# Historical Changes in Landscape Preferences of Chinese Tourists (1980-2020)-Analysis Based on Tourist Photographs*

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***Abstract*** **-** Tourism photos reflect the emotional perceptions and behavioral biases of tourists in tourism activities, and are informative for studying the characteristics of tourism trends. In this paper, 784 tourism photos of domestic tourism in China from 1980 to 2020 were collected using the UGC (User Generated Content) platforms, and the data of photo landscape categories were recorded with SPSS 22.0 and regression estimation was done to study the historical change pattern of landscape preferences of Chinese tourists.

The research results show that in 1980-2020, (1) Chinese tourists' landscape preference for historical sites and architecture and facilities category is high but the preference degree has a decreasing trend; Chinese tourists' preference for geomantic landscape and water landscape is high and the landscape preference degree has increased; tourism preference for humanistic activities, tourism purchases, astronomical and climatic landscape, and biological landscape is relatively low but the preference degree is trending upward; (2) Chinese tourists' landscape preferences tend to be dispersed and gradually diversified in the choice of landscape categories. The results of the study are of reference value in predicting the development of Chinese tourists' tourism landscape preferences, and have directional significance for the comprehensive development of tourism resources in various categories.

**Keywords:** Chinese tourists, tourism photos, regression estimation, landscape preference, historical change.

## I. INTRODUCTION

To deeply explore China's domestic tourism market, tourist demand is the key, and it is important to understand tourist demand preferences. How to understand? Consumption and output are relative, and the output of tourists' emotional cognition and behavior reflects the habits and preferences of tourists' consumption. Among them, tourism photos are the textual output of tourists' visual behaviors, which have a good spatial and temporal recording effect and reflect tourists' tourism preferences to a certain extent, and when tourism photos reach continuous in time, they can reflect the historical changes of tourists' preferences. In this paper, we will use the domestic tourism photos of Chinese tourists in the past 41 years (excluding inbound tourism of people from Hong Kong, Macao and Taiwan and outbound tourism of people from mainland to Hong Kong, Macao and Taiwan, same below) to explore the historical changes of Chinese tourists' landscape preferences through regression analysis, analyze the changes in the diversity of tourists' tourism landscape preferences, and identify valuable and instructive contents for the further development of China's domestic tourism market.

## II. LITERATURE REVIEW

(I) Theoretical basis

This paper is based on tourism semiotics and tourist gaze theory. First of all, Lotman's cultural semiotics considers that every artifact that contains a function and a coded message can be regarded as a text. The tourist photograph is an influential visual text in tourist culture. Tourism photos can identify tourists, i.e., they can be used as the text i of tourism culture,

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which can be used to explore the process of formation, development and extinction of tourism culture. [1] It is scientifically feasible to select multiple samples of tourism photographs in consecutive time periods to explore the process of formation, development and inherent trends and characteristics of Chinese tourism culture. At the same time, Urry's tourism gaze theory believes that "tourism gaze" is the result of the fusion and abstraction of tourism desire, tourism motivation and tourism behavior. And tourism gaze is closely related to tourism photography, which is the tangible and concrete embodiment of tourism gaze. [1] [2] Tourism photography is a manifestation of the tourist's gaze on the tourism landscape, and the resulting tourism photographs can reflect the interaction between the human and scenic subjects in tourism.

(II) Current status of research

Chinese academics are gradually paying attention to the research on tourism photos. The current research based on tourism photos focuses on two directions. First, tourist photo information can help analyze the spatio-temporal behavior of tourists. For example, Yang Xingzhu et al. (2014) combined tourist geotagged photo data with Arcgis research methods to explore the spatial characteristics of tourist path trajectories in Nanjing [3] . Second, human landscape perception and aesthetic psychology have universal consistency [4], and tourism photos can indirectly analyze tourists' cognitive and emotional preferences for tourism landscape. Liu Danping and Bao Jigang (2006) discussed the role of tourism photography in satisfying voyeurism, image memory and proof, self-narrative and self-identity [5]; Kong Lingyi et al. (2018) deciphered the typical intentional elements of Phoenix under the tourism gaze through techniques such as metaphorical extraction [6].

