Electronic Supplementary Information

Precise Analysis of Calcium Stable Isotope Variations in Biological Apatites using Laser Ablation MC-ICPMS

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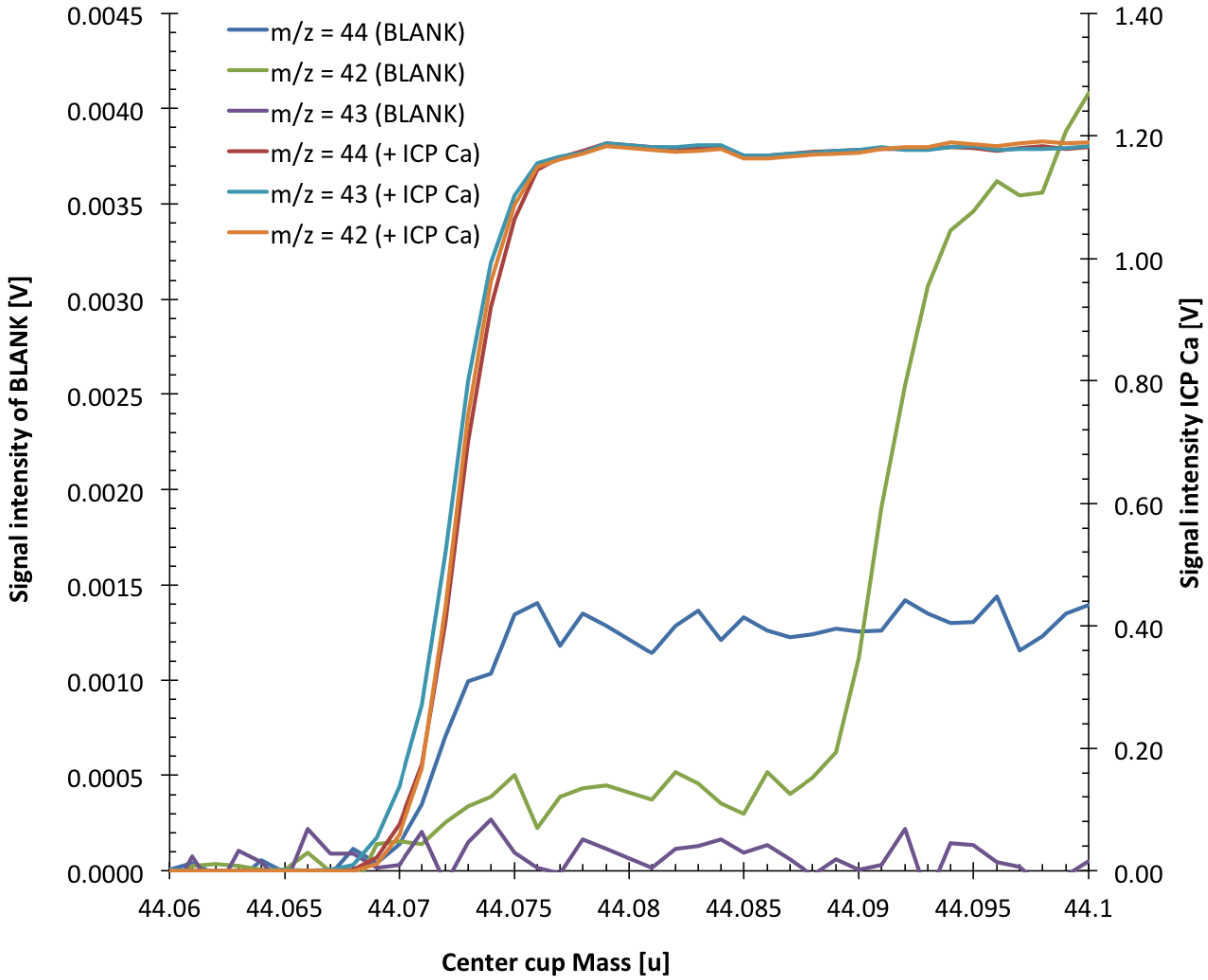


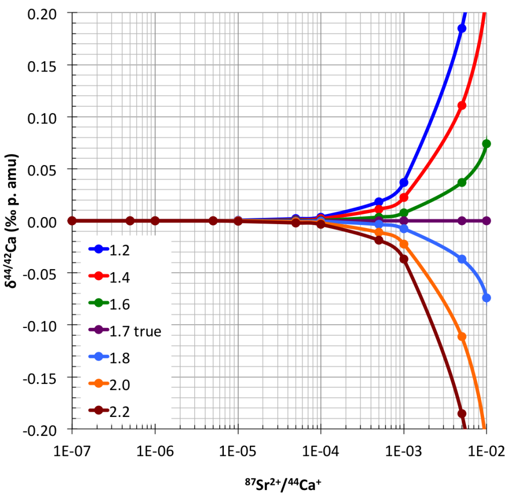
Figure S1: **Mass scans in blank (Ar + He gases only) and with added Ca (ICP Ca *via* Aridus II) in LA mode** measured with settings described in Table 2B. Calcium isotope analyses were carried out between the left side of Ca peak and $^{40}Ar^{1}H^{2+}$ growing interference on the right side of m/z = 42 BLANK signal. No difference is observed when compared to scans performed in SOL mode only, as published elsewhere (Wieser et al., 2004, Tacail et al., 2014)

