

Holocene vegetation and climate changes in Northeast Greece deduced from a terrestrial pollen record

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1 INTRODUCTION & METHODS

To unravel Holocene climate setbacks in the eastern Mediterranean Region, we performed a high-resolution study of pollen abundances in a core from the fan of Tenaghi Philippon, located in the near coastal Drama Basin (NE Greece), spanning the interval from the onset of the Holocene to the Middle Holocene. In addition, we analyzed the carbon- and nitrogen-isotope values of the upper part of the section to reconstruct the water table ranges and thus the precipitation rates. The relative age control is primarily based on the correlation of key events in the Holocene Tenaghi Philippon pollen record with correspondending features in the well-dated marine pollen record of core SL 152 from the Mount Athos Basin (Fig. 1).

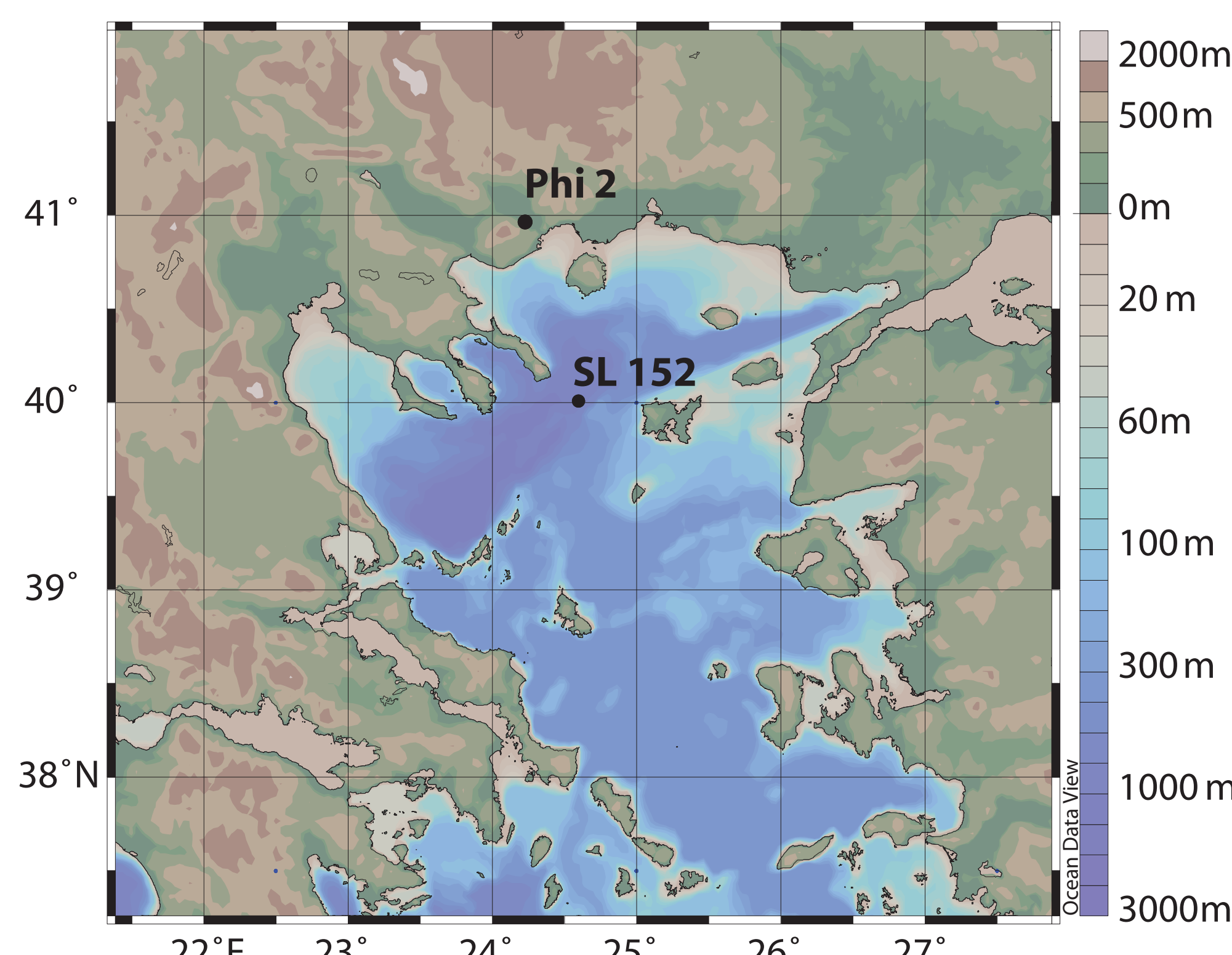
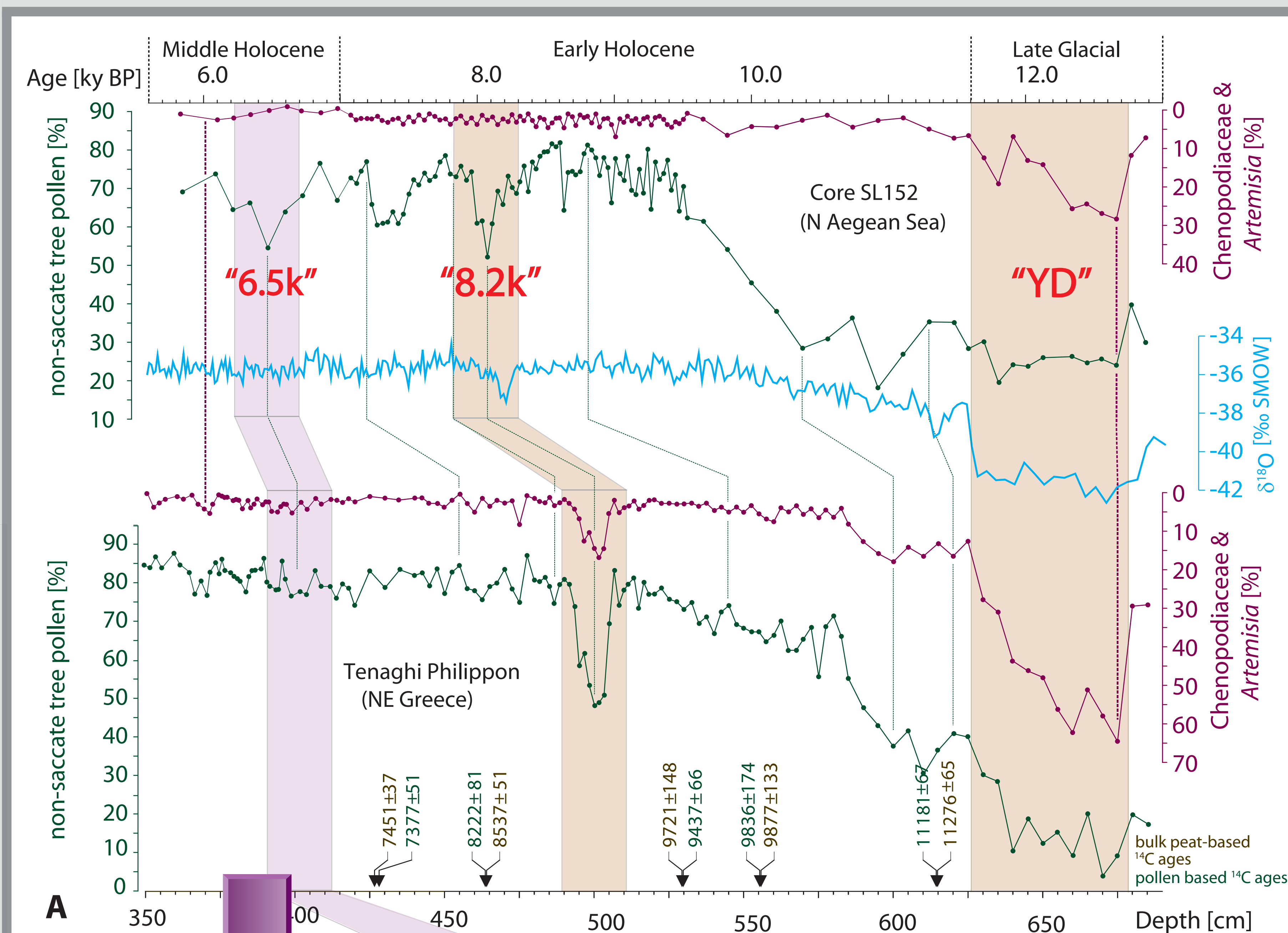


