

TECTONICS AND VOLCANISM OF AN UNUSUAL SECTION OF THE MID-ATLANTIC RIDGE, 45N

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The Mid-Atlantic Ridge at 45N is unusual in that it erupts lavas of hotspot composition and shows long wavelength free-air gravity higher than expected for the observed axial depths and crustal structure. These characteristics can be explained by the existence of an anomalous mantle underlying the region. This mantle probably derives from a hotspot that existed at the North America-Africa-Eurasia triple junction when it was at 45N between 59 and 26 Ma. The King's Trough Complex is the remnant of that hotspot. Further detailed morpho-structural analysis of the region reveals tectonic similarities with regions not influenced by hotspots, such as the style of segmentation, the median valley width and axial relief, and the characteristics of the volcanic ridges. However, there are important features characteristic of the 45N region, which are not observed in other areas studied in the northern Mid-Atlantic Ridge. These features are an abundance of curved faults, a blocky volcanic morphology in the crestal mountains, and a less pronounced structure of the residual Bouguer gravity anomaly. These major differences in tectonic style are probably associated with the anomalous mantle in the region, and its recent tectonic history as a site of a triple junction. However, segment scale processes apparently are not wholly influenced by this factor, because of the similarities between 45N and areas underlain by normal mantle.