Figure S2: Modelling of doubly charged Sr interferences mis-corrections

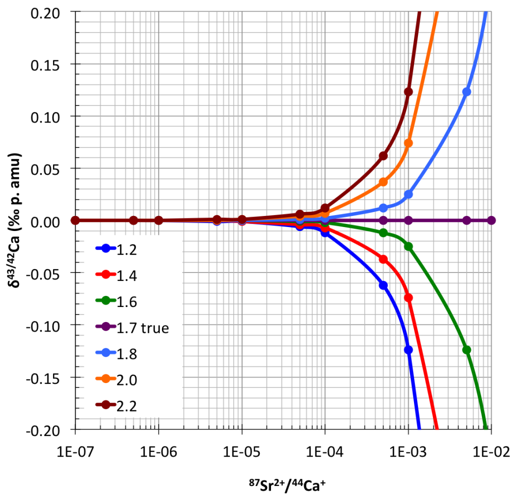
The influences of both parameters $f_{Sr^{2+}}$ instrumental mass fractionation factor and $^{87}Sr/^{86}Sr$ radiogenic ratio used for doubly charged Sr interferences corrections were assessed by performing theoretical calculations. We considered that both Ca and Sr were affected by an instrumentral mass fractionation following an exponential law with mass fractionation factors f_{Ca^+} and $f_{Sr^{2+}}$ of 1.7 both. $^{87}Sr/^{86}Sr$ true ratio was set at 0.7103 and ^{42}Ca, ^{43}Ca and ^{44}Ca signals were calculated with increasing Sr interferences ($^{87}Sr^{2+}/^{44}Ca^{+}$ between 10^{-7} to 10^{-2}).

Corrected $\delta^{44/42}Ca$ and $\delta^{43/42}Ca$ (in ‰ *per amu*) were finally calculated for various $f_{Sr^{2+}}$ and $^{87}Sr/^{86}Sr$ correcting parameters (Figure S3A to S3D). The $\delta^{44/42}Ca$ and $\delta^{43/42}Ca$ true values (0‰) are found when correction is performed with true $f_{Sr^{2+}}$ and $^{87}Sr/^{86}Sr$ (1.7 and 0.7103 respectively)

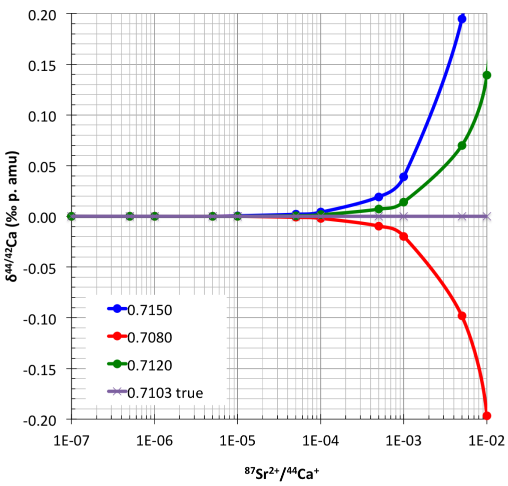
Slopes and offsets at origins of $\delta^{43/42}Ca$ - $\delta^{44/42}Ca$ mass fractionation lines were also calculated using varying $f_{Sr^{2+}}$ and $^{87}Sr/^{86}Sr$ correcting parameters.



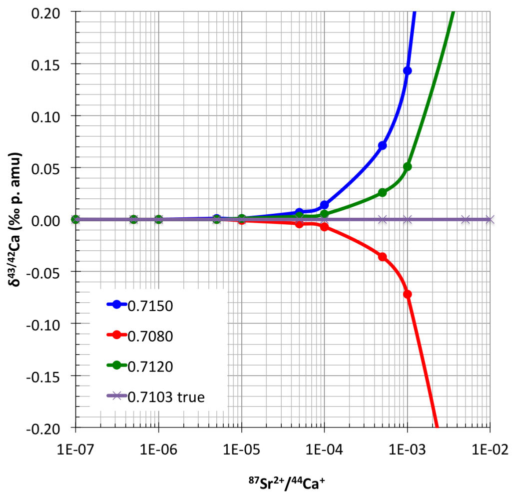
S2A. $\delta^{44/42}Ca$ **(per amu) for varying corr.** $f_{Sr^{2+}}$



