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Weather and the Public: A Study of Weather Forecast Information in the Eastern Times

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Introduction

In 1856, France established a network of weather stations and set up the first forecasting system. The Paris Observatory began utilising the data amassed from these stations to generate weather forecasts, which were disseminated to the public via the production and dissemination of weather maps by telegraph.[1] In the same period, British meteorologist Robert FitzRoy was instrumental in the inception of British weather forecasts.[2] On 5 September 1860, the British newspaper *The Times* began publishing simple weather forecasts in its evening edition, a practice subsequently adopted by other newspapers. This signified the emergence of the newspaper as a pivotal conduit for the dissemination of meteorological forecasts. The establishment of meteorological services in the United States occurred at a later date than in Western Europe. In 1873, General Albert Mier, head of the US Army weather reporting service initiated the production of *the Farmers' Bulletin*, which included brief weather forecasts, with the more comprehensive *Weather and Crop Bulletin* following in 1887.[3] The history of weather forecasting in China can be traced back to the establishment of the Zikawei Observatory in 1872. Since its inception, the observatory has provided public services, such as weather forecasts for coastal residents and sailors. Initially, it posted a weather map and report each morning and afternoon at the Yangjingbang Signal Tower. By 1882, the Zikawei Observatory began issuing rudimentary weather forecasts,

[1] John L. Davis, "Weather Forecasting and the Development of Meteorological Theory at the Paris Observatory, 1853–1878," *Annals of Science* 41, no. 4 (1984): 359–82, https://doi.org/10.1080/00033798400200311.

[2] Burton, Jim. "Robert FitzRoy and the Early History of the Meteorological Office." *The British Journal for the History of Science* 19, no. 2 (1986): 147–76. https://doi.org/10.1017/S0007087400022949.

[3] Ćurić, M., Spiridonov, V. (2023). Establishment of Weather Forecast Services. In: *History of Meteorology*. Springer, Cham. https://doi.org/10.1007/978-3-031-45032-7_7

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which were supplied to major newspapers in Shanghai.[4] Leveraging the geographical advantage of the Zikawei Observatory, newspapers in Shanghai became the earliest in China to publish weather forecasts, serving as a crucial medium for disseminating meteorological information.

Since the mid-nineteenth century, the dissemination of Western meteorological knowledge in China has grown in both depth and breadth.[5] During both the Late Qing Dynasty (1840-1911) and the Republic of China period (1912-1949), the influence of Western meteorological science on China was profound, playing a pivotal role in promoting the early development of China's meteorological industry and the spread of meteorological knowledge. The establishment of church printing institutions, such as the Morrison Press and the Malacca Anglo-Chinese College Press both in 1807, led to a surge in the translation of Western meteorological textbooks, monographs, and journals. At this time, China also began to take the initiative to disseminate Western meteorological knowledge through publications, although the content and quantity remained limited. Establishing schools and offering meteorology courses became an important avenue for spreading Western meteorological knowledge during the Late Qing Dynasty.[6] During the Self-Strengthening Movement (1861-1895), which was also known as the Western Affairs Movement, basic Western meteorological knowledge was introduced in schools, and by the late Qing New Policies period (1901-1911), meteorology courses closely related to agriculture were included in primary education.[7]

Weather forecasts themselves contain essential meteorological knowledge and serve as a significant driver for transforming public meteorological awareness. Studying weather forecast information in newspapers is not only crucial for understanding the weather forecast services provided by meteorological observatories and how these have varied over time and space, but also for gauging public attitudes and cognition regarding meteorological knowledge. Existing research primarily focuses on the observational work of modern Chinese meteorological observatories,[8] with limited attention given to their weather forecast services. Previous studies have noted that, beginning in 1915 the Zikawei Observatory began providing weather forecast information to *Shen Bao* (上海《申报》) a former British owned Chinese language newspaper known in English as *Shanghai News*. This prior scholarship proposed the newspaper's central role in introducing meteorological knowledge to Chinese

[4] Yan, Linshan, and Ma, Zongliang. "Establishment and Development of the Zikawei Observatory (1872 - 1950)." *China Historical Materials of Science and Technology* 5, no. 2 (1984): 65-72.; Tian, Guozhu. *The Zikawei Observatory in Shanghai*. (Shanghai Zikawei Library Printing House,1918).

[5] Zhang, Gaizhen, and Liu, Bo. "The Spread of Western Meteorological Science and Technology in China and its Influence during the Period of Eastward Graduation of Western Learning." *Journal of Meteorology* 67, no. 4 (2022): 643-648.

[6] Zhang, Yan. "Probe into the Policy about Developing the Modern Education of the Qing Government during the Westernization Movement." *Lanzhou Academic Journal* 41, no. 7 (2010): 196-199.

[7] Zhao, Chaofeng. "New Policy and Modernisation of Chinese Agriculture in the late Qing Dynasty." *Journal of Capital Normal University (Social Science Edition)* 28, no.1 (2001): 12-17.; Chen Shaofang. "On Educational Legislation in the Late Qing Dynasty." *Journal of Jinan (Philosophy and Social Sciences)* 19, no. 2 (1997): 87-96.

[8] Yan Linsan. "Xujiahui Observatory." *Navigation* 15, no. 1 (1993): 48; Xu Yafang. "Xujiahui Observatory". *Cultural Heritage of Cities* 1, no. 00 (2008): 15-17; Liu Hua. "Fify-Year Scientific Research on Zi-Ka-Wei Observatory." *Cultural Heritage of Cities* 7, no. 2, (2014): 133-139; Shen Sirui. "French Origin of Zi-Ka-Wei Observatory." *Cultural Heritage of Cities* 9, no. 2 (2016): 93-108; Wu Yan. "Observatory of Zi-Ka-Wei and Modern Meteorological Station Network Founded in China Studies in the China." *Studies in the History of Natural Sciences* 32.no. 2 (2013): 165-175; Shen Bingbing,Zhang Jing,Yan Huiling,et al. "A study on the historical evolution and contribution of Qingdao Observatory (1898-1949)." *Advances in Meteorological Science and Technology* 6, no. 4 (2016): 44-50; Xie Mingen, He Wennong, "Historical Sketch of the Creation of Modern Meteorological Stations in Yunnan." *Advances in Meteorological Science and Technology* 9, no. 5 (2019): 63-67; Song Wenjuan, Li Lixin, Han Qiguang. "Development of public meteorological services at the Hong Kong Observatory." *Advances in Meteorological Science and Technology* 7, no. 1 (2017): 227-237.

