Marine atmospheric anomaly detection-based on GIS and research on process product design

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Abstract
With the improvement of marine exploration level, marine geographic information system (MGIS) has received more and more attention. Marine data has many sources, heterogeneity, and other attributes. Visualization is an important part of GIS, which transforms the data that cannot be perceived directly into graphics. It is very important to introduce GIS into the field of marine science. The core function of marine data visualization is comfort and interaction. This paper combines the functions of ocean data. With the support of GIS, distributed technology, and scientific computer visualization technology, the key GIS visualization technology of ocean air data has been studied and applied, and some achievements have been achieved. The results show that the atmospheric anomalies in the tropical Northwest Pacific and the southeastern tropical Indian Ocean are realized by two main changes: in-phase and out of phase. When the OLR deviation of the tropical Northwest Pacific and the southeast Indian Ocean is positive, there are low-level differences, high-level convergence, and the same circulation characteristics in these two regions. The negative precipitation in MC is weaker than that in eastern China, which may have a significant impact on the climate of northern China and Australia. This paper analyzes the unique tropical ocean style tourism craft product design of H Province, which occupies a large part of the local souvenir market. Through the research of marine geographic information system, it is applied to the design of tourism handicrafts in H Province, so that the handicrafts in H Province have a better design language.

Keywords GIS system · Marine atmosphere · Atmospheric anomaly · Process product design

Introduction
Oceans account for 71% of the world’s total area. With the improvement of marine research level, the ability of humans to obtain marine data will continue to improve, and more and more marine data will be accumulated. The effective use and research of marine data have become an important research topic (Tabari et al. 2014). In recent years, spatial information system (GIS) has developed rapidly and has been successfully applied in many fields. The GIS system technology is introduced into the marine field to promote the comprehensive management and analysis of complex marine data and introduce new technologies for the management and utilization of marine data. Visualization is an important function of a spatial information system. GIS visualization is the research of visualization theory, method, and scientific technology in GIS (Madani 2014). Visualization technology can transform the data that people cannot directly perceive into visual information that people can easily accept. Data can be represented in a variety of formats, such as 2D or 3D images, curves, graphics, and animations, and their states and relationships can be viewed and analyzed (Vaghefi et al. 2019). Web-based visualization requires a high degree of interactivity and accuracy and is mainly based on two-dimensional visualization (Modarres et al. 2016). This document uses and extends the npot control to design and develop a two-dimensional display method of ocean data based on Web, including scatter curve, wind field vector diagram, and dotted line. And it is applied to “marine atmospheric anomaly” for online display of marine atmospheric data (Najafi et al. 2013). Then the author tries to use folk culture, art design, and brand communication to study some problems related to tourism crafts and brands in H Province on the basis of
the investigation of the development status of tourism crafts market in H Province: (1) the system and category of tourism craft product design in H Province, the discrimination of related concepts of tourism crafts, the relationship between the traditional characteristics of local tourism craftsmen in H Province and regional culture, and the relationship between their location and tourism product brand; (2) strategic research: the significance and characteristics of brand building, the formation method of brand visual image, and the guiding factors of brand communication; and (3) case studies are conducted (Ozturk et al. 2015). This paper studies the brand and distribution of representative tourist craftsmen in H Province, compares the development of T Bay cultural and creative craftsmen, and analyzes their innovation (Yu et al. 2018). This paper introduces a dynamic research process from problem analysis to solution, integrates the modern brand method of the traditional tourism industry, and emphasizes that innovative brand thinking is the source of vitality and strength of modern transformation of tourism handicrafts in H Province (Önol et al. 2013).

Materials and methods

Data source

The materials used in this paper include:

(1) Monthly mean sea-level temperature (SST) data from the Hadley Centre for climate prediction and research, met office, UK, for the period 1979–2020 with a horizontal resolution of 1° × 1°.

(2) NCEP/NCAR analysis data set: the variables mainly include monthly average surface pressure (PS), specific humidity (Shum), temperature (air), surface wind, and upwind field (U, V, ω). From 1979 to 2020, the accuracy of the network is 2.5° × 2.5°.

(3) The network resolution of NOAA’s monthly long-wave radiation (OLR) data is 2.5° × 2.5°. It should be pointed out that due to the need for sliding correlation 11a, according to the analysis, in the actual calculation of sliding correlation, the time period of NOAA OLR data is 1975–2020.

