We wish to thank the Reviewer for the helpful and detailed comments on our manuscript. Following his and first Reviewer's suggestions we have applied a different detrending method to our tree-ring width chronologies and improved the June-July temperature reconstruction.

Reviewer comments are light-blue shaded

The set of data used for this study is largely the same as the one used for the study in Quaternary Research (2012) by the same team of authors, so I think it would be important to improve the reconstruction by applying a more appropriate detrending model and with that, retaining more low frequency climatic variability. Otherwise I am not entirely sure if there is enough novelty deserving publication

The detrending method has been changed and the reconstruction improved. We describe more in detail the new reconstruction in the following answers.

Why just June-July?

The positive responses of *Larix decidua* (Mill.) to summer temperatures has been observed at high altitudes in the Alps by several authors (e.g. Frank and Esper, 2005). In Coppola et al 2012, we have performed a climate tree-ring growth analysis finding that in the four sampling sites June and July temperature are the climate parameters that mostly drive tree-ring growth. The correlation with August temperature has given not significant results, even if, analyzing climate tree-ring growth relationship by means of moving correlation analysis, we have find that the influence of late summer temperature is progressively increasing in determining larch growth. We have then decided to use our tree-ring dataset in this study for reconstructing those climate parameters that mainly influence larch growth.
The influence of precipitation on larch growth in our sampling sites resulted non significant, even if the moving correlation analysis performed with monthly precipitation have revealed an increasing influence of June precipitation over time.

The climate data used for calibration and validation require a much more detailed description. How representative do you think your climate data are for your study sites?

The HISTALP dataset provides a long-term instrumental climate data of gridded monthly and seasonal mean temperature and precipitation for the Greater Alpine Region. Temperature and precipitation anomalies are referred to the 20th century mean (1901–2000) and were derived for homogenised data, both for the monthly temperature series (2004–11 release) and the monthly precipitation series (2004–2008 release) (Auer et al., 2007).
The HISTALP high-elevation temperature data derive from individual stations located >1500m a.s.l. The HISTALP low-elevation (<1500m a.s.l.) temperature time series is derived from much more (118) stations across the Greater Alpine Region and goes back to 1760. The high-temperatures time series are mostly centred on Central Alps (Auer et al., 2007) making this long climate data set a valuable tool in dendroclimatic analysis in this section of the alpine region. We think that the reference grid point 10° N 46° E can well represent the elevation-zone and spatial area of our tree-ring dataset. The HISTALP gridded data set has been widely used in literature in proxy-based reconstructions of climate parameters allowing to compare reconstructions on an uniform base.

Tree-ring data set and detrending method

In the revised version of our work, following your suggestions, in order to preserve as best as possible low-frequency information, we have changed the standardization method applied to the tree-ring dataset, using a regional curve standardization method (RCS, Briffa et al. 1992, Esper et al., 2003). All measurement series were aligned according to their cambial age smoothing the regional curve with a cubic spline of 10% the series length (Büntgen et al., 2006). A biweight robust mean was applied to all the series (Cook and Kairiukstis 1990). Totally 51 series were used in the analysis covering a time period of 459 years, spanning from from 1550 to 2008.

The tree-ring dataset description will be improved in the revised version of the manuscript. Here we report the two tables describing principal statistics of the four men site and of the regional chronology that will be included in the manuscript.

Site	Val Presanella	Val di Fumo	Val d'Avio	Val Presena
Code	PRL	FUM	AVI	PRS
Lat/Long	46°25'/10.65'	46°05'/10°34'	46°10'/10°28'	46°23'/10°60'
Elevation (m a.s.l.)	1910	1990	2150	2160
First year of chronology	1550	1710	1550	1645
Last year of chronology	2005	2008	2008	2004
Chronology length (year)	456	299	459	360
Number of trees	16	13	11	11
Mean length of series	257	215	348	179
Mean ring width (mm)	1,16	1,27	0,78	0,99
Mean sensitivity	0.22	0.26	0.24	0.28
Serial correlation	0.84	0.60	0.80	0.63

Table 1. Description and statistics of the four raw site chronologies of *Larix Decidua*

	FUM	**PRS**	**PRL**	
	71.9			%GLK
PRS	***			GLKsig
	12.35			tBP
	70.8	67.5		%GLK
PRL	***	***		GLKsig
	13.10	11.16		tBP
	73.3	73.5	67.5	%GLK
AVI	***	***	***	GLKsig
	13.6	13.44	12.41	tBP

Table 2. Correlation matrix of the four raw mean site chronologies showing Gleichläufigkeit (GLK, year-to-year agreement between interval trends, Schweingruber, 1988), the statistical significance level for the Gleichläufigkeit value and t-values *sensu* Baillie Pilcher.

