)," 91-95.

[22] ibid., 103.

[23] Meteorology in the Yan'an Era Compilation Committee, *Meteorology in the Yan'an Era*, 21-22.

Moreover, during the early stages of the war, the Nationalist government sought meteorological broadcasts from the Soviet Union's Siberian region via diplomatic channels to extrapolate weather conditions for northwestern China. However, beginning in September 1941, the Soviet Union, citing the classification of meteorological data as military intelligence, declined to continue sharing such information. This development coincided with the Soviet Union's engagement in combat against Germany on the European front, leading to the withdrawal of Soviet military assistance to China.[24]

However, it is essential to recognize that although meteorological intelligence was critical to U.S. military operations, the U.S. decision to send an observation group to Yan'an had far broader objectives. As early as 1942, following the U.S. declaration of war on Japan, Zhou Enlai (周恩来), one of the CPC's key leaders, met with John Paton Davies, a civilian official at the U.S. Embassy in China. Zhou proposed that the U.S. dispatch a military officer team to establish intelligence stations in Shanxi and Shaanxi provinces. Later, Zhou made a similar suggestion to John S. Service, another official from the U.S. embassy, seeking American support.[25]

Following these discussions, in January 1944, John Paton Davies drafted a detailed memorandum emphasizing the severe deficiency in U.S. intelligence stemming from the lack of direct contact with Communist-controlled areas in northern China. He argued that establishing an observation group in Yan'an would address this isolation.[26] The memorandum was ultimately presented to President Franklin D. Roosevelt, who raised the matter with Nationalist leader Chiang Kai-shek on three separate occasions over the following months. Despite initial resistance, Chiang relented in June 1944, following Roosevelt's decision to send Vice President Henry Wallace on a diplomatic visit to China. [27]

On the day the Dixie Mission set out for Yan'an, Joseph Dickey, the head of military intelligence for the China-Burma-India theater, handed a memorandum to the mission leader, Colonel David D. Barrett. This memorandum outlined tasks far beyond meteorological intelligence, emphasizing the collection of information on the Communist Party. Key objectives included assessing the composition, deployment, and operations of Communist forces, compiling a comprehensive list of Communist officials, and evaluating the CPC's potential contributions to the war effort. These instructions resembled a broad operational guideline rather than a specific military directive.[28]

From the CPC's perspective, the arrival of the U.S. mission was of significant diplomatic importance. After receiving a telegram from the U.S. military, Mao Zedong, the CPC's top leader, welcomed the mission in a telegram dated 28 June. [29] Subsequently, on 18 August, the CPC Central Committee issued a directive in which Mao underscored the strategic importance of this interaction, stating: *"We should not regard their visit and observation as*

[24] Liu, *Weather and Warfare*: 104-105.

[25] Davies Jr, *Dragon by the Tail*, 316-321.

[26] Carter, *Mission to Yenan*, 16-18.

[27] ibid., 19-24.

[28] Barrett, *Dixie Mission*, 26-27.

[29] "Mao Zedong's Telegram to Lin Boqu and Dong Biwu on Requesting Them to Welcome U.S. Military Personnel in Yan'an (毛泽东关于请代欢迎美军事人员来延给林伯渠董必武的电报)" *Compilation of U.S. Army Observer Group files in the Central Archives*, 27-39.

ordinary actions but rather as the beginning of our diplomatic work in the international united front." [30]

Among the members of the U.S. observation group, several technical military officers were directly involved in meteorological work. At the time, meteorological support operations were overseen by the U.S. Tenth Meteorological Squadron, which was led by the renowned Colonel Richard Ellsworth. The squadron was responsible for coordinating meteorological services across the China-Burma-India theater. Under Ellsworth's leadership, Army Air Corps Major Charles R. Dole was chosen to join the "Dixie Mission," where he was tasked with managing meteorological affairs in Yan'an.[31] According to Dole's recollections, upon the U.S. observation group's arrival in Yan'an, they were warmly welcomed by figures such as Mao Zedong and Lin Biao (林彪), creating an extremely cordial social atmosphere, which Dole believed to be highly conducive to their mission. [32]

