FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"

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Spatial Distribution Characteristics of Color Steel Plate Buildings in Lanzhou City

- Introduction
- Data and research methods
- Spatial expansion distribution of color steel plate building
- Agglomeration distribution of color steel plate building
- Conclusion

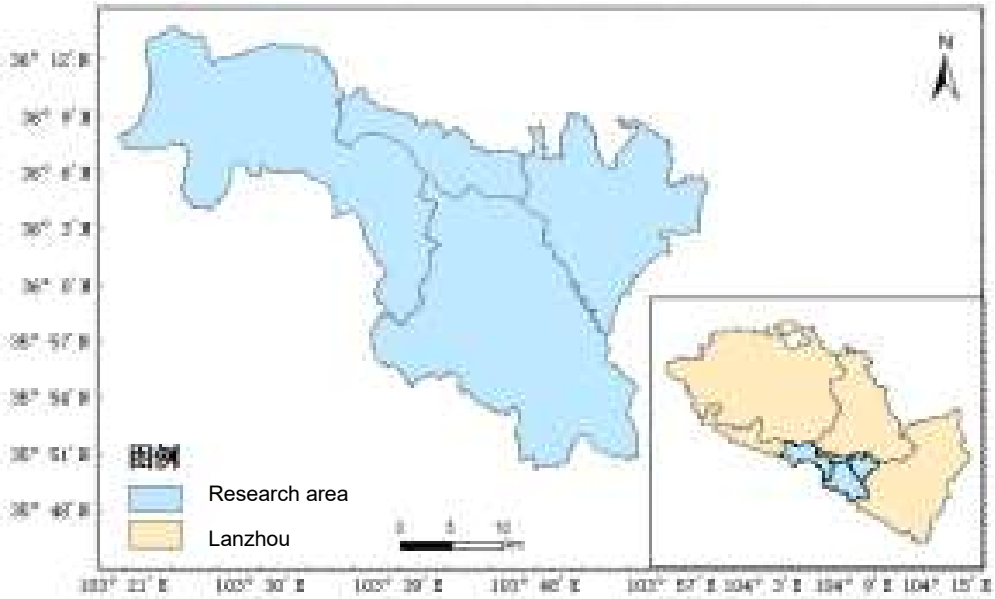
➢ Introduction

- Temporary color steel plate buildings are widely used in urban construction.

- At present, research has been conducted on the relationship between nighttime lighting, roads, green spaces, high-speed rails, and residential prices, as well as the evolution of urban spatial form, but there has not been any research related to color steel plate buildings.

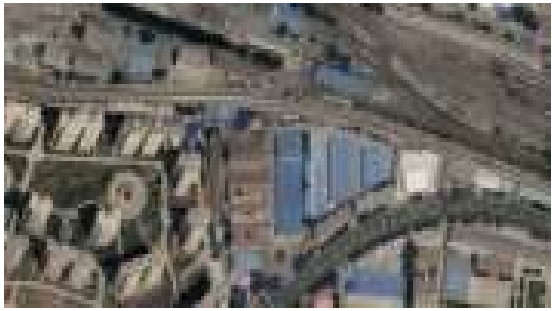
- grasping the temporary urban color steel plate building, a new urban space element, and revealing its relationship with urban development level by analyzing the spatial distribution characteristics of color steel plate building in Lanzhou.

➢ Research area



Administrative boundaries include Chengguan District, Qilihe District, Xigu District and Anning District. There are 77 street offices in the main city.

