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# Atmospheric $CO_2$ from the late Oligocene to early Miocene reconstructed from photosynthesis data and leaf characteristics of fossil plants

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In the Cenozoic era, global climate changed from greenhouse to icehouse conditions. During the Oligocene, the comparatively cool phase in the earlier part of the late Oligocene is followed by the Late Oligocene Warming and a major glaciation event at the Oligocene-Miocene transition (Mi-1). Various studies indicate that these climate events were coupled to changes in atmospheric $CO_2$ levels.

In this study, atmospheric $CO_2$ from the late Oligocene to the early Miocene was reconstructed by using photosynthesis data and fossil leaf characteristics. We used plant material from various sites located in Germany and Austria comprising fossil leaves of four angiosperm plant species: *Platanus neptuni* (Platanaceae), *Quercus rhenana*, *Q. praerhenana* and *Eotrigonobalanus furcinervis* (all Fagaceae). A mechanistic-theoretical approach based on stomatal parameters, photosynthesis data and gas exchange parameters was applied to model palaeoatmospheric $CO_2$ levels. Detailed climate data of the considered sites were reconstructed as well since the mechanistic-theoretical approach requires climate data as input parameters for calculating both assimilation rate and transpiration rate.

Our results indicate a steady $CO_2$ level of about 400 ppm for all sites and therefore suggest a decoupling of $CO_2$ and cooling/warming events for the considered time slices.