Analysis of Spatial Mismatch of Tourism Development in Guangdong Province

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Abstract: The spatial mismatch situation of tourism development in Guangdong Province is analyzed by gravity model and two-dimensional matrix based on the spatial mismatch hypothesis, and the results are visualized using ArcGIS software. This study finds that varying degrees of spatial mismatch exist between the level of tourism development, abundance of tourism resources and accessibility of tourism locations in the 21 cities in Guangdong Province. The gravity centers for tourism economy, tourism resources and tourism location are (113.55° E, 23.00° N), (113.69° E, 23.21° N) and (113.74° E, 22.86° N), respectively. According to the two-dimensional combinatorial matrices, synchronous development is shown in 10 prefecture-level cities for the tourism revenue-resource abundance combination, whereas it is shown in seven prefecture-level cities for the tourism revenue-tourism location combination. Guangzhou and Shenzhen are synchronous-double high zones for both combinations, while Foshan, Qingyuan, Yangjiang, Zhongshan and Jieyang are deviating-negative mismatch zones for both combinations. Furthermore, the vast majority of prefecture-level cities within the province currently present mismatching trends in tourism development. Based on the analysis results, corresponding countermeasures and suggestions are put forward taking into account the actual situation and opportunities for further tourism development in various prefecture-level cities.

Key words: spatial mismatch; tourism development level; tourism resource abundance; tourism location accessibility; Guangdong Province

1 Introduction

At present, spatial research on the development of tourism industry by domestic scholars focuses on the spatial distribution features of tourism resources, the spatial difference analysis of tourism economy, and other relevant distributions. However, few studies analyze the spatial matching and combinatorial relations among various factors from the perspectives of regional tourism resource abundance, location conditions, tourist reception facilities, public services and other factors that influence the overall development of tourism industry. Taking tourism resources as an example, in

1993, Auty made an initial attempt to study the spatial discrepancies of economic development, finding that the economic growth performance of some resource-rich countries are considerably inferior to the performance of resource-poor countries. This phenomenon is called the "Resource Curse" (Auty, 1998), which the academic community later introduced into tourism research. In the practice of tourism development in various places, the abundance of tourism resources also varies because of different historical, natural and social conditions. Studies have found that some regions are rich in tourism resources, and the tourism industries there have indeed achieved the corresponding levels of

development. However, in some tourism resource-rich areas the tourism economy presents a significant negative mismatch with the state of resource enrichment, which is precisely the phenomenon of "Resource Curse". To figure out what effect does resource produce in the development of regional tourism, and how does the mechanism by which it works be affected by other factors, it is necessary to compare and study the tourism development of different regions by combining various factors to reach scientific and objective conclusions. Therefore, it is of great practical significance to study the spatial matching and combination of factors that affect the development of tourism in individual regions. It can help us to reveal the practical impact of difference in combinations of factors on the development level of tourism, and facilitate us to better understand the advantages and shortcomings of the development in various regions, so as to make arrangements for the focus and direction of tourism development in the future.

Spatial Mismatch Hypothesis (SMH) is a theoretical hypothesis proposed in the 1960s for reflecting the impact of rapid urban spatial reconstruction on the opportunity for finding living and employment spaces by vulnerable groups (Liu et al., 2010). This hypothesis was initially published in 1968 by John Kain in the US Quarterly Journal of Economics (Kain, 1968). The proposal of SMH aroused widespread attention and discussion in academia, which directly reflected the concerns of Western scholars at the time over racial discrimination. In the 1980s, the studies of Kasarda (1985) and Wilson (1987) reaffirmed the hypothesis of spatial mismatch. Ewers (1986) claimed that in addition to the mismatch between local communities, there was also nationwide mismatch. With the ongoing connotative enrichment of the SMH theory, the spatial mismatch model has been widely used to describe and evaluate the spatial mismatches within and between urban areas. At present, it is commonly applied in fields like sociology (Thompson, 1997; Stoll, 1999; Cleguer et al., 2015; Lau, 2011), economics (Li et al., 2013; Shi et al., 2015; Campbell et al., 2013) and environmental resources (Polce et al., 2014; Ferrara et al., 2014; Li et al., 2017). Some domestic tourism scholars have also employed the SMH to carry out relevant studies. For example, Deng Zutao et al. (2009) investigated the spatial mismatch between tourism resources, location and inbound tourism revenue in China. Wang Meihong et al. (2009) studied the spatial mismatch in China's tourism landscape resources, brand attractions and tourism financial performance. Liu Zhanfu et al. (2015) examined the spatial mismatch of international tourism receipts, inbound tourist arrivals and regional tourism resources in China's coastal tourism regions based on the SMH. In addition, some scholars have dealt with the spatial mismatch relationships between associated elements, such as: tourism human capital and tourism income (Weng et al., 2014); foreign direct investment and inbound business travel (Bao et al., 2016); tourism industry, cultural industry and economic development level (Li Lingyan et al., 2016); and inbound tourism flow, tourist attractions and star hotels (Ren et al., 2016).

In general, most of the existing studies have been concerned with the spatial mismatch between tourism-related elements at the macroscopic level. Although they can reveal the overall spatial differences in China's tourism development and provide a reference for the introduction of national-level policies, they are inadequate to guide the actual tourism development tasks effectively in the various individual regions. Therefore, this paper will explore the application of SMH at the provincial spatial scale. Guangdong Province is used as the research object to quantitatively analyze the spatial mismatch between tourism development level, tourism resources and location accessibility in its 21 prefecture-level cities by gravity model and two-dimensional combinatorial matrix methods, thus enriching the perspectives and methods of tourism spatial research to a certain extent. Meanwhile, the causes of spatial mismatch are investigated, and the corresponding corrective measures are discussed, with the dual aims of providing a reference for the tourism development-related policy decision making in Guangdong Province, and offering new ideas to further enrich the study of regional tourism development space optimization in the future.

