

This study presents North American ground surface temperature histories for the last 500 years reconstructed from 510 North American temperature-depth profiles, which suggests a warming of $\sim 1.8\text{ }^{\circ}\text{C}$ for the last 500 years. The result of this study is verified by climate reconstructed by paleoclimate proxies.

- 1) The measurement error for different temperature-depth profiles are different, and the noise of temperature profile affects the choice of the “cut-off value”, so why retained the same number of singular values? I think using the cutoff value is more reasonable than choose fixed number of retained singular values because for different temperature data the level of singular value maybe not on a same level.
- 2) The ground thermal diffusivity is $\kappa=1.0*10^{-6}\text{m}^2\text{s}^{-1}$, being taken as a one-fit-all case.
- 3) In Page 4, Line 24, use $T(z = 0, t)$, rather than $T(t, z = 0)$
- 4) In Page 4, Line 28, references should be cited after expression of δ ;
- 5) In Page 7, Line 24, equation (9) the discretion of 500 year in 10 time step is questionable. According to equation (6), it is more reasonable if the distribution of temporal length is chose as some kind of exponential growth.
- 6) In Page 7, Line 30, there is “presentpresent” in this line.
- 7) In Figure 5, the large deviation of the reconstructed temperature changes may be due to the same choice of 100 m of linear regression. As the presumption of method, the reconstructed temperature changes should start around $0.0\text{ }^{\circ}\text{C}$ at 1500 years (such as in Figure 2), but the result in this figure shows large deviation to $0.0\text{ }^{\circ}\text{C}$. The 510 borehole sites may have different type of soil or bedrock and different heat flux, maybe the choice of 100 m of linear regression is not suitable for all sites.
- 8) In Figure 7, why the temporal lengths here is same for the near than for the remote past which are different with distributes as in equation (15)?