citizens, though the forecasts did not thoroughly change the public's understanding of meteorology. The public still adhered to traditional customs, such as "praying for rain" and "banning the slaughter of livestock".[9] Beginning in 1905, *Shibao* or the *Eastern Times* (上海《时报》) of Shanghai had been the first Chinese-language newspaper to publish weather forecasts, thereby promoting the dissemination of meteorological knowledge to Mandarin readers in China. While previous research has examined distinctive news,[10] content reforms,[11] and newspaper personnel[12] of the *Eastern Times* of Shanghai, specialized studies on its weather information remain scarce. Academic research has predominantly focused on the observational work and contributions of modern Chinese meteorological observatories, often concentrating on a single newspaper with relatively stable weather information. This paper aims to integrate and analyse the weather information content from two distinct time periods of the *Eastern Times'* history, examining changes and trends in weather forecast information, and comparing them with contemporary English-language newspapers. This work is crucial in helping to elucidate the process of public cognition and acceptance of Western meteorological knowledge in modern China.

The Pioneer of Chinese Newspaper Weather Forecasts

In 1905, the Chinese-language newspaper the *Eastern Times* of Shanghai began publishing weather forecasts, marking it as the first Chinese newspaper to do so. The *Eastern Times* was one of three major newspapers in Shanghai during the late Qing Dynasty and the Republic of China period, the other two *Shen Bao* and *Xinwen Bao* (《新闻报》) did not publish weather forecasts until August 1915, and March 1923, respectively. Therefore, the *Eastern Times* provided a crucial platform for Chinese people to independently learn about Western meteorological knowledge. According to distribution records, the *Eastern Times* was not only widely circulated in Shanghai but also reached 54 cities across Jiangsu, Hubei, Zhejiang, and Anhui provinces, as well as being distributed in 13 overseas cities, including major centres in Japan, Singapore, Myanmar, the United States, and the United Kingdom.

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[9] Wang Hao. "Xujiahui Observatory and the Transformation of Meteorological Concepts in Chinese Society-Centred on the Declaration (1875-1935)." *Jinan History* 19, no. 1 (2020): 169-183.

[10] Yu Yu. "Chen Jinghan's News Thoughts and Influences: An Investigation of Shanghai Shibao." *Journalism Research* 40, no. 3 (2020): 71-83; Wang Baoping. "Journalist Meet the Time: A Discussion Focused on Jin Xiongbai's Experience in the Eastern Times (1926-1929)." *Journalism & Communication* 25, no. 1 (2018): 84-109; Liu Yuanzheng. "The public opinion trend of the Sino-Japanese joint Han Ye Ping case in the early years of the Republic of China-A study centred on Shen Pao and Eastern Time." *Journal of Hubei University（Philosophy and Social Science）* 44, no. 6 (2017): 83-91; Yu Yu,Yu Fenxia. "An analysis of the content and style of Chen Leng's current commentary--Eastern Times in Shanghai as an example." *Journal of Zhejiang University of Media and Communications* 24, no. 3 (2017): 40-48; Guo Feng. "Eastern Times1904-1914 Tibet-related reports and national identity study." *Journal of News Research* 9, no. 10 (2018): 42-43.

[11] Shao L. "From 'Reference' to 'Expression': The Yellow Journalism in Huang Bohui's Eastern Times and Shanghai's Urbanization." *Chinese Journal of Journalism & Communication* 35, no. 4 (2013): 140-149; Yu Fenxia,Yu Yu. "An analysis of the translated novels of Eastern Times in the late Qing Dynasty." *Journal of Ming-Qing Fiction Studies* 27, no. 3 (2021): 252-269; Yu Yu. "The Early Exploration and Successful Practice of Chinese Newspaper Commentaries: A Study of Commentaries of Current Affairs in the Shanghai Shibao." *Journalism Bimonthly* 37, no. 2 (2017): 30-37; Yu Yu. "From Genre to Subject: An Analysis on the Practice Transformation and Effect of Shibao's News Operation." *Journal of Nanchang University (Humanities and Social Sciences)* 48, no. 4 (2017): 83-90; Zhang Zhenting, Zhang Huina. "Party people's newspaper, literati newspaper, businessman's newspaper:A preliminary study of the metamorphosis of Eastern Times in Shanghai and its causes". *Academic Exchange* 31, no. 1 (2015): 191-196; Zhang Zhenting,Yin Ting. First Column in Newspapers in China. *Journal of Zhengzhou University (Philosophy and Social Sciences Edition)* 46, no.3 (2013): 173-176; Yao Fushen. "Eastern Times' Vice-Publication Reform in the May Fourth Period." *Journalism & Communication* 14, no.4 (1992): 146-154; Shao, Lu. 2013.The Transformation of Eastern Times in the Process of Urbanisation (1921-1939). Fudan University, PhD dissertation.

[12] Yu Yu. "Chen Jinghan's News Thoughts and Influences: An Investigation of Shanghai Shibao." *Journalism Research*, no. 3 (2020): 71-83; Yuan Yi-Qin. "Huang Bohui and Eastern Times." *Journalism Research* 40, no. 2 (1995): 42-44; Wu Xiang. "When did Gogongzhen become the chief editor--Republican newspaper man transformation from the examination of Gogongzhen's Eastern Times' news activities." *Youth Journalist* 20, no. 13 (2013): 79-82.

The *Eastern Times* was distributed early in the morning in Shanghai, ensuring that readers in the city could receive the paper on the same day. Also, "[t]hanks to the early morning train service connecting Shanghai and Suzhou, residents in Suzhou could purchase the latest issue each morning."[13] Consequently, readers in both Shanghai and Suzhou had access to the day's weather forecast ahead of time via the pages of the *Eastern Times*.

