



Subsurface tectonics of nontransform mid-ocean ridge discontinuities: its relationship with hydrothermal circulation and offset-dependent crustal deformation

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We present new results and geological models from seismic anisotropy analyses showing the complex subsurface tectonic structures of the 9 deg N overlapping spreading centre on the East Pacific Rise. Our results show that there exist significant lateral and depth variations in the aspect ratio and orientation of the aligned cracks in a region with contrasting levels of magma supply. This observation implies that there is a strong influence of the availability of magma on the characteristics of fissures and joints in the upper oceanic crust. Our results allowed us to construct a geological model that explains the relationship between along-axis variation in magma supply and the pattern of on-axis hydrothermal circulation (Tong et al., 2004). Moreover, we show that the characteristics of the subsurface tectonic structures of the overlap basin covered by volcanic edifices are influenced by the propagating ridge. Unlike large nontransform ridge discontinuities, where surface fissures are found in the overlap region, the tectonic deformation in the overlap basin at this ridge discontinuity with a relatively small offset is limited. We therefore propose that the crustal deformation between overlapping ridge segments is offset-dependent and may be thermally related (Tong et al., 2005).

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