Supplementary information

In the supplementary information the *A. islandica* growth index is denoted by the location of the sites since there are many comparisons between sites or groups of sites. In the article the KES sites were for simplicity denoted 'shelf sites' and NVOH sites 'coastal sites'.

Table S1. Pearsons correlation coefficients between *A. islandica* growth chronologies, i.e. RCS detrended growth curves, from five different sites on the Faroe Plateau. The time span is from the depicted year (1896, 1910 or 1920) to last year (sites K and VOH in 2009, site E in 2010, site N in 2013 and site S in 2014). The three time spans were selected to illustrate the effect of eliminating the earlier part of the series were the number of shells was low as well as the latest part of the series where there was a discrepancy in growth between the NVOH and KES series.

	To last year					
1896 -	K	E	S	N	VOH	AVG
K		0.23	0.45	0.20	0.06	0.24
E	0.23		0.01	0.24	0.17	0.16
S	0.45	0.01		-0.14	0.12	0.11
N	0.20	0.24	-0.14		0.11	0.10
VOH	0.06	0.17	0.12	0.11		0.12

1910 -	K	E	S	N	VOH	AVG
K		0.26	0.46	0.21	0.08	0.25
E	0.26		0.02	0.26	-0.01	0.13
S	0.46	0.02		-0.27	0.13	0.09
N	0.21	0.26	-0.27		0.20	0.10
VOH	0.08	-0.01	0.13	0.20		0.10

1920 -	K	E	S	N	VOH	AVG
K		0.32	0.49	0.28	0.14	0.31
E	0.32		0.07	0.26	-0.08	0.14
S	0.49	0.07		-0.20	0.39	0.19
N	0.28	0.26	-0.20		0.12	0.11
VOH	0.14	-0.08	0.39	0.12		0.14

Table S2. Same as in Table 1, but now all series go up to year 2000, i.e., the years 2001 and onwards are excluded.

To 2000

1896 -	K	E	S	N	VOH	AVG
K		0.20	0.43	0.18	0.10	0.23
E	0.20		-0.02	0.24	0.20	0.16
S	0.43	-0.02		-0.06	-0.01	0.08
N	0.18	0.24	-0.06		0.21	0.14
VOH	0.10	0.20	-0.01	0.21		0.13

1910 -	K	E	S	N	VOH	AVG
K		0.21	0.45	0.18	0.12	0.24
E	0.21		-0.01	0.25	0.01	0.12
S	0.45	-0.01		-0.20	-0.02	0.05
N	0.18	0.25	-0.20		0.36	0.15
VOH	0.12	0.01	-0.02	0.36		0.11

1920 -	K	E	S	N	VOH	AVG
K		0.28	0.49	0.27	0.18	0.30
E	0.28		0.07	0.24	-0.06	0.13
S	0.49	0.07		-0.06	0.27	0.19
N	0.27	0.24	-0.06		0.29	0.18
VOH	0.18	-0.06	0.27	0.29		0.17

Table S3. Same as in Table 1, but now arranged in a spatial fashion. The VOH series were located in fjords and the square around them indicates the approximate location of Faroe Islands. The S series is located west of the islands, the K series to the north, the E series to the east and the N series to the south-east. The number of 1 indicates the site that is compared with the other ones.

1896 to last year			1910 to last year			1920 to last year		
	K			K			K	
S	VOH	E	S	VOH	E	S	VOH	E
		N			N			N
	0.45			0.46			0.49	
1	0.12	0.01	1	0.13	0.02	1	0.39	0.07
		-0.14			-0.27			-0.20
	1			1			1	
0.45	0.06	0.23	0.46	0.08	0.26	0.49	0.14	0.32
		0.20			0.21			0.28
	0.23			0.26			0.32	
0.01	0.17	1	0.02	-0.01	1	0.07	-0.08	1
		0.24			0.26			0.26
	0.20			0.21			0.28	
-0.14	0.11	0.24	-0.27	0.20	0.26	-0.20	0.12	0.26
		1			1			1
	0.06			0.08			0.14	
0.12	1	0.17	0.13	1	-0.01	0.39	1	-0.08
		0.11			0.20			0.12

Table S4. Same as in Table 2, but now arranged in a spatial fashion. See also table S3.

1896 to 2000			1910 to 2000			1920 to 2000		
	0.43			0.45			0.49	
1	-0.01	-0.02	1	-0.02	-0.01	1	0.27	0.07
		-0.06			-0.20			-0.06
	1			1			1	
0.43	0.10	0.20	0.45	0.12	0.21	0.49	0.18	0.28
		0.18			0.18			0.27
	0.20			0.21			0.28	
-0.02	0.20	1	-0.01	0.01	1	0.07	-0.06	1
		0.24			0.25			0.24
	0.18			0.18			0.27	
-0.06	0.21	0.24	-0.20	0.36	0.25	-0.06	0.29	0.24
		1			1			1
	0.10			0.12			0.18	
-0.01	1	0.20	-0.02	1	0.01	0.27	1	-0.06
		0.21			0.36			0.29

Table S5. Investigation of how strongly other shells correlated to the present shell growth (log-transformed to be compared directly with Figure S4 and Figure S5) for the KES sites. The correlation coefficients (r) are grouped by 0.1 bins, e.g. '0.2' indicates values from 0.15 to 0.25. A summary statistics is shown for r: mininum, 25% quartile, average, 75% quartile and maximum. The true age of the shells is 15 years older than depicted in the table.