From 1907, when the *Eastern Times* temporarily ceased reporting weather forecasts until its resumption in 1926, China underwent nearly two decades of profound social transformation. During this period, the content included in Chinese weather forecasts also evolved, though the specific reasons for these changes remain unclear. According to our research,[14] more Chinese and English-language newspapers began including weather forecasts in the 1920s, with the number of weather forecasts reaching a peak in the 1930s.

Initially, the primary audience for the *Eastern Times'* weather forecasts was the intellectual community. During the first period (1905-1907), Di Chuqing, the founder of the *Eastern Times*, focused on literary and educational circles, aiming to make the newspaper indispensable for intellectuals of the period.[15] Later, management of the *Eastern Times* was transferred to his younger brother Dibao Feng, and in 1921, due to financial difficulties, the newspaper was taken over by Huang Bohui.[16] Under Bohui's management from 1926 to 1929, the *Eastern Times* underwent significant reforms, including the addition of sports and social news, which broadened its appeal to the general public.[17] This transformation contributed to the popularization of the *Eastern Times* and extended the reach of its weather forecasts to a wider audience.

Differences and Similarities between the two periods of weather forecasts in the *Eastern Times*

Unlike the continuous weather forecast reporting by Chinese-language newspapers such as *Shen Bao* and *Xinwen Bao*, the *Eastern Times*' weather forecasts were only published during two distinct periods: 1905-1907 and 1926-1929. During these periods, the format and content of the weather forecasts underwent significant transformations. By comparing the weather forecast information from these two periods, we can trace the evolution of public understanding of meteorological knowledge through newspaper media in modern China, summarize the impact of weather forecasts on the public, gain deeper insights into the dissemination of weather forecast knowledge among the public, and further examine the Chinese public's attitude and level of understanding of Western meteorological knowledge.

The content of the *Eastern Times*' weather forecasts in both periods shares three primary similarities. First, in both periods, coverage included meteorological forecasts and information related to meteorological hazards. The forecasts in both periods described key meteorological elements such as weather conditions, wind, clouds, and precipitation. Across both periods typhoons were the most frequently mentioned phenomena in the meteorological disaster warnings issued. Secondly, both periods of the *Eastern Times*' weather forecasts

[13] Bao Tianxiao. *Memoirs of Kushi studio.* (2008, Encyclopedia of China Publishing House).

[14] We have analyzed the electronic newspapers from the late Qing Dynasty and the Republic of China, which are included in the National Newspaper Index Database and the "ShenBao" Database.

[15] Bao Tianxiao. *Memoirs of Kushi studio*, 13.

[16] Chen Ting. "Necessity and Chance: A Study of the Reasons for Eastern Times' Change of Ownership News Tribune." *News Tribune* 10, no.3 (2019): 107-110.

[17] Joan Judge. *Print and Politics: Eastern Times and the Culture of Reform in Late Qing China*. (2015, Guangxi Normal University Press); Yu Yu. *A Study of News Business Change at Eastern Times in Shanghai*. (2018, People's Publishing House).

encompass domestic and international countries and regions. Coverage included meteorological conditions within the Yangtze River Valley, Zhili, Shandong, Hong Kong and Taiwan, in addition to other pivotal coastal locations. Furthermore, it incorporated weather patterns in neighbouring countries and regions, including Japan, Korea, Manila and Siberia. Thirdly, during both periods the Zikawei Observatory provided the meteorological data for the *Eastern Times*' weather forecasts.[18] On the first day of the initial period in 1905, the "Special Announcement" section stated that the Zikawei Observatory was the source of the meteorological forecasts:

> We are honoured by the Zikawei Observatory's generous offer to provide daily climate charts, which will significantly contribute to our original mission. Since yesterday, the weather forecast has been included alongside the Shixian Calendar《时宪书》, presenting current-day events as reported by the Zikawei Observatory and made available to readers.[19]

The "Daily Measured Climate Tables" constituted the daily weather reports from the Zikawei Observatory. While in the second period from 1926, the "Weather Reports" section clearly indicated the source with the heading "Weather Forecast by the Zikawei Observatory at 4:30 p.m."

The discrepancies between the content of the *Eastern Times*' weather forecasts in the two periods can be attributed to six key factors. Notably, the two periods of weather forecasting in the *Eastern Times* are designated by different names. In the initial period, the weather forecast section was titled "Weather Forecast" and included sub-headings for "Weather" and "Wind". Starting from 13 November 1906, the "Wind" sub-heading was discontinued, and its content was integrated into the "Weather" column. By contrast, the second period presented the weather information in a single column titled "Weather Report", without any sub-headings.

Secondly, the two periods of the *Eastern Times*' weather forecasts were positioned in different page locations in the newspaper. In the initial period, the meteorological forecast was prominently featured on the front page, interspersed with advertisements related to the education sector. During the second period, the weather forecast appeared irregularly, positioned on lower portions of the fifth, sixth, and seventh pages, intermingled with content pertaining to sports and social affairs.

Thirdly, the two periods of the *Eastern Times*' weather forecasts cover distinct time periods. In the initial period, the forecasts focus on the prevailing meteorological conditions and relevant hazard warnings for the current day. By contrast, the subsequent period provides a detailed review of the preceding two days, along with a comparative analysis of the current day's weather patterns relative to those of the previous year. Moreover, it incorporates the aforementioned elements related to the current day's weather forecast and hazard warnings.

Fourthly, the two periods of the *Eastern Times* weather forecasts encompass distinct meteorological elements. In the initial period, the forecasts provided primarily qualitative descriptions of meteorological conditions, focusing on elements such as weather, wind,

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[18] Zhu, Marlon. "Media, typhoons, and contests over meteorological sovereignty in nineteenth-century East Asia." *History of Meteorology* 9, (2020).

