

120 years, and thus do not affect our interpretations. Four samples are quartz sandstone boulders collected from Kap Brewster (22GRO-126, 22GRO-127, 22GRO-128, 22GRO-131) and we use a density of 2.4 g cm^{-3} . All other samples are crystalline boulders or bedrock (e.g., orthogneiss, granodiorite) and we use a density of 2.65 g cm^{-3} . Unless otherwise noted, all radiocarbon ages (reported as: cal ka BP) mentioned in the text are recalculated using CALIB 8.2 (Stuiver and Reimer, 1993); <http://calib.org/calib/calib.html>, last access: 18 April 2025), and the IntCal20 calibration curve (Reimer et al., 2020) for terrestrial samples, or the Marine20 calibration curve (Heaton et al., 2020) for marine samples (Tables 1, S3). For marine samples, marine reservoir corrections were calculated using the Marine Reservoir Correction Database (<http://calib.org/marine/>, last access: 18 April 2025) (Reimer and Reimer, 2001). Each site uses an average ΔR value based on water depth, distance to coast, and where possible, species that are most representative of the study site, as suggested in Pearce et al. (2023).

4 Results

4.1 Scoresby Sund

The 13 erratic boulder samples from the outer coast of the Scoresby Sund region produce ^{10}Be ages that range from 11.4 ± 0.3 – 26.4 ± 0.6 ka (Figs. 3, 6). On Rathbone Island, east of Scoresby Sund, three erratic boulders were sampled between 97 and 118 m elevation and produce exposure ages of 14.1 ± 0.3 ka (22GRO-142), 16.4 ± 0.4 ka (22GRO-139), and 17.7 ± 0.4 ka (22GRO-140). At Uunarteq located at the northern mouth of Scoresby Sund, five erratic boulders sampled between 91 and 103 m elevation produce ^{10}Be ages that range from 12.3 ± 0.5 – 26.4 ± 0.6 ka. At Kap Brewster (Kangikajik) located at the southern mouth of Scoresby Sund, five erratic boulders sampled between 225 and 233 m elevation produce ^{10}Be ages that range from 11.4 ± 0.3 to 13.9 ± 0.3 ka. The ^{10}Be ages from samples 22GRO-126, 22GRO-127, and 22GRO-128 are 11.4 ± 0.3 ka, 13.2 ± 0.6 ka, and 13.6 ± 0.3 ka, respectively; these samples were collected from the same boulders as samples KB-1, KB-2, and KB-3 from Håkansson et al. (2007a), which yield recalculated ages of 18.3 ± 2.9 ka, 17.2 ± 2.2 ka, and 14.5 ± 1.7 ka. The large difference in ages is outside the 1σ error range, and may be attributed to analytical errors. After excluding one older outlier (26.4 ± 0.6 ka) from Uunarteq, and a younger outlier from Kap Brewster (11.4 ± 0.3 ka), the mean age from the two sites at the mouth of Scoresby Sund is 13.2 ± 0.7 ka ($n = 8$; Table 2).

4.2 Storstrømmen Glacier

The 15 erratic boulder samples from the unnamed island at the Storstrømmen Glacier terminus produce ^{10}Be ages that range from 7.9 ± 0.3 – 12.3 ± 0.3 ka (Figs. 5, 6). Exclud-

ing two outliers (23DMH-18, 23DMH-22) the mean age of the boulders on the island is 8.4 ± 0.4 ka ($n = 13$; Table 2). Of these, seven samples were collected from boulders on a prominent moraine (M1 moraine) deposited by the western lobe that extends ~ 5 km through the island, and produce ^{10}Be ages of 9.6 ± 0.2 , 8.6 ± 0.4 , 8.4 ± 0.2 , 8.6 ± 0.3 , 8.6 ± 0.2 , 8.7 ± 0.2 , and 8.5 ± 0.2 ka. The mean age for the M1 moraine is 8.6 ± 0.3 ka ($n = 6$), excluding sample 23DMH-22 (9.6 ± 0.2 ka), which was identified as an outlier (Fig. 6). ^{10}Be ages from three boulders ~ 500 m north and outboard of the moraine are 8.7 ± 0.3 , 8.9 ± 0.2 , and 12.3 ± 0.3 ka. The 12.3 ± 0.3 ka sample (23DMH-18) outboard of the M1 moraine was identified as an outlier as it falls outside of the 2σ range of the mean age of the boulders on the island. The one bedrock surface, ~ 500 m north of the moraine and in close proximity to 23DMH-18, produced a ^{10}Be age of 11.5 ± 0.3 ka (23DMH-CR1-SURFACE). The bedrock surface likely has inherited ^{10}Be and was not used to determine deglacial history.

On the southeastern side of the island, ^{10}Be ages from three boulders close to the raised marine terrace are 7.9 ± 0.3 , 8.3 ± 0.2 , and 8.2 ± 0.2 ka, and are inboard of the M1 moraine. On the northern margin of the island, ^{10}Be ages from two boulders adjacent to the historical moraine and modern ice margin are 8.1 ± 0.2 ka (23DMH-32) and 8.0 ± 0.2 ka (23DMH-33). These boulders were deposited by the eastern lobe.

5 Discussion

5.1 Glacier evolution in Scoresby Sund

The ^{10}Be exposure ages from Rathbone Island provide new minimum constraints on the retreat of the GrIS off the coast of Liverpool Land at 14.1 ± 0.3 ka, and record one of the earliest terrestrial deglaciation events in Greenland. Our mean ^{10}Be age of 13.2 ± 0.7 ka ($n = 8$) from the north and south sides of the mouth of Scoresby Sund is consistent with the minimum ^{10}Be exposure age from Kap Brewster reported by Håkansson et al. (2007a) of 14.5 ± 1.7 ka, and provides a minimum constraint on ice margin retreat past the mouth of Scoresby Sund (Fig. 6). Based on our age constraints at the mouth of Scoresby Sund, we infer the depositional age of the Kap Brewster submarine moraine to correspond with our mean age of ~ 13.2 ka.

At sites (≥ 300 km) north of Scoresby Sund, the outer coast deglaciated between 12.8 ± 0.6 and 11.5 ± 0.2 ka (Larsen et al., 2022). This retreat chronology is consistent with mountain glacier retreat between ~ 12.8 and 11.7 ka from Milne Land, Kjøve Land, Gurreholm Dal and Schuchert Dal derived from ^{10}Be and radiocarbon ages (Hall et al., 2008; 2010; Kelly et al., 2008; 2025; Levy et al., 2016). We suggest the earlier onset of deglaciation at the outer coast of the Scoresby Sund region may be related to the closer proximity of our dated sites to the edge of the continen-