		# shells that correlated with this correlation coefficient (r) with this shell															Summary statistics of r				
Shell	AGE\r	-0.7	-0.6	-0.5	-0.4	-0.3	-0.2	-0.1	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	MIN	Q1	AVG	Q3	MAX
S 1	35			1	7	11	20	22	16	12	8	10	2				-0.48	-0.21	-0.06	0.08	0.38
S 2	35			2	2	12	20	21	20	19	8	4		1			-0.50	-0.18	-0.06	0.09	0.48
S 3	36			2	8	8	8	11	20	21	16	11	2	2			-0.53	-0.14	0.01	0.18	0.52
S 4	42				1	4	10	10	16	21	22	13	9	3			-0.43	-0.03	0.10	0.24	0.53
S 5	43				1	3	5	10	20	18	21	12	12	4	3		-0.39	0.00	0.14	0.31	0.58
S 6	43					4	5	10	10	19	23	17	14	5	1	1	-0.35	0.05	0.16	0.32	0.70
S 7	45				4	5	9	16	15	16	13	18	8	5			-0.39	-0.08	0.08	0.27	0.53
S 8	47				3	1	9	7	15	32	21	13	4	4			-0.43	0.02	0.10	0.22	0.55
S 9	47			1	2	5	7	16	21	24	20	6	5	2			-0.52	-0.07	0.05	0.19	0.51
S 10	49				3	7	25	28	16	10	11	6	1	2			-0.43	-0.18	-0.05	0.08	0.52
S 11	55					3	3	15	19	13	23	14	9	8	2		-0.34	-0.03	0.14	0.28	0.64
S 12	62			1		2	15	15	31	23	14	6	2				-0.52	-0.08	0.02	0.12	0.42
S 13	98				1	2	8	14	12	29	13	19	8	3			-0.38	-0.01	0.11	0.27	0.55
S 14	99				1		8	12	22	29	22	10	2	2	1		-0.36	-0.01	0.09	0.21	0.56
S 15	100				2	1	11	14	21	19	20	14	7				-0.40	-0.06	0.08	0.21	0.42
S 16	100				1	4	14	17	21	12	25	9	5	1			-0.38	-0.09	0.05	0.19	0.45
S 17	104				1		3	16	23	24	24	14	4				-0.35	-0.01	0.10	0.22	0.43
S 18	104					3	9	17	16	23	25	8	7	1			-0.29	-0.06	0.08	0.21	0.46
S 19	105				1	1	4	24	26	25	15	5	6	1		1	-0.38	-0.05	0.06	0.15	0.65
S 20	105					3	7	10	26	23	18	18	4				-0.32	-0.03	0.09	0.22	0.40
S 21	107					3	5	10	21	15	25	20	7	1	2		-0.28	0.02	0.13	0.26	0.58
S 22	107					2	5	16	34	30	13	6	3				-0.29	-0.04	0.05	0.12	0.41
S 23	111				3	2	5	13	14	20	26	16	8	2			-0.39	0.01	0.11	0.25	0.52
S 24	112					2	7	24	30	26	12	6	1	1			-0.30	-0.06	0.03	0.11	0.46
S 25	112				1	1	13	14	13	30	21	11	4	1			-0.37	-0.06	0.07	0.20	0.53
S 26	116				1	2	13	17	34	25	14	3					-0.39	-0.06	0.01	0.11	0.32
S 27	119				2	2	9	14	19	23	15	20	4	1			-0.39	-0.05	0.08	0.22	0.51
S 28	119	1			4	6	14	15	16	13	12	17	7	3	1		-0.74	-0.13	0.05	0.25	0.57
S 29	120			1	3	5	6	12	25	32	11	12	2				-0.52	-0.05	0.03	0.14	0.41
S 30	121					3	5	26	27	30	12	5	1				-0.34	-0.07	0.03	0.12	0.37
S 31	122				2	5	20	15	32	17	11	5		1	1		-0.41	-0.14	-0.01	0.08	0.55
S 32	123					3	10	18	13	17	14	19	10	5			-0.28	-0.07	0.11	0.27	0.54
S 33	127					2	4	15	14	33	19	14	5	2	1		-0.35	0.00	0.11	0.22	0.57
S 34	130					4	10	17	23	23	16	12	4				-0.34	-0.07	0.06	0.17	0.40
S 35	134				3	8	9	9	25	17	18	9	10	1			-0.42	-0.06	0.06	0.19	0.50
S 36	135			1	9	16	24	24	13	12	7	3					-0.46	-0.24	-0.12	0.01	0.34
S 37	138			1	1		16	18	32	24	10	5		2			-0.52	-0.08	0.01	0.11	0.53
S 38	140					1	7	15	21	21	20	14	8	2			-0.29	-0.02	0.11	0.23	0.51
S 39	146					1	11	17	20	32	17	11					-0.26	-0.06	0.05	0.15	0.32
S 40	155				2	1	21	22	25	23	12	2	1				-0.45	-0.12	-0.01	0.11	0.38
Pooled																	-0.74		0.06		0.70

Table S5 continued

K 1	24	1	1	4	7	13	16	15	12	14	7	11	2	3	2	1	-0.74	-0.24	-0.04	0.14	0.70
K 2	25				1	4	9	10	7	14	16	15	16	14	1	2	-0.39	-0.01	0.18	0.40	0.70
K 3	33		1	2	6	13	17	18	20	12	9	6	1	2	2		-0.56	-0.23	-0.05	0.07	0.63
K 4	38				1	3	9	9	23	26	13	14	9	2			-0.36	-0.01	0.09	0.24	0.52
K 5	40			3	4	13	13	16	15	15	14	9	4	2		1	-0.55	-0.17	0.00	0.16	0.70
K 6	43				1	7	9	10	13	16	19	16	10	5	3		-0.36	-0.03	0.12	0.30	0.63
K 7	45				2	5	7	12	23	23	16	13	6	2			-0.43	-0.04	0.07	0.19	0.55
K 8	47					2	6	17	23	25	21	10	4	1			-0.32	-0.04	0.07	0.19	0.52
K 9	47			3	5	4	10	26	17	14	13	13	2	1	1		-0.52	-0.12	0.01	0.16	0.56
K 10	49			1		7	9	10	16	14	26	15	7	3	1		-0.48	-0.04	0.09	0.24	0.61
K 11	51				8	11	12	17	20	18	7	12	3	1			-0.43	-0.19	-0.02	0.13	0.53
K 12	55			1	1	5	6	24	23	22	16	9	2				-0.51	-0.09	0.02	0.15	0.39
K 13	66		1		3	11	15	25	17	18	6	9	4				-0.55	-0.16	-0.03	0.08	0.41
K 14	73					4	8	10	20	24	24	15	4				-0.34	-0.03	0.09	0.22	0.41
K 15	104		1		3	4	12	24	27	23	9	4		1		1	-0.57	-0.11	-0.01	0.09	0.70
K 16	104					3	10	18	18	22	16	14	6	1	1		-0.33	-0.07	0.08	0.22	0.56
K 17	105				2	5	6	8	23	20	19	9	14	3			-0.39	0.00	0.10	0.24	0.51
K 18	105				2		3	14	27	19	24	10	10				-0.40	-0.03	0.10	0.21	0.44
K 19	113				2	8	6	8	15	25	16	20	5	3	1		-0.42	-0.04	0.09	0.26	0.61
K 20	113				2	2	7	10	18	27	21	15	6	1			-0.43	-0.01	0.10	0.23	0.48
K 21	114				2	1	11	6	15	15	20	21	10	7	1		-0.43	0.01	0.15	0.30	0.59
K 22	114					3	8	10	21	21	22	14	8	2			-0.33	-0.02	0.10	0.24	0.50
K 23	115					3	7	15	20	32	15	8	8		1		-0.32	-0.04	0.08	0.18	0.64
K 24	116				1	4	6	14	28	28	21	4	3				-0.40	-0.04	0.05	0.15	0.41
K 25	119				1	4	13	24	30	16	16	4	1				-0.40	-0.11	0.00	0.12	0.36
K 26	120				2	7	17	15	27	22	13	5		1			-0.42	-0.14	-0.01	0.11	0.50
K 27	121			1	2	1	10	13	14	22	22	14	9		1		-0.52	-0.03	0.10	0.22	0.61
K 28	137					4	6	21	33	27	14	4					-0.35	-0.06	0.02	0.12	0.32
K 29	138				3	2	8	9	15	32	28	6	5	1			-0.37	-0.03	0.08	0.19	0.55
K 30	149			1		5	4	16	16	24	18	20	4	1			-0.47	-0.04	0.09	0.24	0.45
K 31	149		1	2	2	2	14	8	12	17	15	17	10	7	2		-0.56	-0.08	0.11	0.31	0.63
K 32	150			1	1	6	11	14	16	18	20	11	7	4			-0.50	-0.10	0.07	0.21	0.53
K 33	150			1	2	4	7	6	16	18	21	20	8	6			-0.46	0.01	0.13	0.29	0.51
K 34	151		1		2	4	6	8	17	26	16	18	10	1			-0.55	-0.02	0.10	0.26	0.48
K 35	158			1	3	5	5	12	10	16	14	19	16	8			-0.49	-0.03	0.14	0.32	0.53
K 36	159				1	2	8	17	23	22	21	10	5				-0.43	-0.05	0.07	0.18	0.41
K 37	160					2	6	22	10	21	19	20	8	1			-0.28	-0.07	0.10	0.25	0.52
K 38	168			1	2	5	8	26	21	22	15	8		1			-0.47	-0.11	0.01	0.13	0.52
K 39	203				1	13	11	20	25	22	7	8	1		1		-0.39	-0.13	-0.02	0.09	0.59
K 40	252					5	13	28	22	24	13	4					-0.33	-0.12	-0.01	0.09	0.34
K 41	253			1	6	7	20	32	18	14	8	2		1			-0.49	-0.18	-0.07	0.03	0.48
K 42	284					4	12	20	17	19	20	10	7				-0.33	-0.10	0.05	0.19	0.40
Pooled																	-0.74		0.06		0.70

