Electronic Supplementary Material (ESI) for JAAS.
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Supplementary figures

Figure S1

Effect of plasma loading on boron isotope measurements. Standards were measured against the eBlue standard (calcite) under the same ablation parameters (e.g. 2 hz 75mm vs 2hz 75 mm). The other ICP and laser parameters were kept constant. The ICP was tuned for maximum sensitivity and the laser was operated at 150 laser pulses per measurement and 6 repeats of each standard bracketed by the eBlue primary standard. Error bars are ±1SE from repeats.

Figure S2

Instrument mass-bias and its effect on boron isotope measurements. Colour coding is the same as in fig.1 and represents different carbonate standards. Grey symbols represent the NIST612 glass. Diamonds are data acquired at Cambridge and triangles are data collected at UWA. All error bars are ±2SE intervals. Note the lack of consistency in mass-bias, as reflected in absolute $^{11}B/^{10}B$ ratios and boron isotope variability in each standard. Offset $\delta^{11}B$ values for each standard were calculated as the difference between the average $\delta^{11}B$ value of each analytical session and the average $\delta^{11}B$ values of this standard across all analytical sessions (0 at y-axis).

Figure S3

Cross calibration between Faraday cups with 10^{13} Ω amplifiers and ion counters for boron isotope measurements. **A**) Mass scan around ^{10}B and ^{11}B masses. Note the signal is collected simultaneously by Faraday cups and ion counters. **B)** Linear regression of signals from Faraday cups and ion counters used for cross-calibration correction.

Figure S4

Effect of differences in the 10^{13} Ω amplifiers' time response on accuracy of boron isotope measurements.

A- Examples of down-hole fractionation for B signal of the three different carbonate standards. Red line and circles are signals from ablating sclerosponge Scl1 (scale on the left). Blue line and circles are signals from ablating NEP recrystallised press pellet

(scale on the right) and green line and circles are signals from ablation of the octocoral K2oct sample (scale on the right). Note data was collected at the same analytical session with identical laser and ICP parameters. The signal evolution is different for different carbonate matrices. B/Ca values were recalculated from B intensity without Ca normalisation (see methods section).

B- Evolution of B isotopes for each measurement. Red is Scl1 sclerosponge signal without time response correction and Blue is after time response correction. Solid lines and coloured envelope are polynomial regressions using weighted least squares method in R code package. Coloured intervals are ±1 standard error interval of the polynomial regression through the data (see www.r-project.org function loess). Note that red and blue signals are statistically different for most of the ablation period resulting in several ‰ offset between data obtained with and without the amplifiers' time-response correction.

Figure S5

Relationship of the offset between the expected and measured boron isotope values of carbonate standards (fig. 4 red symbols) and B concentrations of these standards.

