Mountain atmospheric characteristics based on 5G big data and Yunnan minority pattern design

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Abstract
With the constantly updated new technologies and application software and the 5G big data era that is gradually moving to the market, big data as a modern technological resource has gradually developed in terms of conversion conditions and methods, and it is more convenient to transform from abstraction to reality, which is a mountainous atmosphere detection zone. There are new opportunities and challenges. Therefore, in the context of 5G big data, discussing how to improve the ability of mountain atmospheric observation has certain theoretical value and practical significance. The atmospheric characteristics of the mountain refer to the heat (warming) generated by the uplifted land. The altitude of the mountain/plateau changes the heat distribution pattern of the mountain and its surrounding area, and raises the internal temperature of the mountain to be higher than the surrounding open air temperature at the same altitude. Horizontal pattern is observed, thus forming a vertical pattern in which the inside of the natural area is higher than the outside. The quantification of mountain effects is the key to solving the problem of no belts in vertical mountainous areas. The country must promote its legacy and make it widely known. A basic element of modern pattern design is the pattern design of Yunnan ethnic minorities, which is a medium for expressing cultural heritage. This part of the pattern design of ethnic minorities includes profound ancient cultural and esthetic characteristics, rich in national colors. Relying on the application of Yunnan ethnic minority folk art patterns in contemporary art design, it demonstrates leading the ethnic cultural personality decoration trend, promoting the diversification of contemporary design styles, fully reflecting the natural customs and human factors and other aspects, and discussing the Yunnan ethnic folk art pattern spiritual essence. Based on the actual demands of contemporary pattern design, analyzing the actual application of Yunnan ethnic and folk art patterns plays an important role in the development of the field of Chinese art design.

Keywords 5G big data · Mountain atmosphere · Yunnan ethnic minorities · Pattern design

Introduction
Most of the frequency bands used for weather satellite data transmission use the 1 band (1670–1710 MHz), which is the frequency band allocated by the International Telecommunication Union for weather satellites. Obviously, the 1 band no longer meets the requirements and must be increased to a higher band. Compared with the previous four generations of mobile communication technology, 5G has greatly improved and progressed. The 5G system combines a large number of wireless communication technologies and wireless air interface technologies, and has produced a great breakthrough, which includes higher bandwidth, higher speed, and stronger performance. The 5G big data is not only a specific wireless access technology, but also a revolutionary design that accompanies the development of existing wireless access technology (Meng et al. 2013). The reception of meteorological satellite data is an important link in the reception, processing, transmission, and application of satellite data (Mo et al. 2014). If high-quality data cannot be received, the data will not be processed or distributed, and users will not be able to use it. An important part of the terrestrial ecosystem is the mountains, the habitat is highly complex, and the environmental gradient is very concentrated (Ouyang et al. 2019). The horizontal information covered by the vertical slope of the mountain is usually 1000 times that of the horizontal information about ecological and geographic changes, thus forming
the vertical differentiation of the entire vegetation, soil, and natural geographic complex, forming the complexity and diversity of the ecological geographic surface composition (Paton et al. 2010). The changes in the atmospheric characteristics of the mountains caused by the rise of the mountains/plateaus are caused by the changes in the water and thermal conditions in the area, which leads to changes in vegetation and climate divisions, and affects the distribution range of the main climate zones (Peng et al. 2001). Yunnan is located in the border region of southwest China. Due to its unique regional location and climatic factors, it has created unique local customs and inherited unique spiritual culture (Ramos-Vázquez and Armstrong-Altrin 2019). Of course, the patterns of Yunnan ethnic minorities embody the essence of Yunnan traditional culture. This part of the pattern design includes a series of contents, such as primitive religious beliefs, human customs, and esthetics (Ritts et al. 2001). At the same time, there are many beautiful ethnic patterns closely related to daily life in all kinds of minority art in Yunnan. One of the basic elements of minority pattern design is to extract the traditional patterns of Yunnan minority, which is the medium to express the cultural significance (Santosh 2010). This part of the pattern contains profound ancient culture and esthetic characteristics, emphasizing strong national color. Designers need to consider how to apply this part of national characteristics to pattern design (Tao 2003).

Materials and methods

Observation site location

From January to December 2019, four vertical observation experiments were carried out in the meteorological office of a certain city in a certain province (30.1 degrees north and 103.1 degrees east). These experiments are based on meteorological elements and the particle size spectrum of the atmospheric boundary layer. Figure 1 shows the topography near the observation point. Area C is located on the western edge of a basin, and a plateau is adjacent to a basin in the east. The altitude is about 700m. Because it is located on the edge of the basin, the population density is far less dense than that in the eastern part of the basin, and there are fewer local industrial facilities. The air quality is relatively clean.

