

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.

Mikhail Verbitsky

verbitskys@gmail.com

Received and published: 29 May 2020

The authors endeavor to study the limitations of some quantitative methods of assessing future economic damages using “an ad absurdum example of a hypothetical cooling of climate at speed and magnitude equivalent to what the business-as-usual scenario of the IPCC announces.”

Though ad absurdum examples are always entertaining and occasionally useful, the “degree” of absurdity should be constrained by the laws of physics. From this standpoint, fast cooling of the planet toward the end of this century, though hard to imagine, is not precluded by physics. The real absurdity, which is not supported by physics

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and therefore invalidates the study, appears elsewhere. The authors suggest that “. . . the regions covered by ice at the LGM would in our scenario be buried under several meters of snow at the end of the century. . . The impacted regions would be: Canada, Alaska and the Great Lakes region of the United States, the states north of 40N on the East coast, the Scandinavian countries, the northern part of Ireland and of the British islands, half of Denmark, the northern parts of Poland and the north-east territories of Germany, all of the Baltic countries as well as the north-eastern part of Russia, Switzerland and half of Austria”. It appears that the authors think that an ice age begins immediately and simultaneously on ~50 mln square kilometers when the winter snow is not completely melted during the summer and over time becomes what we know as Laurentide and Scandinavian ice sheets. This is not how ice-age physics works. The timing of the ice ages is defined by the speed of the moving horizontal boundary of the spreading viscous ice media, not by the snow growth from the ground. To spread all over the areas mentioned above, would take about 100,000 years, not 1,000 years as the authors suggest. Therefore, though the authors call this vast permanent snow coverage the “most obvious consequences for human societies”, it is in fact far from obvious and all of these regions may be permanent-snow-free for a very long period of time. Even the emergence of smaller, nucleus, glaciers (that do grow from the ground) is not granted because the cooling may reduce snow precipitation rates in polar regions instead of increasing them. In short, the climate system is non-linear; the ice ages begin when the global temperature is high and end when it is low. Anthropogenic global warming, if extended, may preclude next ice age; it doesn't necessarily mean that anthropogenic global cooling would “instantaneously” generate one.

I understand that this paper is not about ice-age physics, and the authors want to make a (probably valid) point about the inconsistency of some economic models, but their choice of the thought experiment is very unfortunate. As economists, they want to “. . . conclude that temperature only is a very bad proxy to estimate damages of a major climate change at a country scale or at the global scale and should not be used for that purpose” but, as climatologists, they make exactly the same mistake, assuming that

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temperature only (-4 C) would bring our climate exactly where it was 20,000 years ago.

Interactive comment on Earth Syst. Dynam. Discuss., <https://doi.org/10.5194/esd-2020-28>, 2020.