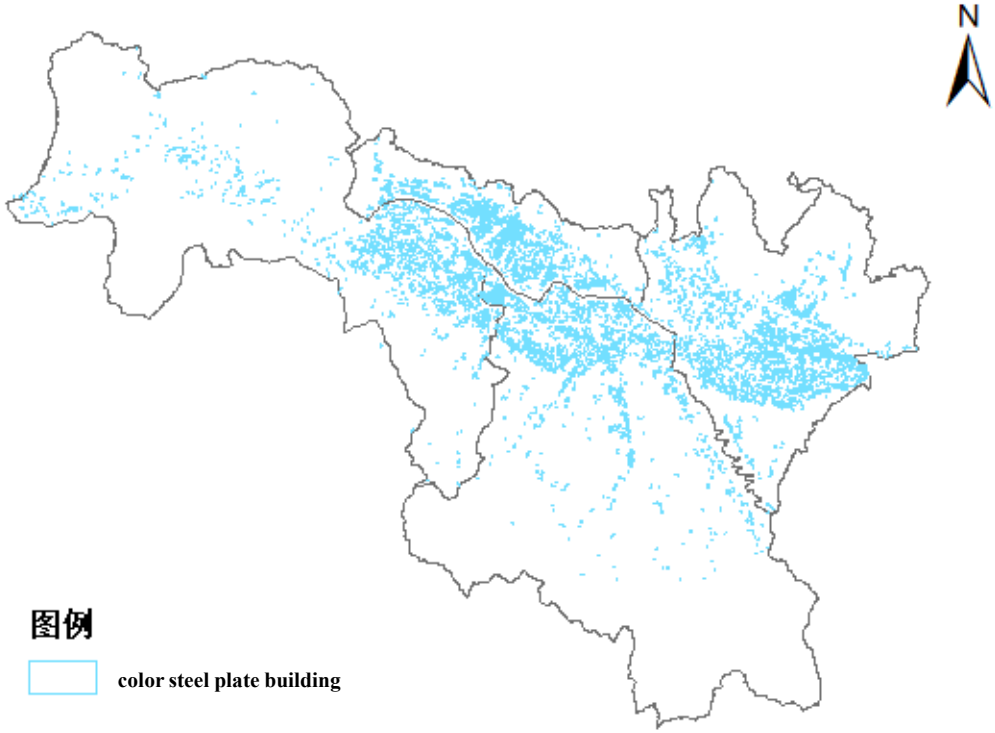
- Research area



1) Economic Development Zone 2) Urban-rural Integration 3) Chengzhong Village

Temporary color steel plate construction in different urban plots

➢ Data



Color steel plate construction extraction results

- The main data sources for this study included 2017 GF2 Fusion Images and Google Earth Images.
- According to incomplete statistics, in 2017, the number of color steel plates in the main city of Lanzhou reached 34518, accounting for 0.99% of the total area of the district.

➢ Research methods

- Buffer analysis

A buffer is a neighborhood of a given spatial object or collection. The size of the field is determined by the radius of the neighborhood or the conditions established by the buffer. So for a given object A, its buffer can be defined as:

$$P = \{x \parallel d(x, A) \leq r\}$$

Where,d generally refers to the Euclidean distance, or other distances.
r is the condition of the neighborhood radius or buffer establishment.

➢ Research methods

- Spatial autocorrelation analysis

(1)Global spatial autocorrelation

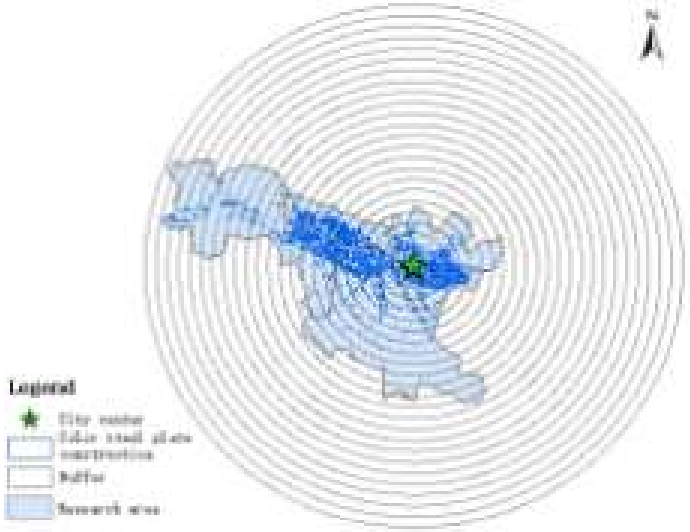
$$I = \frac{n\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

