ABSTRACT

TITLE:	Paleoclimate and Sequence Stratigraphy of Multistory Paleosols: Honaker Trail Formation, Southeast Utah
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ABSTRACT: A sequence of paleosols in the regressive sequence of the Late Pennsylvanian (Missourian) Honaker Trail Formation is interpreted in terms of climate and landscape evolution, and sequence stratigraphic significance based on field, petrographic, and isotopic evidence. The study section consists of ~10m of calcareous loessite containing multistory weakly developed paleosols overlain by a ~3.5m thick mature calcisol, ~1.5m of calcareous green siltstone and a fusilinid rich limestone. The immature paleosols are characterized by calcareous rhizoliths in a fine grained sand/silt matrix with almost no destruction of original bedding structures. These sediments are interpreted to have been deposited during low stand in an arid environment with sparse vegetation when eolian transport of fine grained material was unimpeded by the presence of standing water or abundant vegetative cover. The mature paleosol is characterized by: well developed blocky ped structures, accumulation of pedogenic carbonate to stage 3 (as defined by Gile et al. 1966), rhizoliths in the form of stacked carbonate nodules, clay slickensides, and drab mottles in an otherwise red matrix of clay and silt. Stable isotope analysis of pedogenic carbonates from the mature paleosol showed Carbon and Oxygen stable isotope ratios are depleted (C13 avg. -6.03 PDB and O18 avg. -4.01 PDB) relative to marine carbonates of similar age. Stable Carbon ratios are depleted sufficient to infer soil CO2 was present during carbonate precipitation. However, stable Oxygen isotope ratios were only slightly depleted compared to marine water values at the time; this may be a result of overprinting from isotopically heavier marine fluids moving through the soil post deposition. The formation of a mature soil is interpreted to be the result of increased humidity reducing wind transport of sediment and encouraging landscape stabilization through increased vegetative cover. The color and lack of pedogenic features in the green siltstone suggests a reducing, waterlogged depositional environment not conducive to plant growth and is interpreted as a transgressive supratidal deposit. This hypothesis is supported by the presence of glauconite and the fact that the green siltstone underlies a marine carbonate.