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# Delivery of aged terrestrial organic matter to the Laptev Sea during the last deglaciation

**Arnaud Nicolas et al.**

*Correspondence to:* Arnaud Nicolas (arnaud.nicolas@awi.de) and Gesine Mollenhauer (gesine.mollenhauer@awi.de)

**Section S1**

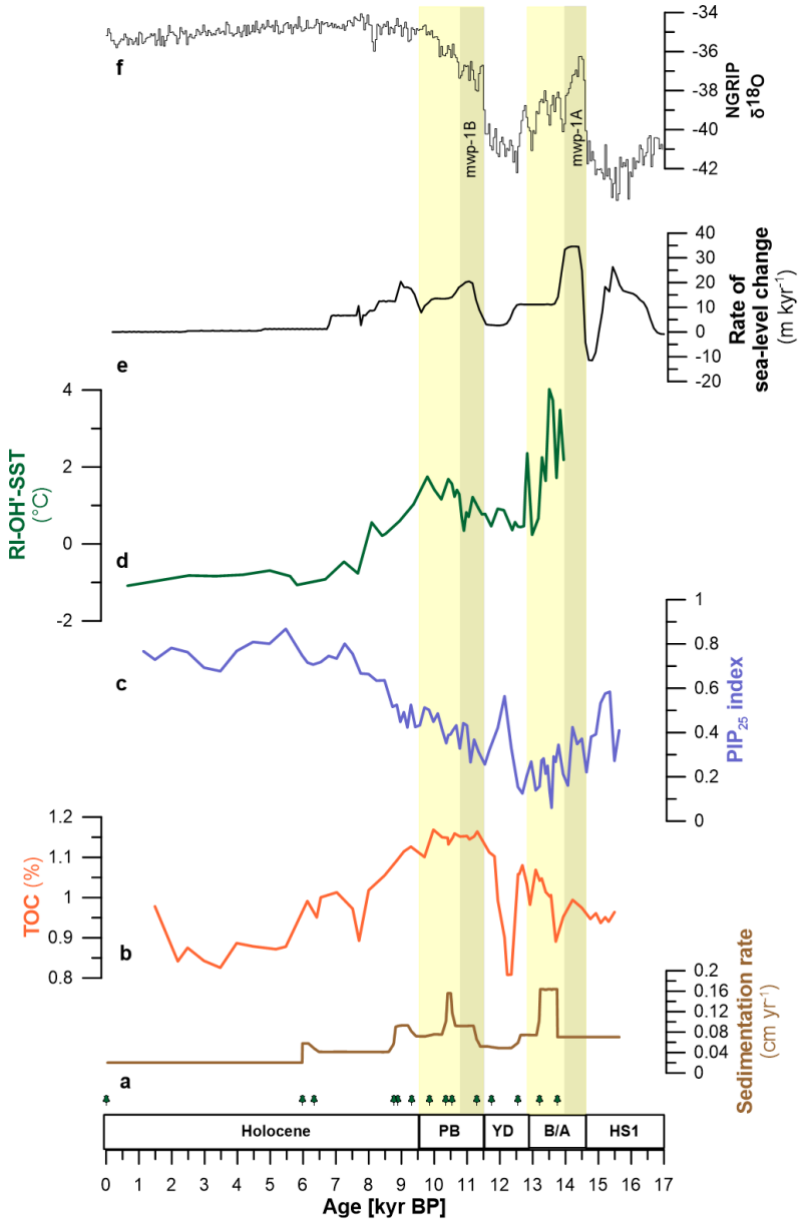


**Figure S1. (a) Modelled sedimentation rate derived from the age-depth model for core PS2458-4 calculated in OxCal4.4 software. (b) Total organic carbon (TOC). (c) Sea-ice proxy $PIP_{25}$ index** (Fahl & Stein, 2012)**. (d) RI-OH'-SST** (Wu et al., 2020)**(e) Rate of global sea-level change** (Lambeck et al., 2014)**. (f) NGRIP $\delta^{18}O$** (Andersen et al., 2004)**.**

