Motion of the Paleomagnetic Axis Relative to Hotspots

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Southward motion of the Hawaiian hotspot plume relative to the paleomagnetic axis has been observed (Tarduno et al.,2003), and this can be explained by either motion of the Hawaiian hotspot relative to other Pacific hotspots, or motion of the group of hotspots relative to the paleomagnetic axis.

First, we examined whether inter-hotspot motion is essential or not for the explanation of observed age data and positions of seamounts in the Pacific basin. We found that both the Polygonal Finite Rotation Method (Harada and Hamano, 2000) and the Hotspotting Method (Wessel and Kroenke, 1997) can successfully be used to develop models of the Pacific and the Nazca plate motion relative to hotspots. This indicates that no inter-hotspot motion is needed to explain ages and positions of hotspot tracks in the Pacific basin.

Second, combining the Pacific plate motion relative to hotspots and Pacific paleomagnetic poles (Acton and Gordon, 1994, Johnson, 2000), we calculated the motion of Pacific hotspots relative to the paleomagnetic axis (Pac-PWP). Based on this analysis, southward drift of the Hawaiian hotspot is predicted and it is quite in harmony with the newly observed southward motion of paleolatitude for the Emperor seamount chain (Tarduno et al.,2003).

Similarly, we constructed a model of the African plate motion relative to African hotspots, and calculated the motion of African hotspots relative to the paleomagnetic axis (Af-PWP).

Pac-PWP and Af-PWP are quite similar and we conclude that there is no significant relative motion between Pacific hotspots and African hotspots since 70 Ma. The combined Pac-Af-PWP, thus, can be regarded as motion of the global hotspots relative to the paleomagnetic axis.