Solar forcing of Holocene summer sea-surface temperatures in the northern North Atlantic

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Supplementary Information

Supplementary Table DR1. Summer SST data from core MD99-2275 on the North Icelandic Shelf

Core depth (cm)	Age (cal yr B.P.)	Summer SSTs (°C)
0.5	75	6.5
2.5	77	6.7
5.5	81	7.1
7.5	84	7.4
10.5	88	6.3
12.5	90	6.7
15.5	94	6.3
17.5	97	7.4
20.5	101	6.4
22.5	103	6.7
25.5	107	7.1
27.5	110	6.9
30.5	114	7.2
32.5	117	7.1
35.5	120	7.1
37.5	123	6.8
40.5	127	5.8
42.5	130	6.7
45.5	133	6.5
47.5	136	7.1
50.5	140	6.5
52.5	143	7.0
55.5	147	7.0
57.5	149	7.3
60.5	153	6.8
62.5	157	7.0
65.5	163	6.8
67.5	167	7.2
70.5	173	6.3
72.5	177	6.9
75.5	183	7.3
77.5	187	6.8
80.5	193	7.2
82.5	196	7.1
85.5	202	7.2
87.5	206	7.1
90.5	212	6.9
92.5	216	7.2
95.5	222	8.0
97.5	226	7.2
100.5	232	7.3
102.5	238	7.2

105.5	247	6.6
107.5	253	7.3
110.5	262	7.3
112.5	268	7.0
115.5	277	7.1
117.5	283	6.5
120.5	292	6.9
122.5	298	6.8
125.5	307	6.6
127.5	314	6.9
130.5	323	6.6
132.5	329	6.8
135.5	338	6.9
137.5	344	7.1
140.5	353	7.0
142.5	359	7.4
145.5	368	7.2
147.5	374	7.3
150.5	383	6.9
152.5	389	6.5
155.5	399	6.9
157.5	405	7.5
160.5	414	7.1
162.5	420	6.7
165.5	429	6.6
167.5	435	6.8
170.5	444	6.8
172.5	450	6.8
175.5	459	6.2
177.5	465	7.3
180.5	474	7.0
182.5	478	6.9
185.5	486	6.4
187.5	490	6.7
190.5	498	7.3
192.5	502	7.5
195.5	510	7.0
197.5	515	6.6
200.5	522	7.0
202.5	527	6.8
205.5	534	6.6
207.5	539	6.7
210.5	548	6.9
212.5	555	6.7

215.5	566	7.0
217.5	573	7.5
220.5	584	6.1
222.5	591	7.3
225.5	601	6.8
227.5	609	7.2
230.5	620	6.3
232.5	627	7.0
235.5	637	7.1
237.5	645	8.0
240.5	658	7.3
242.5	669	7.3
245.5	685	7.2
247.5	696	7.3
250.5	712	7.7
252.5	722	7.6
255.5	739	7.7
257.5	749	7.8
260.5	765	7.6
262.5	776	8.2
265.5	792	7.4
267.5	803	7.5
270.5	819	7.2
272.5	830	8.0
275.5	846	6.9
277.5	853	7.6
280.5	863	7.7
282.5	870	7.5
285.5	881	6.9
287.5	888	7.8
290.5	898	7.3
292.5	905	8.0
295.5	916	7.6
297.5	923	8.1
300.5	935	7.6
302.5	949	7.2
305.5	970	7.3
307.5	985	7.2
310.5	1006	8.1
315.5	1041	7.4
319.5	1069	6.7
322.5	1088	7.6
327.5	1113	8.1
332.5	1139	7.2

