

## Formation of non-hydrothermal saddle dolomite in the Ordovician Yeoman Formation, Southeastern Saskatchewan

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Minor saddle dolomite cements are identified in the Upper Ordovician Yeoman carbonate rocks in southeastern Saskatchewan. These saddle dolomite cements are restricted to upper part of the Yeoman Formation, in a 20–30 m zone of dolomite rocks, and they are conspicuously absent both in the underlain limestones and overlying dolostones and limestones, suggesting their precipitation in a relatively closed system. These Ordovician saddle dolomite cements are characterized by  $\delta^{13}\text{C}$  values (-0.2 to 0.9 ‰ PDB) and Sr isotopic ratios (0.7082 to 0.7090) similar to those of their host replacement dolomites, indicating the sources of carbon and strontium for the saddle dolomite cements were mostly from precursor host dolomite rocks via pressure dissolution. The distinct lower  $\delta^{18}\text{O}$  values of saddle dolomite cements (-10.2 to -11.1 ‰ PDB) than those of their dolomite host rocks (-5.9 to -8.1 ‰ PDB) were partially attributed to the precipitation of saddle dolomite at higher temperatures. The measured homogenization temperatures from the saddle dolomite cements vary from 99 to 105 °C, which could be accounted for by the normal burial temperatures in the region. Based on these data and observations, the saddle dolomite cements in the Upper Ordovician Yeoman Formation in southeastern Saskatchewan are interpreted to be related to pressure solution of earlier replacement dolomite in a relatively closed system during burial, rather than related to hydrothermal activities documented elsewhere in the Western Canada Sedimentary Basin. The occurrences of saddle dolomite, therefore, are not necessarily indicative of hydrothermal activity or fluids; nor are all saddle dolomites definitely related to hydrothermal fluids.