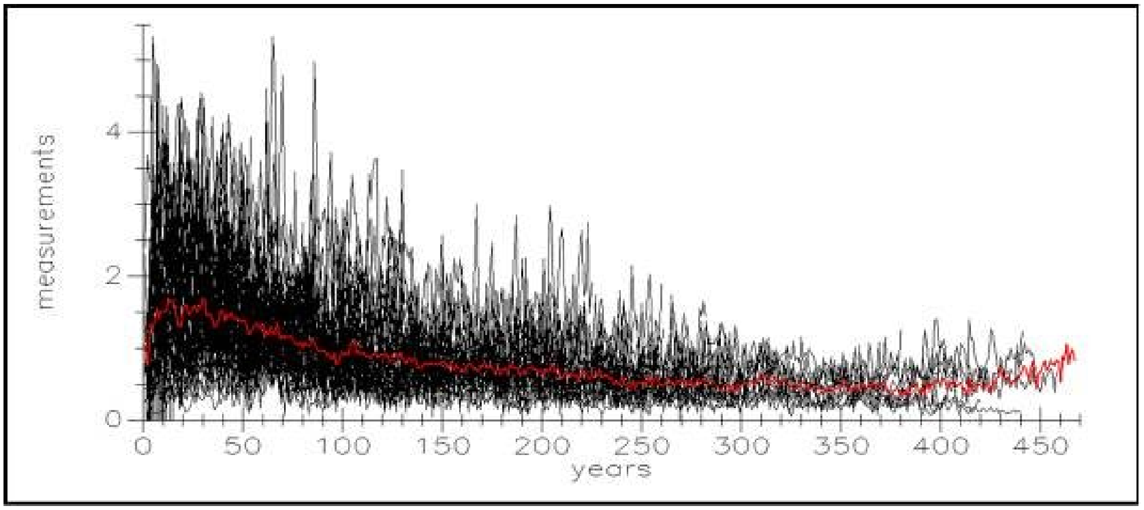

Figure caption: RCS aligned data with mean

First year	Last year	Total years	Mean index	Std. dev.	Mean sens	Serial corr
1	467	467	0.75	0.33	0. 10	0.97

Table 3: mean age-aligned chronology statistics

Can you show the development of SSS (or RBAR) over time in a figure?

In the revised manuscript signal strength of the RCS chronology is assessed by menas of the interseries correlation (RBAR) and the "expressed population signal" (EPS; Wigley et al. 1984). Following Wigley et al. 1984, we assumed the 0.85 EPS value as threshold limit, limiting our reconstruction to the time period 1610-2008, corresponding to a minimum number of 8 samples.

The EPS and RBAR statistics will be reported in the following figure and described in text.

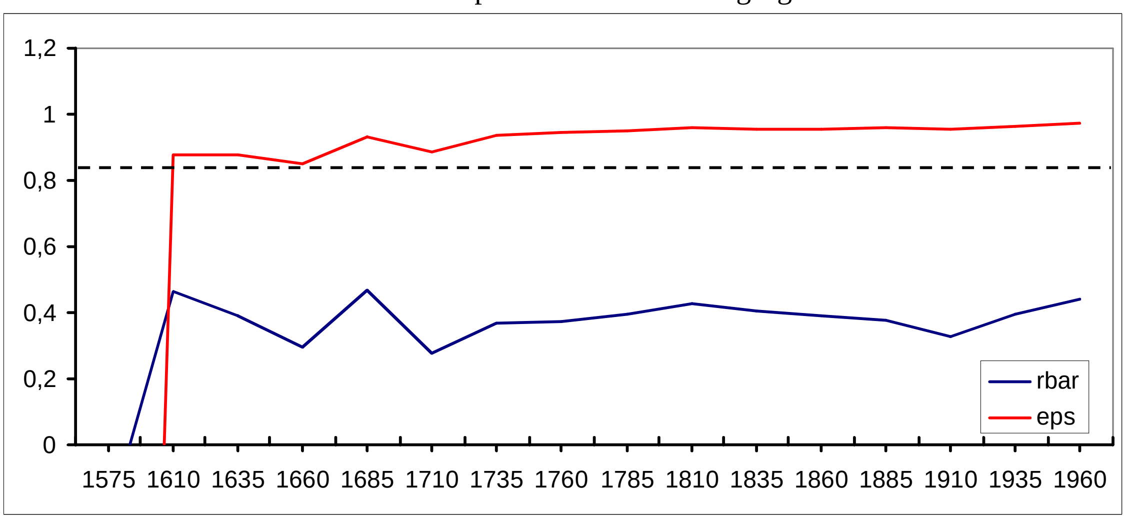

Figure caption. EPS and RBAR statistics showing the temporal signal strength of the RCS chronology. The horizontal line indicates the 0.85 EPS validity threshold. Mean RBAR value= 0.39.

