Spatiotemporal patterns and influencing factors of intangible cultural heritage of music in the "Yellow River—Yangtze River Civilization Corridor", China

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Abstract

The "Yellow River—Yangtze River Civilization Corridor" is an important cultural corridor in China that gathers the main cultural heritage resources along China's two river basins. The space-time distribution of intangible cultural heritage in the "Yellow River–Yangtze River Civilization Corridor" significantly helps understand the development and evolution of China's two river civilizations. This study examines 3,277 national and provincial intangible cultural heritage sites related to music in the Yellow River and Yangtze River basins of China. The spatial and temporal distributions of intangible cultural heritage of music (ICHM) were visualized by means of the nearest neighbour index, kernel density analysis, standard deviation ellipse and geographical detector, and the influencing factors were discussed. The results show the following: (1) The spatial distributions of ICHMs in the "Yellow River—Yangtze River Civilization Corridor" are significantly different, with a high concentration in the central region, where the largest number of traditional dance and the smallest number of quyi arts are located. (2) The "Yellow River–Yangtze River Civilization Corridor" ICHMs are agglomerated, forming a pattern of "one area and four points" in the combined area of western Shandong—southern Henan—southern Shanxi—central Shaanxi, along with Jiangsu, Jiangxi, Hubei and Chongqing. The distributions of various ICHMs are different. (3) The historical development of ICHMs of the "Yellow River—Yangtze River Civilization Corridor" generally presents the changing characteristics of "two peaks and three valleys", which articulate a peak in artistic production in the pre-Qin to Qin and Han dynasties, and another in the Song and Yuan to Ming and Qing dynasties. Comparatively, production lies in a trough in prehistoric times, the Wei, Jin, Southern and Northern dynasties and in modern times. The overall trajectory of the centre of gravity of ICHMs shifts from northwest to southeast. (4) Population, an average temperature ≥ 10℃, GDP, elevation and annual rainfall play a leading role in the spatial distribution of ICHMs along the "Yellow River—Yangtze River Civilization Corridor". The synergistic effect of the social economy and natural environment is greater than the effect of single dimension factors on the spatial distribution of ICHMs in the "Yellow River-Yangtze River Civilization Corridor". The results provide a reference for policy-makers designing the protection, inheritance and sustainable development of ICHMs in the "Yellow River—Yangtze River Civilization corridor" and enrich the theoretical research and practical management of the world's river civilization ICHMs.

Introduction

Intangible cultural heritage is the precious spiritual wealth that embodies the essence of national culture created by human beings in the process of social production and daily life [1]. It not only bears the burden of historical witness and expression but also has a mission to promote cultural diversity and human creativity [2]. As an important part of the intangible cultural heritage system, music originates from the daily lives of working people and can reflect the living situations of ordinary people. It is a full expression of the pursuit of a better life and has profound folk significance [3]. However, due to the complexity of the inheritance conditions and requirements for musical inheritors, it is difficult to protect and develop these musical traditions. Therefore, the study of ICHMs has extremely important theoretical value and practical significance.

With the deepening of the international community's protection of intangible cultural heritage, the academic community has paid increasing attention to the study of intangible cultural heritage [4–6]. In previous studies, the study of intangible cultural heritage was divided into four stages: First, most early studies focused on the definition [7], classification and evaluation of intangible cultural heritage [8, 9], and they made clear the connotations and extended meaning of intangible cultural heritage from the internal level to the external level. Second, the literature further studied the protection, inheritance [10–12], development [13–15] and utilization of intangible cultural heritage. They discussed in depth the concepts of protection [7], organization management [16], living protection [17, 18], tourism development [19] and other content associated with intangible cultural heritage. Third, the literature gradually began to delve into the spiritual and emotional aspects of intangible cultural heritage and studied intangible cultural heritage from the historical and social dimensions. The research on intangible cultural heritage and "cultural identity" has thus gradually matured. At the same time, it has increased the respect for the inheritors of intangible cultural heritage and changed the focus of protection from "things" to "people" [20–23]. In recent years, scholars have gradually combined the protection of intangible cultural heritage with geographical items from a macro perspective and explored the spatial relationship and influencing factors of cultural heritage with quantitative research methods [24–27]. This kind of research provides a scientific basis for the protection of intangible cultural heritage from the perspective of space [28–32]. However, the research is mostly based on a comprehensive grouping of intangible cultural heritage traditions, and there are few studies that examine a single category, mainly reflected in the study of sports and religious-themed intangible cultural heritage [33–35]. In addition, there are few studies on trans-regional areas, especially the "Yellow River—Yangtze River Civilization Corridor". Cultural research on the Yellow River and Yangtze River mainly focuses on regional cultural comparison [36, 37], cultural gene research [38, 39], cultural heritage [40], and national park construction [41]. There is no special article that comprehensively discusses the distribution of intangible cultural heritage in the "Yellow River—Yangtze civilization corridor" from a geographical perspective [25, 42, 43].

Almost all civilizations in the world originate from great rivers. Chinese civilization is essentially a river civilization [44]. The civilization corridor composed of the Yellow River Basin and the Yangtze River Basin is the source of Chinese cultural genes. It belongs together with the Egyptian civilization, which originated in the Nile Valley of northern Africa, the Mesopotamian civilization, which originated in the Euphrates and Tigris rivers of Western Asia, the Harappan Civilization, which originated in the Indus Valley, and the Cretan civilization (Minoan civilization), which originated in the Aegean Sea region of Southern Europe. These cultures are called the World Great Rivers Civilizations. Together, they bear witness to the profound influence of rivers on human civilization [38].

The Yellow River and the Yangtze River are the two closest rivers on Earth. that are both separated and connected in geographical space. They echo each other, connecting the grasslands and the sea and forming a huge biosphere and living space. In terms of history and culture, from the prehistoric Neolithic Age to the modern civilization era, the "Yellow River—Yangtze River Civilization Corridor" was a natural corridor for the Chinese nation to multiply and thrive. It is a corridor for the exchange and interaction of different civilizations, for ethnic integration, and for connections among intangible cultural heritage sites [38]. Influenced by natural, historical, political and cultural factors, the "Yellow River—Yangtze River Civilization Corridor" has formed a rich and colourful ICHM over the long arc of historical development [1]. This traditions have countless connections with the cultures of various regions and ethnic groups,

which have had a subtle impact on the production and life of the local people. In view of this, this study uses GIS spatial analysis and geographic detectors to explore the spatial pattern and influencing factors of ICHMs in the "Yellow River - Yangtze River Civilization Corridor" to achieve the following research objectives:

1. From the macro perspective of China's two river basins, explore the structure of ICHM genres in the "Yellow River–Yangtze River Civilization Corridor";
2. Grasp the characteristics of temporal and spatial distribution of ICHMs in the "Yellow River–Yangtze River Civilization Corridor";
3. We discuss the factors influencing the distribution characteristics of music intangible heritage in the "Yellow River–Yangtze River Civilization Corridor".

The purpose is to grasp the temporal and spatial distributions, rules and influencing factors of ICHMs in the "Yellow River–Yangtze River Civilization Corridor" for better management. This study provides a scientific basis and reference for the development of targeted and efficient protection measures. It also provides a reference for the protection and sustainable development of the ICHMs from the World Great Rivers Civilizations.

Materials and methods

Research area

The Yellow River–Yangtze River basin runs through eastern and western China, and abundant water energy resources provide convenient natural conditions for the generation and dissemination of intangible cultural heritage. "The Yellow River–Yangtze Civilization Corridor" is an academic concept proposed by Chinese scholar Cheng Jincheng [45]. It is believed that the river civilization corridor is mainly composed of two corridors, the Yellow River Basin Corridor and the Yangtze River Basin Corridor, and is a self-contained and complete geographical region [38]. This study accepts the division of the Yellow River Basin and the Yangtze River Basin determined by Liu Zhicai as standard [46], as this interpretation is currently widely recognized [47–49]. The River Civilization Corridor in this study covers 18 provinces and cities, including 9 in the Yellow River basin, comprising Shandong, Henan, Shanxi, Inner Mongolia, Shaanxi, Ningxia, Sichuan, Gansu and Qinghai, and 11 in the Yangtze River basin, including Shanghai, Jiangsu, Anhui, Jiangxi, Hubei, Hunan, Chongqing, Sichuan, Yunnan, Qinghai and Tibet. Among these locations, Qinghai and Sichuan are overlapping areas of the two watersheds, so the study scope is combined (Fig. 1).

Data source

This study adopts a broad definition of music, which includes vocal music, dance, drama, and quyi [24]. According to the 10 classification standards of China's intangible cultural heritage, we divide ICHMs into four categories: traditional music, traditional dance, traditional drama and quyi. The national ICHMs data from the "Yellow River–Yangtze River Civilization Corridor" are from the China Intangible Cultural Heritage Network (http://www.ihchina.cn). The provincial ICHM data are from provincial intangible cultural heritage centres. As of December 31, 2022, there were a total of 3,277 ICHMs, including 872 national-level ICHMs and 2,405 provincial-level ICHMs. The coordinate picking tool from Baidu was used to locate the spatial location of each intangible cultural heritage point. The base map was made by using the standard map downloaded from the national basic geographic information system database. For period divisions, based on the research achievements of Tian Xiaobo, Yue Ju and others [50, 51], the historical period of ICHMs is divided into the prehistoric period, pre-Qin period, Qin and Han Dynasties, Wei, Jin, Southern and Northern Dynasties, Sui, Tang and Five Dynasties, Song and Yuan Dynasties, Ming and Qing Dynasties, and modern times. In terms of influencing factors, elevation and slope data were mainly derived from the Geospatial Data Cloud website (https://www.gscloud.cn/). The indices of rainfall and average temperature were derived from the website of Resources and Environmental Sciences and Data Center of Chinese Academy of Sciences (https://www.resdc.cn/). River and transportation data are sourced from the latest vector data provided by Open Street Map and Bigemap. Regional population, GDP, urbanization, etc., are mainly sourced from the China Statistical Yearbook (2022) and the Regional Economic Statistical Yearbook (2022).

Research methods

The nearest neighbour index

The nearest neighbour index is an index used to judge the degree of proximity of ICHM elements in the "Yellow River–Yangtze River Civilization Corridor". The nearest neighbour index is obtained by comparing the ratio of the average nearest distance between ICHMs points to the average distance under a theoretical random distribution. The calculation formula is as follows [52]:

$$R = \frac{r}{r_1} = \frac{r}{\frac{1}{2\sqrt{n/s}}} \quad (1)$$

where R is the nearest neighbour distance index and r is the average actual nearest neighbour distance between ICHM points. r_1 is the theoretical nearest neighbour distance between ICHM points. n is the number of ICHM points, and s is the area of the area. When R < 1, ICHM points are aggregation-random. When R = 1, the ICHM points are randomly distributed. When R > 1, the ICHM points are uniformly distributed.

