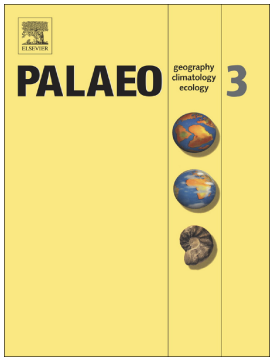

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The west water formation (hualapai plateau, arizona, usa) as a calcrete-paleosol sequence, and its implications for the paleogene-neogene evolution of the southwestern colorado plateau

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ABSTRACT. Analyses of stratigraphic sequences within the paleocanyons of the Hualapai Plateau, Arizona, are important because these deposits offer the only evidence for the Paleogene-Neogene geological history of the Grand Canyon area. In this paper, we focus on the origins and paleoenvironmental significance of the West Water Formation, located within the Milkweed and West Water paleocanyons on the Hualapai Plateau. We propose that the supposed "limestone unit" of the West Water Formation at and near its type section is not a limestone; rather, it is a 21 m-thick valley calcrete, overprinted by a ~1-2 m-thick pedogenic calcrete, and subsequently dolomitized in its upper-to-middle sections, with a superimposed 4 m-thick red paleosol. We also propose that this unit is not coeval in age or origin with the Long Point limestone (LPl) on the Coconino Plateau, and that the presence of a complex calcrete-dolocrete-paleosol alters previous interpretations associated with this unit. Evidence for a calcrete-paleosol origin, beyond the West Water Formation's lack of fossils, includes: its predominantly micritic calcite-palygorskite composition; its textures characteristic of valley and pedogenic calcrete deposits (as exhibited by thin section, SEM, and TEM analyses); and its association with a relatively thick overlying red paleosol that also contains abundant palygorskite. Stable carbon and oxygen isotope values from carbonate cements are also within the range expected of a near-surface calcrete. Carbonate minerals within the calcrete-dolocrete were precipitated at or near the water table in a valley setting due to evaporation and/or CO_2 degassing in a semi-arid to arid environment of deposition. High $^{87}Sr/^{86}Sr$ values within the calcrete were inherited from groundwater infiltrating through Music Mountain Formation arkosic sediments, which were derived from a Precambrian source terrane to the south and southwest. No absolute ages exist