**Supplementary Material**

**Table S1.** Location of the surface sediment samples collected during AI 51 cruise with their Station number, Water depth, Latitude and Longitude.

|  |  |  |  |
| --- | --- | --- | --- |
| **Station**  **No.** | **Water depth (m)** | **Latitude**  **(**°**N)** | **Longitude**  **(**°**W)** |
| 1 | 3346 | 55.00 | -43.76 |
| 2 | 3393 | 58.22 | -54.17 |
| 3 | 3477 | 59.11 | -50.51 |
| 4 | 2389 | 59.97 | -47.04 |
| 5 | 328 | 59.90 | -42.32 |
| 6 | 2399 | 59.56 | -41.01 |
| 7 | 2922 | 59.50 | -39.33 |
| 8 | 3156 | 59.49 | -37.32 |
| 9 | 3064 | 59.50 | -34.98 |
| 10 | 1531 | 59.51 | -30.66 |
| 11 | 1694 | 59.50 | -28.67 |
| 12 | 2237 | 59.50 | -26.66 |
| 13 | 2512 | 59.50 | -24.71 |
| 14 | 2740 | 59.49 | -21.99 |
| 15 | 2825 | 59.50 | -20.69 |
| 16 | 2182 | 59.50 | -18.00 |
| 17 | 1519 | 59.50 | -15.33 |
| 18 | 1291 | 59.50 | -13.33 |
| 19 | 1611 | 59.50 | -11.33 |
| 20 | 1468 | 59.50 | -9.33 |
| 21 | 1051 | 59.50 | -7.33 |
| 22 | 158 | 59.50 | -3.83 |
| 23 | 1150 | 61.07 | -3.87 |
| 24 | 484 | 62.74 | -8.46 |
| 25 | 567 | 64.03 | -12.62 |

**Table S2.** Depth habitat, Geographic distribution, Ecological information and distribution in SPNA (from present study) of planktic foraminiferal species, found in the AI 51 transect along 59.5 °N

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Depth Habitat | Geographical distribution | Ecological Information | Distribution in SPNA  (Present study) | References |
| *N. pachyderma* | Upper 100m (in EGC)  50-200m (when warm Atlantic water present) | Subpolar to polar | The abundance increases towards poles. It dominates the assemblage when summer SST < 9°C. | •Dominated in the west of Reykjanes Ridge  •Also found in the Faroe-Shetland channel  •Absent in the central Iceland Basin and at the eastern transect | Hemleben et al., 1989; Husum & Hald, 2012; Simstich et al., 2003; Toldurlund & Be, 1971 |
| *N. incompta* | 60 -150m | Temperate to subpolar | This species prefers warm and stratified water. | •Found maximum at the eastern transect.  •Minimum in Labrador Sea | Toldurlund & Bé, 1971; Fairbanks et al., 1982; Reynolds & Thunell, 1985; Schiebel & Hemleben, 2000; Kuroyanagi & Kawahata, 2004 |
| *G. bulloides* | Upper 50m (surface mixed layer) | Temperate to subpolar | The species abundance is enhanced with increased nutrients. | •Maximum in the Iceland basin | Bé & Toldurlund, 1971; Ottens, 1992; Thunnel & Sautter, 1992; Ganssen & Kroon, 2000; Schiebel & Hemleben, 2000 |
| *T. quinqueloba* | 10-60m (near surface) | Temperate to subpolar | This symbiotic species is related to presence of Oceanic fronts. Abundance increases with primary productivity. | •Patchy in abundance  •Maximum at the central Irminger Sea and the eastern transect | Reynolds & Thunell, 1985; Johannsen et al., 1994; Carstens et al., 1997; Volkmann, 2000; Husum & Hald,2012; Meilland et al., 2020 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *G. uvula* | 40-100m | Temperate to polar | This species is associated with oceanic front and primary productivity. | •Constitutes only minor %  •Maximum at the eastern near coastal region and in the central Irminger sea | Schiebel & Hemleben, 2002; Schiebel et al., 2002; Husum & Hald, 2012 |
| *G. glutinata* | 60-150m | Cosmopolitan | Its presence marks the onset of Spring bloom. | •Constitutes major % of the assemblage  •Absent only in the Labrador Sea | Ottens, 1992; Volkmann 2000a, Schmuker & Schiebel, 2002; Schiebel & Hemleben, 2000; Chapman, 2010 |
| *G. inflata* | 100-400m (Near thermocline) | Temperate | Abundance of *G. inflata* in SPNA depends on the flux of advected warmer water. | •Present only in the central and eastern transect  •Absent in the Irminger Sea and Labrador Sea | Hemleben et al., 1989; Ottens, 1992; Ganssen & Kroon, 2000; Pflaumann et al., 2003; Chapman, 2010 |
| *G. scitula* | Below thermocline to 200-300m | Cosmopolitan | Presence of this species in SPNA indicates warm water entrainment from subtropics. Its abundance is related with primary productivity. | •Rare in this study | Hemleben et al., 1989; Schiebel & Hemleben et al., 2000; Schiebel et al., 2002; Chapman, 2010; Retailleau et al., 2011 |
| *Orbulina sp.* | Upper 100m (euphotic zone) | Tropical to temperate | This symbiote bearing species can tolerate wide ranges of temperature and salinity. Presence of this species in high latitude indicates presence of warmer water from subtropics. | •Rare in this study | Berger, 1969; Fairbanks et al., 1982; Hemleben et al., 1989; Schiebel & Hemleben, 2017 |