(4) The average monthly rainfall of CMAP during 1979–2020 is selected, and the network accuracy is 2.5° × 2.5°.

(5) National Climate Center (IOC) IOD index and Niño index, including nino12, nino34, NINO3, and nino4. This paper deals with the summer (June to August) from 1979 to 2020. The average value of summer is the average value of three months from June to August (Sabooi et al. 2012).

Design of marine atmosphere database based on GIS

Since the 1980s, many scientific research institutions, government agencies, companies, and enterprises at home and abroad have used GIS as an effective tool to store, process, analyze, and express geographic information. The marine database of the Magis platform is shown in Figure 1 below.

At present, the research direction of a spatial information system (GIS) visualization mainly includes spatial data visualization and spatial data analysis. Two-dimensional representation of spatial data, such as scatter plot, vector plot, and statistical plot, has been developed and matured. Interactivity means that the visualization system must let the user choose the interface, because it can control the data source, brush shape, color, coordinate axis, and so on. Network transmission, data volume, and waiting time data visualization based on the network is mainly two-dimensional visualization (Sharifi et al. 2011).

Calculation of marine atmospheric anomalies

In order to reveal the relationship between the tropical Northwest Pacific and the tropical southeast Indian Ocean, the atmospheric apparent heat source < Q1 > and the atmospheric apparent water vapor sink < Q2 > are calculated:

\[ Q_1 = C_p \left( \frac{\partial T}{\partial t} + V \cdot \nabla T + \frac{p}{p_0} \omega \frac{\partial \theta}{\partial p} \right) \]  

\[ Q_2 = -L \left( \frac{\partial q}{\partial t} + V \cdot \nabla q + \omega \frac{\partial q}{\partial p} \right) \]  

The above formulas include vertical transport term, local variation term, and horizontal advection term. Through vertical integration of the above two formulas, it is obtained that:

\[ < Q_1 > = - \frac{1}{g} \int_{p_1}^{p_2} Q_1 dp = (L Pr + LC - LE) + Q_{S+} < Q_r > \]  

\[ < Q_2 > = - \frac{1}{g} \int_{p_1}^{p_2} Q_2 dp = (L Pr + LC - LE) - \Delta E_S \]  

\[ \Delta Q = \langle Q_1 \rangle - \langle Q_2 \rangle = < Q_R > + (Q_{S} + \Delta E_{S}) \]

Results

Comparative analysis of atmospheric anomalies in tropical Northwest Pacific and Southeast Indian Ocean

In order to study the spatial pattern represented by the phase distribution of OLR aberrations in the tropical Northwest Pacific and the southeastern tropical Indian Ocean, the phase correlation index (IOLR) defined above is used to analyze the cycle characteristics of anomalous years. When the tropical Northwest Pacific and Southeast tropical Indian Ocean
functions are positive, the distribution of the regression coefficients of the 950hpa and 300hPa divergent wind fields and the phase correlation index (Iolrp) of the discharge function are shown in Fig. 2a and b. There is an anticyclone cycle, the lower layer is an important wind direction dispersion area, 200 hPa is an important wind field convergence area, and the tropical region of the South Indian Ocean east of the southern hemisphere has a negative value, and there are also horizontal convergence of anticyclone circulation low-level difference and low-level difference, which indicates that the tropical Northwest Pacific and the southeast Indian Ocean have the same cycle characteristics. The tropical convective activities in the tropical Pacific in the northwest Indian Ocean and in the southeast Indian Ocean are relatively weak and will not cause rainfall. The lower tropical Central Pacific rotates periodically, the lower part merges, and the upper part separates. The circulation disturbance in the west of the tropical Indian Ocean is opposite to that in the southeast of the Indian Ocean. The bottom layer is an important divergence region of wind field, and 200 hPa is a significant divergence region of wind field. Above 200 hPa (Fig. 2b), the long and narrow areas north of the Yangtze River Basin in China and north of Japan have obvious negative flow areas, indicating the existence of an obvious cyclonic cycle. In the southern hemisphere, there are obvious positive current activities in Central and Western Australia and the tropical Indian Ocean, indicating that the occurrence of the cyclone cycle is significant.