Improve the reconstruction

The reconstruction based on the RCS chronology has been derived following methods illustrated in the original manuscript but, assuming the suggestion of the first referee, we decided to include in the calibration/verification period the whole overlapping period between the *high-elevation* June-July temperature record and the RCS chronology (1818-2007). We checked the stability of the regression equation choosing a calibration/verification period of 188 years (1818-2006) and dividing it into two sub-periods of 90 years for the split-sample procedure, (1818-1912 and 1913-2006). Moreover, in the improved version of our June-July temperature reconstruction, we decided to use the HISTALP low-elevation time series to verify our reconstruction in the period 1760-1818. The resulting, improved, reconstruction is shown in the figure below (Fig 7) that will substitute the figure 7 in the former manuscript and will be discussed in the revised manuscript.
We think that this new reconstruction has a better performance in tracking low frequency climate variability. Pearson's correlation between reconstructed and instrumental *high-elevation* June-July temperature series is 0.54 over the time period 1818-2008, and 0.62 between reconstructed and instrumental *low-elevation* June-July temperature series over the time period 1760-1818. Pearson's correlations values calculated between reconstructed and the high/low elevation instrumental series smoothed by means of a 10-yrs moving average increase respectively to 0.64 and 0.71 over the same periods, as above defined. The reconstruction shows a better tracking of recent early-summer temperature even if an underestimation is still noticeable. In the revised manuscript this reconstruction will be discussed in detail.

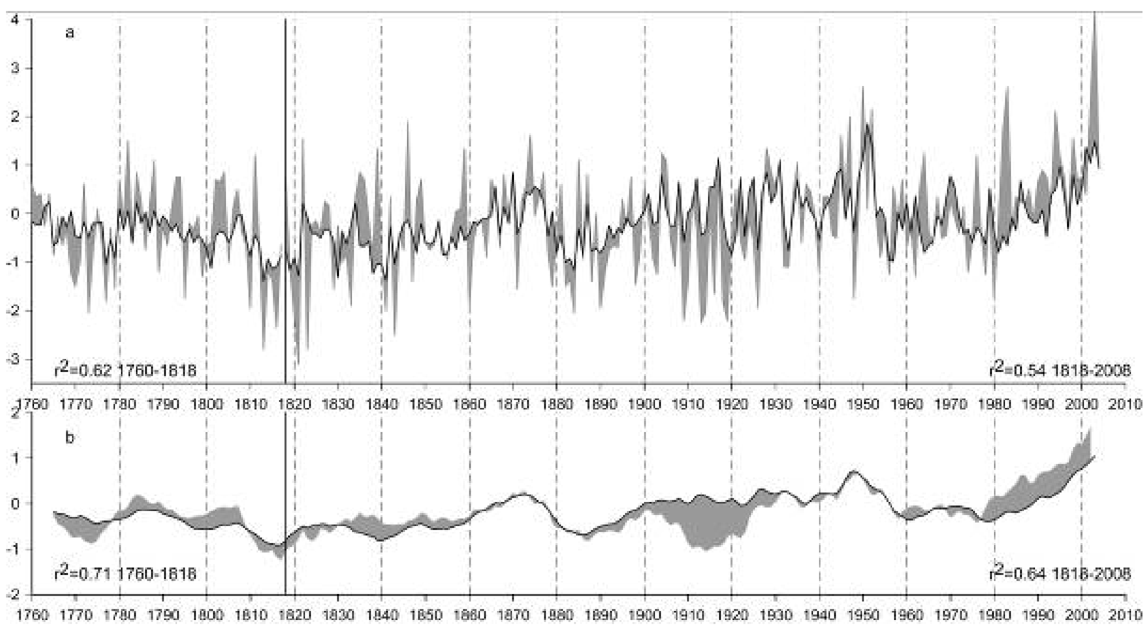

Figure 7. (a) Comparison of the reconstructed JJ temperatures (black) against the high-elevation JJ mean temperatures (grey) over their common period (1818–2008). Extra verification using low-elevation data back to 1760 is visible in the earlier part of the graph. (b): 10-year moving average of the reconstruction (black) and JJ mean temperatures at high and low elevations (grey). The offset between instrumental and reconstructed data is shaded.

In general, the language could be improved.
All your suggestion will be inserted in the revised manuscript and the English will be further checked by an English-speaking reviewer.

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