**Section S2**

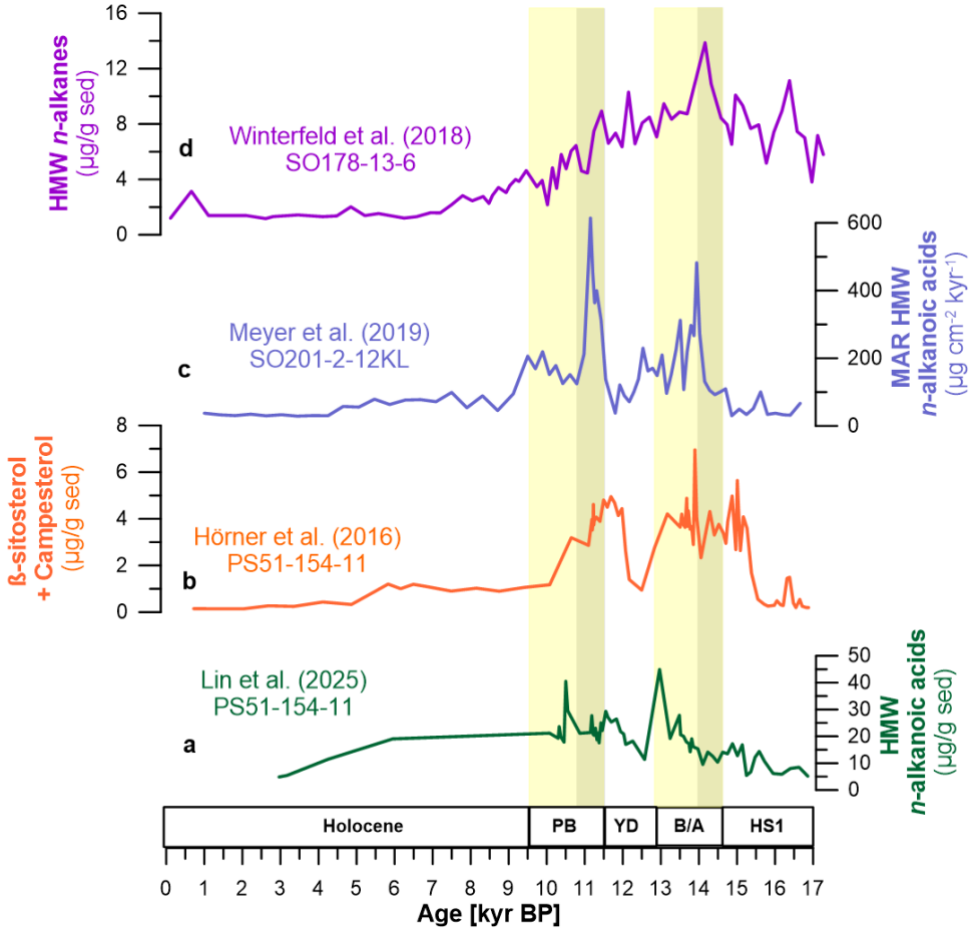


**Figure S2. (a) HMW *n*-alkanoic acids concentration** (Lin et al., 2025)**. (b) β-sitosterol+Campesterol concentration** (Hörner et al., 2016)**. (c) MAR HMW *n*-alkanoic acids** (Meyer et al., 2019)**. (d) HMW *n*-alkanes concentration** (Winterfeld et al., 2018)**.**