The four observation experiments were carried out from January 2, 2019 to January 15, 2019, from April 29, 2019 to May 13, 2019, and from July 2, 2019 to July 31, 2019. Four seasons were from December 2019 to December 20, 2019. The abnormal data caused by various interference near the ground and the high wind speed in the high altitude will limit the height of the moored motorboat and thus limit the height of the data acquisition. For the unified research standard, this paper adopts the observation data of 10–1000m for analysis.

Meteorological observation method based on 5G big data

The 5G communication and remote sensing satellites that use remote sensing satellite products as the data monitoring application platform of meteorological observatories are used as the main data source, and the remote sensing parameters of the atmosphere, water, and ecological environment are inverted based on the research results (Wan et al. 2013). The various functions of the application platform are reasonably divided, and independent plug-ins are developed. The plug-ins are flexibly combined to realize the various functional modules of the system and form a multi-source remote sensing satellite environment monitoring application platform (Wang and Guo 2017). This system is mainly divided into 4 levels, as shown in Fig. 2.

Observation data preprocessing

First is quality control of all observation data. Because of the large amount of data, the Raida criterion was selected for processing. The basic idea is to use 99.7% confidence as a measurement standard. If the difference between the measured value and the average value is greater than 3 times the standard deviation, it is removed as an outlier. We use the aerosol particle number measured by the DT-9880M air quality detector to measure the particle number concentration. The formula is shows as follows:

\[
N = \frac{n}{1000q \cdot t}
\]

In the formula, \(N\) represents the concentration of the number of particles, in units of \(\text{cm}^{-3}\), \(n\) represents the number of particles, in units, \(q\) represents the sampling flow, in units of \(\text{L} \cdot \text{min}^{-1}\), and \(t\) represents the single sampling time, in units of s.
We use this formula to calculate the particle number concentration.
This paper uses the Geographically Weighted Regression Model (GWR) to estimate the temperature of the Qinba Mountains. GWR is a regional regression method that can be used to examine the instantaneous relationship between the dependent variable and the explanatory variable. GWR adds the geographic location of the data to the regression parameters. The relationship between the dependent variable and the explanatory variable is shown below:

\[ Y_i = \beta_0(u_i,v_i) + \sum_{k=1}^{p} \beta_k(u_i,v_i)x_{ik} + \varepsilon_i \]  

The regression coefficient of the independent variable in the formula is obtained according to the following formula:

\[ \hat{\beta}(u_i,v_i) = \left( X^T(W(u_i,v_i)X) \right)^{-1} X^T W(u_i,v_i) Y \]  

In the formula, \( B(u_i,v_i) \) is the local coefficient of \( i \) point, and \( W(u_i,v_i) \) is the weight matrix. Spatial weighting functions include Gaussian functions and bi-square functions. This research is expressed by Gaussian function:

\[ W_{ij} = \exp \left[ -\left( \frac{d_{ij}}{b} \right)^2 \right] \]  

In the formula, \( b \) is the bandwidth (window size), and \( d_{ij} \) is the distance between the sampling points \( i \) and \( j \).

In this article, we refer to the research method of converting temperature to the same altitude to estimate the temperature difference between the inside and outside of the Qinba Mountains at the same altitude, and convert the monthly temperature to the same altitude of 1500 m, as shown below:

\[ T_{ah} = T_a + \left( \text{elevation} - h \right) \times \partial \]  

In the formula, \( h \) is the specified altitude, which is set to 1500m in this study; \( T_{ah} \) is the temperature at altitude \( h \), and \( T_a \) is the actual.

In the international temperature, \( \partial \) is the vertical decline rate of the temperature.

The method of calculating total solar radiation is based on the method of Rich et al. and further developed by Fu and Rich. The ArcGIS solar analysis tool calculates the solar radiation of a fixed point or area, calculates the total solar radiation, the formula of direct solar radiation, and scattered solar radiation as follows:
Global_{tot} = \text{Dir}_{tot} + \text{Dif}_{tot}  \quad (6)

Global_{tot} \text{ is the total solar radiation, Dir}_{tot} \text{ is the direct radiation, and Dif}_{tot} \text{ is the scattered radiation.}

\text{Dir}_{tot} = \sum \text{Dir}_{\theta,\alpha}  \quad (7)

The direct radiation in the solar graph sector (\text{Dir}_{\theta}) is as follows:

\text{Dir}_{\theta,\alpha} = S_{\text{const}} \cdot \beta_{m} \cdot \text{SunDur}_{\theta,\alpha} \cdot \text{SunGap}_{\theta,\alpha} \cdot \cos(\text{AngIn}_{\theta,\alpha})  \quad (8)

Among them, \(S_{\text{const}}\) is the solar constant 1367 W/m\(^2\); \(\beta\) is the atmospheric transmittance of the shortest path; \(\text{SunDur}_{\theta,\alpha}\) is the duration expressed in sky sectors.

