[This is an unpublished response to *Nature* by Keith R. Briffa and Thomas M. Melvin, data 10 January 2006]

Response to submitted comment: 11th Century Crossdating in Briffa et al. [1995]

The substantive part of the argument contained in the McIntyre and McKitric submission (henceforth MM) is that several cores, forming the earliest part of the Polar Urals chronologies (ring width and density) and subsequently contributing to the temperature reconstruction presented in Briffa et al. (1995) (henceforth BEA), are not securely dated. There is a subsidiary implication that BEA were not correct in interpreting the data for AD 1032 as indicating an unusually cold summer in that area in that year. MM are wrong on both counts.

Their principal evidence for the implied incorrect dating in the early section of the chronology relates to cores 862450, presumably 862460 (note that MM repeat the number 862450) and 862470. Their 'evidence' is that the average correlation between these cores and other overlapping series is lower than correlations found in later parts of the chronology. However, it is often the case that early sections of cores at one site have lower inter-core correlations than later sections of cores. It does not follow that these lower correlations indicate incorrect dating.

Dating is achieved through a combination of techniques that include visual comparison of ring structure, clarity of signal, subset inter-core correlations, and mean subset to "chronology" correlation. Correlation can be poor over sub sections of chronologies but careful inter comparison of data can assure correct alignment. In this case we (and MM) also have access to tree-ring maximum-latewood-density data for these cores and the evidence of correct dating in the statistical comparisons using these data is much clearer. MM choose not to show these or the considerable evidence from subset comparisons and correlations with other independent chronologies that confirm our dating.

The illustration MM present is highly misleading because it shows only the chronology comparison with a single selected ring-width series (862470), and fail to show the inter-comparison between all the early cores and comparison between the average of early cores and the overlapping section of chronology, all of which clearly demonstrate correct alignment. What is worse, MM state that results using the density data for 862470 “are similar”. This is not true, as the *t*-value for the match between this density core and the density chronology (not including the 862470 core data) is greater than 7. So while the ring-width correlations are indeed low, the density data for all early cores show very much higher correlations.

Subsequent to the publication of Briffa et al. (1995), completely independent ring-width data have become available for the Yamal area adjacent to Polar Urals (Hantemirov & Shiyatov 2002). Comparisons between ring-width data for each of the early Polar Urals cores under discussion and the Yamal chronology (freely available to MM on my web site) all confirm our original dating.

Because the allegation of incorrect dating has already been made public (on website http://www.climateaudit.org and in a poster presented by McIntyre at a public meeting) this response and supporting Figures (attached with this message) will be posted on the Climatic Research Unit website, regardless of whether *Nature* decide to publish.

I now turn to the subsidiary AD 1032 issue in MM’s comment. Our original statistical estimate for the cold in AD 1032, is based largely on very low values in all density cores and, even though we have few cores that year, we see no reason to doubt that this summer was cold. MM cite BEA as stating 1032 to be the “coldest year of the millennium”. In fact this statement does not appear in BEA. Rather, 1032 is simply listed as the coldest summer (note not yearly) value. It is also clearly indicated (in Figures 1c and 1d), that the statistical quality of the chronology is poor at this time so, while we still believe the summer of 1032 to have been cold, we were and are still circumspect about the precise degree of coldness.

Despite MM’s incorrect inference regarding the poor quality of the crossdating, it is worth stressing that circumspection should also apply to the mean level of inferred temperature in the early section of the BEA, because of low replication of the data prior to about 1100. However, this is clearly indicated in Figure 1 of BEA and also in our subsequent publication (Briffa 2000) where the low-frequency variability in the

Yamal chronology and BEA Polar Urals temperature reconstruction is shown to differ: the Yamal series implying warmer conditions at this time.

In summary, MM's comment is entirely wrong in challenging the security of the dating of the early section of the Polar Urals chronology used in BEA. The subsidiary point about the need for circumspection in interpreting the relative levels of warmth in the early and late sections of the chronologies is valid, though hardly original. As a final comment I note that the "Yamal" ring-width series (providing evidence of warmth around AD 1000) is incorporated in many published Northern Hemisphere reconstructions, making the original premise in the MM comment debatable anyway.