2 Overview of tourism development in Guangdong Province

Located in the southernmost tip of the Chinese mainland, Guangdong Province neighbors the Nanling Mountains in the north and adjoins the South China Sea in the south. It has beautiful natural landscape resources and profound historical cultural significance. With the regional advantages as a frontier of reform and opening up, and as a neighbor to Hong Kong and Macao, the economy of Guangdong has maintained rapid development, including the overall prosperity of tourism. Its tourism industry indices have ranked first nationwide for years, making Guangdong a genuine major province of tourism nationally. Since 2012, the total tourism revenue of Guangdong Province has ranked first in China for five consecutive years. The tourism revenue increased about 8-fold from 114.995 billion yuan in 2000 to 908.076 billion yuan in 2015 (Fig. 1), with an average annual growth of up to 57.57 billion yuan (except for the negligible growth from 2002 to 2003)[1].

Despite these remarkable achievements, tourism development in Guangdong also faces some serious problems. On the one hand, the pace of development has slowed down, so the overall advantages are becoming less obvious compared to other major domestic tourism provinces. Between 2010 and 2015, the average annual growth rate of tourism revenue in Guangdong Province was 19.90%, which was lower

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[1] http://www.gdta.gov.cn/

than the national level by 2.1% over the same period. In 2016, although the total tourism revenue remained at number one, other provinces like Jiangsu and Zhejiang are catching up rapidly. Moreover, the visitor arrivals had begun to lag behind Jiangsu and Zhejiang in 2016 (Table 1). On the other hand, the imbalance in tourism development between various prefecture-level cities in Guangdong is prominent. In 2015, the mean total revenue from the tourism industry among provincial cities was 43.241 billion yuan, of which Guangzhou had the highest tourism revenue of 287.218 billion yuan, representing nearly 1/3 of the province's entire tourism revenue. Shanwei City, in contrast, showed a tourism revenue of only 10.788 billion yuan, which was far below the provincial average. At present, Guangdong's traditional advantages as a window of entry and exit and as a frontier of reform and opening up have gradually weakened. Facing the increasingly competitive pattern of the tourism industry throughout China, there is an urgent need to determine systematic ways to optimize the tourism related factors such as tourism resources, traffic location and market demand in order to reconstruct Guangdong Province's competitive advantage in tourism development.

3 Data sources and methods

3.1 Data sources

The tourism revenue data, highway traffic mileage and administrative area of prefecture-level cities in Guangdong Province are from the *Guangdong Statistical Yearbook 2016*. The Grade A scenic spot data of Guangdong Province are organized based on the *Directory of Grade A Scenic Spots in Guangdong Province (as of December 2015)* published on the Guangdong Provincial Tourism Administration's official website. The railway mileages are from the vectorization of the *Guangdong Tourist Map* published by the Guangdong Map Publishing House. The geographic coordinates of various prefecture-level cities are represented by the coor

dinates of the respective city administrative centers, and thedata are from the *Gazetteer of China*.

3.2 Methods

Spatial mismatch refers to the phenomenon in which the geometric centers of two closely linked production factors show a spatial separation and are out of synchronization. Among the many ways of analyzing spatial heterogeneity, the center-of-gravity model and the spatial mismatch analysis methods have prominent advantages in the quantitative analysis of industrial gravity center movement and spatial mismatch degree (Martin, 2010). In this paper, the tourism income index, grade A scenic spot index and tourist location index are selected as the indices for measuring the tourism economy, tourism resources and tourism traffic, respectively. Then, the gravity centers for the tourism economy, tourism resources and tourism location in Guangdong Province are calculated using a gravity model. By comparing the distribution of gravity centers and the arrangement of two-dimensional combinatorial matrices, the degree and causes of spatial mismatch in tourism development for Guangdong Province are revealed.
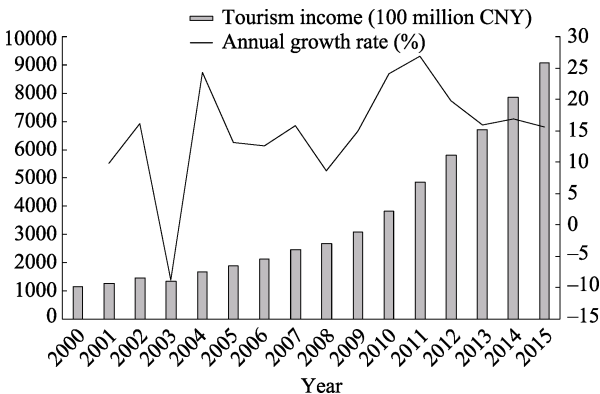

Fig.1　Tourism revenue of Guangdong Province during 2000-2015

Table 1　Statistics of tourism revenue and visitor arrivals in some provinces and cities in 2016

Province	Tourism revenue (one hundred million yuan)	Year-on-year growth (%)	Visitor arrivals (ten thousand people)	Year-on-year growth (%)
Guangdong	11560	11.50	39000	13
Jiangsu	10200	13	68000	9.40
Zhejiang	8093.23	13.36	58400	9.16
Sichuan	7705.5	24	–	–
Henan	5764	14.47	58300	12.37
Guizhou	5027.54	43.10	53100	41.20
Beijing	5020	9	28500	4.60
Jiangxi	4993.29	37.27	47000	22.11
Anhui	4932	19.70	52485	17.08
Hubei	4870	13	57300	12

3.2.1   Measurement indices and methods for their calculation

(1) Tourism income index. Total tourism revenue refers to the total amount of monetary income earned by the sales of tourism products for a tourist destination over a period of time. It is an important comprehensive indicator that reflects the overall scale and developed level of tourism in a country or region. In some sense, it represents the level of regional tourism development. For the sake of comparison, the tourism income index I_i is introduced herein to measure the level of regional tourism development. Its formula is as follows:

$$I_i = \frac{X_i - X_{\min}}{X_{\max} - X_{\min}} \times 100 \tag{1}$$

where X_i denotes the tourism revenue of city i; and $X_{\min}$, $X_{\max}$ denote the minimum and maximum tourism revenues among the prefecture-level cities, respectively.

