On the non-proportionality of the effective transient climate response to cumulative emissions - the impact of non-CO$_2$ climate forcers

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1. Background
- Transient climate response to cumulative CO$_2$ emissions (TCRE)
- Observational based cumulative carbon budget for 1.5°C = 1075 PgC
- Effective transient climate response to cumulative CO$_2$ emissions (TCRE$_{eff}$)
- Observational based cumulative carbon budget for 1.5°C = 870 PgC

Is the TCRE$_{eff}$ still linear if we account for the effect of future non-CO2 climate forcers?

2. The effect of non-CO$_2$ climate forcers

3. Effective transient climate response

4. CO$_2$ forcing equivalent emissions

5. How big is the contribution from non-CO$_2$ climate forcers?

6. Transient climate response to CO$_2$-fe

The use of CO$_2$-fe emissions allows us to estimate remaining budgets independent of the scenario!