The problem with discounting and some alternative solutions

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We need to account for contribution to cumulative CO_2 emissions

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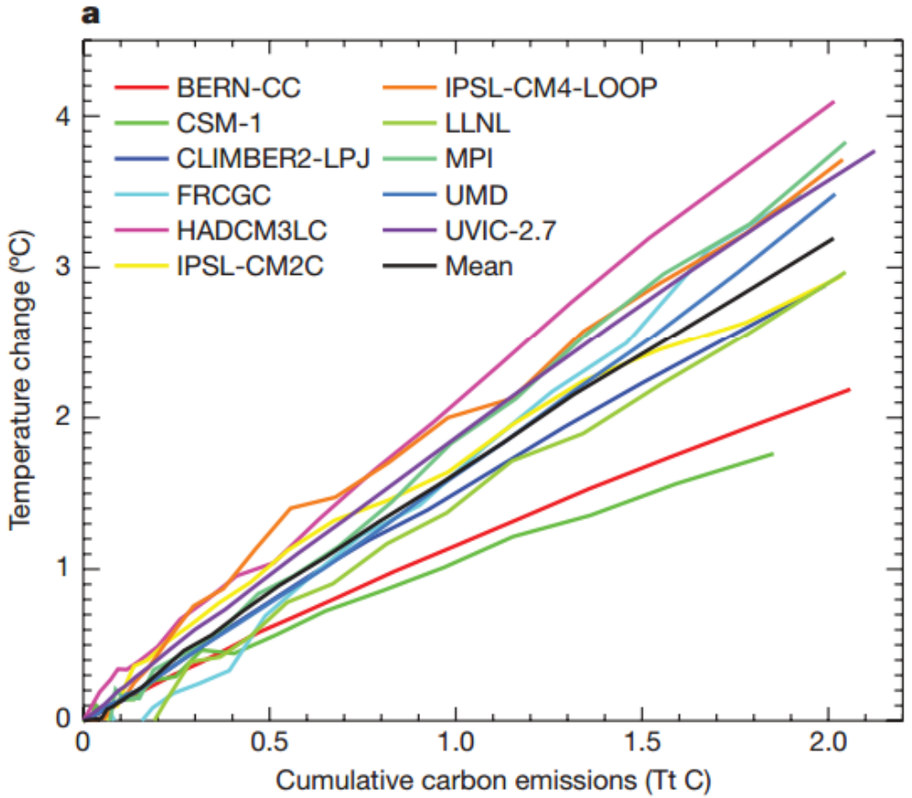
- Long-term temperature change is caused by **cumulative** CO_2 emissions
- Fixed amount (i.e. 'budget') that society can emit before exceeding 1.5 degrees
- **Insensitive to the timing** of emissions



Source: Matthews, H.D. et al., 2009. The proportionality of global warming to cumulative carbon emissions. Nature, 459(7248), pp.829–32. Available at: http://www.ncbi.nlm.nih.gov/pubmed/19516338

The problem with discounting (and tonne-year crediting)

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- **Discounting or 'tonne-year crediting' ignores or discounts** (i.e. marks down) **reversal emissions** (based on when they occur)
  - Based on avoided radiative forcing within an arbitrary time period (e.g. 100 years)
  - Based on avoided damage costs via economic discounting
- **But reversal emissions contribute to cumulative emissions**, regardless of when they occur – **and need to be counted in full** (if we want to know about contribution to cumulative emissions)

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Discounting creates false physical equivalence claims:

- 1 tCO_2 removal + 1 tCO_2 reversal = **0 net change in cumulative emissions**
- **With discounting:** 1 tCO_2 removal + '<1' tCO_2 reversal = '>0' tCO_2 net removal (**though actual net removal is 0**)
- We can't emit 1 tCO_2, buy the "offset", and say **'Our net contribution to cumulative emissions is zero'** (1 tCO_2 emission + 0 tCO_2 offset = 1 tCO_2 emission)

Brander and Broekhoff (2023). Methods that equate temporary carbon storage with permanent CO2 emission reductions lead to false claims on temperature alignment. https://doi.org/10.1080/17583004.2023.2284714

The problem with discounting (and tonne-year crediting)

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- **Danger in making temporary storage look the same as permanent storage:**
  - Temporary storage with discounting '1tCO_2' (really 0tCO_2) at $10
  - Permanent 1tCO_2 at $20

Which should I buy?

Which should society invest in?

Both appear to offset 1 tCO_2 (but actually have completely different impact on cumulative emissions)

Temporary storage can have value

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- **Temporary storage can have value by ‘buying time’ and ‘shaving’ peak temperature change**
- **We need accounting approaches that show duration/value of storage** (without completely undermining our reporting on cumulative emissions)
- **Some solutions for corporate level accounting:**
  - **a.** Report emissions and removals in the year they occur (time series)
  - b. Separately report on change in cumulative tonne-years of storage
- **Some solutions for offsetting:**
  - a. Use temporary crediting
  - b. Separate market for non-fungible ‘buying time’ credits