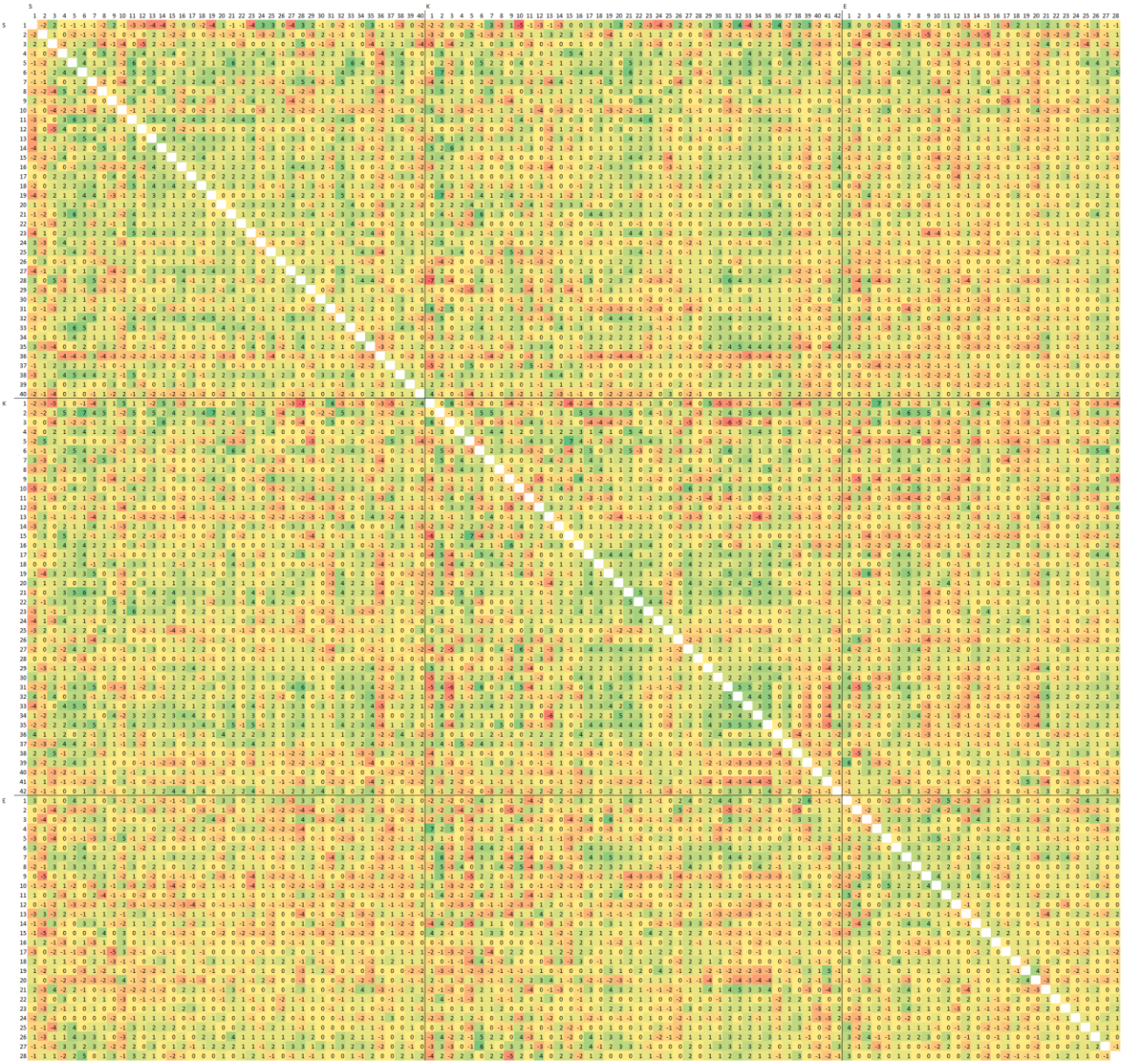
Table S5 continued.

E 1	28				1	4	9	15	22	10	20	19	7	1	1		-0.36	-0.05	0.09	0.25	0.59
E 2	39			3	5	11	23	13	16	18	11	6	2	1			-0.49	-0.20	-0.05	0.12	0.50
E 3	43				3	7	14	14	14	18	15	14	7	2	1		-0.44	-0.12	0.06	0.22	0.61
E 4	55				3	5	14	18	25	20	19	3		1		1	-0.41	-0.12	0.00	0.12	0.70
E 5	60				1	7	10	29	25	16	14	5		2			-0.43	-0.11	-0.01	0.11	0.53
E 6	90					5	5	10	18	26	25	12	8				-0.33	0.00	0.10	0.22	0.43
E 7	91				4	3	13	9	14	16	20	21	7	1	1		-0.37	-0.06	0.09	0.26	0.64
E 8	95				1	2	7	17	18	25	19	14	4	2			-0.42	-0.04	0.08	0.21	0.53
E 9	97			2	3	11	18	17	20	19	11	4	2	2			-0.55	-0.17	-0.03	0.10	0.55
E 10	105				2	7	22	20	18	20	10	7	2	1			-0.37	-0.17	-0.02	0.10	0.53
E 11	112				2	1	12	22	23	23	15	7	3	1			-0.43	-0.09	0.03	0.15	0.52
E 12	114				1	9	24	25	30	9	8	2	1				-0.35	-0.18	-0.06	0.04	0.41
E 13	115				3	10	9	23	16	25	16	6	1				-0.45	-0.13	-0.01	0.13	0.39
E 14	116			1	2	5	13	16	25	22	8	13	4				-0.45	-0.11	0.02	0.14	0.42
E 15	118			1		4	19	20	26	16	14	6	3				-0.50	-0.13	0.00	0.12	0.39
E 16	118					2	6	33	33	25	9	1					-0.30	-0.09	-0.01	0.07	0.31
E 17	129			1	1	5	10	19	35	24	13	1					-0.52	-0.07	-0.01	0.09	0.31
E 18	134				1	3	3	21	24	29	17	9	2				-0.36	-0.06	0.05	0.15	0.39
E 19	138					8	15	20	31	25	5	2	2	1			-0.33	-0.14	-0.02	0.07	0.48
E 20	147				4	12	18	23	20	18	8	3	3				-0.41	-0.17	-0.05	0.08	0.37
E 21	151				3	7	9	19	26	14	13	10	7	1			-0.41	-0.10	0.04	0.19	0.53
E 22	269					2	4	18	37	31	14	2	1				-0.33	-0.04	0.03	0.11	0.41
E 23	277					3	6	15	36	31	15	2	1				-0.30	-0.04	0.03	0.09	0.37
E 24	286					5	10	22	33	24	12	3					-0.31	-0.07	0.00	0.10	0.34
E 25	286				1	1	6	20	30	28	18	3	2				-0.37	-0.05	0.04	0.12	0.40
E 26	290					4	5	10	22	35	15	11	6	1			-0.32	0.00	0.09	0.18	0.52
E 27	307					4	8	16	21	18	21	19	1		1		-0.28	-0.07	0.07	0.21	0.58
E 28	399			1	1		7	15	32	25	20	6	1	1			-0.52	-0.04	0.05	0.15	0.48
Pooled																	-0.55		0.02		0.70
All pooled																	-0.74		0.05		0.70

Table S6. The shells of site E were dead (articulated) when they were collected 1st of December 2012. They were assumed to have had the last normal growth in 2011. This assumption is investigated by shifting the end-year of site E between 2002 and 2012 and correlating the growth index with the pooled series of sites K and S. The correlations were highest for 2012 and 2011. Assuming that the last normal growth could not have been in 2012 due to the appearance of the shells, 2011 is the best option.