Kernel density estimation

Nuclear density analysis is commonly used to calculate the density of point-like elements in the surrounding neighbourhood of a point [53], which can clearly reflect the dispersion and aggregation of ICHM elements. The higher the nuclear density value f (x), the denser the point-like elements. The

calculation formula is as follows [54]:

$f_n(x) = \frac{1}{nh}\sum_{i=1}^{n} k\left(\frac{x-X_i}{h}\right)$ (2)In the formula, k (x) is the kernel function, h > 0 is the search radius, and x-X_i represents the distance from the estimate point x to the sample point Xi.

Standard deviation ellipse

The standard deviation ellipse analysis takes the standard deviation and average centre of the x-axis and y-axis as the basic parameters. It is a quantitative method for analysis of the central trend and transformation direction of geographic feature space. The calculation formula is as follows [55]:

$\mathrm{x} = \frac{\sum_{i=1}^{n} x_i}{\mathrm{n}}\ \mathrm{Y} = \frac{\sum_{i=1}^{n} y_i}{\mathrm{n}}$ (3)

In the formula, x_i and y_i represent the coordinates of the distribution of ICHM points, and n is the total number of ICHM points in a certain period.

Geographical detector

Geographic detectors are a new statistical method to detect spatial differentiation and reveal the driving factors behind it [56, 57].

(1)Factor detection. Factor detection is the detection of the extent to which Factor X explains the spatial variation of the variable Y. The *q* value is used to indicate its degree. The calculation formula is as follows [58]:

$$q = \left(N\sigma^2 - \sum_{h=1}^{L} N_h\sigma_h^2\right)/N\sigma^2$$

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In the formula, *N* and σ^2 are the sample size and variance, respectively. *N*h and σ_{h}^2 are the sample size and variance of class h influencing factors. *L* is the classified number of the influencing factors of class *h*. The value of *q* is [0,1], and the larger the value, the stronger the explanatory power of the index to the spatial distribution of ICHMs [59].

(2)Interaction detection. Interaction detection is used to detect whether the influence from Factors X_1 and X_2 will increase or decrease the density of geographical features after their interaction. There are five main types of results: nonlinear weakening, unilinear weakening, bilinear enhancement, mutual independence, and nonlinear enhancement (Table 1) [56].

Table 1 Interaction probe types

Basis of judgment	Interaction detection
q(X1∩X2) Min(q(X1) q(X2))	Nonlinear weakening
Min(q(X1) q(X2)) q(X1∩X2) Max(q(X1) q(X2))	Unilinear weakening
q(X1∩X2) Max(q(X1) q(X2))	Bilinear enhancement
q(X1∩X2) = q(X1) + q(X2)	Mutual independence
q(X1∩X2) q(X1) + q(X2)	Nonlinear enhancement

Spatial and temporal distribution pattern of ICHMs in the "Yellow River–Yangtze River Civilization Corridor"

Scale of ICHMs

According to the division standard of China's national geographical regions, the "Yellow River–Yangtze River Civilization Corridor" is divided into three different geographical regions: The east, the middle and the west. The statistics of the number of ICHM projects in the three regions of the corridor are shown in Table 2. On a regional scale, the central region (Henan, Shanxi, Inner Mongolia, Hubei, Hunan, Jiangxi, Anhui) has the largest number of ICHMs, with a total of 1462 items, accounting for 44.61% of the total in the corridor. The western region (Tibet, Qinghai, Gansu, Ningxia, Shaanxi, Sichuan, Yunnan, Chongqing) takes second place, with a total of 1371 items, accounting for 41.84% of total ICHMs in the corridor. The eastern region (Shandong, Jiangsu, and Shanghai) has the smallest number of ICHMs, with only 444 items, accounting for 13.55% of the total in the corridor. In terms of watershed zone, the Yellow River Basin has a large number of ICHMs, with a total of 1777 items, accounting for 54.23%. The number of ICHMs in the Yangtze River Basin ranks second, with a total of 1500 items, accounting for 45.77%. At the provincial level, Henan has the highest number of ICHMs (326 items), accounting for 9.95%, and Sichuan, Shandong, and Shanxi have a large number of ICHMs, accounting for 8.54%, 8.33%, and 7.75%, respectively. Yunnan, Chongqing, Jiangxi, Hubei, and Shaanxi take second place, accounting for 6.71%, 6.62%, 6.59%, 6.59%, and 6.19%, respectively. Ningxia (21) and Shanghai (41) have the fewest ICHMs, accounting for 0.64% and 1.25%, respectively.

Table 2

Types and proportion of ICHM in the “Yellow River—Yangtze River Civilization Corridor”

region	Provinces and municipalities (autonomous regions)	Traditional music	Traditional dance	Traditional drama	Quyi	Total	Proportion
West	Qinghai	32	30	13	9	84	2.56
	Gansu	56	59	40	26	181	5.52
	Ningxia	7	7	5	2	21	0.64
	Shaanxi	55	74	44	30	203	6.19
	Tibet	31	112	13	9	165	5.04
	Yunnan	89	94	25	12	220	6.71
	Sichuan	135	86	33	26	280	8.54
	Chongqing	105	58	31	23	217	6.62
Middle	Inner Mongolia	90	31	19	15	155	4.73
	Shanxi	64	78	73	39	254	7.75
	Henan	64	105	111	46	326	9.95
	Anhui	38	52	32	29	151	4.61
	Hubei	70	51	52	43	216	6.59
	Hunan	38	37	50	19	144	4.39
	Jiangxi	48	92	54	22	216	6.59
East	Shandong	62	82	75	54	273	8.33
	Jiangsu	33	30	44	23	130	3.97
	Shanghai	15	10	10	6	41	1.25

Type structure of ICHMs

We further calculate statistics on the number of ICHMs in the "Yellow River–Yangtze River Civilization Corridor" from the perspective of type. Overall, traditional dance and music are abundant (with quantities of 1088 and 1032, accounting for 33.20% and 31.49%, respectively). Traditional dramas are relatively few (with a quantity of 724, accounting for 22.09%). Quyi is the least varied (with a quantity of 433, accounting for 13.21%). In terms of region, traditional dance is the most common ICHM in the western and central regions, with 520 and 446, respectively, accounting for 37.93% and 30.51%. Traditional drama (129 items) is the most common ICHM in the eastern region, accounting for 29.05%. Quyi is still the least common ICHM in the three regions, accounting for 9.99%, 14.57%, and 18.69%, respectively. In terms of watershed zone, traditional music is the most abundant type of ICHM in the Yellow River Basin, with a total of 565 items, accounting for 31.80%. The Yangtze River Basin has the highest number of traditional dances, with a total of 536 items, accounting for 35.73%. Quyi remains the least abundant ICHM in the two watersheds, accounting for 13.9% and 12.40%, respectively. At the provincial level, traditional music (135 items) is the most varied in Sichuan, accounting for 13.08%. Traditional dance has the greatest variation in Tibet, with 112 items, accounting for 10.29%. Henan has the highest number of traditional dramas (111 items), accounting for 15.33%. Quyi has the highest number in Shandong, with 54 items, accounting for 12.47%.

Spatial Distribution Pattern of ICHMs

Spatial distribution type characteristics

To better illustrate the spatial agglomeration characteristics of ICHMs in the "Yellow River–Yangtze River Civilization Corridor", the nearest neighbour index (Table 3) is obtained by calculating and processing all ICHMs and their various types in the corridor using the average nearest neighbour in the ArcGIS spatial statistics tool according to the calculation for the nearest neighbour index. The results show that the nearest neighbour index of ICHMs in the corridor is 0.17, and the P value is 0, indicating that the distribution of ICHMs in the basin is strongly agglomerated. The nearest neighbour index of different types of intangible musical heritage ranges from 0.35 to 0.46, and the spatial distribution pattern shows the characteristics of agglomeration.

Table 3

Nearest neighbor index of ICHM in the “Yellow River—Yangtze River Civilization Corridor”

Types	Total	Traditional music	Traditional dance	Traditional drama	Quyi
R	0.17	0.37	0.35	0.43	0.46
P	0.000	0.000	0.000	0.000	0.000
Distribution types	agglomeration	agglomeration	agglomeration	agglomeration	agglomeration

Spatial density distribution characteristics

In this study, the nuclear density analysis tool in ArcGIS is used to estimate the spatial distribution density of ICHMs in the "Yellow River–Yangtze River Civilization Corridor". We further explain the intensity of different intangible musical heritage types in different regions of the corridor. At the same time, the density distribution of ICHM nuclei in the corridor was visualized. The results are shown in Fig. 2 and Fig. 3.

Overall distribution characteristics

From the overall nuclear density map, ICHMs are more abundant in the middle east and less abundant in the west in the corridor, and continuous distribution. A pattern of "one area with multiple points" has been formed. The "one zone" refers to the high-density core area of ICHMs located in the central and eastern regions of the Yellow River Basin, consisting of west Shandong, north Henan, south Shanxi and central Shaanxi. The "four points" refer to the provinces of Jiangsu, Jiangxi, Hubei and Chongqing along the Yangtze River from east to west. In addition, three core areas with lesser density have been formed, from east to west, namely, central Sichuan, eastern Qinghai and southern Tibet. The central and eastern regions are mostly plains with superior natural conditions, which are conducive to the spread and integration of culture and makes it easy for people to gather. The western region is located on the plateau in a desert area and has poor natural conditions, a low level of social and economic development, and a relatively sparse population, which are not conducive to the spread of ICHMs. In addition, as Shaanxi, Shanxi, Henan, Shandong and other provinces are located in the hinterland, they are important birthplaces of Chinese history and culture. The profound cultural heritage and similar cultural background have promoted the exchange and dissemination of ICHMs, thus forming an integrated core area.