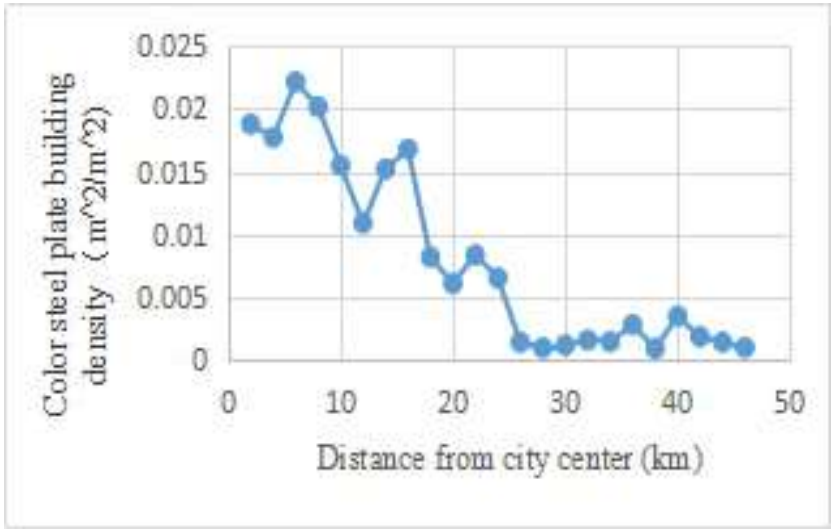
(2) Local spatial autocorrelation

$$I_i = \frac{n(x_i - \bar{x})\sum_{j} w_{ij}(x_j - \bar{x})}{\sum_{i}(x_i - \bar{x})^2}$$

Where, I is the Moran index; $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$; w_{ij} is the spatial weight.

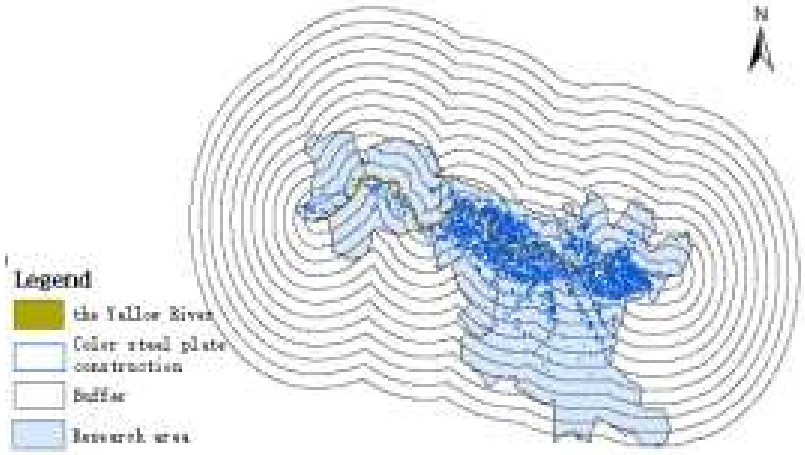
➢ Spatial expansion distribution of color steel plate building

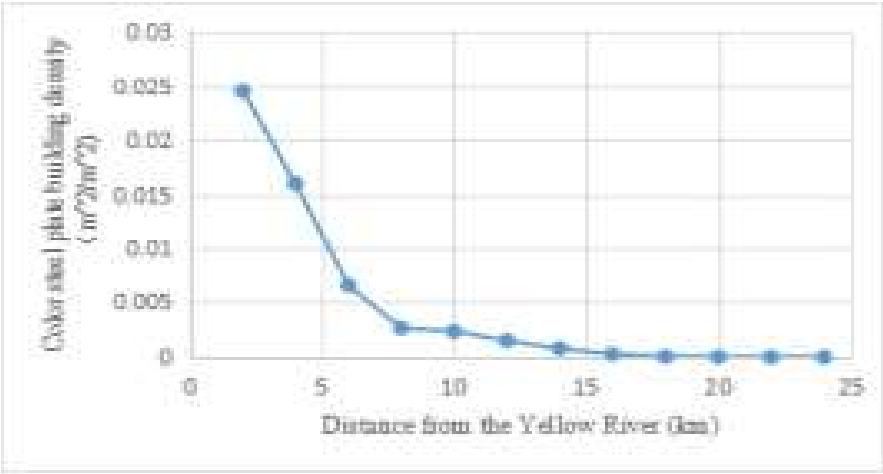




- the municipal government as the center and 2000m as the radius;
- the largest at 6km from the city center,
- at 6-12km, 16-18km, a sharp drop occurred;
- rises at 4-6km, 12-16km, and then slowly decreases from 26-46km.

