

## ***Interactive comment on “Only the instantaneous global warming potential is consistent with honest and responsible greenhouse gas accounting” by Peter Nightingale***

**K. Caldeira (Referee)**

kcaldeira@carnegiescience.edu

Received and published: 22 May 2018

The title of this paper suggests that its primary function is not to act as a scientific paper but rather to support a normative claim.

Concepts like what it means to be 'honest and responsible' in this context do not lend themselves to empirical tests, but rather express normative judgments.

GWPs are flawed metrics for almost every purpose, so I do not seek here to defend the use of GWPs.

GWPs are metrics, and thus do not have a truth value. Like all tools, they can be more

C1

useful or less useful, but they cannot be right or wrong.

One could perhaps rephrase the title as: "Among global warming potential definitions, only the instantaneous global warming potential is useful", but this too is a matter of degree and depends on what you want to know.

If the author could come up with a cogent argument for what would be better than GWPs as conventionally defined that have not already been discussed in the literature, I would be open to reviewing that as a perspective or opinion piece.

Addressing the normative claims, instantaneous radiative forcing values would seem to be a flawed metric for greenhouse gas accounting and attribution. Imagine two gases with the same instantaneous radiative forcing, but one decays in a year and the other remains in the atmosphere forever. Would it be wise to consider these two gases to be equivalent? The paper criticizes GWPs as conventionally defined but does not make a strong case for the use of instantaneous radiative forcing as an improvement. Indeed, many have criticized GWPs as conventionally defined for not considering effects on long time scales.

The author may want to resubmit as an opinion or perspective piece, but on a quick perusal I would not be enthusiastic to review that.

Ideally, in a policy context, one would like a metric to compare different greenhouse gases that would indicate the relative amount of damage that would be caused by an equal mass release of the different gases. This measure would be the ratio of the value of the damage caused by release of gas X to the damage caused by release of an equivalent quantity of CO<sub>2</sub>, where that time series of damage is appropriately turned into a scalar value to allow simple comparison.

Unfortunately, the estimation of future marginal damage and the conversion of time series to scalars (typically done in a net present value calculation) are rife with problems that have been widely discussed already. Further, the relative damage would also

C2

depend on the assumed background scenario against which these emissions occur.

GWPs are used mostly because of historical legacy. They are clearly flawed metrics. Some people use them and are unaware with their deficiencies. Others use them, aware of their deficiencies. There are no doubt dishonest and irresponsible people who use these metrics to try to achieve nefarious ends. But users of flawed GWP metrics can be both honest and responsible.

And scientific papers should report previously unknown empirical facts, not value judgments.

---

Interactive comment on Earth Syst. Dynam. Discuss., <https://doi.org/10.5194/esd-2018-22>, 2018.