Tourism preferences are expressed both in terms of tourists' preferences for tangible products among the six elements of tourism and in terms of preferences for various abstract and emotional tourism factors [7] . Researchers have conducted fewer studies on tourism preferences in general, with data sources such as questionnaire field survey data, online travelogues, tourism photos, and Unicom operator tourism big data, etc., and analysis methods such as content analysis method and statistical test analysis. For example, Liang Rong et al. (2020) analyzed the tourist attractiveness of scenic spots and seasonal tourism preference characteristics from the visits of different scenic spot categories based on the Unicom operator tourism big data in Helong City from 2016-2018 [7] These studies mainly focused on the description of the current situation, while the trend description was less, while the geographical scope involved in the study was mainly within individual scenic areas. This paper is innovative in doing landscape preference analysis of Chinese tourists based on tourism photos.

## III. STUDY DESIGN

(I) Data collection

Tourism photos can be understood as photos taken by tourists and photos produced by hosts for tourists [8], but in this paper, tourism photos specifically refer to the type of "tourist+scenery" photos taken by tourists in the course of their visit, through self and other photos. In addition, this paper defines "scenery" as the natural and human environment of the tourist destination other than the target tourists photographed. On this basis, the tourism photos in this study were collected according to specific requirements: (1) within the year range of 1980-2020; (2) belonging to the domestic tourism photos of Chinese tourists; (3) the category of scenic spots and landscape can be judged from the photos themselves or text descriptions; (4) each tourist's tourism photo appears only once; (5) the number of target photographic tourists of the photos does not exceed four, and the group photos of group tours are not included in the study. collective photos into the scope of the study. The photos in this paper are mainly UGC type photos, collected from online platforms such as Ma Hive, Ctrip, Baidu, Weibo, and Meitou.

In accordance with the principle of equal number, this study expected to collect photos according to the number of 20 photos/year, but due to the distribution of the number of photos itself, the substantive collection of photos in this paper was 8 photos in 1980, 16 photos in 1981, 10 photos in 1982, 15 photos

[1]The above description of cultural semiotics is taken from the book "Introduction to Cultural Studies: Theoretical Foundations, Methodological Approaches and Research Perspectives" by Ansgar Neuning et al.

in 1983, 32 photos in 1987, 13 photos in 1989, and 20 photos in the rest of the years, and the total number of photos in the whole study area was 784 photos were taken. The number of elderly, middle-aged, and young people were 91, 314, and 379, respectively. The sample collection method and extraction method were scientific and reasonable. After organizing the textual information of the photos, this study organized and entered the year and landscape category information of each photo in SPSS 22.0.

(II) Classification and coding methods

According to the National Standard of the People's Republic of China, Classification, Survey and Evaluation of Tourism Resources (GB/T 18972-2017) [9], the basic types of tourism resources can be divided into 8 main categories, 23 subcategories and 110 basic types. The eight main categories are geomantic landscape, water landscape, biological landscape, astronomical and climatic landscape, historical relics, architecture and facilities, tourism purchases and humanistic activities. In this paper, the eight main categories of this document are used as classification criteria to categorize the landscape taken by tourism photos.

In this paper, tourism photos are coded according to the year and landscape category, where the year is coded according to the number of A.D., and to distinguish each photo of the same year, the photos are coded in the order of 1, 2, 3, 4, 5...for each year, for example, the first photo in 1980 is coded as 198001; The landscape categories are coded as 1, 2, 3, 4, 5, 6, 7, 8 in the order of eight categories: geomantic landscape, water landscape, biological landscape, astronomical and climatic landscape, historical relics, architecture and facilities, tourism purchases, and humanistic activities.

(III) Data analysis methods

**1.** Data logging

In this paper, the year, serial number, location and name of the photos were extracted from the photos and the corresponding text, and the information was summarized in a table. Then, using SPSS 22.0, the "variable view" was prepared according to the classification and coding scheme, and the variable entries were "number", "year", and "landscape category". Numerical codes were entered according to the coding principle by entering the serial number, year, and landscape category to form a preliminary information table.

