青藏高原东北缘黄土的气候演化与高原隆升的耦合

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提要：通过对青藏高原东北缘的民和黄土的磁化率、粒度、CaCO3和TOC等气候载体进行综合测试分析，可以将青藏高原东北缘黄土1.90～0.70 Ma B.P. 段划分出7个气候阶段。对民和黄土的气候分析表明，1.10 Ma B.P.(民和黄土的L11黄土层)前气候差异较小，冬夏季风不强，对抗性较弱，黄土古土壤发育不明显，厚度较薄；1.10 Ma B.P.后，冬夏季风对抗性迅速增强，气候差异性增强。将民和黄土与其他地区以及深海沉积物氧同位素记录进行对比可以发现，民和黄土的S8、S9和S10古土壤分别与深海氧同位素21、23和25阶段较好地对应，而L9、L10和L11则分别对应22、24和26阶段。L11黄土层以下的黄土记录与深海氧同位素记录的可比性不是很明显。同时，民和黄土的高分辨率气候记录与青藏高原的阶段性隆升有较好的耦合关系。
关键词：青藏高原；民和黄土；气候载体；深海沉积物氧同位素
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Climatic evolution of loess on the northeastern margin of the Qinghai-Tibet Plateau and its coupling with plateau uplift

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Abstract: An integrated analysis has been performed of the climatic carriers such as magnetic susceptibility, grain-size, CaCO3 and TOC in the Minhe loess on the northeast margin of the Qinghai-Tibet Platean. The time interval of 1.90 to 0.70 Ma BP for the loess on the northeast edge of the Qinghai-Tibet Platean can be subdivided into seven climatic stages. Climatic analysis of the Minhe loess shows the following: before 1.10 Ma BP (layer L11 of the Minhe loess), the climatic difference was small and the winter monsoon and summer monsoon were not strong, with only weak antagonism, and loess and paleosol were less developed and relatively thin; by contrast, after 1.10 Ma BP, the antagonism between the winter monsoon and summer monsoon was enhanced rapidly, and the climatic difference became pronounced. A comparison between the isotope records of the Minhe loess and other areas and the oxygen-isotope records of deep-sea sediments indicates that paleosol layers S8, S9 and S10 of the Minhe loess correspond separately to deep-sea oxygen stages 21 and 23 and 25 better, while loess layers L9 and L10 and L11 are separately coincident with stages 22 and 24 and 26. The correlation between loess records below loess layer L11 and deep-sea oxygen-isotope records is not very pronounced. In addition, the high-resolution climatic records of the Minhe loess are well coupled with the staged uplift of the Qinghai-Tibet Plateau.
Key words: Qinghai-Tibet Plateau; Minhe loess; climatic carriers; oxygen-isotope record of deep-sea sediments