Figure 1 Location of cores SL 152 and Phi 2 in the Mount Athos Basin, northern Aegean Sea and Tenaghi Philippon in the Drama Basin, NE Greece.

2 RESULTS & DISCUSSION

The pollen record indicates that following a forestation phase at the onset of the Holocene, the northern Aegean Region was densely wooded throughout the most of the Holocene. The forest assemblages were dominated by deciduous trees, mainly *Quercus robur* (British oak). Climate setbacks are revealed by the increase of pollen abundances of open landscape plants, particularly of steppe elements like *Artemisia* (mugworts/sagebrush), *Chenopodiaceae* (Goose foot) and true grasses, indicating dryer and/or cooler conditions. For the early Holocene, all significant climate setbacks revealed at Tenaghi Philippon are also reflected in the neighbouring marine pollen record. The strongest of these climate setbacks is linked to the climatic perturbation around 8.2 ky BP. For the early Holocene, most of the climate setbacks show stronger signals in the pollen record from Tenaghi Philippon (Fig. 2 A). This is different for the Middle Holocene: while the marine pollen record suggests a rapid deforestation around 6.5 ky BP, the terrestrial pollen record reveals only a small decrease in arboreal pollen percentages. With support of statistical methods, vegetation changes could be identified which indicate an opening of the landscape, and thus probably drier conditions (Fig. 2 B).