337.5	1164	7.2
342.5	1190	7.6
347.5	1215	7.7
352.5	1241	7.4
357.5	1266	7.3
362.5	1292	7.3
367.5	1318	7.8
372.5	1343	8.2
377.5	1369	7.7
382.5	1394	7.9
387.5	1420	7.6
392.5	1446	7.9
397.5	1471	8.3
402.5	1497	7.9
407.5	1522	7.3
412.5	1548	8.0
417.5	1573	8.2
422.5	1599	8.0
427.5	1624	8.0
432.5	1650	7.4
437.5	1676	7.2
442.5	1701	7.5
447.5	1727	7.9
452.5	1752	8.1
457.5	1778	8.0
462.5	1804	7.6
467.5	1830	7.6
472.5	1856	7.5
477.5	1883	8.4
482.5	1909	8.0
487.5	1935	7.7
492.5	1961	7.6
497.5	1988	7.3
502.5	2014	7.7
512.5	2066	7.8
522.5	2118	8.2
532.5	2171	8.7
542.5	2223	9.3
552.5	2276	7.6
562.5	2328	8.2
572.5	2380	7.6
582.5	2433	8.0
592.5	2486	7.6
602.5	2538	8.5

612.5	2590	8.2
622.5	2643	7.4
632.5	2695	7.3
642.5	2748	7.6
652.5	2800	7.8
662.5	2852	8.5
672.5	2905	7.9
682.5	2958	7.9
692.5	3008	8.8
702.5	3056	8.3
712.5	3103	8.3
722.5	3152	8.7
732.5	3200	7.6
742.5	3248	8.1
752.5	3296	7.7
762.5	3344	7.9
772.5	3392	7.6
782.5	3440	8.5
792.5	3488	8.3
802.5	3536	8.4
812.5	3584	8.0
822.5	3632	8.5
832.5	3680	7.6
842.5	3729	8.2
852.5	3776	7.9
862.5	3825	8.7
872.5	3873	8.1
882.5	3921	7.8
892.5	3969	7.9
903.5	4022	7.8
912.5	4065	8.3
923.5	4118	7.6
932.5	4161	7.9
943.5	4214	8.4
952.5	4260	7.6
962.5	4312	8.8
972.5	4363	8.3
982.5	4414	8.3
992.5	4465	7.8
1002.5	4516	8.8
1012.5	4567	8.4
1022.5	4618	8.2
1032.5	4670	8.3
1042.5	4721	8.8

1052.5	4772	8.0
1062.5	4823	8.1
1072.5	4874	7.7
1082.5	4925	8.5
1092.5	4977	7.5
1102.5	5028	7.7
1112.5	5079	8.2
1122.5	5130	7.4
1132.5	5181	8.1
1142.5	5233	8.8
1152.5	5284	8.5
1162.5	5335	7.7
1172.5	5386	8.5
1182.5	5437	8.1
1192.5	5485	8.1
1202.5	5528	8.7
1212.5	5572	8.1
1222.5	5616	8.5
1232.5	5660	7.9
1242.5	5703	8.2
1252.5	5747	8.2
1262.5	5791	8.9
1272.5	5835	8.9
1282.5	5878	9.1
1292.5	5922	9.0
1302.5	5966	8.8
1312.5	6010	8.1
1322.5	6053	8.4
1332.5	6094	8.1
1342.5	6134	8.3
1352.5	6175	8.1
1362.5	6215	8.5
1372.5	6256	8.5
1382.5	6296	8.7
1392.5	6336	8.7
1402.5	6377	8.4
1412.5	6417	8.8
1422.5	6457	8.8
1432.5	6498	8.4
1442.5	6538	8.5
1452.5	6579	8.2
1462.5	6619	8.6
1472.5	6662	9.0
1482.5	6705	8.7

1492.5	6748	9.5
1502.5	6791	8.6
1512.5	6834	8.8
1522.5	6877	8.7
1532.5	6920	8.2
1542.5	6964	9.1
1552.5	7008	8.9
1562.5	7050	9.2
1572.5	7094	8.9
1582.5	7138	9.4
1592.5	7181	8.9
1602.5	7225	8.5
1612.5	7269	9.2
1622.5	7312	9.9
1632.5	7356	9.3
1642.5	7400	9.0
1652.5	7443	9.5
1662.5	7487	9.7
1672.5	7530	9.9
1682.5	7574	9.9
1692.5	7618	9.4
1702.5	7662	9.1
1712.5	7705	9.5
1722.5	7749	9.8
1732.5	7792	9.5
1742.5	7836	9.7
1752.5	7880	9.0
1762.5	7923	9.6
1772.5	7967	9.2
1782.5	8011	9.1
1792.5	8054	9.2
1802.5	8098	9.8
1812.5	8143	8.2
1822.5	8188	8.0
1832.5	8233	8.3
1842.5	8278	8.8
1852.5	8324	8.6
1862.5	8369	8.2
1872.5	8414	8.6
1882.5	8459	9.6
1892.5	8504	8.2
1902.5	8549	8.6
1912.5	8594	8.7
1922.5	8639	8.1

