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The effects of post-deposition dissolution on the cristallinity and Mg/Ca content of calcite from planktonic foraminifera *Globorotalia tumida.*

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Several authors suggested that the thinning, with increasing depth of deposition, of X-ray diffractometry (XRD) peaks from foraminifera calcite results from the preferential removal of poorly crystallized parts as dissolution increases (Bonneau and al, 1980; Bassinot and al, 2004). Thus, Bassinot and al (2004) suggested that the Full Width at Mid-Height (FWMH) of calcite diffraction peak (104) could be used as a quantitative dissolution index. However, the substitution of Ca^{2+} by Mg^{2+}reduces the dimensions of the calcite lattice, which results in a shift of X-ray diffraction peaks toward higher angles and modifies the geometry of the peaks. By deconvoluting XRD main diffraction peak (104) of foraminifera calcite, we show that the FWMH does not depend only upon crystallinity (an estimate of the degree of perfection of the crystal organization), but reflects also the chemical and structural heterogeneity of foraminifera tests. This heterogeneity results in closely spaced, individual (104) diffraction peaks corresponding to several calcite phases with slightly different Mg contents.

We worked on the planktonic foraminifera *Globorotalia tumida* picked from surface sediments retrieved along a depth transect between 2750 m and 4950 m of water depth on Sierra Leone Rise. Based on electron-microprobe analyses, Brown and Elderfield (1996) had shown that *G. tumida* foraminifera tests contain two main calcitic phases: a Mg-poor "outer" calcite corresponding to the external crust, mainly composed of a surrounding keel, and a Mg-rich "inner" calcite corresponding to the chamber walls.

Our deconvolution of X-ray diffraction peak (104) confirms the results from Brown and Elderfield and the existence of two calcite phases with slightly different Mg content. Our results also show that:

– the Mg-poor calcite is well-crystallized and does not seem to be noticeably affected by dissolution;

– the Mg-richer calcite is poorly-crystallized and is preferentially removed during dissolution (resulting in an progressive improvement of its crystallinity as the most poorly-crystallized parts are preferentially dissolved with increasing depth of deposition).

This example illustrates the species-specific behavior of foraminifera tests relative to dissolution processes (which affect both trace element contents and calcite crystallinity), and its close relationship to the structural organization of tests (multi-phase calcite) and, therefore, to the mechanism(s) driving their mineralization.

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