Results

Circulation characteristics of mountain valleys

During the field observation period in 2019, the temperature, humidity, and wind speed are shown in Fig. 3. The average daily temperature change in the four seasons in C area is between 0 and 37.5°C, and the average temperature in winter, spring, summer, and autumn is 6.4°C, 19.5°C, 26.5°C, and 7.4°C respectively. The relative humidity range is 24%–100%, and the average relative humidity in winter, spring, summer, and autumn is 85.2%, 72.2%, 76.4%, and 82.2% respectively. The wind speed range is 0–5 m\(\cdot\)s\(^{-1}\). The average wind speed in winter, spring, summer, and autumn is 0.9 m\(\cdot\)s\(^{-1}\), 1.4 m\(\cdot\)s\(^{-1}\), 1.4 m\(\cdot\)s\(^{-1}\), respectively, 1.0 m\(\cdot\)s\(^{-1}\); C temperature and wind speed showed a trend of low in autumn and winter, and high in spring and summer, and relative humidity showed a trend of high in autumn and winter and low in spring and summer, but both were above 70%. O\(_3\) is the main air pollutant in summer. The average O\(_3\) value is 132.6 \(\mu\)g\(\cdot\)m\(^{-3}\). There are fewer pollution days in spring and autumn. The representative city of Chengdu in the basin during the same time period has an average PM2.5 value of 130.9 \(\mu\)g\(\cdot\)m\(^{-3}\) in winter and an average O3 value in summer. It is 178.8 \(\mu\)g\(\cdot\)m\(^{-3}\), which shows that the air quality in the western marginal area of a basin (C area) in 2019 is lighter than that of the cities in a basin.

According to the principle of judgment of the above-mentioned mountain cereagance, the seasonal characteristics of the C-valley wind under the observation time period, as shown in Table 1, in 2019 Co-regional Valley Wind Excellent Frequency are Summer> Winter> Autumn> Spring. At 12 o’clock valley, the mountain wind happened at 22:00 — the next day 10, from the valley wind, and for the wind speed in the summer, the summer grain wind speed is 1.9 m\(\cdot\)s\(^{-1}\), and the mountain wind average is 1.2 m\(\cdot\)s\(^{-1}\); mountain valley is the smallest, the grain wind speed is 1.2 m\(\cdot\)s\(^{-1}\), and the mountain wind is 0.2 m\(\cdot\)s\(^{-1}\); the spring and autumn season cereal is 1.8 m\(\cdot\)s\(^{-1}\), mountain wind the average is 0.8 m\(\cdot\)s\(^{-1}\), which is due to the strong sun radiation in summer, leading to the wind speed of the valley; the solar radiation in the winter is the weakest, and the heat difference between the mountain bodies is small, leading to the mountain valley.

Taking 2019011314 and 2019011402 as winter valley wind and mountain wind, 2019051217 and 2019051302 as spring valley wind and mountain wind, 2019071114 and 2019071202 as summer valley wind and mountain wind, 2019121814 and 2019121823 as autumn valley wind and mountain wind, the vertical structure characteristics of local wind field under the influence of valley wind in different seasons are analyzed. Among them, there is lack of data at 200-300m in spring. The result is shown in Figs. 4, 5.
local wind speed of each season is increased at a high level, and there is a raised peak in 300m or less, and the high temperature is attenuated. It is particularly obvious at night (there are many days in autumn and more than 500M). The wind speed is extremely resistant to the rod possibly due to the maximum impact of spring and summer, and its effect to the valley is wide, and the impact of the local wind field is more intense. Under the influence of the valley wind, the vertical structure of the local wind field appears similar to the loss of the atmospheric boundary layer low-altitude rapid flow.

We choose a typical valley wind in July 10–11, 2019, which was produced from 10th, 15:5, showing 15 PM2.5 concentrations of 17.9μg·m⁻³, and the cereal circulation is produced. The ground PM2.5 concentration was converted from the original decline to an upward trend until 4 h after the end of the cereals, and PM2.5 stopped. The mountain wind circulation at night begins at 11 months, ending from 10, accompanied by PM2.5 concentration from 38.9μg·m⁻³ to a continuous decline. O₃ concentration exhibits a similar trend, and the concentration of atmospheric pollutants is only determined by the turbulent diffusion and the wind flow.

