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Meiyu in the middle and lower reaches of the Yangtze River since 1736

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"Yu Xue Fen Cun" records during the Qing Dynasty are used to identify the starting and ending dates of Meiyu at the period of 1736—1911. These results, along with the instrumental meteorological records, are used to reconstruct the series of length and precipitation of Meiyu during 1736—2000 over the middle and lower reaches of the Yangtze River. The characteristics of Meiyu are analyzed since 1736. Moreover, the strength of East Asian Summer Monsoon and locations of rainband are discussed, based on the relationship between the length of Meiyu and the Index of East Asian Summer Monsoon. It is found that the starting and ending dates and the length of Meiyu have significant interannual and interdecadal variations. Apart from 7—8 years, 20—30 years and 40 years cycles for the lengths of Meiyu, the centennial oscillation is also presented. The length of Meiyu, monsoon rainband movement over eastern China, and the strength of East Asian Summer Monsoon (EASM) have a very good correlation, which can be expressed in the following: during the periods of 1736—1770, 1821—1870 and 1921—1970, the EASM was stronger, and the monsoon rainband was located in North China and South China easily, corresponding to the decreased length of Meiyu. Whereas during the periods of 1771—1820, 1871—1920 and 1971—2000, the EASM was weaker and monsoon rainband usually stopped at the middle and lower reaches of the Yangtze River, corresponding to the increased length of Meiyu.

"Yu Xue Fen Cun" records, reconstruction, past 300 years, variation of Meiyu, middle and lower reaches of the Yangtze River

Meiyu is an important climate phenomenon over the middle and lower reaches of the Yangtze River (MLRYR), south part of Korean Peninsula (called Changma) and mid and south Japan (called Baiu) from June to July, characterized by persistent rainfall. Meiyu is a unique climate feature in East Asia monsoon region when the seasonal march of the East Asian Summer Monsoon (EASM), and its onset and intensity closely correlate with the seasonal variation of atmospheric circulation over East Asia, particularly with the characteristic of summer monsoon[1,2]. It is important to disclose the characteristics of Meiyu change for understanding the evolvement of the EASM System.

The research work on Meiyu in China has been conducted since the 1930s[3]. However, due to the scarce long climatic records, attention has only been paid to the recent 100 years by Chinese researchers[4,5]. In China, abundant historical documents, such as official records on histories, local gazettes, and "Memos to Emperors", exist, containing a great deal of information of Meiyu. These documents have been used to reconstruct the long-term characteristic of Meiyu, and Chinese scholars have provided good paradigms for us, for example, Zhang, who reconstructed the Meiyu activity of the eighteenth century in the lower reaches of the Yangtze River using "Qing Yu Lu" records[6] (records of sunny

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and rainy days in Qing Dynasty), and Jiang, who reconstructed abrupt change of flood and drought during the past millennium over the Yangtze River valley[7].

Here we used "Yu Xue Fen Cun" records during the Qing Dynasty, along with the instrumental records, to reconstruct the Meiyu change over the MLRYR since 1736, and to analyze the characteristics of Meiyu, the strength of EASM and the location of rainband at different stages.

1 Data sources

The five representative stations Anqing (Anqing Fu), Nanjing (Jiangning Fu), Shanghai (Songjiang Fu), Hangzhou (Hangzhou Fu) and Wuhan (Wuchang Fu) are selected within the region of MLRYR, and Fu is an administration unit between province and county (Figure 1). The data sources of this paper include "Yu Xue Fen Cun" records during the Qing Dynasty and instrumental precipitation data, where Yu refers to rainfall, Xue means snowfall, Fen is a Chinese length unit, approximately 0.32 cm, and Cun equals 10 Fens, which are involved in the "Memos to Emperors" from the first year of Qianlong Reign (1736) to the third year of Xuantong Reign (1911), documenting the precipitation information of either the "Yu Fen Cun" (rain infiltration depth) or the "Xue Fen Cun" (snow depth) and sometimes the descriptions of monthly, seasonal and annual precipitation conditions during the specially critical periods for crops growth or flood periods. "Yu Fen Cun" depicts the depth of the moisture penetration after the rainfall, determined by the wet-dry boundary identified by digging into the soil in "designated" flat farmland, and "Xue Fen Cun" elaborates the snow depth on the surface after snowfall. "Yu Xue Fen Cun" records are proved to be quantitative, high-resolution temporal and spatial distribution measurement data, with every precipitation event covering 273 administrative sites within the 18 provinces of China, and they to date are the earliest and systematic precipitation measurements in the world[8]. Like most historical documents, there is something missing in the records because of damage due to fire, steal, and other natural disasters. Most missing records were concen-

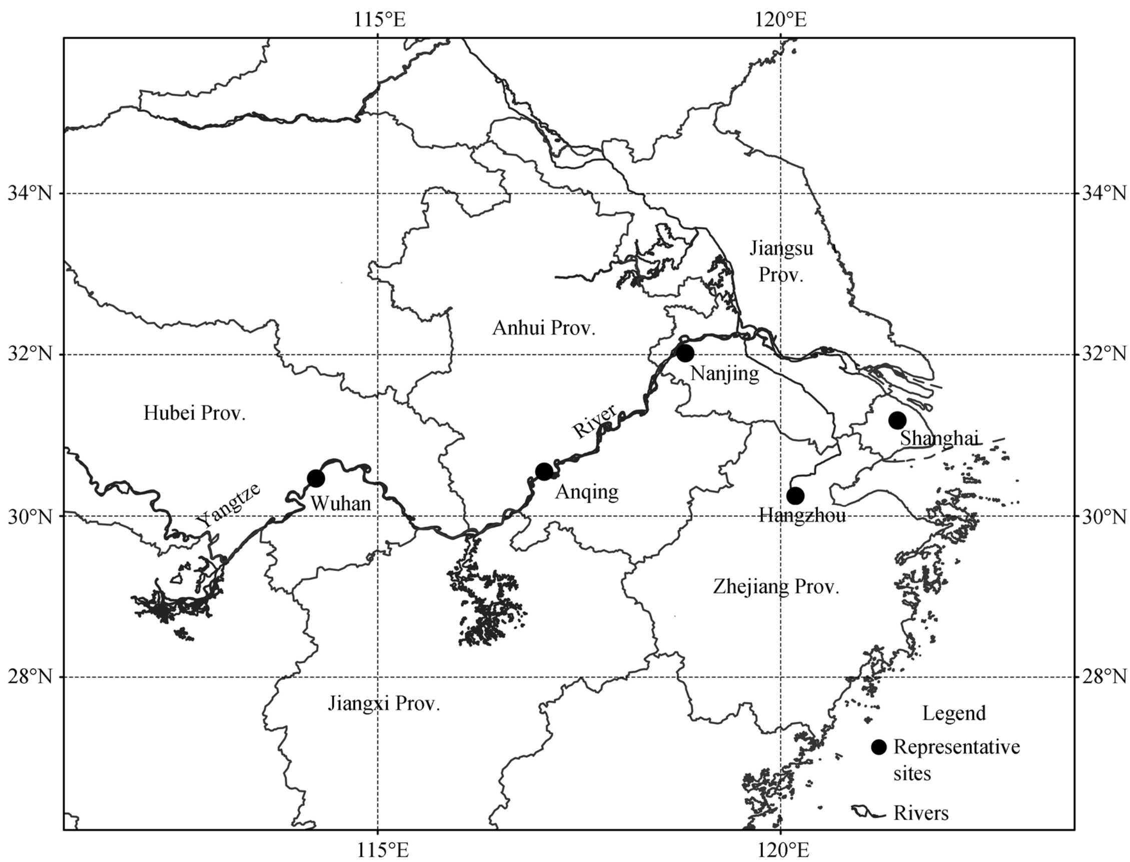

Figure 1 The research domain and representative sites distribution.

trated in the years 1752, 1815, 1819—1820, 1833, 1845, 1860—1861, 1870—1871 and 1884. In addition, the flood and drought archives for the rivers were also extracted from "Memos to Emperors" in the Qing Dynasty recording the typical precipitation information in China, which are used to supplement the missing data of "Yu Xue Fen Cun" in 1849 and 1851[9−11].