In addition, Figure 3 shows that in the southeastern part of the tropical Indian Ocean (97 °E, 10 °S), it is connected with the tropical Northwest Pacific (132.5 °E, 15 °N), abnormal tilt vertical cycle, and abnormal vertical cycle on a straight line. It can be seen from Fig. 3A that when the parts of the tropical Northwest Pacific and the southeastern tropical Indian Ocean split at the same stage, the two regions were in the sinking region and the convective activity was weak, which was not helpful for rainfall. The vertical velocity anomaly in the tropical region of the southeast Indian Ocean is higher than that in the tropical Northwest Pacific. It also shows that when the OLR deviations of the two regions are in the same phase, the northwest tropical Pacific and the tropical Southeast Asian Indian Ocean have the same cycle characteristics. This is consistent with the analysis in Figures 2a and b. Figure 3b also shows that 18% of the total variation of anomalous vertical velocity in the tropical center of the Northwest Pacific can be explained by the correlation index (Iolrp).

The distribution of precipitation and water vapor flux regression coefficients (from 300 HPA land consolidation) to phase correlation index (Iolrp) (Fig. 4a) shows that the rainfall in the southeast tropical Indian Ocean is also negative.

Similarly, in order to study the state model characterized by the inverse correlation between the tropical Northwest Pacific and the tropical Indian Ocean, we use the Iolrn index to analyze the characteristics of the anomalous circulation system. When the tropical Northwest Pacific is negatively correlated with the tropical convective activities in the Indian Ocean, the distribution of the regression coefficients of the divergent wind fields at 850 hPa and 200 hPa and the inverse correlation index (Iolrn) of the discharge function show that (Fig. 5a, b) the ocean is negatively correlated. The current operation is abnormal and wind convergence is important. At 850 hPa, there is a positive current deviation, and a large shunt flows through the continental ocean into the tropical southeast Indian Ocean, which reflects the abnormal decrease of convective activity in the tropical Northwest Pacific, and the rainfall may have a
negative deviation. There are different wind fields in the upper troposphere near the southwest of Sumatra, and there is obvious wind convergence in the lower troposphere. 850 hPa is a series of forward flow functions with cyclonic circulation. It can be seen from Fig. 5a and Fig. 5b that the OLR configurations are different in the tropical Northwest Pacific and the tropical Indian Ocean in Southeast Asia and their rotation structures are opposite. 850 hPa (Fig. 5a) has a significant positive anomalous discharge function in the coastal area of southern China, which is a divergence region of wind field. It should be noted that 850 hPa (Fig. 5a) is a series of negative discharge functions with anticyclone circulation in the central and upper parts of Australia and 200 hPa is the strongest positive deviation with obvious cyclones and circulation. The low-level air flows westward into the tropical Indian Ocean, strengthening the low convergence airflow in the southeast tropical Indian Ocean.

At 850 hPa (Fig. 5c), about 28% of the variance of the anomalous current function can be explained by the inverse correlation index. The interval (MC) corresponds to the total variance of the abnormal current function. The percentage is even higher, over 30%. At 200 hPa (Fig. 5d), disturbances in the South China Sea and northeastern Australia are relatively high.

**Occurrence of marine atmospheric anomalies and analysis of its influencing factors**

Classification of different types of ENSO events (Table 1): using CPC to define ENSO events (based on the 3-month moving average niño-3.4 index, the deviation of winter SST
for five consecutive months is greater than/less than 0.5 °C—0.5 °C is the El Niño/La Niña event), and 17 El Niño events and 16 La Niña events from 1963 to 2019 were selected. If niño 3 index is greater than nifio4 index, it is defined as Eastern El Niño or Eastern La Niña. Among them, the La Niña events in 1970/1971, 1999/2000, 2007/2008, and 2008/2009 showed that it moved rapidly from east to west during the peak period, so it is difficult to determine whether it is the east or the middle.

