Reconstructing of C_3/C_4 vegetation evolution and climate variety since the Last Glacial Maximum in the northeast Tibetan Plateau

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Attributed to the special geographical and climatic environment conditions, the Tibetan Plateau(TP) is sensitive to climate change, as a consequence, Climates reconstruction in the TP which was called the Third Pole Environment has been a concerned focus in recent years, especially in the context of global warming.

Studies on the C_3/C_4 vegetationpaleovegation, paleoclimate evolution process and possible driving mechanism at the Hurleg Lake area in the northern Tibetan Plateau since the Last Glacial Maximum were researched by varied organic geochemical indicators. The utilization of GC/MS was carried out for detecting the n-alkanes in core sediment from Hurleg Lake. The results manifested that the carbon number of n-alkanes ranged from C_{14} to C_{34}, appeared unimodal with the main peak C_{16}/C_{17} or C_{29}/C_{31} and bimodal distribution. There was nowas no significant odd to even predominance in the short-chain while strong odd to even predominance emerged in the mid- to long-chain n-alkanes. Combined with $\sum n\text{-}C^{-}_{21}/\sum n\text{-}C^{+}_{22}$ we came to the conclusion that the organic was derived from mixed source of terrestrial higher plants as well as lower bacteria and algae organisms. The evolution between herbs and woody plants was reconstructed by ACL and nC_{27}/nC_{31}, together with Paq, we hold that the primary factor whether herbs or woody plants predominate maybe controlled by humidity in this area.

Besides, the compound-specific carbon isotope of C_{27}, C_{29}, and C_{31} in the n-alkanes were tested, then, we reconstructed the relative abundance of C_3/C_4 plants from 16.6 cal ka BP to 0.2 cal ka BP calculated by a binary model in the Hurleg Lake area. Climate change based on variety of C4 plants and other proxies in the Hurleg Lake was reconstructed too, the main trend of change was alternation of cold and warm, it can be viewed on 5 stages, most of the climate interval were corresponded to the typical climate events, which had been verified that occurred in the TP, such as B/A (16.6-12.1 cal ka BP), YD (12.1-10.2 cal ka BP) etc, suggested that the relative abundances of C_3, C_4 plants probably could be a response to the climate change in this area. Solar radiation in summer, East Asian monsoon, westerly wind and salinity all have obvious effects on the growth of C_4 plants. Most importantly, we found that the seasonal variation of solar radiation, temperature and precipitation may play an important role in the variation of relative abundance of C_4 plants. These results suggested that the relative abundance of C_4 might increase and the ecological pattern of vegetation will change probably in the coming warmer climate condition.