

Diagenesis of shallow marine sandstones, the Lower Ordovician Dongjeom Formation, Korea: Response to relative sea-level changes

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This study deals with the diagenesis of shallow-marine mature sandstones in the view of relationship between depositional conditions and diagenesis. The Dongjeom Formation (Early Ordovician), Korea is composed of three coarsening-upward siliciclastic sequences deposited on an extensive carbonate platform. Dongjeom sandstones are divided into two facies according to depositional conditions with respect to changes in relative sea-level: transgressive facies and regressive facies. The transgressive facies are characterized by calcareous sandstones, and regressive facies by quartzose to feldspathic (non-calcareous) sandstones. Dongjeom sandstones in the different facies experienced different pathways of diagenesis. In the regressive facies, siliciclastic deposition was dominant and feldspar grains were broken by active reworking and concentrated in the finer fraction. With deep burial, the regressive facies sandstones experienced significantly chemical compaction and quartz cementation. In the transgressive facies, carbonate grains were concentrated, which was successively followed by extensive early calcite cementation. Such early calcite cementation prevented the transgressive facies sandstones from further significant diagenetic changes during deep burial. The results of this study indicate that the composition, early diagenesis, and late diagenesis are intimately related to each other and that diagenesis of Dongjeom sandstones was mainly controlled by depositional facies formed in response to relative sea-level changes.