Table 2 shows the number of different types of La Niña and El Niño events on the subtropical seafront below the index threshold. The frequency of ENSO events is defined as the proportion of ENSO events in all subtropical oceans. It can be seen that the Subtropical Ocean Front is positive, while the

![Fig. 3](image1)

**Fig. 3** a Vertical tilt rotation (arrow; unit: m/s) and vertical velocity anomaly (shadow area; setting: 10-3 HPA/s); the distribution of lolp regression coefficient (BOLD arrow and shadow) indicated that the abnormal vertical velocity of blood circulation had passed the t test (0.1 reliability). b The variance of vertical velocity relative to lolp represents the percentage of the total variance of abnormal vertical velocity (profile, unit: %)

![Fig. 4](image2)

**Fig. 4** a Distribution of lolp regression coefficients of total horizontal precipitation (shadow, unit: mm/D) and water vapor flow (all vectors pass 0.1 reliability t test, unit: kg/(m * s), supplemented by 300 HPA soil); b percentage change of abnormal precipitation (shadow) caused by abnormal precipitation and whole layer water vapor flow change and whole layer water vapor flow (boundary) related to lolp (unit:%)
thresholds of 0.5, 1.0, and 1.5 correspond to 55%, 80%, and 67% of La Niña prevalence, respectively, while the Subtropical Ocean Front is negative. The thresholds were −0.5, −1.0, and −1.5, and the frequency of El Niño events was 50%, 71%, and 100%, respectively. The frequency of ENSO events is more than 50%, which indicates that the intensity of the Subtropical Ocean Front in spring is a good indicator of subsequent ENSO events. Except in the spring

Table 1  Year of ENSO events from 1963 to 2019

| Type       | Eastern type                      | Central type                      | Mixed type              |
|------------|-----------------------------------|-----------------------------------|-------------------------|
| La Niña    | 1964/1965, 1971/1972, 1984/1985    | 1973/1974, 1974/1975, 1975/1976   | 1970/1971, 1999/2000    |
|            | 1996/1997, 2006/2007               | 1984/1985, 1989/1990, 1999/2000   | 2005/2006, 2004/2006    |
|            |                                   |                                   | 2000/2001               |
| El Niño    | 1965/1966, 1972/1973, 1976/1977    | 1963/1964, 1968/1969, 1969/1970   | 2004/2005, 2006/2007, 2009/2010 |
|            | 1982/1983, 1986/1987, 1987/1988    | 1977/1978, 1994/1995, 2002/2003   |                         |
|            | 1991/1992, 1997/1998               | 2004/2005, 2006/2007, 2009/2010   |                         |
of 1996, when the Subtropical Ocean Front was positive, there was no corresponding La Niña event. When the Subtropical Ocean Front is very strong (threshold) in spring, the ENSO event occurred in the next winter. In the middle of spring, the Subtropical Ocean Front (threshold: 0 ± 0.5 or ± 0), El Niño was more likely to occur. For eastern and medium ENSO events, the subtropical spring coastal threshold is 0 ± 5; there are 6 kinds of medium-sized events and 4 kinds of Eastern events, and the concentrated events are more frequent. Therefore, in general, the nonlinear relationship between the Subtropical Ocean Front in spring and the subsequent ENSO events is not obvious, and its ability to predict La Niña events is slightly stronger than that of the El Niño events. The prediction ability of ENSO eastern event is stronger than that of the El Niño event. There is no influence on the subtropical ocean slope events. In addition, the spring Subtropical Ocean Front intensity index calculated by ERSST is consistent with Hadley data in principle (Table 3). The central and eastern part of ENOS is not sensitive to the Subtropical Ocean Front, but the subtropical ocean slope of ERSST data is not sensitive to La Niña, and the prediction effect is much better than that of the El Niño event.

### Table 3

It is the same as Table 2, but the Subtropical Ocean Front index is calculated by ERSST

| La Niña | El Niño |
|---------|---------|
| NPSTF   | All(16) | CP(7) | EP(5) | M(4) | All(17) | CP(9) | EP(8) |
| ±0.5    | 9/14    | 2/14  | 3/14  | 4/14 | 6/13    | 4/13  | 2/13  |
| ±1.0    | 4/5     | 0/5   | 1/5   | 3/5  | 3/7     | 1/7   | 2/7   |
| ±1.5    | 2/2     | 0/2   | 1/2   | 1/2  | 3/3     | 1/3   | 2/3   |

### Table 4

Correlation coefficients of Iolrp and Iolrn index with Niño index and IOD index

|        | nino12 | nino34 | NINO3 | nino4 | IOD |
|--------|--------|--------|-------|-------|-----|
| Iolrp  | 0.45   | 0.43   | 0.50  | 0.40  | 0.58|
| Iolrn  | 0.08   | −0.18  | −0.10 | −0.11 | −0.49|