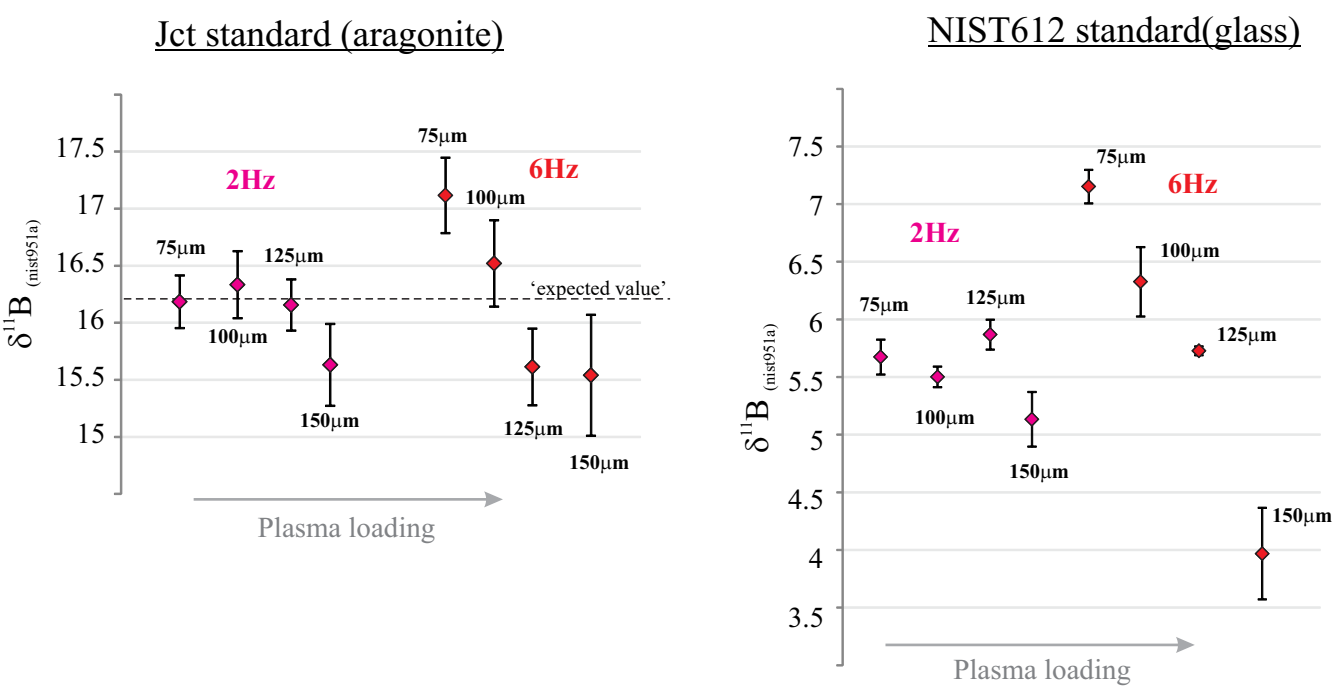

Figure S1

Effect of plasma loading on boron isotope measurements. Standards were measured against the eBlue standard (calcite) under the same ablation parameters (e.g. 2 hz 75mm vs 2hz 75 mm). The other ICP and laser parameters were kept constant. The ICP was tuned for maximum sensitivity and the laser was operated at 150 laser pulses per measurement and 6 repeats of each standard bracketed by the eBlue primary standard. Error bars are ±1SE from repeats.