(2) Grade A scenic spot index. According to the relevant provisions of the *National Standards for Quality Rating of Tourist Attractions*, China's grade A tourist attractions are classified into five sublevels: 5A, 4A, 3A, 2A and 1A. High-quality tourism resources tend to have a strong appeal to foreign tourists.   Grade A scenic spots are selected from numerous tourism resources throughout the country by considering multiple factors including the resource grade, location, transportation, accommodation facilities and services. The number and level of grade A scenic spots in a region, to a certain extent, represent the comprehensive situation of tourism resources in the region. To allow the evaluation of regional tourism resources to be uniform and comparable among different locations, the grade A scenic spot index is introduced herein. To assign varying weights to grade A scenic spots at different levels, the following formulas are used:

$$N_{ij} = \frac{D_{ij} - \min D_j}{\max D_j - \min D_j} \times 100 \tag{2}$$

$$T_i = 5.0 \times n_{i5} + 2.5 \times n_{i4} + 1.75 \times n_{i3} + 0.5 \times n_{i2} + 0.25 \times n_{i1} \tag{3}$$

where N_{ij} denotes the normalized value of grade j (j =1, 2, ···, 5) scenic spot in Guangdong's i-th prefecture-level city; D_{ij} is the original number of grade j scenic spots in the i-th prefecture-level city; $\max D_j$ is the maximum number of grade j scenic spots; $\min D_j$ is the minimum number of grade j scenic spots; T_i represents the grade A scenic spot index of Guangdong's i-th prefecture-level city; and n_{i5}, ···, n_{i1} denote the normalized values for grades 5A to 1A scenic spots in i-th prefecture-level city, respectively.

(3) Tourism location index: According to the *Guangdong Statistical Yearbook 2016*, the highway and railway passenger traffic accounted for 93.84% of the total passenger traffic for Guangdong Province in 2015. Thus, the transportation accessibility in each prefecture-level city is calculated herein by taking the unit area highway and railway traffic mileages as the basic indices. For the convenience of comparisons among cities, the tourism location index L_i is introduced. Its calculation uses the following two steps:

First, the unit area for highway traffic mileage and unit area for railway traffic mileage of each prefecture-level city are normalized:

$$L_1 = \frac{X_1 - X_{\min}}{X_{\max} - X_{\min}} \times 100 \tag{4}$$

$$L_2 = \frac{X_2 - X_{\min}}{X_{\max} - X_{\min}} \times 100 \tag{5}$$

where X_1, X_2 represent the unit area highway and railway traffic mileages of i-th city, respectively; and $X_{\min}$, $X_{\max}$ are the minimum and maximum unit area highway and railway traffic mileages of the prefecture-level cities, respectively.

Second, the tourism location index L_i of each prefecture-level city is calculated:

$$L_i = 0.58 \times L_1 + 0.42 \times L_2 \tag{6}$$

where 0.58, 0.42 are the normalized weight values for the unit area highway and railway traffic mileages obtained by the Delphi method (equations 4 and 5), respectively.

3.2.2   Spatial mismatch analysis methods

(1) Gravity model. In this paper, the gravity model formula is used to calculate the gravity centers of tourism economy, tourism resources and tourism location in the study area. When the three centers coincide, it indicates that the level of tourism development matches reasonably with the abundance of tourism resources and location accessibility, and reflects favorably on the regional tourism development. When the three gravity centers deviate (i.e., do not spatially coincide), it indicates that the level of regional tourism development is mismatched with the abundance of tourism resources and location accessibility. The calculations of the three gravity centers each take the form of:

$$X_I = \frac{\sum_{i=1}^{n}(I_i \times X_i)}{\sum_{i=1}^{n} I_i} \tag{7}$$

$$Y_I = \frac{\sum_{i=1}^{n}(I_i \times Y_i)}{\sum_{i=1}^{n} I_i} \tag{8}$$

where X_I, Y_I are the longitude and latitude of the tourism economy gravity center in the study area, respectively; I_i is the tourism income index of i-th city; X_i, Y_i are the longitude and latitude of i-th city's administrative center, respectively; and n is the number of prefecture-level cities in the study area. Similarly, the tourism resource gravity center (X_T, Y_T) and the tourism location gravity center (X_L, Y_L) of the study area can be calculated.