### Relationship between ocean atmospheric anomaly and sea surface temperature anomaly

In addition, Table 4 uses the Niño index (nino12, nino34, NINO3, nino4) and IOD index to calculate the correlation coefficient of correlation index (Iolrp) and inverse correlation index (Iolrn). It can be seen from Table 4 that, regardless of nino12, nino34, NINO3, or nino4, the Iolrp index and its correlation coefficient are very high, and the correlation coefficient between Iolrp index and NINO3 index is the largest, which is 0.5. The correlation coefficient between the inverse correlation index (Iolrn) and the Niño index indicates that there is no significant correlation between the inverse OLR configuration separated from the tropical Northwest Pacific and the Southeastern Tropical Indian Ocean and ENSO. However, the correlation coefficient between the Iolrn index and the IOD index is relatively high, reaching −0.49, which indicates that the abnormal structure of the OLR tropical Indian Ocean in the Northwest Pacific and the tropical East South China Sea has a certain relationship with the IOP.

In the central equator and the eastern Pacific, the heat sources in the atmosphere have obvious deviations, and the atmosphere is abnormally heated. The Pacific SST in the central and Eastern equator is positive (Fig. 6a), and the convective activity is improved. Located on the southeastern margin of Oceania, the convective activities in the two regions of the northwest edge are related to ENSO.

In the tropical Northwest Pacific and the southeast tropical Indian Ocean, the mechanism of OLR aberrations and antiphase structures, as well as the SST aberrations in Fig. 7 and the distribution of index regression coefficients, is shown. When the tropical Northwest Pacific and the southeastern tropical Indian Ocean are in the same stage (Fig. 7a), the apparent atmospheric heat source of the tropical Indian Ocean is positive, the atmospheric heating is abnormal, and the southeastern tropical Indian Ocean is negative. Because of the obvious anticyclone circulation and various air currents in the lower troposphere of the southeast tropical Indian Ocean, the cooling and sinking of turbulence promote the gill-type reaction. From the abnormal wind field of 850 hPa, we can also see that there is a low-level difference in the southeast tropical Indian Ocean. The tropical Northwest Pacific also has negative apparent heat in the atmosphere, and the atmosphere is abnormally cooled and submerged.
In Figure 8, the nonadiabatic warming in the southeastern tropical Indian Ocean is a positive anomaly, indicating that the sum of surface sensitive heat and radiant heating in these regions is a positive anomaly, which is related to excessive sunshine in the divergent subsidence area.

Discussion

Main categories of marine arts and crafts

The change and development of handicrafts in H Province’s tourism industry are also an example of the historical development of modern marine handicrafts from early family shop production to semiautomatic and semi-mechanized production and then to modern industrial production. Some of them become the basis of understanding history in the form of national and mass heritage, and some of them are used as a supplement to large-scale industrial production and become unique hot products with traditional culture. With the strong development of tourism in H Province, handicrafts have rapidly entered the era of art coexistence and life to meet the needs of tourists. The natural environment and geographical characteristics affect the tourism tools of H Province. They are based on marine culture, Li culture, history, and traditional culture and also adopt modern fashion culture. Now they provide a variety of brocade, pottery, seafood, and traditional crafts. For example, coconut paper cutting is the mainstream of the market, reflecting the “characteristics of H Province.” According to their characteristics, they are mainly divided into five categories: textiles, sculpture, shellfish products, ceramics, and weaving (Abbaspour et al. 2012).

Textile category

The textile industry represented by Li brocade in H Province has a long history. Its intricate technology, colorful patterns and symbols, and unique linear geometric patterns are amazing, and it has become a window for scholars to explore the traditional culture (Amiri and Eslamian 2010). Traditional spinning, dyeing, weaving, and embroidery skills (including hemp weaving, dyeing, double-sided embroidery, and dragon weaving) also make Li brocade the only traditional handicraft in H Province, which is one of the intangible cultural heritage...
of H Province. The five dialect custom systems have different meanings and characteristics. In recent years, ribbon, tapestry, coaster, tablecloth, and other product series have been continuously injected into the market. At the same time, there are some exquisite Li Jin art gifts (Basha et al. 2015). It has been transformed into different cultural and creative products, such as bows, necklaces, earrings, and mobile phone cases; the visual image has a unified plan and brand. Outlets are not limited to scenic spots, hotels, and roadside kiosks. A large number of dynamic scenes, such as online stores, festivals, exhibitions, and competitions, are beginning to appear for tourists to choose from. However, the traditional brocade of Li nationality is limited by the traditional loom. The manual brocade based on the traditional spinning, dyeing, weaving, and embroidery technology is rare in the market. Its output is not high, and its price is also high. Most of the handmade brocade products seen in the tourism market are made by modern machines, whose price is affordable for people, but the original flavor no longer exists. Lijin technology is committed to brand development but also to combine with traditional technology to improve production capacity.