In September 1944, the U.S. observation group established a meteorological station at the foot of Fenghuang Mountain in Yan'an. Staffed by six to seven personnel, the station conducted daily ground-level weather observations. [33] By November, they had set up a radio-based wind-sounding station, also known as an upper-air station, within the Yan'an meteorological station. In April 1945, lightning detection capabilities were added to the station's operations. The station served dual purposes: providing meteorological support for aircraft flying in and out of Yan'an and transmitting weather intelligence from Yan'an and its surrounding areas to the command center in Chongqing. [34]

However, a single meteorological station in Yan'an proved insufficient to meet the U.S. military's demand for comprehensive weather data. The Americans expressed interest in establishing additional stations in areas surrounding other CPC-controlled territories. Recognizing the urgency of acquiring meteorological data, the U.S. proposed airdropping equipment to various observation points. However, General Ye Jianying (叶剑英) rejected this proposal, remarking, *"These meteorological observers [young communist soldiers]were all cattle herders when they were children, and have no parachuting skills. They can only travel to the sites on foot."* [35]

After negotiations with Wang Zheng (王诤), the CPC official in charge of intelligence and communications, an agreement was reached: the U.S. would train CPC soldiers in meteorological observation and telegraphy, enabling them to operate over 20 meteorological stations in Communist-controlled regions. These stations would transmit meteorological data to CPC communication hubs, which would then relay the information to the U.S. for operational use.

Simultaneously, Ye Jianying issued directives to CPC military units emphasizing the importance of intelligence collection, stating, *"Our existing intelligence supply to the Americans is insufficient… It is imperative that you appoint individuals to focus on collecting*

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[30] "Directive of the CPC Central Committee on Diplomatic Work（中共中央关于外交工作的指示）," ibid., 219-223.

[31] "Personnel List from David D. Barrett to Commander-in-Chief Zhu De (包瑞德给朱德总司令的人员名单)," China Central Archives, Archive No. J006-008-0058-00010.

[32] Fuller, *Thor's Legions*, 119.

[33] Meteorology in the Yan'an Era Compilation Committee, *Meteorology in the Yan'an Era*, 22.

[34] Air Force Command, *History of Meteorology in the Air Force of the People's Liberation Army* (中国人民解放军空军气象史) (Beijing: Blue Sky Press, 1999), 4-5.

[35] Meteorology in the Yan'an Era Compilation Committee, *Meteorology in the Yan'an Era*, 30.

and analyzing intelligence." In a detailed telegram, Ye referred the U.S demand, outlined specific requirements for meteorological reporting:

> Key points for meteorological reports: A. Station code. B. Report date. C. Time of observation. D. Observed weather conditions at the time (e.g., fog, drizzle, light rain, heavy rain, storm, light snow, heavy snow, clear skies [cloud cover under 30%], overcast [cloud cover over 30%]). E. Cloud cover percentage. F. Cloud types. G. Cloud altitude above ground (in meters). H. Cloud movement direction. I. Visibility (in kilometers). J. Wind direction and strength (calm, light breeze, moderate, strong). K. Atmospheric pressure (from barometer readings). L. Temperature. Meteorological reports should be based on observations taken at 7:00 a.m. and 5:00 p.m. daily, with two reports submitted each day.[36]

Due to the lack of modern transportation equipment, meteorological instruments for proposed observation sites around Yan'an were transported either personally by foot or with the assistance of local livestock.[37] For example, by 1945, three graduates of the first training session—Ge Shimin (葛士民), Wang Zhenhai (王振海), and Hu Youxun (胡友训)—had successfully established simple observation sites at the Xie County Red Coast Observation Station, the Hebei-Shandong-Henan Observation Station, and the Taihang Military Region Observation Station, respectively.

Hu Youxun was assigned to Shandong, where two Chinese military personnel involved in intelligence transmission had already begun self-teaching basic observation techniques using meteorological books. They had also enlisted the help of two 16- or 17-year-old students from a local anti-Japanese school to assist in meteorological observations. Upon his arrival, Hu brought a set of lightweight meteorological instruments and initiated more systematic and detailed observation efforts. Ge Shimin and Wang Zhenhai undertook similar tasks in their respective stations. Both Hu and Wang conducted observations twice daily, compiling weather conditions into reports that were sent to Ge Shimin at Red Coast. Ge then forwarded the consolidated reports to Yan'an headquarters and the U.S. meteorological team.[38]