End-year of E	Correlation with series KS
2012	0.1644
2011	0.1639
2010	0.1084
2009	0.0429
2008	-0.0248
2007	0.0522
2006	0.0592
2005	0.0634
2004	0.0419
2003	-0.0647
2002	-0.0284

Table S7. Intercorrelations between shells for the KES sites. The correlation coefficients, in bins of 0.1, are multiplied by 10 in order to save space in the table. Same data as in Table S5.



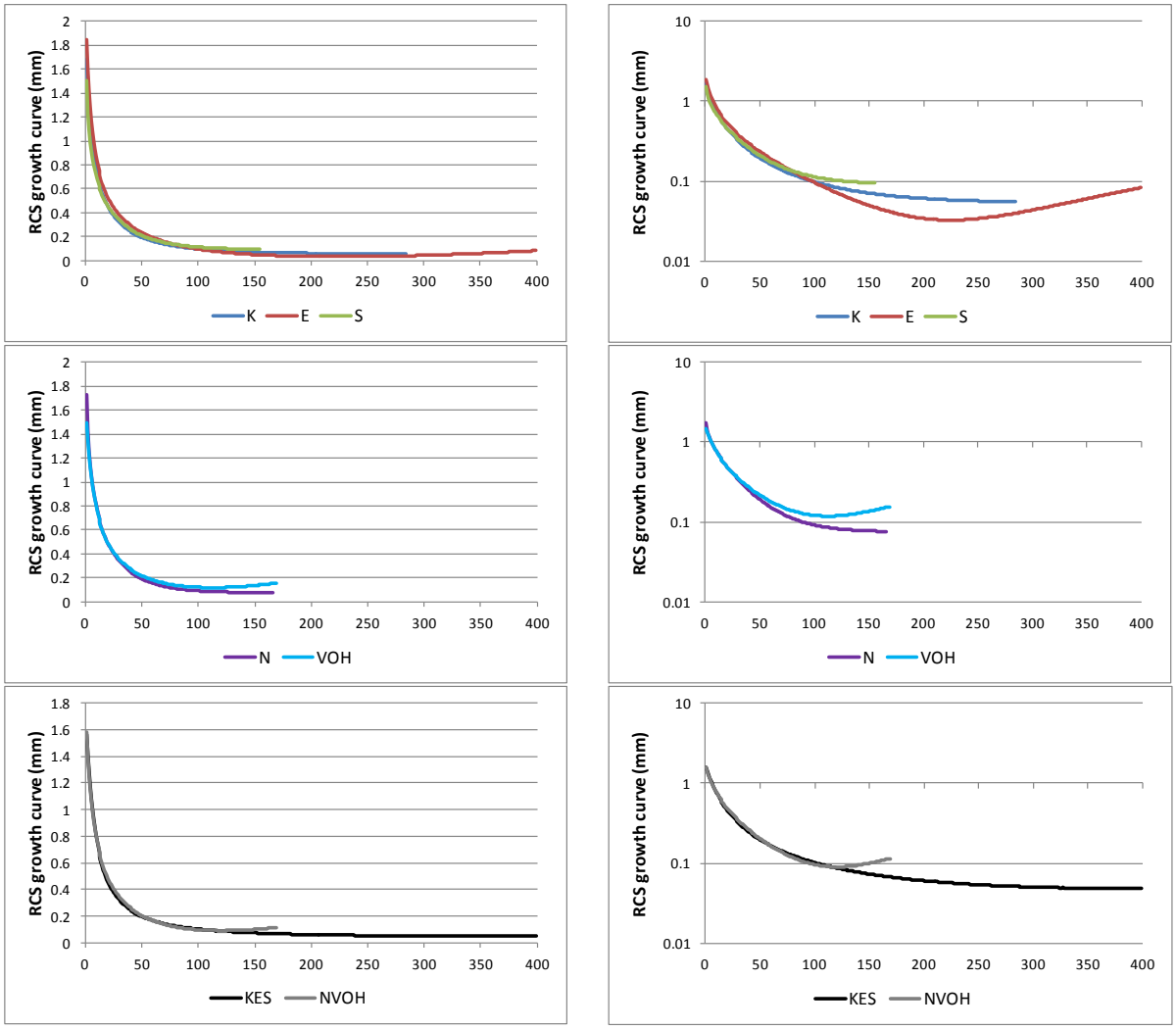


Figure S1. Regional curve standardisation (RCS) of *A. islandica*: observed and modelled growth as a function of the number of growth rings for the KES sites and NVOH sites. Left panels show absolute scale and right panels log scale. Each site is denoted by a capital letter and several letters denote pooled sites. The first 15 growth rings were omitted.

