

矫顽力组分定量分析揭示下蜀黄土磁化率异常降低的原因

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摘要 镇江大港下蜀黄土剖面多个层位的磁化率出现异常降低, 导致与北方黄土的磁化率记录难以对比. 为探讨磁化率异常降低的原因, 我们在大港钻探ZK孔获取了岩芯. 在10个具有代表性的层位采样并测量了其等温剩磁获得曲线. 通过基于期望最大化算法的计算程序 (Irmunmix V2.2), 定量分析了样品的磁性矫顽力组分 (magnetic coercivity component). 结果显示这10个样品可大致分成3类, 第一类不含中磁组分, 第二类含有较少的中磁组分, 第三类则含较多的中磁组分. 矫顽力组分的含量与样品中铁锰结核的含量密切相关. 铁锰结核含量高的样品, 中磁组分、硬磁组分含量也高, 而软磁组分含量低, 与此对应的是这类样品的磁化率低. 表明在铁锰结核的形成过程中, 原始的软磁组分被溶解, 而产生新的中磁组分、硬磁组分, 这个次生变化过程导致样品磁化率异常降低. 铁锰结核含量高的样品, 经历过较强的还原作用, 因此ZK剖面磁化率异常降低是还原作用的结果, 可能是某时期降水量增大所致.

关键词 [下蜀黄土](#) [IRM](#) [矫顽力组分](#) [铁锰结核](#) [磁化率](#) [还原作用](#)

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Quantification of magnetic coercivity components reveals the cause of anomalous decrease of magnetic susceptibility of the Xiashu loess

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Abstract The magnetic susceptibility of the Xiashu loess of several layers in Dagang section in Zhenjiang anomalously decreases, which results in a poor correlation of the susceptibility record with its counterpart in North China. In order to explore the cause of the anomalous decrease, we drilled the ZK core in Dagang. Ten representative samples are collected from different depths and their isothermal remanent magnetization acquisition curves are measured. Quantification of magnetic coercivity components is carried out by using the program (Irmunmix V2.2) that uses the expectation-maximization algorithm. The results show that these ten samples can be divided into three groups. The first group contains no moderate magnetic coercivity component; the second group only contains a few moderate magnetic coercivity components; the third group contains many moderate magnetic coercivity components. The content of magnetic coercivity components is closely related to the content of the ferromanganese concretion. More ferromanganese concretions the sample contains, fewer soft magnetic coercivity components and more moderate and hard magnetic coercivity components the sample contains. Correspondingly, the sample of this kind has a low magnetic susceptibility. The magnetic coercivity component analysis indicates that the soft magnetic coercivity components were dissolved and new moderate and hard magnetic coercivity components were precipitated during the formation process of the ferromanganese concretion. This secondary process leads to the anomalous decrease of the magnetic susceptibility. The sample containing more ferromanganese concretions underwent stronger reducing action. Therefore, we conclude that the anomalous decrease of the magnetic susceptibility is the result of the reducing action, which might be the production within a period of enhanced precipitation.

Key words [Xiashu loess](#); [IRM](#); [Magnetic coercivity component](#); [Ferromanganese concretion](#); [Magnetic susceptibility](#); [Reducing action](#)

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