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Climate of the Past Discussions

Interactive comment on "Millennium-long summer temperature variations in the European Alps as reconstructed from tree rings" *by* C. Corona et al.

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My knowledge of the analogue technique is limited but I wonder if it is possible to get the same confidence in the reconstruction in the time period before the XIVth century, which is reconstructed, from a limited number of series than in the following centuries?

We explain that results will show that the method has an interesting characteristic as compared with the regression based methods: the correlations between estimated series are not better than those of the observed series as the estimation process is not based on the similarity between variables but between the years. The method is then conservative for the observed spatial variability. Moreover, it has been demonstrated that variance is well maintained independent of the number of predictors (Nicault et al. 2008b).

- Calibration: Why do you choose the JJA temperature anomalies as a target? Have all the possible combinations of regressors been tested? Justify. What is the proportion of calibration versus verification? (p 1168) The use of JJA temperature anomalies as regressors has been assessed. The best calibration was obtained when calibrating with JJA temperatures anomalies in accordance with the positive responses of Pinus cembra and Larix decidua to summer temperatures observed by several authors (e.g. Frank and Esper 2005), at high altitude in the Alps. The use of a bootstrap technique which employs sampling with replacement prevent us to produce precisely the proportion of calibration versus verification. However, approximately in mean, this proportion is estimated to be 2/3, 1/3. - Line 2 p1168: 'Correlation before 1200...': I guess it is still about intra-species correlation? Please, guide the reader. The mean correlation R=0.38 and R=0.31 was indeed calculated between larch populations and pine populations, though it corresponds to an intra-species mean correlation. The original sentence : " Interestingly, for larch chronologies (Fig. 3c), the correlations before 1200, between 0.38 and 0.55, reveal a fairly robust signal in the four oldest populations from Switzerland/Austria (Swiss 1, Swiss 2) and France (Merveilles, Nevache)" . Was replaced by : The average interspecies cross-chronology correlation, calculated over the 1637-1974 common period, is 0.19, lower than the intra-species mean correlations for larch (R = 0.38) or pine (R = 0.31). It seems also influenced by the distance between sampling sites.

- Line 19 p1168: high values at 1150-1170: Isn't the agreement between Larix and Pinus ARGC expected as this part of the Pinus chronology is built from Larix data? Pinus chronology is not built from Larix data. If such was the case, the correlation between both chronologies would have increase significantly before 1500AD while the number of populations for Pinus cembra decreases. However, we show on figure 3 that this correlation does not increase before this date. - Line 20: 'High values... at 1660-1675'. I do not agree with this description. For me after 1600 the two chronologies are out of phase, with Pinus lagging behind Larix by 20 years. They are back in phase by the end of the XIXth century. Indeed both chronologies are out phase by 20 years after 1600

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and back in phase by the end of the 19th century. This phase difference was explained in the paragraph as following: Interestingly, after 1620, the two chronologies are out of phase, with Pinus lagging behind Larix by 20 years. For example, during the Late Maunder Minimum 1675-1715, all larch chronologies show a prominent, multi-decadal growth reduction during the ∼1680-1700 period, whereas pine chronologies indicate a later and less important reduction at ∼1710-1720. Between 1810 and 1821, almost all chronologies indicate reduced growth rates and by the end of the 19th century, the chronologies are back in phase. - Line 12 p 1169: Consider also the decoupling between 1819 and 1825. The decoupling between 1819 and 1825 has been underlined in the text as following " When the curves are smoothed with a 20-year low-pass filter (Fig. 4b), we see a maximum decoupling between colder periods e.g. 1950-1970 (-0.6°C), 1819-1825 (-0.4°C) and 1875-1900 (-0.25 °C) (Fig. 4b) ".

- Line 19 p 1169: 'which proves that the reconstruction is better in the high frequency domain than in the low frequency one'. why? It would need some explanations. An error occurs in the computation of R2 in the original manuscript. The original sentence, For the 20-yr low pass curves, R2 is similar (0.45) before and after 1819. (Fig. 4d), which proves that the reconstruction is better in the high frequency domain than in the low frequency one. Is replaced by the following sentence : "For the 20-yr low pass curves, R2 is 0.45 before 1819 and increases to 0.81 between 1819 and 2000. (Fig. 4d). This statement proves that the reconstruction has a good behavior in the low frequency domain.