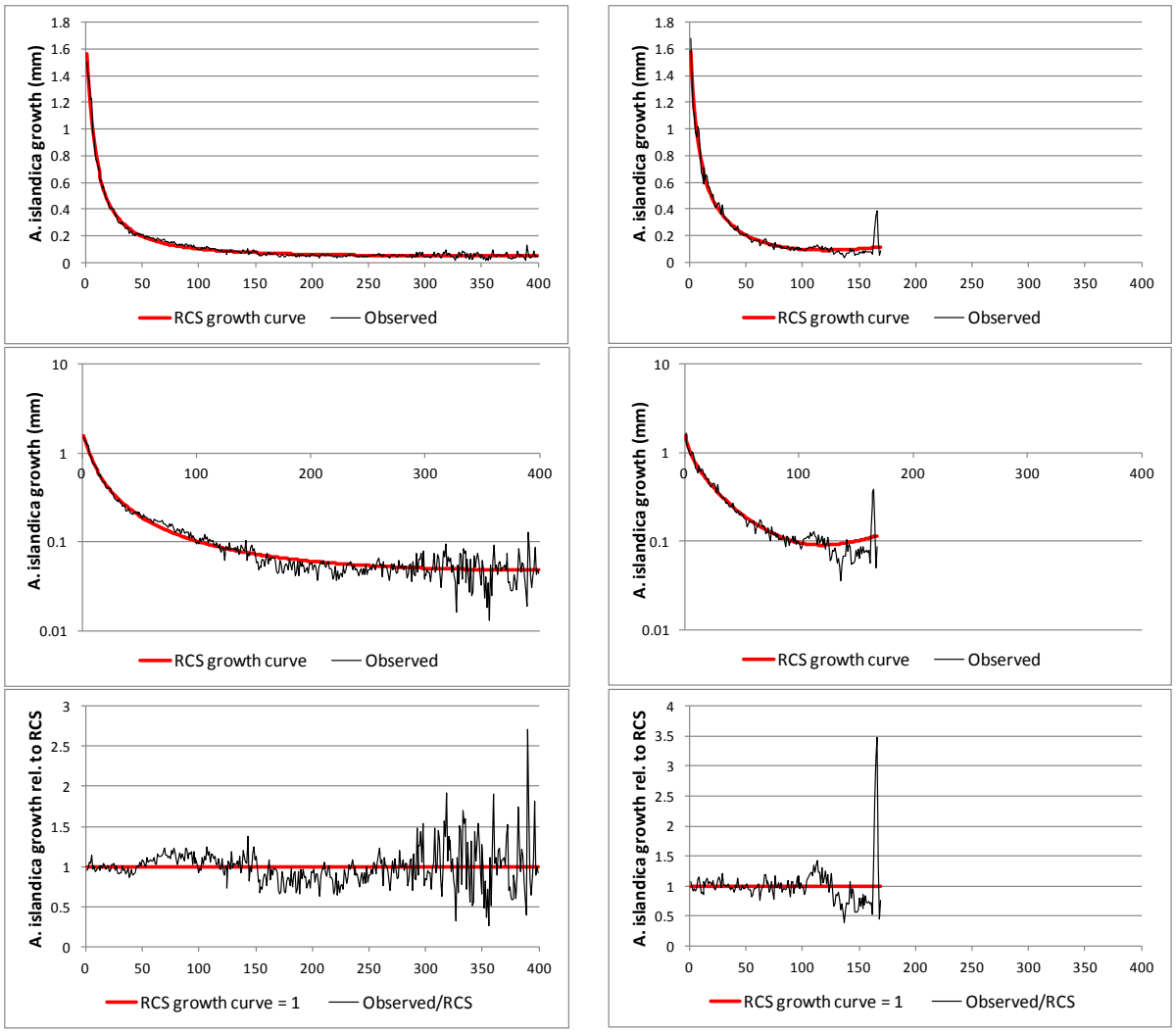


Figure S2. Regional curve standardisation (RCS) of *A. islandica*: observed and modelled growth as a function of the number of growth rings for the KES sites (left) and NVOH sites (right). Upper panels show absolute values on a normal scale, middle panels on a log-scale and lower panels show the relative values (observed values divided by the RCS curve). The first 15 growth rings were omitted.

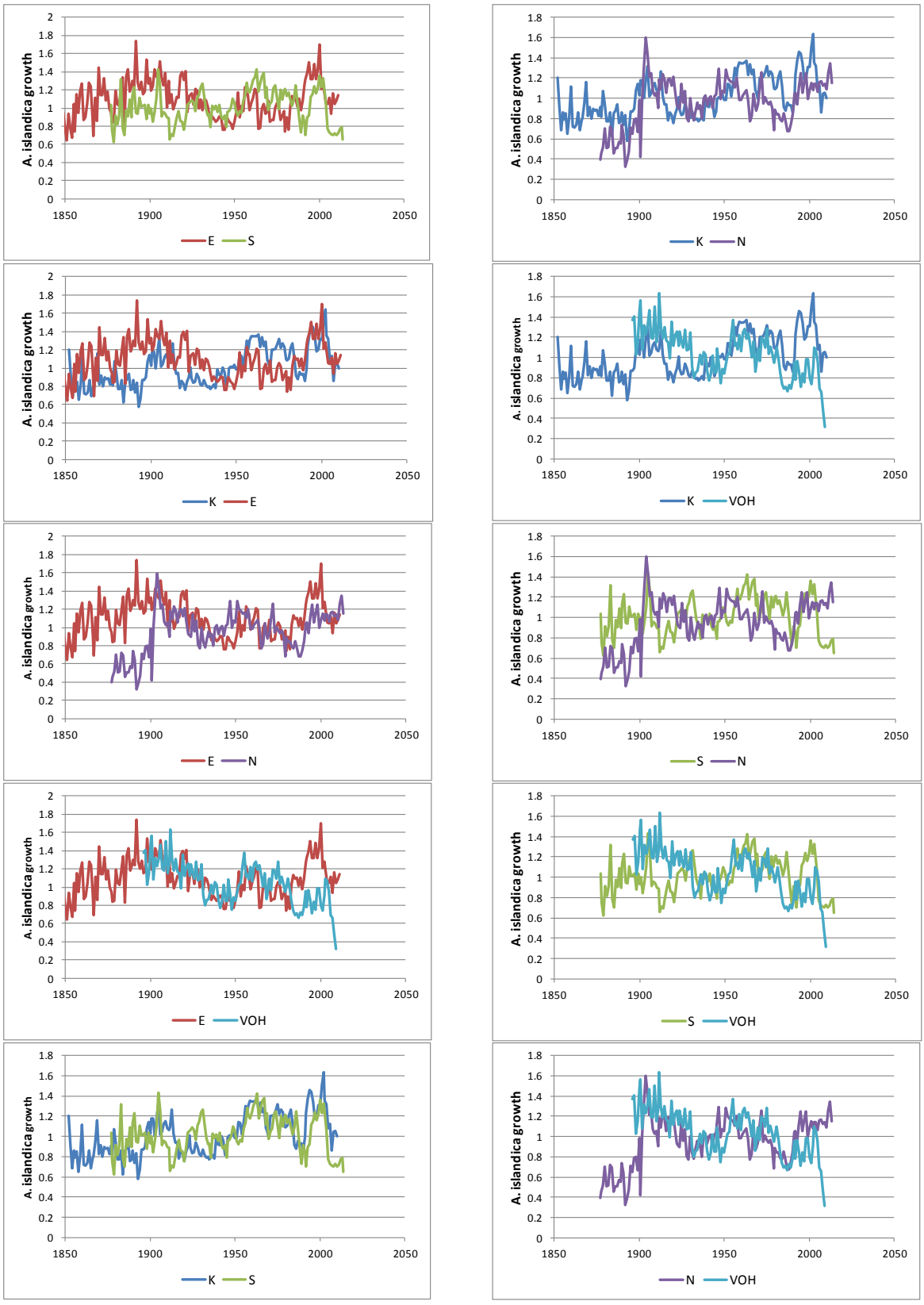


Figure S3. *A. islandica* growth indices, i.e., RCS detrended growth curves, from different sites on the Faroe Plateau compared with each other. Each capital letter denotes a site and several letters denote pooled sites.