Distribution characteristics of different types

According to the density map of different types of nuclei, each type has varying degrees of aggregation. Traditional music heritage is dense in the central and eastern regions and sparse in the western regions, forming a distribution structure of "two cores and two belts" (Fig. 3a). There are two high-density core areas at the border between northwest Henan and southeast Shanxi, as well as in Chongqing and southwest Hubei. The two belts include the weak east–west belt in the Yellow River Basin formed by the five provinces of Shandong-Henan-Shanxi-Shaanxi-Gansu and the weak east–west belt in the Yangtze River basin formed by the eight provinces and cities of Shanghai-Jiangsu-Anhui-Hubei -Chongqing-Sichuan-Yunnan. Traditional music is the ICHM that is best at expressing human emotions. Due to the highly developed river transportation system in Henan, Shanxi, Sichuan Chongqing, Hubei and other regions, a large amount of labour music has been produced, such as Yellow River chants, Weifeng gongs and drums, Chuanjiang chants, Longgupo lifting chants, and Yangtze River Xiajiang chants. These are the songs produced and disseminated by the working people in long-term shipbuilding work. In addition, the core areas of ICHMs are located in mountainous areas. High-pitched and bright folk songs have become an important vehicle of emotional expression for people who work in the mountains and for young men and women, resulting in a large number of folk songs, such as Xiling folk songs, Xingshan folk songs, Mashan folk songs, and Mudong folk songs.

Traditional dance shows the characteristic of multicore spatial distribution. It has formed three high-density core areas: west Shandong-north Henan-south Shanxi, central Jiangxi, and Chongqing-southwest Hubei, and two core areas with lesser density: the junction of east Anhui - southwest Jiangsu and north Tibet (Fig. 3b). The main functions of traditional Chinese dance are sacrifice and entertainment. Many traditional dances are distributed in the cradle of Chinese civilization (Shaanxi, Shanxi, Henan, Shandong). Due to the needs of historical rulers, royal sacrificial activities were often held in these areas, which promoted the production and spread of traditional dances. The dense areas of traditional dance that formed in Jiangxi, Hubei, Chongqing, Sichuan, and Tibet may be related to the needs of ethnic minorities to worship gods and their ability to sing and dance.

Traditional drama is the most concentrated ICHM type in the corridor, forming a continuous high-density core area in western Shandong - northern Henan - southern Shanxi - central Shaanxi (Fig. 3c), while other regions have not yet formed high-density areas. Chinese traditional drama developed during the pre-Qin to Tang dynasties and flourished in the Ming and Qing dynasties. During the Ming and Qing dynasties, with the development of the commodity economy, the civil class gradually grew. With the emergence of a large number of consumer groups, art has gradually become popular. Thus, came into being Henan drama, Qu drama, Yue Tune (Henan), Lv drama, Shandong Clapper drama (Shandong), Pu drama, Jin drama, North Road Clapper drama (Shanxi) and Shaanxi Guanzhong Daoqing, Ankang music and other operas. These types of opera continue to grow and influence each other, resulting in a high-density core area of traditional opera.

Quyi has the lowest quantity and a relatively concentrated distribution, with more in the central and eastern regions and fewer in the western regions. It is dispersed in a distribution of "three points in one area" (Fig. 3d). The first district refers to the core area of the Jiangsu-Shandong-Anhui-Henan-Hubei-Shanxi-Shaanxi contiguous area, and the three points include southwestern Hubei, southwestern Chongqing, and central Sichuan. Other areas have not yet formed dense regions. In addition, many cities do not have quyi. Quyi came into being late, but the performance conditions are not highly demanding, and

the content is rich and colourful, which is welcomed by the general public. Therefore, although the quantity is limited, it is easier to spread and form dense distribution areas.

Time series pattern of ICHMs

Scale and type structure

"Yellow River – Yangtze River Civilization Corridor" ICHMs have a huge time span. From ancient times to the present day, these traditions cover approximately 3 million years of history. From the perspective of quantitative change, the distribution of ICHMs along the corridor in various historical periods is uneven and fluctuates greatly (Table 4). Overall, the ICHMs are distributed with a characteristic of "two peaks and three valleys", reaching one peak during the pre-Qin to Qin and Han dynasties, and another during the Song, Yuan, and Ming and Qing dynasties. Especially during the peak period of the Ming and Qing dynasties, the number of ICHMs accounted for 57.83% of the total. The lowest points for quantity of ICHMs were in the prehistoric period, the Wei, Jin, Northern and Southern dynasties, and in modern times. The overall quantity gradually increased after two fluctuations of first increasing and then decreasing. The number of ICHMs is greatly influenced by social productivity and people's spiritual and cultural needs. With the continuous improvement of social development and living conditions and people's increasing spiritual needs, the closer to today that the period under examination is in history, the more ICHMs there are.

Table 4

Number of "Yellow River-Yangtze River civilization Corridor" ICHM in different historical periods

ICHM	Prehistoric(item /%)	Pre-qin(item /%)	Qin and Han(item /%)	Wei, Jin, Southern and Northern(item /%)	Sui, Tang and Five(item /%)	Song and Yuan(item /%)	Ming and Qing(item /%)	modern times(item /%)
Traditional music	35/41.67	91/67.41	63/37.95	35/72.92	117/36	148/37	352/20.87	23/31.94
Traditional dance	43/51.19	25/18.52	69/41.57	11/22.92	123/37.85	150/37.5	518/30.71	19/26.39
Traditional drama	4/4.76	7/5.19	31/18.67	2/4.17	46/14.15	43/10.75	540/32.01	17/23.61
Quyi	2/2.38	12/8.89	3/1.81	0/0	39/12	59/14.75	277/16.42	13/18.06

The prehistoric period is the longest time span among the eight historical periods. There were 84 ICHMs in this period, accounting for 2.88% of the total. Traditional dance (43 items) was the most common, followed by traditional music (35 items), and traditional drama (4 items) and quyi (2 items) were the least common. From an examination of spatial distribution, the overall trend shows that there are more traditions in the central part and fewer in the eastern and western parts (Fig. 4a). ICHMs are mainly concentrated in two core areas. One is the border of Chongqing, Hubei and Hunan provinces, and the other is central Sichuan. In addition, a lower density core area has been formed in central Shaanxi. In prehistoric times, due to the poor natural conditions and extremely low productivity, the ancestors were influenced by the thought of nature worship and often worshipped the gods through traditional dances to seek shelter. Therefore, the prehistoric period had the largest number of traditional dances. Since ancient times, Chongqing, Hubei, Hunan and Sichuan have had fertile land and abundant rainfall, which are suitable for planting and conducive to the production and life of the ancestors, so it is easy to form a dense distribution area of ICHMs.

There were 135 ICHMs in the pre-Qin period, accounting for 4.63% of the total. Among them, traditional music accounted for the absolute majority, with 91 items accounting for 67.4%, traditional dance accounted for 25 items, quyi accounted for 12 items, and traditional drama accounted for 7 items. From the perspective of its spatial distribution, ICHMs of this period are mainly concentrated in the three provinces of central Shaanxi, central eastern Shanxi, and north Henan, and the junction of central Hubei and northern Hunan. In addition, two lower density core areas were formed in south Chongqing and northwest Jiangsu (Fig. 4b). In the pre-Qin period, a hundred schools of thought contended. The "Shi" nationality among the nobility began to receive education in the "six arts" (etiquette, music, archery, driving, calligraphy, arithmetic); Confucianism, Taoism, Legalism, Mohism and other schools began to attach importance to the elaboration of musical aesthetics, thus producing a large amount of n traditional music creation. During this period, the core areas of ICHMs were located in the five powerful vassal states of China, namely, Qin (now Shaanxi), Jin (now Shanxi), Chu (now Hubei, Hunan), Wei, and South Korea (now Henan).

During the Qin and Han dynasties, there were 166 ICHMs, accounting for 5.69% of the total. The main ICHMs are traditional dance (69 items) and traditional music (63 items), followed by traditional drama (31 items), and the least common is quyi (3 items). In this period, ICHMs formed a large-scale continuous core area composed of Henan, Shanxi, Gansu, Sichuan and Chongqing and then spread outwards, reflecting the characteristics of the core-edge diffusion pattern of early civilization (Fig. 4c). Qin destroyed the six states and unified China, establishing a unified central country. The state has established the Yuefu system, in which specialized institutions are responsible for collecting, sorting out, creating and performing Folk music and dance. This system has promoted the development of traditional dance and music.

During the Wei, Jin, Northern and Southern dynasties, there were only 48 ICHMs, accounting for 1.64% of the total. Among them, traditional music accounts for the absolute majority, accounting for 72.92% of the total for that time, followed by traditional dance (11 items), and the least varied is traditional drama (2 items), with no quyi. From the perspective of spatial distribution, multiple high-density core areas formed in Jiangsu, Hubei-Hunan-Chongqing, Central Shaanxi-Shanxi-Inner Mongolia-north Henan, Central Sichuan, central Gansu (Lanzhou), northwest Gansu, and central Tibet (Lhasa) (Fig. 4d). During this

period, the situation was turbulent, wars were frequent, and the inheritance of some ICHMs was interrupted, resulting in a great reduction in the number of ICHMs compared with the previous period. However, there was a great integration of ethnic groups during this period. Buddhism and Taoism flourished, resulting in the generation and inheritance of numerous religious songs, thus forming multiple distribution points.

During the Sui, Tang, and Five Dynasties periods, the number of ICHMs rapidly increased, totalling 325 items, accounting for 11.14% of the total. Among them, traditional dance had the most items (123 items), traditional music had many items (117 items), and traditional drama and quyi had fewer items (46 items and 39 items). From the perspective of their spatial distribution, ICHMs are concentrated in northern Henan - southern Shanxi - southern Shaanxi - most of Chongqing - northeast corner of Sichuan - northwest Hubei and the northern corner of Hunan, forming a belt core area. In addition, there are two secondary core regions with one on the border between south Anhui and northwest Jiangxi and another in central Tibet (Lhasa). As a whole, it presents a spatial pattern of continuous distribution with more traditions condensed in the middle regions and fewer in the east and west (Fig. 4e). In the Sui and Tang dynasties, the country enjoyed a long period of peace and stability; the rulers were open to the outside world. People from the north moved to the south, social and economic activities were active, and culture and entertainment were abundant. This led to a new peak in the number and distribution of traditional dance and ICHMs, reflecting the general pattern for distribution in ICHMs during the peak of feudal society.

In the Song and Yuan Dynasties, there were 400 ICHMs, accounting for 13.71% of the total. Among them, traditional dance and traditional music have the largest number of ICHMs, 150 and 148, respectively. Compared with the previous era, the number of quyi increased significantly, and the number of traditional dramas is the smallest, accounting for only 10.75 percent of the total. From the perspective of spatial distribution, ICHMs formed four high-density core areas, which were distributed at the border between northwest Shandong and northeast Henan, Jiangxi, southeast Sichuan and northwest Chongqing, and the border between central and western Gansu and eastern Qinghai (Fig. 4f). In the Song and Yuan Dynasties, the art of Song Ci and Yuan Qu (song) reached its peak. There are countless connections between the art of Song Ci and Yuan Qu (song) and quyi, which influence and promote each other. Therefore, the number of quyi types increased during this period. During this period, multiple national regimes were established, and regional political and cultural centres were dispersed. ICHMs formed multiple densely distributed areas and shifted to the southeast.