**2.** Primary Statistics

In order to avoid the effect of different number of photographs in individual years, this paper uses frequency as the main reference value for the study. Based on the preliminary information table, this paper uses the data analysis function of SPSS 22.0 to select out the years as cases, and do the analysis and recording of frequency, standard deviation and plurality for each year for the landscape categories. And the codes of each year, as well as the frequency of each type of landscape corresponding to each year, the standard deviation and plural of the distribution of each year's landscape category were regrouped into a table to form a percentage data table.

**3.** Secondary Statistics

(1) Conducting frequency statistics for the 41 years of tourism photo landscape category data from 1980 to 2020, and obtaining a statistical table of the frequency of landscape categories for the sample as a whole. (2) Comparing the frequencies occupied by each category of landscape in each year and averaging them to get the descriptive statistical table of the frequency distribution per year of each landscape category. (3) On the basis of the percentage data table, this paper uses the data analysis function of the software to make scatter plots and linear regression estimates of frequency versus time for each type of landscape for each year as the independent variable, and outputs the anova data of each plot. (4) The standard deviation of the distribution of landscape categories for each year is done with the linear regression of time, and the standardized coefficients, significance, and goodness-of-fit information in the anova tables of each type of landscape are summarized to produce the relevant graphs.

**4.** Chart Analysis

The graphs derived from the statistics are analyzed to understand the overall characteristics, tendency and magnitude of change of Chinese tourists' landscape preferences, and to describe and evaluate their linear regression estimation, in addition to exploring the change of diversity of Chinese tourists' landscape preferences.

## IV. ANALYSIS OF THE RESULTS

By case selection, frequency description and regression analysis of the data, the frequencies, standard deviations and pluralities of each landscape category for each year were derived, and the analysis yielded the following results.

(I) Landscape category frequency statistics

In the 41 years from 1980 to 2020, in general, the frequencies of tourist photos of various types of landscape were from high to low: architecture and facilities, historical sites, geomantic landscape, water landscape, biological landscape, astronomical and climatic landscape, tourism purchases, and humanistic activities, among which the frequencies of the categories of astronomical and climatic landscape and tourism purchases were the same. Architecture and facilities, historical relics and geomantic landscape tourism photos appear with high frequency; astronomical and climatic landscape, tourism purchases, humanistic activities category tourism landscape photos appear with low frequency. Among them, there are 239 landscape tourism photos of architecture and facilities, accounting for 30.5% of the sample size, which is the highest frequency; there are 7 landscape photos of humanistic activities, accounting for 0.9% of the sample size, which is the lowest frequency. The specific situation is shown in Table 1.

Table 1 Frequency statistics of landscape categories

| | Geoscape | Waterscape | Bioscape | Astronomical and Climatic Landscape | Historic Sites | Architecture and Facilities | Tourism purchases | Humanities Activities | Total |
|---|---|---|---|---|---|---|---|---|---|
| Quantity | 175 | 112 | 27 | 14 | 196 | 239 | 14 | 7 | 784 |
| Frequency (%) | 22.3 | 14.3 | 3.4 | 1.8 | 25.0 | 30.5 | 1.8 | 0.9 | 100.0 |

(II) Descriptive statistics of annual frequency distribution of each landscape category

Averaging the frequencies of each landscape category of each year, the landscape category frequencies were ranked from highest to lowest as follows: architecture and facilities, historical sites, geomantic landscape, water landscape, biological landscape, astronomical and climatic landscape, tourism purchases, and humanistic activities, i.e., the average preferred degree of architecture and facilities and historical sites was relatively high. The highest annual frequency of 30.3585% was found for the landscape category of architecture and facilities, while the lowest frequency of 0.7098% was found for humanistic activities. Comparing the size of the standard deviation of each landscape category, from the highest to the lowest are: historical sites, architecture and facilities, geomantic landscape, water landscape, biological landscape, tourism purchases, astronomical and climatic landscape, and humanistic activities, among which the annual frequency of three types of landscape, historical sites, architecture and facilities, and geomantic landscape, account for a high dispersion, and the volatility of tourists' preference for them is relatively large. And the highest frequency value of each landscape category is 62.5% in 41 years, and the value is the frequency of landscape of historical sites category in 1980. The details are shown in Table 2.