1932.5	8685	8.9
1942.5	8730	8.6
1952.5	8775	8.7
1962.5	8820	8.3
1972.5	8865	8.4
1982.5	8910	8.5
1992.5	8956	9.0
2002.5	9001	8.6
2012.5	9046	7.9
2022.5	9091	8.7
2032.5	9136	9.2
2042.5	9181	8.6
2052.5	9226	8.3
2062.5	9271	8.9

Supplementary Table DR2. Positions and the modern summer SSTs of the surface samples from around Iceland used for diatom-based summer SST reconstruction*.

Sample name	No.	Water depth (m)	Latitude	Longitude	Summer SST (°C)
BS1191-K12[+]	12	224	68°06.69'N	25°54.00'W	-0.7
BS1191-K14-1A[+]	14	459	68°11.49'N	29°35.74'W	-0.7
JM96-1216/2GC[+]	1216	478	65°57.77'N	30°38.00'W	8.1
JM96-1219/1[x]	1219	2144	64°29.01'N	30°27.01'W	8.7
JM96-1229/1GC[+]	1229	1047	67°01.20'N	25°09.10'W	3.3
JM96-1234/1GC[+]	1234	223	66°35.15'N	23°58.80'W	7.0
BIOICE2066	2066	199	66°09.29'N	17°35.30'W	8.0
BIOICE2084	2084	743	67°15.61'N	17°24.91'W	6.4
BIOICE2130	2130	642	66°47.20'N	18°42.16'W	6.6
BIOICE2194	2194	125	66°17.18'N	18°48.85'W	7.3
BIOICE2196	2196	38	64°18.30'N	22°23.90'W	9.2
BIOICE2205	2205	86	64°02.88'N	22°59.55'W	9.9
BIOICE2208	2208	136	63°58.90'N	23°33.40'W	9.9
BIOICE2217	2217	259	64°11.60'N	25°17.10'W	9.6
BIOICE2231	2231	212	63°43.10'N	24°24.50'W	10.4
BIOICE2235	2235	263	63°26.90'N	24°39.90'W	9.2
BIOICE2238	2238	309	63°21.00'N	25°21.00'W	9.9
BIOICE2250	2250	850	63°14.59'N	25°47.80'W	9.8
BIOICE2258	2258	1197	63°15.50'N	26°29.80'W	9.7
BIOICE2746	2746	800	67°46.06'N	20°50.95'W	4.7
BIOICE2748	2748	973	68°02.20'N	20°41.60'W	0.5
BIOICE2752	2752	1021	67°55.00'N	19°21.00'W	3.1
BIOICE2764	2764	1198	68°05.00'N	17°30.00'W	3.1
BIOICE2770	2770	492	68°35.75'N	16°56.89'W	2.9
BIOICE2775	2775	1552	68°36.07'N	14°40.10'W	6.7
BIOICE2794	2794	458	67°13.60'N	19°03.05'W	6.0
BIOICE2796	2796	396	66°54.18'N	17°54.22'W	6.0
BIOICE2798	2798	425	66°34.56'N	17°41.22'W	6.1
BIOICE2831	2831	111	63°25.15'N	16°36.61'W	9.5
BIOICE2840	2840	239	63°18.00'N	16°53.62'W	10.7
BIOICE2859	2859	2270	61°50.22'N	16°52.86'W	11.1
BIOICE2863	2863	2400	61°10.18'N	18°02.57'W	11.8
BIOICE2875	2875	777	64°34.40'N	27°36.26'W	10.6
BIOICE2879	2879	355	64°55.60'N	27°13.90'W	10.6