The number of ICHMs during the Ming and Qing dynasties reached its second peak, with 1687 items, accounting for 57.83% of the total. Traditional drama and traditional dance accounted for 540 and 518, respectively, 32.01% and 30.71% of the total of the era, followed by traditional music (352), and quyi was the least common. In this period, ICHMs formed a continuous distribution in the core area, namely, northwest Jiangsu-north Anhui-west Shandong-northeast Henan-southwest Jin. In addition, the distribution is relatively dense in central Jiangxi and northwest Chongqing. The overall spatial pattern is more focused in the east and distributed less densely in the west (Fig. 4g). During the Ming and Qing dynasties, culture flourished, and entertainment activities were rich and diverse. The five major Chinese drama genres, including Yue drama, Huangmei drama, Pingju, and Yu drama, reached their peak. Traditional dance underwent unprecedented development and became a higher spiritual pursuit in people's daily lives.

In modern times, the number of ICHMs has sharply decreased to only 72, accounting for only 2.47% of the total. The number of ICHMs is relatively evenly distributed across the four categories of musical traditions, and the number of traditional music practices is the largest (23), followed by the number of traditional dance schools (19), traditional drama types (17), and the number of quyi types (13). In this period, the distribution of ICHMs was very concentrated, and a large contiguous core area was formed in Jiangsu-Shandong-Henan-Anhui-Jiangxi-Hubei-Shanxi-Shaanxi-Gansu-Ningxia, showing the characteristics of agglomeration as a whole (Fig. 4h). In modern times, due to the political divisions created by warlords and frequent wars, the protection and inheritance of ICHMs have been adversely affected, so the number has been reduced.

Changes to the centre of gravity

Through the standard deviation ellipse analysis, in general, the "Yellow River – Yangtze River Civilization Corridor" ICHMs over 8 historial periods present a northeast–southwest - northwest - south - northeast - southeast - south "turning to southeast" trend(Fig. 5). The centre of gravity of the standard deviation ellipse of ICHMs is located in Yunyang District, Shiyan City, Hubei Province (32.815° N, 110.614° E), 911.89 km east of the geometric centre of gravity of the geography of China (36.03° N, 103.40° E). From the point of view of different periods, the centroid of ICHMs in the prehistoric period was in Dianjiang County, Chongqing (30.315°N, 107.571°E); in the pre-Qin period, it moved northeast to Yunyang District, Shiyan City, Hubei Province (32.607°N, 110.305°E). In the Qin and Han Dynasties, it was transferred to Zhuxi County, Shiyan City, Hubei Province (32.326°N, 32.326°N, 32.30°N). 109.517°E). In the Wei, Jin and Southern and Northern Dynasties, the centroid moved northwest to Zhouzhi County, Xi 'an City, Shaanxi Province (33.86°N, 107.737°E). In the Sui, Tang and Five Dynasties period, the centroid moved south to Wanyuan City, Dazhou City, Sichuan Province (32.04°N, 107.889°E). In the Song and Yuan dynasties, it moved northeast to Shangzhou District, Shangluo City, Shaanxi Province (33.677°N, 109.802°E). In the Ming and Qing Dynasties, it continued to move southeast to Neixiang County, Nanyang City, Henan Province (32.933°N, 111.652°E). In modern times, it moved south to Dengzhou City, Nanyang City, Henan Province (32.559°N, 111.805°E). The centre of gravity shifted 554.17 km over the eight periods. Overall, after the Sui and Tang dynasties, the centroid of the ICHMs of the "Yellow River-Yangtze River Civilization Corridor" gradually shifted to the southeast. This may be related to the fact that southern China's economy, culture, politics, military and other aspects began to gradually surpass those of the north. The economic centre of gravity gradually shifted to the south. This result is also similar to the evolution of Qin Shu ICH and China's material cultural heritage historically [26, 50].

As shown in Fig. 5, in general, the standard deviation ellipse rotation angle of ICHMs in the "Yellow River – Yangtze River Civilization Corridor" is 68.357°, showing a narrow distribution in the northeast and southwest directions. The ellipse includes ICHMs in Shandong, Henan, Shanxi, Shaanxi, Inner Mongolia, Ningxia, Gansu (Yellow River Basin), as well as Jiangsu, Anhui, Jiangxi, Hubei, Hunan, Chongqing, Sichuan (Yangtze River Basin) and other provinces. From the perspective of different periods, the ICHM space in prehistoric times presents an east–west pattern, with an elliptical rotation angle of 87.013°. From the pre-Qin period to the Qin and Han dynasties, the rotation angle changed to the southeast and northwest pattern, and the rotation angle first weakened and then strengthened, rising from 62.63° to 69.677°. From the Wei, Jin, Southern and Northern Dynasties to the Sui, Tang and Five Dynasties, the rotation

angle returned to the east–west pattern, which first strengthened and then weakened, from 84.794° to 82.594°. After the Song and Yuan dynasties, it changed to the southeast and northwest pattern again, and the rotation angle first weakened and then strengthened, rising from 57.037° to 65.994°. Across this historical period from the Sui, Tang, and Five Dynasties period to the Song and Yuan dynasties, the rotation angle of the standard deviation ellipse changed the most, reaching 25.557°. The standard deviation ellipse direction for all 8 periods ranged from 57.037° to 87.013°. The trend of changes in the long and short axes of the ellipse is consistent. They all went through a successive process of "growth–decline–growth" before the Qin and Han dynasties, during the Song and Yuan dynasties, and after the Ming and Qing dynasties. It shows that the spatial distribution of ICHMs in the "Yellow River–Yangtze River Civilization Corridor" evolves consistently along the pattern of agglomeration–dispersion–agglomeration.

The influencing factors of ICHM spatial distribution in the "Yellow River–Yangtze River Civilization Corridor"

There is a comprehensive impact from multiple factors, such as the natural environment and socioeconomic factors, on the protection and inheritance of intangible cultural heritage resources [24, 26]. Therefore, this study summarizes the spatial distribution and influencing factors of intangible cultural heritage both domestically and internationally and combines the actual situation of the Yellow River and Yangtze River basins. By using the geographic detector method, 9 factors, including elevation, slope, rainfall, accumulated temperature, river, traffic, population, GDP and urbanization, were selected to analyse the influencing factors of the spatial distribution of ICHMs in the "Yellow River - Yangtze River Civilization Corridor". Geographic detectors perform better in calculating category data than continuous data, so SPSS software was used to perform two-step clustering on the values of the ICHM continuous detection factors of the "Yellow River – Yangtze River Civilization Corridor", which are divided into six or seven categories.

Analysis of influencing factors

Using geographical detector factor detection, we calculated the q value reflecting the influence of each detection factor on the distribution of ICHMs in the corridor (Table 5). Different dimensions and factors have different influences on the spatial distribution of ICHMs in the corridor. The results show that the core factors that dominate the spatial distribution of ICHMs in the corridor are population (0.4747), accumulated temperature ≥ 10°C (0.4543), GDP (0.4006), elevation (0.3343) and annual rainfall (0.3281). Among dimensions, the natural environment index accounted for 3, and the social economy index accounted for 2, indicating that the distribution of ICHMs in the corridor is the result of the interaction of the natural environment and human activities. People are the direct creators of and participants in culture, and a dense population provides relatively more feasibility for the generation and development of ICHMs in the region. A developed economy can provide better support and conditions for the generation and dissemination of ICHMs. Sufficient heat and abundant precipitation make it more suitable for human life with abundant resources and high material abundance, which is more conducive to the generation and dissemination of ICHMs. In addition, the flat and open terrain of the area is conducive to human interaction and communication and can effectively promote cultural exchange and dissemination. Relatively steep and closed spaces will block the flow and communication of the population.

Table 5

Influencing factors and its determinant values

Dimensionality	Evaluation Indicators	Value range	Data sources	q	P
Natural environment factors	Elevation	According to DEM elevation, topographic relief is divided into 6 levels	ArcGIS	0.3343	0.000
	Slope	Divide the slope into 7 levels based on the degree of steepness of surface units	ArcGIS	0.0025	0.000
	Rainfall	The annual average precipitation in China is automatically divided into seven levels according to the natural discontinuity point	ArcGIS	0.3281	0.000
	≥ 10°C accumulated temperature	China ≥ 10°C accumulated temperature is automatically divided into 7 levels according to the natural discontinuity point	ArcGIS	0.4543	0.000
	River	Automatically divide the total length of the water system (above level 3) into 6 levels based on natural breakpoints	Official statistics	0.24	0.000
Socioeconomic factors	Traffic	The total mileage of railways, highways and inland waterways will be automatically divided into six levels according to natural discontinuity points	Official statistics	0.1103	0.000
	Population	The permanent population is automatically divided into 6 levels according to natural discontinuity points	Official statistics	0.4747	0.000
	GDP	The total GDP is automatically divided into 6 levels according to the natural break point	Official statistics	0.4006	0.000
	Urbanization	The urbanization rate is automatically divided into 6 levels according to the natural break point	Official statistics	0.1203	0.000

Detection and analysis of natural environmental factors. The natural environment is closely related to the formation and development of ICHMs. As seen from the results of Table 5, accumulated temperature ≥ 10°C (0.4543), elevation (0.3343) and annual rainfall (0.3281) are the natural environmental factors with the highest degree of influence on ICHMs of the "Yellow River – Yangtze River Civilization Corridor". The second most influential factor is the river (0.24), and the degree of influence is also relatively high; Slope (0.0025) has the lowest effect.

Detection and analysis of socioeconomic factors was conducted next. Since ICHMs are a product that is created, protected and inherited in the long term by human beings, social and economic behaviours have a great impact on ICHMs. The influence of socioeconomic factors on the spatial distribution of ICHMs in the corridor is in the following order: population > GDP > urbanization > transportation. Of these, population and GDP have the strongest influence on the spatial distribution of ICHMs, with q values of 0.4747 and 0.4006, respectively. The influence of urbanization and transportation is moderate, with q values of 0.1203 and 0.1103, respectively.

Interaction analysis of influencing factors

In reality, the spatial distribution of ICHMs in the "Yellow River – Yangtze River Civilization Corridor" cannot be determined by a single factor or a single dimension. In this study, the interaction of different factors on the spatial distribution of ICHMs in the "Yellow River-Yangtze Civilization Corridor" was detected by the interaction of geographical detectors (Table 6). The results showed that the five natural environmental factors and the four socioeconomic factors all enhanced each other after pairwise interaction; the influence type was mainly two-factor enhancement, followed by nonlinear enhancement, and there were no independent factors.

