# Variable crustal structure along the JdFR; influence of on-axis hotspots and absolute plate motions

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*Abstract*

Observations of crustal structure along the JdFR reveal influence of on-axis hotspots and absolute motion of the spreading ridge on axial melt distribution. Multi-channel reflection seismic and bathymetric data are used to constrain axial structure and spreading history for past 4-8 Ma within 3 spreading corridors crossing Cleft, NSymmetric and Endeavour segments. Along-axis data reveal south-to-north gradients in seafloor relief, depth and presence of the crustal magma lens which indicate a warmer axial regime at Cleft segment than at the northerly NSymmetric and Endeavour segments. *S*outh-to-north gradients are also observed within individual ridge segments with shallower ridge axis and crustal magma lens located to the south within most segments. Cross-axis lines reveal differences in inferred crustal thickness with higher average two-way travel times (twtt) to Moho found at Cleft and Endeavour segments (2300 and 2200 msec) coincident with distinct plateau, 32 and 40 km wide. Further on the ridge flanks, Moho twtt are similar at all 3 segments (~2100 +/- 35 msec) indicating little difference in inferred crustal thickness prior to ~ 0.71 Ma. We attribute the recent increase in crustal production at Cleft and Endeavour segments to initiation of ridge axis-centered melt anomalies associated with the Cobb HS and the Heckle melt anomaly. [Does this mean that you think that the crust is actually thicker here, and that this is not just the effect of higher temperatures and therefore slower twtt, an effect that will eventually disappear with time/cooling?] Rapid along-axis channeling of the Cobb thermal anomaly preferentially to the south to influence melt production at Cleft segment 160 km away is implied. The northwesterly absolute motion of the JdFR axis could account for preferential southward directed asthenospheric flow along axis. The regional and within-segment scale south to north gradients in seafloor and sub-seafloor structure along the JdFR may also reflect the influence of absolute motion of the ridge axis on sub-axial melt distribution.