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An alternative method to improve AMS 14C dating for paleoclimate and environment studies in Chinese Loess Plateau

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We applied the high temperature pyrolysis-combustion technique to 2 last glacial loess-paleosol sequences in the Chinese Loess Plateau (CLP) to partition the total soil organic carbon (SOC) into pyrolysis labile-recalcitrant and pyrolysis inert SOC fractions for accelerator mass spectrometry radiocarbon (AMS 14C) dating analysis to explore which SOC fraction yields more reliable AMS 14C chronology for climate stratigraphy studies in the southern and eastern CLP. The dating results of pyrolysis labile-recalcitrant and pyrolysis inert fractions from 2 loess-paleosol sites show similarities in 2 aspects: (1) almost all loess samples show 14C dates of pyrolysis inert SOC compounds older than that of pyrolysis labile-recalcitrant molecules consistent with the general consensus that SOC molecular groups with stronger activation energy have older 14C ages; (2) dating results from the upper-middle loess profiles show good correlations with loess depths but deviated one from another in the lower loess profile. In addition to previous studies in the region , the comparison of soil morphology and climate proxies between loess-paleosol sequences indicate that climate-induced SOC content、soil texture and depositional mode matter strongly to AMS 14C dating range and accuracy. Our pyrolysis-combustion technology provides an alternative method to assess AMS 14C dates of different SOC fractions in molecular levels to improve chronology for paleoclimate and environment studies in the CLP.

Student Submission

Yes

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