BIOICE2894	2894	664	65°29.04’N	27°31.95’W	9.8
BIOICE2919	2919	1268	65°26.27’N	29°11.29’W	8.4
BIOICE2938	2938	151	65°30.75’N	26°13.40’W	7.4
BIOICE2949	2949	160	65°42.18’N	25°16.99’W	9.3
BIOICE2960	2960	53	65°21.28’N	24°04.96’W	9.9
BIOICE2964	2964	122	65°08.12’N	23°36.00’W	9.2
BIOICE2971	2971	91	65°02.96’N	24°12.99’W	10.2
BIOICE2975	2975	163	65°02.10’N	25°52.10’W	9.9
BIOICE3142	3142	1024	67°31.59’N	24°09.49’W	2.7
BIOICE3147	3147	835	67°12.89’N	25°56.51’W	1.4
BIOICE3150	3150	342	66°39.91’N	27°43.27’W	4.1
BIOICE3156	3156	374	66°06.21’N	28°35.19’W	4.8
23347K^{++}	23347	1229	70°26.20’N	16°04.80’W	2.8
23348K^{++}	23348	729	70°25.10’N	18°56.90’W	0.3
23349K^{++}	23349	308	70°23.30’N	20°11.40’W	-1.1
23350K^{++}	23350	400	70°23.80’N	19°20.80’W	0.3
23351K^{++}	23351	1673	70°21.70’N	18°12.30’W	1.0

*Samples marked with + were provided by Anne Jennings, University of Colorado at Boulder, USA, samples marked with x are from Morten Hald, University of Tromsø, Norway, and samples marked with ++ are from Nalan Koç, Norwegian Polar Institute, Tromsø, Norway. All other samples were collected by the BIOICE project during the period of 1995–98.

Supplementary Table DR3*. Test of numerical reconstruction methods. Six numerical reconstruction methods were tested, including weighted averaging (WA), weighted averaging with tolerance down-weighting ($WA_{(tol)}$), weighted averaging partial least squares (WA-PLS) and Modern analogue technique (MAT). Both inverse and classical deshrinking regression were used in the WA and $WA_{(tol)}$ reconstruction procedures. The results are presented as root-mean squared error of prediction based on the leave-one out jack-knifing ($RMSEP_{(Jack)}$) test, maximum bias ($Max_Bias_{(Jack)}$), and coefficient of determination between observed and predicted values $r^2_{(Jack)}$. WA-PLS using 4 components results in low $RMSEP_{(Jack)}$ (0.94) and $Max_Bias_{(Jack)}$ (1.59), a high $r^2_{(jack)}$ (0.93) and a smaller number of "useful" components for reconstructing summer SSTs based on the modern data set of diatom and measured environmental variables from around Iceland and neighboring areas.

		$Max_Bias_{(Jack)}$	$R^2_{(Jack)}$	$RMSEP_{(Jack)}$
WA	Inverse	1.89	0.86	1.29
$WA_{(tol)}$	Inverse	1.71	0.86	1.29
WA	Classical	2.12	0.86	1.34
$WA_{(tol)}$	Classical	2.02	0.86	1.30
WA-PLS	1 component	1.88	0.86	1.29
WA-PLS	2 components	1.80	0.89	1.12
WA-PLS	3 components	1.97	0.91	1.03
WA-PLS	4 components	1.59	0.93	0.94
WA-PLS	5 components	1.51	0.93	0.89
MAT	1 analogues	2.7	0.84	1.44
MAT	2 analogues	2	0.86	1.41
MAT	3 analogues	2.47	0.86	1.32
MAT	4 analogues	1.85	0.88	1.27
MAT	5 analogues	2.24	0.85	1.40

* Telford and Birks (2009) used the MAT and the WA-PLS methods to test the significance of 6 transfer functions (diatom–pH transfer function, benthic foraminifera–salinity transfer function, planktonic foraminifera–SST transfer function, dinoflagellate–salinity transfer function, and pollen temperature and sunshine transfer functions) in autocorrelated environments. They found that in all cases except the diatom-pH training set, MAT outperforms WA-PLS. In our case, however, the MAT gave relatively high $RMSEP_{(Jack)}$ (1.27) and $Max_Bias_{(Jack)}$ (1.85), and low

$r^2_{(jack)}$ (0.88).