Matrix analysis. The gravity model can only reflect the spatial mismatch between the overall regional tourism development level, tourism resource endowment and location

accessibility, without enabling the further classification of such phenomena. To reflect the specific situations contributing to spatial mismatch in various prefecture-level cities in the study area, the prefecture-level cities of Guangdong Province are classified into five matching types. These types are classified by borrowing Deng Zutao *et al.*'s method that takes into account the actual situation of the study area through two sets of combinatorial matrices for tourism revenue-resource abundance and tourism revenue-tourism location. The five types are based on matches between the tourism development level and either the tourism resource abundance or the tourism location, and include:

The synchronous-double high zone refers to the regions with a high level of tourism development and a good endowment of tourism resources or location accessibility;

The synchronous-intermediate zone refers to the regions with a medium level of tourism development and a moderate endowment of tourism resources or location accessibility;

The synchronous-double low zone refers to the regions with a low level of tourism development and a poor endowment of tourism resources or location accessibility;

The deviating-positive mismatch zone refers to the regions with a high level of tourism development but a poor endowment of tourism resources or location accessibility;

The deviating-negative mismatch zone refers to the regions with a low level of tourism development but a good endowment of tourism resources or location accessibility.

4 Analysis of spatial mismatch of the tourism industry in Guangdong Province

4.1 Analysis of spatial mismatch of the degree of tourism industry development

The gravity centers for tourism economy, tourism resources and tourism location in Guangdong Province obtained with the gravity model were (113.59 °E, 23.00 °N), (113.69 °E, 23.21 °N) and (113.74 °E, 22.86 °N), respectively (Fig. 2). The tourism economy gravity center is mismatched with the tourism resource gravity center by 0.14° longitude and 0.21° latitude, while it is mismatched with the tourism location gravity center by 0.19° longitude and 0.14° latitude. The tourism resource gravity center is mismatched with the tourism location gravity center by 0.05° longitude and 0.35° latitude. These suggest an overall spatial mismatch of the tourism development level with tourism resource abundance and location accessibility in Guangdong Province.

4.2 Analysis of spatial mismatch types of tourism development

4.2.1 Analysis of matching types between tourism development level and tourism resource abundance

The two-dimensional combinatorial matrix of tourism development level and tourism resource abundance in Guangdong Province is obtained by the matrix analysis (Table 2), and, the matching types for these two indices are visualized

using ArcGIS software (Fig. 3). Based on Table 2, Fig. 3 and the actual situation of tourism development in various matching type regions, it appears that Guangzhou and Shenzhen, both of which are synchronous-double high zones, have high levels of economic development, early commencement of the tourism industry and huge tourism markets. In these two cities, theme park tourism products represented by the Chimelong Tourist Resort, OCT Travel & Resort Area and OCT East have brought substantial numbers of tourists and high income. Dongguan, Jiangmen, Zhanjiang and Shantou, which are synchronous-intermediate zones, have abundant tourism resources. Moreover, their coastal locations endow them with natural advantages for developing coastal tourism resources. For example, Shangchuan and Xiachuan Islands of Jiangmen, five islands and a bay of Zhanjiang and Nanao Island of Shantou are all representative coastal travel destinations in these cities. Zhaoqing, Maoming, Chaozhou and Shanwei, which are synchronous-double low zones, suffer from a lack of branded tourism resources, with severely aging products and limited development potential. In Shanwei, grade A scenic spots are extremely scarce, which seriously affects the overall potential to improve its regional tourism development level. Zhuhai, a deviating-positive mismatch zone, has a regional advantage as a port city despite a lack of obvious tourism resource advantages. Its coastal style city scenery and sound public service facilities have attracted a large number of visitors and tourist projects, thus greatly promoting the development of tourism. Foshan, Huizhou, Meizhou, Shaoguan, Qingyuan, Yangjiang, Yunfu, Heyuan, Zhongshan and Jieyang, ten cities representing half of the prefecture-level cities within the province, are deviating-negative mismatch zones. Despite the abundant tourism resources available in these cities, including the high quality ones like Danxia Mountain and Hailing Island, their tourism products mostly remain in the traditional sightseeing and primary leisure stage of development. The lack of brand resources and failure to integrate participatory, experiential and creative tourism projects leave these cities unable to meet the demands of modern tourists for the high quality, diversified tourism products integrating natural scenery with cultural experiences. Thus, the development of tourism in these regions fails to reach the level matching with available resources. This mismatch is the most severe in Qingyuan. Because of its poor traffic conditions, inadequate infrastructure, and other shortcomings, the quality of tourism resources fail to bring the corresponding high tourism income, and the phenomenon of "Resource Curse" has appeared there.

4.2.2 Analysis of matching types between tourism development level and location accessibility

The two-dimensional combinatorial matrix of tourism development level and location accessibility in Guangdong Province is derived by the matrix analysis method (Table 3), and the matching types of tourism development level and
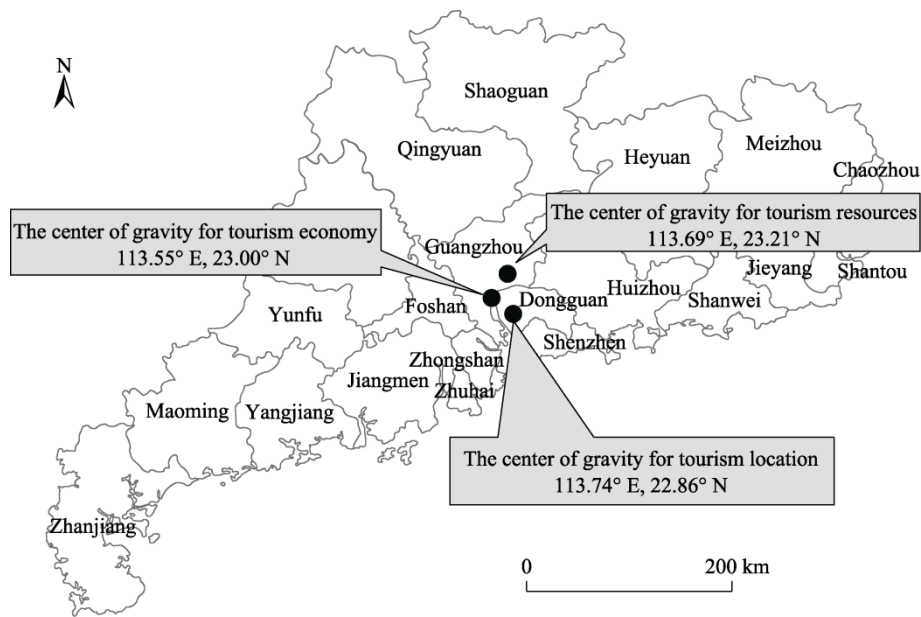
Fig.2   Spatial distribution of the gravity centers for tourism economy, tourism resources and tourism location accessibility of Guangdong Province