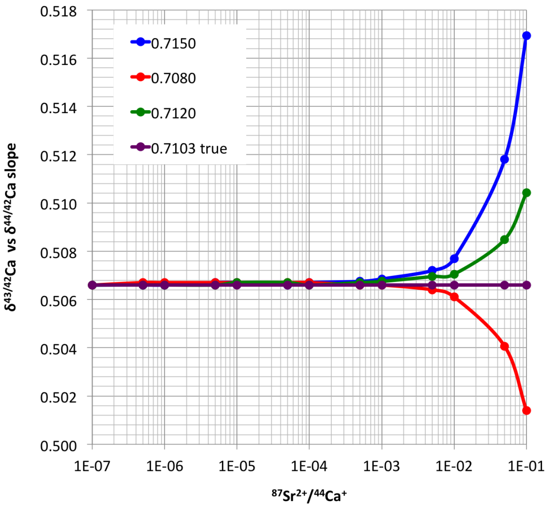
S2B. $\delta^{43/42}Ca$ **(per amu) for varying corr.** $f_{Sr^{2+}}$



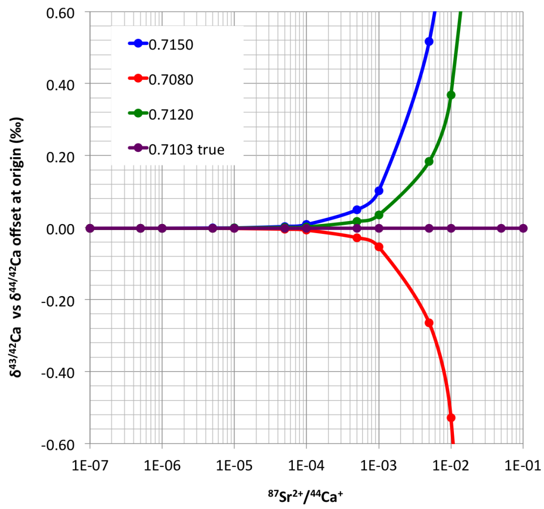
S2C. $\delta^{44/42}Ca$ **(per amu) for varying corr.** $^{87}Sr/^{86}Sr$



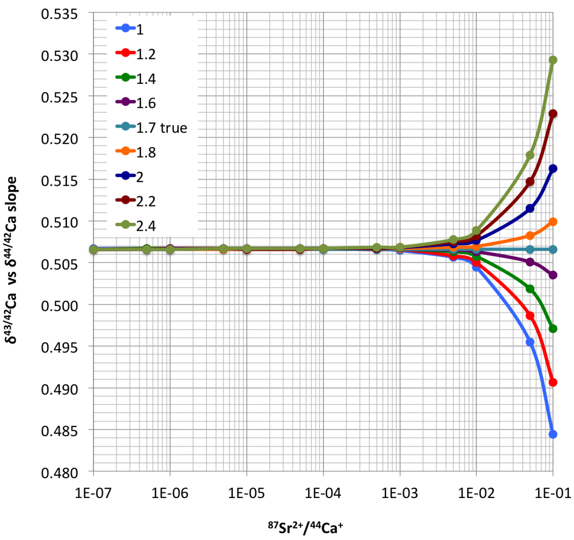
S2D. $\delta^{43/42}Ca$ **(per amu) for varying corr.** $^{87}Sr/^{86}Sr$



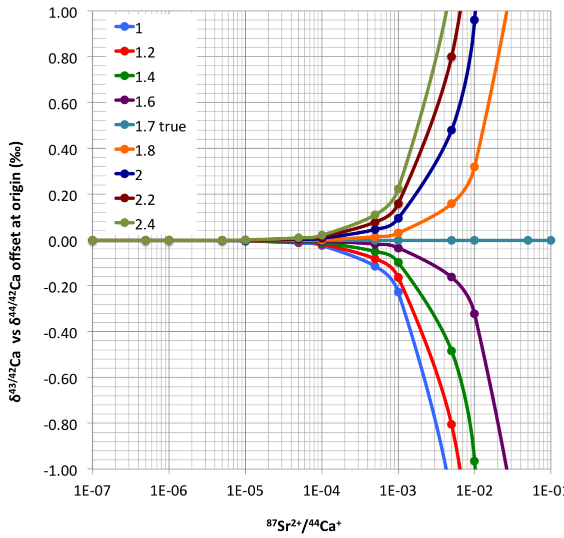
S2E. $\delta^{43/42}Ca$-$\delta^{44/42}Ca$ **slopes for varying corr.** $^{87}Sr/^{86}Sr$



S2F. $\delta^{43/42}Ca$-$\delta^{44/42}Ca$ **offsets at origin for varying corr.** $^{87}Sr/^{86}Sr$



S2G. $\delta^{43/42}Ca$-$\delta^{44/42}Ca$ **slopes for varying corr.** $f_{Sr^{2+}}$



S2H. $\delta^{43/42}Ca$-$\delta^{44/42}Ca$ **offsets at origin for varying corr.** $f_{Sr^{2+}}$