

## 甘肃灵台黄土-红粘土序列中坡缕石的分布及其古气候意义

### The distribution of palygorskite in Lingtai section of Chinese Loess Plateau and its paleoclimate significance

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中文关键词: [坡缕石](#) [古气候](#) [灵台](#) [黄土-红粘土序列](#)

英文关键词: [palygorskite](#) [paleoclimate](#) [Lingtai](#) [loess-red clay sequences](#)

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中文摘要:

坡缕石是典型的干旱、强蒸发环境的指示矿物,黄土-红粘土序列中坡缕石的分布对古气候和古环境重建具有重要的指示意义。本文对灵台任家坡剖面中黄土、古土壤和红粘土代表性样品进行了场发射扫描电镜和高分辨透射电镜观察,结果发现,在3.6Ma以前沉积的红粘土中存在大量的自生坡缕石,而在3.2Ma以来沉积的红粘土及其上覆黄土古土壤序列没有坡缕石。剖面样品扫描电镜原位观察形貌特征和微观结构显示,坡缕石属于成壤作用自生矿物,系由伊蒙矿物在富镁孔隙液作用下转化形成。灵台剖面中坡缕石消失的层位与红粘土磁化率升高和粉尘通量及沉积速率增加的层位相一致。坡缕石在剖面中的分布指示3.6~3.2Ma前后是东亚季风的重要转型期,东亚古气候格局发生改变,由连续干暖的夏季风占主导向干冷季风和暖湿夏季风高频强波动交替环境演化。

英文摘要:

Palygorskite is a typical indicator mineral for arid and strong evaporation environment. The distribution of palygorskite in loess-red clay sequence may act as an important indicator for reconstruction of paleoenvironment and paleoclimate in ~7.0 Ma eolian sequence from the Chinese Loess Plateau. In this paper, scanning electron microscopy (SEM) and transmission electron microscopy (TEM) investigations on Renjiapo red clay-loess-paleosol profile in Lingtai, Gansu Province were performed. The results indicate that palygorskite extensively existed in red clay sequence deposits before 3.6 Ma, while no palygorskite has been observed in the eolian sediments in the last 3.6 Ma, including 3.6~2.6 Ma red clay sequence and Quaternary loess-paleosol sediments. Micromorphology and microstructure shows that palygorskite is an autogenic mineral formed during pedogenesis. The results of this study indicate that the horizon where palygorskite disappeared in the red clay sequence was consistent with that of magnetic susceptibility enhancement, and eolian flux and dust depositional rate increased in about 3.6~3.2 Ma, which was a conversion period of east Asian monsoon type, during which paleomonsoon climate pattern shifted from summer monsoon dominated by sustainable dry\_warm climate to east Asian paleomonsoon characterized by the alternation of winter monsoon with dry and cold climate and summer monsoon with warm and humid climate, noted for simultaneous strengthening of east Asian winter and summer monsoon.

谢巧勤, 陈天虎, 季峻峰, 陈骏, 徐惠芳, 徐晓春, 2005, 甘肃灵台黄土-红粘土序列中坡缕石的分布及其古气候意义[J]. 岩石矿物学杂志, 24(6): 653~658.

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