Interactive comment on "Economic impacts of a glacial period: a thought experiment. Assessing the disconnect between econometrics and climate sciences" *by* Marie-Noëlle Woillez et al.

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Thank you for your response. Your explanations are helpful, and the modifications to the text you propose will definitely improve it.

The only concern I still have relates to your following statement: "We make the hypothesis of a return to the LGM, even if physically implausible, and merely have a look at what the consequences would be according to econometrics. Our main focus is on highlighting the unrealistic results obtained with statistical damage functions for a climatic change symmetrical to the RCP8.5 (when looking only at the mean temperature), not to discuss the physical mechanisms that could trigger such a change."

Frankly, I have a difficulty to imagine a situation where physically implausible arguments would have any value. If the LGM is implausible in 2100, then all your arguments regarding the economic impact are also implausible. How can we judge that the statistical damage function is unrealistic if you compare it with unrealistic world? Again, the absurdity must be measured against physical laws. The econometrics you challenge may be absurd (unrealistic) only if physics tells us that, for example, in 2100 North America and Europe will be covered by ice. But if it is not physically plausible, then the econometrics seems to be valid. If physically implausible arguments are admitted, one may come up with multitudes of equally implausible scenarios that support the econometrics you contest.

Therefore, plausibility of a scenario should always be a concern. Let us estimate it from very general scaling considerations. The empirical energy density spectrum of Huybers and Curry (2006) has a frequency slope of roughly $B \approx 1.64$ in northern latitudes. Since the energy density slope B relates to the fluctuation amplitude slope b as $B=2b+1$, $B \approx 1.64$ corresponds to $b = 0.32$. Therefore, the amplitude of the climate system response to 0.1-kyr forcing relates to the amplitude of the 100-kyr response as $10^{-0.96} = 0.11$. Thus, regardless of the physical nature of the centennial forcing you want to invoke for your scenario, in 2100 you may count at best on $\sim 10\%$ response relative to LGM. Perhaps it is enough to make a case regarding the validity of the econometrics. Otherwise, to discredit the econometrics, one needs to come up with a justification of the centennial forcing amplitude which is 10 times stronger than it was observed in the past.

Reference: Huybers, P. and Curry, W.: Links between annual, Milankovitch and continuum temperature variability, Nature, 441, 329–332, https://doi.org/10.1038/nature04745, 2006.