

Meteoric Diagenesis of the Upper Winnipegosis Member in the Subsurface of South-central Saskatchewan, Canada

Qilong Fu*, Hairuo Qing* and Katherine Bergman
Department of Geology, University of Regina, Regina, SK S4S 0A2

In south-central Saskatchewan, the Upper Winnipegosis Member is composed of dolomitized carbonate mounds as much as 98 m thick. The various, meteoric diagenetic features are preserved in the upper part of the mounds.

Solution vugs, channels and caverns are common in the Upper Winnipegosis, and most of them are lined or filled with anhydrite/gypsum and/or dolomite. The cavern may be several meters in height. Speleothems and cave sediments are observed in several cores. The solution voids occur as deep as 50 m below the top of the Winnipegosis, suggesting that meteoric/brackish water penetrated carbonate mounds deeply during lowered sea-level and subaerial exposure. Crackle breccias and chalky, friable to powdery, white to tan dolomite deposits occur in the upper mounds. Crackle breccias are commonly angular and cemented with anhydrite or gypsum. Meteoric alternation is also indicated by pisolites, cements, crystal silts and some other diagenetic features.

The results of this study shows the Winnipegosis carbonate is characterized by a predominance of secondary porosity with significant vertical and lateral heterogeneity controlled by diagenesis. The mounds were subaerially exposed and subjected to the influence of meteoric water. Meteoric diagenesis is one of the key processes that control porosity evolution.