**Sculpture**

According to different materials, the carving crafts in H Province are divided into coconut, stone, bone, and wood carvings (Bucchignani et al. 2018). Among them, coconut carving, ox horn carving, huanghuali wood carving, and root carving have been very successful in the handicraft market of H Province. The early carving techniques were used for manufacturing and living, such as building canoes, carving textile tools, and so on. The most famous function is the common method of carving wood such as letters and human bone hairpins. ① Wood carving technology has become a historical witness: the skin-shaped bone hairpin is unique to the Li people. Li women take it as a symbol of identity and marriage and have a strong interest in headwear. Nowadays, human bone hairpins are still scattered in the market, and the price is very high. Because the human bone hairpin is mainly handmade,
the production cycle of the final product is 1 year, which is divided into ten stages, and there are few craftsmen, so marketing is also very difficult. Its length is in the shape of animals, such as sea fish, eagles, peacocks, and other dynamic and aesthetically collected shapes (Draxler et al. 2001). Due to the shortage of raw materials and the mass production of Huanghua wood carvings, his collection is very popular in the antique market.

In addition, coconut cut products in H Province occupy the largest market share in carving crafts and are known as pearls, brocades, and seafood all over the country. In 2008, they were listed in the second batch of national intangible cultural heritage (Droogers et al. 2012). As a traditional art project, traditional coconut carving in H Province uses coconut bark, coconut palm, and coconut wood as raw materials and uses typical handicrafts, including flat relief, three-dimensional relief, open carving, deep carving, and jointing. Coconut sculpture is exquisite in craft and shape. Coconut sculpture, based on raw materials, is unique in tropical coastal areas. There is a wide range of coconut shredding products on the market, from simple coconut bowl, spoon, wide-mouth bottle, milk bottle to coconut baby, coconut stick, watch, bag, and belt, and the public awareness is very weak. The added value of products is not high, and the price is generally low. In recent years, many refreshing coconut masks, coconut oil, coconut milk soap and other cultural and creative products have appeared in the souvenir market. Coconut shell with “small coconut shell” has won the praise of tourists (Emadodin et al. 2019).

**Seashell products series**

The islands of H Province are rich in fish resources, and the market is mainly based on shell ornaments and Pearl collars. Shell, mussel, crystal, and coral products enrich the common crafts on the market, including vertical shell decoration, hanging shell decoration, small windshields, coasters, necklaces, and bracelets made of shells. Other mussels, such as big snail shells and sea urchin shells, sell smaller shell bracelets and shell products. Mussel products also have problems in individual varieties and rough processing. For example, shells and sea urchins sell raw materials, let alone artistic design and technology, and occupy a place in the low-cost market. It is an excellent material for shell tools and jade carving. The tourist arts and crafts market mainly uses decorations, bracelets, and large sculptures. In ancient times, mussels were often
placed on tables in temples. The products include pearl necklaces, hand ornaments, headwear, earrings, etc., as well as skin care products derived from pearl raw materials. Consumers love them deeply (Fazel-Rastgar 2020). There are many gems in H Province. Famous brands include Jingrun pearl, Meiyu pearl, Hairun pearl, and nanrun pearl. The characteristics of mollusk, shell, and coral products cannot be the hallmark of H Province. The problems of deep treatment and packaging design are more obvious. Compared with the popularity of pearl brands, there is still a long way to go to create brands of seafood, shells, coral products, and other crafts (Ghiami-Shamami et al. 2018).

Pottery

The primitive ceramic art of Li people in H Province has a long history. Most of the original pottery was handmade by women, while men dug the ground. Ceramic tools are simple homemade tools that can be photographed outdoors according to weather conditions. The original Li pottery is simple in form, simple in decoration, and practical. The spread of primitive pottery has never stopped: from family inheritance to visits to schools, colleges, and rural universities, the inheritance of this primitive handicraft has greatly developed.