[19] "Special Confession of the House". *Eastern Times*. March 6, 1905. Translated from the original Chinese by the author: "今承徐家汇天文台，慨然允以每日所测气候表见赠，裨得玉成本馆初意。自昨日起添登天气预报一门，与时宪书并列，又天气预报均系言本日之事，以便阅者" The Shixian Calendar was compiled by Xu Guangqi and his colleagues during the late Ming Dynasty, utilizing the Western new method. In the first year of the Shunzhi reign (1644), it was presented to the Qing court by the German missionary Johann Adam Schall von Bell. Prince Regent Dorgon officially designated it as the "Shixian Calendar" and decreed its promulgation.

precipitation, clouds, and other phenomena. Wind direction is indicated using cardinal points, such as "south-west wind." On occasion, temperature and barometric pressure are reported qualitatively; for example, temperature is described as either 'cold' or 'hot,' and fluctuations in thermometer and barometer readings are occasionally mentioned, though specific values are not provided. By contrast, the second period incorporates both qualitative and quantitative descriptions of meteorological elements. In this later period, detailed coverage of weather, including wind, rain, clouds, temperature, and barometric pressure was provided. Wind direction was specified using sixteen compass points, such as "south-south-east wind." While temperature was reported with specific high and low values, indicating maximum and minimum readings. Barometric pressure was described in terms of the movement of high- and low-pressure centres.

In addition, the two periods of the *Eastern Times*' weather forecasts covered different geographical ranges. The initial period primarily focuses on the city of Shanghai and other urban centres along the Yangtze River. While by contrast, in the second period the content's coverage was broadened to encompass other regions of China, including the north, northeast, and central areas.

A further distinction can be observed in the methods of accessing information from the Zikawei Observatory during the two periods of the *Eastern Times*' weather forecasts. In the initial period, meteorological reports were sourced exclusively from the Zikawei Observatory. By contrast, during the second period a combination of on-site journalistic research and telephone interviews with the Zikawei Observatory were used to gather weather forecast data.[20]

The two periods of weather forecasts in the *Eastern Times* exhibit notable differences, attributable to the distinct operational approaches adopted by the newspaper's editors and journalists during each time period. These senior operators at the *Eastern Times* played a pivotal role in the format of the weather forecasts disseminated, highlighting the significance of their business philosophy in shaping this piece of science communication. Established by political reformists such as Kang Youwei and Liang Qichao, the *Eastern Times* initially comprised personnel who were primarily disciples of Kang Youwei and members of the New School of Reformers. Additionally, the newspaper's founder, Di Chuqing, and its editor, Lei Fen, both studied in Japan.[21] They belonged to a group of open-minded and forward-thinking intellectuals, who while in Japan focused on acquiring knowledge of Japan's modern systems. Although they had some familiarity with Western meteorological concepts introduced to them via Japan, it was impractical for them to divert their primary objective of systemic reform to focus on meteorology. Consequently, their understanding of Western meteorology remained limited. Upon receiving meteorological data from the Zikawei Observatory, they curated the information and provided qualitative assessments. Their approach was profoundly influenced by traditional Chinese observational practices, making it challenging for them to discard the accumulated knowledge gained through prolonged experience of the weather. The Astronomical Bureau's daily meteorological observations primarily focused on elements such as sunshine, rain, wind, and clouds.[22] Therefore, the meteorological elements reported in the first period of the *Eastern Times* coverage closely resembled those of ancient Chinese meteorological observations. In contrast, the second period was overseen by Huang Bohui, for whom the Zikawei Observatory served as a more

[20] Gu Zhizhong, *A Newspaper Man's Career-An Autobiography of a Journalist*. (1987, Jiangsu Classics Publishing House).

[21] Yu Yu. *A Study of News Business Change at Eastern Times in Shanghai*.

[22] Wang Ting, Lv Lingfeng, Chu Wenjuan, "Investigation of the Meteorological Work in Astronomical Bureau during Qing Dynasty." *The Chinese Journal for the History of Science and Technology* 39, no. 1 (2018): 35-47.

important source of information.[23] Weather forecasts during this period were obtained through a combination of field visits and telephone interviews conducted by reporters, resulting in more detailed and accurate forecasts. In addition, it is related to the systematic introduction of Western meteorological knowledge into China by Chinese students majoring in meteorology overseas, who introduced this knowledge after they completed their studies and returned home to China.[24] When overseas meteorology students, such as Jiang Bingran and Zhu Kezhen, completed their studies and returned to China, they carried out meteorological research, established meteorological societies, trained new meteorological talent, advocated for the addition of meteorological stations, and actively promoted the construction of China's meteorological undertakings.

Intertwining Meteorological Knowledge with Traditional Concepts

Continuous Attention to Meteorological Disasters

The *Eastern Times* was dedicated to monitoring and reporting on disaster-related weather conditions globally. Its meteorological coverage included typhoons, rainstorms, hailstorms, and other forms of extreme weather, with a particular emphasis on their impacts on global communities. Shanghai is situated in a coastal region prone to frequent typhoons and is vulnerable to significant damage and disruption to its infrastructure, particularly in maritime shipping and trade. Consequently, it was of paramount importance to disseminate timely and accurate typhoon warnings to the residents of the city. The Zikawei Observatory played a crucial role in issuing these warnings, as evidenced in the weather forecast sections during both periods of reporting in the *Eastern Times*.

Prior to the inclusion of meteorological forecasts, the *Eastern Times* demonstrated a keen awareness of and responsiveness to extreme weather events both domestically and internationally. This was exemplified by its publication in July 1904 of detailed reports on the extensive damage caused by windstorms in Fujian province in May of that year:

> The province of Fujian has recently experienced a series of adverse weather conditions, including a lack of wind and an epidemic, which have collectively been classified as a disaster. In May, the region experienced a period of no wind and hurricane-force winds, followed by a sudden gale on the 18th of the same month. This subsequent event has the potential to be particularly violent and destructive, with reports indicating that it lasted for approximately 24 hours. On the 23rd, the winds reached such intensity that they caused damage to the rocks and sands and destroyed houses.[25]

Between 1907 and 1926, during the interruption of weather forecast services, several reports and forecasts were issued concerning the potential for catastrophic weather conditions. These reports provided detailed information on the timing and location of such events, as well as their potential impacts on Shanghai. On 18 August 1908, the *Eastern Times* initiated coverage of the projected trajectory of an impending typhoon:

> The Zikawei Observatory issued a forecast yesterday afternoon at five o'clock, predicting the advent of clouds and a storm that had travelled to the Tongyong Island area. The wind force was observed to be slightly to the northeast, indicating its imminent movement away from Shanghai. A storm tide rainstorm is expected to reach Shanghai from the mouth of the

[23] Gu Zhizhong, *A Newspaper Man's Career-An Autobiography of a Journalist*.