We choose this data analysis of July 09–10, 2019. Under the conditions of the valley wind, the time, and space changes of the atmospheric pollutants in the western region of a basin, as shown in Fig. 6, the PM2.5 quality concentration has almost no change in the afternoon and reduced at night possibly due to the high reduction of the night boundary layer, and the PM2.5 is slightly increased after sunrise, indicating that the O₃ concentration remains unchanged from the night to 10 days of 09, as shown in the O₃ concentration vertical structure in Fig. 6. The same variation is not large, indicating that the C region has weaker O₃ spatiotemporal changes under no valley wind circulation at night begins at 11 months, ending from 10, accompanied by PM2.5 concentration from 38.9μg·m⁻³ to a continuous decline. O₃ concentration exhibits a similar trend, and the concentration of atmospheric pollutants is only determined by the turbulent diffusion and the wind flow.

**Table 1** Statistics on the appearance of the four season valley wind

| Season   | Winter     | Spring     | Summer     | Autumn     |
|----------|------------|------------|------------|------------|
| Dates    | 20190102–20190115 | 20190429–20190513 | 20190702–20190731 | 20191212–20191220 |
| Cereal   | 011312–011318 | 051215–051219 | 071015–071019 | 121814–121818 |
| Mountain wind | 011414–011417 | 07114–071119 | 073015–073019 | 121822–121902 |
| Average wind speed | 1.2 | 1.8 | 1.9 | 1.7 |
| Frequency | 2/(14–7) | 1/(15–9) | 3/(30–24) | 0/(4–4) |
| Mountain wind | 011400–011405 | 051300–051304 | 071100–071110 | 071208 |
| Average wind speed | 0.4 | 0.8 | 1.2 | 0.8 |
| Frequency | 2/(14–7) | 1/(15–9) | 3/(30–24) | 0/(4–4) |

![Fig. 4](image-url) Four seasons in 2019 represent the cereal wind, mountain wind speed vertical profile.
conditions. Overall, the air pollutant time and space structure of the C region almost did not change compared to the conditions of mountain valley.

**Low-altitude rapid flow structure of the mountain atmospheric boundary layer**

For low-altitude rapids in the atmospheric boundary layer, many scientists have different definitions and standards, as shown in Table 2. This part uses C encryption to explore the observation data, and we intercept 10–1000m part of the data to analyze the characteristics of the low-altitude rapids of the atmospheric boundary layer in the western edge of a basin, referring to WEI, etc. For the definition of the low-altitude rapids of the atmospheric boundary layer, considering the special terrain of a basin, this section reduces the atmospheric boundary layer of WEI or the like to 5m·s\(^{-1}\), and if there is more than 5m·s\(^{-1}\) wind, the \(V_{\text{max}}\) has a high degree of wind speed attenuation to 3m·s\(^{-1}\). \(V_{\text{max}}=2V_{\text{min}}\), the process is defined as a low-altitude rapid flow of atmospheric boundary layers, and this paper selects data with the largest air speed to perform the analysis.

The wind speed observation data in each season is given averaged feature characteristics, as shown in Fig. 7, and different heights are discovered in the atmospheric boundary layer in the four seasons in the air velocity zone, and there is winter wind in winter. At 02-08, the altitude is 100–300 m; spring appears at 02-08, 14–17 h, at night, the highest wind speed is 02, 14, 14, about 100–300 m high; when winter appears at 06-08 and 23, the height is 100–300m. Comprehensive view reveals that the wind speed in the boundary in the C region appears at night, but is also happening during the days 14–17.

Counting all atmospheric boundary layer low-altitude rapids in the high-altitude, wind speed, and wind discovery (Fig. 8), the low-air rapids at the atmospheric boundary layer
in the C area mainly appear at 100–500m height, especially 100–300m, 500m or more in the atmosphere. The boundary layer low-altitude rapids have a lower frequency, the maximum height occurs in the summer, the height is 637m, and the minimum height of 75m also appeared in the summer. Atmospheric boundary layer low-altitude rapid flow rate is mainly distributed at 5–8m·s⁻¹, especially in 5–7 m·s⁻¹, and the maximum wind speed appears in winter, 9.6 m·s⁻¹.

Choosing the process of April 30, 2019 as an example to analyze the daily variation characteristics of the atmospheric boundary layer low-altitude rapids in the western region of a basin, as shown in Fig. 9, starting from 14 months, low-altitude wind speed begins to increase at 17, the peak appeared in the 200–400m height range, the wind speed reached 6 m·s⁻¹, and then slightly reduced, weakened at 2 h, the wind speed decreased to 4 m·s⁻¹, the wind speed continued to increase at 05 h, and the rapids disappeared at 08 h. Guessing this typical atmospheric boundary layer low-altitude rapid flow is a common role in the two rapids. Under the influence of the mountain terrain in the afternoon, the sun heating ground causes the temperature gradient of the hillside and the basin, which further leads to changes in the air pressure.

