REPLY TO COMMENTS OF PROF. M. MAUGERI

We are pleased that Dr Maugeri appreciated our work and we thank him for his useful comments and suggestions.

Main comment
"The main deficit of the paper is that it is not easy to get which results are really new with respect to previous papers of the authors on the same issue. I suggest therefore to extend the introduction in order to clearly explain what results are already available, what are the main open issues and how this paper can help to better investigate them. The main goal should be to highlight the needing of the to main issues of this paper: the analysis of a wider time period and a better comparison with other Europe and northern hemisphere proxy records over about the last 1000 years. The extended version of the introduction should also include some parts of section 3 as e.g. rows 13-18 of page 6, which are now under the "results and discussion" but actually refer to previous papers."

We extended the introduction, as suggested, and included also in it some part of the 'Results and discussion' (from pag.5, line 25 to pag.6 line 9).
Lines 13-18, pag. 6, actually apply to the present analysis.

Minor comments
i) *"I suggest to add a short section aiming at giving a brief explanation of the SSA method, of the MC-SSA test and of the problems connected with the width of the windows used for data analysis. The goal should be to make the paper more independent from previous papers as Ghil and Taricco (1997) and Ghil et al. (2002)."*

Done.

ii) "*As far as data analysis is concerned, I think it were interesting to see also the SSA results obtained considering only the new period presented in this paper. In this way the old and the new results were independent from each other and the comparison were probably more interesting, especially for the oscillations that can be investigated with the length of the new period."*

This work is focused on centennial and multicentennial variability. The new measurements considered in this work span a time interval of about 500 years, corresponding to about 130 points. Therefore we cannot spectrally verify if the multicentennial oscillations (of periods 600, 350, 200 years) we revealed in the previously published portion of the series are also active in the new portion. However, the big advantage of SSA in respect to classical spectral methods lies in the fact that the detected oscillations can be amplitude modulated and the amplitude can practically vanish in any time interval in which the corresponding variability is not present in the data. This flexibility avoids the need for sectioning the record to study local behaviours and the unavoidable consequent loss of statistics and spectral resolution. Therefore we confidently analized the whole series (old and new measurements) using SSA. Considering the reconstructed centennial components (see Fig. 3) we may actually notice that the amplitude of all the oscillations doesn't decrease significantly during the most ancient 500 years, suggesting that also in the most ancient part of the record the same modes of variability detected in the most recent part were present.

iii) "*Why does the core end in 1979?"*

The top of the core corresponds to 1979 because the core was taken in this year. We are continuing the measurement of this core because it is well dated using different methods. We plan to extend the series using more recently taken cores.

iv) "*What does it mean that "these two modes also give the most important contributions to the net modern NH temperature rise (page 9 – rows 12-14)"? Do the authors suggest that global warming (at least up to 1979) may be significantly influenced by the 200-year oscillation?"*

The sentence cited by the Referee refers to the analysis of the NH temperature data set recently published (Taricco et al., 2014). In that paper, the spectrum in Fig. 4 shows that the trend and the bicentennial components are the dominant ones. From Fig. 6, panels a and b of the same paper, we can actually see that these two oscillations capture the modern temperature rise. This doesn't mean that the modern increase is explained by natural variability, since the reconstructed oscillations contain both natural and anthropogenic effects.
We added for clarity the reference to the NH temperature paper at line 14.

v) "*The caption of figure 6 is not consistent with the figure: the range is -0.6 - +0.6 _C."*

The variability range is -0.2 – + 0.2 ^{o}C, as reported on the colorbar of the upper panel of Fig.6. In the lower panel the range -0.6 - +0.6 ^{o}C is used for a better visualization of the oscillations.