- Line 27 p 1171: 'The proximity of these chronologies ...may explain these high correlations'. Following this logical statement, the chronologies located in Central Alps (20 a,b,c,d, 21 a,b,c) should have higher correlation coefficients... This is the case Swiss1 and Swiss2 have the maximum correlation.

- Line 22 p1172:'Summers 1639, 1627 and 1632 were the three coldest...'. They were shown to be also cold in Ile-de-France (Etien et al., 2008; CP). The reference to Etien et al. (2008) has been added. Summers of 1639, 1627 and 1632 were the three coldest summers during the last millennium with respective anomalies of -2.2 °C and -2.1°C and -2.2°C. They were shown to be also cold in Paris region (Etien et al. 2008). - Line 9 p 1173: The comparison of the mean levels of the centuries is not meaningful. This time slicing is artificial. I think it would be more interesting to identify periods of high or low temperature independently of the calendar, for instance the cold period spanning the second half of the XIIth century and the first half of the XIIth. The comparison of the mean levels of the century has been been replaced by the comparison of abnormally cold or warm periods independently of the calendar, as following: Figure 5b shows the smoothed summer reconstruction. We recontruct long cold periods from the second half of the 11th and the first half of the 12th century (-0.5°C below the 1901-2000 average) and between the late 16th century and the early 18th century (-0.8°C). The culmination is achieved between 1680 and 1705 (-1.1°C), which appears to be the coldest decades of the millennium. By contrast, a warm period is reconstructed between 1200 and 1420 (+0.4°C). The first decades of the 13th century (1300-1340) are clearly the warmest of the millennium (+0.7°C) until 1980-2000 (+1.8°C). Line 11 p 1173: 'The last two decades of the XIIth century are clearly the warmest of the millenium'. The 1980-2000 period is clearly warmer! The 1980-2000 period is clearly the hottest on the millennium, and the sentence has been corrected as following: " The 13th century appears as warm as most of the 12th century but the last two decades of the 12th century are clearly the warmest of the millennium until 1980-2000."

Line 21: 'The MWP is characterised by significant interdecadal variations'. Do you mean here? Or in general? If this is a general statement a reference is needed. The reference refers to the present reconstruction and it was modified as following to be more explanatory: "It is characterized at high altitude, in the French Alps by its shortness and by significant interdecadal variations. Warmer decades are centered around 1160, 1240 and 1315"

Line 23 p 1173: Note that the cooling begins in the mid-XVIIIth century in phase with the decrease of the solar irradiance. The simultaneity between the cooling in the mid-18th century and the decrease of the solar irradiance has been stated in the final revision: “These coldest periods of the LIA coincide with the Spörer and Maunder solar minima (Fig. 6a). The cooling beginning in the mid-18th century is in phase with the decrease of the solar irradiance”.

Line 4 p 1174: You cannot say that the volcanic eruptions are in phase with the Dalton minimum as it implies a causal relation between the two Indeed there is no relation between the volcanic eruptions during the 19th century and the Dalton solar minimun. To avoid this nonsense, we modified our sentence : Happening during the Dalton solar minimum, these eruptions most likely lead to an accumulated aerosol cooling effect (Esper et al. 2007).

Line 6-7 p 1174:’Recent anthropogenic impact further diminishes the proportion...’. What do you mean by ’further’ here? This sentence was not explicite. It has been replaced by the following sentence: During the industrial period, the proportion of man-made forcing agents on the earth’s climate system increases comparatively to natural forcing agents (Anderson et al. 2003; Crowley 2000; Meehl et al. 2003).

Line 8-10 p 1174: I guess that you compare some temperature records to each other. But specify what is instrumental / reconstructed, etc. The instrumental and reconstructed records use for comparison have been specified in the text as following : This trend and the inter-decadal variations of the reconstructed temperatures seen since the beginning of the 19th century are in line with JJA instrumental temperatures recorded in the Alps (Auer et al. 2007).

