

On the pollen-based quantitative reconstruction of vegetation and climate using Japanese surface pollen data set.

Takeshi Nakagawa[1], Katsuya Gotanda[2], Pavel E. Tarasov[3], Yoshinori Yasuda[1]

[1] IRCJS, [2] Kyoto Univ, [3] Dept. Geogr., Moscow State Univ.

Using newly compiled surface pollen data set and improved biome model, we succeeded in quantitatively reconstructing Japanese vegetation and climate at much higher accuracy than was generally believed. We also propose a new method of error estimation for the result of pollen-based climate reconstruction. The details of the methods and the results of our trial to apply these new methods to the sediment cores from lakes Mikata and Suigetsu, Fukui Pref., Japan will be reported.

Since its invention of the method in mid-1990's, quantitative reconstruction of vegetation (biomization) and climate has been actively performed in many regions of the world (Europe and North America are the most typical). In Japan, Takahara et al. (2000) did a pioneer work of biomization and proposed paleovegetation maps for some key time slices. However, the accuracy of vegetation reconstruction has stayed relatively lower in Japan. As for pollen-based quantitative climate reconstruction, practically no attempt has been made so far.

We compiled about 300 Japanese surface pollen spectra. Using this new data set and improved biome model, we succeeded in reconstructing vegetation at the accuracy of 80 %. We then compared this surface pollen data set with Japanese meteorological data in an attempt of quantitative climate reconstruction. After trying several methods, we concluded that the best result was provided by the best-modern-analogue method based on 32 arboreal pollen taxa (not on Pfts). In case of mean annual temperature, as an example, the correlation coefficient was about 0.86.

We also propose a newly developed method of error estimation for the result of pollen-based climate reconstruction. This method allowed us to demonstrate not only error bars but also probability distribution of real climatic value.

Above mentioned methods were applied to the sediment cores from lakes Mikata and Suigetsu in an attempt to illustrate a standard history of pollen-derived vegetation and climate changes. The overall trend of curves is mostly consistent with the general standard climate changes of the northern hemisphere, but there remains minor inconsistencies including the missing of some short-term climatic events. If such difference is due to the accuracy of reconstruction or it is reflecting real history is still subject to the further discussion and checking.