| Author     | Wind speed standard                                      | High standard |
|------------|----------------------------------------------------------|---------------|
| Blackadar(1957) | The very high wind speed is 2.5 m·s⁻¹ or more        | No            |
| Bonner(1968)  | The wind speed is 6 m·s⁻¹ or more, and it is greater than 12 m·s⁻¹ | 1.5km         |
| Stull(2012)   | The great value of 2 m·s⁻¹ is larger than the upper wind speed | 1.5km         |
| Wei(2013)     | max\(\geq 6\) m·s⁻¹, 2km range wind speed attenuation \(\geq 3\) m·s⁻¹ | 2km           |

Fig. 7 The average wind speed of each time in the four seasons in 2019 changing with high changes
gradient, thereby producing the airflow similar to the mountain valley, accelerating the local airflow caused by the low-altitude rapids of the atmospheric boundary layer. In addition, the slope terrain is conducive to the formation and development of the rapids and the obstruction of the mountain. The ramp thermodynamation increases the amplitude of the rapids. After the atmospheric boundary layer of the night is stable, the turbulence is rapidly weakened, and CCHE induced inertial oscillations thus causing the formation of the atmospheric boundary layer low-altitude rapids.

As for the atmospheric boundary layer structure characteristics of the typical atmospheric boundary layer low-level jet, due to the high low-level wind speed at 17:00, the tethered motorboat observation failed to reach the height above 500 m. Therefore, the atmospheric boundary layer structure characteristics of the atmospheric boundary layer low-level jet at night are mainly analyzed. We take 05:00 on May 1, 2019 as an example, as shown in Fig. 10.
We choose an atmospheric boundary layer with severe contaminated atmospheric boundary layer with severe pollution (Fig. 11), starting from January 4. January 04 has exceeded 250 μg·m⁻³. At 18 o’clock on January 04, the peak was reached, and then decreased to 16 o’clock until 16:00 on January 05, the second peak was reached on January 05, and then decreased until January 06 at 11 o’clock. Combined with the wind speed filling map, it was found that the C region had two atmospheric boundary layer low-altitude rapids in the period of time, once in 02, 02-02, at once, the height is approximately 300m; the second appearance is on January 06 at 11 o’clock-17, and the height is about 400m. In general, the wind speed has a large corresponding pollution, which corresponds to the first atmospheric boundary layer low-altitude rapids, but the second atmospheric boundary layer low-altitude emergency process has a significant increase in PM2.5 concentration. This section is targeted as two atmospheric boundary layer low-altitude rapids, combined with the concentration of atmospheric pollutant concentration encrypted with vertical observation data.

The first atmospheric boundary layer low-altitude emergency process has a range of approximately 600m height from the ground (Fig. 12), which is a night rapid flow, and the rapids appear at 300m left and right heights, the most stronger in 02-08-08.

Observing the second atmospheric boundary layer low-altitude emergency process (Fig. 13) reveals a daily rushing process, affecting the entire atmospheric boundary layer. In addition, the time point of the wind speed increases, and the time point of the PM2.5 concentration began to increase at 11 o’clock. When the wind speed reduces timing (17 o’clock) at the time of the PM2.5 concentration, the PM2.5 mass concentration continues to 155 μg·m⁻³ at 11 o’clock at 111 μg·m⁻³.

Based on the analysis of the low-altitude rapids of the two atmospheric boundary layers, the effects of low-altitude rapids on the two atmospheric boundary layers on the air pollutants are extremely different. In order to remove local atmospheric pollutants, we purify the air quality, then wrap the particles to the local distance, and aggravate the local atmospheric pollution, in order to analyze the effects of specific atmospheric boundary layer low-altitude rapids on atmospheric pollutants in C region by using encrypted sparking weather data to draw the following wind to vertical profile (Fig. 14), West Wind, and Dongfeng. The determination is consistent with the valley

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Fig. 11 (a) Changes in the wind speed of PM2.5 and (b) during the atmospheric pollution of January 04, 2019

Fig. 12 Number of particulate matter concentrations of different particle size sections in different particle size sections in different size particles
festival, stipulating 45–135° to Dongfeng, and 225–315° for the western wind.

Analysis of atmospheric boundary layer structure under mountain terrain

This part uses WRF-Chem3.8.1, selects different boundary layer parameterization schemes, simulates the low-altitude process of the atmospheric boundary layer under different atmospheric pollutions, and the corresponding settings are as follows: mode uses two nested layers, the nested area is shown below (Fig. 15).

It can be found from the observational data (Fig. 16): From 23:00 on January 4th to 14:00 on January 5th, 2019, the PM2.5 concentration in area C showed an overall downward trend, from 195 μg·m⁻³ to 112 μg·m⁻³. It rose slightly at 14 o’clock. With 02, 02, at 02, the largest air boundary layer with a maximum wind speed of 6 m s⁻¹ at a high level of air boundary layer in low-altitude rapids.