In addition, the analysis of the highest frequency landscape categories for each year from 1980 to 2020 shows that the number of architecture and facilities, geomantic landscape, historical sites, and water landscape as the highest frequency landscape categories in the past 41 years is 18, 11, 11, and 1. In general, the preference of Chinese tourists for architecture and facilities, historical sites, and geomantic landscape is generally high in the 41 years.

(III) Scatter plot and linear regression estimation of annual frequencies of eight types of landscape

With time as the independent variable and the annual frequency of each type of landscape as the dependent variable, a linear regression analysis of frequency and time was conducted by SPSS 22.0, and the changes in the frequency distribution of each type of landscape were obtained as shown below.

**1.** Changes in the annual frequency distribution of geomantic landscape

Over the 41 years from 1980 to 2020, the annual frequency of tourism photos in the category of geomantic landscape tended to increase as the years progressed. The preference of Chinese tourists for geomantic landscape generally shows an increasing trend, with an average annual frequency of 21.7341%.

Table 2 Descriptive statistics of the annual frequency of eight types of landscape

| | Geoscape | Waterscape | Bioscape | Astronomical and Climatic Landscape | Historic Sites | Architecture and Facilities | Tourism purchases | Humanities Activities |
|---|---|---|---|---|---|---|---|---|
| Average frequency (%) | 21.7341 | 14.0537 | 3.5463 | 1.8293 | 25.3341 | 30.3585 | 1.7073 | 0.7098 |
| Standard deviation | 11.23046 | 8.84257 | 5.58718 | 3.83342 | 16.65120 | 13.53030 | 4.27343 | 2.08804 |
| Min. value (%) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.00 | 0.00 | 0.00 |
| Max. value (%) | 55.00 | 30.00 | 25.00 | 15.00 | 62.50 | 55.00 | 20.00 | 10.00 |

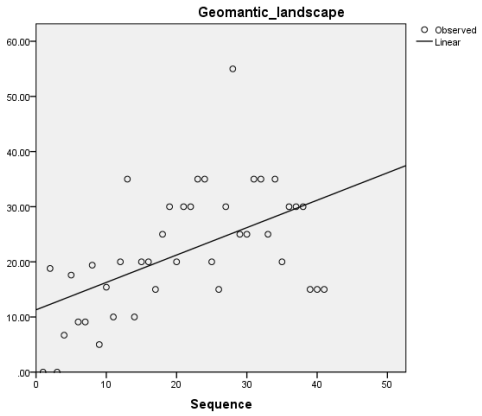


Fig. 1 Annual frequency distribution of geomantic landscape

**2.** Changes in annual frequency distribution of water landscape

Over the 41 years from 1980 to 2020, the annual frequency of the waterscapes category of tourism photos tended to increase as the years progressed. The overall preference of Chinese tourists for waterside landscape shows an increasing trend with an average annual frequency of 14.0537%.

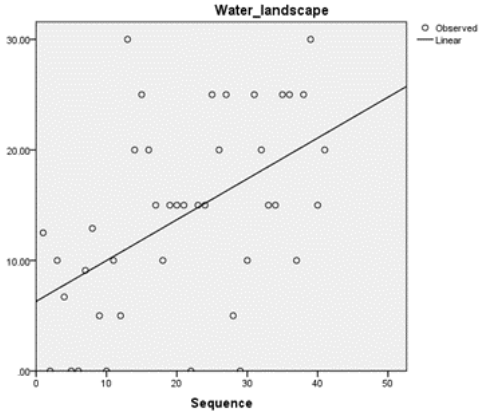


Fig. 1Annual frequency distribution of water landscape

**3.** Changes in annual frequency distribution of biological landscape

Over the 41 years from 1980 to 2020, the annual frequency of tourism photos in the biological landscape category tended to increase as the years progressed, but the rise is smaller. The preference of Chinese tourists for biological landscape showed an overall upward trend, but the increase is smaller. The average annual frequency is 3.5463%.

