Characterization, Origin, and Significance of Carbonate Pulverulite: A Weathering Product of Microporous Strata

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ABSTRACT

Pulverulite rock is a very porous and weakly-cemented fine-grained carbonate (commonly limestone, containing variable amounts of dolomite, or dolostone), and pulverulite powder is a very fine degradational product of the pulverulite rock. The rock and powder are produced by weathering of microporous carbonates. In the Texas Hill Country area surrounding Junction, Texas, on the Edwards Plateau, pulverulite rocks and powders are common and well exposed. From a number of roadcuts, we investigated the formation of pulverulite rock and powder by analyzing samples that represent the transition from intact and firm parent rock, to slightly-weathered rock, to pulverulite rock (strongly weathered), to pulverulite powder. The process that produced the transition from intact rock to pulverulite rock was dissolution by meteoric water of an initial microporous limestone. Pulverulite powder formed by breaking down weakly-lithified pulverulite rock by rain and possibly, in part, by freeze/thaw cycles, or a combination of the two. The force of recrystallization of dissolved carbonate also may have added to the breakdown of the parent rock. Pulverulite rock in the Texas Hill Country is composed predominantly of weakly-cemented microcrystalline calcite particles that are rounded and pitted by dissolution. Similar pulverulite rocks are seen in the Middle East, where they form portions of economical microporous hydrocarbon reservoirs beneath unconformities. Relict pulverulite powder in the ancient record is a criterion for subaerial weathering.

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