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Magma plumbing system and associated hydrothermal vents in the Guaymas Basin - geometry and implications

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We document the geometry of a massive sill at the root of an approximately 20-m high and 800 m-wide ring of hydrothermal formations, termed Ringvent, located 28.5 km off-axis on the northwestern flanking regions of the actively rifting Guaymas Basin (Gulf of California). Using petrophysical data collected during the IODP Expedition 385 and processed 2D seismic profiles, we present evidence on the mechanics of sill emplacement and how the related hydrothermal vent conduits were constructed. The currently active moderate-temperature hydrothermal vent field indicates that, despite being cold and crystallized, the magma plumbing system, is tapping into a deeper geothermal source of the basin. The vent system roots at the vertical end of the magma plumbing system with the top of the sill located at a depth range of 80 to 150 m below the seafloor. Our research aims at constraining how far deep the geothermal fluids are coming from, and identifying how close the hydrothermal system is from a steady-state condition, to draw implications for how frequently such a system may arise in nascent ocean basins.

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