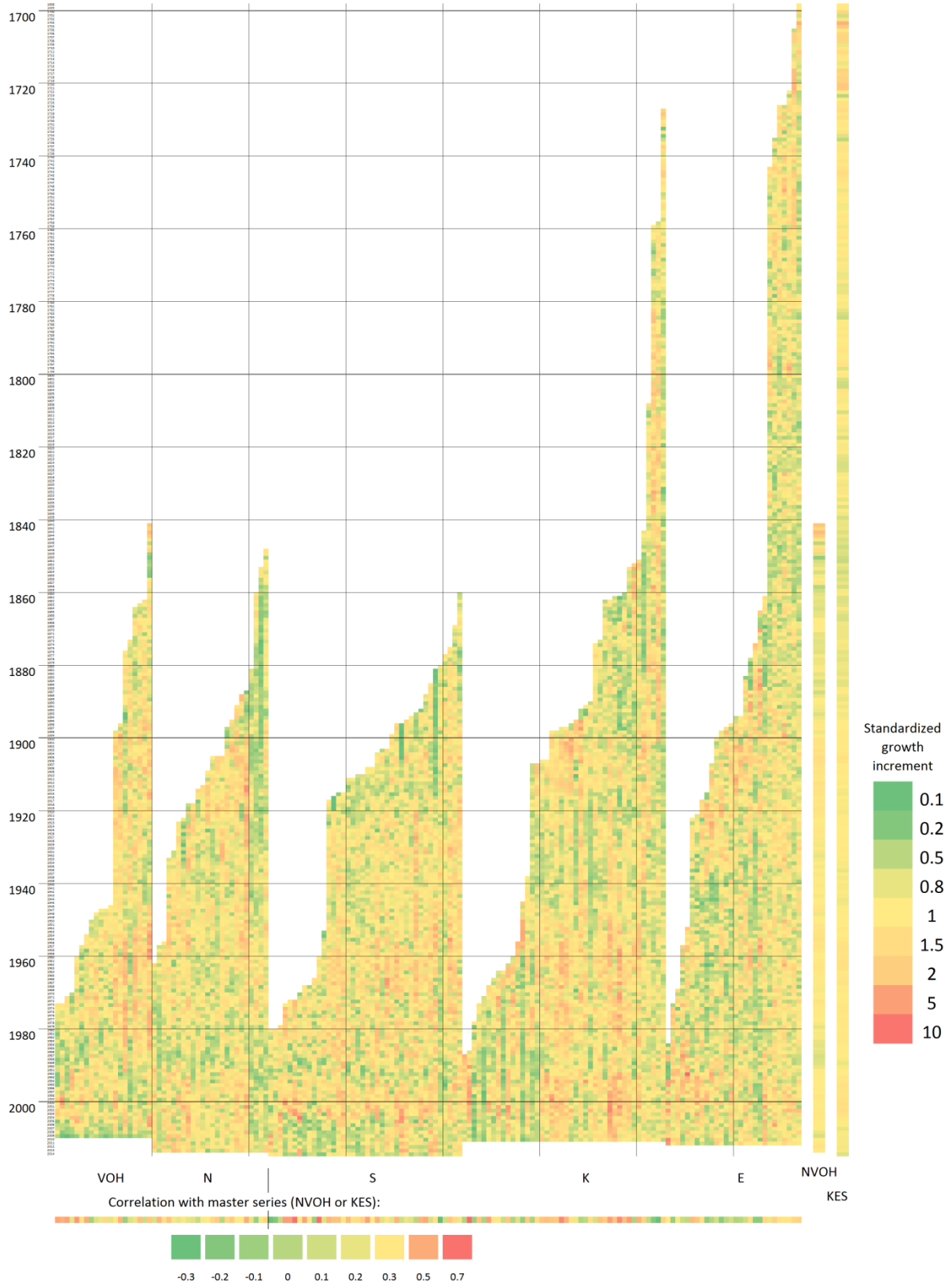


Figure S4. Individual *A. islandica* standardized growth increments for the sites VOH, N, S, K and E. The Pearson correlation coefficient with the master series, NVOH or KES is shown. A vertical line between the sites N and S indicates the main grouping of the series into NVOH and KES. The period from 1613 to 1697 is not shown because there was only one individual.

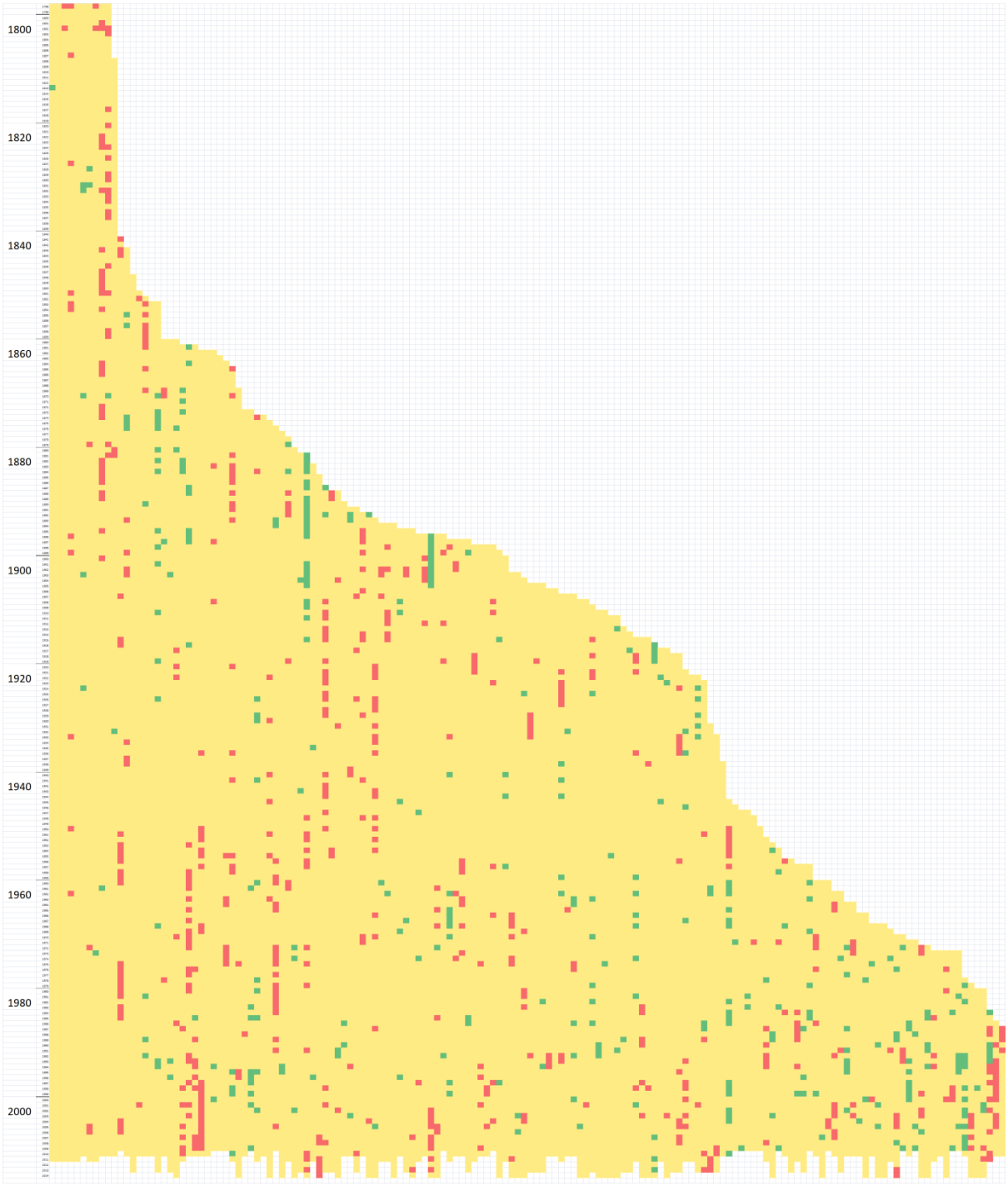


Figure S5. Individual *A. islandica* standardized growth increments for the sites VOH, N, S, K and E, now sorted by decreasing beginning year and grouped into three growth intervals: green < 0.25, red > 2.5 and yellow between 0.25 and 2.5. The figure shows potential marker years. The figure is based on the same data as in Figure S4.