So we use WRF-CHEM mode to carry out simulation research, and the simulation time period is 08:00 on January 02, 2019, 08:00, 08:00, 08, as preheat. The preliminary air pollutant is PM2.5, so PM2.5 is used as the main atmospheric pollutant to compare the simulation effect, and the weather data of the automatic weather station and the main contaminant data of the National Environmental Monitoring Station can be found in Fig. 17. Temperature, wind speed, and PM2.5 have basically reached 0.8, 0.2, 0.5 or more, and all over 90% of the significant test, but there is a significant overestimation of the simulation of wind speed and PM2.5. The simulation is underestimated.

We choose a low-altitude rapid of the atmospheric boundary layer with moderate atmospheric pollution on January 15, 2019. From the observation data (Fig. 18), starting at 14 o’clock on January 15th, the C region PM2.5 concentration continued to rise to 173 μg·m⁻³ after 0 January 16, and started to decline.

From the simulation results of different boundary layer regimens (Fig. 19), three schemes are substantially close to the concentration of 2M temperature, 10m wind speed, and ground PM2.5, and the relevant coefficients are basically 0.9, 0.3, and 0.7. The above results show all over 90% of the significant test. The temperature trend is almost entirely, and the wind speed is fast, where MYJ is more serious about the simulation of nighttime wind speed, and the wind direction trend is basically simulated, and the simulation of PM2.5 concentration is slightly higher than the observation value.
We choose a low-altitude of the atmospheric boundary layer of the air quality on July 17, 2019. From the observation data, it can be found (Fig. 20) that starting from 07, 08, the wind speed began to increase, and the atmospheric boundary layer is low. The rapid flow, the height of the acute flow shaft, is 136m, the maximum wind speed is 6.3 m·s$^{-1}$, and the wind direction is toward Dongfeng, because the atmospheric boundary layer low-altitude rapids occurred in the afternoon. In order to facilitate the discussion of the effect of low-altitude rapids in the atmospheric boundary layer on atmospheric pollutants, we avoid the error of the O3 concentration rising due to the photochemical reaction-generating mechanism, using PM2.5 as atmospheric contaminants, with the PM2.5 concentration rising from 08, 18 o’clock begins to decline.

In order to facilitate the discussion of the effect of low-altitude rapids in the atmospheric boundary layer on atmospheric pollutants, we avoid the error of the O3 concentration rising due to the photochemical reaction-generating mechanism, using PM2.5 as atmospheric contaminants, with the PM2.5 concentration rising from 08, 18 o’clock begins to decline.

First, the simulation effect of the three boundary layers (Fig. 21), the 2M temperature, 10m wind speed, and the ground PM2.5 concentration correlation of the three programs, and the temperature and wind speed ratio observable results are achieved, respectively. Ultrafield, PM2.5 is basically an accurate simulation, which is slightly overestimated at night and July 17th, and the wind direction simulation is basically consistent with the observation wind direction.

**Analysis of estimation and radiation effect of mountain temperature**

The results of the monthly GWR regression analysis (Table 3) show that the GWR model can significantly improve the estimation accuracy of monthly average temperature.

As shown in Table 4, the local determination coefficient (Localr$^2$) of the Qinba Mountain area (LocalR$^2$) is from 0.61 to 0.97, and the residual error of each point is $-3.85$–$5.16^\circ$C, and the residual error in each month is $-1.2$–$1.2^\circ$C stage ratio exceeding 80%, while the stage proportion of stage $-2$–$2^\circ$ C exceeds 94%.

According to the results of the relevant analysis (Table 5), the A and B have different relationships with the high level of the mountain base surface, and the high level of the mountain base surface and the constant green leaf broad-leaved hybrid forest belt distribution are constantly negative ($-0.459$). Relatedly, the base height of the B region is constant in a positive correlation between the distribution of the evergreen

![Fig. 16](image1.png)  
**Fig. 16** Heavy PM2.5 contamination level lower boundary layer (a) PM2.5 concentration and (b) atmospheric boundary layer low-altitude rapid current change

![Fig. 17](image2.png)  
**Fig. 17** Monogram at severe PM2.5 contamination level simulation wind speed structure
leaf broadleaf mixed forest belt (0.516), but it is not significant.

According to the constant green leaf gap-mixed forest belt upper and growth seasons with sea level, the annual relationship between the annual temperature (Table 6), the A and B often green leaf broad-leaved mixed forest belt upper limit is determined and equipped with altitude temperature. Among them, the A region is more significant, with the relevance of the growth season altitude temperature of $-0.716$ ($P < 0.05$), and the annual correlation with the altitude temperature is $-0.738$ ($P < 0.01$), and B correlation is not significant. The correlation with the same altitude at the same altitude is $-0.298$, and the annual correlation with the altitude temperature is $-0.043$.

