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The smectite to chlorite transition in the Chipilapa geothermal system, El Salvador

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ABSTRACT

Clay mineralogical X-ray diffraction and electron microprobe studies have been carried out on separated <2 μm fractions from cutting and core material from three wells in the Chipilapa geothermal system in El Salvador. The data indicate that the smectite to chlorite transition is prevalent, but a secondary smectite to illite transition is also present. At depths approximately <750 m, smectite with very minor chlorite mixed-layers (approximately <15%) is dominant, and has a composition midway between a di- and tri-smectite. At ~750 m there is a very clear distinction and sharp transition into discrete chlorite with very minor smectite mixed-layers (approximately <10%). Corrensite is recorded only as a rare and minor phase.

Smectite occurs in abundance at temperatures up to ~200 °C, and the transition from a smectite-dominant to chlorite-dominant assemblage takes place over a narrow temperature range (~150 to 200 °C). The stability range of smectite is very similar to that recorded in other geothermal systems, whereas the smectite to chlorite transition differs greatly from that recorded in other systems. The transition does not involve continuous chlorite/smectite mixed-layering but a marked step: It is the sharpest and most discontinuous stepped sequence of this mineralogical transition recorded.