Briffa KR (2000) Annual climate variability in the Holocene: interpreting the message of ancient trees. Quaternary Science Reviews 19:87-105

Briffa KR, Jones PD, Schweingruber FH, Shiyatov SG, Cook ER (1995) Unusual 20th-century summer warmth in a 1,000-year temperature record from Siberia. Nature 376:156-159

Hantemirov RM, Shiyatov SG (2002) A continuous multimillennial ring-width chronology in Yamal, northwestern Siberia. Holocene 12:717-726

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Figures:

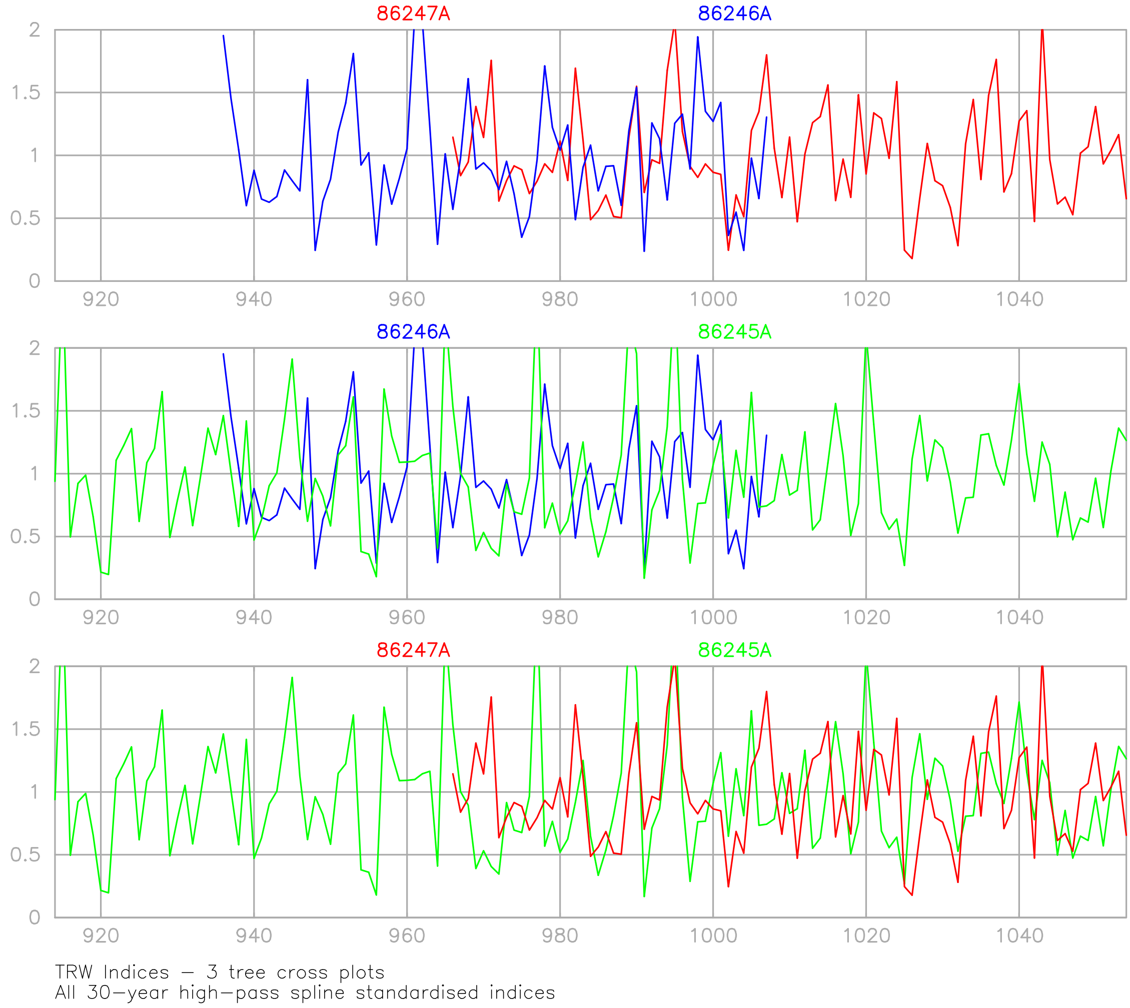


Figure 1. Plots showing the comparison of indices of ring-width measurements (residuals from a 30-year high-pass spline) for the three trees making up the early section of the Polar Urals chronology (Briffa et al. 1995).