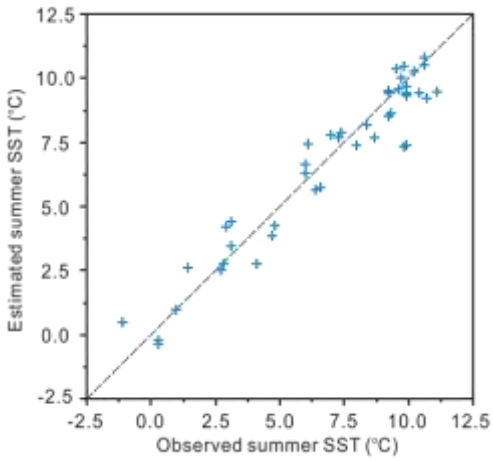
A reliable transfer function should have not only a low root mean squared error of prediction based on leave-one out jackknifing RMSEP(Jack), a low maximum bias, a high coefficient of determination between observed and predicted value (r2), but also a small number of “useful” components (Birks 1995, 1998). Hence, as the difference between the RMSEP(Jack) of the WA-PLS with 4 components (0.94) and that of WA-PLS with 5 components (0.89) is quite small, we used WA-PLS with 4 components for our transfer function.

Supplementary Table DR 4. Information of 15 tephra layers and 64 AMS ^{14}C dates from MD99-2275. The age of the core top is estimated to 55 cal yr B.P. (AD 1895) based on a comparison of overlapping proxy data between core MD99-2275 and a multicore B05-2006-MC04 retrieved at the same location and dated using ^{210}Pb and 137Cs via gamma spectrometry (cf. Knudsen et al., 2009). The ages of the tephra markers are based on historical records from Iceland for the last 900 yr, correlation to the Greenland ice core chronology and age calculations based on soil accumulation rate (SAR) between dated tephra layers (Rasmussen et al., 2007; Eiríksson et al., 2011; Gudmundsdóttir et al., 2011). The age model is constrained on the basis of the first appearance depth of each tephra marker and of the historical age or terrestrial radiocarbon date of the marker.

