



**The Effect of Spatial Heterogeneity of
Environmental Factors on Species Assemblages in
temperate - subtropical ecological transition zone**

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- **Introduction**
- **Materials and Methods**
- **Results**
- **Discussion**
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Introduction:

How species coexisted in a limited space is a complicated problem, and the discussion and debate of mechanisms of species coexistence always keep going.

Developed in recent years many species coexist on the mechanisms by which niche theory, neutral theory and negative density dependence mechanisms concern.

Evaluating the relative weight of niche theory and neutral theory and even a variety of species coexistence mechanisms in the community, exploring their interaction and integrating research is the research direction and also the main research methods to deeply understand the community building mechanism.

Introduction:

● However, in the ecological transition zone between adjacent climatic species how to coexist, what kind of coexistence mechanisms plays a more important role is seldom reported.

● So, in the ecological transition zone species coexistence mechanisms conform to this conclusion?





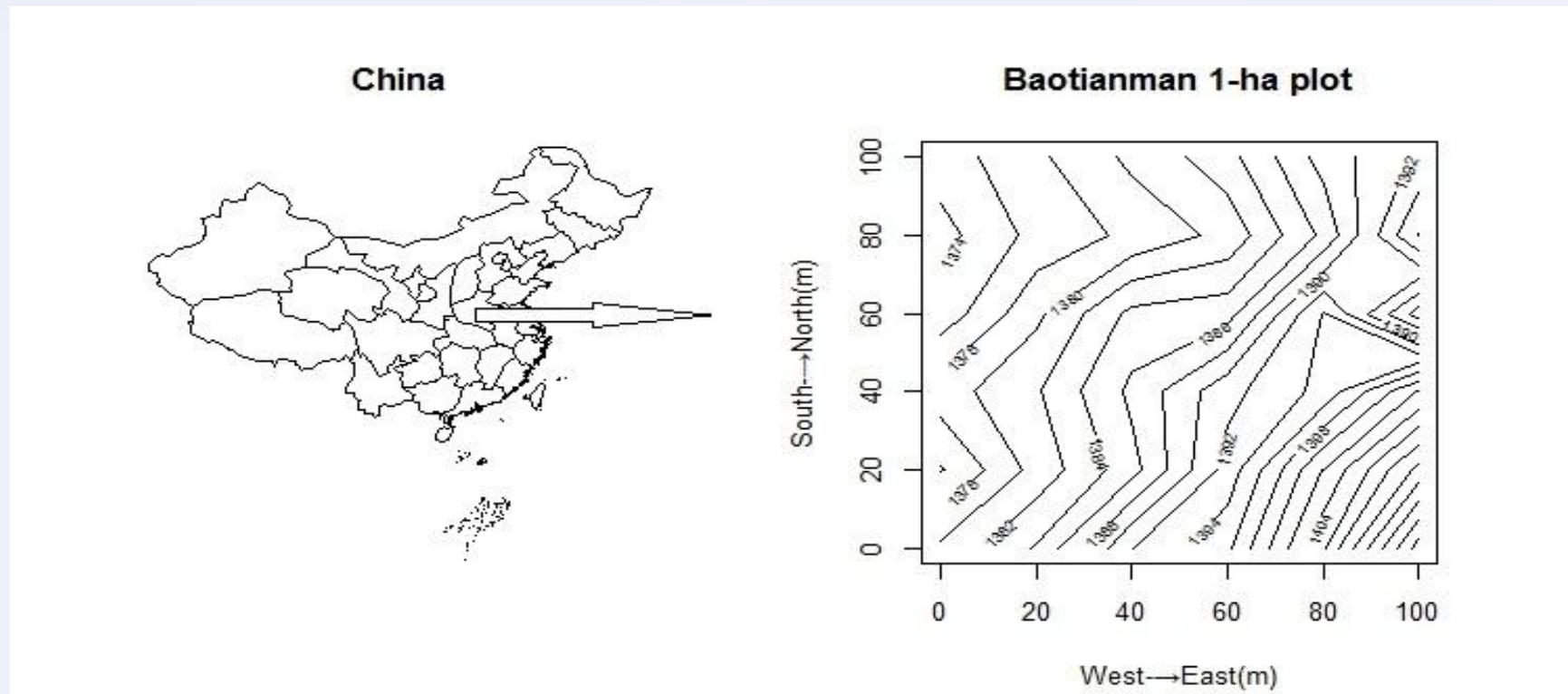
Introduction:

Focuses on the question of:

- ◆(1)The ecological transition zone spatial structure features of plant community structure;
- ◆(2)The contribution rate of spatial variables and various environmental variables on the distribution of species in ecological transition zone, to explain the distribution of species;
- ◆(3)Stand density of warm temperate - north subtropical transition zone contribution to the distribution of species?
- ◆(4)Verify the conclusions of Li Wan Chang etc. in Taiwan, and evaluate the niche theory, neutral theory and negative density dependence mechanisms on the ecological transition zone communities build process.

Materials and Methods:

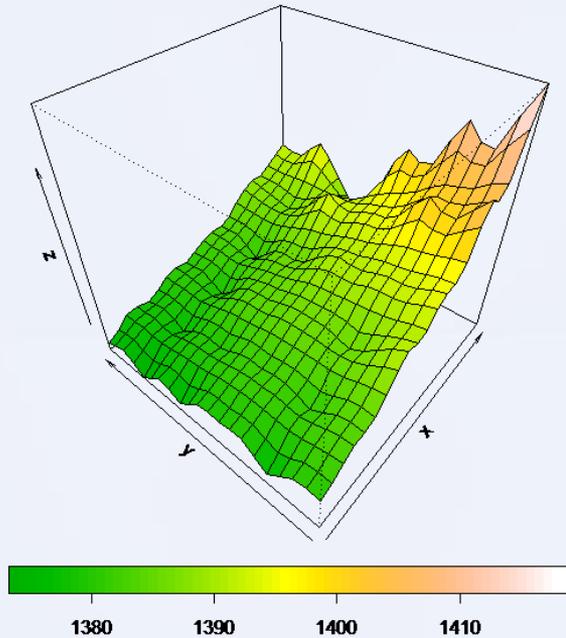
Study area



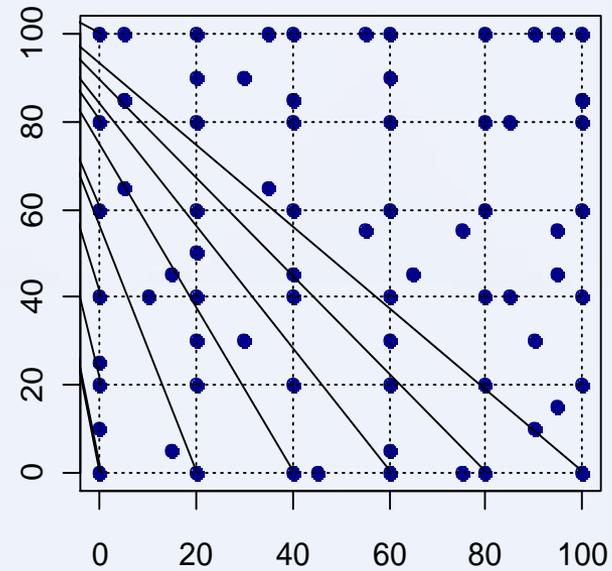
Materials and Methods:



Variable selection



Topographic map of the 1 ha Baotianman plot.



The distribution of soil points in the plot



Materials and Methods:

The spatial structure of community structure in the study area is analyzed first by the method of PCNM.

Select Diversity index, diameter at breast height, basal areas, stand density, clump fact to reflect the basic structure of the community.

The method of variance partitioning is used for analyzing contribution ratio of topography variable, soil variable and spatial variable to species distribution, discussing the mechanism of species distribution of warm temperate and subtropical transition zone;

Finally, the introduction of stand density as a variable, combined with environmental variables, spatial variables discussed the contribution of stand density to species distribution of warm temperate and subtropical transition zone.

