



Geochemical modeling of shallow submarine hydrothermal systems

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Shallow submarine hydrothermal activity occurs in the western coast of Mexico and along the Gulf of California coast, it is related to faults probably generated by Tertiary extensional tectonics. Diffuse and focused hydrothermal venting of water and gas occurs at depths from 5 down to 30 mbsl. Temperatures in the submarine vents vary from 50°C to more than 100°C. A common feature is the enrichment of the thermal water in Ca, As, Hg, Mn, Ba, Li, Sr, B, I, Cs, Fe and Si with respect to seawater. The results show that the water chemistry is similar in these coastal hydrothermal systems. O and H isotopic composition shows that thermal water has a meteoric origin component that penetrates through the extensional faults, and is heated by high geothermal gradient. Some components in the thermal water are contributed by the deep strata in each location. Chemical modeling of the hydrothermal solutions and deposited minerals suggests that the interaction of deep circulating thermal water with underlying sediments and further mixing with seawater constrain the composition of the vent fluids.