A significant consequence of the U.S. military's efforts was the integration of CPC-controlled regions into a broader meteorological network supporting operations against Japan, effectively bridging the previously isolated meteorological data exchanges between the Nationalist and Communist regimes. Importantly, this network facilitated bidirectional data flow. Represented by Major Charles R. Dole, U.S. meteorological officers stationed in Yan'an insisted that weather intelligence also be transmitted to Yan'an. Simultaneously, meteorological reports from Yan'an were dispatched twice daily to Chongqing. [39]

With support from CPC officials, this emerging "Red Meteorological Network" expanded into Japanese-occupied areas, establishing additional meteorological stations. John F. Fuller vividly described this expansion in his writings, noting that in Japanese-occupied zones, the interruption of meteorological reports often indicated that guerrillas had ousted the occupiers. Typically, transmissions resumed after several days, signaling the reestablishment of control by CPC forces. [40]

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[36] "Outline of Intelligence for the Military Region, Jin-Sui Sub-Bureau, Taiyue, Huazhong, and Various Divisions, September 1944" (叶剑英发军区、晋绥分局、太岳、华中及各师情报纲要). China Central Archives(中央档案馆), Archive No. J005-008-0035-00004.

[37] Meteorology in the Yan'an Era Compilation Committee, *Meteorology in the Yan'an Era*, 30-32.

[38] ibid., 32-35.

[39] ibid., 40-42.

[40] Fuller, *Thor's Legions*, 181.

Furthermore, concerning the effectiveness of the meteorological network construction, the development of communication networks is also crucial. During the Communist-controlled area, both meteorology and radio communication were under the unified management of a military officer, Wang Zheng. Indeed, under Wang's efforts, the Communist regime had already established its own telegraph network. However, the lack of communication infrastructure had already caused the system to operate at overload. Nevertheless, the Communist Party still hoped that meteorological reports should be transmitted through their radio network. After negotiations, the U.S. military agreed to provide the necessary radio communication equipment. Meanwhile, meteorological information in the Communist base areas would be collected by the department under Wang Zheng's command and then handed over to the U.S. military for integration into its larger-scale meteorological network.

The entry of the Dixie mission enabled the United States to form a complete network of meteorological intelligence for the Pacific theater, providing strong military support for operations against Japan. Additionally, it was the American construction of the meteorological network that broke the isolation between the two regimes in the ideological domain, facilitating the flow of meteorological data and the application of weather analysis. Therefore, this phase of cooperation provided important support for Allied actions in the Far East theater of World War II. As showed by a gratitude telegram sent from the U.S. Air Force Command to Zhu De (朱德):

> The Commander of the Tenth Meteorological Squadron, Colonel Ellsworth, recently returned from his visit to Yan'an, reporting to me the excellent work of the North China government in meteorology and their significant contributions to our joint war effort... I express my sincere thanks. The training of personnel by your government and the Tenth Meteorological Squadron jointly operated meteorological schools have greatly increased the efficiency of our air force's meteorological work. We express our gratitude for your assistance in this important joint effort.[41]

Nurturing the Red: Meteorological Knowledge and Training the Local Personnel

When discussing the generation of meteorological knowledge, it is best to explore the details of interaction from the perspective of grassroots practitioners. Compared to the Nationalist government's meteorological institutions, the Communist-controlled areas had significantly fewer intellectuals with advanced education, let alone specialists dedicated to meteorology. As a result, when the Dixie Mission proposed establishing a meteorological station, the CPC assigned officers with expertise in communications and intelligence to liaise with the U.S. representatives. This effort was led by Wang Zheng, the radio communication expert. Notably, the first group of Communist soldiers to receive meteorological training from the U.S. military were predominantly radio operators.

Memoirs from CPC participants suggest that in July 1944, Wang Zheng, on behalf of the CPC leadership, began negotiations with the U.S. military. One critical agreement reached during these talks was that the U.S. would provide training for CPC soldiers in meteorological observation.[42] This timeline is corroborated by recently declassified archives, which reveal a more nuanced sequence of events. As early as July 1944, the CPC had already issued a detailed work schedule for the U.S. Observation Group during their stay in Yan'an. This schedule included plans for senior CPC military commanders to introduce the structure and operations

[41] "Telegram from Schoettmeyer to Zhu De on thanks for assistance in USAAF meteorological work, 5 January 1945 (斯彻特梅耶关于感谢协助美国空军气象工作给朱德的电报)," *Compilation of U.S. Army Observer Group files in the Central Archive*, 399-400.

