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PALEOSOLS AS PROXY DATA FOR CLIMATE CHANGE — INTERPRETING HOLOCENE DEPOSITS IN THE BADLANDS AND PRAIRIES OF WESTERN NORTH DAKOTA

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Late Holocene sediments in badlands terrain of Theodore Roosevelt National Park, Billings County, and in prairie settings of Knife River Indian Village National Historic Site, Mercer County, and along the north shore of Lake Sakakawea (Missouri River), McLean County, preserve a record of numerous paleosols buried by alluvial deposits. Along the headwaters of Knutson Creek in Roosevelt Park, Ab horizons occur in minor sections (<1.6 m) with as many as 10 paleosols. Although not dated directly, a date from a nearby section suggests formation of the paleosols over the last 1430 years (all dates are from AMS radiocarbon analyses). The Knife River Elbee Bluff Locality contains 8 Ab horizons in a 2.4-m section, the middle portion of which has five thin, evenly spaced paleosols from about 2000 to 2974 years BP. The Lake Sakakawea Douglas Creek Locality consists of a stacked sequence of 15 Ab horizons in a 2.8-m section that can be traced laterally across a small paleovalley. Excluding the lowermost paleosol, the remaining paleosols occur in a 2.2-m section spanning about 1580 years, from an estimated maximum of 4165 years to 2585 ±60 years BP.

The paleosol record preserved at all three localities indicates that soils seem to have been the result of relatively stable environments interrupted by brief episodes of burial every 110 to 170 years. The regularity of these burial events may stand as possible proxy indicators of minor climatic variation on an otherwise general record of climate stability. Stable carbon studies of these paleosols indicate generally cool and moist conditions ($-22.6 \pm 0.6 \delta^{13}\text{C}_{\text{PDB}}\text{‰}$), except for those forming about 2585 years BP (Douglas Creek) to at least 2165 years BP (Elbee Bluff), during which warmer and drier conditions ($-20.0 \pm 0.4 \delta^{13}\text{C}_{\text{PDB}}\text{‰}$) more likely prevailed.

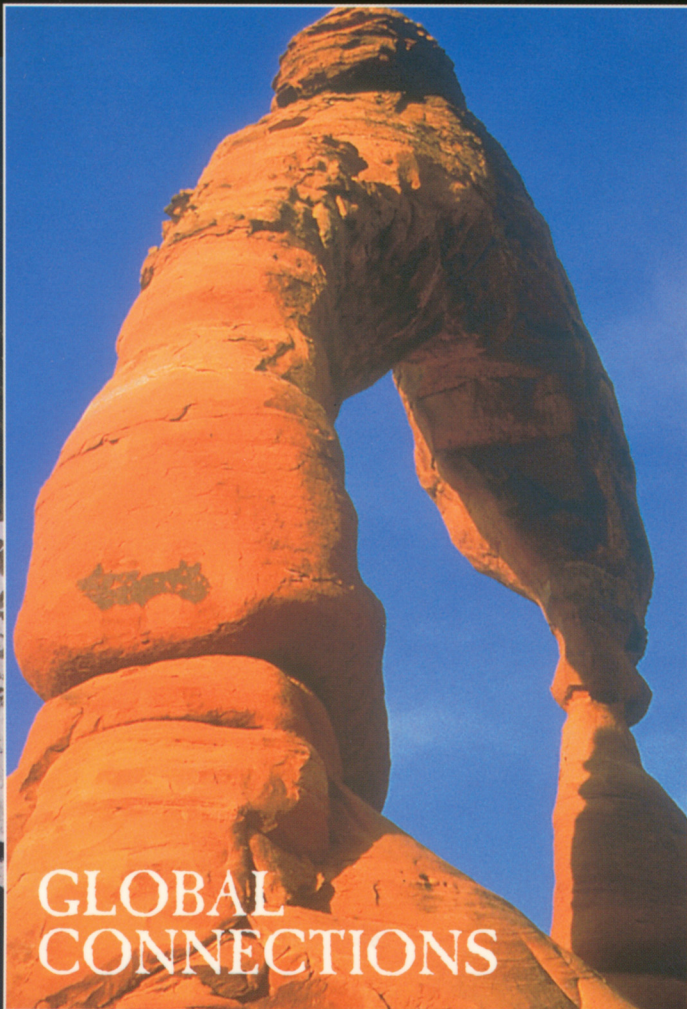
Holocene, paleosols, climate, North Dakota



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