3 CONCLUSIONS

We conclude that the northern Aegean Region witnessed a decrease in precepitation around 12 ky BP, 8.2 ky BP and 6.5 ky BP (Fig. 2 A, B, C), and therefore an increase of plants of an open landscape (Fig. 2 C). But the decrease in precipitation around 6.5 ky BP in the Early Middle Holocene influenced the vegetation in the Drama Basin to a lesser degree than the coastal and lowland vegetation reflected in the marine record SL 152. The differences concerning pollen transport and preservation for both sides have led to a stronger reflection of the setback for the marine record. These differences might be linked to changes in hydrography and sedimentation processes controlled by the local climate at the end of the sapropel-1-formation around 6.5 ky BP in the northern Aegean Region.

Figure 2 A Correlation of maxima and minima in the tree and herb pollen curves from Tenaghi Philippon with respective features in the pollen record from the marine core SL 152 (northern Aegean Sea), which has a robust ¹⁴C-based chronology (Kotthoff et al. 2008). GISP2 oxygen isotope record after Grootes et al. (1993), (arranged after Pross et al. 2009).

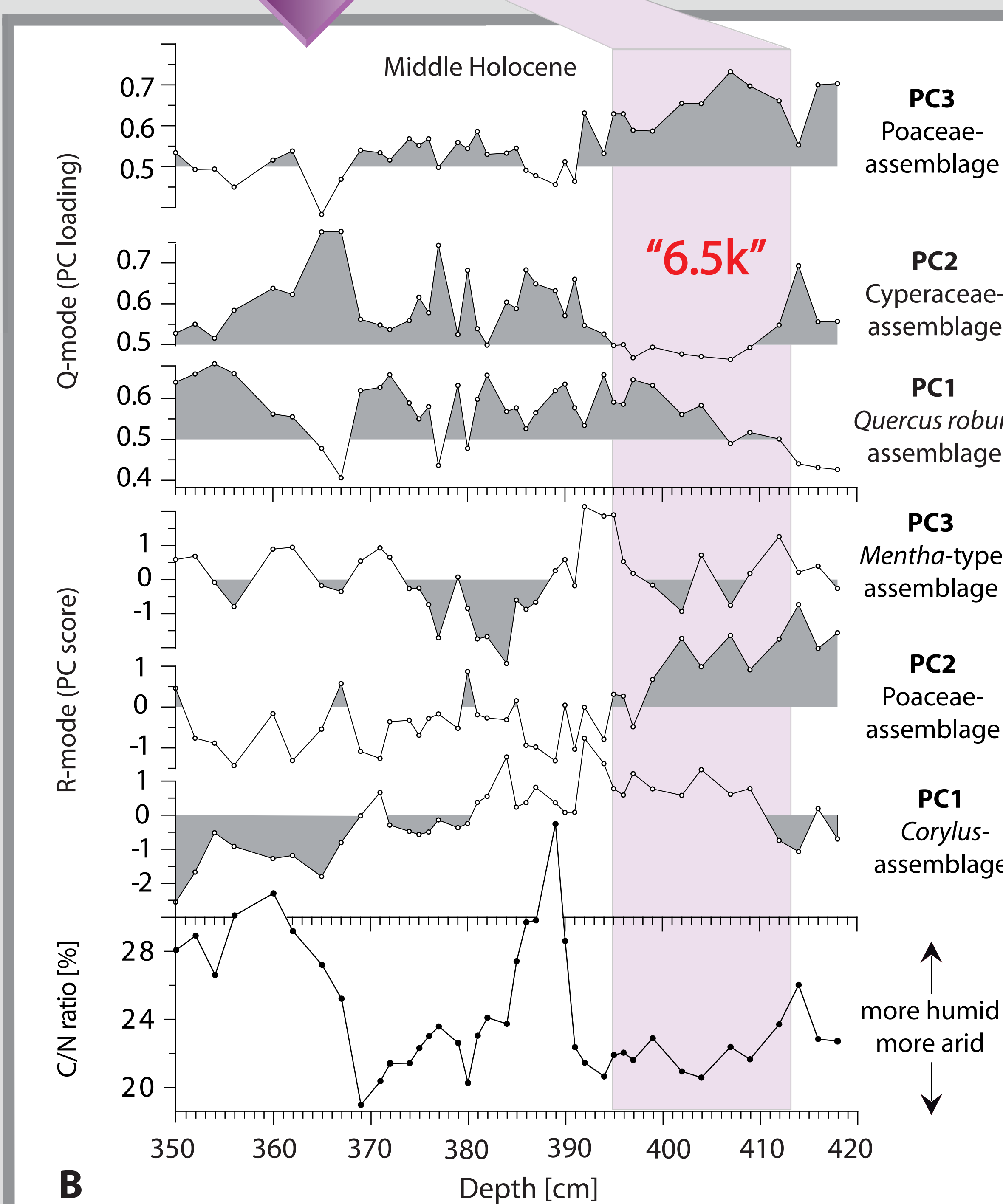
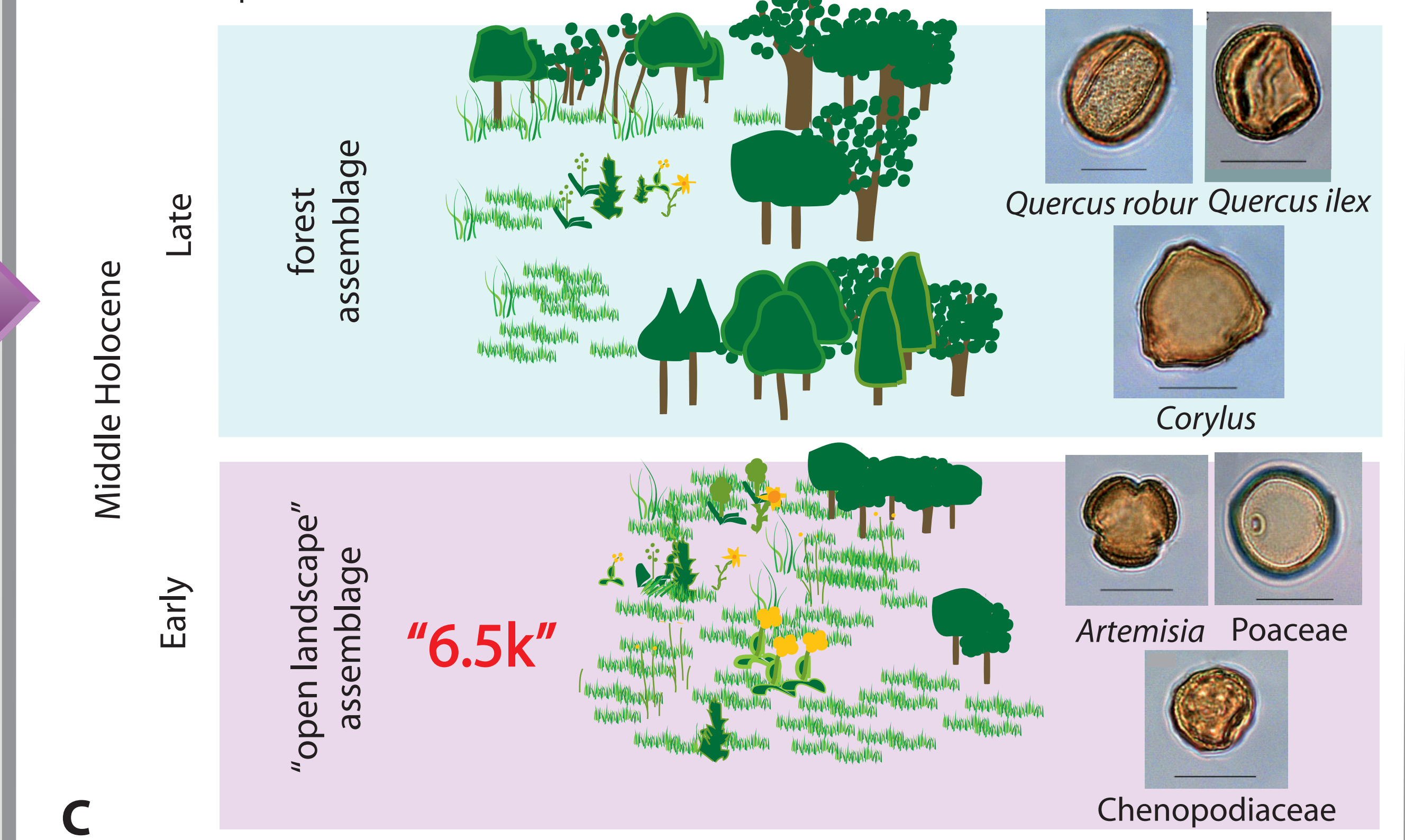


Figure 2 B Results of the principle component analysis in the Q-mode and R-mode plus the C/N ratio in the Middle Holocene. The climate deterioration around 6.5 ky BP is highlighted.

Figure 2 C Middle Holocene landscape reconstructions according to principle component analysis in Q-mode and R-mode. Characteristic pollen grains are represented on the right. Scale bar: 20 µm.



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