[42] Meteorology in the Yan'an Era Compilation Committee, *Meteorology in the Yan'an Era*, 22.

of the Communist forces and for visits to local production facilities. Notably, a key component of the program was the provision of specialized training, explicitly listing a "Meteorology and Training Course" (**气象及**训练班) and identifying the CPC personnel designated to participate.[43]

For the U.S. observational group, this training was essential because the Dixie Mission's meteorological experts could not independently achieve their goal of establishing multiple stations and collecting meteorological data across northern China. The Americans not only lacked familiarity with the local terrain and environmental conditions but also faced constant threats from Japanese attacks, further underscoring the necessity of enlisting trained local observers to support their efforts.

To bridge the language barrier, Zhang Naizhao (张乃召), a faculty member at the Yan'an Medical School (**延安医科大学**), to serve as a translator. Zhang was a graduate of the meteorology program at Tsinghua University, facilitated the training sessions. The first group of trainees, comprising 21 CPC soldiers, was collectively known as the "Qingliangshan Meteorological Team" (**清凉山气象**队), named after their training location. The program officially commenced in March 1945 and was completed by May, lasting two months. The training content was designed to align closely with battlefield conditions and was broadly divided into two components. The first focused on U.S. military telegraph communication protocols. The U.S. military transported Communist soldiers to their observation group's radio station, where they practiced using American military radios and sending and receiving reports via the U.S. military station in Chongqing. This was aimed at familiarizing them with American military communication standards. A sergeant named Walter Grace was specifically responsible for instruction. The radio models used during the period were the V-101 and SCR-284. Since most of the selected soldiers were already responsible for intelligence transmission within the Communist forces, learning to operate this equipment posed relatively little difficulty. [44]

The second component involved basic meteorological observation training. U.S. meteorological personnel instructed trainees on methods for observing parameters such as temperature, humidity, air pressure, wind direction, wind speed, visibility, cloud types, cloud height, and cloud movement, as well as the use of meteorological instruments. The main instruments used at the time included aneroid barometers, hand-operated psychrometers, and anemometers. [45] However, as most of the trainees had only received education at a junior high school level, they found the theoretical aspects of meteorology more challenging to understand.

However, while the U.S. military provided training in meteorological skills, one can observe the integration of traditional Chinese practices into modern meteorological knowledge. Carolle J. Carter described a striking example of this synthesis: Communist soldiers using ancient abacuses to perform technical meteorological calculations—a process she characterized as "surprising ways in which the East blended old customs with new."[46] As Elman demonstrated in *On Their Own Terms*, Western science began to be applied in China

[43] "Work Schedule of the U.S. Army Observer Group in Yan'an for August (美军观察组八月份在延安期间的工作计划预定表)" *Compilation of U.S. Army Observer Group files in the Central Archives*, 101-102.

[44] Heng Wu ed. *Historical materials on the development of science and technology*, 337-356.

[45] Heng Wu, *The History of Science and Technology in the Yan'an Period* (延安时代科技史) (Beijing: China Academic Press, 1988), 20.

[46] Carter, *Mission to Yenan*, 84.

through processes of translation and adaptation as early as the Ming and Qing periods, illustrating how scientific practice unfolded under local conditions.[47] Following Elman's work, scholars such as Dagmar Schäfer Shellen Wu and Fa-ti Fan have further emphasized that scientific knowledge is both global in scope and subject to adaptation and reconstruction at the local level.[48]

Given the general lack of science education among the trainees, Communist soldiers made significant efforts to adapt to American meteorological training. For instance, in the face of a clear shortage of translators, both sides often relied on an English dictionary to convey specialized meteorological terminology. Additionally, due to Yan'an's geographic location and its predominantly clear and cloudless weather, soldiers were required to seize every opportunity to observe and identify clouds whenever they appeared, regardless of the time of day or night.[49] Due to the limitations of local production capacity, the trainees used Malan paper (马兰纸)—a coarse type of paper made from locally sourced plant fibers—produced by the Yan'an Paper Mill. In the absence of ink, they improvised by mixing soot from iron pots above a stove with water as a substitute.[50] This also provides a localized case for understanding scientific practices in China.