Results

Community structure analysis



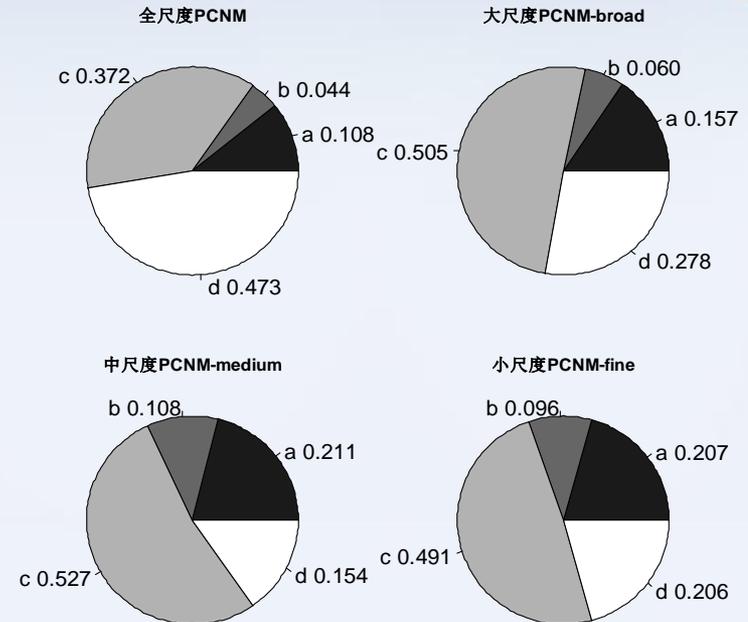
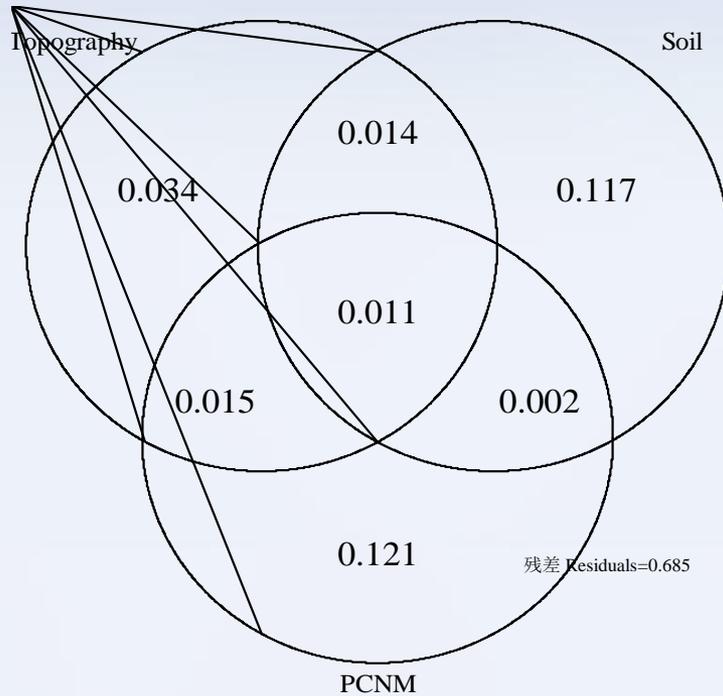
	H ²	DBH(m) ²	BA(m ²) ²	DEN ²	Clump Fact ²
Fine(<i>R</i> ²) ²	0.125 ²	0.083 ²	0.067 ²	0.167 ²	
Medium(<i>R</i> ²) ²	0.233 ²	0.082 ²	0.128 ²	0.190 ²	0.090 ²
Broad(<i>R</i> ²) ²		0.311 ²	0.192 ²	0.722 ²	0.270 ²
PCNM1 ²		0.001 ²	0.012 ²	0.016 ²	
PCNM3 ²					0.027 ²
PCNM4 ²					0.001 ²
PCNM5 ²		0.001 ²	0.023 ²		
PCNM7 ²				0.001 ²	
PCNM8 ²		0.013 ²			
PCNM9 ²		0.012 ²	0.011 ²		
PCNM10 ²		0.042 ²			
PCNM13 ²		0.003 ²	0.010 ²		
PCNM12 ²				0.021 ²	0.004 ²
PCNM18 ²					0.015 ²
PCNM21 ²		0.012 ²		0.001 ²	