Table 6

Results of interaction between different influencing factors

Dimensionality	Evaluation Indicators	Elevation	Slope	Rainfall	≥ 10°C accumulated temperature	River	Traffic	Population	GDP	Urbanization
Natural environment factors	Elevation	0.3343								
	Slope	0.4016**	0.0025							
	Rainfall	0.5302	0.3840**	0.3281						
	≥ 10°C accumulated temperature	0.5164	0.5125**	0.6115	0.4543					
	River	0.51	0.249**	0.5676	0.5475	0.24				
Socioeconomic factors	Traffic	0.4887**	0.1604**	0.4755**	0.5438	0.3239	0.1103			
	Population	0.5414	0.5066**	0.6284	0.5781	0.5881	0.5657	0.4747		
	GDP	0.5017	0.4301**	0.5978	0.5627	0.5433	0.5105	0.5035	0.4006	
	Urbanization	0.4798**	0.1318**	0.5581**	0.5372	0.4258**	0.3943**	0.5353	0.5048	0.1203

Note: ** indicates a nonlinear enhancement relationship, underscores indicate a bilinear enhancement relationship

Specifically, for the sets 1) elevation and slope, traffic, and urbanization, 2) slope and annual rainfall, accumulated temperature ≥ 10°C, river, traffic, population, GDP, and urbanization, 3) annual rainfall and traffic, urbanization, 4) river and urbanization, 5) traffic and urbanization, the relationships are nonlinear and mutually enhancing, and the explanatory power after the intersection of these variables is greater than the sum of their individual effects.

Among the natural environmental factors, the interaction between accumulated temperature ≥ 10°C and annual rainfall is the strongest. This indicates that a relatively temperate climate will be more conducive to the generation and dissemination of ICHMs in abundant areas. Among the social and economic factors, the synergistic effect between population and traffic is the strongest. This indicates that the more densely populated and highly developed, high-traffic areas easily form ICHM agglomerations. In the interaction between natural factors and social factors, the synergistic effect between annual rainfall and population is more significant than other factors. This indicates that the spatial distribution of intangible heritage is denser in regions with more abundant rainfall and a denser population.

Overall, when natural environmental factors and socioeconomic factors play separate roles, the driving force is not as strong as the interaction between the two. Therefore, policymakers guiding the protection and inheritance of ICHMs in the "Yellow River–Yangtze River Civilization Corridor" need to comprehensively consider the role of all impact factors on the spatial distribution of ICHMs in the corridor.

Conclusion and discussion

Conclusion

Suggestions for the Protection and Development of ICHMs in the "Yellow River-Yangtze River Civilization Corridor"

ICHM is an important part of intangible cultural heritage and is the world's precious wealth. As one of the mother rivers of world civilization, the "Yellow River–Yangtze River Civilization Corridor" contains rich traditions of intangible musical heritage. From a macro perspective, this study adopts the nearest neighbour index, nuclear density analysis, elliptic standard deviation and geographic detector methods to grasp the temporal and spatial distribution and influencing factors of ICHMs along the "Yellow River - Yangtze River Civilization Corridor". A comprehensive and in-depth analysis of the above issues was

conducted and the following suggestions are proposed based on local conditions to promote the practical work of protection, inheritance, and innovative development:

First, the research results show that the temporal and spatial distribution of ICHMs in the corridor is highly heterogeneous, forming a core circle of ICHMs across different types and times. This result is consistent with the research findings of similar studies for the Xiangxi, the Yellow River basin regions and Beijing, Tianjin, Hebei [24, 26, 27]. Therefore, in the development and utilization of ICHMs, regional culture should be highlighted, cross-provincial and intercity exchanges and cooperation should be strengthened, and a "Yellow River – Yangtze River Civilization Corridor" ICHM protection system should be built in coordination. Further the public service system of ICHMs in the "Yellow River - Yangtze River Civilization Corridor" should be improved, the protection of ICHMs of the "Yellow River - Yangtze River Civilization Corridor" should be implemented, and regional linkage should be gradually realized. Important contributions should be made to the cultural inheritance and sustainable development of the corridor. The multicore spatial characteristics of ICHMs—"four points in one area"—should be given full play. The "four high points" of concentrated ICHMs in the "Yellow River – Yangtze River Civilization Corridor" can be taken as core places of power and the "three secondary high points" as auxiliary points to connect the ICHMs in the western, central and eastern regions. According to the distribution characteristics across historical periods, preservation tactics can highlight the historical theme, and diverse ICHM exhibitions and performance spaces can be created.

Second, from the perspective of influencing factors, population and GDP are the main factors affecting the number, type and spatial distribution of ICHMs in the corridor. We can increase the capital investment in ICHMs, deepen the integration of cultural and tourism industries, and achieve a virtuous circle in the ICHM economy. In recent years, China's tourism industry has shown vigorous development, and the increasing public demand for cultural and spiritual enrichment has also made cultural tourism the focus of economic development. Therefore, integrating intangible cultural heritage with the tourism industry can not only create more economic benefits but also provide more effective protection for intangible cultural heritage. During actual implementation, it should be considered that the western region of the corridor is mostly mountains and deserts with a small population and low level of economic development, and there are few ICHMs; however, a large number of ethnic minority music and dance traditions with strong characteristics are distributed here, forming a unique ethnic minority culture. We should increase economic investment in ICHMs in the region, activate ICHM resources, innovate ICHM tourism models, and form a "community of shared destiny" where ICHM protection and tourism development interact and coexist. The central and eastern parts of the "Yellow River - Yangtze River Civilization Corridor" have a large population, developed economy and many ICHMs. Therefore, a long-term assessment system for the authenticity of ICHMs should be established to avoid the adverse impact of excessive commercial development.

Contribution of this study

At a time when the world's rivers are facing global challenges such as the climate crisis and the degradation of cultural diversity, it is our common mission to promote dialogue between China's Yellow River and Yangtze River civilizations and other civilizations in the world. Civilizations are colourful through communication and rich through mutual learning. Strengthening exchanges and mutual learning among civilizations is an important part of the responsibility to better protect, inherit and carry forwards the Yellow River and Yangtze River cultures in China. The world also shares a common mission to promote the prosperity and development of river civilizations and the well-being of the people.

The results of this study provide a reference for future theoretical research on the ICHMs of great river civilizations. First, previous studies have paid more attention to a single river, lacking the study of the intangible cultural heritage of the worldwide great river civilizations. China's "Yellow River – Yangtze River Civilization Corridor" is extremely important to among the world’s great river civilizations, and scientific research on it is of great significance to the study of intangible cultural heritage in river basins. Second, the geographical spatial analysis method is used to analyse musical intangible heritage, expanding the research perspective of world musical intangible heritage. The results of this study not only more accurately grasp the distribution of ICHMs in the "Yellow River – Yangtze River Civilization Corridor" but also provide methods and references for the temporal and spatial analysis of ICHMs in other river civilizations.

Future research

The "Yellow River – Yangtze River Civilization Corridor", as one of the great river civilizations in the world, has certain similarities in culture within the scope of study. However, the world has multiple centres of civilization born from rivers, and the cultures of different civilizations vary greatly. The applicability of the results of this study in other regions still needs to be verified. Therefore, the study of the temporal and spatial distribution of the ICHMs of the world's great river civilizations and their influencing factors is another direction of future research.

Discussion

ICHMs are not only an important part of world cultural protection but also an important force for regional economic development. Through the analysis of the temporal and spatial distribution and influencing factors of ICHMs in the "Yellow River-Yangtze River Civilization Corridor", the main conclusions are as follows:

(1) The number of ICHMs in the "Yellow River - Yangtze River Civilization Corridor" is large, and the difference in spatial distribution is obvious. The central region has the largest number of ICHMs, while the eastern region has the least. In terms of river basins, the number of ICHMs in the Yellow River basin is higher than that in the Yangtze River basin. From the perspective of provinces, Henan has the most ICHMs, and Ningxia and Shanghai have the fewest ICHMs. The number of traditional dance ICHMs is the largest, while the number of quyi ICHMs is the smallest.

(2) The "Yellow River - Yangtze River Civilization Corridor" ICHMs are spatially clustered, forming a pattern of "one region and four points" in western Shandong-northern Henan-southern Shanxi-central Shaanxi, Jiangsu, Jiangxi, Hubei and Chongqing. The distribution areas of all kinds of ICHMs are not

the same: traditional music forms two high-density core areas at the intersection of northwest Henan-southeast Shanxi and Chongqing-southwest Hubei. Traditional dance has formed three high-density core areas, namely, west Shandong - north Henan - south Shanxi - central Shaanxi, central Jiangxi, and Chongqing-southwest Hubei. The distribution of traditional drama is the most concentrated, forming a contiguous high-density core area in the west of Shandong - north Henan - south Shanxi and Shaanxi. Quyi has formed four high-density core areas: Jiangsu-Shangdong-Anhui-Henan-Hubei-Shanxi-Shaanxi, southwest Hubei, southwest Chongqing and central Sichuan.

(3) The historical development of the ICHMs of the "Yellow River-Yangtze River Civilization Corridor" generally presents the changing characteristics of "two peaks and three valleys", which first peaked in the pre-Qin to Qin and Han dynasties along with the Song and Yuan dynasties and then peaked a second time in the Ming and Qing dynasties. Its lowest points were reached in the prehistoric period, during the Wei, Jin, Northern and Southern dynasties, and in modern times. The number of all kinds of ICHMs in the 8 periods was uneven. The number of traditional dances was largest in prehistoric times, and during the Sui, Tang and Five Dynasties. The number of musical traditions was largest in the pre-Qin period, during the Wei, Jin, Northern and Southern dynasties, and in modern times. The number of musical traditions and traditional dance in the Song and Yuan dynasties and the Qin and Han dynasties is not much different, becoming the types with the largest number of ICHMs. In the Ming and Qing dynasties, the number of traditional drama types increased rapidly and became the most common ICHM type. The centre of gravity of the ellipse of ICHMs is located in Shiyan City, Hubei Province, and the eight periods show a "turning to the southeast" trend of moving from the northeast to southwest - northwest - south - northeast - southeast and south. The changes in the long axis of the ellipse indicate that ICHMs exhibit an evolutionary process of agglomeration, dispersion, and agglomeration in spatial distribution.