The relationship between the total radiation of the Qinba Mountain growth season on the upper limit of the constant green leaf broadleaf-mixed forest belt is shown in Table 7, and the relationship between the upper limit of the A and B often green leaves and the total amount of sun radiation is not significant.

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Fig. 18  Medium PM2.5 contamination level of the boundary layer PM2.5 concentration and atmospheric boundary layer low-altitude rapids

Fig. 19  Mid-range PM2.5 contamination level is more than the analog wind speed structure
Discussion

Elemental analysis of Yunnan minority pattern

One of the most common decorative patterns in China is a single pattern, as shown in Fig. 22. It does not have an external contour or bone limit, which can be processed separately and freely.

As a basic form, the pattern is not directly related to the other surrounding modes. It can be used as a single decorative or continuous pattern cell pattern. For example, two consecutive patterns often use two consecutive patterns, as shown in Fig. 23. Traf and latitude rotating textile formation were determined to greatly improve production efficiency and save time and money.

There are many ethnic minorities in Yunnan, and the visual symbols they create are varied, with unique artistic imagina-
tion and rich national style. Its theme is wide, with geometric graphics, floral plants, birds and beasts, religious beliefs, ethnic totems, etc. For example, the peacock symbolizes the rich and auspicious, and the white elephant is a Buddhist beast. The two often appear in the decorative patterns. The butterfly pattern is the meaning of Ding Xingwang (Fig. 24).

Another example is the Phoenix of the Zhuang, the peacock of the Yi people (see Fig. 25), and the Miao’s brocious. They are all graphic symbols with special semantics. In addition, in the tribes of different races, the snake has a special location as an important image of animal worship, which is the predecessor of Totem “Dragon”.

At the same time, the preferences of each nation vary in colors. The Yi people like mineralization, jujube red, purple yellow green, as shown in Fig. 26.

The Yi people have a good use of cyan, white as a headker; Naxi people worship black and white (see Fig. 27). Therefore, in a minority, color is not only a visual language, but also a system symbol that delivers information.

### Table 3

| Statistical indicator | January | February | March | April | May | June | July | August | September | October | November | December |
|-----------------------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|-----------|---------|
| $R^2$                 | 0.91    | 0.89     | 0.91  | 0.94  | 0.95 | 0.96 | 0.96 | 0.95   | 0.95      | 0.94    | 0.92      |
| Adj $R^2$             | 0.89    | 0.87     | 0.88  | 0.92  | 0.94 | 0.95 | 0.95 | 0.94   | 0.94      | 0.93    | 0.90      |
| RMSE (°C)             | 0.98    | 0.94     | 0.92  | 0.76  | 0.71 | 0.68 | 0.71 | 0.68   | 0.72      | 0.78    | 0.95      |
| AICc                  | 371.91  | 355.70   | 352.85| 313.12| 298.22| 295.11| 287.10| 296.81  | 286.18    | 299.42  | 317.24    |

### Table 4

| Month | Residue | $-1.2$ to $1.2$ °C station proportion/% | $-2$ to $2$ °C station proportion/% | Local decision coefficient | Local $R^2$ |
|-------|---------|----------------------------------------|-------------------------------------|---------------------------|-------------|
|       | Range/°C |                                       |                                     |                           |             |
| 1     | $-3.77$–$2.90$ | 80.51                                    | 96.61                               | 0.67–0.93                |             |
| 2     | $-3.41$–$3.37$ | 87.29                                    | 96.61                               | 0.61–0.94                |             |
| 3     | $-3.85$–$4.02$ | 88.14                                    | 97.46                               | 0.63–0.96                |             |
| 4     | $-2.85$–$3.50$ | 92.37                                    | 98.31                               | 0.72–0.95                |             |
| 5     | $-2.08$–$3.91$ | 93.22                                    | 98.31                               | 0.81–0.95                |             |
| 6     | $-1.55$–$3.52$ | 89.83                                    | 99.15                               | 0.81–0.95                |             |
| 7     | $-1.59$–$3.45$ | 88.98                                    | 99.15                               | 0.78–0.97                |             |
| 8     | $-2.75$–$5.16$ | 94.07                                    | 98.31                               | 0.78–0.97                |             |
| 9     | $-1.77$–$2.60$ | 93.22                                    | 98.31                               | 0.78–0.97                |             |
| 10    | $-2.79$–$2.33$ | 91.53                                    | 98.31                               | 0.78–0.96                |             |
| 11    | $-2.32$–$3.38$ | 88.98                                    | 97.46                               | 0.79–0.95                |             |
| 12    | $-3.09$–$2.56$ | 80.51                                    | 94.07                               | 0.68–0.94                |             |