Instrumental precipitation data are available from 1912 to 2000, with the data missing during 1912—1950. Because of the missing 1912—1950 measurements at Anqing, the precipitation measurements at the neighboring city, Wuhu, are used for supplement. The missing data for individual sites are concentrated in 1920—1921, 1923, 1938—1940, and 1944—1945 for Nanjing, 1937—1946 for Wuhan, 1912—1923, 1927—1928, and 1936—1950 for Anqing (Wuhu), and 1919—1932, 1938—1941, and 1943—1949 for Hangzhou.

2 Identification of Meiyu period and verification

2.1 Meiyu period

The starting and ending dates of Meiyu are usually determined by the rainy days, precipitation amount at the selected 5 sites, Nanjing, Shanghai, Jiujiang, Wuhu and Hankou over the MLRYR, and the location of the subtropical high in the western Pacific. The three significant characteristics of Meiyu can be expressed with continuous rainfall in summer (mid-June to early and mid-July), the result of the large-scale atmospheric circulation covering most of the regions in the MLRYR, and the high correlation existing between rainy days, the amount of rainfall and the subtropical high, so "Yu Xue Fen Cun" can be used to reconstruct the Meiyu series for the distinct rainy days records. The daily instrumental precipitation data provide a cross check of the accuracy on the reconstruction results.

(1) The identification of Meiyu period for a single site. During May—August, at least six rainy days during any continuous 10 days can be called precipitation concentration period. However, the spring rain, Meiyu and summer rain always occur in sequence in some years over this region and there exists the overlapped time, so it is difficult to extract the starting and ending dates of Meiyu exactly. As indicated by other references on the identification of Meiyu period[12−15], the precipitation ending before June 15 is called spring rain, the precipitation starting after July 10 is called summer rain, and the rest is called Meiyu. Here the related records of the fourth year of Qianlong Reign (1739) in Anqing site are taken as an example (Table 1) to introduce the identification of Meiyu period. As shown in Table 1, the precipitation events are continuous during June 11—July 8,

Table 1 An example of Meiyu identification at individual site: Anqing, 1739

Reporter	Date source[a)]	Description for rainfall in YXFC	Concentrated rainfall period	Meiyu period
Buzhengshi of Anhui Yan Sisheng	duplicate memos by Military Department	"All Fus were in rainless again from March to first of May in Chinese Lunar Calendar (April 8—June 5) in Shangjiang (Anhui), besides Huizhou Fu…. It got the rain on the 6th,11—13th of the fifth month (June 6,16—18)…"	rainless before June 11	June 11—July 8
Governor General of Liang Jiang Na Sutu	memos with red postil by Emperor	"Jiangsu and Anhui both got the heavy rain on the 8th—9th and 13th day of the fifth month in Lunar Calendar (June 13—14,18), and got the heavy rainstorm from 16th to 19th day (June 21—24)" again	June 13—14, 18, 21—24	
Governor General of Liang Jiang Na Sutu	memos with red postil by Emperor	"…Anqing got the continuous rain on the 6th, 8th, 11th, 12th day (June 11, 13, 16, 17), but the soil was not wet enough, and got the rain again on the 17th—19th day in Lunar Calendar (June 22—24)"	June 11—17, 22—24	
Governor General of Anqing Sun Guoxi	memos with red postil by Emperor	"Anqing got the rain 3 cuns on the 16th day of the fifth month (June 21) in Lunar Calendar, 8 cuns on the 17—18th day (June 22—23), 6 cuns on the 18th day (June 23) from Wushi (Chinese ancient time 11:00 am—1:00 pm) to Youshi (17:00 pm—19:00 pm), and 2 cuns on the 19th day (June 24)…"	June 21—24	
Governor General of Anqing Sun Guoxi	cultivation archives	"After Anqing got the rain from the 16th—18th day of the fifth month in Lunar Calendar (June 21—23), it was raining till the 3rd day of the sixth month (July 8)"	June 21—July 8	
Governor General of Anqing Sun Guoxi	memos with red postil by Emperor	"All Fus (Zhous) got the enough rain before the 30th day of the sixth month (July 8), but were short of rain from the 10th day to first of the sixth month(Aug. 4—13), and had rain again with different cuns on the 5th and 6th (Aug. 8—9), 15th—18th (Aug. 18—21) day of the seventh month in Lunar Calendar"	rainless after July 8	

a) From "Memos to Emperors of Qianlong Reign".

but scare before June 11 and after July 8. So the Meiyu period in 1739 in Anqing can be identified as June 11—July 8. In sequence, the Meiyu periods in other sites can be also identified as June 11—June 30 in both Nanjing and Shanghai, June 11—July 6 in Hangzhou, and June 10—June 24 in Wuhan. To keep the reconstruction series consistent, the Meiyu period during 1912—2000 with instrumental data is identified using the same definition.

It is worthwhile to note the supplement for the missing data in the individual site. To reconstruct the consecutive Meiyu series, two steps are conducted: the first is regression equation calculation for the starting (ending) dates between any selected two sites during 1951 — 2000, because of their high correlation coefficient over 0.80 (see Appendix 1 of web edition); the second step is interpolation for the missing data of supplement materials as listed in Appendix 2 of web edition based on the regression equations.

(2) The identification of Meiyu period over the MLRYR region. The regional starting (ending) dates of Meiyu are defined with the individual year of the period of 1736—2000 to be the respective dates contained in four of the five sites. For example, the regional Meiyu period of 1739 would be June 11—July 6.

(3) Empty Meiyu. During May—August, this year will be defined with empty Meiyu, when the rainy days are less than six days at any continuous 10 days. The empty Meiyu can be readily identified from the "Yu Xue Fen Cun" records, documenting a lot of descriptions of drought events in this region. For example, in the fiftieth year of the Qianlong Reign (1785), a large number of "Yu Xue Fen Cun" records reported the drought events and the actions taken to relieve the people, such as 94 records in Zhejiang Province, 174 records in Anhui Province, 259 records in Jiangsu Province, and 125 records in Hubei Province, but few precipitation descriptions were found. As the "Imperial Edicts of Emperor Qianlong" recorded, "*Yunhe in Wuxi region dried up, since the farmers, living on the two banks of river were irrigating with noria from day to night…*", "*summer and autumn were both lack of rain…, the water of official channel had been used for trade and transportation, however the government cannot forbid the farmer to do so when the weather was in severe drought…*"; "*…the disaster area of Hubei Province needed rice support urgently from other provinces…;…Anhui, Jiangsu and Zhejiang provinces needed rice support urgently from Sichuan…*"; "*Anhui Province did not have enough rain, and the farmlands of other Fus were in drought, besides 6 counties in Huizhou Fu*"; "*Anqing, the capital city of Anhui, got rainfall 2 cun on June 26th, but the soil was still arid for long clear days in the past, now the buckwheat and cereals cannot be complementarily cultivated, and the farmers were expecting the continuous heavy rainfall*"; "*the west of Zhejiang Province was sunny for a long time, and river around the two cities, Hangzhou and Jiaxing, dried up…*"; "*… Zhejiang Province was in severe drought…*". Therefore, 1785 is a year of empty Meiyu. The years 1856, 1897, and 1905 also can be identified with empty Meiyu during 1736—1911.

2.2 Verification for the definition of Meiyu period

The comparison has been made between our definition of Meiyu here and the normal definition summarized from the rainy days, rainfall, and the location of subtropical high during 1951—2000. The mean starting and ending dates of Meiyu are June 16 and July 12 respectively, and the duration is 26 days by our definition, whereas that is June 18, July 14, and 26 days by the comprehensive method. While, the mean length is identical for the both methods, and the mean of starting and ending dates of Meiyu are both advanced 2 days in our definition. Table 2 shows that the difference of less than 3 days accounted for 60% of starting dates and 80% of ending dates of all the years, and the difference of less than 5 days accounted for 75% and 87%. However, a small number of the years have big difference between the two methods, e.g. the starting dates of 1960, 1974, 1987 and 1991, the ending dates of 1963, 1973 and 1980, which might have been caused by the two reasons: one is the special precipitation events, due to the stagnate duration of rainband inconsistent with the location of subtropical high; for example, in 1987, our identification with June 13 is different from ref. [5] with July 1. This is because the continuous rainfall started on June 13, but after the ridge of the subtropical high arrived at the north of 20°N on June 11—13, retreated southward, and stopped at 23—25°N until late June. Another reason is that our definition cannot distinguish the second Meiyu from the observational data. For example, the Meiyu period was identified with June 7—July 18 in 1980, which is almost consistent with the first Meiyu of June

9—July 21 of ref. [5]. Besides, the inconsistent sites in the two definitions could result in difference.