Line 27-28 p 1174: ’GI are bound on a high density of data’. What do you mean? The original paragraph : Monthly Graduated Indexes GI, ranging from −3 to +3 (from very cold to very warm anomalies), 0 being “average” months or data not available (according to the 1901–1960 period), are bound on a high density of data and on the availability of quasi continuous proxy data from historical and natural archives that are calibrated within the period of instrumental observations.

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has been clarified as following:

Graduated Indexes GI, ranging from -3 to +3 (from very cold to very warm anomalies), 0 being "average" months or data not available (according to the 1901-1960 period), are related to a high density of data and on the availability of quasi continuous proxy data from historical and natural archives that are calibrated within the period of instrumental observations. On a seasonal level the GI is defined as the average of the monthly GI, which yields gradations of 0.3 between -3 and +3.

Line 12 p1175: What is the resolution in the c of figure 6. The original data have a resolution of 3 years but a filtering is applied. Is the final reconstruction filtered with a 20-year filter as said, or 20-consecutive data? The final reconstruction is filtered with a 20-year filter as said in the original text.

Line 12 p1175: You could also compare your data to the reconstruction of April-August Temperature anomalies in Switzerland between 1480 and 2000 proposed by Meier et al. (2007, GRS). A comparison with Meier et al (2007) is indeed very interesting because, this alpine reconstruction is based on a phenological proxy (grape ripening) fully independent from our dataset. It has been added to the paragraph 5.3.1 dealing with regional scale comparisons

The filtered Meier07 record has lower amplitude than our reconstruction. The greater amplitude of our reconstruction can be related to both scaling uncertainties/dependence upon particular statistical reconstruction approaches as well as amplitude dependence upon both the spatial and temporal scales of interest (e.g., Esper et al. 2005). The courses of both curves are similar between 1660-1710, 1800–1830 and 1950–2000. A divergence of the curves is seen mainly between 1600-1660, 1730-1760 and 1880–1950. Such discrepancies may be explained by changing viticultural traditions (Lachiver, 1988) and other environmental influences than temperature. For example, anomalously high September precipitations fosters diseases and irregular sugar assimilation and, thus, distort the accuracy of the harvest date (Meier et al.

2007). However, the numerical quantification of this proxy inherent uncertainty and statistical reconstruction uncertainty is very difficult (Keenan, 2007).

Line 19-30 p 1176: What are the correlation coefficients and p-values between your data and Mangini et al.'s? As a general comment, you should report errors bars on the lines of the figures when possible and accompany the correlation coefficient of their p-values in the text. Here, you can calculate a minimum error (to report as an error bar on the figure) using the original data. The discrepancy between your data and Mangini et al.'s may not only be due to the fact that they calculate yearly average temperatures while you report JJA temperature but it may also be related to their dubious calibration.

p-values have systematically been added in the text to accompany the correlation coefficient. However, if we want to maintain the readability of the figure we cannot add errors bars on the lines of the figures.

Line 25 p 1177 to 6 p 1178: This part is not written in a very logical way. Causes, consequences and comparison to present day are mixed. Consider rewriting This paragraph has been rewritten in a more logical way :

Between1720 and 1920, our reconstruction slightly differs from Büntgen05 and Büntgen06. Higher temperatures are reconstructed at the end of the Maunder minimum (1720's) and the Dalton solar minimum (1820's) is less pronounced (Fig. 6d). They are related with growth increases in several of the most Western chronologies used for reconstruction, e.g. Chardonnet, Freyssinières, Névaches Granges or Lac Miroir and absents in eastern populations. These periods match with abnormal dry conditions in Europe (Pauling et al. 2006) and in the Alps (Casty et al. 2005) and a lower drought sensitivity of Western populations exposed to oceanic conditions might explain the observed differences. This hypothesis is consistent with recent studies showing the existence of longitudinal gradients of chronologies responses for coniferous species (Frank and Esper, 2005b; Carrer et al. 2007).

Line 8 p 1178: 'comparison with large...considers...'. What do you mean? The original sentence: Comparison with large-scale temperature records considers the tree-ring-based D'Arrigo (D'Arrigo et al., 2006), and the multiproxy-based Mann (Mann et al., 2003) and Moberg (Moberg et al., 2005) reconstructions (Fig. 6e). has been rewritten replacing the verb consider by carry out as following: Comparisons are carried out with the hemispheric tree-ring-based D'Arrigo06 (D'Arrigo et al., 2006), and the multiproxy-based Mann03 (Mann et al., 2003) and Moberg05 (Moberg et al., 2005) reconstructions (Fig. 6e).