The US meteorological station used high-altitude balloons linked to radios to observe weather information. Before Communist soldiers adopted this method, they still relied on visual observation methods and then transmitted the information to Chongqing via telegraph through the Dixie Mission, where it was evaluated and utilized by the meteorological center.[51]

If we delve into the specific details of the lives of CPC soldiers and American meteorologists, we will find that they actually had deeper exchanges beyond their professional duties. For example, automobiles were nearly nonexistent in Yan'an, and CPC leaders primarily relied on horses for transportation. In contrast, the U.S. Observation Group had access to several vehicles. During their spare time, personnel from the U.S. weather station taught CPC soldiers how to drive. This skill became crucial during the Chinese Civil War, as several weather station soldiers utilized their newly acquired driving expertise to transport vital meteorological and communication equipment during the CPC's retreat from Yan'an. Additionally, the U.S. brought film projection equipment to the Yan'an Observation Group. They invited CPC soldiers to watch movies and taught them how to operate the equipment. According to a memoir from the CPC side, U.S. personnel occasionally commented on these screenings to emphasize that not everything in America was as ideal as depicted in the films. Weather station soldiers also expressed their fatigue with war and their desire to return the United States.[52]

The collaboration between the Communist Party of China and U.S. military meteorologists reveals how meteorological knowledge transcended national boundaries through diplomatic and military interactions. On a micro-level, the exchange of meteorological knowledge depended on the combination of local environments, personnel, and equipment,

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[47] Benjamin Elman, *On Their Own Terms: Science in China, 1550–1900*. (Cambridge, MA: Harvard University Press, 2005).

[48] See Dagmar Schäfer, *The Crafting of the Ten Thousand Things: Knowledge and Technology in Seventeenth-Century China* (Chicago: University of Chicago Press, 2011). And Shellen Wu and Fati Fan, "Science in Modern China," in *Modern Science in National, Transnational, and Global Context,* ed. Hugh Slotten, Ronald Numbers, and David Livingstone, *The Cambridge History of Science,* vol. 8 (Cambridge: Cambridge University Press, 2020), 521–554.

[49] Meteorology in the Yan'an Era Compilation Committee, *Meteorology in the Yan'an Era*, 25.

[50] ibid., 26.

[51] Carter, *Mission to Yenan,* 82-88.

[52] Meteorology in the Yan'an Era Compilation Committee, *Meteorology in the Yan'an Era*,53-55.

producing distinctive narratives, effects, and influences. This provides a vivid case study for understanding how diplomatic relationships facilitated the flow of knowledge.

Meteorological expertise was not only understood but also applied at the grassroots level in Yan'an by soldiers with no formal meteorological training. With the aid of a small number of educated translators, the latest meteorological theories from the U.S. were adopted by what was then considered an underdeveloped Communist Army. This highlights the importance of examining meteorological history before the establishment of the People's Republic of China, moving beyond the conventional focus on highly educated scientists and engineers within governmental institutions. The Yan'an case offers a localized perspective on knowledge adaptation. Moreover, these instances challenge the conventional narrative of severe Sino-American antagonism in the post-war period, presenting a contrasting picture to the portrayal in the Xinhua News Agency's reports mentioned in the beginning of this paper.

A Shift in Diplomatic Relations

In existing Chinese and English scholarship, much attention has been given to how the United States ultimately shifted its support toward the Nationalist government, examining the domestic reasons, international factors, and subsequent consequences of U.S. policy toward China.[53] However, for the history of meteorology—particularly the history of interactions between the CPC and the U.S. military—this policy shift had direct and tangible effects on meteorological work.

On 6 September 1944, Patrick Jay Hurley, acting as President Franklin D. Roosevelt's personal representative, arrived in China. His primary mission was to mediate the escalating conflict between Chiang Kai-shek and General Joseph Stilwell, ensuring U.S. control over Chinese military forces to coordinate operations in the broader Far East theater. Contrary to expectations, tensions between Chiang and Stilwell worsened. On October 18, Roosevelt ordered Stilwell's recall, replacing him with General Albert Coady Wedemeyer. During Stilwell's tenure, he had suggested Hurley visit Yan'an to gain insights into the Communist movement, and senior Communist leader Zhu De had extended an invitation to Hurley.[54] This visit materialized on 7 November.

During his visit to Yan'an, Hurley held discussions with Mao Zedong and other Communist leaders. Acting in his personal capacity, he endorsed and signed the "Five-Point Declaration" with the CPC, aiming to mediate relations between the Communists and the Nationalist government. However, upon his return to Chongqing, the Nationalist government rejected the proposal. Instead of alleviating tensions, this mediation effort further escalated the rivalry between the two regimes. Following the breakdown of negotiations, Hurley openly aligned himself with the Nationalist government, transitioning from his role as the President's special envoy to the U.S. ambassador to China.[55] This shift in Hurley's stance had a direct impact on the Dixie Mission's meteorological collaboration with the CPC in Yan'an.