Table 2 The comparison of starting (ending) dates between the reference by Xu et al.[5] and our definition (no empty Meiyu is included)

Difference by days (d)	For starting dates		For ending dates	
	Occurrence years (a)	Percentage (%)	Occurrence years (a)	Percentage (%)
≤3	27	60	38	85
4	7	15	1	2
6—10	7	15	4	9
≥11	4	9	2	4

The correlation coefficients of annual starting and ending dates of Meiyu are 0.77 and 0.96, respectively, which explained 59.4% and 91.3% variance, passing 99.9% confidence level. So it is reasonable to select rainy days indicator for determining the Meiyu period. The difference of starting (ending) date of Meiyu between the two definitions possibly is derived from the system error, which does not have affected the characteristic analysis of Meiyu.

In addition, the differences exist in the ending dates, that is, July 6 for our definition, and July 8 for ref. [6] over the lower region of Yangtze River, and length of Meiyu during the 18th century, though the starting dates both are June 15. The mean length differs by 2 days. The consistent change trend of Meiyu duration existed, i.e. a longer length before 1765, but a shorter length for the period of 1765—1790, and an increasing trend during 1790—1800.

3 Results and analysis

3.1 Interannual and interdecadal variation of Meiyu

As mentioned in section 2.1, the annual starting and ending dates, the length of Meiyu and the precipitation reconstruction during Meiyu period of 1736—2000 are shown in Figure 2. The historical Meiyu rainfall is calculated using the regression relationship (P_m = 9.8463L_m–10.086, where P_m indicates the rainfall of Meiyu, L_m indicates the length of Meiyu, the sample size is 49, and correlation coefficient R = 0.876, the high variance explanation can reach up to 76.7%). Table 3 gives the comparison of statistical results of the three periods, 1736—1911, 1912—1950, and 1951—2000. It can be seen that the mean statistical characteristics of Meiyu during 1736—1911, starting date, June 14, ending date, July 8, and the length with 24 days are almost identical with those of the period, 1951—2000. And the interannual variability is significant, for example, there is big difference between the earliest and latest starting (ending) dates, and the longest and shortest lengths of Meiyu (rainfall). Spectral analysis reveals that the Meiyu length during 1736—2000 shows statistically significant interannual variations with 2 years and 7—8 years cycles.

Meiyu has significant interdecadal variability. For example, there existed four regimes for the starting date, the relative earlier starting before 1830, after 3 significant fluctuations with 20-years cycle during 1831—1920, the series showing a delay trend after 1921, although it became advance after 1971. While, the ending date of Meiyu also has four regimes: the relative earlier ending before 1820, after significant fluctuations with 20—30 years cycle during 1821—1890, the series showing a decreasing fluctuation at the period of 1891—1940, and then increasing interdecadal variability afterward. The length of Meiyu period and the amount of rainfall both have significant interdecadal variability. Morlet wavelet transformation for signal analysis shows that the Meiyu length has different interdecadal oscillation and strength in different periods, but the 20—30 years and 40 years cycles are significant (Figure 3). Besides, the centennial oscillation is significant for the length of Meiyu as well, for example, the three periods, 1771—1820, 1871—1920 and 1971—2000, are longer but in the other three periods, 1736—1770, 1821—1870 and 1921—1970, are shorter.

High correlation exists between the starting and ending dates of Meiyu, but not all the time, for example, the correlation coefficient of 0.5729 for the period of 1736—1895 and 0.3839 for the period of 1931—1970, passing α = 0.05 significance level; but the correlation coefficient of 0.0817 for the period of 1896—1930 and 0.1514 for the period of 1971—2000.

3.2 Relationship between Meiyu and EASM

The comparison of the length of Meiyu and the variability of EASM index[16] during 1873—2000 is shown in Figure 4. It can be seen that the EASM has significant multi-decadal variability with a relatively crucial period from 1921 to 1970 separating a relatively weak earlier period from a later period. The index of the EASM is negatively correlated with length of Meiyu: when the

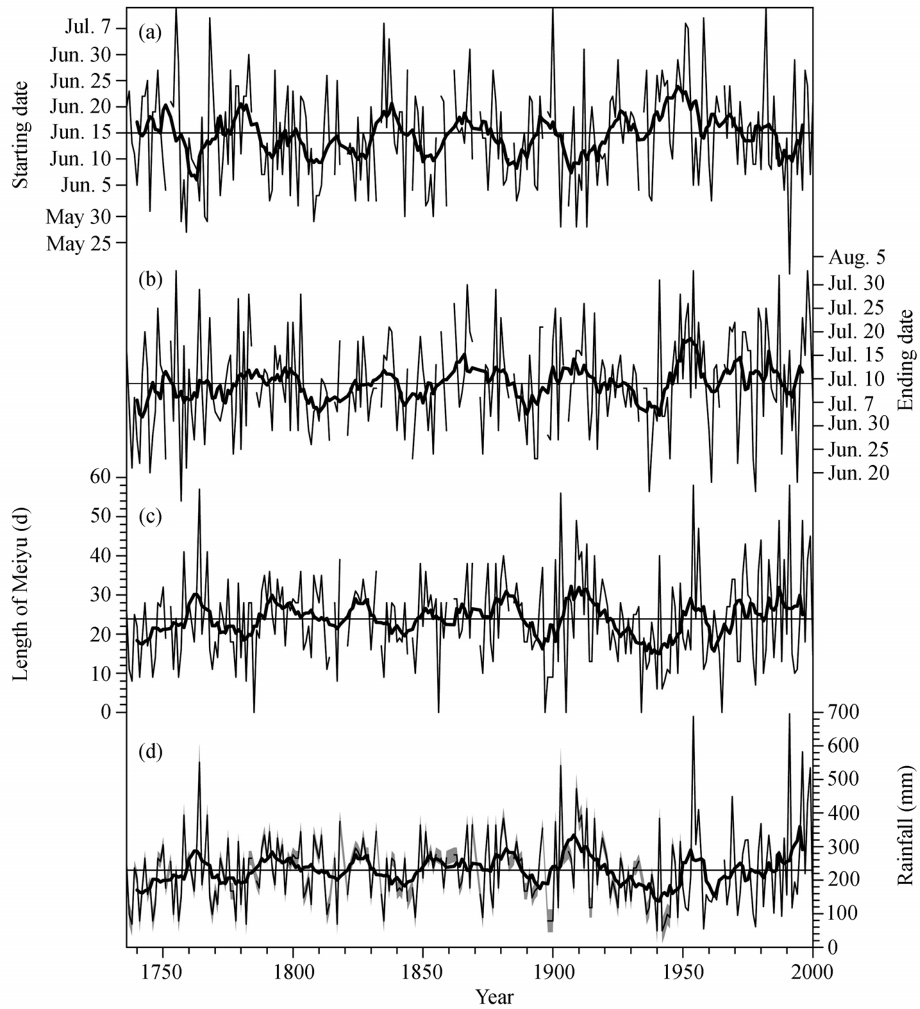

Figure 2 The characteristic of Meiyu during 1736－2000. (a) Starting dates; (b) ending dates; (c) length of Meiyu; (d) rainfall of Meiyu; heavy line: 9 years running mean value; grey area in (d): 95% confidence boundary.