PCNM24 ²		0.031 ²	0.012 ²		0.025 ²
PCNM25 ²	0.020 ²			0.008 ²	
PCNM27 ²	0.008 ²	0.036 ²	0.020 ²		
PCNM28 ²				0.019 ²	
PCNM35 ²	0.023 ²			0.024 ²	
PCNM37 ²	0.004 ²				
PCNM39 ²			0.016 ²		0.037 ²
PCNM43 ²				0.044 ²	
PCNM44 ²				0.019 ²	
PCNM45 ²	0.001 ²				0.015 ²
PCNM47 ²		0.042 ²			
PCNM49 ²				0.029 ²	
PCNM54 ²	0.011 ²				
PCNM63 ²				0.002 ²	
PCNM66 ²	0.026 ²	0.029 ²	0.010 ²		

Interpretation variance of the PCNM variables at fine, medium and broad scales. Data in the table showed *R*² of each spatial submodel and *P*-values of the regression coefficients

Results

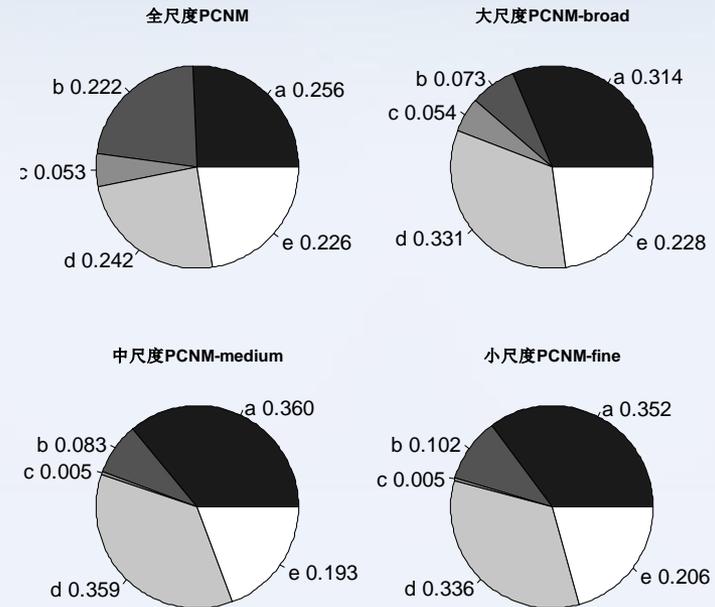
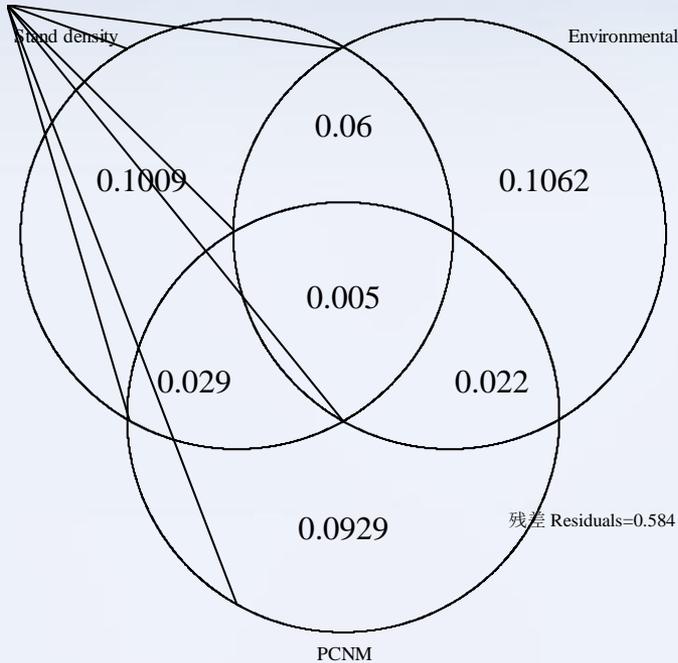
Topography, Soil and Spatial