(4) The results of the factor detector show that the five factors of population, ≥ 10 ℃ accumulated temperature, GDP, elevation and annual rainfall play a leading role in the spatial distribution of ICHMs in the "Yellow River- Yangtze civilization corridor". The analysis results of the interaction detector show that there is an enhanced relationship between different factors after pairwise interaction, mainly manifested in two types: nonlinear enhancement and dual factor enhancement. The dual factor interaction results indicate that among natural environmental factors, the interaction between accumulated temperature ≥ 10 ℃ and annual rainfall is the strongest. Among socioeconomic factors, the synergy between population and transportation is strongest. Among the interactions between natural and social factors, the synergistic effect between annual rainfall and population is the most significant. When social and economic factors and natural environmental factors jointly affect the spatial distribution of ICHMs in the "Yellow River - Yangtze River Civilization Corridor", the synergistic effect is greater than that of individual factors.

Abbreviations

ICHM: intangible cultural heritage of music.

Declarations

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Author contributions

T.Y.G: conceptualization, data collection and quality, and formal analysis; C.M.: interpretation, visualization and methods; L.Y.: editing the manuscript. All authors read and approved the fnal manuscript.

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References

1. Yang SS, Cai YX. Spatial Distribution, Influential Factors and Optimization Strategies of Religious Intangible Cultural Heritage in the Northwest Ethnic Corridor. Qinghai J Ethnol. 2020;31(03):220–8. (in Chinese).
2. Liang J, Wang HM. The Spatial Distribution Characteristics and Influencing Factors of Intangible Cultural Heritage in Pearl River-Xijiang River Economic Belt. J Soc Sci.2018;(12): 39–49. (in Chinese).
3. Xiao YJ, Xiao X. Research on the Protection Strategy of Music Intangible Cultural Heritage in Southeast Guizhou under the Background of Information. Mod Music.2022;(10): 4–6. (in Chinese).
4. Craith MN. UNESCO, cultural heritage, and outstanding universal value: value-based analyses of the world heritage and intangible cultural heritage conventions. Am Anthropol. 2013;3:528–30.
5. Tan SK, Siow H, Kok YS, Choon SW. Sense of place and sustainability of intangible cultural heritage—the case of George Town and Melaka. Tourism Manage. 2018;67:376–87.
6. Sun C, Chen H, Liao R. Research on incentive mechanism and strategy choice for passing on intangible cultural heritage from masters to apprentices. Sustainability. 2021;13:5245.
7. Cominelli F, Grefe X. Intangible cultural heritage: safeguarding for creativity. City Cult Soc. 2012;3(4):245–50.
8. Guo C. Building a scientifc and reasonable classifcation system for Intangible Cultural Heritage - Centering on the statistical analysis of the database of the list of the convention for the safeguarding of Intangible Cultural Heritage. S Ethnic Liter. 2021;39:158–68.
9. Su X, Li X, Wu Y, Yao L. How is intangible cultural heritage valued in the eyes of inheritors? Scale development and validation. J Hosp Tour Res. 2020;44:91469.
10. Xiao F, Xi H. Basic characteristics of the cultural space of intangible cultural Heritage and principles of protection. Cult Herit. 2022;1:9–16.
11. Tao W, Cai H, Gao Y, Zhang C, Jiang Y. The transmission and practice of intangible cultural heritage from the perspective of body geography. Acta Geogr Sin. 2020;75:2256–68.
12. Thomas B. Whom does heritage empower, and whom does it silence? Intangible cultural heritage at the Jemaa el Fnaa Marrakech. Int J Herit Stud. 2015;22:1–13.
13. Giudici E, Melis C, Dessì S. Is intangible cultural heritage able to promote sustainability in tourism? Int J Qual Serv Sci. 2013;5:101–14.
14. Wang Y, Bramwell B. Heritage protection and tourism development priorities in Hangzhou, China: A political economy and governance perspective. Tourism Manage. 2012;33:988–98.
15. Zhang XY, Yu H, Chen T, et al. Evaluation of tourism development value of intangible culture heritage resources: A case study of Suzhou City. Prog Geog. 2016;35(8):997–1007. (in Chinese).
16. Hou X, Tan G, Zhuang W, Tang M. Research on knowledge management of Intangible Cultural Heritage Based on Linked Data. J Libra Sci China. 2019;45:88–108.
17. Xu S. Exploring ways to protect intangible cultural heritage in a “living” way–-The intangible cultural heritage in Chinese animation flms as an example. Dong Tribu. 2019;40:115–24.
18. Gu D, Wang B, Huang Y, Xu X. Research on the protection and renewal of traditional villages based on the revitalization of intangible cultural heritage:the case of Hucun in Jixi County, Anhui Province. J Hum Settle West China. 2018;33:100–5.
19. Wei LDanLShenyang. Intangible Cultural Heritage Tourism Development Analysis. Stud Sociol Sci. 2013;04:65–8.
20. Fromm AB. Ethnographic museums and Intangible Cultural Heritage return to our roots. J Mar Isl Cult. 2016;5:89–94.
21. Terzic A, Bjeljac Z, Curcic N. Common histories, constructed Identities: intangible cultural heritage and the rebranding of Serbia. Int J Intang Herit. 2015;10:102–20.
22. Tong YQ. Protection and system construction of inheritors of Intangible cultural heritage. Cult J 2011(01):128–33. (in Chinese).
23. Bille M. Assembling heritage: investigating the Unesco proclamation of Bedouin intangible heritage in Jordan. Int J Herit Stud. 2012;18(2):107–23.
24. Zhang XY, Xiang H, Liu R. Spatial pattern and influencing factors of intangible cultural heritage of music in Xiangxi, central China. Herit Sci. 2022;3:2–12.
25. Nie X, Xie Y, Xie XX, Zheng LX. The characteristics and infuencing factors of the spatial distribution of intangible cultural heritage in the Yellow River Basin of China, Herit Sci. (2022) 10:121.
26. Liu Y, Chen M, Tian YG. Temporal and spatial patterns and infuencing factors of intangible cultural heritage: Ancient Qin-Shu roads, Western China. Herit Sci. 2022;10:121.
27. Pang L, Wu LN. Distribution characteristics and infuencing factors of Intangible Cultural Heritage in Beijing-Tianjin-Hebe.Herit Sci. (2022) 10:121.
28. Xu BC, Pan JH. Spatial Distribution Characteristics of the Intangible Cultural Heritage in China. Econ Geogr. 2018;38(05):188–96. (in Chinese).
29. Zhang YL. Spatial and Temporal Distribution Features of National Intangible Cultural Herit-age in Northeast China. J Yanbian Univ (Soc Sci). 2018;51(06):123–30. (in Chinese).
30. Li JM, Zhao QQ, Chen J. Spatial Distribution Characteristics and Influencing Factors of Intangible Cultural Heritage in Yangtze River Economic Belt. Econ Geogr2020,40(12): 191–8. (in Chinese).

31. Ying K, Li XD. Spatial Distribution Characteristics and Impacting Factors of Intangible Cultural Heritage in Guizhou Province. J Nat Sci Hunan Norm Univ. 2021;44(05):70–9. (in Chinese).
32. Iang JL, Yang QY, Zhang ZX et al. Spatial Distribution Pattern of Intangible Cultural Heritage and Tourism Development in Chongqing. Econ Geogr 2019,39(06): 205–13. (in Chinese).
33. YinD, Shi B, Chen XR. Spatial Distribution of Sports Intangible Cultural Heritage Tourism Resources in China —— Based on GIS Spatial Analysis. J Beijing Sport Univ.2018;41(11):116–122. (in Chinese).
34. Liao JM, Geng BJ, Yan Y. Research on the Intangible Cultural Heritage of Xinjiang Minority Sports. J Fujian Norm Unive (Nat Sci Edit). 2020;36(05):92–101. (in Chinese).
35. Wang LYUB, He H. Spatial Distribution Characteristics and Influencing Factors of Intangible Cultural Heritage in Liaoxi Corridor. Beijing Surv and Mapp. 2021;35(7):860–5. (in Chinese).
36. Liu JX. The Common Characteristics and Development Trends of Yellow River Culture and Yangtze River Culture. Dynam Soc Sci 2022(03): 35–44. (in Chinese).
37. Yang Y. The Diagonal Effect of Wu Culture and The Yellowã€ Yangtze River Civilization. J Soochow Univ (Philos & SocSci Edit). 2012;33(05):8–20. (in Chinese).
38. Cheng JC. Chinese Intangible Cultural Heritage and Chinese Cultural Genes:Centered on the Intangible Cultural Heritage of the Yelow River -Yangtze River Civilization Coridor. J Lanzhou Univ Art Sci (Soc Sci). 2021;37(04):2–11. (in Chinese).
39. Li HQ, Li HL. Viewing the Cultural Genes of the Chinese Nation from the "Dual Union" of the Yangtze and Yellow Rivers. Soc Sci Res 2021(01);165–73. (in Chinese).
40. Zhou S. From Yellow River Culture to Yangtze River Culture. Pearl River Water Transport.201;1(17): 83–6. (in Chinese).
41. Our Interview Team. Shouldering the mission of inheriting cultural heritage and building a good national cultural park. China Tourism Daily.2022-10-25. (in Chinese).
42. Mu SL, Yuan ZH, WuRTKTH. Spatial differentiation pattern and impacting mechanism of intangible cultural heritages in the Yellow River Basin. J Desert Res. 2022;42(06):255–65. (in Chinese).
43. Liao LQ, Hu J. Spatial-temporal characteristics and evolution of Intangible Cultural Heritage in the Yangtze River Economic Zone. J Cent China Norm Univ(Nat Sci). 2019;53(05):804–14. (in Chinese).
44. Li HQ, Li HL. Viewing the Cultural Genes of the Chinese Nation from the "Dual Union" of the Yangtze and Yellow Rivers. Soc Sci Res. 2021;(01): 165–73. (in Chinese).
45. Cheng JC. The time-space dimension and multiple meanings of the "Yellow River Yangtze civilization Corridor" on the Silk Road. Gansu Soc Sci. 2021; (04),69–79. (in Chinese).
46. Liu ZC. Overview of the Yellow River and Yangtze River. Jilin Publ Group Co Ltd 2013, 10,1. (in Chinese).
47. Jiang YT, Hao ZC, Feng SF, et al. Spatiotemporal evolution characteristics in compound hot dry events in Yangtze River and Yellow River basins. Water Res Prot. 2023;39(02):70–7. (in Chinese).
48. Zheng JQ. Temporal and spatial variations of nitrogen and phosphorus fluxes and key driving factors in the Yangtze and Yellow River Basins. Chin Res Acad Environ Sci. 2022.6.(in Chinese).
49. Du HB. Analysis of spatial differences in carbon emissions between the Yellow and Yangtze River basins based on nighttime light data. Northwest Norm Univ,2022.5.(in Chinese).
50. Tian XB, Hu J, Xu X, et al. Spatial–temporal distribution characteristics and infuence mechanism of key cultural relics protection units in China at diferent historical periods. Econ Geogr. 2021;41:191–201. (in Chinese).
51. Yue J. Temporal and spatial pattern of cultural heritage in Beijing-TianjinHebei region and its infuencing factors: a case study of Cultural Relic Protection Unit. Econ Geogr. 2020;40:221–30. (in Chinese).
52. Wang Y, Li S, Jiu J, et al. Research on the Spatial Distribution of Traditional Villages and Influencing Factors in Henan Province. Chi J Agr Res Reg Plan. 2019;40:129–36. (in Chinese).
53. Jiao S, Zhen Z, Xu F, Li C, Li H, Ma B. The marginal characteristics of traditional village distribution: the case of Hunan Province. Geogr Res. 2016;35:1525–34. (in Chinese).
54. Zhang J, Li C, Zhou H, Shen Q, Ma Z. The evolution pattern and mechanism of public service facility land in Changchun. Acta Geogr Sin. 2015;70:1939–52. (in Chinese).
55. Li X, Li D, Dong X, Xu N. Spatial pattern of 5A-class tourist attractions distribution and network attention in China. J Arid Land Resou Envir. 2019;33:178–84. (in Chinese).
56. Wang JF, Xu CD. Geodetector: principle and prospective. Acta Geogr Sin. 2017;1:116–34. (in Chinese).
57. Shao X, Liu Y, Wang X, Zhai Z, Li Z. Tourism responsiveness of traditional Villages in the Yellow River Basin and Influencing Factors. J Arid Land Resou Envir. 2021;35:200–8. (in Chinese).
58. Wang JF, Li XH, Christakos G, Liao YL, Zhang TL, Gu X, Zheng XY. Geographical detectors-based health risk assessment and its application in the neural tube defects study of the Heshun Region, China. Int J Geogr Inf Sci. 2010;24(1):107–27. (in Chinese).
59. Wang JF, Zhang TL, Fu BJ. A measure of spatial stratified heterogeneity. Ecol Ind. 2016;67:250–6. (in Chinese).