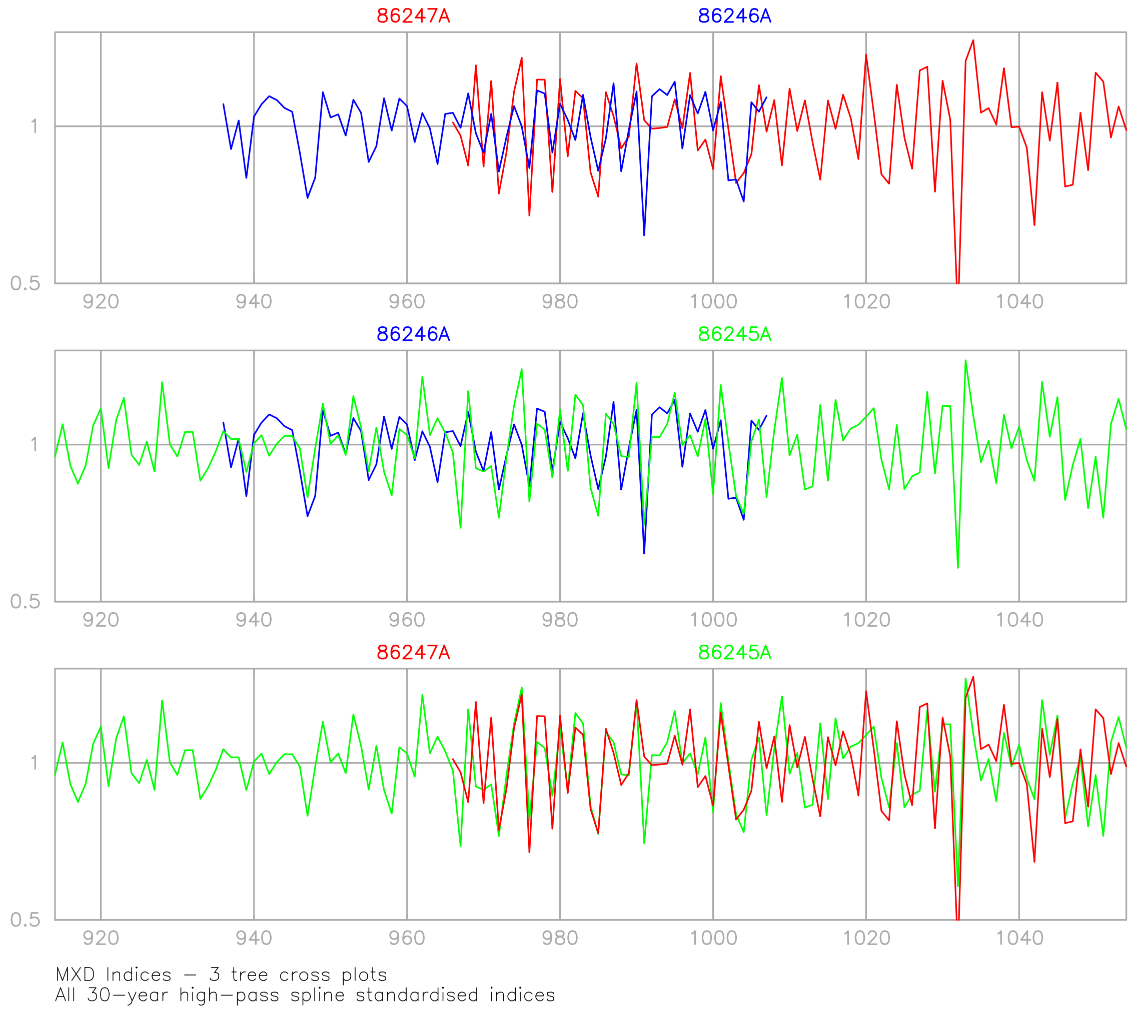


Figure 2. Plots showing the comparison of indices of maximum latewood density measurements (residuals from a 30-year high-pass spline) for the three trees making up the early section of the Polar Urals chronology (Briffa et al. 1995).

