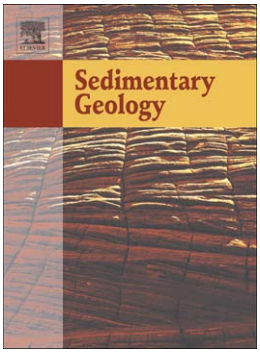

What do we really know about early diagenesis of non-marine carbonates?

Eva De Boever, Alexander T. Brasier, Anneleen Foubert, Sándor Kele

PII: S0037-0738(17)30200-2
DOI: doi:10.1016/j.sedgeo.2017.09.011
Reference: SEDGEO 5235

To appear in: *Sedimentary Geology*

Received date: 6 June 2017
Revised date: 14 September 2017
Accepted date: 15 September 2017

Please cite this article as: De Boever, Eva, Brasier, Alexander T., Foubert, Anneleen, Kele, Sándor, What do we really know about early diagenesis of non-marine carbonates?, *Sedimentary Geology* (2017), doi:10.1016/j.sedgeo.2017.09.011

What do we really know about early diagenesis of non-marine carbonates?

Eva De Boever[a]*, Alexander T. Brasier[b], Anneleen Foubert[a], Sándor Kele[c]

[a] *Department of Geosciences and Geology, University of Fribourg, Fribourg, Switzerland*
[b] *School of Geosciences, University of Aberdeen, Old Aberdeen, Scotland, UK.*
[c] *Institute for Geological and Geochemical Research, Research Centre for Astronomy and Earth Sciences,*
Hungarian Academy of Sciences, Budapest, Hungary
*Corresponding author: eva.deboever@unifr.ch ; Tel.: +41 26 300 89 73

Abstract

Non-marine carbonate rocks including cave, spring, stream, calcrete and lacustrine-palustrine sediments, are susceptible to early diagenetic processes. These can profoundly alter the carbonate fabric and affect paleoclimatic proxies. This review integrates recent insights into diagenesis of non-marine carbonates and in particular the variety of early diagenetic processes, and presents a conceptual framework to address them. With ability to study at smaller and smaller scales, down to nanometers, one can now observe diagenesis taking place the moment initial precipitates have formed and continuing thereafter. Diagenesis may affect whole rocks, but it typically starts in nano- and micro-environments. The potential for diagenetic alteration depends on the reactivity of the initial precipitate, commonly being metastable phases like vaterite, Ca-oxalates, hydrous Mg-carbonates and aragonite with regard to the ambient fluid. Furthermore, organic compounds commonly play a crucial role in hosting these early transformations. Processes like neomorphism (inversion and recrystallization), cementation and replacement generally result in an overall coarsening of the fabric and homogenization of the wide range of complex, primary microtextures. If early diagenetic modifications are completed in a short time span compared to the (annual to millennial) time scale of interest, then recorded paleoenvironmental signals and trends could still acceptably reflect original, depositional conditions. However, even compact non-marine carbonate deposits may behave locally and temporarily as open systems to crystal-fluid exchange and overprinting of one or more geochemical proxies is not unexpected. Looking to the future, relatively