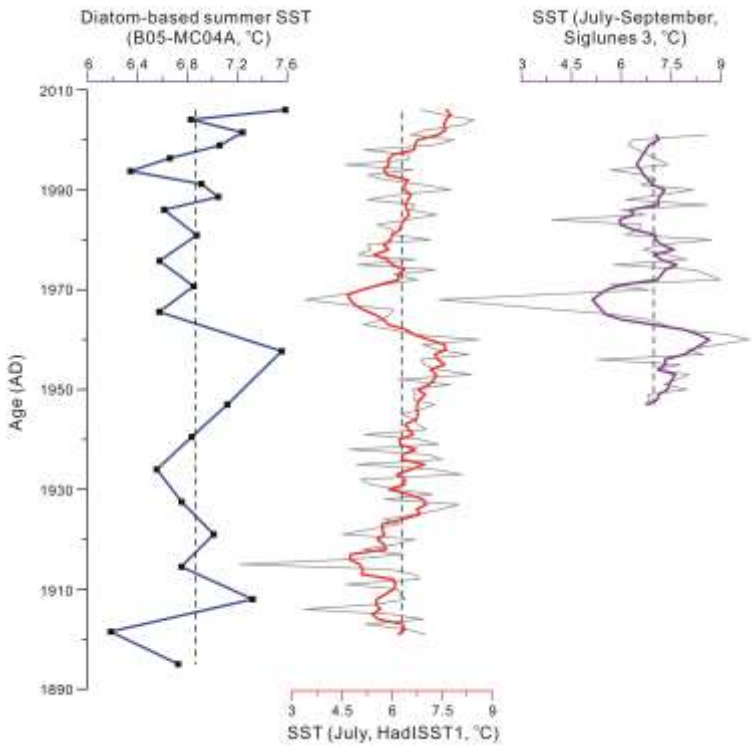
MD99-2275 AMS 14C dates and tephra markers			Calibrations: Oxcal v4.20 using Marine09 calibration curve		
Core depth (cm)	Lab. no.	Material dated	^{14}C age (BP ±1 σ)	Cal ^{14}C yr B.P. (mean of range)	Cal range (±1 σ)
0.5		Core Top		55	
2.5	AAR-8418	*Thyasira equalis*	745±60	380	450 - 310
7.5	AAR-9808	*Bathyarca glacialis*	491±34	75	150 - 0
22.5	AAR-9809	*Thyasira equalis*	666±41	317	370 - 265
34.5	AAR-7702	*Siphodentalium lobatum*	475±36	62	125 - 0
60.5		V 1797, AD 1797		153	153
63.5	AAR-7116	*Thyasira equalis*	695±45	345	400 - 290
100.5	AAR-7117	*Thyasira* cf. *equalis*	785±40	435	485 - 385
101.5		V 1717, AD 1717		233	233
122.5	AAR-6089	*Siphonodentalium lobatum*	895±45	505	540 - 470
133	AAR-7118	*Thyasira* cf. *equalis*	815±45	457	500 - 415
162.5	AAR-7119	*Nuculana* sp.	945±35	547	595 - 500
179.5		V 1477, AD 1477		473	473
209.5		V 1410, AD 1400 – 1420 (SAR)		540	550 - 530
222	AAR-7120	*Thyasira equalis*, *Thyasira* sp.	1265±45	815	880 - 750
239.5		Hekla 1300		650	650
259.5	AAR-7121	*Thyasira equalis*, *Thyasira* sp.	1420±50	970	1030 - 910
275.5		Hekla 1104, AD 1104		846	846
289	AAR-6931	*Thyasira equalis*	1555±35	1112	1165 - 1060
321		Settlement layer, AD 867 – 873 (IC)		1079	1082 - 1076

332.5	AAR-7122	*Siphonodentalium lobatum*	1710±45	1265	1310-1220
373.5	AAR-6932	*Siphonodentalium lobatum*	1905±40	1450	1510-1390
381.5	AAR-6933	*Bathyarca glacialis*	2020±40	1580	1640-1520
439.5	AAR-7703	*Thyasira equalis*	2262±42	1870	1930-1810
460.5		Snæfellsjökull 1	1855 ±25	1780	1820 - 1730
472.5	AAR-6934	Cf. *Dentalium entalis*	2245±40	1855	1910-1800
490.5	AAR-9648	*Thyasira equalis*	2470±55	2125	2220-2030
512.5	AAR-6935	Cf. *Siphonodentalium lobatum*	2530±45	2210	2280-2140
537.5	AAR-7123	*Thyasira equalis*	2680±65	2385	2480-2290
573.5	AAR-9649	*Siphonodentalium lobatum*	2765±38	2485	2580-2390
583	AAR-6936	*Thyasira sp.*	3110±70	2880	2980-2780
599.5	AAR-9650	*Yoldiella fraterna*	2940±45	2722	2765-2680
605.5	AAR-9651	*Thyasira equalis*	2960±70	2750	2830-2670
624.5	AAR-9652	*Thyasira equalis*	3144±45	2925	3000-2850
632.5	AAR-7124	*Thyasira* cf. *equalis*	3345±45	3215	3290-3140
660.5	AAR-9653	*Thyasira equalis, Yoldiella fraterna*	3230±65	3055	3160-2950
687.5		Hekla 3	2879 ±34	2980	3080 - 2950
688.5	AAR-9654	*Thyasira equalis*	3325±60	3175	3270-3080
696.5	AAR-6937	*Siphonodentalium lobatum*	3265±50	3105	3190-3020
709.5	AAR-9655	*Thyasira equalis, Yoldiella fraterna*	3416±44	3300	3360-3240
723.5	AAR-9656	*Thyasira equalis*	3466±42	3350	3410-3290
758	AAR-9657	*Tridonta elliptica, Yoldiella fraterna*	3649±43	3550	3620-3480
778.5	AAR-9658	*Thyasira equalis*	3715±55	3635	3720-3550
796.5	AAR-6938	*Bathyarca glacialis*	3795±50	3745	3820-3670
817	AAR-9659	*Thyasira equalis, Thyasira* sp., *Yoldiella fraterna*	3955±60	3955	4050-3860
824.5	AAR-6088	*Siphonodentalium lobatum*	3980±55	3985	4070-3900
850	AAR-9660	*Yoldiella fraterna*	4009±44	4015	4090-3940
880.5	AAR-9661	*Thyasira equalis*	4055±44	4070	4150-3990
942.5		Hekla 4	3826 ±12	4200	4240 - 4160
895.5	AAR-9662	*Siphonodentalium lobatum*	4135 ± 40	4205	4130-4280
917.5	AAR-9663	*Siphonodentalium lobatum*	4390 ± 50	4525	4440-4610

