

***Interactive comment on “The influence of
constrained fossil fuel emissions scenarios on
climate and water resource projections” by
J. D. Ward et al.***

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An interesting paper that provides further elements of discussion on a subject that, so far, has been only marginally addressed by mainstream climatology. In short, most climate projections developed so far fail to take into account the effect of fossil fuel depletion.

This said, it is clear that by considering this effect, we are adding a further layer of uncertainty to projections. Already we are talking about medium/long term projections which are always difficult - consider how difficult they are in a field where you are dealing

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with a multi-parameter non-linear system.

So, the paper is a tentative exploration of a very, very difficult area. As such, it is a good contribution to the field. The main problem with it is that there is a further level of uncertainty in the field that is not addressed. That is, projections are reported in terms of "GtC" which, if I understand correctly, means carbon in the form of "CO₂" only.

Alas, that is probably optimistic - CO₂ is not the only greenhouse gas emitted by fossil fuels. CH₄ is a further one - of course it does not come from combustion, but from processing of CH₄, oil extraction and perhaps other sources. Now, how does depletion affect the emission mix? Clearly, the recent rush towards "shale gas" is going to increase CH₄ emissions and the results could be devastating considering the much higher warming effect of methane.

In this sense I would suggest to discuss this issue in the paper and cite the recent work by Howarth <http://www.sustainablefuture.cornell.edu/news/attachments/Howarth-EtAl-2011.pdf> and which I have discussed at: <http://cassandralegacy.blogspot.com/2011/04/shale-gas-problem-with-eroei.html>

So, I would also add a further note of caution in the conclusion - that the results presented are valid in the assumption of a constant mix of greenhouse gas emission, but that depletion might be effectively counteracted - at least for a certain time span - by methane emissions and - more in general - the switch to dirtier fuels such as coal.

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