Line 22: A reconstruction is hardly 'hot'. Hotter has been replaced by hardly hot as suggested by referee #2 However, hemispheric reconstructions are hardly hot during the 10th and 11th centuries and are less sensitive to the Oort solar minimum.

Style, Tables and Figures

You should check the spelling and grammar. The spelling and the grammar have been carefully verified through the whole manuscript.

Sections 3.1, 3.2 and 3.3 have the same title! The titles of sections 3.2 and 3.3 have been rectified : 3.2 The analogue technique 3.3. Calibration and verification

A temperature is neither hot nor cold but high or low: modify in the text. The adjectives hot or cold referring to the word temperature have been systematically replaced by high or low.

Figure 3 is cited in text on line 1 p1168 while figure 2 is cited only in line 9. The paragraph has been re-arranged and figure 2 is now cited before figure 3 :

In the caption of figure 3 : 'the alpine larch...original ((a), (d), grey) and infilled ((a), (e), black)...': b instead of the second a. The change has been made.

Figure 4: '...and the high (low) temperatures (grey)'. You'd rather say :'JJA mean temperatures at high and low elevations'. You should mark years 1823 and 1976 on the figure. The suggested changes in the figure and in the caption have been made.

Line 18 p 1169: There is an inconsistency between the text and the figure. $R2$ is 0.81 between 1819 and 2000 on the figure while it is 0.45 in the text. The mistake occurred in the text and 0.45 has been replaced by 0.81

I guess that the GI reported in figure 6 is the average value of June to August GI? It should be said explicitly. The caption has been modified has following : b. The average value of June to August graduated indices of Pfister et al. (1994).

P1162: Table 1: AGR in 1/100 mm. Shouldn't it be in mm/year? In this table, AGR is in 1/100mm/year. It has been specified in the caption

The site numbers are not the same in Table 1 and 5. Ex: SWISS 2 (MXD) is 21 in Tab. 1 and 22 in Tab. 5. Check if there are other mistakes like this one.

The site number has been modified in table 5 where a mistake occurs and numbers have been verified in each table.

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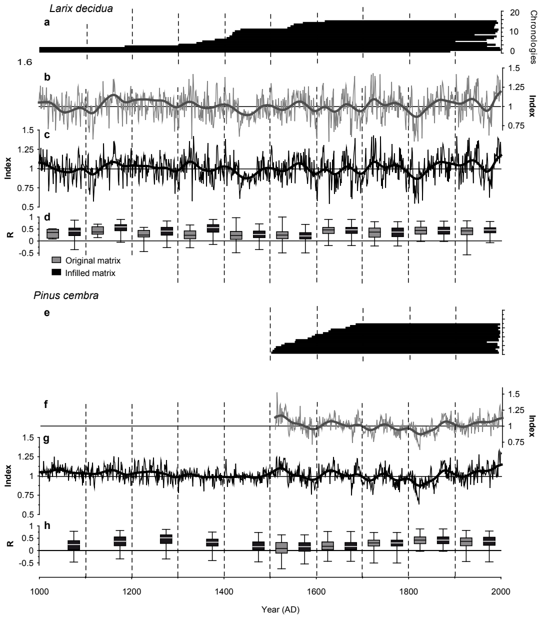

Fig. 3. Adaptative Regional Growth Curve (ARGC) detrended alpine chronologies and signal robustness. **(a), (e),** distribution of the chronologies with each bar representing a single chronology. The alpine larch **(b), (c)** and pine **(f), (g)** ARGC detrended chronologies are calculated for original ((b), (f), grey) and infilled ((c), (g), black) matrixes. The thick lines derive from 20-years low-pass filtering. The box-plots **(d), (h)** display the mean correlations computed for 100-years segments in each matrix.

