

Red Dog Loess, evidence for Pleistocene ecological collapse, White River Badlands, S.D.
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Understanding detrimental effects of prehistoric climate change is essential to understanding our potential for future global climate disasters. During the Last Glacial Period (LGP) beginning around 70 thousand years ago, as Earth's temperature dropped, the midcontinent grew increasingly dry, resulting in ecological collapse of the Great Plains grassland ecosystems. Due to the breakdown of the grasslands, wind eroded the Great Plains, depositing vast amounts of windblown dust (loess). Loess deposits form valuable midcontinental agricultural deposits in Nebraska and Iowa. This study aims to identify the origin of loess found on mesas in the White River Badlands (WRB) of South Dakota, which is called the Red Dog Loess. If the composition of the Red Dog Loess is similar to the composition of sediments from other environments in the WRB, then this supports a local source. To test our hypothesis, we analyzed geochemical composition and particle size distribution of sediments from various environments (streams, floodplains, bedrock) in the WRB and compared these results to the composition of the Red Dog Loess. Preliminary results show compositional similarities between stream deposits and the Red Dog Loess, supporting the hypothesis of a local source, from which we infer a local ecological collapse in the WRB. These events likely correlate with global climate events including the LGP, as well as more recent Holocene (last 12,000 years) climate shifts such as the Medieval Climate Anomaly, and the Little Ice Age. Understanding the effects of these climate events could help predict future catastrophic events across the Great Plains.