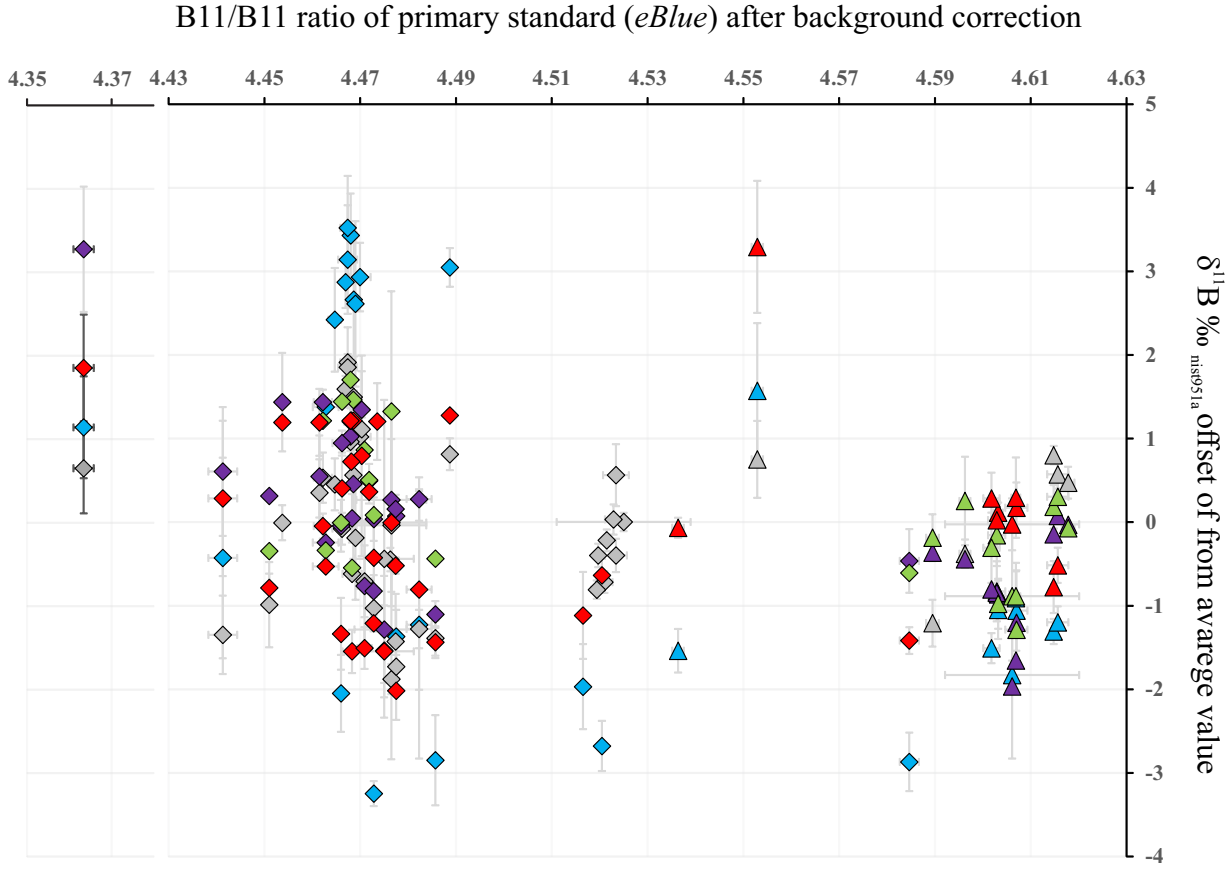

Figure S2

Instrument mass-bias and its effect on boron isotope measurements. Colour coding is the same as in fig.1 and represents different carbonate standards. Grey symbols represent the NIST612 glass. Diamonds are data acquired at Cambridge and triangles are data collected at UWA. All error bars are ±2SE intervals. Note the lack of consistency in mass-bias, as reflected in absolute $^{11}B/^{10}B$ ratios and boron isotope variability in each standard. Offset $\delta^{11}B$ values for each standard were calculated as the difference between the average $\delta^{11}B$ value of each analytical session and the average $\delta^{11}B$ values of this standard across all analytical sessions (0 at y-axis).