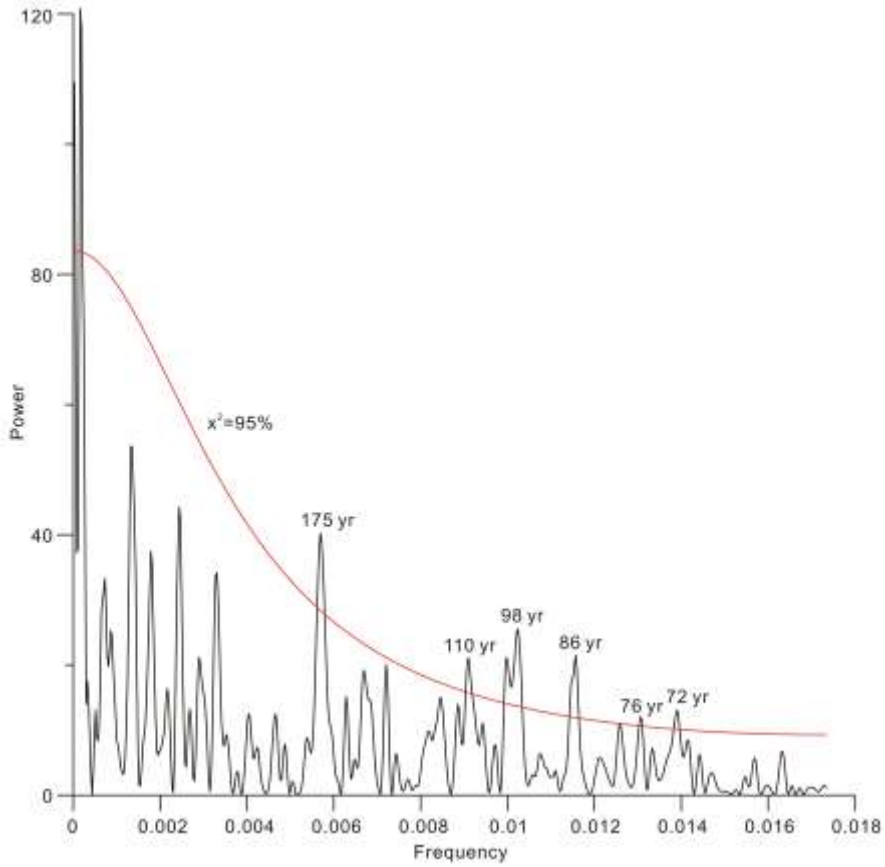
933.5	AAR-7125	*Siphonodentalium lobatum*	4320 ± 45	4455	4390-4520
969.5	AAR-7126	*Siphonodentalium lobatum*	4405 ± 45	4565	4480-4650
1002	AAR-9664	*Thyasira equalis*	4760 ± 100	5030	4870-5190
1045.5	AAR-9665	*Yoldiella lenticula*	4805 ± 65	5100	4980-5220
1067.5	AAR-6825	*Thyasira equalis*	4880 ± 60	5185	5080-5290
1088.5	AAR-9666	*Thyasira equalis*	5160 ± 80	5520	5430-5610
1154.5	AAR-9313	*Thyasira equalis*	5105 ± 50	5490	5420-5560
1232.5	AAR-6824	*Yoldiella* cf. *lenticula*	5500 ± 50	5880	5810-5950
1251.5	AAR-6823	Cf. *Dentalium entalis*	5605 ± 50	5995	5920-6070
1283.5	AAR-9314	*Yoldiella fraterna, Thyasira* sp.	5625 ± 70	6025	5930-6120
1322.5		Hekla OE	5301 ±21	6060	6175 - 6005
1332.5	AAR-9360	*Siphonodentalium lobatum*	5830 ± 50	6240	6190-6295
1432.5	AAR-6822	*Yoldiella* cf. *lenticula*	6275 ± 55	6725	6650-6800
1463		Hekla DH, BC 4653 ±50 (SAR)		6650	6600 - 6700
1468.5	AAR-6468	*Siphonodentalium lobatum*	6425 ± 55	6910	6830-6990
1507.5	AAR-7681	*Siphonodentalium lobatum*	6615 ± 55	7150	7070-7230
1557.5		Hekla 5	6108 ±75	7125	7160 - 6890
1579	AAR-6469	*Siphonodentalium lobatum*	6680 ± 55	7210	7150-7270
1622.5		*Siphonodentalium lobatum*	6905 ± 50	7420	7360-7480
1757.5	AAR-9315	*Yoldiella fraterna, Lunatia pallida*	7415 ± 60	7880	7810-7950
1802.5		Sudurøy[1]	7240 ±95	8000	8160 - 7980
1806.5	AAR-6086	*Bathyarca glacialis, Thyasira* sp.	7710 ± 90	8180	8070-8290
1870.5	AAR-6087	*Bathyarca glacialis*	7720 ± 65	8205	8120-8290
1899.5	AAR-7680	*Siphonodentalium lobatum*	8055 ± 65	8500	8420-8580
1900.5	AAR-9279	*Siphonodentalium lobatum*	8095 ± 80	8545	8430-8660
1920.5	AAR-9280	*Siphonodentalium lobatum, Yoldiella frigida*	8150 ± 50	8625	8540-8710
2283.5	AAR-6939	Cf. *Siphonodentalium lobatum*	9105 ± 60	9830	9700-9960
2549.5	AAR-9281	*Yoldiella fraterna, Yoldiella* cf. *lenticula, Natica (Tectonatica) affinis*	9550 ± 80	10 410	10 310-10 510
2560.5		Saksunarvatn ash, BC 8347 ±89 (IC)		10300	10390 - 10210