Table 3 The main statistical comparison between the three periods over the middle and lower reaches of the Yangtze River (no empty Meiyu is included)

Periods		1736－1911	1912－1950	1951－2000
Starting dates (d/month)	earliest (year)	27/5(1759)	28/5(1913)	19/5(1991)
	latest (year)	9/7(1900)	1/7(1912)	9/7(1982)
	mean	14/6	17/6	16/6
Ending dates (d/month)	earliest (year)	14/6(1757)	16/6(1931)	16/6(1978)
	latest (year)	2/8(1755)	31/7(1947)	5/8(1954)
	mean	8/7	8/7	12/7
Length (d)	longest (year)	57(1764)	43(1913)	58(1991)
	shortest (year)	8(1782,1838)	6(1940,1942)	7(1978)
	mean	24	21	26
Rainfall (mm)	maximum (year)	551(1764)	413(1913)	695(1991)
	minimum (year)	69(1782, 1838)	49(1940,1942)	61(1978)
	mean	226	197	246

EASM at the mean value of 1.13 for the period of 1873－1920 is relatively weak, the mean length of Meiyu is 26 days; while the relatively crucial period with the mean value of 1.30 corresponds to the length of Meiyu 21 days; but for the weakest period during 1971－2000 with the mean value of 0.81, the length of Meiyu even reaches up to 27 days. As demonstrated by Guo et al., the summer precipitation spatial pattern over

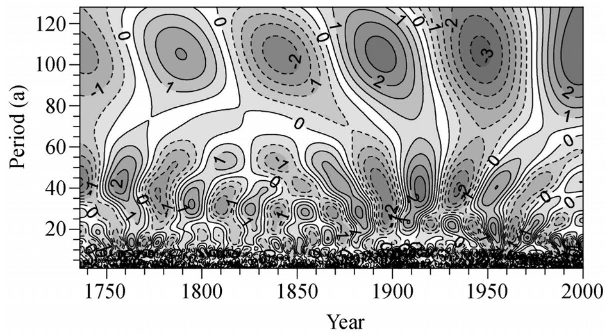

Figure 3 The wavelet transformation on the length of Meiyu over the MLRYR. The dash line circles: the shorter length of Meiyu, and the solid line circles: the longer length of Meiyu.

the east of China is usually characterized by 2 rainbands in North China (NC) and South China (SC), when the EASM is strong, and conversely, the rainy region will occur in MLRYR, corresponding to the weak EASM. So we can infer the location of summer monsoon rainband at the different periods for the last 300 years. Our speculation, indicated in Table 4, is consistent with the result of Wang et al.[17] from *Yearly Charts of Dryness/Wetness in China for the Last 500-year Period* and the high frequency of rainband stayed in Yellow River valley during 18th century, and Yangtze River valley during 19th century.

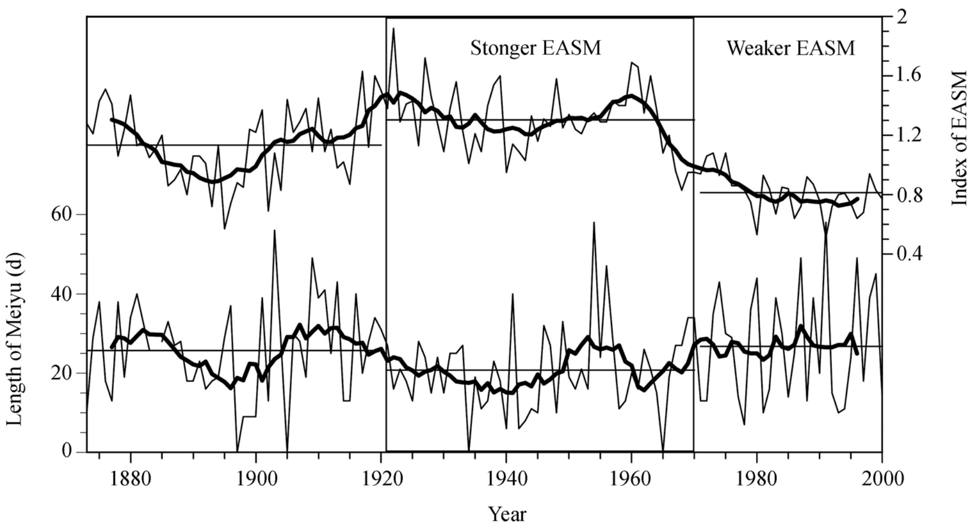

Figure 4 The relationship between EASM index[16] and length of Meiyu. Heavy solid line: 9 years running mean value; slim line: annual mean value of the related periods.

Table 4 The location changes of summer rainband over the eastern monsoon region of China during the last 300 years

Period	Length of Meiyu	Strength of EASM	Location of rainband
1736—1770	shorter	stronger	NC and SC
1771—1820	longer	weaker	MLRYR
1821—1870	shorter	stronger	NC and SC
1871—1920	longer	weaker	MLRYR
1921—1970	shorter	stronger	NC and SC
1971—2000	longer	weaker	MLRYR

4 Conclusions

The combination of the historical records of "Yu Xue Fen Cun" and instrumental records and analysis demonstrated that interannual-interdecadal variation existed, with 2 years, 7—8 years, 20—30 years, 40 years and centennial oscillation. The length of Meiyu, monsoon rainband movement over eastern China, and the strength of the EASM have very good relationship. For example, the relatively strong EASM during the periods of 1736—1770, 1821—1870 and 1921—1970, the subtropical high northward, and the monsoon rainband usually were located in North China and South China, corresponding to the decreased length of Meiyu. Conversely, the weaker EASM during the periods of 1771—1820, 1871—1920 and 1971—2000, the subtropical high southward, and monsoon rainband usually lied in the MLRYR, which corresponded to the increased length of Meiyu. These conclusions suggested that the increased precipitation over the MLRYR and decreased precipitation over the middle and lower reaches of the Yellow River since 1970s[18] might have been caused by the interdecadal natural climate oscillation.

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Appendix 1 Meiyu period during 1736－2000

	Shanghai	Nanjing	Hangzhou	Anqing	Wuhan	Region
1736	6.19－7.15	6.19－7.15	6.19－7.8	6.16－7.15	6.19－7.18	6.19－7.15
1737	6.22－7.5	6.22－7.4	6.28－7.4	6.23－7.4	6.22－7.4	6.23－7.4
1738	6.14－6.21	6.11－6.21	6.11－6.21	6.13－6.21	6.9－6.25	6.13－6.21
1739	6.11－6.30	6.11－6.30	6.11－7.6	6.11－7.8	6.10－6.24	6.11－7.6
1740	6.3－6.23	6.4－6.23	6.4－6.26	6.4－6.28	6.4－6.15	6.4－6.26
1741	6.13－6.22	6.13－6.22	6.12－6.22	6.13－6.22	6.13－6.22	6.13－6.22
1742	6.22－7.11	6.22－7.11	6.22－7.11	6.22－7.11	6.22－7.11	6.22－7.11
1743	6.22－7.20	6.22－7.20	6.22－7.6	6.23－7.6	6.22－7.6	6.22－7.20
1744	6.20－7.11	6.20－7.11	6.24－7.11	6.25－7.11	6.20－7.16	6.24－7.11
1745	(5.29－6.20)	5.30－6.21	5.29－6.16	5.20－6.16	5.30－6.14	5.30－6.20
1746	6.19－6.28	6.13－6.28	6.19－6.28	6.19－7.1	6.19－6.28	6.19－6.28
1747	(6.19－7.2)	6.19－7.3	6.19－7.3	6.19－7.2	6.18－7.2	6.19－7.3
1748	6.26－7.13	6.26－7.13	6.26－7.13	6.26－7.24	6.26－7.24	6.26－7.24
1749	6.15－7.13	6.16－7.10	6.16－7.13	6.15－7.9	6.19－7.13	6.16－7.13
1750	6.8－7.10	6.7－7.10	6.9－7.10	6.7－7.11	6.10－7.11	6.9－7.11
1751	(6.4－6.22)	6.4－6.23	6.4－6.23	6.4－6.23	(6.4－6.24)	6.4－6.23
1752						missing
1753	6.21－7.18	6.21－7.24	6.21－7.15	6.21－7.17	6.22－7.17	6.21－7.18
1754	6.20－7.1	6.20－7.1	6.18－6.29	6.20－7.1	6.23－6.30	6.20－7.1
1755	7.9－8.2	7.9－8.2	7.9－7.27	6.29－8.7	7.9－7.31	7.9－8.2
1756	(6.27－7.4)	6.27－7.5	6.27－7.9	6.27－7.6	6.19－6.30	6.27－7.6
1757	(5.28－6.14)	5.28－6.15	5.28－6.13	5.28－6.15	6.5－6.13	5.28－6.14
1758	(6.6－7.16)	6.6－7.17	6.6－7.15	6.6－7.17	6.9－7.14	6.6－7.17
1759	(5.26－6.20)	6.12－6.21	5.26－7.4	5.26－6.21	5.26－6.21	5.26－6.21
1760	(6.12－7.10)	6.13－7.11	6.12－7.6	6.13－7.11	6.13－7.6	6.13－7.11
1761	6.10－7.1	6.10－7.1	6.10－7.3	6.13－7.4	6.10－7.1	6.10－7.3
1762	(6.7－6.26)	(6.10－6.27)	6.7－6.26	6.9－6.26	6.9－6.27	6.9－6.27
1763	(6.8－7.6)	6.8－7.7	6.8－7.10	6.6－7.10	6.8－7.10	6.8－7.10
1764	(5.31－7.27)	5.31－7.28	5.31－7.28	5.31－7.28	6.1－7.28	5.31－7.28
1765	(6.18－7.6)	6.15－7.7	6.18－7.17	6.18－7.8	6.17－7.7	6.18－7.8
1766	(5.29－6.25)	5.29－6.26	5.29－6.22	5.27－6.30	5.29－6.26	5.29－6.26
1767	(5.28－7.9)	5.28－7.10	5.28－6.22	5.18－6.22	5.28－6.22	5.28－7.9
1768	(7.5－7.19)	7.6－7.20	7.5－7.22	7.5－7.22	(7.6－7.23)	7.6－7.22
1769	6.26－7.7	6.26－7.7	6.26－7.2	6.26－7.8	6.26－7.7	6.26－7.7
1770	6.15－7.3	6.14－7.3	6.15－7.3	6.11－7.3	6.15－7.5	6.15－7.3
1771	6.18－7.2	6.18－7.2	6.17－7.2	6.20－7.2	(6.18－7.3)	6.18－7.2
1772	6.2－6.30	6.2－6.30	5.29－6.30	6.2－7.1	6.1－6.30	6.2－6.30
1773	6.8－7.4	6.8－7.4	6.10－7.5	6.8－7.4	6.10－7.4	6.10－7.4
1774	6.19－7.7	6.19－7.7	6.18－7.11	6.19－7.8	(6.19－7.9)	6.19－7.9
1775	6.8－7.7	6.9－7.16	6.9－7.13	6.8－6.25	6.9－6.27	6.9－7.13
1776	6.26－7.14	6.26－7.14	6.15－7.16	6.26－7.12	6.26－7.14	6.26－7.14
1777	6.6－6.24	6.1－6.24	6.6－6.22	6.6－6.24	6.5－6.24	6.6－6.24
1778	6.24－7.3	6.24－7.3	(6.24－7.3)	(6.24－7.3)	(6.24－7.3)	6.24－7.3
1779	6.24－7.27	6.24－7.27	6.21－7.21	(6.21－7.27)	6.24－7.21	6.24－7.27
1780	6.10－6.24	6.11－6.23	6.10－6.25	6.10－6.24	6.3－6.24	6.10－6.24
1781	6.17－7.18	6.17－7.20	6.22－7.20	6.22－7.20	6.16－7.20	6.22－7.20
1782	6.21－6.30	6.21－6.30	6.18－6.26	6.22－6.30	6.23－6.30	6.22－6.30
1783	6.30－7.28	6.30－7.28	(6.30－7.28)	(6.30－7.28)	6.30－7.28	6.30－7.28

