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# Hydrothermal Origin of the Clays from the Upper Slopes of Mauna Kea, Hawaii

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**Abstract:** The soils of the summit region of Mauna Kea are similar to the soils of the high mountain deserts and to the soils of cold deserts. Dramatic differences, however, exist between the soils of the summit and other neighboring cones and the soils of the glaciated terrain. The soils of some of the cones of the summit area are clay rich and contain phyllosilicate minerals; the soils of the glaciated terrain are sandy and contain X-ray amorphous clay. Montmorillonite and a Mg-rich trioctahedral mineral identified as saponite are the clay minerals of the summit. Because the summit area of Mauna Kea supported an ice cap at the time of the formation of the cones, the origin of the smectite minerals could have resulted from the alteration of the tephra by steam and water released in the melting of the ice. Hypogene fluids are, however, more likely to be responsible for the genesis of the phyllosilicate minerals.

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