Records of a 1945 conversation between Ye Jianying and members of the U.S. Observation Group highlight this shift. The U.S. military initially sought to expand telegraph

[53] In addition to the personal memoirs of individuals such as John Paton Davies, Wilbur J. Peterkin, and David D. Barrett, which were discussed earlier, numerous historians have explored this topic. Notable examples include E.J. Kahn's *The China Hands: America's Foreign Service Officers and What Befell Them* (New York: Viking Press, 1972), Robert P. Newman's *Owen Lattimore and the "Loss" of China* (Berkeley: University of California Press, 1992), and Graham Peck's *Two Kinds of Time* (Seattle: University of Washington Press, 2008), among others.

[54] Carter, *Mission to Yenan,* 116-117.

[55] ibid., 118-126.

networks in Communist-controlled Shanxi-Suiyuan (晋绥) regions and conduct atmospheric balloon measurements. However, Ye Jianying remarked:

> This year can be divided into two periods: before and after Hurley's statement. In the earlier period, we cooperated unconditionally with the U.S. military … After the [Hurley] statement, the U.S. responded to our cooperation with unwillingness … Previously, issues such as naval landings, meteorology, communications, and intelligence were all considered within the framework of collaboration with the U.S. military … Now, the entire plan needs to be re-discussed from the beginning.[56]

In the realm of meteorological intelligence cooperation, while shifts in diplomatic relations did not result in the immediate cessation of all collaboration, practical operations increasingly reflected a desire to safeguard distinct political and strategic interests. For instance, as Ge Shimin recalled, he was instructed by his superiors to ensure that every meteorological report sent to the U.S. military was also provided to the CPC's intelligence department for translation and analysis.[57] Similarly, in 1946, when Nationalist Air Force pilot Liu Shanben (刘善本) defected to a Communist-controlled area, U.S. personnel stationed at the meteorological site sought immediate clarification regarding the circumstances surrounding the defection. However, CPC meteorological and telegraph personnel deliberately delayed transmitting information until the event was publicly disclosed. [58]As Fuller aptly noted, the efficiency of the Red Meteorological Network often mirrored the U.S. government's stance toward the Communist regime: it thrived during periods of favorable relations and deteriorated as tensions escalated. [59]

As the tide of World War II shifted, Japan found itself increasingly unable to sustain its occupation of mainland China. In April 1945, President Franklin D. Roosevelt's sudden death brought Harry S. Truman to the presidency. On 6 August, the United States dropped an atomic bomb on Japan, and the Soviet Union launched its offensive in Manchuria, driving out Japanese forces. Japan surrendered on August 15, marking the end of World War II.

For China, however, the surrender intensified the growing tensions between the Nationalist government and the Communist Party. Delegations frequently traveled between Yan'an and Chongqing to negotiate, with meteorological work becoming a critical priority during this period. In November 1945, Patrick Hurley resigned from his post, and President Truman dispatched General George Marshall to China in an effort to mediate between the two regimes. As Carolle Carter observed, although Marshall initially succeeded in reducing the likelihood of a full-scale civil war, he was ultimately unable to bring both sides together as Hurley had attempted to do. [60]

In March 1946, the US military formally proposed the withdrawal of its observation mission from Yan'an and sent a telegram to Zhou Enlai. Zhou replied, hoping that the US military would stay a little longer until withdrawing its headquarters in China at the same time. However, by early April, Colonel Eaton, who was then in charge of the observation mission, received orders to retreat, leaving behind some officers as liaison points with Yan'an. Thus, the

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[56] "Record of Conversation between Ye Jianying and Members of the U.S. Observation Group (Peterkin, et al.) on June 2nd" (六月二日叶参谋长与美军观察组毕德金中校、斯文生少校及斯特尔上尉谈话记录), China Central Archives(中央档案馆), Archive No. J006-009-0004-00002.

[57] Meteorology in the Yan'an Era Compilation Committee, *Meteorology in the Yan'an Era*, 33.

[58] ibid., 51-52.

[59] ibid., 181.

[60] Carter, *Mission to Yenan*, 189-190.