**Table S1. List of samples for bulk organic carbon measurements for core PS2458-4.**

| Depth (cm) | $F^{14}C$ | ± σ-$F^{14}C$ | $\Delta^{14}C$ [‰] | ± $\sigma^{14}C$ | Deposition Age (cal yr BP) | σ-Depositional Age (yr) | AMS $^{14}C$ Age (yr) | σ-AMS $^{14}C$ Age (yr) | Age at deposition (yr) | ± 1σ (yr) |
|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 0.4578 | 0.0019 | -539.8 | 32.8 | 1487 | 741 | 6276.6 | 32.8 | 5717 | 788 |
| 44 | 0.4052 | 0.0013 | -592.7 | 25.3 | 2184 | 829 | 7256.2 | 25.3 | 5903 | 882 |
| 50 | 0.3791 | 0.0017 | -619.0 | 36.4 | 2483 | 864 | 7792.6 | 36.4 | 6077 | 911 |
| 60 | 0.3650 | 0.0014 | -633.1 | 30.3 | 2982 | 931 | 8095.2 | 30.3 | 6049 | 984 |
| 70 | 0.3433 | 0.0016 | -654.9 | 37.4 | 3480 | 876 | 8589.0 | 37.4 | 6075 | 916 |
| 80 | 0.3237 | 0.0012 | -674.6 | 30.8 | 3979 | 820 | 9059.8 | 30.8 | 6242 | 838 |
| 90 | 0.3060 | 0.0015 | -692.4 | 39.8 | 4477 | 768 | 9511.1 | 39.8 | 6375 | 905 |
| 104 | 0.2656 | 0.0011 | -733.0 | 33.4 | 5175 | 575 | 10648.9 | 33.4 | 7502 | 613 |
| 110 | 0.1886 | 0.0010 | -810.4 | 41.5 | 5474 | 463 | 13398.8 | 41.5 | 10658 | 542 |
| 130 | 0.2266 | 0.0011 | -772.2 | 38.1 | 6133 | 192 | 11924.9 | 38.1 | 7673 | 296 |
| 145 | 0.1823 | 0.0007 | -816.8 | 32.2 | 6419 | 239 | 13673.2 | 32.2 | 10102 | 318 |
| 150 | 0.1776 | 0.0013 | -821.4 | 56.8 | 6541 | 311 | 13881.2 | 56.8 | 10316 | 419 |
| 170 | 0.1688 | 0.0009 | -830.4 | 44.4 | 7027 | 457 | 14293.1 | 44.4 | 10344 | 560 |
| 190 | 0.1533 | 0.0012 | -845.9 | 62.6 | 7513 | 501 | 15067.0 | 62.6 | 10936 | 633 |
| 198 | 0.1511 | 0.0006 | -848.1 | 34.3 | 7708 | 494 | 15179.0 | 34.3 | 10754 | 605 |
| 210 | 0.1513 | 0.0009 | -847.9 | 48.4 | 7997 | 465 | 15169.4 | 48.4 | 10469 | 578 |
| 230 | 0.1392 | 0.0009 | -860.1 | 51.5 | 8485 | 334 | 15842.0 | 51.5 | 10618 | 415 |
| 250 | 0.1320 | 0.0012 | -867.3 | 71.1 | 8859 | 135 | 16267.2 | 71.1 | 10801 | 244 |
| 270 | 0.1242 | 0.0012 | -875.1 | 75.2 | 9075 | 184 | 16752.4 | 75.2 | 11180 | 293 |
| 287 | 0.1216 | 0.0006 | -877.8 | 37.7 | 9258 | 197 | 16925.3 | 37.7 | 11193 | 250 |
| 290 | 0.1238 | 0.0009 | -875.6 | 56.7 | 9290 | 197 | 16781.9 | 56.7 | 11007 | 284 |
| 320 | 0.1149 | 0.0011 | -884.5 | 77.5 | 9702 | 212 | 17380.1 | 77.5 | 11282 | 331 |
| 340 | 0.1178 | 0.0011 | -881.6 | 78.1 | 9974 | 190 | 17183.1 | 78.1 | 10753 | 293 |
| 360 | 0.1038 | 0.0011 | -895.6 | 86.1 | 10240 | 169 | 18195.7 | 86.1 | 11916 | 266 |
| 377 | 0.0939 | 0.0005 | -905.6 | 41.5 | 10410 | 127 | 19003.2 | 41.5 | 12543 | 176 |
| 380 | 0.0955 | 0.0011 | -904.1 | 92.1 | 10430 | 129 | 18870.5 | 92.1 | 12336 | 259 |
| 400 | 0.0873 | 0.0008 | -912.3 | 73.8 | 10562 | 136 | 19590.4 | 73.8 | 12993 | 273 |