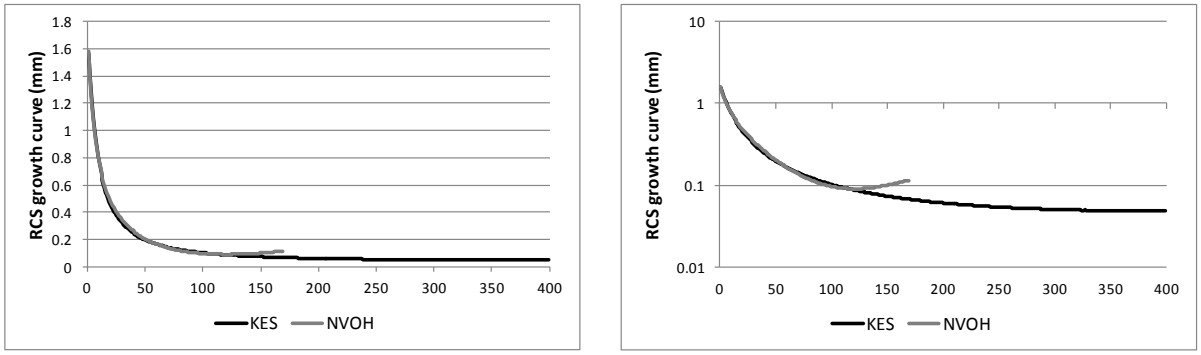


Figure S6. Regional curve standardisation (RCS) of *A. islandica*: observed and modelled growth as a function of the number of growth rings for the KES sites and KES without 11 shells. The left panel shows absolute values on a normal scale, and the right panel on a log scale. The first 15 growth rings were omitted.

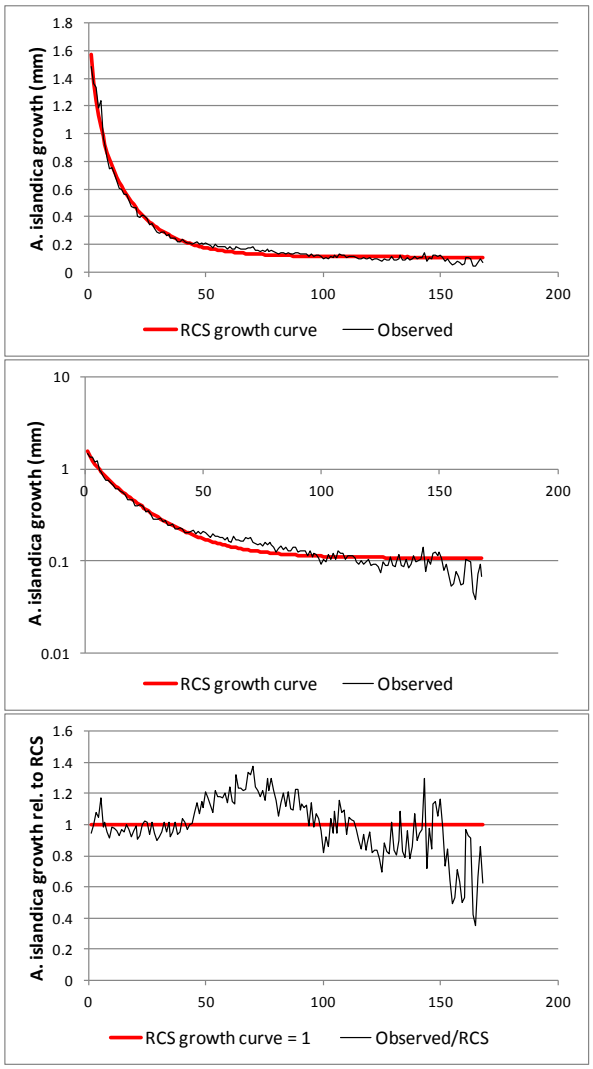


Figure S7. Regional curve standardisation (RCS) of *A. islandica*: observed and modelled growth as a function of the number of growth rings for sites KES omitting 11 shells. Upper panels show absolute values on a normal scale, middle panels on a log-scale and lower panels show the relative values (observed values divided by the RCS curve). The first 15 growth rings were omitted.

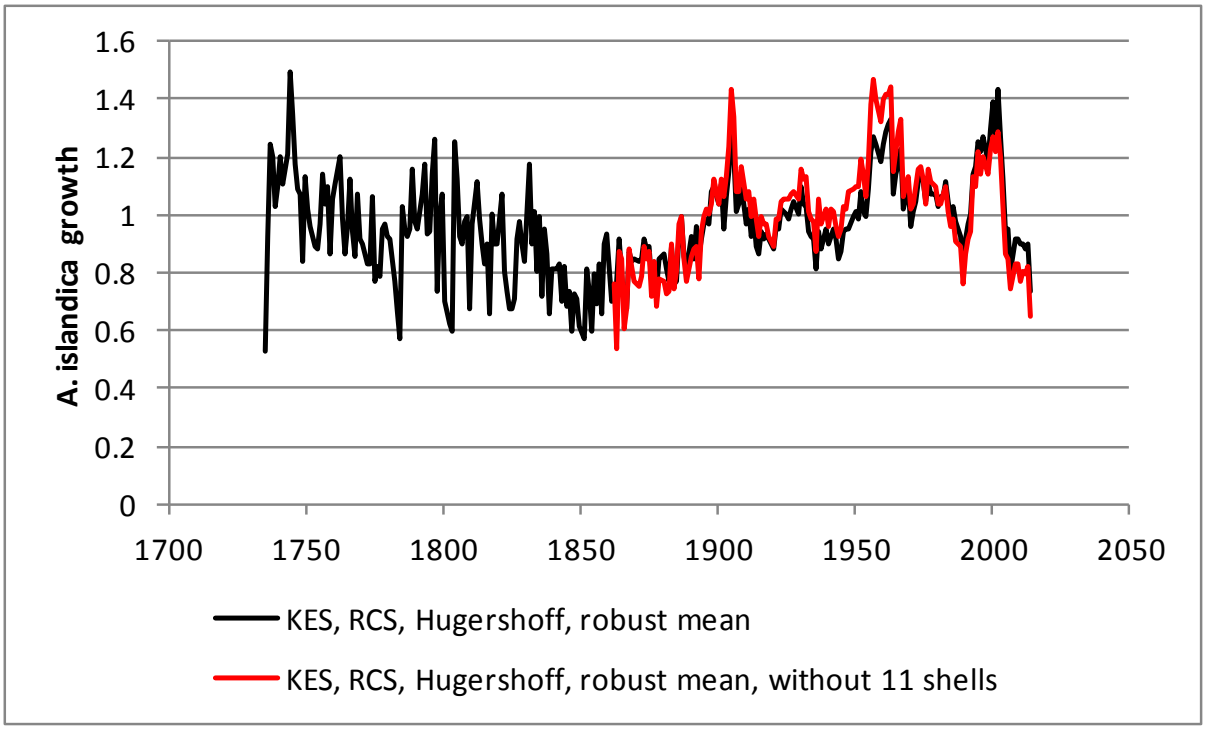


Figure S8. *A. islandica* growth index for the KES sites using all shells and KES without the 11 oldest shells. Note that excluding the 11 oldest shells causes a downward revision of the values after 1980s compared with the 1900-1980 values.

