The Pescadero Basin Complex, southern Gulf of California: structure, tectono-stratigraphic evolution and magmatism

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The Pescadero Basin Complex (PBC) in the southern Gulf of California comprises three distinctive stretched rhomboid pull-apart basins separated by several short transforms. Multibeam and Autonomous underwater vehicle (AUV) bathymetry data collected at 40-m and 1-m resolution, respectively, combined with the processing and interpretation of three 2-D high-resolution multichannel seismic reflection profiles, were used to characterize the architecture of the entire PBC, as well as the internal structure of the northern Pescadero basin. Detailed mapping and cross-sectional kinematic modeling based on multichannel seismic images of the northern Pescadero basin reveals a highly evolved pull-part geometry, characterized by a well-defined ~1.8 km wide axial graben stretching ~32 km in an NNE-SSW direction. Both finite and incremental strain analyses carried out in this study point out that the PBC developed under sustained transtensional deformation, where the relative motion of the crustal blocks is oblique and divergent to the...
transforms or principal displacement zones (PDZ’s), and subsidence is likely being accommodated by one of more décollement layers located at the bottom of a broad negative flower structure. We also present new geochemical data of lava flows with a N-MORB composition outcropping on the NE segment of the northern Pescadero axial graben, and lava-flow samples of E-MORB composition from an uplifted sediment hill on the western margin of the southern Pescadero basin. MORB samples from the PBC represent the northernmost surface flows known in the Gulf of California, highlighting that the PBC has evolved beyond being a pull-apart complex to having initiated seafloor spreading with new oceanic crust formation in response to the opening of the Gulf of California.