➢ Spatial expansion distribution of color steel plate building





- Taking the Yellow River as the axis and 2000m as the radius;
- decreases with the distance from the Yellow River,slowly decreases from 8 km;
- there is no color steel plate construction after 20 km;
- The logarithmic model is presented, $y = -0.01\ln(x) + 0.27$ (R2 = 0.872).

➢ Agglomeration distribution of color steel plate building

Global spatial autocorrelation analysis

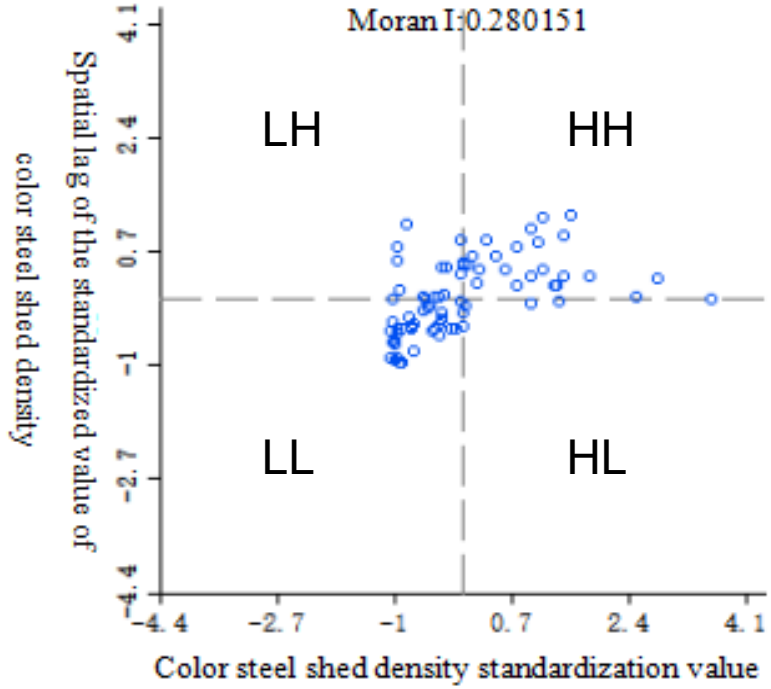
Global Moran index of building density of color steel sheds in each street and its test

Variable	I	z-score	p-value
Color steel plate buildings density	0.265458	4.030186	0.000056

I=0.265458>0, at a significant level of 0.001, z>1.96, indicating that there is a positive spatial autocorrelation between the building density of each street color steel plate

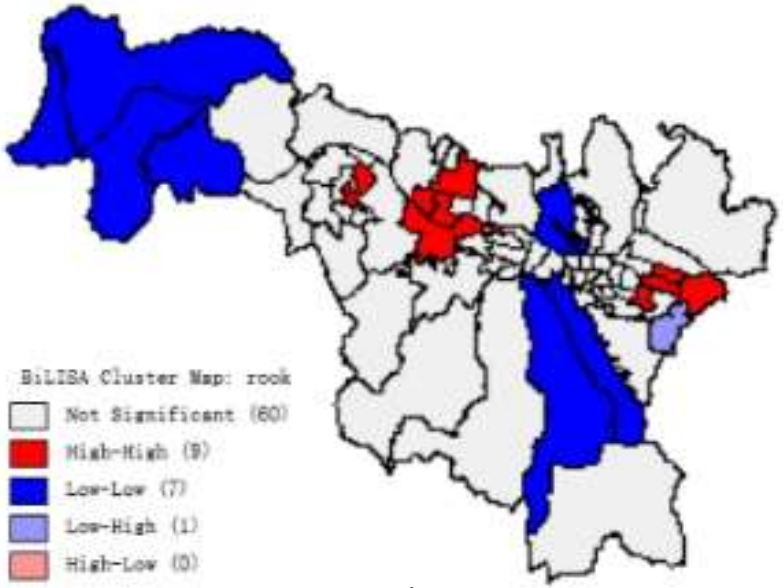
➢ Agglomeration distribution of color steel plate building

Local spatial autocorrelation analysis



- mainly the aggregation of high and high values, and the aggregation of low and low values;
- the number of "low-low" streets in the third quadrant is much larger than the number of "high-high" streets in the first quadrant;
- the low-value agglomeration has a larger number and a wider distribution than the high-value cluster.