"Dixie Mission" was downgraded to a small liaison point, with the remaining US soldiers renamed as the US military liaison group. [61]

At this time, Clifford F. Young, a member of the meteorological team, became the commanding officer of the liaison group. For a while, he and another soldier became the only members of the liaison group in Yan'an. Meanwhile, communist soldiers began taking over the management of the meteorological stations. Due to Young's lack of manpower, the Communists provided him with a team of soldiers. Consequently, a US Army major commanded a work group of the Communist Party of China responsible for meteorological observations, radio communication, and other tasks. [62]

After most of the U.S. military meteorological personnel withdrew, the Communist army assumed full responsibility for meteorological operations. Under Wang Zheng's recommendation, Zhang Naizhao led a group of young students from Yan'an University, who had received basic education, to take over the observation station from the U.S. military meteorological group. This marked the establishment of the "Yan'an Meteorological Observatory" in Communist Party history. The takeover included accessing an abandoned U.S. military warehouse filled with meteorological equipment and radio communication devices, which later proved crucial for training their own meteorological personnel. [63]

The selection of students for this program emphasized not only technical skills but also political reliability. Since the primary mission of the observatory was to ensure the safety of Mao Zedong and other leaders during flights, the first batch of selected individuals largely came from strong Communist backgrounds. For instance, Zou Jingmeng (邹竞蒙) was the son of the renowned revolutionary martyr and publisher Zou Taofen (邹韬奋), while Mao Xuehua (毛雪华), Chen Yongmin(陈涌珉), and others had already been admitted as Communist Party members, along with the originally trusted Zhang Naizhao.

Although relations between the Communist Party and the U.S. military had begun to deteriorate, the training of these young students was still conducted under the guidance of the remaining U.S. meteorological group in Yan'an. The training, which lasted just three weeks, focused heavily on practical skills, including ground observations, wind measurements using theodolites, and the use of radio instruments for detecting high-altitude temperature and pressure. In October 1946, a graduation ceremony was held for the trainees, during which Ye Jianying addressed the group: *"You are the first batch of meteorological personnel of the Eighth Route Army (八路军) Headquarters Meteorological Observatory. In the future, you will also work under the leadership of Colonel Eaton, so you must follow his command and work diligently."* U.S. military officers who had not yet withdrawn attended the ceremony, and each graduate wore the armband of the U.S. military's meteorological branch as a symbol of friendship. [64]

Regardless of the circumstances, for members of the observation mission, the withdrawal of the US military seemed only a matter of time. The was despite the Communist Party's hopes to adopt a policy of "differentiation", opposing individuals who supported the Nationalist government while trying to win over neutral or sympathetic individuals, as the US

[61] ibid., 191-192.

[62] ibid., 192.

[63] Meteorology in the Yan'an Era Compilation Committee, *Meteorology in the Yan'an Era*, 48.

[64] ibid., 40.

decision-makers gradually turned towards supporting the Nationalist government. However, changes in the political and diplomatic situation were not entirely mirrored in personal interactions in China. The relationship between the CPC and the United States cannot be fully characterized as simply adversarial or cooperative. For example, by October 1946, the Communists had already adopted slogans like "Americans, get out of China," yet members of the U.S. military liaison group continued to engage regularly with senior CPC officials. These interactions ranged from attending Thanksgiving banquets to participating in daily leisure activities such as playing bridge with Communist leaders.[65]According to the CPC's official accounts, key members of the Dixie Mission maintained positive personal relationships with Communist officials even as formal relations grew strained. For instance, Young, upon his return to Hawaii, sent five volumes of cutting-edge meteorological textbooks to Yan'an.[66] These gestures highlight an enduring spirit of collaboration, even amidst the shifting geopolitical tensions of the time.

With the withdrawal of the US military, the actual learning of these students did not end. Zhang Naizhao and other technical personnel transferred from various departments began using the US military's textbooks to teach meteorological theory. These textbooks represented the newer theories and monographs in the American meteorological community at that time. In the end, in 1947, as Chiang Kai-shek's forces launched an offensive against the Communist Party's core area in northern Shaanxi, the Communist Party chose to withdraw from the region. Prior to this, on March 11, 1947, members of the US liaison group flew to Nanjing by plane, marking the formal end of direct contact between the United States and the Communist Party of China during World War II.