(*To be continued on the next page*)

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	Shanghai	Nanjing	Hangzhou	Anqing	Wuhan	Region
1784	6.18－7.8	6.18－7.8	6.15－7.8	6.15－7.16	(6.18－7.17)	6.18－7.16
1785	Empty Meiyu	Empty Meiyu	Empty Meiyu	Empty Meiyu	Empty Meiyu	Empty Meiyu
1786	6.15－7.7	6.16－7.7	6.16－7.5	6.16－7.5	6.15－7.15	6.16－7.7
1787	(6.15－7.3)	6.15－7.4	6.15－7.4	6.15－7.4	(6.15－7.5)	6.15－7.4
1788	6.6－7.3	(6.7－7.8)	6.4－7.3	6.6－7.7	6.4－7.3	6.6－7.7
1789	(6.6－7.12)	(6.7－7.12)	6.6－7.12	6.6－7.11	(6.7－7.12)	6.7－7.12
1790	6.13－7.8	6.13－7.8	6.11－7.12	6.12－7.10	6.14－7.11	6.13－7.11
1791	6.2－7.9	6.2－7.8	6.2－6.30	6.2－7.8	6.2－7.1	6.2－7.8
1792	6.3－6.28	6.4－7.11	6.3－6.27	6.3－6.26	6.3－6.26	6.3－6.28
1793	6.10－7.17	6.10－7.17	6.27－7.9	6.28－7.9	(6.10－7.10)	6.27－7.17
1794	6.3－7.26	6.8－7.4	6.8－7.11	6.9－7.12	6.3－7.12	6.8－7.12
1795	6.17－7.15	6.17－7.15	6.19－6.30	6.17－7.4	6.17－7.6	6.17－7.15
1796	6.6－7.8	6.6－7.8	6.5－7.4	6.5－7.9	6.5－7.8	6.6－7.8
1797	6.15－7.4	6.18－7.8	6.17－7.4	6.17－7.4	(6.18－7.5)	6.18－7.5
1798	6.20－7.22	7.4－7.22	5.30－7.13	(5.30－7.22)	6.24－7.20	6.24－7.22
1799	6.3－6.29	6.3－6.29	6.4－6.29	6.3－6.23	(6.3－6.24)	6.3－6.29
1800	6.22－7.21	6.22－7.21	6.22－7.15	6.22－7.15	6.21－7.15	6.22－7.21
1801	6.12－7.10	6.12－7.10	6.11－7.10	6.11－7.10	(6.12－7.11)	6.12－7.10
1802	(5.31－6.29)	(6.1－6.30)	5.31－6.29	(5.31－6.29)	5.31－6.29	5.31－6.29
1803	6.10－7.28	6.10－7.28	6.22－7.18	6.15－7.14	6.22－7.15	6.22－7.28
1804	6.20－7.3	6.21－7.9	6.19－7.6	6.20－7.6	6.20－7.4	6.20－7.6
1805	6.18－7.6	6.18－7.6	5.29－7.6	5.29－7.7	6.18－7.6	6.18－7.6
1806	5.25－6.26	5.25－6.26	6.7－6.29	6.7－6.26	6.7－6.30	6.7－6.29
1807	6.12－6.21	6.12－6.21	6.6－6.26	6.6－7.4	6.19－6.24	6.12－6.26
1808	5.20－7.2	5.20－7.2	5.27－7.2	5.25－7.2	6.3－7.5	5.27－7.2
1809	6.2－6.30	6.2－6.30	6.2－7.4	6.3－7.4	6.3－7.5	6.3－7.4
1810	6.3－7.2	6.3－7.1	6.2－6.25	6.2－7.1	6.5－7.1	6.3－7.1
1811	6.4－7.10	6.4－7.10	6.5－7.6	6.3－7.6	6.5－7.10	6.5－7.10
1812	6.16－7.8	6.16－7.8	6.16－7.8	6.16－7.8	6.16－7.15	6.16－7.8
1813	6.26－7.7	6.17－7.7	6.26－7.7	6.27－7.7	6.4－7.7	6.26－7.7
1814	6.13－6.24	6.13－6.27	6.13－6.23	6.18－6.27	6.13－6.23	6.13－6.27
1815						missing
1816	(6.6－7.3)	6.6－7.4	6.6－7.4	5.27－7.4	6.6－7.4	6.6－7.4
1817	6.25－7.3	6.25－7.3	6.25－7.4	(6.25－7.3)	(6.25－7.3)	6.25－7.3
1818	6.9－7.18	6.9－7.23	6.9－7.2	6.4－6.27	6.7－7.2	6.9－7.18
1819						missing
1820						missing
1821	5.31－6.28	6.12－6.28	6.11－6.23	6.10－6.28	6.10－6.28	6.11－6.28
1822	6.13－7.5	6.13－7.5	6.13－7.8	6.20－7.8	6.13－7.3	6.13－7.8
1823	6.9－7.3	6.9－7.3	6.10－7.2	6.9－7.7	6.9－7.7	6.9－7.7
1824	6.1－7.2	6.1－7.2	6.1－6.27	6.1－6.26	6.1－6.26	6.1－7.2
1825	6.18－7.15	6.18－7.15	6.16－7.15	6.18－7.18	6.16－7.18	6.18－7.18
1826	6.6－7.4	6.6－7.4	6.6－7.4	6.6－7.4	6.6－7.4	6.6－7.4
1827	6.7－7.13	6.7－7.13	6.15－7.13	6.15－7.19	6.24－7.23	6.15－7.19
1828	6.5－7.7	6.5－7.11	6.12－7.11	6.12－7.11	6.12－7.11	6.12－7.11
1829	5.22－6.30	(6.3－7.1)	6.2－6.30	5.23－7.10	6.2－6.30	6.2－7.1
1830	6.20－7.8	6.21－7.6	6.18－7.6	6.20－7.6	6.20－7.5	6.20－7.6
1831	6.5－7.8	6.13－7.8	6.12－7.5	6.12－7.8	6.20－7.8	6.13－7.8
1832	(5.30－7.6)	(5.31－7.7)	5.30－7.6	6.4－7.6	5.30－7.7	5.31－7.7
1833						missing
1834	(6.17－7.3)	(6.18－7.4)	6.17－7.3	6.7－7.3	6.17－7.6	6.17－7.4
1835	7.6－7.15	7.6－7.15	(7.6－7.15)	7.6－7.18	7.6－7.15	7.6－7.15