[24] Liu Xiao-Jun. Institutionalization of Meteorological Service in the Period of the Republic of China" *Studies in Dialectics of Nature* 30, no.8 (2014): 100-105.

[25] "News from the provinces". *Eastern Times*. July 19, 1904. Translated from the original Chinese by the author： "福建 风疫为灾 闽中五月向无风飓，而本年五月十八日忽起大风，势极猛烈，历一昼夜始息。迨至二十三日又复，狂风怒吼，走石飞沙，早稻均遭损坏，此次拔木毁屋尤不计其数日"

> Yangtze River to the Taiwan Strait. This will coincide with a period of intense rainfall and high winds, which will spread to the lower Yangtze River basin.[26]

Two days later, on 20 August, it was reported that:

> Yesterday afternoon at 5 o'clock, the Zikawei Observatory issued a forecast predicting the gradual spread of clouds and gales in Sichuan, the Yangtze River south of the area, and the Chinese seaside. Meanwhile, the weather in Shanghai is expected to remain clear.[27]

The *Eastern Times* acknowledged the significance of the typhoon warnings and had been monitoring the typhoon, reflecting the public's demand and the crucial role of their weather forecasts.

In its coverage of another anomalous precipitation event in July 1923, the *Eastern Times* stated:

> The North-China Herald has reported that the Zikawei Observatory has observed high precipitation levels in recent years. This trend is attributed to the influence of regional air pressure patterns in central and northern China during the latter half of June, which increases the likelihood of heavy rainfall. Notably, this year's precipitation, which was relatively limited in June, shifted predominantly to July. This shift aligns with observed rainfall patterns over recent years. Despite recent advances in scientific understanding, significant uncertainty remains in accurately predicting meteorological phenomena such as air pressure fluctuations. Specifically, while the formation and initial development of cyclones can be predicted with some certainty, the exact date of dissipation remains uncertain. Consequently, it is not possible to determine with certainty when the heavy rainfall will cease, despite the advanced capabilities of meteorological equipment in Europe and the United States. According to the Zikawei Observatory, however, heavy rainfall in China is expected to subside within six days, with clear skies anticipated tomorrow and the following day.[28]

By addressing advancements in meteorological technology in Europe and the United States, and in highlighting the lack of a definitive method for forecasting typhoons due to fluctuations in barometric pressure, the newspapers publishers' demonstrated an advanced understanding of meteorological science and technology, which exceeded that of the general public at the time.

Adapting to the Needs of Chinese Readers

The differences in weather forecast information in the *Eastern Times* in the two periods analysed demonstrate that the public's cognition of Western meteorology was improving, and that in general (at least among the readership) understanding of meteorological data and the weather conditions in other regions across China was also growing. By comparing the two periods of weather forecasts in the *Eastern Times* with English-language newspapers circulated in Shanghai during the same period, the cognitive

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[26] "News from this town". *Eastern Times*. August 18, 1905. Translated from the original Chinese by the author： "徐家汇天文台昨日午后五下钟预报云，暴风已行至通永岛一带，风势稍向东北方向前进，相离上海甚近。长江口与台湾海峡之间，当有风潮暴雨，大约风雨行至上海或更剧烈，且须蔓延至长江下游流域一带云"

[27] "Honbu News". *Eastern Times*. August 20, 1905. Translated from the original Chinese by the author： "徐家汇天文台昨日午后五点钟预报云，大风将逐渐散布于四川，长江南方一带，中国海滨当续发气候，惟上海则气候晴朗"

[28] "Published by the Xujiahui Observatory. Comparison of Rainfall in Recent Years". Eastern Times. July 11, 1923. Translated from the original Chinese by the author："字林报云，徐家汇天文台报告，近年雨水之多，全国空气变压之作用，中国中部及北部每年六月下半月必有一度之多雨。今年之多雨，则因六月雨并不多，故移至七月而沛然大下，可以历年雨量为证…近年来科学虽昌明，但于气象学之预测空气变压之活动，尚不能有确切之把握。空气变压，即是旋风（Cyclone），其何日起与何日散，只能预测将起，而不能预测何日散。故如今之大雨，究何日可了，亦不能定，即在欧美气象测察设备较周，亦无把握也。兹据徐家汇天文台长法人之言，中国大雨连六日后必可放晴或消停，大约明后日可有晴之望云。"

differences in weather forecasts between the Chinese public and the expatriate businessmen doing business in Shanghai are highlighted. It turn, this helps us better understand the ongoing cognitive changes occurring with regards to the Chinese public's understanding of weather forecasts.

Western, English-language newspapers published in Shanghai were the first to report weather information and provided more detailed and informative content compared to their Chinese-language counterparts. For instance, the English-language *North-China Herald* commenced reporting weather forecasts from the Zikawei Observatory in 1895 and continued to do so until 1949. While comparable Chinese language newspapers, *The China Press* and *The Shanghai Times* began publishing weather forecasts respectively on 23 August 1911, and 23 January 1925, both were again provided by the Zikawei Observatory. *The North-China Herald* was established in Shanghai on 3 August 1850, by British businessman Henry Shearman (Xi'anmen) and was intended to serve the interests of British businessmen in China.[29] Given that its primary audience was the expatriate community, weather forecasts were of significant interest due to the importance of accurate sea conditions for shipping. Consequently, *The North-China Herald* disseminated meteorological forecasts from the Zikawei Observatory to benefit British retailers and expatriates in China. In addition to reporting the current day's weather forecast, the newspaper also reviewed the weather conditions of the previous two days, including the path of high- and low-pressure centres, qualitative and quantitative characteristics of the winds, and the area's cloudy and sunny conditions. The meteorological data provided by the Zikawei Observatory—such as air pressure and its fluctuations, temperature and its variations, wind strength and direction, cloud cover, and precipitation—were presented in a direct and unadulterated manner.