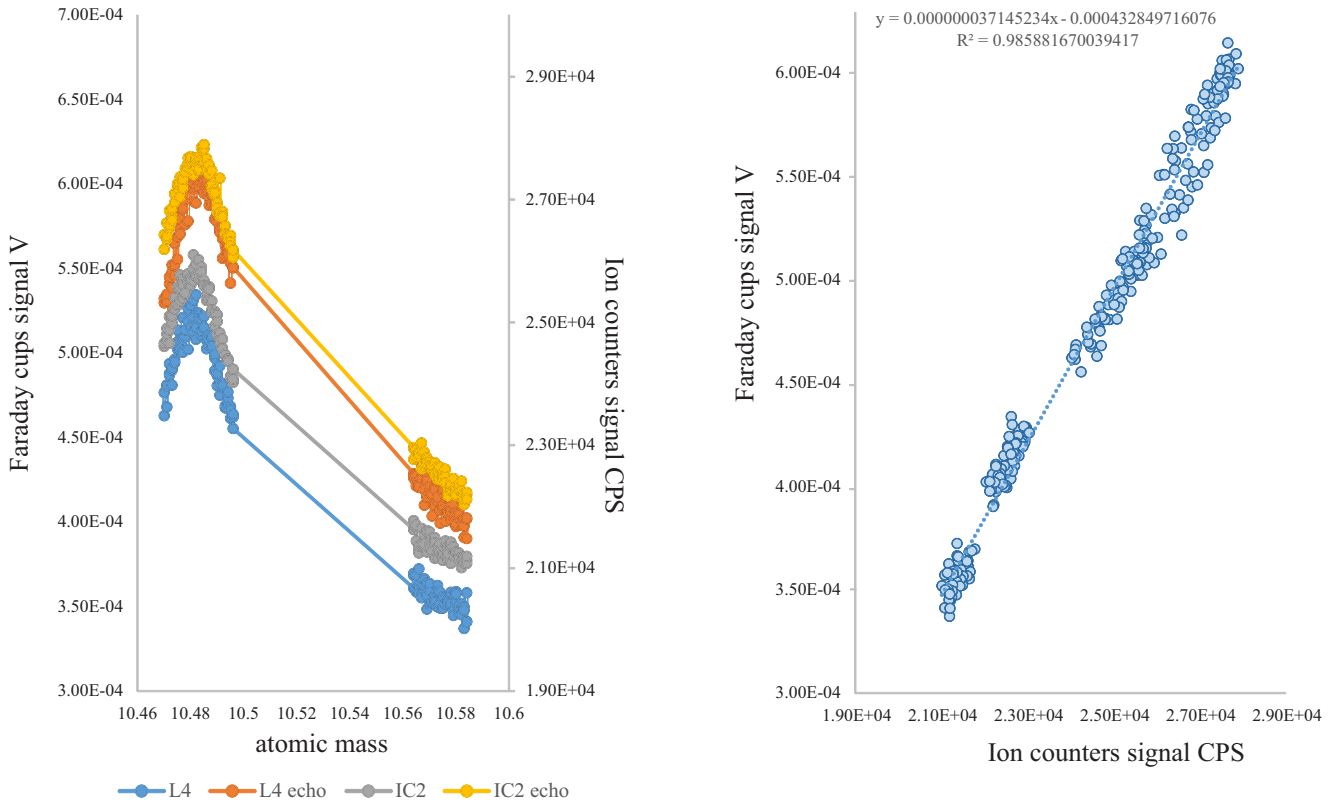

Figure S3

Cross calibration between Faraday cups with $^{13}\Omega$ amplifiers and ion counters for boron isotope measurements. **A**) Mass scan around ^{10}B and ^{11}B masses. Note the signal is collected simultaneously by Faraday cups and ion counters. **B)** Linear regression of signals from Faraday cups and ion counters used for cross-calibration correction.

