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Catherine Lerouge, Sylvain Grangeon, Martin Mazurek, Guillaume Wille

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Role of clay minerals on the carbonate chemistry in a marine clay formation

Lerouge C., Grangeon S., Mazurek M., Wille G.

Samples from different levels of the Opalinus clay formation at Benken were studied for their mineralogy using X-ray diffraction, and for chemistry of diagenetic calcite, using X-Ray diffraction and electron microprobe (EPMA). X-ray diffraction data combined with EPMA mean chemical composition of calcite indicate that the calcite *c* lattice parameter decreases with the decreasing Ca occupancy in its cationic site, and consequently with incorporation of trace elements in calcite, the major ones being Fe and Mg. At the scale of the formation, the trace element content in calcite is anticorrelated with clay content in the claystone.

The different generations of diagenetic calcite identified in a sample (micrite in clay matrix, and sparite in silty layers or lenses) exhibit almost the same trace element content, but are characterized by different Fe/(Fe+Mg) atomic ratios : <0.45 for micrite and ~0.7 for sparite. These data suggest that clay minerals have a constant control on the cation content of porewater from which calcite precipitated, but cation ratios are respected independently of cation sorption on clay minerals.

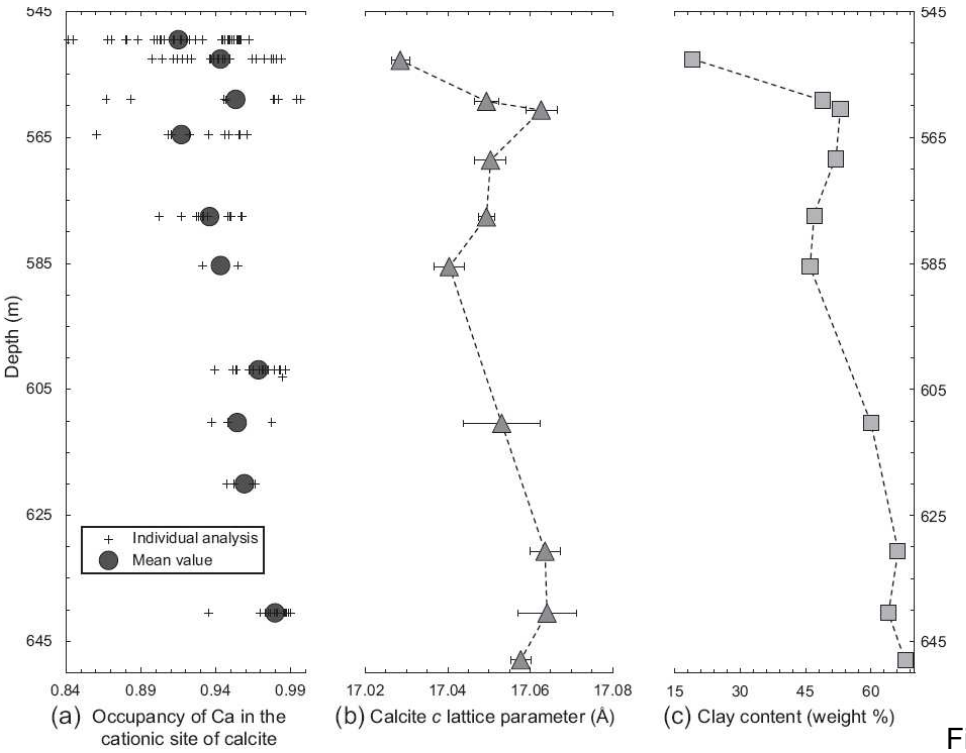

Figure 1.