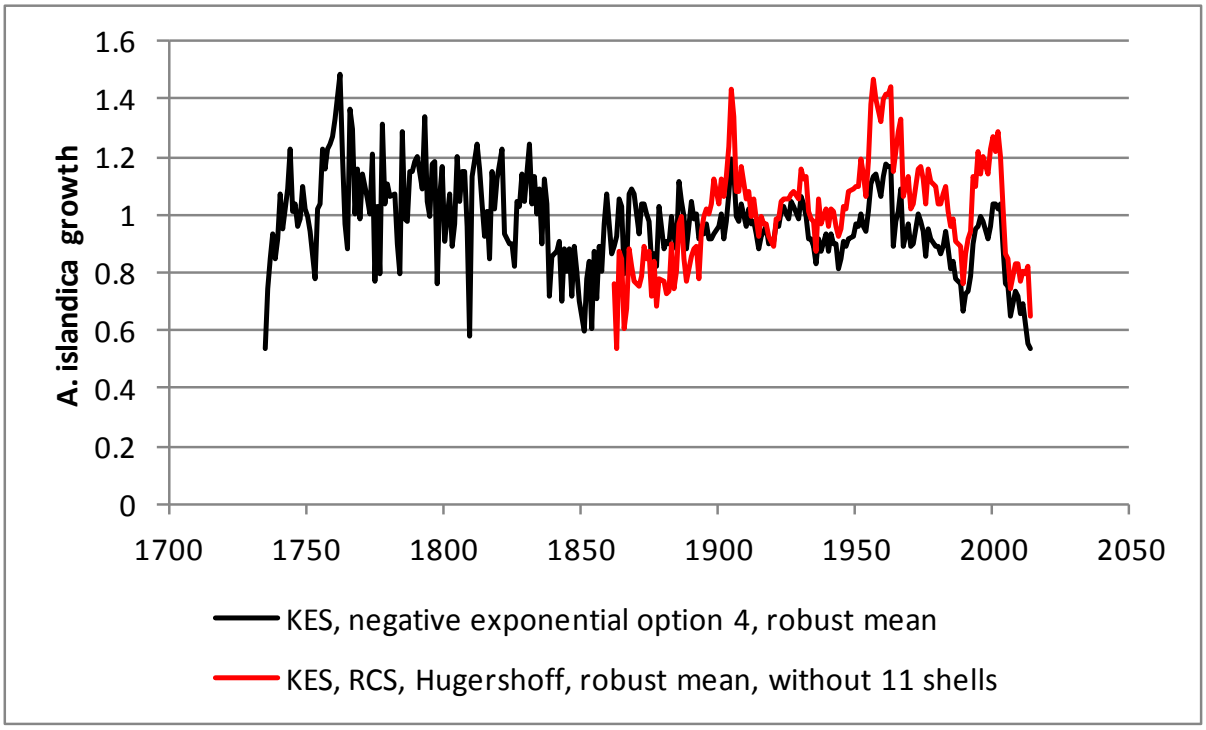


Figure S9. *A. islandica* growth index for the KES sites (incl. all shells) using a negative exponential detrending function (option 4 in the Arstan program) for individual shells and the regional detrending method for KES without the 11 oldest shells. Note that the individual detrending method gives the same decadal variability but that the pre-1900 values are higher compared with the regional detrending method.

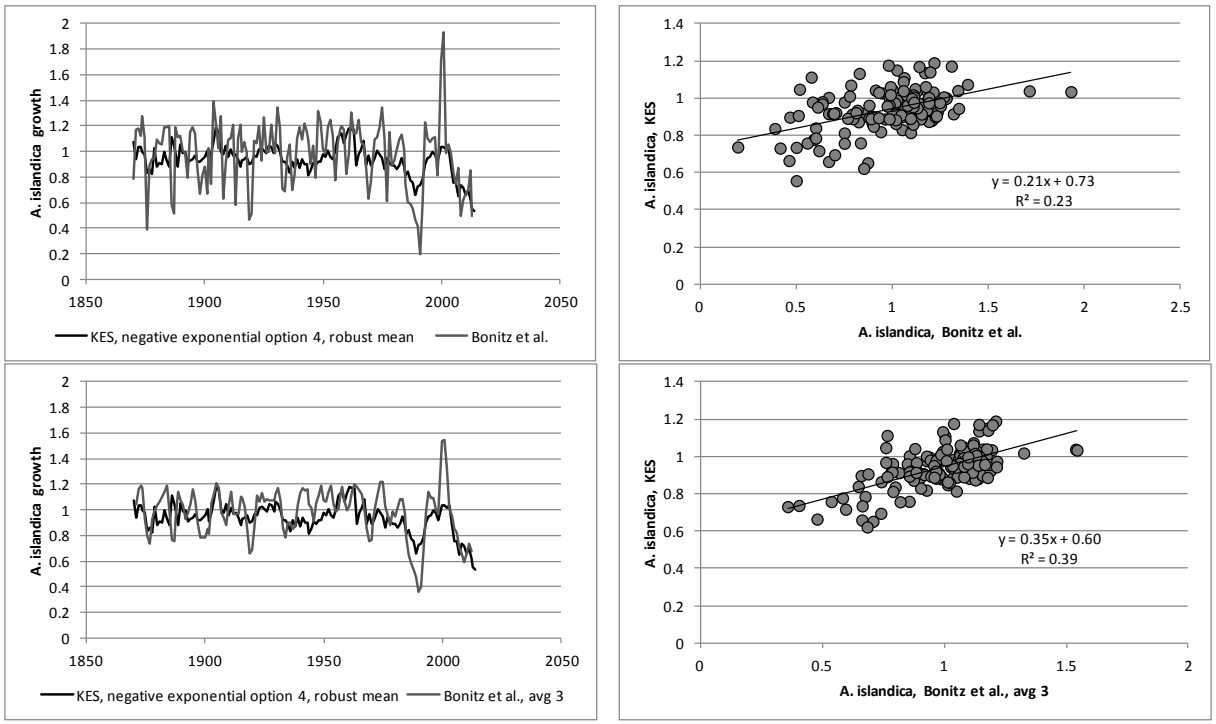


Figure S10. Comparing the *A. islandica* KES growth index with the chronology in Bonitz et al. (2018). A three year moving average (avg 3) is also applied to the latter series.

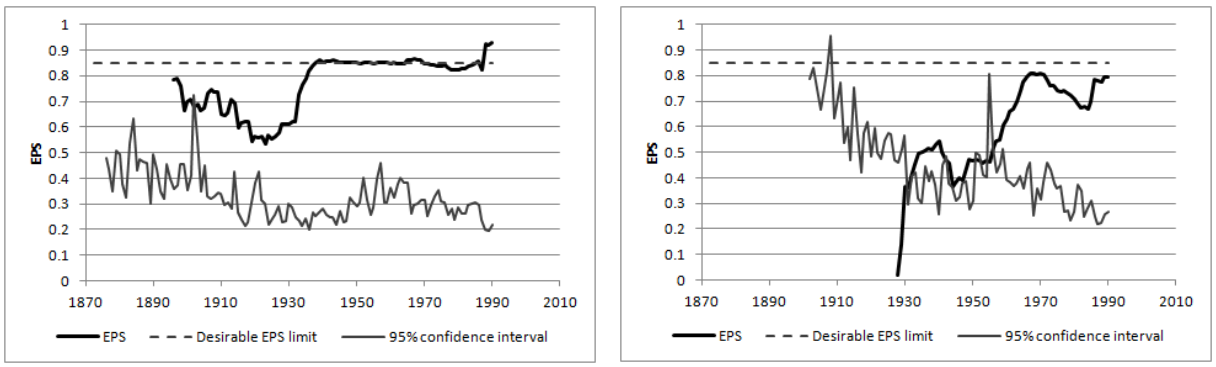


Figure S11. Comparing the *A. islandica* EPS values with the confidence intervals for shelf sites (left) and coastal sites (right).