The initial iterations of weather forecasts published by *The North-China Herald* and the *Eastern Times* exhibited notable discrepancies, particularly in the level of detail and technical terminology used. These differences were primarily attributed to the simplicity of the *Eastern Times*' reporting style and its readership's limited familiarity with Western meteorological terminology, which often resulted in simplified descriptions of complex weather phenomena. During the early period, the *Eastern Times* focused exclusively on daily weather forecasts, with particular emphasis on wind conditions. Take for example, the weather forecast published by *The North-China Herald* on 8 August 1905, which was presented as follows:

> The typhoon signalled yesterday afternoon, passed this morning a little to the S.-ward of Naha; it will progress over the Eastern Sea, inclining to N.N.W…According to the last observation, the typhoon seems to be to the N.E. of Formosa, moving W.N.W.[30] **Error! Reference source not found.**

The North-China Herald initially reviewed the typhoon's projected trajectory in the afternoon of the previous day, this was followed by a detailed examination of the typhoon's subsequent path and a comprehensive forecast of its future activities. In contrast, the *Eastern Times* merely noted "windy conditions on the north and south coasts."[31] The meteorological description was inadequate, failing to even specify that the weather event itself was a typhoon. The reported information was simplistic and vague, suggesting that the Chinese intellectuals editing the *Eastern Times* lacked a foundational understanding of western meteorological science. As a result, despite their awareness of the weather conditions, the

[29] Liu Chenchen. "Characteristics of *The North-China Daily News.*" *Youth Journalist* 27. No. 32 (2020): 101-102.

[30] *North China Daily News*, August 8,1905.

[31] "Weather forecast". *Eastern Times*. 8 August 1905. Translated from the original Chinese by the author "南北海滨有风。"

editors were unable to furnish accurate descriptions thereof. From 16 May 1905, the editors of the *Eastern Times* were supposed to have initiated monsoon-related reports, which identified the distinctive characteristics of the monsoon and distinguished them from the more general concept of 'wind'. This date is later than the commencement of monsoon reports in *The North-China Herald*. In the translation process, the French term for monsoon, "mousson," was inaccurately rendered as "mousson wind," which failed to fully capture the precise meaning of the English word "monsoon" for their Anglophone readership. At this time, two translators with experience in the United States were employed at the newspaper's office. However, the imprecise translation of Western meteorological terms reflected, to some extent, the incomplete understanding of Western meteorological knowledge among intellectuals working at the newspaper. Consequently, readers who were also of the same intellectual class could only gain limited insight into Western meteorology through the *Eastern Times*' coverage. The initial weather forecasts indicated that while some intellectuals had limited exposure to, and understanding of, Western meteorology, their grasp of the subject remained superficial. Therefore, it is reasonable to infer that the general public's understanding of Western meteorological knowledge was similarly limited.

During the later period from 1926-1929, the Weather Report section of the *Eastern Times* is comparable to the content in *The North-China Herald*. It provided quantitative descriptions of temperature values and changes over the previous two days, including daily highs and lows, along with qualitative assessments of other meteorological data such as windspeed and humidity. This comprehensive coverage offers a more accurate representation of the weather data provided by the Zikawei Observatory. For example, on 2 July 1926, *The North-China Herald* published the following weather report:

> The temperature near the Cathedral, Shanghai, for 24 hours ending 7p.m. Yesterday Min. 72.4 Max. 80.5 Same date, 1925 Min. 71.8 Max. 88.0 Rainfall trace.
>
> State on the morning of the 30th: High pressures over the Pacific Ocean. Low area crossing Nippon east-north-eastward. Summer monsoon along the China coast. Fine weather in the north: rainy and foggy in our Valley, improving in the afternoon. Overcast skies in the south.
>
> State on the morning of the 1st: Overcast weather with some mist. Normal pressure. South-south-easterly breezes.
>
> Probabilities, 4.30 p.m. yesterday: Cloudy weather with local mist, some thunder in the Valley. Variable winds in the north and over the Yellow Sea. Summer monsoon south of the Saddles. Siccawei [sic] Observatory.[32]

The weather forecast included in the *Eastern Times* on the same day closely mirrored that of *The North-China Herald*:

> The Zikawei Observatory forecasts at 4.30p.m. on the first day of the month a cloudy sky with fog and thunder in many places over the Yangtze River basin. The Yellow Sea and its northern part, the wind is not directional, south of Ma'an Island there are summer winds, one day at 3p.m. before the 24-hour period, the minimum temperature in this port 69.4, the maximum 84.4, the maximum temperature in the city. Four, the highest 84.8, the same day last year, a minimum of seven. Last year on the same day, the lowest 70.4, the highest 81.8. The same day last year, the minimum was 70.4 and the maximum 81.5. On another day the sky was cloudy and foggy, and the pressure was as usual, with a slight south-south-easterly wind. On the 30th of last month, there was high pressure in the Pacific Ocean, low pressure through Honshu, Japan, and east-northeast direction, along the coast of China with summer

[32] *North China Daily News*, 2 July 1926.

> winds, the sky was clear in the north, the Yangtze River basin rain and fog, the weather turned good in the afternoon, the south was cloudy.[33]

In this later phase, the *Eastern Times* was no longer exclusively directed towards the intelligentsia; it now also targeted the general public, particularly those residing in coastal areas and engaged in maritime activities. It provided weather-related data and information, thereby facilitating the dissemination of meteorological forecasting knowledge. By promoting Western meteorological concepts more widely in China, it enhanced public awareness of weather forecasts.

The dissemination of meteorological forecasts in Western countries preceded that in China. Consequently, Western immigrants in China had earlier exposure to such forecasts and were therefore able to attain a deeper understanding of them compared to the Chinese public. Initially, the *Eastern Times* employed rudimentary translations of meteorological and scientific terminology in its reporting. However, the content of weather forecasts was gradually enhanced during the two time periods analysed. The forecasts evolved from basic meteorological data to incorporate more sophisticated scientific knowledge and insights. This progression reflected the growing sophistication of the Chinese public's comprehension of Western meteorological concepts. Over time, the weather forecasts underwent a gradual process of enrichment, evolving from simple weather information to encompass comprehensive scientific knowledge and data, thereby reflecting the deepening of the Chinese public's understanding of Western meteorological knowledge.