Supplementary Figure DR1. Diatom-based jack-knife inferred summer SSTs against modern observed summer SSTs from the surface sample sites.



Supplementary Figure DR2. Comparison between diatom-based reconstructed summer SSTs from multicore B05-2006-MC04 and instrumental summer SST data from HadISST1 and Siglunes 3. The multicore B05-2006-MC04, with length of 36 cm, covering about last 100 yr, was retrieved at the same location (66°33.18′N; 17°42.04′W) as the studied core MD99-2275 (Ran et al., 2011). Diatom contents of 23 samples were analyzed at every 1–2 cm and the same diatom-based transfer function was applied as for core MD99-2275. The instrumental SST data are from open ocean Hadley Centre Sea Ice and SST dataset version I (HadISST1) series for July (Rayner et al., 2003) and the summer SSTs (mean of July to September SST) at the Siglunes 3 profile (data from the Marine Research Institute, Reykjavik, Iceland). An alkenone-based summer SST record from the same core (Sicre et al., 2008) shows a similar distribution pattern, but the difference between diatom-based and instrumental SSTs is smaller than that between the mean of the alkenone-derived SSTs and the instrumental SSTs (Ran et al., 2011).



Supplementary Figure DR3. Spectral analysis (Lomb-Scargle Fourier transform) of the reconstructed summer sea-surface temperature from piston core MD99-2275. The red line indicates the 95% red-noise false-alarm levels calculated using REDFIT.

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