Figures

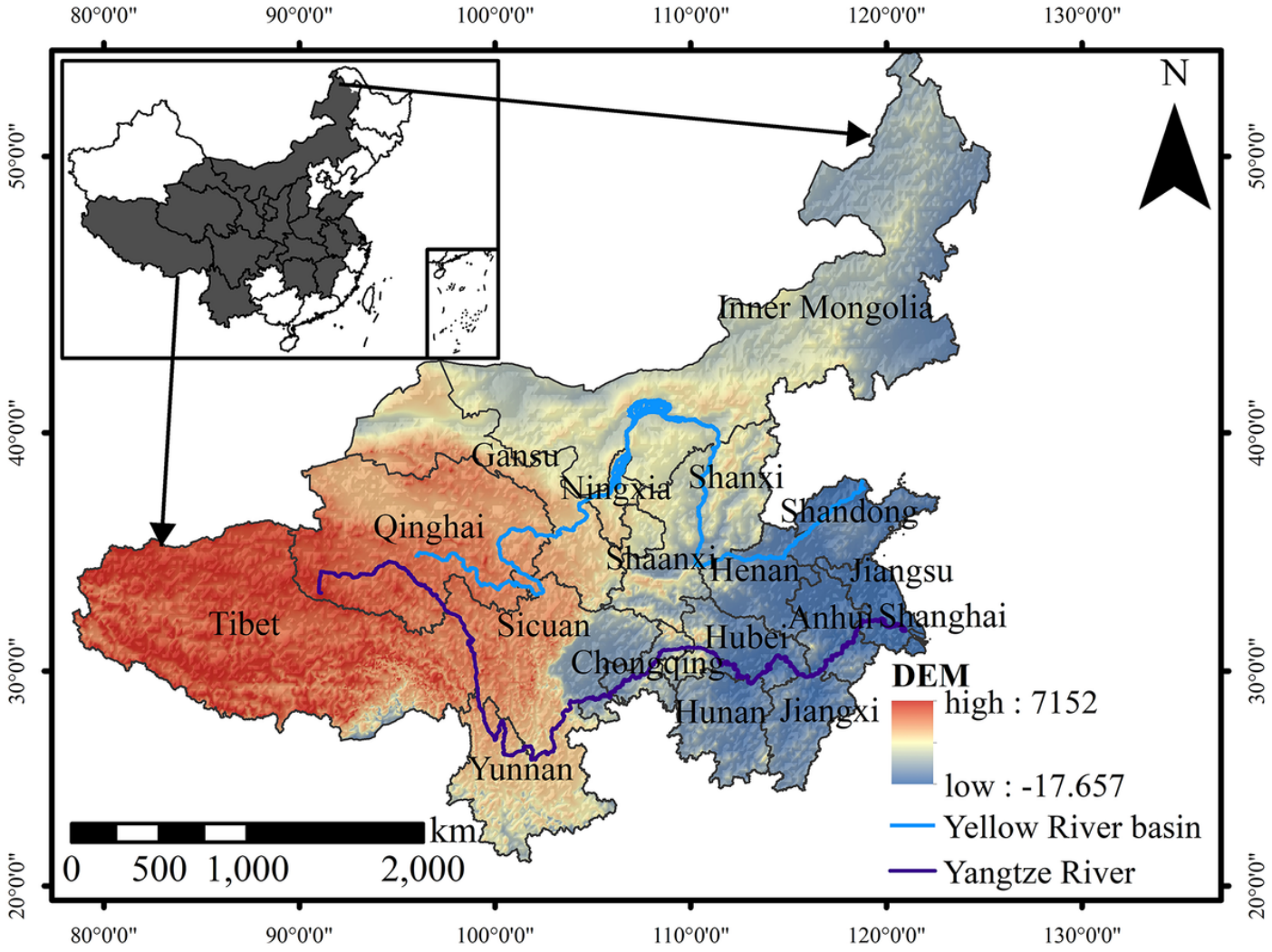

Figure 1

The location of the “Yellow River—Yangtze River Civilization Corridor” and its topographic features

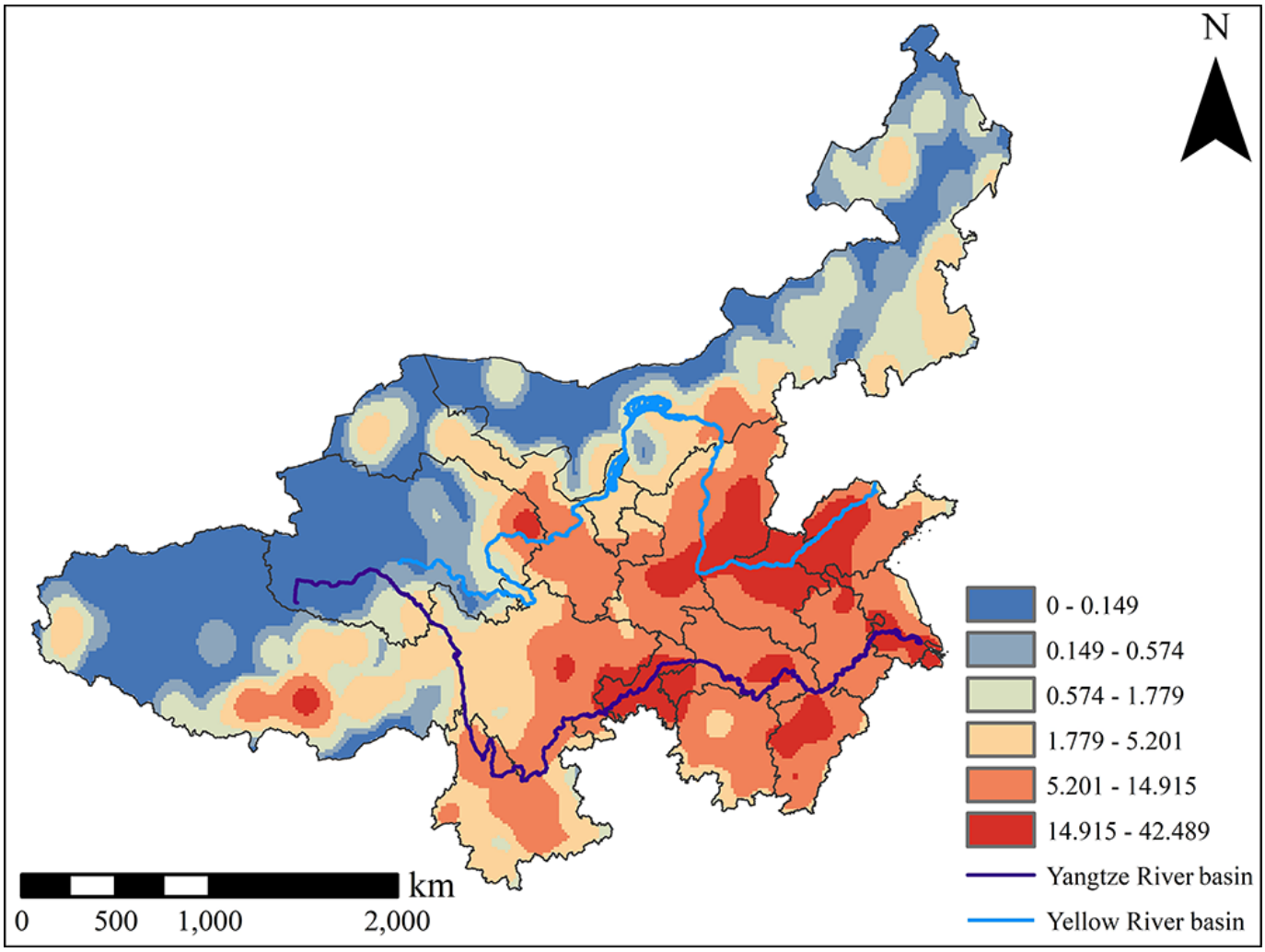

Figure 2

Kernel density of ICHM in the “Yellow River—Yangtze River Civilization Corridor”

