EGU21-13015, updated on 20 Apr 2021
https://doi.org/10.5194/egusphere-egu21-13015
EGU General Assembly 2021

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

Christophe, Y. Galerne[1], Daniel Lizarralde[2], Christian Berndt[3], Florian Neumann[4], Tobias, W. Höfig[5], Joann M. Stock[6], Manet, E. Peña-Salinas[7], Raquel Negrete-Aranda[4], Andreas, P. Teske[8], and the Expedition 385 Scientists[*]

[1]Universität Bremen, AG Petrology of the Ocean Crust, Department of Geosciences, Bremen, Germany (galerne@uni-bremen.de)
[2]Woods Hole Oceanographic Institution, Department of Geology and Geophysics, USA
[3]GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany
[4]CICESE, Department of Geology, Ensenada, Mexico
[5]Texas A&M University, International Ocean Discovery Program, College Station, USA
[6]California Institute of Technology, Division of Geological Planetary Sciences, Pasadena, USA
[7]UABC, Department of Coastal Oceanography, Ensenada, Mexico
[8]University of North Carolina at Chapel Hill, Department of Marine Sciences, Chapel Hill, USA
[*]A full list of authors appears at the end of the abstract

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.

Expedition 385 Scientists: Andreas P. Teske; Daniel Lizarralde; Tobias W. Höfig; Ivano W. Aiello; Janine L. Ash; Diana P. Bojanova; Martine Buatier; Virginia P. Edgcomb; Christophe Y. Galerne; Swanne Gontharet; Verena B. Heuer; Shijun Jiang; Myriam A.C. Kars; Ji-Hoon Kim; Louise M.T. Koornneef; Kathleen M. Marsaglia; Nicolette R. Meyer; Yuki Morono; Raquel Negrete-Aranda; Florian Neumann; Lucie C. Pastor; Manet Peña-Salinas; Ligia L. Pérez Cruz; Lihua Ran; Armelle Riboulleau; John A. Sarao; Florian Schubert; S. Khogenkumar Singh; Joann M. Stock; Laurent M.A.A. Toffin; Wei Xie; Toshiro Yamanaka; Guangchao Zhuang