Fig. 1. fig 3 modified

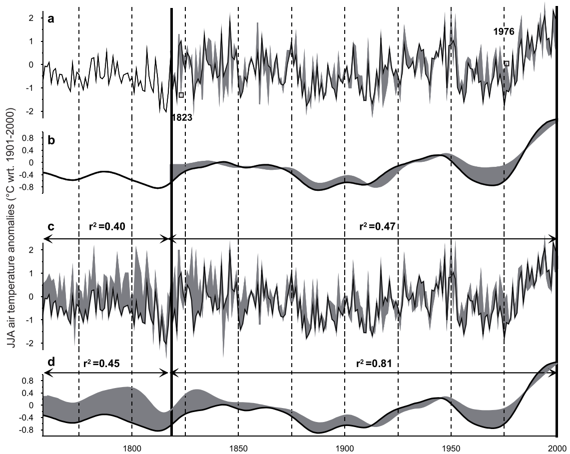

Figure 4. Comparison of the bootstrap ANN reconstruction of the JJA temperatures against the high-elevation (a, grey) JJA mean temperatures (1818-2003) and extra verification using low-elevation data (c, grey) back to 1760. b, d : the 20-year low-pass filter of the bootstrap ANN reconstruction (black) and JJA mean temperatures at high and low elevations (grey). Temperatures are expressed as anomalies with regard to 1901–2000. Grey shadings denote the offset between (warmer) early instrumental and (colder) proxy data.

Fig. 2. fig 4 modified

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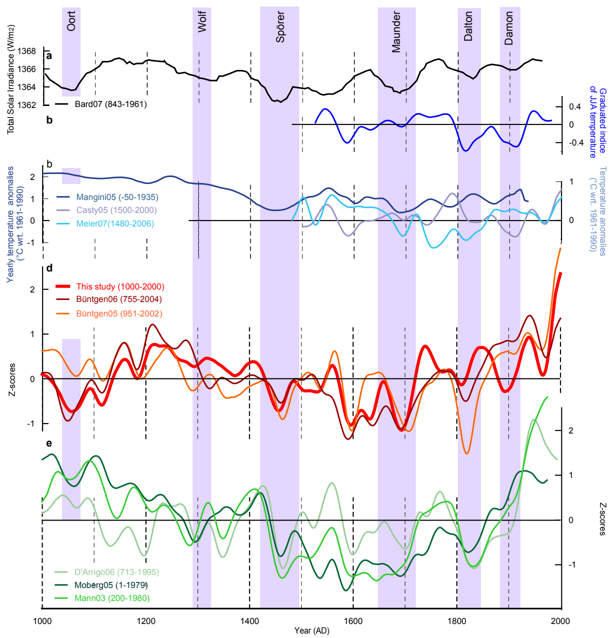

Figure 6. Comparison of regional and large-scale temperature reconstructions. All reconstructions were 20-yr low-pass filtered. a. The solar irradiance variations (black) reconstructed by Bard et al. (2007). Shadings denote the timing of great solar minima. b. The average value of June to August graduated indices of Pfister et al. (1994). c. The speleothem yearly temperature reconstruction (dark blue) of Mangini et al. (2005), the grape harvest April-August temperature reconstruction of Meier et al. (2007) and the multi-proxy JJA temperature reconstruction (light blue) of Casty et al. (2005) ; the original record was adjusted to have the same mean as our reconstruction during the 1901–2000 period. d. Our reconstruction (red; this study), the MXD-based Alpine temperature reconstruction (brown; Büntgen et al. 2006) and RW-based reconstruction (orange; Büntgen et al. 2005). e. Large-scale temperature reconstructions representing the Northern Hemisphere (green, Mann and Jones, 2003, multi-proxy ; dark green, Moberg et al. 2005, multi-proxy ; light green, D'arrigo et al. 2006, tree-rings). All temperature reconstructions were transformed to z scores over the 1000–1979 common period.