### The value of Yunnan minority pattern in contemporary art design

Studying the application of Yunnan national civil art pattern in contemporary art design, we need to find its value positioning and understand the value of using Yunnan national art pattern. The art pattern is an important carrier of Yunnan culture, which is integrated into the local culture of Yunnan with personalized humanity (Wang et al. 2001). The art pattern not only shows the local spiritual style, but also folk culture, living habits, and important educational functions. The Yunnan National Culture Source is long (Wang et al. 2012). In the process of thousands of years on the personalized living habits of the local people, the devout totem belief penetrates into a variety of art patterns, showing the beauty of Yunnan art in this unique graphic pattern (Wang et al. 2013). For example, contemporary designers use Yunnan art patterns to show a “return” beauty, driving the traditional national complex in the inner heart, summoning people’s long-term psychology, using the Ma Sakura, Dragon Tiger,
etc. Yunnan traditional nation texture gets “colorful” art effect, let traditional pattern and national cultures, and gives new connotations in the new era (Wang et al. 2017). The art pattern design promotes the development of Yunnan Tourism Cultural Creative Industry to incorporate the art pattern into the art design area, and will effectively promote the development of Yunnan economics and cultural industries. Using Yunnan national art pattern for commodity design can reflect the unique style of Yunnan national culture. Brand advantage promotes the development of Yunnan tourism industry (Wu et al. 2006). At present, there is a popular woodcut, paper-cut products of these traditional Yunnan national art patterns due to the simple style and design techniques, gaining attention of tourists around the world, and pushing Yunnan national folk culture to the world stage (Wu et al. 2006). As the Yunnan hot bed product decorated in the edge, the pattern uses a cloud pattern, and the way of embroidery is used. This reflects the colorful Yunnan style. It is both the national feelings of the designer, which also demonstrates the characteristics of local cultures (Xia et al. 2006).

### Table 5
| Vegetation band distribution upper limit (m) | Evergreen-deciduous broad-leaved mixed forest belt upper limit | Mountain deciduous broad-leaved forest belt | Mountain storm bread |
|---------------------------------------------|---------------------------------------------------------------|---------------------------------------------|----------------------|
| A                                           | B                                                             | A                                            | B                    |
| Mountain base surface height (m)             | -0.459 0.516 0.435 0.576 0.824 0.875                         |                                              |                      |

### Table 6
| Vegetation band distribution upper limit (m) | Evergreen-deciduous broad-leaved mixed forest belt upper limit | Mountain deciduous broad-leaved forest belt | Mountain storm bread |
|---------------------------------------------|---------------------------------------------------------------|---------------------------------------------|----------------------|
| A                                           | B                                                             | A                                            | B                    |

| Growth season altitude temperature (°C)     | -0.716* -0.298 0.323 -0.005 0.950** 0.722*                     |                                              |                      |
| Average annual temperature (°C)             | -0.738** -0.43 0.438 0.001 0.920** 0.758*                     |                                              |                      |

* means significant level 5%; ** means significant level 10%
used as a unique, and it is possible to fuse natural style and folk art reflecting local human factors (Xu et al. 2011).

**Innovation and inheritance of Yunnan minority pattern design under 5G technology**

The development of 5G technology has brought a new media fusion for the design. At the same time, it also has a great influence on the design of ethnic minority patterns in Yunnan. Ethnic patterns contain rich cultural factors, auspicious semantics, and esthetic images. Through 5G technology and database integration, the patterns of ethnic minorities in Yunnan are brilliant and unique. Only by summarizing and sorting out the pattern elements and colors, increase the in-depth interpretation of the cultural semantics of the patterns, paying more attention to the application of shape and color of ethnic patterns in Yunnan, continuously building a design system with unique Yunnan characteristics, and expanding the creative industry. In addition, they can be applied in modern design, selectively absorb traditional pattern elements, and constantly inherit and innovate Yunnan local traditional culture.

**Conclusion**

In this paper, the integrated monitoring and early warning system of mountain ecological environment based on 5G big data is proposed, and the overall goal and architecture of the system are described; moreover, the construction of ecological environment monitoring and early warning model, the construction of ground monitoring system based on 5G and IOT, and the construction of space air ground integrated remote sensing monitoring system and the integrated monitoring system.
and early warning system based on AI are explored (Xu et al. 2013a). And what we call the application of Yunnan national art patterns in contemporary art design is to carry forward the new design spirit of the combination of traditional art and modern art (Xu et al. 2013b). When analyzing the application of Yunnan ethnic art patterns, designers should accurately position them and carry forward the spiritual essence of Yunnan ethnic culture on the basis of inheritance (Xu et al. 2015). It is a process to realize the self-transcendence of ethnic pattern design and an innovative attempt to add traditional national spirit into contemporary art design (Yan et al. 2000).

Declarations

Conflict of interest The author declares no competing interests.

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