➢ Agglomeration distribution of color steel plate building



LISA aggregation map

High-high	Low-low
Xigucheng Street	Dongchuan Town
Xiuchuan Street	New town
Jiayuguan Road Street	Dachuan Town
Gongxingdun Street	Hekou Town
Donggang Street	Weiling Township
High-tech district street	Bali Town
West Road Street	Jingyuan Road Street
Yintan Road Street	
Liujiabao Street	

- nine prominent "high-high" streets, mainly located at the junction of Anning District and Qilihe District and the southern part of Chengguan District.
- seven prominent "low-low" streets, mainly distributed in the west of Xigu District, the western part of Chengguan District and two townships in the south of Qilihe District.

Conclusion

- Using the buffer analysis, the density of the color steel plate building decreases with the distance from the Yellow River, which is in line with the logarithmic model. As the distance from the city center increases, it decreases overall.

- Spatial autocorrelation analysis is used to study the interdependence of color density of various color steel plates in various districts. It is concluded that significant "low-low" streets are mainly distributed at the junction of Anning District and Qilihe District and the southern part of Chengguan District. Significant "low-low" streets are mainly distributed in the western part of Xigu District, the western part of Chengguan District and two townships in the south of Qilihe District. The Gongxingdun Street in Chengguan District is a "low-high" type.

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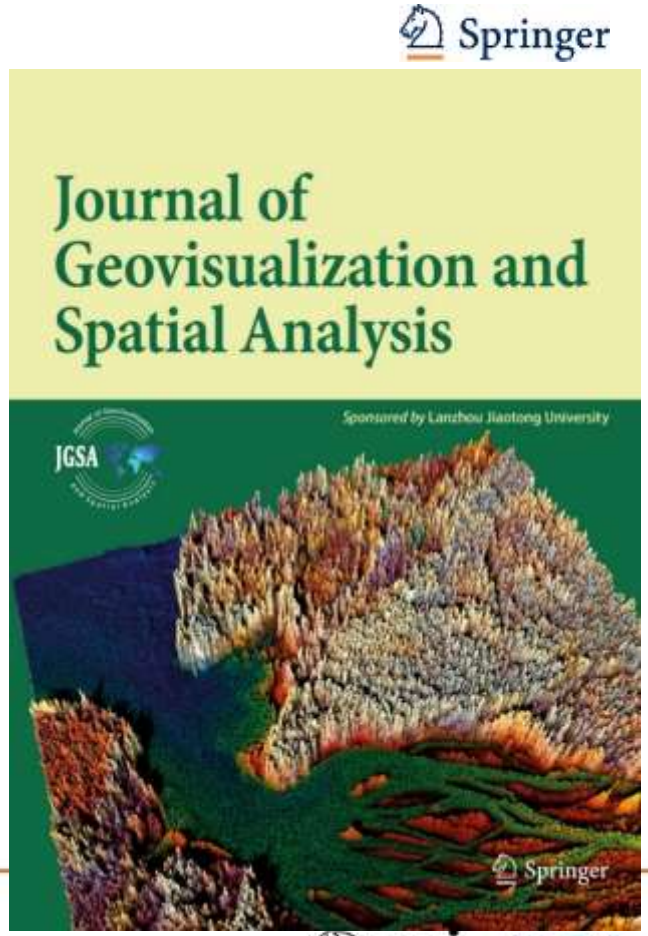
JGSA provides an advanced forum for theories and applications of geospatial analysis and visualization. The journal serves diverse fields such as cartography, geographic information science/systems, remote sensing, location-based services, photogrammetry and geology. It publishes high-quality research papers, reviews, and communications. While there is no restriction on the length of the papers, the standard length is between 3000-5000 words.