Fig. 3. fig 6 modified

No	Site	Species	Longitude (E)	Latitude (N)	Altitude (m a.s.l.)	Period (AD)	n	MSL	AGR	Source
1	Aleve	LADE	7°04	44°36	2200	1426-1997	12	400	51.6	Nola P., DENDRODB
2	Alpe Musella	LADE	9°51	46°17	2200	1563-1992	16	143	97.6	Nola P., DENDRODB
3	Berchtesgaden	LADE	13°01	47°24	1725	1380-1947	27	163	33.2	Brehme K., WDC
4	Cadini Lago di Misurina	LADE	12°15	46°34	2000	1463-1998	17	283	68.3	Urbinati C., DENDRODB
5	Chalets de l'Orgère	LADE	6°40	45°12	2100	1353-1973	26	335	83.6	Tessier L., DENDRODB
6	Chardonnet	LADE	6°32	45°01	2180	1492-1989	18	331	67.9	Edouard J.-L., unpublished
7	Clapouse	LADE	6°25	44°51	2150	1557-1995	14	289	60.8	Guibal F., DENDRODB
8	Comasine	LADE	10°39	46°20	2200	1438-1999	17	447	69.1	Urbinati C., DENDRODB
9	Fodara Vedla Alm	LADE	12°03	46°22	1970	1520-1990	69	140	10.2	Huesken W., DENDRODB
10	Freyssinières	LADE	6°29	44°42	2150	1474-1992	21	317	75.8	Edouard J.-L., unpublished
11	Merveilles	LADE	7°26	44°02	2200	988-1974	28	448	36.8	Tessier L., DENDRODB
12	Moutieres	LADE	6°50	44°17	2100	1414-1995	34	395	68.3	Edouard J.-L., unpublished
13	Muestair	LADE	10°26	46°36	_	1295-1905	17	78,4	15.7	Schweingruber F.H., WDC
14	Névache Granges	LADE	6°34	45°01	2000	751-1894	88	159	63.1	Edouard J.-L., unpublished
15	Obergurgl	LADE	11°01	46°31	_	1333-1974	35	182	14.8	Giertz V., DENDRODB
16	Oriol	LADE	6°35	44°47	2180	1381-1989	19	445	63.1	Edouard J.-L., unpublished
17	Passo Cinque Croci	LADE	10°34	46°10	2050	1468-1999	15	220	87.4	Urbinati C., DENDRODB
18	Ravin de Congerman	LADE	6°39	44°06	2100	1421-1992	8	338	62.9	Tessier L., DENDRODB
19	Ventina	LADE	9°46	46°18	2050	1007-1993	21	441	57.8	Nola P., DENDRODB
20	Swiss1 (TRW)	LADE	7°29-11°03	46°-47°	1900-2200	951-2002	Composite			Büntgen U., Büntgen et al. 2005
20a	Lötschental (TRW)	LADE	7°29	46°25	_	1085–2002	330	201	86	Büntgen U., Schmidhalter M.
20b	Simplon (TRW)	LADE	8°03	46°12	_	685–2003	78	259	87	Schmidhalter M.
20c	Engadine (TRW)	LADE	9°46	46°27	_	800–1993	376	144	115	Seifert M. et al.
20d	Goms (TRW)	LADE	8°10	46°25	_	505–2003	326	129	104	Schmidhalter M.
20e	Tyrol (TRW)	PICE	11°03	47°00	_	645–1997	417	197	99	Nicolussi K.
21	Swiss2 (MXD)	LADE	7°29-11°03	46°12-47°	1900-2200	755-2004	Composite			Büntgen U., Büntgen et al. 2006
21a	Aletsch (MXD)	LADE	8°01	46°50	–	1681-1986	31	–	–	Büntgen U.
21b	Simmental (MXD)	LADE	6°24	46°25	_			_	_	Büntgen U.
21c	Lötschental (MXD)	LADE	7°29	46°25	_	1258-2004	110	_	_	Büntgen U., Schmidhalter M.
21d	Simplon (MXD)	LADE	8°03	46°12	_	735-1510	39	_	_	Schmidhalter M.
22	Aleve	PICE	7°04	44°36	2225	1453-1994	23	312	70.9	Nola P., DENDRODB
23	Ambrizzola	PICE	12°07	46°06	2100	1425-1997	56	220	84.8	Urbinati C., DENDRODB
24	Bois des Ayes	PICE	6°40	44°49	2000	1475-1998	26	361	68.8	Edouard J.-L., unpublished
25	Buffères	PICE	6°34	45°00	2100	1594-2000	39	243	92.4	Edouard J.-L., DENDRODB
26	Chaussettaz	PICE	7°07	45°31	1820	1478-1994	25	274	85.4	Nola P., DENDRODB
27	Clavieres	PICE	6°40	44°55	2200	1472-1995	24	308	74.2	Nola P., DENDRODB
28	Fodara Vedla Alm	PICE	12°03	46°22	1970	1474-1990	93	164	91	Huesken W., DENDRODB
29	Formin	PICE	12°04	46°29	2100	1493-1995	13	195	93.6	Urbinati C., DENDRODB
30	Isola	PICE	7°09	44°10	2100	1637-2000	18	235	82.2	Edouard J.-L., DENDRODB
31	Jalavez	PICE	6°47	44°39	2270	1575-1998	23	294	78.4	Edouard J.-L., DENDRODB
32	La Joux	PICE	6°57	45°42	2200	1472-1997	17	376	67.9	Nola P., DENDRODB
33	Lac Miroir	PICE	6°28	44°22	2300	1564-2000	11	327	60.6	Meijer F., DENDRODB
34	Manghen	PICE	11.26	46°10	2100	1488-1996	29	235	97.1	Urbinati C., DENDRODB
35	Obergurgl	PICE	11°01	46°31	_	1544-1971	24	309	28.5	Giertz V., DENDRODB
36	Roubinettes	PICE	7°13	44°07	2100	1540-2000	16	284	64.9	Edouard J.-L., DENDRODB
37	Val di Fumo	PICE	10°32	46°02	2100	1584-1996	14	211	98.6	Nola P., DENDRODB
38	Vallee du Tronchet	PICE	6°30	44°22	2350	1551-2000	12	280	77.1	Meijer F., DENDRODB