Table 2   Two-dimensional matrix of tourism development level and tourism resource abundance in Guangdong Province

Tourism resource abundance	Tourism development level		
	High (I >40)	Medium (5 <I <40)	Low (I <5)
Abundant (R >400)	Guangzhou, Shenzhen	Foshan, Huizhou, Meizhou, Shaoguan	Qingyuan
Moderate (50 <R <400)		Dongguan, Jiangmen, Zhanjiang, Shantou	Yangjiang, Yunfu, Heyuan, Zhongshan, Jieyang
Scarce (R <50)		Zhuhai	Zhaoqing, Maoming, Chaozhou, Shanwei

Table 3   Two-dimensional matrix of tourism development level and tourism location accessibility in Guangdong Province

Location accessibility	Tourism development level		
	High (I >40)	Medium (5 <I <40)	Low (I <5)
Good (L >40)	Guangzhou, Shenzhen	Foshan, Dongguan, Zhanjiang, Shantou	Zhongshan, Jieyang, Chaozhou
Moderate (20 <L <40)		Huizhou, Meizhou, Zhuhai	Qingyuan, Yangjiang, Zhaoqing, Maoming, Shanwei
Poor (L <20)		Jiangmen, Shaoguan	Yunfu, Heyuan

location accessibility are visualized using ArcGIS software (Fig. 4). A combination of Table 3, Fig. 4 and the actual situation of tourism development in the various prefecture-level cities indicates that Guangzhou and Shenzhen, both of which are synchronous-double high zones, are not only key travel destinations, but are also important intra-provincial tourism stopovers as a provincial capital and a special coastal economic zone, respectively. They have the best tourism location accessibility, complete basic facilities, and their levels of tourism development are at the best levels in the province. Huizhou, Meizhou and Zhuhai, which are synchronous-intermediate zones, have superior location accessibility. Among them, Huizhou and Meizhou have more abundant tourism resources. With grade A scenic spot

index values both higher than 400, they are important tourist destinations within the province. In Zhuhai, the modern service industry represented by tourism is developing rapidly. Thus, the overall tourism development in these three regions is at the higher levels for the province. Yunfu and Heyuan, which are synchronous-double low zones, are located in the eastern Guangdong and western Guangdong inland areas, respectively. As non-Pearl River Delta regions, the economic development is relatively backward in these two cities. In addition, the tourism resources are not abundant, the infrastructure conditions need to be improved, and the overall development of the tourism industry is in a backward state. Jiangmen and Shaoguan, which are deviating-positive mismatch zones, possess the only two major United National
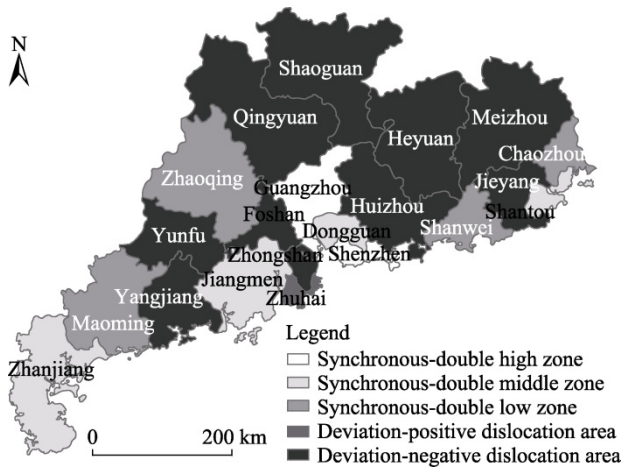
Fig.3 Mismatch type of tourism development level and abundance of tourism resources
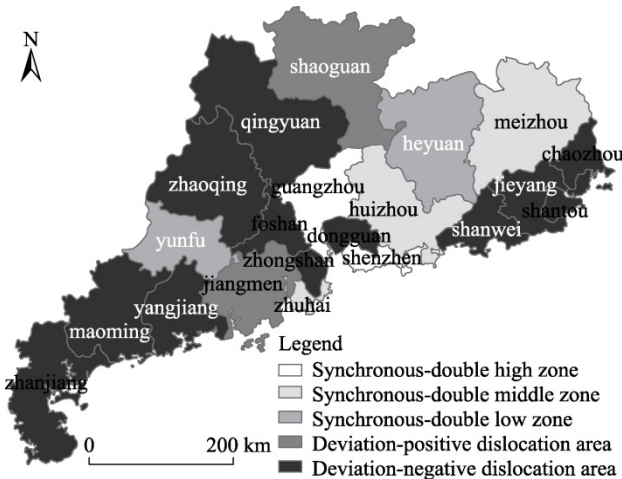

Fig.4 Mismatch type of tourism development level and tourism location accessibility

Educations, Scientific and Cultural Organization (UNESCO) World Heritage sites of Guangdong Province, i.e. the Kaiping Diaolou and Villages and Danxia Mountain. Despite a continuous upward trend in tourism income, the internal traffic limitations restrict the further development of tourism in these cities, to some extent. In the future, efforts should be directed toward improving the traffic conditions to further elevate the level of tourism development. The prefecture-level cities classified as the deviating-negative mismatch zones include more than half of all the prefecture-level cities in Guangdong Province. They include Foshan, Dongguan, Zhanjiang, Shantou, Zhongshan, Jieyang, Chaozhou, Qingyuan, Yangjiang, Zhaoqing, Maoming and Shanwei. These 12 cities have good location accessibility, but the development of their tourism industries are at the medium to lower levels, and none of them has fully utilized the advantage of their traffic location.

