REVISIONS ITEMIZED AND EXPLAINED

In response to the feedback contained in the reports of the referees and the editor I have revised the presentation of the paper as is evident in the new title "Proposed policymaker-friendly metric of radiative effects of greenhouse gases." More specifically, there are the following changes:

- The paper is presented as an attempt to construct a tool for policy makers. Indeed, the IPCC for the longest time has done exactly that with respect to the global warming potential (GWP). The paper presents arguments to show that the time has come for science to provide a better tool than the UNFCCC-blessed, widely used GWP with a 100-year horizon. In view of comments contained in the referee reports, this should not be controversial in the least.

  The abstract, introduction (Sections 1) and the conclusions (Section 4) have been changed to reflect this. To be more specific, I included new references; see *e.g.* Refs. 1 and 2 and to references to recent, 2018 papers that highlight the decision timeframe: see page 2 paragraph at 15.

- I expanded the discussion about outpaced climate change projections and "erring on the side of least drama" by including more context and additional references, such as Ref 3 and 4. There also is a new reference on tipping points—Ref. 5 in addition to *e.g.* the Hansen Ref. 6, which had already been included.

- The new version of the paper features a more extensive discussion and detailed references to IPCC's own criticism of the GWP going back to it Second Assessment: see page 2 paragraph at 20 and specific page references in footnote 1 on the same page. Also included to provide context is a reference to a paper the title of which is *"Unmask temporal trade-offs in climate policy debates;"* see Ref. 7 in Science. All of this makes it clear that the proposal contained in this paper is part of an ongoing scientific discussion.

- The issue of values and of statements that cannot be objectively confirmed and are not strictly verifiable or falsifiable comes with the territory of trade-offs and policy tools. Words such as "honest" and "responsible" which seem to have come across as inflammatory have been replaced by more neutral ones.

- As to the science background, the current presentation more explicitly addresses the fact that creating a simple tool useful for decision makers is intrinsically problematic. This is traced back to the the wide range of inextricable length- and timescales that characterize a complex system such as the earth's climate in the dynamics of which human behavior and values play a crucial role. For comments in this context about time- and lengthscale inseparability see page 2, paragraph at 25.

- The issue raised by one of the referees, namely that there is only one timescale in the kinetic model, that of methane, has been addressed and clarified in several places. Indeed, the paper features two greenhouse gasses in its calculations: one with an an infinite decay time, namely $CO_@$, and the other on CH_4, with a finite decay time. See page 6, paragraph at 10; also see the paragraph at 15 and more specifically the newly added Ref. 8 to justify the treatment of the decay time of CO_2 as infinite.

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[3] J. M. Melillo, T. C. Richmond, and G. W. Yohe, eds., *Climate Change Impacts in the United States: The Third National Climate Assessment* (U.S. Government Printing Office, 2014) pp. 1–841.

[4] Patrick T. Brown and Ken Caldeira, "Greater future global warming inferred from earth's recent energy budget," Nature **552**, 45–50 (2017).

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[7] I. B. Ocko, Steven P. Hamburg, Daniel J. Jacob, David W. Keith, Nathaniel O. Keohane, Michael Oppenheimer, Joseph D. Roy-Mayhew, Daniel P. Schrag, and Stephen W. Pacala, "Unmask temporal trade-offs in climate policy debates," Science **356**, 492–493 (2017).

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