Table S2. List of *Arctica islandica* shells used in present study. HR = Heye Rumohr, Geomar Kiel, Germany; WD = Wolfgang Dreyer, Zoological Museum (Moebius collection), University of Kiel, Germany; AM = Alda Möller, Ministry of Fisheries and Agriculture, Reykjavìk, Iceland; RJ = Ronald Janssen, Senckenberg Research Institute and Natural History Museum, Frankfurt/M., Germany; Wd = water depth; BMU morphometry = morphometric analysis of individual biomineral units (quantitative analysis) of specimens ultrapolished with 60 nm Buehler MasterMet suspension; qualitative analysis were done on polished sections etched for 10 seconds in 1 M HCl. CG = Cumulative growth curves. Shells used previously for sclerochronological analyses: a = Schöne et al. (2021): Mn/Cashell, Ba/Cashell, seasonal timing and rate of shell growth (STR), annual shell growth in hinge (ASGh); b = Schöne et al. (2022): Mn/Cashell, Ba/Cashell, STR, ASGh; c = Huang et al. 2023 (in press): Mn/Cashell, Ba/Cashell, STR, ASGh; d = Höche et al. (2022a): STR, BMU morphometry within annual increment (without disturbance lines); e = Schöne et al. (2003, doi:10.1130/G20013.1): ASG (hinge and ventral margin, vm); f = Schöne et al. (2005b): STR, ASGh+vm.

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| Region | Sample site | Specimen ID | Lon/Lat | Wd (m) | Date of death | Provider | Lifespan (yr) | CG | Microstructure analysis |
| 1: W Baltic Sea | Mecklenburg Bight | MLZ-St12-A2Ra | 54°18'59.50"N, 011°33'00.00"E | 24.8 | 25 Oct. 2001 |  | 19 | X |  |
| MLZ-St12-A4Ra,b,c,d |  | 19 | X | BMU morphometry |
| MLZ-St12-A5Ra,b,c |  | 15 | X |  |
| MLZ-St12-A6Ra,b,c,d |  | 14 | X | BMU morphometry |
| MLZ-St12-A7La,b,c |  | 7 | X | BMU morphometry |
| MLZ-St12-A9Ra,b,c,d |  | 8 | X |  |
| HR-MB2-96-A1Lc | 54°19'55.754"N, 011°29'52.946"E | 24 | 22 June 1996 | HR | 12 | X |  |
| HR-MB2-96-A2Lc | HR | 15 | X |  |
| HR-MB2-96-A3Lc | HR | 18 | X |  |
| MOL 8215\_04.XI.O4-A1Lc | 54°10’N, 011°16‘E | 23.5 | Nov. 1904 | WD | 65 | X |  |
| MOL 8215\_04.XI.O4-A2Lc | WD | 57 | X |  |
| Fehmarn Belt | MLZ-FBR36-A6Rb | 54°35'53.67"N,011° 00'34.24"E | 21 | 29 June 2020 |  | 9 |  | Qualitative analysis |
| 2: Iceland +  Tromsø | Þistilfjörður, NE Iceland | ICE06-6.2-A6Rd | 66°11'22.26"N, 015°21'09.54W | 6.6 | 17 Aug. 2006 |  | 12 |  | BMU morphometry |
| ICE06-6.2-A11Rd |  | 7 |  | BMU morphometry |
| ICE06-6.2-A16Rd |  | 15 |  | BMU morphometry |
| ICE06-6.2-A56R |  | 6 |  | Qualitative analysis |
| Bakkafjörður, NE Iceland | Möller-A1Le | 66°16.00'N, 014°55.20'W | ca. 32m | 26 Nov. 2003 | AM | 157 | X |  |
| Möller-A2Le | AM | 90 | X |  |
| Möller-A3Le | AM | 88 | X |  |
| Möller-A4Le | AM | 159 | X |  |
| Möller-A5Re | AM | 124 | X |  |
| Möller-A6Le | AM | 145 | X |  |
| Möller-A7Re | AM | 85 | X |  |
| Möller-A8Re | AM | 152 | X |  |
| Möller-A9Le | AM | 89 | X |  |
| Möller-A10Le | AM | 134 | X |  |
| Möller-A12Re | AM | 82 | X |  |
| E Iceland | M071868-A3Re,f | N/A  | N/A | July 1868 | WD | 375 | X |  |
| M071868-A4Re,f | WD | 273 | X |  |
| Tromsø | SM- Tromsø-A1Le | N/A  | N/A | July 1861 | RJ | 104 | X |  |
| SM- Tromsø-A2Re | RJ | 57 | X |  |
| SM- Tromsø-A3R | RJ | 56 | X |  |
| SM- Tromsø-A4L | RJ | 56 | X |  |
| 3: N coast U.K. | unspecified | M071868-A9L | N/A | N/A | July 1868 | WD | 57 | X |  |
| 4: S coast U.K. | unspecified | M071868-D5R | N/A | N/A | July 1868 ? | WD | 37 | X |  |