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- Find new members for the editorial board, especially the ones from the countries that no members are on the board.
- Could you please contribute papers?
- Could you please organized a special issue for the journal?

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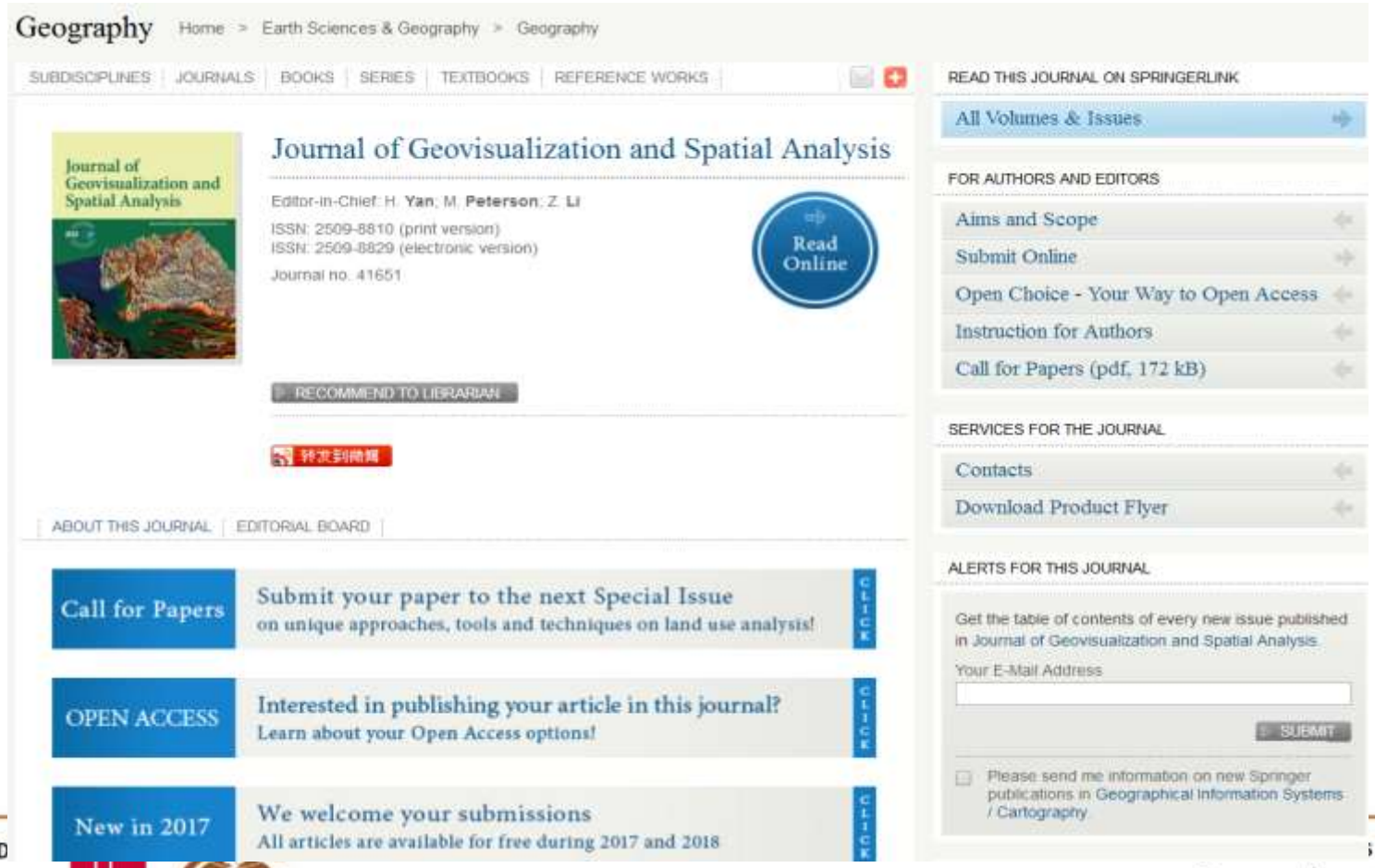

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