4.2.3 Suggestions for improving tourism development

Based on the above analysis results and the actual situations

of tourism development in various prefecture-level cities of Guangdong Province, the following suggestions are put forward:

First, for the prefecture-level cities with tourism revenue-resource abundance mismatches, on the one hand, the quality of traditional advantageous resources needs to be enhanced, and the brand building of key scenic spots should be promoted. These efforts should focus on famous scenic spots, such as the Xiqiao Mountain Scenic Area in Foshan, Luofu Mountain Scenic Area in Huizhou, Yearning Tea Plantation Resort in Meizhou, Danxia Mountain Scenic Area in Shaoguan, Lianzhou Subterranean River in Qingyuan, and the Maritime Silk Road in Hailing Island of Yangjiang. These enhanced efforts should include further image-building and promotion efforts through innovative marketing modes, expanded visibility and influence of tourism products, and would likely prompt the further development of tourism in the surrounding regions. On the other hand, for cities like Yunfu, Shaoguan, Qingyuan and Heyuan, emphasis should be directed toward improving the construction of tourism infrastructure to speed up their interconnection with other cities in the Pearl River Delta region and establish a smooth and convenient tourism transport network system. Such improvements would allow these cities to take better advantage of existing resources and promote the prosperity of tourism.

Second, for the prefecture-level cities with tourism revenue-tourism location mismatches, tourism cooperation with the surrounding regions should be strengthened making use of their regional traffic advantages to facilitate the vigorous expansion of their tourism markets. For example, Zhanjiang should strengthen its cooperation with the Beibu Gulf Rim cities, such as Guangxi Beihai and Hainan Haikou, with the aim of constructing a Beibu Gulf Rim tourism central city in a joint effort to build the Beibu Gulf Rim marine cultural tourism area. The eastern Guangdong cities like Shantou, Shanwei, Chaozhou and Jieyang, on the other hand, should fully integrate resources such as Hakka folk, coastal islands, Chaoshan food and overseas Chinese cultures to strengthen the cooperation in product design, line construction and market promotion. Meanwhile, they should also actively blend into the west strait coastal tourist area, to take advantage of new space for market growth. In addition, for cities like Dongguan, Zhongshan and Foshan, a new concept of tourism development needs to be established. It is important for them to promote the cross-border integration of tourism with their intraregional superior industrial resources such as cultural creativity, business services and manufacturing, thereby promoting the upgrading of tourism consumption in the form of new industrial patterns, innovating the mode of tourist experience and cultivating new tourism brands within the regions.

Third, an overall tourism marketing strategy should be implemented for Guangdong Province by integrating its

high quality tourism resources. The overall marketing effort should promote Guangdong as a tourist destination and shape the distinctive image of Guangdong tourism, thereby enhancing its attractiveness and uniqueness. Meanwhile, the state's strategic opportunities such as the "21st Century Maritime Silk Road" and the "Guangdong-Hong Kong-Macao Greater Bay Area" should be used to their full advantage to expand the opening up and cooperation of tourism, strengthen the policy support for the tourism industry, optimize the development environment, and make tourism a breakthrough in achieving innovative, green and coordinated development. Policy preferences and inclinations should be given on tourism project development, infrastructure construction, investment promotion, publicity and marketing, as well as the talents and technology necessary to stimulate the development of tourism investment and tourism economy.

5   Conclusions and discussion

The gravity centers for tourism economy, tourism resources and tourism location in Guangdong Province are (113.55 °E, 23.00 °N), (113.69 °E, 23.21 °N) and (113.74 °E, 22.86 °N), respectively. The gravity model proves the existence of spatial mismatch between tourism development level, tourism resource abundance and tourism location accessibility over 21 prefecture-level cities of Guangdong Province at the macroscopic level.

Based on the combinatorial matrices of tourism revenue-resource abundance and tourism revenue-tourism location, there are five spatial matching types for the 21 prefecture-level cities in Guangdong Province, namely the synchronous-double high zone, synchronous-intermediate zone, synchronous-double low zone, deviating-positive mismatch zone and deviating-negative mismatch zone. In the tourism revenue-resource abundance combination, 10 cities exhibit synchronous development, accounting for about half of the province's total prefecture-level cities. Synchronous-double high zones include Guangzhou and Shenzhen; synchronous-intermediate zones include Dongguan, Jiangmen, Zhanjiang and Shantou; and synchronous-double low zones include Zhaoqing, Maoming, Chaozhou and Shanwei. Zhuhai falls under the deviating-positive mismatch zone, while Foshan, Huizhou, Meizhou, Shaoguan, Qingyuan, Yangjiang, Yunfu, Heyuan, Zhongshan and Jieyang fall under the deviating-negative mismatch zones. In the tourism revenue-tourism location combination, seven cities show synchronous development, accounting for one-third of the province's total prefecture-level cities. Guangzhou and Shenzhen remain as the synchronous-double high zones, while Huizhou, Meizhou and Zhuhai fall under the synchronous-intermediate zones; and Yunfu and Heyuan fall under the synchronous-double low zones. The deviating-positive mismatch zones include Jiangmen and Shaoguan, whereas the deviating-negative mismatch zones include Foshan, Dongguan, Zhanji-