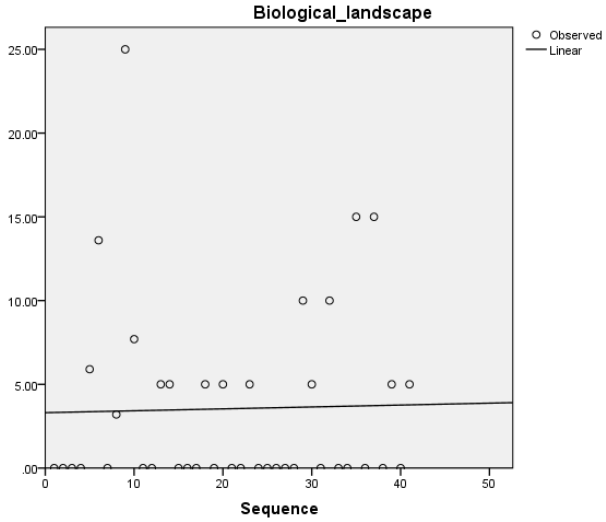


Fig. 2Annual frequency distribution of biological landscape

**4.** Changes in the annual frequency distribution of astronomical and climatic landscape

In the 41 years from 1980 to 2020, the annual frequency of tourist photos in the category of astronomical and climatic landscape tends to increase with each year. There is an overall upward trend in the preference of Chinese tourists for astronomical and climatic landscape. The average annual frequency is 1.8293%.

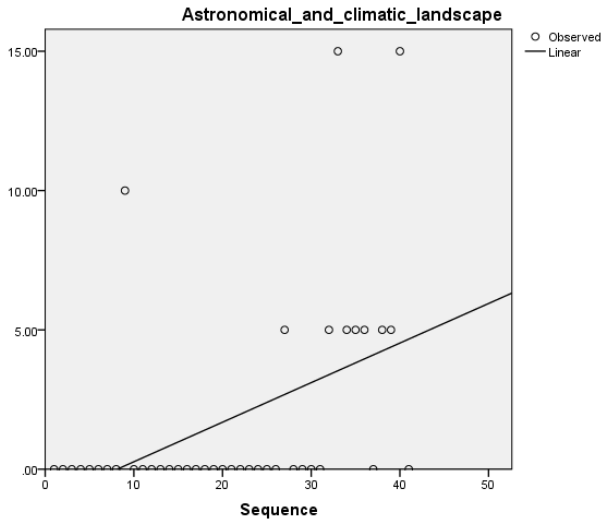


Fig. 3Annual frequency distribution of astronomical and climatic landscape

**5.** Changes in annual frequency distribution of historical relics landscape

Over the 41 years from 1980 to 2020, the annual frequency of historical relics tourism photos tends to decrease as the years increase. The preference of Chinese tourists for historical relics landscape is generally on a decreasing trend, but still at a respectable level. The average annual frequency is 25.3341%.