The Influence of Traditional Concepts

The meteorological section of the *Eastern Times* from 6 March 1905 exemplifies the utilization of scientific knowledge by progressive reformists to challenge traditional Chinese beliefs and practices. The rationale behind the *Eastern Times*' coverage of meteorological forecasts can be attributed to the newspaper's founders' distinctive political stance. They perceived the application of scientific principles as a means to transform the traditional, regressive mindset of the Chinese populace. Consequently, the dissemination of meteorological information became an integral component of this mission. "From its inception in 1904, the primary objective of the newspaper group associated with *Eastern Times* was to dismantle and diminish concentrated authority through constitutional reform".[34] In its formative years, the *Eastern Times* served as a platform for reformists who sought to transform society through the principle of "science to save the country." They advocated that the introduction of scientific knowledge and innovations could challenge entrenched beliefs and practices. On the inaugural day of weather forecast reporting, the newspaper emphasized under the heading "Our Special Confession" that the purpose of disseminating such information was to promote scientific literacy.

> Everyone will surely make comparisons, and only then can they know how to make choices. Therefore, if one wants to rid people of their superstitions, one must first reveal the real principles. Our establishment has always had this intention. Thus, it is planned that this year, the almanac and the weather forecast will be jointly published in the section of the forecast, so that people can understand for themselves which is more useful between superstition and

[33] "Weather report". Eastern Times. July 2, 1926. Translated from the original Chinese by the author:"徐家汇天文台一日下午四时半气候预测，长江流域天际多云，降雾，多处有雷。黄海及其北部，风无定向，马鞍岛以南有夏季风，一日下午三时前二十四小时内，本埠气温最低六九.四，最高八四.八，去年同日，最低七〇.四，最高八一.五。又一日天阴而雾，气压如常，微有东南南风。上月三十日，太平洋有高气压，低压经日本本州而东东北向，沿中国海岸有夏季风，北方天晴，长江流域雨而降雾、下午天气转佳、南方阴霾。"

[34] Joan Judge. *Print and Politics: Eastern Times and the Culture of Reform in Late Qing China*.

> the real principles…Starting from tomorrow, the weather chart indicating wind, rain, cold and heat will be added beneath the Shixian Calendar for the convenience of the readers.[35]

Thus, for comparative purposes the meteorological forecast and the Shixian Calendar were positioned respectively on the left and right sides of the newspaper header. The Shixian Calendar, originally known simply as the calendar, was renamed to avoid the taboo associated with Emperor Qianlong's name. It enjoyed widespread popularity and had a significant influence on people's daily lives.

In practice, the general civil calendar served as a guide for many people, who tended to adhere to it in order to ensure good fortune and to avoid misfortune. Additionally, it is used to record various events and traditions, including visits with friends and relatives, interactions with neighbours, borrowing and lending, weather patterns, family celebrations, and other significant occasions.[36]

The new school of thought, which utilized meteorological forecasts to challenge the influence of the calendar on perceived "good and bad luck," acknowledged the scientific nature of these forecasts and their potential to transform national perspectives. The integration of meteorological instruments—such as wind and rain gauges and thermometers—into the Shixian Calendar exemplified the scientific rigor of these tools and reflected the growing recognition of their utility among intellectuals at the time.

In the early days of the *Eastern Times*, as the Russo-Japanese War was nearing its conclusion, the prevailing weather conditions in Zhili were documented thus on 19 June 1904, in the 'Tianjin' section of the 'News from the Provinces' on the third page:

> Tianjin back to the guest cloud, this year's spring straight province rain in time, grain prices fell, but by April since the hailstorms repeatedly, good rain is very rare. Recently, the yellow winds, drought has been shaped, like Gengzi April and May weather, think because of Japan-Russia war is urgent, so the wind and clouds also for the change of colour also.[37]

In the context of the Russo-Japanese War, the *Eastern Times* attributed meteorological phenomena such as sandstorms and droughts in Zhili to the ongoing conflict. Furthermore, the newspaper drew parallels between these unusual weather patterns and those observed during the Eight-Power Allied Forces' invasion of China in the Gengzi Year (1900). The idea that the war resulted in anomalous meteorological occurrences reflects the prevailing belief among the Chinese intellectuals who were editors of the *Eastern Times* that conflicts could influence weather patterns, a view constrained by conventional wisdom.

The practice of petitioning for precipitation and prohibiting the slaughter of animals was a recurrent phenomenon from the inception of the *Eastern Times* until its cessation of publication in 1939. The *Eastern Times* documented over one hundred instances of such petitions, often prompted by the effects of significant droughts. For example:

> On the 10th, the Central News Agency in Hangzhou reported that the three-day slaughter ban had been implemented. This prompted the gentry and other members of the local elite to once again ascend Mount Jade Emperor to pray for rain. Since the 9th, the gentry of Hangzhou

[35] "Special Confession of the House". *Eastern Times*. March 6, 1905. Translated from the original Chinese by the author: "凡人必有所比较，而后知去取故欲去人迷信者，必先以实理显之。本馆夙具此心，故拟今岁，用时宪书与天气预报二者合登预报端，使人自明迷信与实理之熟为有用…自明日始，再加风雨寒暑表列时宪书之下，以便阅者。"

[36] Wang Yuanchong, "Calendar Books of the Qing Dynasty and the Formation of a Modern." *Unified and Multinational China* 05, (2018):185-203 & 208.

[37] "Provincial News". *Eastern Times*. June 19, 1904. Translated from the original Chinese by the author："天津归客云，今年春间直省雨水应时，谷价顿跌，乃由四月以来冰雹屡降，好雨甚稀。近日黄风时作，旱象已形，恍如庚子四五月间气象，想因日俄战事方急，故风云亦为变色也。"

> have set up an altar on Mount Jade Emperor to pray for rain. This follows the decision of the Provincial Public Security Bureau of the city to ban slaughtering for three days, from the 10th, in the hope that the lack of rain will be alleviated. Furthermore, the production of fish replicas, which are cured, must also be halted in order to facilitate the avoidance of the cloud.[38]

The involvement of well-educated members of the gentry, who may represent certain intellectual groups and the general public, in this activity suggests that the dissemination of Western meteorological knowledge was also influenced by traditional cultural frameworks. In 1926, the Chinese meteorologist Zhu Kezhen published an article entitled: "On Praying for Rain, Banning Butchery and Drought", in which he put forth the proposition that:

> [B]anning butchery and praying for rain, and welcoming the gods and goddesses to compete in droughts are like the wind, horses and oxen, which are not related to drought, and there is no doubt about it when we consider it in the context of today's scientific progress.[39]

Meteorological professionals such as Zhu Kezhen had been vocal in their criticism of the practice of praying for rain and prohibiting the slaughter of animals. They recognized that, against the backdrop of a time when science had not been popularized in China, scientific methods should be promptly used to study weather phenomena and issue weather forecasts. This phenomenon reflects a psychological inertia that had developed among the Chinese people over a long period. It is not unique to China; many other cultures also engaged in similar practices of seeking divine intervention during significant weather events. In the process of developing agricultural production, countries around the world have shown great concern for weather conditions, which gave rise to the practice of rainmaking rituals. Even in the era of the development of modern meteorology, this tradition of praying for rain persisted.[40] For instance, Christian believers in twentieth century America would hold rainmaking ceremonies during droughts, while in China, people would conduct such rituals in temples amid dry spells.

In the era preceding the advent of scientific inquiry, people regarded meteorological phenomena as enigmatic and capricious. Consequently, they petitioned deities for intercession when the weather exhibited aberrant behaviour, a practice observed in China and many other countries.[41]At that time, regardless of a country or nation's level of scientific advancement, the global population tended to seek solace through prayer when confronted with anomalous meteorological events.

Conclusion

Weather forecasts were among the earliest forms of Western meteorological knowledge introduced into public life in China. Newspapers served as the earliest mass media platform for publishing weather forecasts in modern China. The *Eastern Times*, being the first Chinese-run and Chinese-language newspaper to introduce a weather forecast, stands as a valuable source of meteorological history from this era. This publication not only circulated within Shanghai but also reached 54 cities across four Chinese provinces, as well

[38] "Hangzhou prays for rain again". *Eastern Times*. August 11, 1934. Translated from the original Chinese by the author："杭州十日中央社电，杭市十日起，又实行断屠三天，士绅复上玉皇山向玉皇大帝虔诚祈雨。杭州通讯，杭市士绅，自九日起，又在玉皇山设坛祈雨，并由省会公安局通令全市屠宰商及肉铺，自十日起禁屠三天如三日不雨。则全市之腌腊鱼鲞，亦须一例停市祈禳云。"

[39] Zhu Kezhen, "On Praying for Rain, Banning Slaughter, and Drought." *Eastern Miscellany* 13, no. 23 (1926): 9-10.

[40] Seneviratna, Anuradha. "FOLK BELIEFS AND RITUALS ASSOCIATED WITH RAIN AND DROUGHT." Journal of the Royal Asiatic Society Sri Lanka Branch 29 (1984): 33–54. http://www.jstor.org/stable/23730747.

[41] Wang Hao, "The Observations and Cognitions of Foreign Meteorological Observatories by Traditional Scholars Who are Travelling Abroad in Late Qing Period." *Studies of Maritime History*, no. 2 (2023): 282.

as 16 countries overseas. For readers in Shanghai and Suzhou, these forecasts provided daily weather information. Moreover, the reports on port city conditions and warnings about typhoons and other severe weather events offered coastal residents and sailors in Shanghai essential guidance for planning their maritime activities and safeguarding lives and property. The inclusion of weather forecasts in Chinese newspapers facilitated the dissemination of Western meteorological knowledge and technology, allowing the public to gain insights into weather conditions in foreign regions such as Japan, Korea, and Manila, particularly concerning coastal wind patterns.

The evolution of the *Eastern Times*' weather forecasts over two distinct periods reflects the broader engagement of the Chinese public with meteorological science during this period. These changes can be attributed to the differing editorial philosophies of the newspaper's managing editors. In its initial period, the *Eastern Times* was managed by reform-minded individuals who had limited exposure to Western meteorology, leading to a lower level of societal awareness and intellectual interest in meteorology. By the 1920s, however, intellectuals championed the cause of "science," fostering widespread public interest in scientific knowledge. During this second period, the *Eastern Times*, along with other prominent publications like *Shen Bao* and *Eastern Miscellany*, significantly increased their coverage of Western scientific disciplines, including meteorology. The return of meteorology students from abroad played a crucial role in disseminating advanced meteorological knowledge. As a result, both intellectuals and the general public gained deeper access to Western meteorological insights. Weather forecasts were no longer prominently featured at the top of the newspaper but were integrated into the daily news sections, reflecting their growing integration into everyday life.

Throughout its publication history, the *Eastern Times* consistently reported on severe weather events. Despite interruptions in regular weather forecast reporting between 1908 and 1925, the newspaper continued to provide updates on typhoon warnings and cessation notices, often accompanied by analyses of the underlying causes. This ongoing coverage highlights the increasing public concern for meteorological disasters and the expanding scope of public interest in meteorology, underscoring the broader dissemination of Western meteorological knowledge in China during the period.

Comparing the *Eastern Times*' weather forecast content with that of the English-language newspaper *The North-China Herald* offers further insight into the Chinese public's evolving understanding of Western meteorology. Initially, the *Eastern Times*' forecasts lagged behind those of *The North-China Herald*, which began publishing daily weather reports from the Zikawei Observatory in 1884. The consistency and comprehensiveness of *The North-China Herald*'s forecasts reflected the higher public awareness of meteorology in Western countries like Britain and France. By the second period in 1926, the *Eastern Times*' content closely mirrored that of *The North-China Herald*, indicating a significant improvement in the public's comprehension of weather forecasts. This transformation demonstrates how Western meteorological knowledge gradually became an integral part of daily life in Shanghai, contributing to the city's cultural fabric.

The *Eastern Times*' introduction of weather forecasts aimed to promote Western scientific principles and challenge traditional beliefs, such as those found in the Shixian Calendar regarding auspicious and inauspicious days. Despite this goal, the newspaper frequently reported on rain prayers and meat bans, highlighting the enduring influence of traditional practices. A few intellectuals recognized the challenges posed by these traditions and actively promoted Western meteorological knowledge. However, most of the public remained deeply influenced by traditional customs. This phenomenon underscores the

complex interplay between science and tradition, where traditional beliefs often interacted with and sometimes hindered the dissemination of scientific knowledge.

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