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Supplement of

Modal shift in North Atlantic seasonality during the last deglaciation

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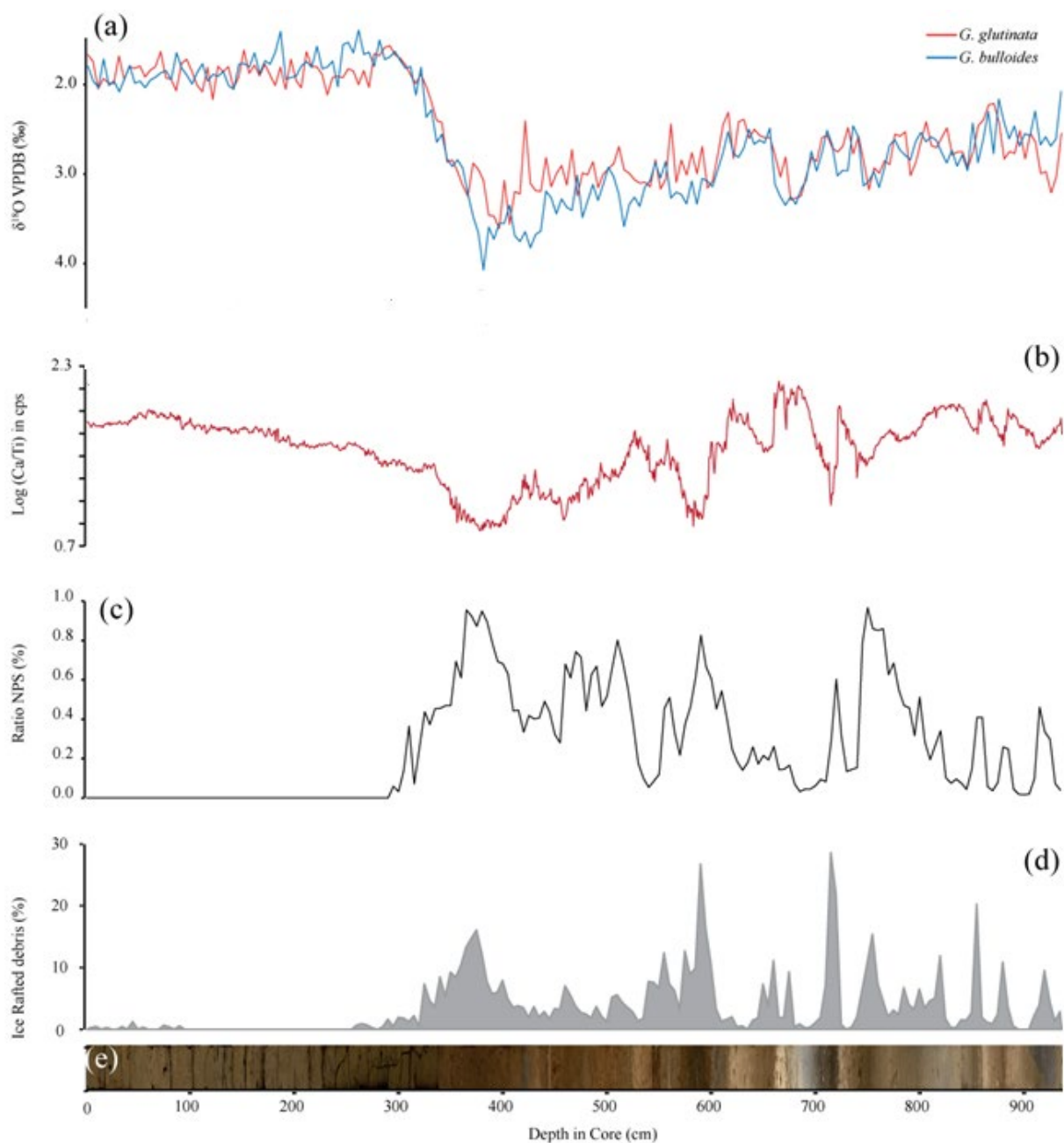
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| Lab Code | | Sample ID | Depth in core (cm) | Species | Measured Radiocarbon Age | ± | ¹³ C/ ¹² C ratio (δ ¹³ C in ‰) | Conventional Radiocarbon Age (in ¹⁴ C yr BP) | ± | Cal Age (in cal. Yr BP) | Cal Age (in cal. Yr BP) |
|----------|--------|--------------|--------------------------|--------------------------|-----------------------------|-----|---|--|-----|----------------------------------|----------------------------------|
| Beta | 343133 | T883P001BULL | 1 | <i>G. bulloides</i> | 570 | 30 | -0.41 | 970 | 30 | 626 | 508 |
| Beta | 343134 | T883P150BULL | 150 | <i>G. bulloides</i> | 3830 | 30 | -0.5 | 4230 | 30 | 4418 | 4225 |
| Beta | 343135 | T883P295BULL | 295 | <i>G. bulloides</i> | 8180 | 40 | -1.07 | 8570 | 40 | 9363 | 9077 |
| Beta | 343136 | T883P340BULL | 340 | <i>G. bulloides</i> | 10590 | 40 | -0.76 | 10990 | 40 | 12651 | 12445 |
| Beta | 343137 | T883P380PACH | 380 | <i>N. pachyderma</i> | 20750 | 90 | -0.68 | 21150 | 90 | 25316 | 24596 |
| Beta | 343138 | T883P500BULL | 500 | <i>G. bulloides</i> | 37080 | 370 | -0.68 | 37470 | 370 | 41890 | 41358 |

