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平均热点参考基准的建立和岩石圈西向漂移的研究

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Establishment of the medial-hotspot reference datum and study of the westward drift of the lithosphere

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摘要

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摘要

对于大地测量应用来说,目前IERS机构在定义地球参考系时推荐采用岩石圈无整体旋转(No-Net-Rotation-NNR)约束条件,然而对于地球物理应用来说,相对于NNR参考基准的绝对板块运动数据可能会对地幔对流等研究结果产生误导.考虑到热点的运动,提出建立平均热点(MHS-Medial HotSpot)参考基准的方法,给出建立该基准的约束准则,分别以地学模型NNR-NUVEL1A和实测模型ITRF2005VEL为基础,建立了平均热点参考基准MHS-NUVEL1A和MHS-ITRF2005,并与其它基于热点的绝对板块运动模型进行了比较和分析;讨论了岩石圈的西向漂移,给出了岩石圈相对于下地幔整体旋转的更精确的定量估计,即基于实测的热点参考架MHS-ITRF2005和地学模型NNR-NUVEL1A之间的整体旋转为 $0.26^\circ/\text{Ma}$,旋转极在(50°S , 62°E),这与由板块的受力模型给出的岩石圈的整体旋转的旋转极很接近,旋转速率大致快了10%.

关键词 平均热点, 参考基准, 绝对板块运动, 岩石圈的整体旋转

Abstract:

Now as to geodetic application, constraint conditions of no-net-rotation(NNR) has been recommended and adopted by IERS organization in defining the Earth reference system, while to geophysical application, absolute plate motion models and data relative to NNR reference datum may bring misguide to mantle convection and other research. Considering hotspot relative motion, the Medial Hotspot (MHS) reference datum has been proposed, and its constraint rule has been given. Two absolute plate motion models designated as MHS-NUVEL1A and MHS-ITRF2005 have been developed using a set of hotspot data globally distributed in conjunction with plate motion models NNR-NUVEL1A and ITRF2005VEL, respectively, which were also compared with other absolute plate motion models based on the hotspots reference frame. The net rotation of the lithosphere was discussed and compared at last. The results show that the lithosphere has a net rotation relative to the hotspots by $0.26^\circ/\text{Ma}$ about a pole of 50°S , 62°E with respect to the deep mantle, which is closer to that from the plate forced model in direction, faster in the rate by 10%.

Keywords [Medial-hotspots](#), [Reference datum](#), [Absolute plate motion](#), [Net rotation of the lithosphere](#)

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