| 405 | 0.0855 | 0.0005 | -914.1 | 44.4 | 10617 | 157 | 19756.2 | 44.4 | 13171 | 229 |
| 420 | 0.0886 | 0.0008 | -910.9 | 72.3 | 10780 | 198 | 19467.0 | 72.3 | 12705 | 362 |
| 440 | 0.0769 | 0.0008 | -922.7 | 81.8 | 10997 | 210 | 20608.7 | 81.8 | 13832 | 355 |
| 447 | 0.0670 | 0.0004 | -932.6 | 49.7 | 11073 | 204 | 21710.9 | 49.7 | 14876 | 261 |
| 460 | 0.0621 | 0.0010 | -937.6 | 134.5 | 11215 | 179 | 22327.6 | 134.5 | 15459 | 385 |
| 468 | 0.0664 | 0.0005 | -933.3 | 61.1 | 11310 | 165 | 21790.1 | 61.1 | 14722 | 273 |
| 487 | 0.0685 | 0.0004 | -931.1 | 48.8 | 11676 | 239 | 21531.6 | 48.8 | 14180 | 289 |
| 495 | 0.0768 | 0.0005 | -922.8 | 57.4 | 11835 | 252 | 20621.5 | 57.4 | 13015 | 369 |
| 500 | 0.0930 | 0.0006 | -906.5 | 50.5 | 11938 | 272 | 19081.4 | 50.5 | 11059 | 317 |
| 510 | 0.0871 | 0.0006 | -912.5 | 53.9 | 12142 | 278 | 19608.7 | 53.9 | 11426 | 411 |
| 514 | 0.0766 | 0.0005 | -923.0 | 57.7 | 12224 | 264 | 20639.0 | 57.7 | 12649 | 382 |
| 530 | 0.0621 | 0.0005 | -937.6 | 63.8 | 12551 | 137 | 22324.4 | 63.8 | 14127 | 298 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 533 | 0.0654 | 0.0005 | -934.2 | 60.8 | 12592 | 152 | 21902.3 | 60.8 | 13552 | 266 |
| 540 | 0.0675 | 0.0005 | -932.2 | 59.3 | 12686 | 180 | 21658.5 | 59.3 | 13236 | 231 |
| 550 | 0.0561 | 0.0007 | -943.6 | 106 | 12821 | 197 | 23136.5 | 106.0 | 14610 | 317 |
| 557 | 0.0583 | 0.0004 | -941.4 | 53.8 | 12915 | 196 | 22826.8 | 53.8 | 14277 | 266 |
| 570 | 0.0502 | 0.0010 | -949.5 | 164.6 | 13091 | 160 | 24033.7 | 164.6 | 15116 | 385 |
| 590 | 0.0495 | 0.0007 | -950.3 | 118.7 | 13272 | 130 | 24152.9 | 118.7 | 15046 | 333 |
| 610 | 0.0462 | 0.0007 | -953.5 | 125.7 | 13394 | 156 | 24697.4 | 125.7 | 15551 | 280 |
| 616 | 0.0473 | 0.0004 | -952.4 | 60.7 | 13431 | 162 | 24508.5 | 60.7 | 15340 | 246 |
| 630 | 0.0460 | 0.0007 | -953.8 | 127.2 | 13516 | 175 | 24741.6 | 127.2 | 15456 | 298 |
| 636 | 0.0457 | 0.0003 | -954.0 | 60.3 | 13553 | 179 | 24781.4 | 60.3 | 15464 | 271 |
| 680 | 0.0374 | 0.0007 | -962.4 | 151.8 | 13927 | 197 | 26396.6 | 151.8 | 16719 | 397 |
| 700 | 0.0346 | 0.0007 | -965.2 | 163.6 | 14211 | 197 | 27024.5 | 163.6 | 16937 | 305 |
| 720 | 0.0338 | 0.0010 | -966.1 | 234.8 | 14496 | 198 | 27221.0 | 234.8 | 16825 | 378 |
| 750 | 0.0285 | 0.0007 | -971.4 | 197.6 | 14922 | 201 | 28585.3 | 197.6 | 17861 | 604 |
| 770 | 0.0345 | 0.0007 | -965.3 | 165.7 | 15207 | 203 | 27047.8 | 165.7 | 15958 | 318 |
| 777 | 0.0300 | 0.0003 | -969.9 | 79.4 | 15306 | 203 | 28172.3 | 79.4 | 16896 | 502 |
| 790 | 0.0257 | 0.0007 | -974.2 | 217.4 | 15491 | 205 | 29422.5 | 217.4 | 18478 | 454 |