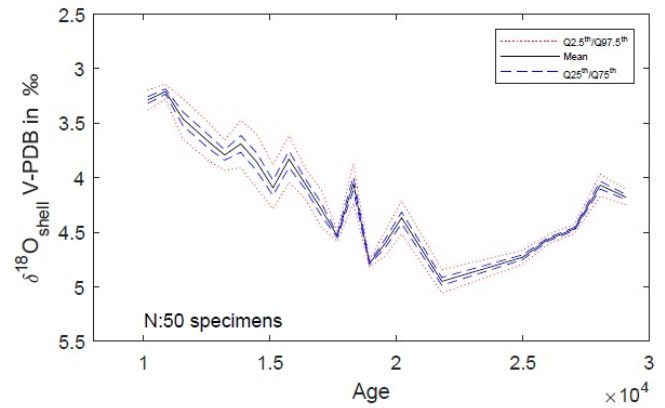
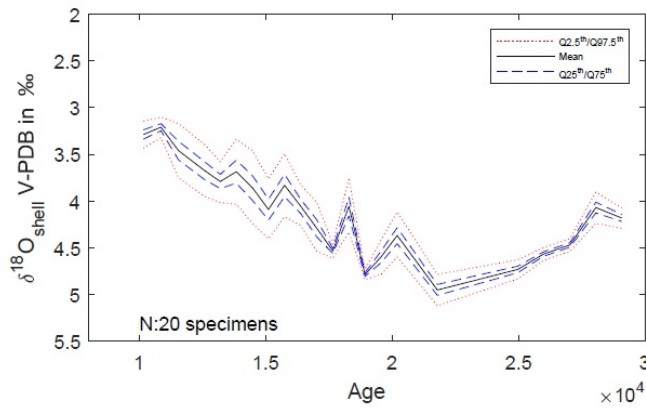
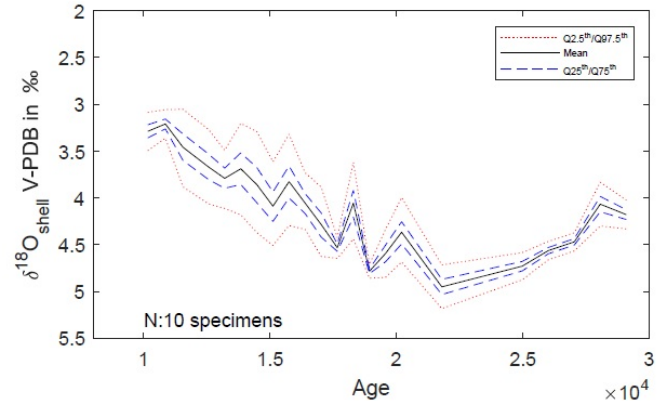
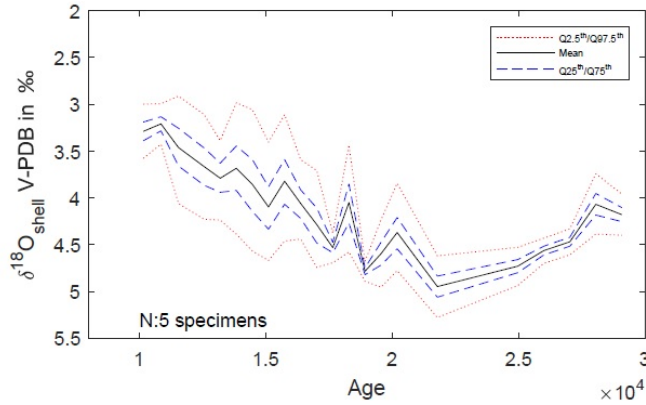
Supplementary Table S1: Raw and calibrated radiocarbon ages. Conventional radiocarbon age represents the Measured radiocarbon age corrected for isotopic fraction. Calendar ages were determined with the Marine 13 Calibration curve, determined ages in Table S1 have been rounded to the nearest 10 for samples with a standard deviation > 50 (i.e., sample T883P380PACH and T883P500BULL), here they are left unrounded.

| Depth in core T88-3P (in cm) | GICC05 Aligned Timescale (yr BP)* |
|---------------------------------|--------------------------------------|
| 0 | 0 |
| 285 | 9332.6 |
| 365 | 12114.8 |
| 405 | 25777 |
| 425 | 29442.4 |
| 475 | 35726.6 |
| 510 | 38190.5 |
| 605 | 44300 |
| 665 | 46804.6 |
| 695 | 48607.5 |
| 745 | 54110.3 |

Supplementary Table S2: Tie-points used for oxygen isotope tuned age model, based upon tuning to the NGRIP GICC05 timescale (*BP = GICC05 b2k - 50 year).



Supplementary Figure S1: Core stratigraphy of T88-3P with (a) $\delta^{18}\text{O}$ of *G. glutinata* (red) and *G. bulloides* (blue), (b) Log(Ca/Ti) ratio (c) abundance ratio (green) of *N. pachyderma* and *G. bulloides* (see methods), (d) percentage of ice rafted debris from particle counts (grey), and (e) Image of core T88-3P. Note the absence of *N. pachyderma* and IRD in the upper 300 cm.



Supplementary Figure S2: Output of estimate of pooled specimen variance for T88-3P. Using the unmixed populations of *N. pachyderma*, based the upon single shell measurements presented here, a pooled synthetic measurement was created using the probability of each population, and a synthesised normal distribution with the same mean and standard deviation. Estimates were made for 5, 10, 20, and 50 specimens. For each sample 10,000 replicates were produced, the mean (black line) of these pooled specimens remains near constant as a by-product of the number of replicates and therefore the purpose of comparison the quantiles are plotted for each sample against age. Four quantiles are used, the 2.5th and 97.5th quantiles (red dotted line) and the 25th and 75th (blue dashed line), which highlight the spread in the synthesised pooled specimen data.