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白令海岩芯记录的冰消期14 ka以来地磁场强度和方向

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Geomagnetic intensity and direction for the last 14 ka recorded in Bering Sea core

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摘要

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摘要

对白令海北部陆坡B5-4孔进行了古地磁和岩石磁学研究, 尝试获得该岩芯的地磁场相对强度和方向变化信息. 结果表明: (1)除0~0.44 m沉积物的磁性矿物粒度比其余沉积物细以外, 岩芯的磁学性质总体均一, 其记录的地磁场相对强度可以与北大西洋ODP983孔相应记录进行高度对比. (2)根据B5-4孔与ODP983孔地磁场相对强度记录对比结果, 并结合该孔4.54~4.56 m处有孔虫AMS¹⁴C测年结果, 可以确定3个深度-年龄对比点, 并据此初步建立了B5-4孔的年龄模型. (3)B5-4孔磁偏角和磁倾角记录与贝加尔湖、北美、欧洲全新世以来的记录和当地地磁场球谐模型结果一致, 其对比点丰富了强度对比点年龄模型, 揭示了14 cal ka B.P.以来近线性的沉积模式. (4)根据与中国东部陆架两个钻孔的磁倾角对比, 我们推测B5-4孔9~14 ka之间两段浅化的磁倾角可能是哥德堡极性事件的记录, 但是受到早期成岩或者沉积物平滑效应的影响. 以上结果足以证明, 地磁场相对强度和方向变化可以从适宜的白令海沉积物中获得, 它可以为确定该海区沉积物年龄提供相关辅助信息, 有助于解决北极、亚北极古环境和古海洋研究中由于有孔虫等钙质生物壳体缺乏导致的年龄信息匮乏问题.

关键词 北极, 白令海, 地磁场相对强度, 磁倾角, 哥德堡极性事件

Abstract:

Paleomagnetic and rock magnetic investigation were undertaken in a continental slope core B5-4 in the Bering Sea for the purpose of acquiring intensity and direction of the geomagnetic field. The results are as follows. (1) The magnetic properties are uniform except for the finer magnetic grain size of the upper 0~0.44 m and the relative paleointensity in the core is highly consistent with that of ODP983. (2) According to the correlation between relative paleointensity in core B5-4 and ODP983 and an AMS¹⁴C dating of foraminifera at 4.54~4.56 m, three correlation points can be further determined, thus the age model in core B5-4 was obtained. (3) The declination and inclination in core B5-4 agree highly with that of high latitude records, for example Lake Baikal, North America and Europe and the spherical harmonic model of local geomagnetic field, which provide additional tie points for the age model and a near linear sedimentation for the last 14 ka was revealed. (4) The inclination correlation between B5-4 and two cores from the continental shelf of east China suggests that the two discrete sections of shallow inclinations in core B5-4 are likely the Gothenburg event and the early diagenesis or smoothing effect might be the cause of shallow not negative inclination. The above results prove that both relative paleointensity and direction can be obtained in appropriate sediment of Bering Sea that serves as time marker. This is very helpful in paleoenvironmental and paleoceanographic study in Arctic and subarctic areas considering the awful scarcity of age information due to the shortage of calcareous tests and shells.

Keywords Arctic, Bering Sea, Relative paleointensity of geomagnetic field, Inclination, Gothenburg event

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