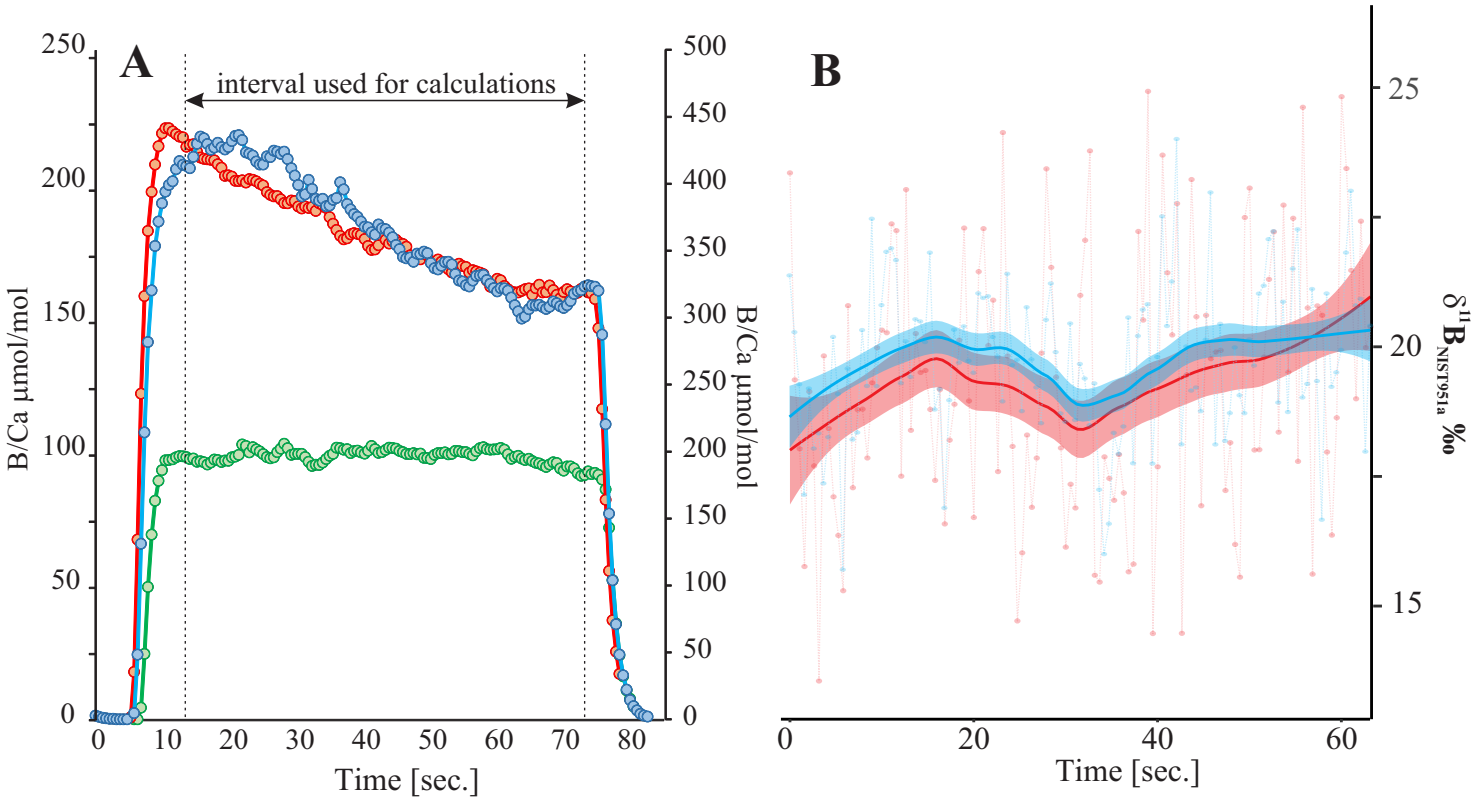

Figure S4

Effect of differences in the $^{13}\Omega$ amplifiers' time response on accuracy of boron isotope measurements.

A- Examples of down-hole fractionation for B signal of the three different carbonate standards. Red line and circles are signals from ablating sclerosponge Scl1 (scale on the left). Blue line and circles are signals from ablating NEP recrystallised press pellet (scale on the right) and green line and circles are signals from ablation of the octocoral K2oct sample (scale on the right). Note data was collected at the same analytical session with identical laser and ICP parameters. The signal evolution is different for different carbonate matrices. B/Ca values were recalculated from B intensity without Ca normalisation (see methods section).

B- Evolution of B isotopes for each measurement. Red is Sc1 sclerosponge signal without τ-correction and Blue is after τ-correction. Solid lines and coloured envelope are polynomial regressions using weighted least squares method in R code package. Coloured intervals are ±1 standard error interval of the polynomial regression through the data (see www.r-project.org function loess). Note that red and blue signals are statistically different for most of the ablation period resulting in several ‰ offset between data obtained with and without the amplifiers' time-response correction.

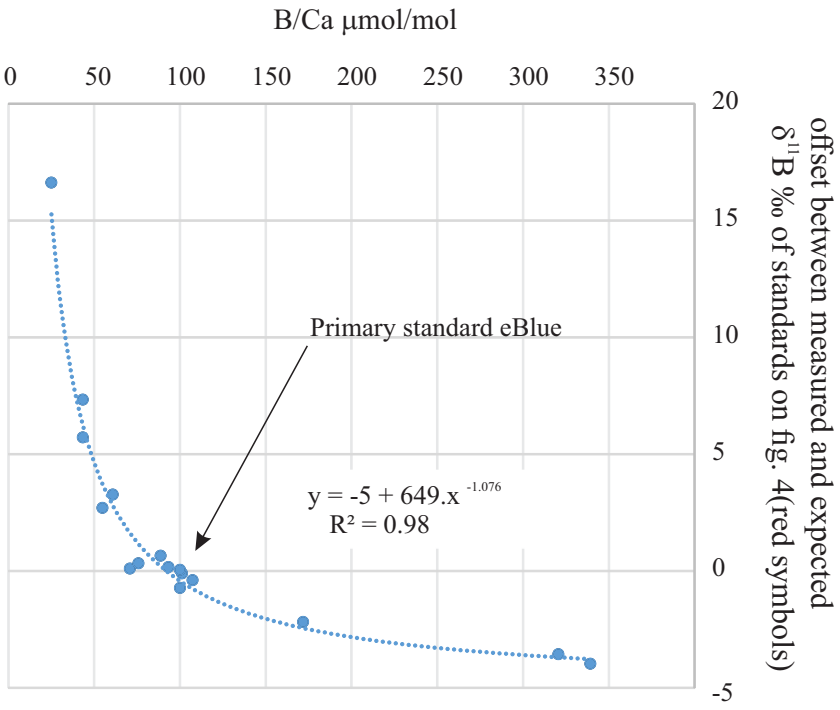

Figure S5

Relationship between offset in expected and measured boron isotope values of carbonate standards (fig. 4 red symbols) and B concentrations of these standards.