**Table S2. List of compound-specific radiocarbon data for core PS2458-4.**

| Depth (cm) | Individual FAME | $F^{14}C$ | ± σ-$F^{14}C$ | $\Delta^{14}C$ [‰] | ± $\sigma^{14}C$ (‰) | Deposition Age (cal yr BP) | σ-Deposition Age (yr) | AMS $^{14}C$ Age (yr) | σ-AMS $^{14}C$ Age (yr) | Age at deposition (yr) | ± 1σ (yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 776-778 | n-C28:0 | 0.0218 | 0.0050 | -978.1 | 5.0 | 15306 | 203 | 30748.6 | 1668.2 | 20576 | 2330 |
| 737-739 | n-C26:0 | 0.0272 | 0.0055 | -972.6 | 5.6 | 14752 | 199 | 28942.6 | 1486.0 | 18950 | 1992 |
| 635-637 | n-C28:0 | 0.0307 | 0.0068 | -969.2 | 6.8 | 13551 | 183 | 27993.4 | 1604.1 | 19363 | 2119 |
| 635-637 | n-C26:0 | 0.0258 | 0.0072 | -974.1 | 7.2 | 13551 | 183 | 29390.1 | 1985.6 | 21151 | 2830 |
| 615-617 | n-C26:0 | 0.0392 | 0.0064 | -960.6 | 6.4 | 13429 | 166 | 26011.1 | 1212.8 | 17098 | 1543 |
| 556-558 | n-C28:0 | 0.0349 | 0.0060 | -964.9 | 6.0 | 12913 | 198 | 26949.4 | 1282.9 | 18701 | 1685 |
| 556-558 | n-C26:0 | 0.0409 | 0.0090 | -958.9 | 9.0 | 12913 | 198 | 25679.2 | 1597.5 | 17589 | 2130 |
| 532-534 | n-C26:0 | 0.0315 | 0.0060 | -968.4 | 6.0 | 12590 | 154 | 27786.7 | 1396.8 | 19955 | 1760 |
| 514-516 | n-C28:0 | 0.0974 | 0.0120 | -902.1 | 11.9 | 12243 | 260 | 18706.9 | 934.9 | 10525 | 1410 |
| 514-516 | n-C26:0 | 0.1161 | 0.0081 | -883.3 | 8.0 | 12243 | 260 | 17296.2 | 540.2 | 8770 | 948 |
| 513-515 | n-C28:0 | 0.0819 | 0.0141 | -917.7 | 14.2 | 12223 | 265 | 20102.3 | 1274.2 | 12270 | 1740 |
| 486-488 | n-C28:0 | 0.0329 | 0.0056 | -966.9 | 5.6 | 11675 | 239 | 27424.3 | 1254.9 | 20423 | 1665 |
| 486-488 | n-C26:0 | 0.0427 | 0.0038 | -957.1 | 3.8 | 11675 | 239 | 25333.8 | 693.5 | 17958 | 945 |
| 446-448 | n-C26:0 | 0.0301 | 0.0038 | -969.7 | 3.8 | 11072 | 203 | 28139.8 | 957.8 | 21550 | 1245 |
| 376-378 | n-C28:0 | 0.0337 | 0.0051 | -966.1 | 5.1 | 10410 | 126 | 27227.3 | 1139.3 | 21421 | 1423 |
| 376-378 | n-C26:0 | 0.0462 | 0.0048 | -953.6 | 4.8 | 10410 | 126 | 24699.7 | 795.0 | 18626 | 942 |
| 286-288 | n-C28:0 | 0.0480 | 0.0077 | -951.7 | 7.7 | 9256 | 196 | 24385.4 | 1200.8 | 19655 | 1462 |
| 286-288 | n-C26:0 | 0.0578 | 0.0051 | -941.9 | 5.1 | 9256 | 196 | 22903.2 | 683.4 | 17959 | 900 |
| 197-199 | n-C28:0 | 0.0708 | 0.0122 | -928.8 | 12.2 | 7705 | 494 | 21266.0 | 1278.9 | 18010 | 1942 |
| 197-199 | n-C26:0 | 0.0662 | 0.0078 | -933.5 | 7.8 | 7705 | 494 | 21815.7 | 894.6 | 18480 | 1458 |
| 144-146 | n-C28:0 | 0.1190 | 0.0074 | -880.4 | 7.4 | 6418 | 238 | 17097.4 | 482.2 | 14333 | 873 |
| 144-146 | n-C26:0 | 0.0915 | 0.0071 | -908.0 | 7.1 | 6418 | 238 | 19208.8 | 597.3 | 16868 | 928 |
| 103-105 | n-C28:0 | 0.1363 | 0.0098 | -863.0 | 9.9 | 5175 | 575 | 16009.5 | 556.3 | 14306 | 1227 |
| 103-105 | n-C26:0 | 0.1256 | 0.0067 | -873.7 | 6.7 | 5175 | 575 | 16665.0 | 414.9 | 14990 | 1095 |
| 43-45 | n-C28:0 | 0.1700 | 0.0118 | -829.1 | 11.8 | 2184 | 829 | 14233.3 | 539.7 | 15132 | 1536 |
| 43-45 | n-C26:0 | 0.2126 | 0.0073 | -786.3 | 7.3 | 2184 | 829 | 12438.1 | 270.4 | 12461 | 1268 |
| 41-43 | n-C28:0 | 0.2155 | 0.0080 | -783.4 | 8.0 | 2085 | 814 | 12329.6 | 291.5 | 12432 | 1274 |
| 41-43 | n-C26:0 | 0.2055 | 0.0060 | -793.4 | 6.0 | 2085 | 814 | 12710.6 | 230.9 | 12962 | 1236 |

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