

陇西民和黄土CaCO<sub>3</sub>和有机碳总量的含量变化及其气候指标的局限性

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**摘要:** 民和黄土地处黄土高原与青藏高原东北缘的交接部位, 对气候反应较敏感。对该黄土1.87~0.70 Ma BP段进行了CaCO<sub>3</sub>和有机碳总量(TOC)的采样分析。民和黄土CaCO<sub>3</sub>含量在5.89%~18.63%之间变化, 平均11.41%; 有机碳含量较低, 在0.007%~0.452%之间, 平均0.088%。民和黄土中的CaCO<sub>3</sub>含量明显高于兰州、洛川和西安等地, 而有机碳含量则远低于上述地区。黄土中CaCO<sub>3</sub>和有机碳含量变化反映了该区1.87 Ma BP以来气候变干冷的趋向。分别受复杂的CaCO<sub>3</sub>来源与类型、困难的采样、地区上的差异对比等和有机碳保存条件、沉积速率以及“埋藏效应”的影响, 黄土中的CaCO<sub>3</sub>和有机碳的波动变化作为气候变化的替代性指标存在一定的局限性。文章最后指出, 在实际应用中, 黄土(特别是黄土高原西北部)中CaCO<sub>3</sub>和有机碳气候指标应结合其他环境指标共同使用, 才能从中提取正确的古气候信息。

**关键词:** 民和黄土; 青藏高原; CaCO<sub>3</sub>; 有机碳; 局限性

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Variations of the CaCO<sub>3</sub> and total organic carbon contents in the  
Minhe loess and their limitations as climatic proxies

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**Abstract:** Situated in the intersection area of the Loess Plateau and the northeastern margin of the Qinghai-Tibet Plateau, the Minhe loess is sensitive to the climate. Analysis of the CaCO<sub>3</sub> and total organic carbon (TOC) contents in the 1.87~0.70 Ma interval of the Minhe loess shows that the content of CaCO<sub>3</sub> in the Minhe loess ranges from 5.89 to 18.63%, averaging 11.41% and that the content of TOC is lower, ranging from 0.007% to 0.452% with an average of 0.088%. The CaCO<sub>3</sub> content in the Minhe loess is notably higher than those in Lanzhou, Luochuan and Xi'an, but the TOC content is much lower than those in the aforesaid areas. The variations of the CaCO<sub>3</sub> and TOC contents in the Minhe loess indicate that the climate in the area had a trend of becoming cold and dry since 1.87 Ma BP. The variations of CaCO<sub>3</sub> and TOC in loess as substitute proxies of climatic changes have certain limitations due to influences of complex sources and types of CaCO<sub>3</sub>, difficult sampling and differential comparisons among areas, as well as preservation conditions, sedimentation rates and "burial-effect" of TOC. At last, the paper points out that in actual applications the climatic proxies of CaCO<sub>3</sub> and TOC in loess, especially loess in the northwestern part of the Loess Plateau, must be used together with other climatic proxies, and then correct paleoclimatic information can be extracted.

**Key words:** Minhe loess; Qinghai-Tibet Plateau; CaCO<sub>3</sub>; TOC; limitation