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	Shanghai	Nanjing	Hangzhou	Anqing	Wuhan	Region
1836	6.14—7.13	6.14—7.13	6.15—7.13	6.15—7.3	6.14—7.13	6.15—7.13
1837	7.3—7.12	7.3—7.16	7.3—7.16	7.4—7.21	(7.3—7.22)	7.3—7.21
1838	(6.21—7.19)	(6.22—7.20)	(6.22—7.20)	(6.21—7.19)	6.22—7.20	6.22—7.20
1839	6.13—7.10	6.13—7.10	(6.11—7.10)	6.11—7.10	6.11—7.10	6.13—7.10
1840	5.31—6.27	6.10—6.28	6.10—6.28	5.31—6.28	6.8—6.28	6.10—6.28
1841	6.19—7.4	6.19—7.5	6.19—7.8	6.19—7.4	6.19—7.17	6.19—7.8
1842	6.19—7.7	6.19—7.7	6.19—7.7	6.19—7.5	6.19—7.7	6.19—7.7
1843	5.20—6.27	5.29—6.27	5.29—6.29	5.29—6.27	5.29—6.27	5.29—6.27
1844	5.17—7.10	(6.27—7.11)	6.26—7.14	6.26—7.5	6.26—7.5	6.26—7.11
1845						missing
1846	5.25—6.23	6.4—6.23	(6.4—6.23)	(5.25—6.23)	6.4—6.23	6.4—6.23
1847	(6.22—7.1)	6.23—7.2	(6.13—7.1)	6.1—7.2	6.13—7.2	6.22—7.2
1848	6.17—7.10	(6.18—7.11)	6.21—7.10	6.17—7.10	6.11—7.10	6.18—7.10
1849	6.11—7.19	6.11—7.18	6.6—7.18	6.11—7.17	6.11—7.19	6.11—7.19
1850	6.20—7.8	6.20—7.8	6.20—7.13	6.20—7.11	(6.20—7.12)	6.20—7.12
1851	5.31—7.7	5.31—7.7	5.31—7.8	5.31—7.7	5.31—6.28	5.31—7.7
1852	(5.30—6.27)	5.31—6.28	(5.30—6.27)	(5.30—6.27)	(5.31—6.28)	5.31—6.28
1853	6.7—7.7	6.7—7.7	6.7—6.26	(6.7—7.7)	6.7—6.26	6.7—7.7
1854	5.29—6.24	5.29—6.24	5.22—6.24	(5.22—6.24)	(5.29—6.24)	5.29—6.24
1855	6.14—7.13	6.14—7.13	(6.14—7.13)	(6.14—7.13)	(6.14—7.13)	6.14—7.13
1856	empty Meiyu	empty Meiyu	empty Meiyu	empty Meiyu	empty Meiyu	empty Meiyu
1857	6.22—7.20	6.22—7.20	6.22—7.20	(6.22—7.20)	(6.22—7.20)	6.22—7.20
1858	6.11—7.10	6.11—7.10	6.21—7.10	(6.21—7.10)	6.21—7.10	6.21—7.10
1859	6.1—6.29	6.1—6.29	6.1—6.29	(6.1—6.29)	6.1—6.29	6.1—6.29
1860						missing
1861						missing
1862	(6.26—7.25)	(6.27—7.26)	(6.27—7.26)	(6.26—7.25)	6.27—7.26	6.27—7.26
1863	(6.15—7.14)	(6.16—7.15)	6.16—7.15	(6.16—7.15)	6.16—7.15	6.16—7.15
1864	(6.13—7.2)	(6.15—7.4)	6.14—7.3	(6.14—7.3)	6.14—7.3	6.14—7.3
1865	(6.15—7.6)	6.16—7.7	6.16—7.11	6.14—7.2	6.16—7.2	6.16—7.7
1866	6.13—7.11	6.13—7.11	6.13—7.11	(6.13—7.11)	6.13—7.11	6.13—7.11
1867	6.22—7.30	6.22—7.30	6.12—7.21	6.22—7.21	6.21—7.21	6.22—7.30
1868	6.20—7.19	6.20—7.19	6.30—7.19	(6.30—7.19)	6.30—7.19	6.30—7.19
1869	6.10—7.8	6.10—7.8	6.1—7.8	6.1—7.18	6.10—7.18	6.10—7.18
1870						missing
1871						missing
1872	6.18—7.5	6.18—7.5	6.18—7.5	6.18—7.1	6.18—7.5	6.18—7.5
1873	(6.13—6.23)	6.14—6.24	(5.26—6.24)	6.14—6.24	5.26—6.24	6.14—6.24
1874	6.14—7.13	6.14—7.13	(6.14—7.13)	6.21—7.13	(6.14—7.14)	6.14—7.13
1875	6.4—7.12	6.4—7.12	6.4—7.2	6.4—7.12	6.4—7.31	6.4—7.12
1876	6.13—6.22	6.12—7.1	6.12—7.1	6.12—7.1	6.13—6.28	6.13—7.1
1877	6.27—7.3	6.27—7.3	6.17—7.10	6.27—7.2	6.11—7.10	6.27—7.10
1878	6.21—7.18	6.21—7.18	6.21—7.18	6.20—7.29	6.21—7.29	6.21—7.29
1879	6.10—6.29	6.10—6.29	6.10—6.29	6.10—6.29	6.10—6.29	6.10—6.29
1880	6.14—7.22	(6.15—7.23)	(6.18—7.22)	(6.14—7.22)	6.18—7.22	6.18—7.22
1881	6.5—7.9	6.6—7.15	6.5—7.15	6.5—7.15	6.5—7.15	6.5—7.15
1882	6.16—7.7	6.6—7.8	6.6—7.14	6.6—7.8	(6.6—7.9)	6.6—7.9
1883	6.10—7.6	6.10—7.6	6.5—7.3	6.5—7.6	(6.10—7.7)	6.10—7.6
1884	6.9—7.1	6.10—7.2	6.9—7.1	6.9—7.1	6.10—7.2	6.10—7.2
1885	6.8—7.10	6.13—7.11	6.13—7.11	6.13—7.11	6.13—7.11	6.13—7.11
1886	6.10—7.5	6.2—7.30	6.2—7.1	6.2—7.1	6.2—7.1	6.2—7.5
1887	6.4—7.1	6.4—7.1	6.2—7.1	5.23—7.7	6.2—6.30	6.4—7.1