Variation partitioning results (left) and proportion explained of the variables at different scales (right). a stands for pure topography; c stands for pure soil; b stands for shared between topography and soil but not by PCNM; d stands for PCNM

Results

Stand density



Variation partitioning results (left) and proportion explained of the variables at different scales (right). a stands for pure environmental; b stands for pure PCNM; c stands for shared between environmental and PCNM but not by stand density; d stands for pure stand density; e stands for shared with environmental, PCNM and stand density



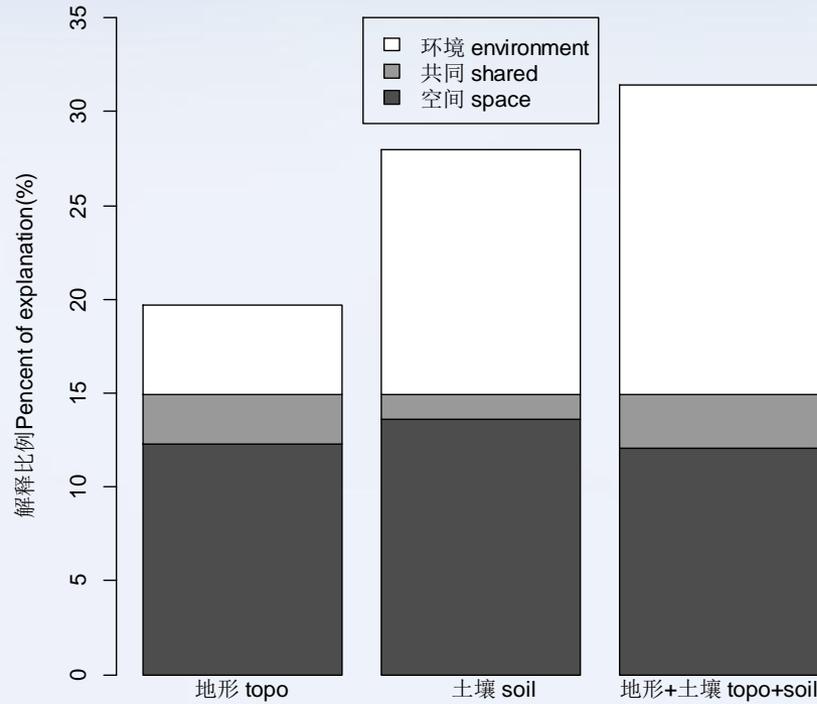
Discussion

Community structure in different scales are widespread variability, spatial factor is one of the important factors affecting community structure, at the same time also shows that the community structure on the space distribution is continuous.

Variable soil has high explain proportion, topography variables to explain ratio is low, space variables to explain the species distribution ratio is higher, at 14.9%. Species distribution significantly associated with the environment variable and influenced by environmental spatial heterogeneity effect obviously.

Density-dependent effects on species distribution pattern formation plays a very important role.

Discussion



Environmental and spatial variables to explain the species distribution (%)



➤ Conclusion

- The results show that space factor is one of the important factors affecting community structure.
- Species distribution significantly associated with the environment variable and influenced by environmental spatial heterogeneity effect obviously.
- Density-dependent effects on species distribution pattern formation plays a very important role.
- The results support the view of Li Wan Chang et al. that that different environment variables can affect the species coexistence mechanisms.

The niche theory, neutral theory and negative density dependence mechanisms have effect on the process of community building in different degrees.

第七届海峡两岸森林动态样区研讨会



Thank you very much!

