

Tephrostratigraphy of the Late Cretaceous Western Interior Seaway

By

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The primary goal of this investigation is to establish a regional chronostratigraphy for sediments associated with the Late Cretaceous Western Interior Seaway. The paleoshoreline of the Western Interior Seaway runs north-south through central Montana; there numerous bentonites are described from terrestrial deposits of the Two Medicine Formation. A crystal-lithic tuff dated at 80.002 ± 0.114 Ma ($^{40}\text{Ar}/^{39}\text{Ar}$ on plagioclase) is believed to have erupted from the Elkhorn Mountains Volcanics (~200 km west) and has bentonitic distal equivalents present in marine deposits which crop out in Alberta, South Dakota, and Wyoming. The abundance and geographic extent of these bentonites makes them highly useful for chronostratigraphic studies.

The chemical composition of phenocryst phases will be used to characterize individual events. Biotite and sanidine are abundant in both proximal and distal bentonites. Correlation of bentonites will rely primarily on stratigraphic position and Electron Microprobe Analysis of sanidine phenocrysts. All analyses are taken 75% of the distance from the core to the rim. This point closely approximates the volume average of the grain. A preliminary suite of analyses establishes the range of Orthoclase (K) content for the sanidine phenocrysts, and detects the presence of authigenic alteration rims. Variations in other oxides (Fe_2O_3 , BaO) at a fixed Orthoclase content are unique, and sufficient to distinguish bentonites from the same locality. Application of these chemical signatures to correlation of bentonites will have significant bearing on regional geologic problems, and greatly aid integration of the marine and terrestrial records.