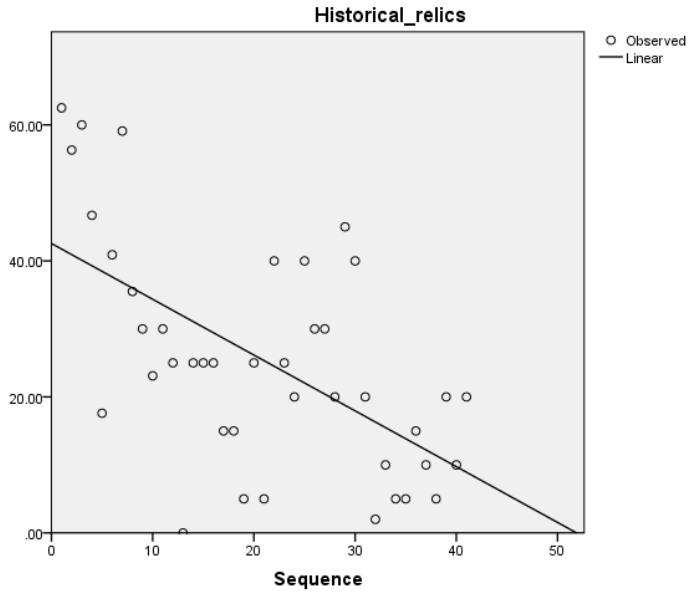


Fig. 5 Annual frequency distribution of historical relics landscape

**6.** Changes in annual frequency distribution of landscape in the category of architecture and facilities

Over the 41 years from 1980 to 2020, the annual frequency of tourist photos in the architecture and facilities category tends to decrease as the years increase. The preference of Chinese tourists for the historical sites category of landscape is generally on a decreasing trend, but the preference is still relatively high. The average annual frequency is 30.3585%.

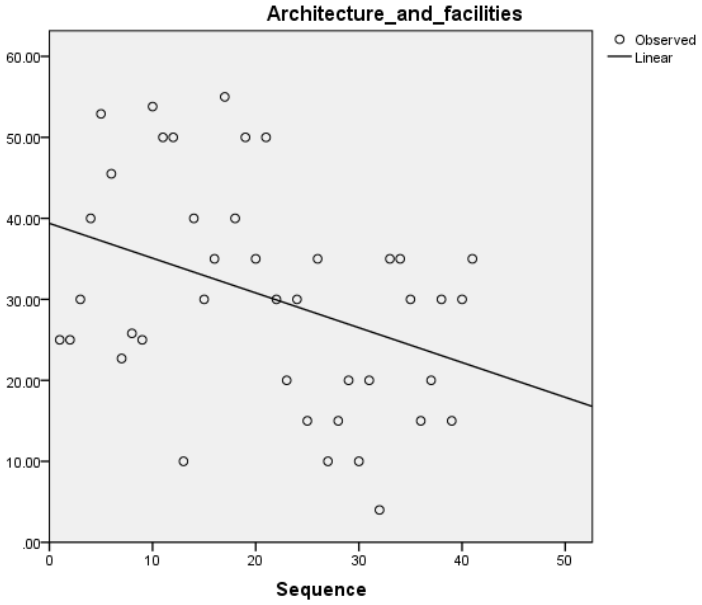


Fig. 4Annual frequency distribution of architecture and facilities landscape

**7.** Changes in annual frequency distribution of tourism purchases category landscape

The annual frequency of tourism photos in the tourism purchase category tends to increase with the year in the 41 years from 1980 to 2020, and especially, its increasing trend is gradually revealed in the last decade. The overall preference of Chinese tourists for the tourist purchase category of landscape is on the rise. The average annual frequency is 1.7073%.

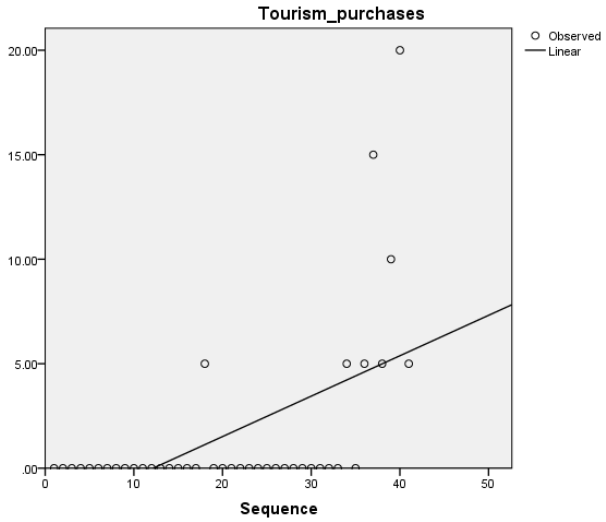


Fig. 5Annual frequency distribution of tourism purchases

**8.** Changes in annual frequency distribution of humanistic activities

In the 41 years from 1980 to 2020, the frequency of human activity-based tourism photos tends to increase slightly with the year, but the increase is less pronounced for the time being. There is an overall small upward trend in the preference of Chinese tourists for human activity-based landscape. The average annual frequency is 0.7098%.

