Supplement

**Table S1:** Age control points in sediment core GS16-204-22CC. (1) This study, (2) Rutledal et al. (2020), (3) Griem et al. (2019).

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| **Tuning tie-point** | **Depth (cm)** | **Age (ka b2k)** | **Error** | **Sedimentation****rate (cm/ka)** |
| 𝛿13C (opt.)3 | 1.3 | 0.85 | 0.5 | 11.12 |
| 𝛿13C (opt.)3 | 39.1 | 4.25 | 0.5 | 11.51 |
| **Vedde Ash1** | 130.25 | 12.171 | 0.057 | 6.94 |
| AMS 14C3 | 150.5 | 15.09 | 0.353 | 4.81 |
| 𝛿18O (opt.)3 | 221.25 | 29.79 | 0.5 | 4.29 |
| AMS 14C3 | 230.25 | 31.89 | 0.282 | 7.44 |
| 𝛿18O (opt.)3 | 265.25 | 36.56 | 0.5 | 10.52 |
| 𝛿18O (opt.)3 | 282.25 | 38.2 | 0.5 | 11.23 |
| 𝛿18O (opt.)3 | 384.25 | 47.26 | 0.5 | 11.11 |
| **NAAZ II2,3** | 474.25 | 55.38 | 1.184 | 9.26 |
| 𝛿13C (opt.)3 | 514.25 | 59.7 | 0.5 | 2.49 |
| 𝛿18O (opt.)3 | 524.75 | 63.92 | 0.5 | 11.87 |
| 𝛿13C (opt.)3 | 604.5 | 70.64 | 0.5 | 11.87 |

**Figure S1:** Visual biplot comparison of the rhyolitic tephra shards identified at 130-130.5 cm (150-500 µm) compared to the Vedde Ash geochemical envelope (Mangerud et al., 1984; Wastegård et al., 1998; Björck and Wastegård, 1999; Wastegård et al., 2000; Zillén et al., 2002; Pilcher et al., 2005).

**Figure S2:** Tephrostratigraphic record from Labrador Sea core GS16-204-22CC 0-540 cm versus age (ka b2k). a) Occurrence of volcanic shards (basaltic and rhyolitic)/gram dry weight (gdw) 150-500 μm. b) Occurrence of basaltic shards /gram dry weight (gdw), 106-150 μm and 63-106 μm. Please note that basaltic shards/gdw were only counted for selected intervals (i.e. TZ 1-8). c) IRD (Ice rafted debris)/gdw from the 150-500 μm size fraction (Griem et al., 2019). d) δ18O isotope record of the planktic foraminifera *Neogloboquadrina pachyderma* (*N. pachyderma*) (Griem et al., 2019). Grey vertical bars mark the eight tephra zones described in the text, whereas Vedde Ash and NAAZ II are indicated by name. Vertical dotted line marks the average IRD concentration within the sediment core. H3-H6 = Heinrich event 3-6.