Earth System Dynamics Discussions

Interactive comment on "On the relationship between metrics to compare greenhouse gases – the case of IGTP, GWP and SGTP" *by* C. Azar and D. J. A. Johansson

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This is a very good and useful paper, thanks to its very nice and straightforward explanation of the dfferences and similarities between iGTP and GWP.

My only comment/suggestion is that the authors could expand their summary of their explanation (page 123 lines 7-16) a little bit. The current text only notes that the larger the inertia, the larger the differences between iGTP and GWP. That is clearly correct and an important conclusion. However, it doesn't explain why (in Figures 2 and 3) the sign of the difference is different between CH4, N2O and SF6. This explanation is found elsewhere in the preceding text but is not included here.

So it might be worthwhile adding in this summary/explanation paragraph that the iGTP will be greater than GWP for gases whose persistence in the atmosphere is shorter than that of CO2 over the time horizon considered (i.e. it is always greater for CH4 and greater for N2O for time horizons >100 years), whereas iGTP is lower than GWP for SF6 for many centuries (because of the more rapid decay in the first three exponential terms describing the persistence of CO2). This would help readers take away an intuitive estimate of where and when iGTP and GWP will be truly equivalent and where and when they will be poorer approximations.

These findings are consistent with those by Peters et al (2011) but I think this article presents a somewhat more intuitively tangible explanation of the differences and what drivers them, and is therefore a very worthwhile addition to the literature.

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