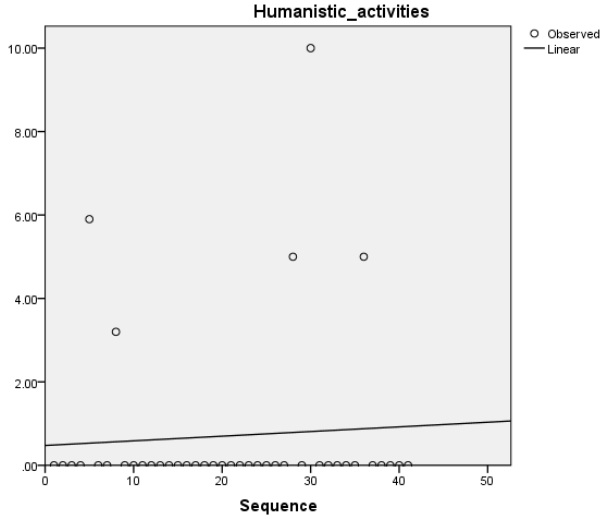


Fig. 8 Annual frequency distribution of humanistic activities

**9.** Linear regression information of annual frequency change of eight types of landscape tourism photos

The information on the annual frequency change trend of tourism photos of the above eight categories of landscape was summarized to obtain Table 3. As shown in Table 3, the frequency of tourism photos in the categories of geomantic landscape, watershed landscape, biological landscape, astronomical and climatic landscape, tourism purchases, and humanistic activities showed an increasing trend, and the regression estimates of the above landscape rate categories are significant except for that of the biological landscape and human activity category, which are not significant; The annual frequencies of the two landscape categories of historical sites and architecture and facilities show a decreasing trend with the growth of the year, and the regression estimates of both are significant. At the same time, the landscape of geomancy, water

landscape, astronomical and climatic landscape, tourism purchases category landscape increased more significantly, the absolute value of the standardized coefficient exceeds 0.40; historical sites, architecture and facilities category tourism landscape decreased more significantly, the absolute value of the standardized coefficient exceeds 0.35.

Table 3 Linear regression information of annual frequency change of eight types of landscape tourism photos

| Landscape category / Related parameters | Geoscape | Waterscape | Bioscape | Astronomical and climatic landscape | Historic Sites | Architecture and Facilities | Tourism purchases | Humanities Activities |
|---|---|---|---|---|---|---|---|---|
| β (normalization factor) | 0.530 | 0.501 | 0.024 | 0.444 | -0.590 | -0.380 | 0.542 | 0.064 |
| $R^2$ (goodness of fit) | 0.281 | 0.251 | 0.001 | 0.197 | 0.348 | 0.145 | 0.294 | 0.004 |
| Sig (Significance) | 0.000 | 0.001 | 0.880 | 0.004 | 0.000 | 0.014 | 0.000 | 0.691 |

(IV) Regression estimation of the standard deviation of the distribution of landscape categories in each year over time

A linear regression of the standard deviation of the distribution of landscape categories for each year against time is obtained in Fig. 9. The goodness-of-fit $R^2$ = 0.462, the standardized coefficient is 0.680, the significance 0.000, and the regression model is significant. In the 41 years from 1980 to 2020, the standard deviation of the distribution of landscape categories in each year tends to increase as time advances. The upward trend is obvious. The results indicate a dispersed and diverse trend of landscape preferences of Chinese tourists.

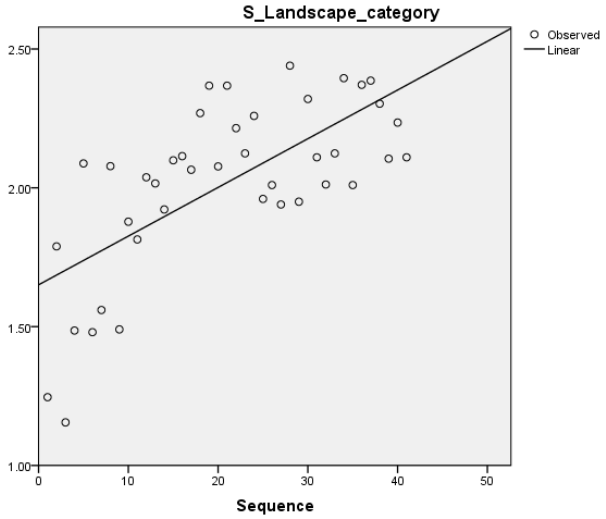


Fig. 6Annual landscape category standard deviation distribution change map

**V. Conclusions and Prospects**

(I) Research findings

Based on the analysis of the study results, the following conclusions can be drawn regarding the landscape preferences of Chinese tourists.