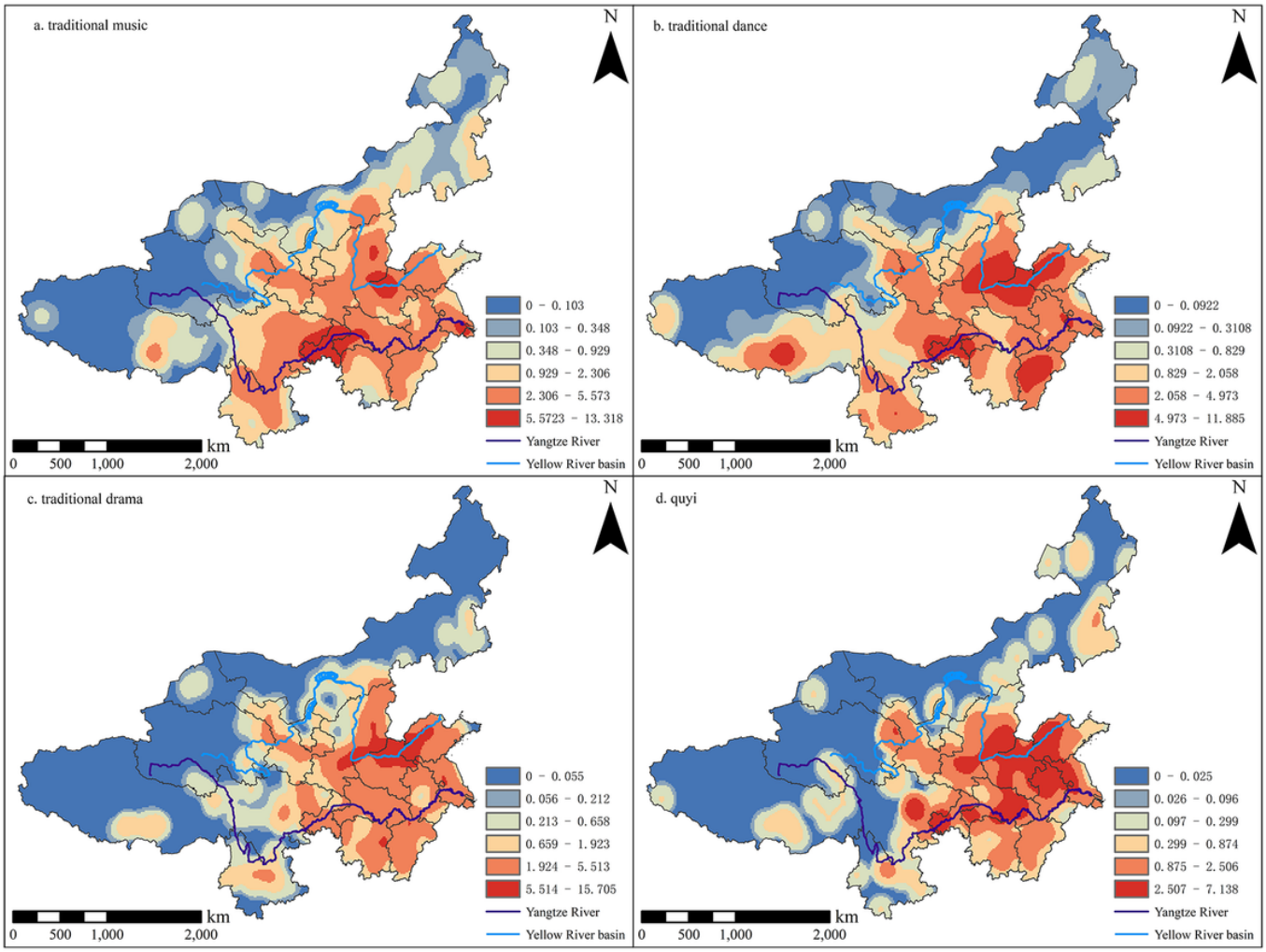

Figure 3

Kernel density of different types ICHM in the “Yellow River—Yangtze River Civilization Corridor”

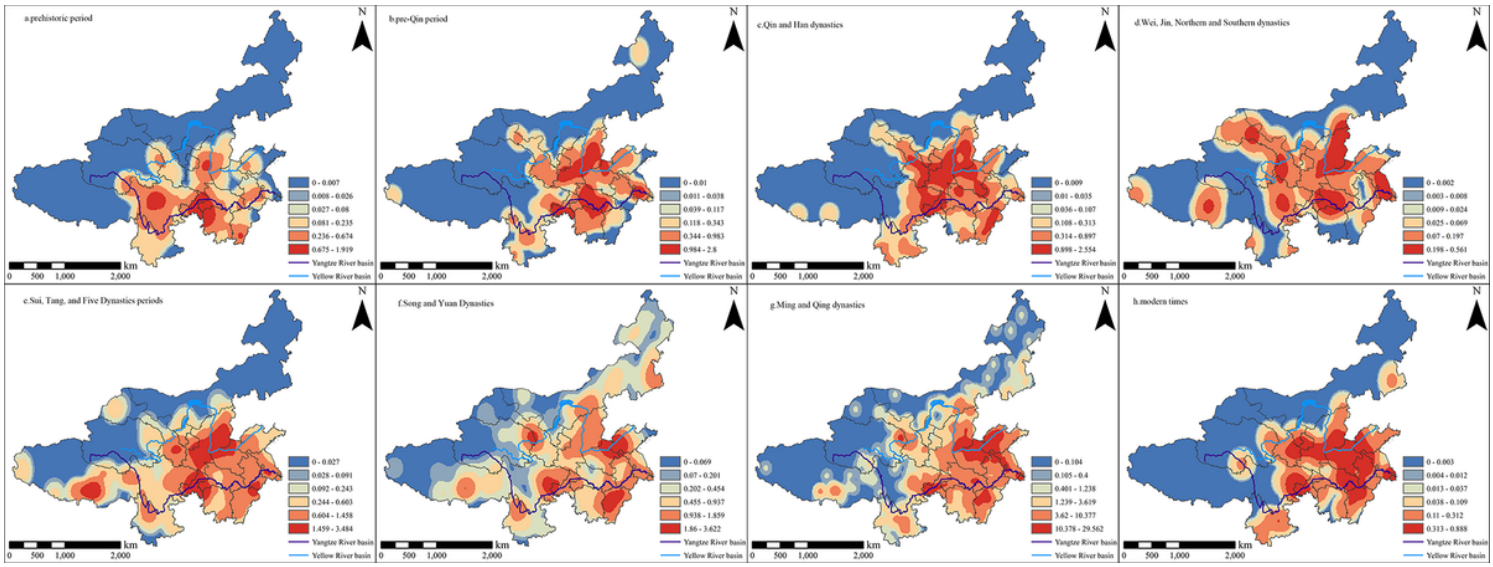

Figure 4

Density of ICHM in different historical periods of "Yellow River - Yangtze River Civilization Corridor"

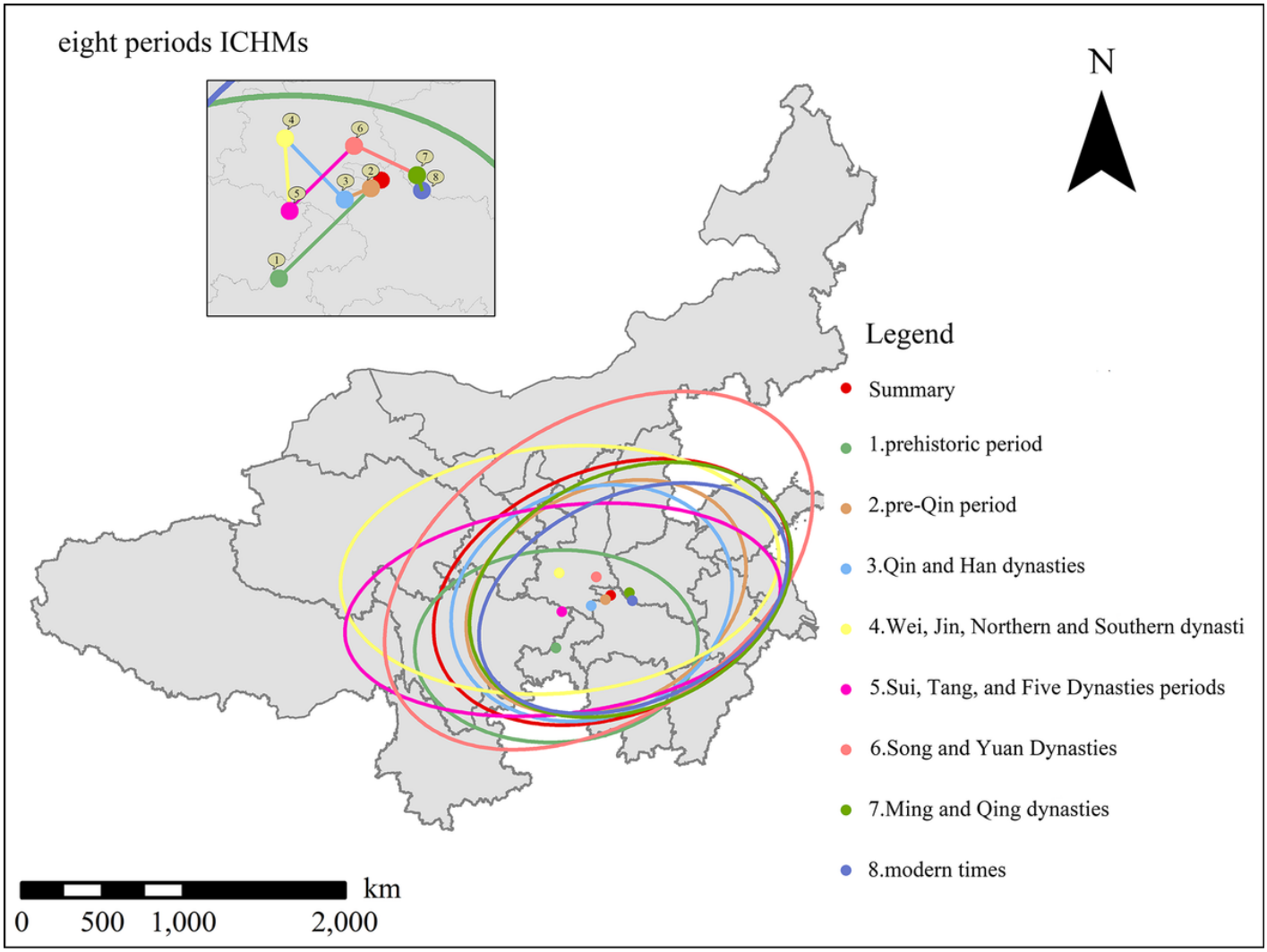

Figure 5

Gravity center and direction of ICHM in the “Yellow River—Yangtze River Civilization Corridor”