ang, Shantou, Zhongshan, Jieyang, Chaozhou, Qingyuan, Yangjiang, Zhaoqing, Maoming and Shanwei. Guangzhou and Shenzhen are the synchronous-double high zones in both combinations, and they clearly occupy an absolute advantage in tourism development. However, the development of tourism in most prefecture-level cities within the province still presents a mismatch trend. Foshan, Qingyuan, Yangjiang, Zhongshan and Jieyang are deviating-negative mismatch zones in both combinations, where the resource and location advantages are not fully utilized, with a great deal of room for improvement in their tourism development.

The tourism industry has become the most dynamic emerging industry with great potential to contribute to the economic development of various regions. The unbalanced development of the tourism industry will pose a series of negative effects on the enhancement of overall regional tourism competitiveness. Therefore, it seems particularly important to reveal the differences in the levels of tourism development between various regions and their causes by analyzing the spatial mismatch of tourism development elements, and to put forward the corresponding suggestions for improvement. Nevertheless, the development of tourism is influenced by a range of factors such as the level of economic development, quality of the ecological environment and tourist source market, in addition to the correlation with resource abundance and traffic location. Therefore, the present study still has some limitations. In the future, the differences in spatial distribution of factors influencing tourism development should be investigated more in depth to reveal the degrees to which they affect the tourism industry. Meanwhile, China's tourism development has entered a relatively mature stage, where the growth of indices like total income and tourist arrival is no longer the only concern. Instead, more attention is being paid to the overall enhancement of the tourism industry's intrinsic quality and the role of tourism in promoting the coordinated development of society, economy and environment. Hence, in future studies, a more objective and comprehensive system should be established for evaluating the level of tourism development.

References

Auty R, Warhurst A. 1998. Sustainable development in mineral exporting economies. *Resources Policy*, 19(1): 14–29.

Bao F H, Chen Y. 2016. Study on the spatial mismatch between foreign direct investment and inbound business tourism in Chinese Mainland. *Journal of Zhejiang University(Science Edition)*, 43(4): 465–475. (in Chinese)

Campbell H, Fernandez S, Li H. 2013. Residential Segregation, Spatial Mismatch and Economic Growth across US Metropolitan Area. *Urban Studies*, 50(13): 2642–2660.

Cleguer C, Grech A, Garrigue C, *et al*. 2015. Spatial mismatch between marine protected areas and dugongs in New Caledonia. *Biological Conservation*, 184(4): 154–162.

Deng Z T, Yin Y M. 2009. An Analysis of the Spatial Mismatch of Tourism

Resources, Location and Inbound Tourism Revenue in China. *Tourism Science*, 23(3): 6–10. (in Chinese)

Ding X S, Li Y W, Lv K W. 2011. A Study on the Regional Disparity Development of Tourism in Henan Province Based on Spatial Mismatch Theory. *Geography and Geo- Information Science*, 27(2): 106–108. (in Chinese)

Dong G L, Xu E Q, Zhang H Q. 2017. Urban Expansion and Spatiotemporal Relationships with Driving Factors Revealed by Geographically Weighted Logistic Regression. *Journal of Resources and Ecology*, 8(03): 277–286.

Ewers. H. J. , Goddard. J. b. , Matzerath. H. 1986. The future of the Metropolis—Berlin, London, Paris, New York Economic aspects. Berlin: Walter de Gruyter, 484.

Fang Y L, HuangZ F, Zhang H, *et al*. 2013. The Asynchronous Phenomenon and Relative Efficiency of Tourism Resources in China: Taking the 31 Provinces'Panel Data from 2001 to 2009 for an Example. *Journal Of Natural Resource*. (10): 1754–1764. (in Chinese)

Ferrara A, Salvati L, Sabbi A, *et al*. 2014. Soil resources, land cover changes and rural areas: towards a spatial mismatch?. *Science of the Total Environment*, 478(8): 116.

Gobillon L, Selod H, Zenou Y. 2005. The Mechanisms of Spatial Mismatch. *Urban Studies*, 44(12): 2401–2427.

Holzer H J. 1991. "The Spatial Mismatch Hypothesis: What Evidence Has It Shown?". Urban Studies, 28(1): 105–122.

Kain John. 1968. Housing segregation, negro unemployment and metropolitan. *Quarterly Journal of Economics*, 82(2), 175–197

Kasarda J. 1985. Urban change and minority opportunities. Peterson, P. (Ed.). The New Urban Reality. Washington, DC: Brookings Institution, 33–67.

Lau C Y. 2011. Spatial mismatch and the affordability of public transport for the poor in Singapore's new towns. *Cities*, 28(3): 230–237.

Li M S, Zang J, Luo H, *et al*. 2013. Spatial mismatch between economic development and pollution emission. *Ecology & Environmental Sciences*, 22(9): 1620–1624.

Li T, Long H, Zhang Y, *et al*. 2017. Analysis of the spatial mismatch of grain production and farmland resources in China based on the potential crop rotation system. *Land Use Policy*, 60: 26–36.