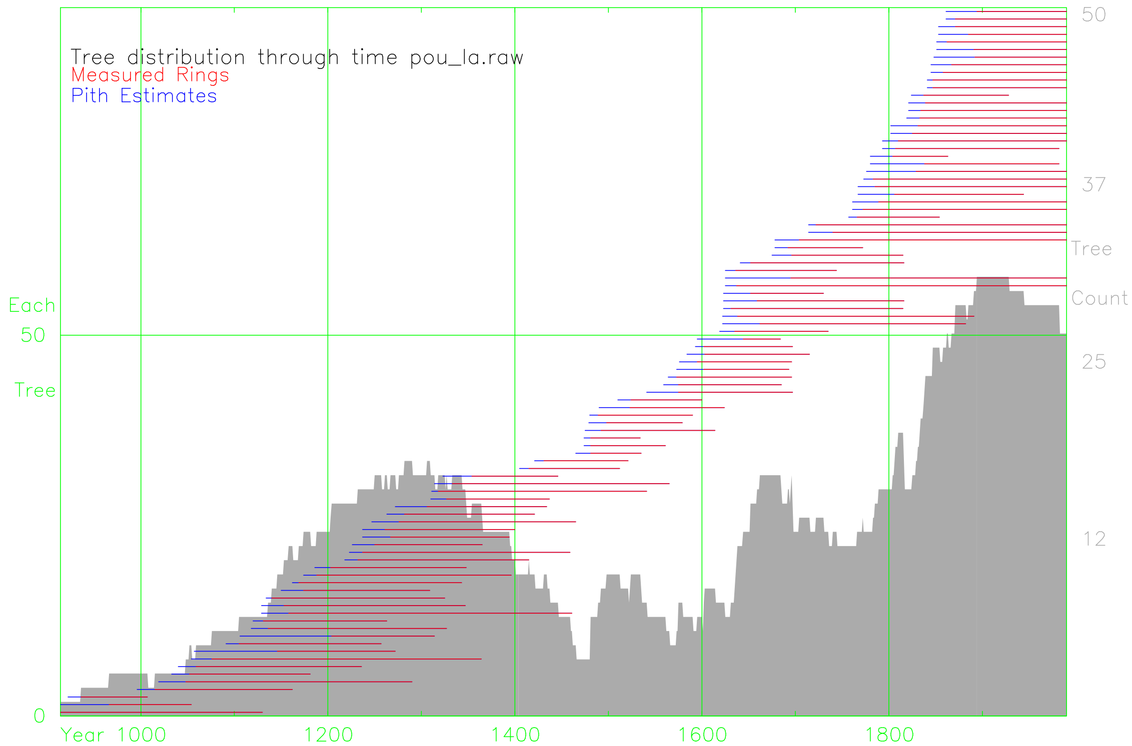


Figure 3 – Polar Urals Tree distribution over time. The three cores at issue are the first ones shown, nearest the bottom of the figure.

Table 1 – Polar Urals, maximum latewood density measurements - Tree to chronology correlation Tables, 50-year segments, 25-year overlap, standardised as per COFECHA.