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	Shanghai	Nanjing	Hangzhou	Anqing	Wuhan	Region
1888	6.14—7.5	6.10—7.8	6.10—7.8	6.10—7.8	6.10—7.8	6.10—7.8
1889	6.15—7.3	6.15—7.3	6.9—7.3	(6.9—7.3)	6.9—7.7	6.15—7.3
1890	5.30—6.24	6.8—6.26	6.8—6.26	6.8—6.26	5.19—6.16	6.8—6.26
1891	6.23—7.14	6.22—7.15	6.22—7.15	6.22—7.15	6.22—7.15	6.22—7.15
1892	6.20—7.6	6.20—7.6	6.19—7.6	6.19—7.6	6.19—7.6	6.20—7.6
1893	6.4—6.22	6.5—6.23	6.5—6.23	6.5—6.23	6.5—6.23	6.5—6.23
1894	6.12—6.23	6.4—6.23	6.4—6.23	6.4—6.23	6.4—6.23	6.4—6.23
1895	6.22—7.21	6.23—7.21	6.23—7.21	6.23—7.21	6.23—7.21	6.22—7.21
1896	6.13—7.20	6.11—7.20	6.11—7.20	6.11—7.20	6.13—7.20	6.13—7.20
1897	Empty Meiyu	Empty Meiyu	Empty Meiyu	Empty Meiyu	Empty Meiyu	Empty Meiyu
1898	6.22—6.28	6.19—6.28	6.19—6.28	6.19—6.28	6.19—6.28	6.19—6.28
1899	6.16—6.27	6.18—6.27	6.18—6.27	6.18—6.27	6.18—7.7	6.18—6.27
1900	7.3—7.16	(7.4—7.17)	(7.8—7.16)	(7.3—7.16)	7.8—7.31	7.8—7.17
1901	6.16—7.20	6.16—7.25	6.16—7.15	6.23—7.25	(6.16—7.26)	6.16—7.25
1902	6.14—6.27	6.6—6.27	(6.13—6.27)	(6.14—6.27)	6.13—7.9	6.14—6.27
1903	6.4—7.15	5.27—7.14	5.27—7.23	5.27—7.23	5.27—7.23	5.27—7.23
1904	6.14—6.24	(6.15—6.25)	6.14—7.3	6.13—7.12	(6.14—7.13)	6.14—7.12
1905	Empty Meiyu	Empty Meiyu	Empty Meiyu	Empty Meiyu	Empty Meiyu	Empty Meiyu
1906	6.3—7.1	6.1—7.1	5.23—7.1	5.23—7.1	5.23—7.1	6.1—7.1
1907	6.11—7.9	6.11—7.9	5.12—7.9	6.11—7.9	6.11—7.9	6.11—7.9
1908	6.19—7.4	6.19—7.8	6.19—7.8	6.19—7.8	6.19—7.8	6.19—7.8
1909	6.3—7.11	5.27—7.16	5.27—7.16	5.27—7.16	5.27—7.16	5.27—7.16
1910	6.1—7.14	6.7—7.16	6.7—7.16	6.7—7.16	6.7—7.16	6.7—7.16
1911	6.4—7.12	5.28—7.15	(6.4—7.12)	5.28—7.15	(5.28—7.16)	6.4—7.15
1912	6.30—7.25	6.24—7.24	6.24—7.24	(6.30—7.25)	6.23—7.17	6.30—7.25
1913	5.23—7.9	6.15—7.10	5.27—7.21	(5.23—7.9)	5.26—7.9	5.27—7.10
1914	6.4—6.27	6.14—7.3	6.14—6.27	(6.4—6.27)	6.6—6.24	6.14—6.27
1915	6.16—7.3	6.21—7.8	6.20—7.2	(6.16—7.3)	6.18—6.30	6.20—7.3
1916	6.5—7.23	6.13—7.23	6.13—7.23	(6.5—7.23)	6.19—7.6	6.13—7.23
1917	6.5—6.25	6.3—6.30	6.4—(6.25)	(6.5—6.25)	6.3—6.24	6.5—6.25
1918	6.7—7.9	6.7—7.3	6.11—7.19	(6.7—7.9)	6.19—7.8	6.11—7.9
1919	6.10—7.14	6.9—7.11	(6.10—7.14)	(6.10—7.14)	6.17—7.25	6.10—7.14
1920	6.10—7.11	(6.11—7.12)	(6.10—7.11)	(6.10—7.11)	6.9—7.6	6.10—7.11
1921	6.4—7.1	(6.5—7.2)	(6.4—7.1)	(6.4—7.1)	6.24—7.13	6.5—7.2
1922	6.20—7.7	6.21—7.2	(6.20—7.7)	(6.20—7.7)	6.27—7.10	6.21—7.7
1923	6.21—7.13	(6.22—7.14)	(6.21—7.13)	(6.21—7.13)	6.23—7.11	6.22—7.13
1924	6.16—7.2	6.20—7.5	(6.17—7.2)	6.17—7.4	6.15—7.18	6.17—7.5
1925	6.29—7.11	6.24—7.18	(6.18—7.11)	6.18—7.12	6.30—7.5	6.29—7.12
1926	6.17—7.15	6.17—7.6	(6.12—7.15)	6.12—7.8	6.10—7.7	6.17—7.15
1927	6.13—7.7	6.13—7.8	(6.13—7.7)	(6.13—7.7)	6.12—7.7	6.13—7.7
1928	6.18—7.3	6.18—6.29	(6.18—7.3)	(6.18—7.3)	6.22—7.5	6.18—7.3
1929	6.14—7.9	6.15—7.12	(6.15—7.9)	6.15—7.7	6.16—7.6	6.15—7.9
1930	6.11—7.3	6.12—7.7	(6.19—7.3)	6.19—7.4	6.10—6.29	6.19—7.4
1931	6.14—7.13	6.14—7.13	(6.18—7.13)	6.18—7.13	6.28—7.29	6.18—7.13
1932	6.11—7.10	6.11—7.11	(6.15—7.10)	6.15—7.6	6.16—7.9	6.15—7.10
1933	6.3—6.22	6.3—6.14	6.4—7.1	6.4—7.8	6.3—6.18	6.4—7.1
1934	empty Meiyu	empty Meiyu	empty Meiyu	empty Meiyu	empty Meiyu	empty Meiyu
1935	6.16—7.8	6.15—6.30	6.19—7.1	6.22—7.1	6.19—7.8	6.19—7.8
1936	6.26—7.7	6.14—7.6	6.14—7.7	(6.26—7.7)	6.1—6.19	6.26—7.7
1937	6.2—6.14	6.2—6.16	6.11—6.29	(6.2—6.14)	(6.3—6.15)	6.3—6.16
1938	6.1—6.24	(6.2—6.25)	(6.1—6.24)	(6.1—6.24)	(6.2—6.25)	6.2—6.25
1939	6.15—7.3	(6.16—7.4)	(6.15—7.3)	(6.15—7.3)	(6.16—7.4)	6.16—7.4

