

## 青海共和盆地达连海湖泊流域表土花粉-气候响应面分析

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中文摘要: 孢粉分析是研究过去全球变化的一种重要方法, 而研究花粉与现代气候之间的相互关系是古气候定量重建研究中的前沿课题。要预测未来气候的中长期变化, 必须从花粉记录中定量提取古气候信息, 建立的多种孢粉-气候数学模型必须经过不同边界条件下的古气候数据检验校正才能应用到实际当中。花粉-气候响应面方法是考虑了花粉与气候间的非线性关系上, 提出的将现代花粉丰度在地理空间的分布转换为气候空间的分布, 并提供定量的古气候数据, 已被广泛应用于COHMAP等各种重要古气候研究项目。本文就是利用该方法, 以青藏高原东北部共和盆地达连海湖泊流域54个表土样品中的花粉丰度及采样点的气候参数为基础数据, 通过主成分分析选择了特征值高且指示意义明显的4种花粉类型, 对其丰度与7月平均温度及年平均降水量两个气候参数进行多项式回归分析, 其结果显示模型对数据拟合较好, 为定量重建该区古气候变化提出了较为准确的数量指标。

中文关键词: [达连海湖泊流域](#) [表土花粉](#) [气候](#) [响应面](#)

## Climatic Response of Vegetation Inferred from Surface Pollen from Dalianhai Lake, Gonghe Basin, Northeastern Tibetan Plateau


**Abstract:** Records from terrestrial ecosystems play a key role in the understanding of the history and the mechanisms of the past global changes. Pollen analysis is one of the best proxies for past changes in the environment. However, due to the complicated relationship between pollen dispersal process and their final accumulation in the sediment, the relationship between fossil pollen assemblages, vegetation reconstructions and climate is not linear. This is why research on surface pollen assemblages and their relationships with modern vegetation and climate provide a foundation for reconstructing paleoenvironments based on fossil pollen. In order to investigate the relationship between the surface pollen and modern vegetation, the authors analyzed a total of 54 surface pollen samples from Dalianhai Lake catchment, a typical small basin in the transition area from arid to semi-arid region, northwest China. The pollen spectra from this region serve as the direct source contributed by wind, and the corresponding relationship between the pollen assemblages of surface samples and main vegetation types is better. Hierarchical Cluster Analysis (HCA) and the RDA ordination analysis of the main herbs and shrubs pollen assemblages stored in surface samples indicate a good correspondance relationship between pollen in the sediment and main vegetation from the region. Temperature and moisture are the main factors identified to influence plant distribution. Pollen response surfaces are non-linear function describing the way in which the abundances of taxa depend on the joint effects of two or more environmental variables, which has been broadly used for studying all kinds of palaeoclimatic projects such as COHMAP. In this paper the authors also used this non-linear method to generate pollen climate-response surface models from 54 surface -pollen samples from Dalianhai Lake catchment and associated climatic parameters at sites; Four different kinds of herbs were selected by the Principle Components Analysis (PCA) with high Eigenvalue and clear indicative significance, which abundance and mean July temperature and annual precipitation were used to obtain second or third degree multiple regressions by various non-linear variable transformations to allow flexibility shapes. The abundance of each species is represented by the height (Z) of surface coordinates (X, Y) corresponding to the values of precipitation (Y) and mean July temperature (X). The results indicate that the response surface pollen typically has at least one peak, and each fitted surface is unique for estimating past climate. In this study, Artemisia- Chenopodiaceae assemblage reflects the relative wetness, while Chenopodiaceae-Artemisia reflects relatively dry conditions, Increases Cyperaceae indicates cold-wet weather, and in Poaceae reflects either cold-wet and/or warm-wet conditions, which is consistent with other research work from North China. This is the first trial to use the pollen climate response surface model to quantitative reconstruct palaeoclimate in the northeastern Tibetan Plateau. Because of the insufficient pollen data of the surface earth samples, this research work is only considered as an attempt for a quantitative reconstruction of the palaeoclimate and palaeoenvironmen.

**keywords:** [Dalianhai Lake catchment](#) [surface pollen](#) [climate](#) [response surfaces](#)

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