Table 1. Characteristics of the tree-ring sites : identifier (*No*), site name (TRW : Tree Ring Width, MXD : Maximum Latewood Density), location, species (LADE : *Larix decidua ;* PICE : *Pinus cembra*), period covered before truncation due to low replication (see details in Sect. 3.1), number of individual tree-ring width series (n), Mean Serie Length (MSL in years), Average Growth Rate (AGR in 1/100 mm/year) and source (DENDRODB : http://dendrodb.cerege.fr; WDC : http://www.ncdc.noaa.gov/paleo/ treering.html). The identifiers are the same as in figure

Fig. 4. tab 1 modified

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No.	Chronologies	Species	Correlation
21	Swiss2 (MXD)	LADE	0.70
4	Cadini Lago di Misur	LADE	0.57
8	Comasine	LADE	0.57
9	Fodara Vedla Alm	LADE	0.57
20	Swiss1 (TRW)	LADE, PICE	0.57
2	Alpe Musella	LADE	0.51
25	Buffères	PICE	0.48
19	Ventina	LADE	0.47
5	Chalets de l'Orgère	LADE	0.46
17	Passo Cinque Croci	LADE	0.45
6	Chardonnet	LADE	0.44
14	Névache Granges	LADE	0.43
34	Manghen	PICE	0.41
3	Berchtesgaden	LADE	0.40
23	Ambrizzola	PICE	0.40
13	Muestair	LADE	0.39
22	Aleve	LADE	0.39
1	Aleve	LADE	0.35
12	Moutieres	LADE	0.33
15	Obergurgl	LADE	0.32
35	Obergurgl	PICE	0.29
28	Fodara Vedla Alm	PICE	0.27
32	La Joux	PICE	0.27
7	Clapouse	LADE	0.26
29	Formin	PICE	0.26
30	Isola	PICE	0.26
37	Val di Fumo	PICE	0.26
26	Chaussettaz	PICE	0.24
31	Jalavez	PICE	0.22
24	Bois des Ayes	PICE	0.20
16	Oriol	LADE	0.19
10	Freyssinières	LADE	0.14
18	Ravin de Congermar	LADE	0.12
27	Clavieres	PICE	0.09
11	Merveilles	LADE	0.06
38	Vallee du Tronchet	PICE	-0,13
33	Lac Miroir	PICE	-0,16
36	Roubinettes	PICE	-0,18

Table 5. Correlation coefficient between the reconstructed temperature of Alps and the proxies used (after estimating the missing data with the analogue method). Coefficients are calculated on the total length of the period analysis, i.e., 1001 observations. Species : LADE : Larix decidua ; PICE : Pinus cembra.

Fig. 5. tab5 modified

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