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	Shanghai	Nanjing	Hangzhou	Anqing	Wuhan	Region
1940	6.24−6.29	(6.25−6.30)	(6.24−6.29)	(6.24−6.29)	(6.25−6.30)	6.25−6.30
1941	6.20−7.31	6.25−7.14	(6.20−7.31)	(6.20−7.31)	(6.21−8.1)	6.21−7.31
1942	6.26−7.1	7.1−7.10	6.15−7.1	(6.26−7.1)	(6.27−7.2)	6.27−7.2
1943	6.24−7.1	6.22−7.2	(6.24−7.1)	(6.24−7.1)	(6.25−7.2)	6.24−7.2
1944	6.23−7.4	(6.24−7.5)	(6.23−7.4)	(6.23−7.4)	(6.24−7.5)	6.24−7.5
1945	6.12−6.22	(6.13−6.23)	(6.12−6.22)	(6.12−6.22)	(6.13−6.23)	6.13−6.23
1946	6.10−7.12	6.9−7.6	(6.10−7.12)	(6.10−7.12)	(6.11−7.13)	6.10−7.12
1947	6.21−7.18	6.21−7.7	(6.21−7.18)	(6.21−7.18)	6.21−7.12	6.21−7.18
1948	6.28−7.8	6.23−7.8	(6.28−7.8)	(6.28−7.8)	6.27−7.3	6.28−7.8
1949	6.25−7.28	6.25−7.11	(6.25−7.28)	(6.25−7.28)	6.23−7.9	6.25−7.28
1950	6.15−7.10	6.14−7.10	6.21−7.11	(6.15−7.10)	6.21−7.5	6.21−7.10
1951	7.4−7.18	7.6−7.23	7.6−7.18	7.6−7.22	7.5−7.22	7.6−7.22
1952	7.3−7.22	7.2−7.25	7.3−7.25	7.4−7.26	7.4−7.25	7.4−7.25
1953	6.20−6.29	6.19−7.3	6.20−7.4	6.20−7.6	6.22−7.6	6.20−7.6
1954	6.5−8.3	6.5−7.29	6.5−8.2	6.4−7.31	6.4−8.2	6.5−8.2
1955	6.6−7.8	6.14−7.8	6.14−7.10	6.13−7.7	6.12−7.5	6.14−7.8
1956	6.1−7.19	6.4−7.21	6.5−7.21	6.4−7.3	6.3−6.29	6.4−7.21
1957	6.11−7.12	6.14−7.12	6.14−7.10	6.14−7.9	6.13−7.10	6.14−7.12
1958	7.7−7.17	7.7−7.17	7.8−7.18	7.7−7.18	7.7−7.18	7.7−7.18
1959	6.24−7.7	6.27−7.5	6.16−7.7	6.15−7.6	6.20−7.3	6.24−7.7
1960	6.7−6.27	6.7−6.29	6.8−6.27	6.7−6.28	6.19−6.28	6.8−6.28
1961	6.1−6.15	6.2−6.17	6.1−6.18	5.30−6.15	6.29−7.8	6.2−6.18
1962	6.12−7.17	6.16−7.12	6.14−7.6	6.16−7.6	6.16−7.11	6.16−7.12
1963	6.22−7.11	6.22−7.13	6.21−7.11	6.21−7.12	6.22−7.19	6.22−7.13
1964	6.18−6.29	6.18−7.2	6.16−6.30	6.17−7.3	6.16−7.3	6.18−7.3
1965	empty Meiyu	empty Meiyu	empty Meiyu	empty Meiyu	empty Meiyu	empty Meiyu
1966	6.12−7.13	6.24−7.13	6.12−7.13	6.11−7.12	6.24−7.14	6.24−7.13
1967	6.17−7.10	6.13−7.11	6.13−7.13	6.13−7.10	6.14−7.10	6.14−7.11
1968	6.22−7.19	6.24−7.20	6.23−7.11	6.22−7.20	6.21−7.21	6.23−7.20
1969	6.15−7.16	6.16−7.21	6.16−7.20	6.16−7.18	6.14−7.20	6.16−7.20
1970	6.18−7.19	6.18−7.20	6.18−7.20	6.18−7.22	6.18−7.27	6.18−7.22
1971	6.9−6.22	6.9−6.21	6.9−6.23	6.9−6.22	6.9−6.22	6.9−6.22
1972	6.19−7.3	6.20−7.3	6.19−7.2	6.19−7.2	6.20−7.1	6.20−7.3
1973	6.12−7.19	6.16−7.20	6.12−7.20	6.15−7.20	6.15−7.19	6.15−7.20
1974	6.9−7.22	6.3−7.19	6.4−7.19	6.7−7.20	6.7−7.20	6.7−7.20
1975	6.16−7.16	6.16−7.16	6.16−7.16	6.16−7.16	6.15−7.17	6.16−7.16
1976	6.16−7.14	6.16−7.15	6.15−7.15	6.15−7.15	6.14−7.15	6.16−7.15
1977	6.9−6.24	6.9−6.23	6.9−6.23	6.9−6.23	6.9−6.23	6.9−6.23
1978	6.8−6.16	6.9−6.17	6.8−6.16	5.27−6.15	6.9−6.14	6.9−6.16
1979	6.18−7.22	6.19−7.26	6.19−7.23	6.18−7.25	6.17−7.21	6.19−7.25
1980	6.7−7.18	6.7−7.21	6.7−7.20	6.6−7.20	6.5−7.21	6.7−7.21
1981	6.22−7.2	6.19−7.1	6.22−7.2	6.21−7.2	6.21−7.2	6.22−7.2
1982	7.9−7.25	7.9−7.25	7.9−8.13	7.9−7.24	7.10−7.24	7.9−7.25
1983	6.9−7.18	6.9−7.23	6.9−7.18	6.9−7.18	6.7−7.17	6.9−7.18
1984	6.7−7.7	6.6−7.9	6.7−7.6	6.6−7.6	6.6−7.6	6.7−7.7
1985	6.22−7.5	6.21−7.6	6.21−7.5	6.23−7.6	6.21−7.7	6.22−7.6
1986	6.11−6.30	6.10−7.11	6.10−6.30	6.10−6.30	6.9−7.5	6.10−7.5
1987	6.13−8.1	6.13−7.30	6.13−7.31	6.13−7.31	6.12−8.1	6.13−8.1
1988	6.10−6.23	6.10−6.22	6.10−6.24	6.10−6.22	6.10−6.22	6.10−6.23
1989	6.4−7.13	6.3−7.13	6.4−7.9	6.3−7.12	6.3−7.12	6.4−7.13
1990	6.21−7.5	6.14−7.2	6.12−7.3	6.13−7.4	6.14−7.2	6.14−7.4
1991	5.19−7.16	5.18−7.16	5.18−7.16	5.18−7.14	5.18−7.14	5.18−7.16

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	Shanghai	Nanjing	Hangzhou	Anqing	Wuhan	Region
1992	6.13－6.27	6.13－7.3	6.13－6.27	6.13－6.28	6.13－6.27	6.13－6.28
1993	6.12－7.9	6.29－7.8	6.13－7.9	6.18－7.8	6.29－7.7	6.29－7.9
1994	6.7－6.18	6.7－6.18	6.6－6.18	6.4－6.17	6.4－6.17	6.7－6.18
1995	6.15－7.7	6.17－7.9	6.12－7.7	6.12－7.7	6.14－7.13	6.15－7.9
1996	6.3－7.22	6.3－7.22	6.2－7.22	5.31－7.22	5.31－7.21	6.3－7.22
1997	6.24－7.18	7.5－7.15	6.24－7.14	6.27－7.15	6.27－7.15	6.27－7.15
1998	6.24－8.1	6.24－8.1	6.24－8.2	6.24－8.1	6.23－8.2	6.24－8.2
1999	6.7－7.18	6.7－7.24	6.7－7.18	6.7－7.22	6.7－7.17	6.7－7.22
2000	6.20－7.4	6.20－7.3	6.20－7.4	6.19－6.29	6.21－7.3	6.20－7.4

Appendix 2 The regression equations for starting (ending) dates between any two sites during 1951－2000

☆**For starting dates (SD)**

1. $S_{nj} = 0.9835S_{sh} + 3.7382$ $R^2 = 0.8489$ R=0.9214
2. $S_{hz} = 0.9631S_{sh} + 5.8556$ $R^2 = 0.9319$ R=0.9654
3. $S_{aq} = 0.9803S_{sh} + 3.0562$ $R^2 = 0.9251$ R=0.9618
4. $S_{wh} = 0.878S_{sh} + 21.3$ $R^2 = 0.7015$ R=0.8376
5. $S_{hz} = 0.8731S_{nj} + 19.904$ $R^2 = 0.8726$ R=0.9341
6. $S_{aq} = 0.9038S_{nj} + 14.852$ $R^2 = 0.897$ R=0.9471
7. $S_{wh} = 0.8741S_{nj} + 21.08$ $R^2 = 0.7921$ R=0.89
8. $S_{wh} = 0.9013S_{hz} + 17.689$ $R^2 = 0.7356$ R=0.8577
9. $S_{aq} = 1.0120S_{hz} - 1.9198$ $R^2 = 0.9819$ R=0.9909
10. $S_{wh} = 0.8904S_{aq} + 19.443$ $R^2 = 0.7489$ R=0.8654

Here, S_{nj}:SD for Nanjing; S_{sh}: SD for Shanghai; S_{wh}: SD for Wuhan; S_{hz}: SD for Hangzhou; S_{aq}: SD for Anqing

☆For ending dates (ED)

1. $E_{nj} = 0.9617E_{sh} + 8.2696$ $R^2 = 0.9392$ R=0.9691
2. $E_{hz} = 0.9991E_{sh} + 0.4264$ $R^2 = 0.9109$ R=0.9544
3. $E_{aq} = 0.9699E_{sh} + 5.4572$ $R^2 = 0.9062$ R=0.9518
4. $E_{wh} = 0.8843E_{sh} + 22.651$ $R^2 = 0.8044$ R=0.8969
5. $E_{hz} = 0.9978E_{nj} - 0.2489$ $R^2 = 0.8947$ R=0.9459
6. $E_{aq} = 0.9803E_{nj} + 2.5564$ $R^2 = 0.9108$ R=0.9544
7. $E_{wh} = 0.895E_{nj} + 19.778$ $R^2 = 0.8114$ R=0.9008
8. $E_{wh} = 0.8289E_{hz} + 33.081$ $R^2 = 0.7744$ R=0.88
9. $E_{aq} = 0.9027E_{hz} + 18.15$ $R^2 = 0.8666$ R=0.9309
10. $E_{wh} = 0.8946E_{aq} + 21.067$ $R^2 = 0.8769$ R=0.9364

Here, E_{nj}: ED for Nanjing; E_{sh}: ED for Shanghai; E_{wh}: ED for Wuhan; E_{hz}: ED for Hangzhou; E_{aq}: ED for Anqing.

The sample sizes are all 49 (except for 1965, empty Meiyu, pass $\alpha = 0.001$significance level.