Correlation tables from 914 to 1990 for POU_LA.MXD

Year	925	950	975	1000	1025	1050	1075	1100	1125	1150	1175	1200	1225	1250	1275	1300	Mean
To	974	999	1024	1049	1074	1099	1124	1149	1174	1199	1224	1249	1274	1299	1324	1349	Core
86201A												.59	.75	.81	.73		.72
86202A					.65	.66	.73	.68	.68	.61	.44	.46	.75	.84			.65
86203A				.77	.82	.80	.88	.83	.78								.81
86204A						.82	.87	.86	.85	.85	.82	.79					.84
86205A									.86	.84	.83	.83	.88				.85
86206A						.68	.83	.70	.59	.61							.68
86207A								.79	.80	.86	.74	.75	.77				.78
86208A									.80	.84	.83	.87	.79	.83	.84	.80	.83
86209A											.86	.94	.90	.84	.70		.85
86210A							.68	.75	.67	.75	.80	.83	.87	.86	.86	.87	.80
86211A									.59	.69	.73	.87	.88	.84	.77		.77
86212A											.45	.73	.87	.85	.79	.85	.77
86213A									.85	.87	.77	.79	.81				.82
86214A										.69	.68	.78	.91	.85	.83	.79	.79
86215A										.88	.85	.83	.77	.70	.65	.43	.73
86216A												.86	.92	.92	.86	.87	.89
86217A													.81	.81	.84	.75	.78
86220A													.88	.90	.85	.80	.78
86221A														.91	.82	.84	.85
86245A	.61	.67	.61	.64	.65	.46	.59	.51									.59
86246A	.58	.55	.57														.57
86247A		.43	.45	.61	.54												.51
86248B														.70	.76	.74	.73
86248C														.51	.55	.54	.59
86256A										.55	.61	.59	.63	.67	.59	.37	.51
Means	.59	.55	.54	.68	.67	.69	.76	.73	.75	.75	.72	.77	.82	.80	.76	.73	.72
POU_LA.R*	.29	.44	.46	.31	.34	.52	.59	.47	.56	.71	.59	.56	.62	.69	.73	.82	.57

* - Correlations for the ring-width against density chronologies

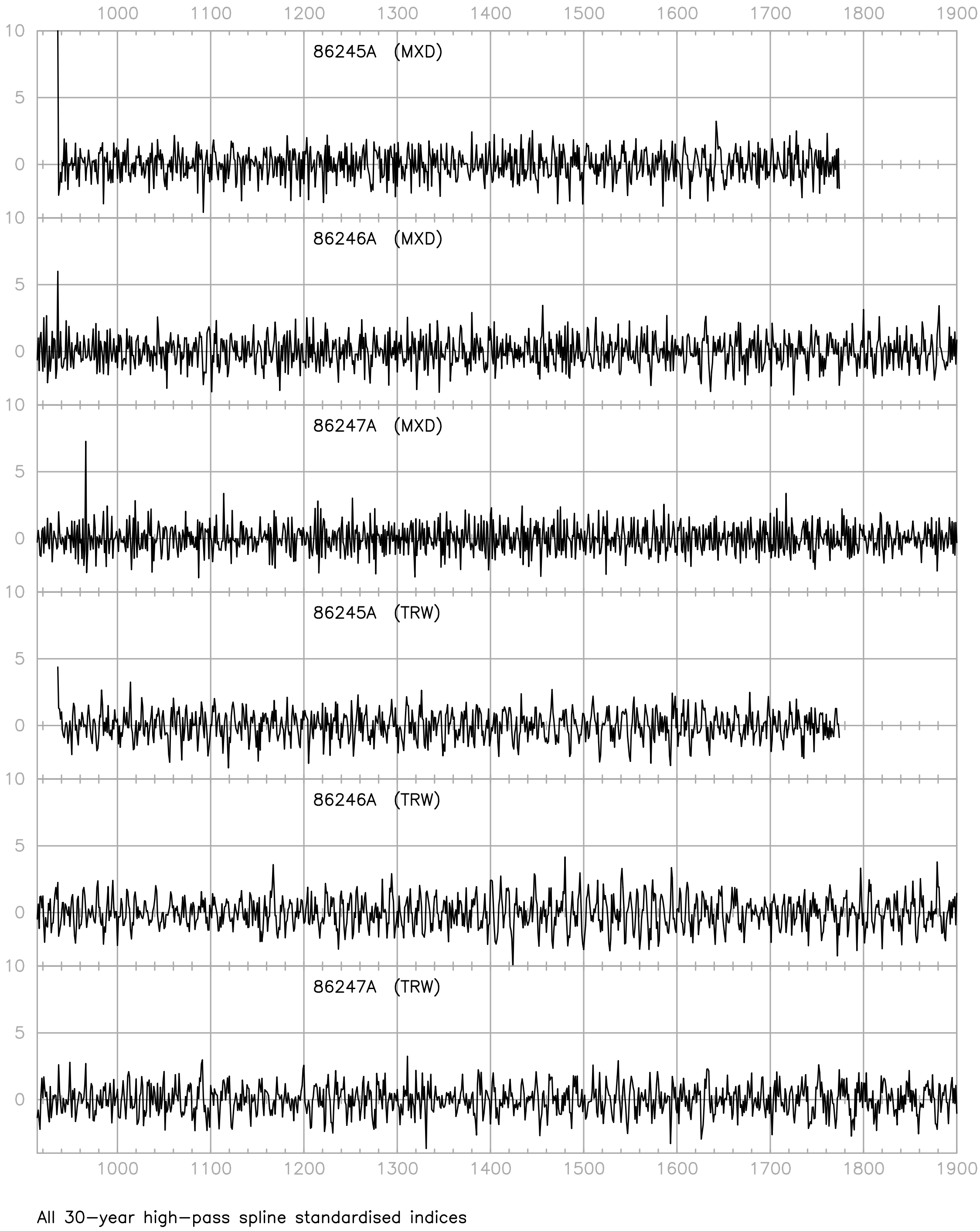
Table 2 – Polar Urals, Tree-ring measurements - Tree to chronology correlation Tables, 50-year segments, 25-year overlap, standardised as per COFECHA.