Conclusion

If we return to the perspective offered by the Xinhua editorial referenced at the beginning, this article presents a markedly different and far more intricate picture of Sino-American interactions. Even today, historical interpretations of U.S.-China relations are often dominated by the ideological confrontations that originated in the 1950s and 1960s. In contrast, this article sheds light on an earlier narrative—one in which the nascent Communist regime engaged in diplomacy with the United States before the founding of the People's Republic of China. While these interactions ultimately succumbed to shifts in diplomatic relations, they nonetheless provide an early and noteworthy precursor to the later thaw in Sino-American relations in 1970s and the diplomatic dynamics of globalization.

Unlike many narratives that focus on political and military history, this article highlights the crucial role played by scientific knowledge. Meteorological science and diplomacy were deeply intertwined during this period. Without the negotiations and coordination of diplomatic relations, the establishment of a meteorological network would not have been possible, nor would the flow of meteorological knowledge from the U.S. military to Yan'an have occurred. Conversely, the pressing need for weather intelligence was one of the factors that motivated the U.S. to dispatch the Dixie Mission to Yan'an.

This study offers a compelling case for the field of science diplomacy, demonstrating how a focus on scientific knowledge can uncover and reinterpret historical processes and impacts. In this case, U.S. meteorological expertise played a dual role. On one hand, the translation of English-language textbooks, personnel training, and the provision of advanced observational instruments facilitated the transfer of knowledge to CPC-controlled territories.

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[65] Carter, *Mission to Yenan,* 196-197.

[66] Meteorology in the Yan'an Era Compilation Committee, *Meteorology in the Yan'an Era*, 55.

On the other hand, the application of meteorological knowledge in Yan'an and its surrounding areas revealed numerous instances where this knowledge was integrated with local practices.

Although the flow of this knowledge was driven by specific military objectives, it enriches our understanding of how meteorological knowledge disseminated across geopolitical and cultural boundaries. In other words, the generation, flow, and application of meteorological knowledge were not limited to U.S.-trained scientists or established scholars. The case of Yan'an offers a localized perspective on grassroots practices, demonstrating that the creation and utilization of scientific knowledge can occur in unexpected and non-traditional settings, shaped by the unique historical and political conditions of the time.

On another note, the subsequent impact of this event is equally worthy of attention. After the U.S. military's departure, the soldiers trained in meteorology continued to use the instructional materials and instruments left behind by the U.S. forces. They were later deployed to more regions to train additional personnel in meteorological skills. Following the establishment of the People's Republic of China, many of these individuals were assigned to take over meteorological stations previously operated by the Nationalist government, often assuming significant roles.

While it is essential to acknowledge the contributions of meteorological scientists who had served under the Nationalist government and scholars returning from studies in the United States or Europe after the Chinese Civil War, the technicians trained during the Yan'an period held a unique advantage: they enjoyed the political trust of the Communist Party. As they gained experience and matured into skilled technical bureaucrats, some rose to leadership positions within the Meteorological Bureau. For instance, Zhang Naizhao and Zou Jingmeng eventually became heads of the China Meteorological Administration, with Zou further serving as the chairman of the World Meteorological Organization (WMO) on behalf of China. This highlights the enduring significance of Yan'an as a critical origin point in the history of meteorology in the People's Republic of China.

Finally, this research offers valuable insights into understanding contemporary Sino-American relations. It cautions against oversimplifying the causes of deteriorating relations by attributing them solely to ideological conflict. Such reasoning often obscures deeper, more nuanced dynamics. This study provides a robust counterexample to the binary narrative of ideological confrontation, underscoring the importance of evaluating bilateral relations on multiple levels. Ideology should not be the sole determining factor. Despite political tensions, transnational flows of knowledge, facilitated by scientific and civilian exchanges, can persist and foster collaboration, mutual understanding, and cultural exchange.

As John S. Service, a member of the Dixie Mission, observed,

> No Communist society has ever been as open to the United States as the Communist Party of China was during the eight months from July 1944 to March 1945. During this period, numerous Americans traversed CPC-controlled territories, engaged in various forms of cooperation, and examined all facets of the local situation.[67]

This historical moment demonstrates the potential for meaningful engagement and knowledge exchange even amidst political divergence, offering a historical lens through which to view and perhaps reflecting on present-day U.S.-China relations.

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[67] John S. Service, *The Amerasia Papers: Some Problems in the History of US-China Relations* (Berkeley: Center for Chinese Studies, University of California, 1971).

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