**1.** Landscape frequency

According to the overall analysis of the frequency of various types of tourist landscape by Chinese tourists in each

year, it can be concluded that Chinese tourists in general have a higher preference for the resources of architecture and facilities, historical relics, geomantic landscape, and water landscape. In the process of tourism planning and development, attention should be paid to the exploration of the dual nature of practicality and landscape of architecture and facilities, the conservation development of historical and cultural relics, the integration of the concept of cultural empowerment and cultural tourism into actual operation, and the development of ecological civilization.

**2.** Trend changes

Analyzing the annual frequency changes of each type of landscape, it can be concluded that the dispersion of Chinese tourists' preference for historical sites, architecture and facilities, geomantic landscape, and waterscapes is relatively high and the changes are slightly larger. The average frequencies of architecture and facilities and historical sites are high, but their preferences are decreasing; the tourism preferences of geomorphology and waterscapes are increasing. Biological landscape, astronomical and climatic landscape, tourism purchases, and humanistic activities are less preferred, but all of them have increased and are in the budding and developing stage. The trend change of landscape preference shows that people's preference for natural landscape has increased, and this change may originate from people's pursuit of relaxation, which also confirms the trend of domestic tourism gradually transitioning from sightseeing to both leisure and sightseeing tourism, and the development momentum of leisure tourism is good. The tourism industry should respond to the development of tourism demand changes, improve tourism and leisure supporting facilities and services, to provide security for leisure tourism to carry out. For the appreciation of biological landscape, celestial and climatic landscape, relevant enterprises and departments should give space and information facilities. Tourism enterprises and departments should also explore, protect and develop the local culture of tourism destinations, innovate tourism activities, and develop tourism purchases with special characteristics according to local conditions, which is also a good means to shape and promote the image of tourism destinations.

**3.** Diversity

The standard deviation analysis of photo scenic categories for the 41 years from 1980 to 2020 reveals that Chinese tourists' preference habits for landscape categories are dispersing and the diversity of preferences is increasing. Jigang Bao and Mengyu Gan (2004) did a study on the evolution of China's urban tourism destination development in 28 key Chinese tourism cities between 1982 and 2001 and found that the change in the geographic concentration index of Chinese tourism destinations tends to slow down and the Chinese urban tourism destination system develops in the direction of diversification. [10] This indicates that under the continuous development of national economy, tourism demand expands, tourism supply is gradually completed, the trend of popularization and popularization of tourism industry is obvious, and various tourism resources and tourism forms are gradually developed. The tourism industry should be people-oriented, and should develop various types of tourism resources in an integrated and comprehensive manner, improve tourism facilities and services, create rich and high-quality tourism products, and promote the further development of mass tourism.

(II) Research outlook

Tourism photographs are important texts for documenting tourism activities and studying the generation and development of tourism. This paper is reasonable and innovative in terms of research approach to analyze the historical changes of Chinese tourists' landscape preferences by extracting information from multiple samples of tourism photos in consecutive time periods. To further analyze the content based on tourism photos, we should expand the sample size, increase the representativeness of the sample, and further study the pattern; we can also use the rooting theory and textual content analysis to further corroborate and analyze the reasons behind the pattern of tourists' landscape preference; we can do a divergence analysis of Chinese tourists' landscape preference by demographic characteristics such as gender, age, occupation, education level, and place of permanent residence; the analysis of geographic information signs for specific scenic spots, combined with the spatial and temporal characteristics of tourists' activities, the study of tourists' tourism preferences, for the reference and guidance of tourism product design, development and promotion and marketing.

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