Correlation tables from 914 to 1990 for POU_LA.RAW

Year	925	950	975	1000	1025	1050	1075	1100	1125	1150	1175	1200	1225	1250	1275	1300	
Mean																	
To	974	999	1024	1049	1074	1099	1124	1149	1174	1199	1224	1249	1274	1299	1324	1349	
Core																	
86201A												.60	.70	.74	.79		.71
86202A					.68	.69	.65	.63	.73	.65	.39	.41	.57	.59			.60
86203A				.51	.57	.75	.78	.79	.77								.70
86204A						.70	.72	.75	.82	.86	.82	.83					.78
86205A									.67	.64	.51	.65	.80				.65
86206A						.71	.76	.75	.74	.78							.75
86207A								.66	.74	.73	.70	.72	.77				.72
86208A									.80	.78	.78	.77	.76	.86	.86	.86	.81
86209A											.61	.65	.76	.76	.64		.68
86210A							.64	.77	.79	.80	.85	.85	.87	.87	.85	.84	.81
86211A									.57	.56	.70	.78	.73	.80	.74		.70
86212A											.74	.74	.71	.70	.80	.86	.79
86213A									.81	.80	.73	.68	.72				.75
86214A										.67	.71	.70	.71	.81	.88	.86	.76
86215A										.84	.79	.80	.77	.72	.80	.65	.77
86216A												.74	.79	.83	.90	.92	.84
86217A													.56	.65	.76	.83	.72
86220A													.71	.77	.77	.73	.78
86221A														.82	.90	.92	.88
86245A	.26	.51	.36	.34	.41	.26	.42	.42									.37
86246A	.25	.42	.40														.36
86247A		.33	.31	.29	.22												.29
86248B														.67	.74	.80	.73
86248C														.61	.74	.86	.75
86256A										.48	.63	.66	.52	.57	.72	.73	.65
Means	.26	.42	.36	.38	.47	.62	.66	.68	.74	.72	.69	.71	.72	.74	.79	.82	.70
POU_LA.M*	.29	.44	.46	.31	.34	.52	.59	.47	.56	.71	.59	.56	.62	.69	.73	.82	.57

* - Correlations for the ring-width against density chronologies

Figure 4 – Polar Urals – t-values for correlation of the three trees against the mean of remaining trees for ring-width and maximum latewood density chronologies (30-year high-pass spline standardisation).