Li L Y, Weng G M. 2016. Evolution Analysis of Tourism, Culture and Economy Development in the Western China Based on Spatial Mismatch Method. *Geography and Geo-Information Science*, 32(2): 121–126. (in Chinese)

Li C X, Ma Y F, Zhang Y Y, *et al*. 2010. An analysis of space-time dynamic evolution and dislocation of inbound tourism based on typical cities——with the gravity model as an empirical research. *Economic Geography*, 30(8): 1372–1377. (in Chinese)

Li L P. 2008. The diagnosis of "SYNCHRONOUSNESS – ASYNCHRONOUSNESS"and the analysis of differences in and among the Chinese destinations——Based on the National Tourism Data of 31 Provincial Cellos. *Human Geography*, (2): 87–90. (in Chinese)

Li Q, Sun G N, Han Y F. 2008. Matrix Analysis of Inbound Tourism Re-sources and Location Attraction of 31 Provinces of China. *Journal of Arid Land Resources & Environment*, 22(5): 101–106. (in Chinese)

Liu Y T, Gan Q L. 2010. Tourism competitiveness of three main regions in

the eastern China: comparison on main tourism urban agglomerations. *Journal of South China Normal University(Natural Science Edition)*, (4): 122–126. (in Chinese)

Liu Z F, Han Z L, Xia X, 2015. Research on the regional differences in coastal tourism based on Spatial Mismatch Hypothesis. *Ocean development and management*, 32(3):95-99. (in Chinese)

Liu Z L, Wang M J, Chai Y W. 2010. Spatial mismatch theory: A review on empirical research and methodology. *Human Geography*, (1): 1–6. (in Chinese)

Martin R W. 2010. Spatial Mismatch and the Structure of American Metropolitan Areas, 1970–2000. *Journal of Regional Science*, 44(3): 467–488.

Pei X X, Xie S Y, Xiao W S. 2014. An Analysis on Spatial Mismatch of Tourism Development in Shanxi Province. *Geography and Geo-Information Science*, 30(2): 102–106. (in Chinese)

Polce C, Garratt M P, Termansen M, *et al*. 2014. Climate-driven spatial mismatches between British orchards and their pollinators: increased risks of pollination deficits. *Global Change Biology*, 20(9): 2815–2828.

Ren Q, Hu J, Chen X J, *et al*. 2016. A study on the evolution of the spatial mismatch of inbound tourism flows, scenic spots and star hotels in Zhejiang Province. *Journal of Huazhong Normal University(Natural Sciences)*, 50(1): 151–157. (in Chinese)

Shi K B, Yang Y C, Ren Q, *et al*. 2015. Study on spatial pattern and spatial mismatch of experiential online group-buying market in China. *Progress in Geography*, 34(6): 696–706. (in Chinese)

Song J P, Wang E R, ZHANG W X, *et al*. 2007. Housing Suburbanization and Employment Spatial Mismatch in Beijing. *Acta Geographica Sinica*, 62(4): 387–396. (in Chinese)

Stoll M A. 1999. Spatial mismatch, discrimination, and male youth employment in the Washington, DC area: Implications for residential mobility policies. *Journal of Policy Analysis & Management*, 18(1): 77–98.

Sun T S, Liu X Q. 2016. Jobs-Housing Spatial Mismatch of Permanent Immigrants and Local Registered Residents in Chinese Metropolises: An Empirical Study Based on Beijing, Shanghai and Guangzhou. *Population & Economics*, (5): 23–34. (in Chinese)

Sun G N, Liu L. 2012. Space complementary and edge area's strategy of Xi'an tourist circle. *Journal of Shaanxi Normal University(Natural Science Edition)*, 40(5): 87–93. (in Chinese)

Thompson M A. 1997. The Impact of Spatial Mismatch on Female Labor Force Participation. *Economic Development Quarterly*, 11(2): 138–145.

Wang M H, Sun G N, Kang G D. 2009. A combined matrix analysis on the spatial dislocation of landscape resource, nameplate scenery and finance achievement in China, *Human Geography*. 24(4): 115–119, 97. (in Chinese)

Weng G M, Chen L N. 2014. Spatial Mismatch Analysis on the Difference of Tourism Development between the Western and Eastern China. *Ecological Economy*, 30(4): 123–126. (in Chinese)

Wilson J. 1987. The truly disadvantaged: the inner city, the underclass, and public policy. Chicago, IL: University of Chicago press, 3–10.

Zhang H Q, Xu E Q, Zhu HY. 2017. Ecological-Living-Productive Land Classification System in China. *Journal of Resources and Ecology*, 8(02): 121–128.

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摘　要：本文以广东省 21 个地级市为研究单元，基于 2015 年广东省旅游经济、旅游资源及交通相关数据，运用重力模型、二维矩阵等方法，选取旅游收入指数、A 级景区指数、旅游区位指数作为评价指标，定量分析了广东省旅游业发展的空间错位关系，并通过 ArcGIS 软件将分析结果进行可视化表达。研究发现：广东省 21 个地市的旅游业发展水平、旅游资源丰度、旅游区位之间存在不同程度的空间错位，旅游经济重心、旅游资源重心和旅游区位重心分别位于（113.55° E，23.00° N）、（113.69° E，23.21° N）和（113.74° E，22.86° N）；从二维组合矩阵来看，旅游收入–资源丰度组合中呈现同步发展的地市为 10 个，旅游收入–旅游区位的组合中呈现同步发展的地市为 7 个，广州、深圳 2 市在两组组合中均处于同步–双高区，佛山、清远、阳江、中山、揭阳 5 市在两组组合中均处于偏离–负错位区，省内绝大多数地市的旅游发展仍呈现错位趋势。根据分析结果，结合各地市旅游发展的实际情况提出相应对策建议。

关键词：空间错位；旅游发展水平；旅游资源丰度；旅游区位；广东省