**Table S3.** Relative abundance of all planktic foraminiferal species observed in all sampled stations along the studied transect of 59.5 °N latitude in Subpolar North Atlantic Ocean. The abundances shown are in percentage (%).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sampling stations | *N. pachyderma* | *N. incompta* | *G. bulloides* | *T. quinqueloba* | *G. inflata* | *G. glutinata* | *G. uvula* | *G. scitula* | *Orbulina* sp. |
| 1 | 40.93 | 2.59 | 4.84 | 41.11 | 0.00 | 6.04 | 4.49 | 0.00 | 0.00 |
| 2 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 81.66 | 6.92 | 5.19 | 1.38 | 0.00 | 0.00 | 0.35 | 4.50 | 0.00 |
| 5 | 42.36 | 19.10 | 4.17 | 20.14 | 0.00 | 12.85 | 1.39 | 0.00 | 0.00 |
| 6 | 59.54 | 11.00 | 9.96 | 12.03 | 0.00 | 6.64 | 0.83 | 0.00 | 0.00 |
| 7 | 47.33 | 12.53 | 5.34 | 21.81 | 0.00 | 12.06 | 0.93 | 0.00 | 0.00 |
| 8 | 12.38 | 12.38 | 3.33 | 60.00 | 0.00 | 6.19 | 4.35 | 0.00 | 0.00 |
| 9 | 64.19 | 9.46 | 3.07 | 13.81 | 0.00 | 8.95 | 0.51 | 0.00 | 0.00 |
| 10 | 20.66 | 23.94 | 19.88 | 14.09 | 0.97 | 20.27 | 0.00 | 0.00 | 0.00 |
| 11 | 5.18 | 22.69 | 5.46 | 34.31 | 0.84 | 28.43 | 2.12 | 0.00 | 0.00 |
| 12 | 53.18 | 16.48 | 9.55 | 5.06 | 3.18 | 12.55 | 0.00 | 0.00 | 0.00 |
| 13 | 1.81 | 33.03 | 9.39 | 11.55 | 0.90 | 39.71 | 3.61 | 0.00 | 0.00 |
| 14 | 1.52 | 32.61 | 10.65 | 2.61 | 5.22 | 45.65 | 0.43 | 0.65 | 0.65 |
| 15 | 0.00 | 25.30 | 3.08 | 32.34 | 1.32 | 35.75 | 0.55 | 1.65 | 0.00 |
| 16 | 9.93 | 23.26 | 3.40 | 26.95 | 1.56 | 33.76 | 0.71 | 0.43 | 0.00 |
| 17 | 8.45 | 19.75 | 3.54 | 39.51 | 0.27 | 27.25 | 1.23 | 0.00 | 0.00 |
| 18 | 39.87 | 26.51 | 2.51 | 15.66 | 1.67 | 12.53 | 1.25 | 0.00 | 0.00 |
| 19 | 38.12 | 36.83 | 6.64 | 3.21 | 0.00 | 13.70 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | 43.25 | 1.59 | 13.89 | 1.06 | 38.10 | 1.73 | 0.00 | 0.00 |
| 21 | 0.00 | 35.10 | 2.45 | 34.08 | 1.02 | 22.04 | 5.31 | 0.00 | 0.00 |
| 22 | 0.00 | 19.63 | 0.00 | 39.63 | 0.00 | 26.79 | 13.94 | 0.00 | 0.00 |
| 23 | 33.33 | 41.84 | 0.00 | 6.12 | 1.70 | 15.65 | 1.02 | 0.00 | 0.34 |
| 24 | 22.98 | 39.76 | 1.79 | 9.40 | 1.67 | 22.98 | 1.43 | 0.00 | 0.00 |
| 25 | 17.61 | 42.86 | 5.32 | 5.65 | 5.32 | 21.59 | 0.00 | 0.00 | 0.00 |