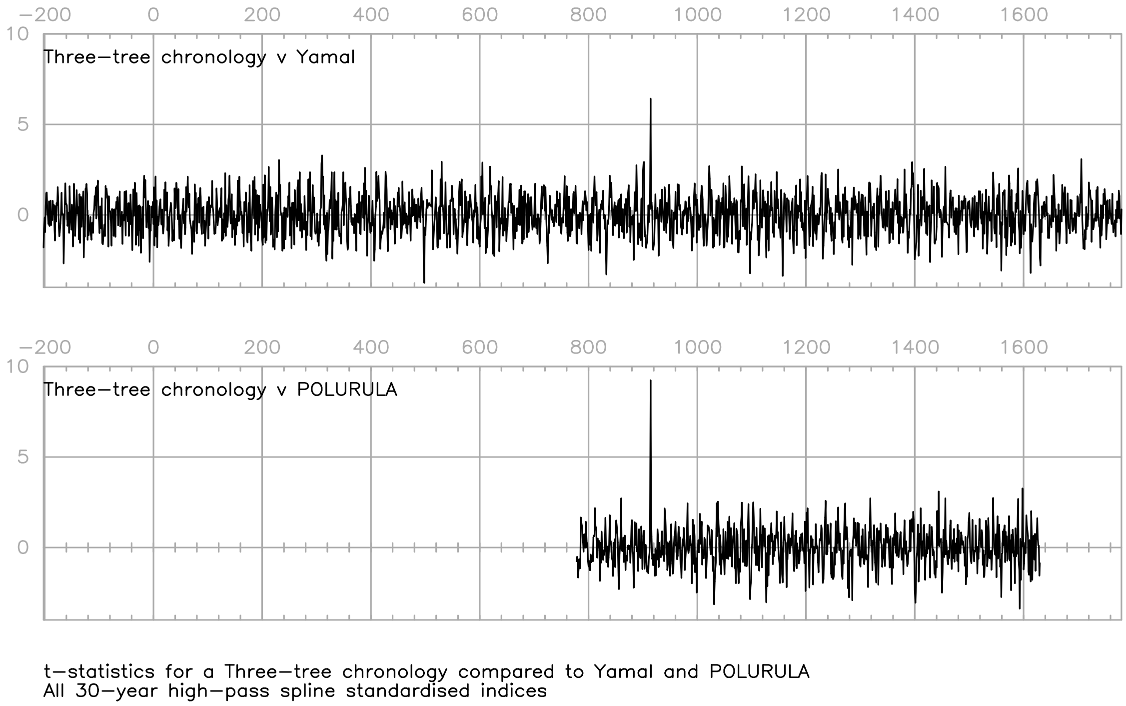


Figure 5 – t-statistics at each possible fit for the three-tree chronology of Polar Urals against the Yamal (Hantemirov & Shiyatov 2002) chronology and the Polar Ural historical chronology (Schweingruber & Briffa 1996)

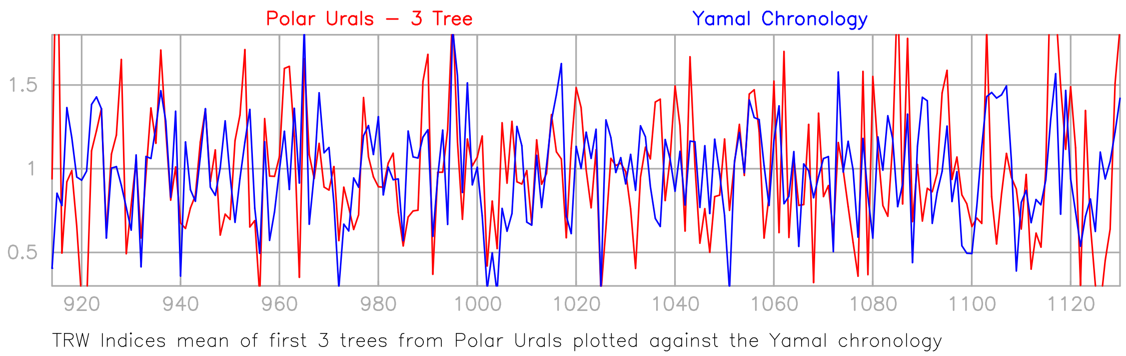


Figure 6 – Three tree polar Ural chronology plotted against the Yamal chronology over their common period (30-year high-pass spline standardisation).

Briffa KR, Jones PD, Schweingruber FH, Shiyatov SG, Cook ER (1995) Unusual 20th-century summer warmth in a 1,000-year temperature record from Siberia. Nature 376:156-159

Hantemirov RM, Shiyatov SG (2002) A continuous multimillennial ring-width chronology in Yamal, northwestern Siberia. Holocene 12:717-726

Schweingruber FH, Briffa KR (1996) Reconstruction of summer temperatures with a circumpolar tree ring network. In: Fire in Ecosystems of Boreal Eurasia, Vol 48, p 105-111