Knitting

Palm, sugarcane, red cane, bamboo, straw, panda leaf, banana leaf, and other weaving resources of H Province are widely used in Li nationality areas. It covers almost all the daily needs of families, such as beds, straw hats, hats, and baskets, which are very high. Coupled with the impact of other cheap industrial food, the output of materials is low. However, the simple and pure craft of rattan weaving has always been loved by people who support the concept of natural life.

Analysis of the current situation and existing problems of marine arts and crafts design

The design has no or lacks regional cultural characteristics

At present, the tourism craftsmen in H Province often lack design focus and research on the local cultural significance, and the degree of differentiation is very low (Karami 2019). The author finds that the tourist tours sold in scenic spots of H Province are almost the same and can be purchased in specific scenic spots.

Trademark or brand

Tourism handicrafts, production control, and dependence on raw materials make H Province tourism handicrafts “brand” and “import” phenomenon serious, lack of qualified planning, and technical personnel. In the process design, such as theft and continuation of tradition, although there are great differences in tourism handicrafts in H Province, imitation products are rampant. The trademark is only kept at the trademark registration level, and there is no market plan for the trademark. In Tianyahaijiao, an Asian scenic spot, and the business district of Boao Forum, most craftsman have no brands. Although the packaging and logo are visible, they cannot be distinguished from other companies.

The design of tourist crafts is too traditional

The traditional tourism work design of H Province is mainly reflected in the following aspects: first, the lack of new models and in-depth treatment. The company focuses on manufacturing products with weak product design and R&D capabilities: for example, shellfish (such as mussels, sacks, and sea urchins) sell raw materials directly without design and post-processing, so it is difficult to buy them again. Secondly, we can’t see the combination of products and modern design concepts. We lack creativity and can’t keep up with the trend. Another example is cut coconut products on the market (Lelieveld et al. 2012). Although the shape of the product has been greatly improved, it is basically made of coconut shell. Its shape is monotonous and rough, and its practicability and manufacturability are very weak, which greatly weakens the product strength. In addition, most of the coconut cutting workers are surplus rural workers, and the production process is not guaranteed, which is in sharp contrast to the coconut cutting skills of nongenetic heirs. Third, it is difficult to break through the bottleneck of technology. For example, the traditional brocade of Li nationality is complicated, handmade, with a long production cycle, high price, less audience, and low sales. However, mechanical manufacturing lost its original flavor and reduced its artistic value.

Brand image design strategy of marine crafts

Transformation of regional culture

The regional culture of H Province is relatively unique and diverse. Marine culture, Li and Miao culture, DanJia culture, festival culture, folk culture, and tropical agricultural culture are more spectacular (Lelieveld et al. 2016). The branding of tourism products can be summarized into two aspects: intangible culture and tangible culture. The first is to shape the connotation of brand culture, and the second is product development and brand visual design. A good tourism brand must “tell a story” through the stories behind it or the myths and legends expressed by craftsmen, so that tourists can better understand the cultural significance and brand value of the brand.
Refining symbolic value

People’s understanding of the brand is usually based on specific social conditions, while tourists’ understanding of the brand depends on the conditions of the tourism destination they choose. Different tourist groups have different situational experiences and emotional concentration due to different tourism products. Lovers who choose honeymoon should use sweet memories to enhance their impression of the brand. Twilight elders who choose the sunset journey must use their own ideas to improve brand memory. When travel partners choose adventure travel, it is necessary to use novelty to enhance their brand memory. By analogy, tour groups must meet the different requirements of different passengers. The tone of tourism brand must be consistent with the emotional experience of its target group and enhance brand awareness and memory.

Conclusion

This paper focuses on the relationship between the tropical Northwest Pacific and the southeastern Indian Ocean and its potential impacts. First, the key details of the tropical Northwest Pacific and the southeastern Indian Ocean are analyzed using NOAA observations from the ocean and atmosphere. Based on the two regional distribution models and their potential impacts on climate, the circulation was analyzed by linear regression. By analyzing the wavelength of the correlation index and anticorrelation index, it can be concluded that the atmospheric deviation of the two regions is closely related to the ENSO and IOD of phase configuration. Finally, it analyzes the changes of convective activities in the tropical Northwest Pacific and Southeast Indian Ocean over the past decades.

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Declarations

Conflict of interest The authors declare no competing interests.

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