

# **The role of climate science in carbon accounting: An introduction**

**Prof. Jean-Pascal van Ypersele**

**(Université catholique de Louvain)**

**Former IPCC Vice-Chair (2008 - 2015)**

**Twitter: @JPvanYpersele**

**Climate accounting guide: How to spot false climate action claims?**

**Bellona Europa event at COP26, Glasgow,**

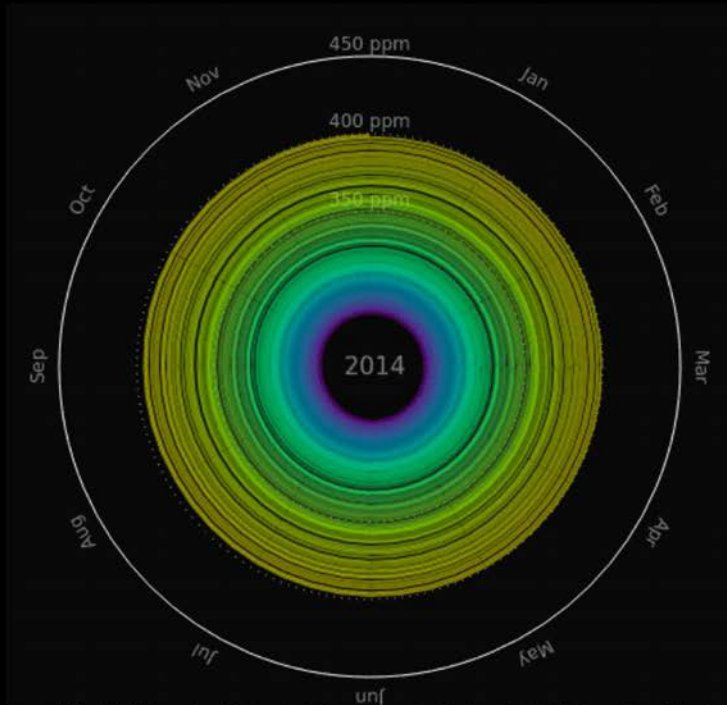
**9 November 2021**

**Thanks to the Walloon Government (funding the Walloon Platform for IPCC)  
and to my team at the Université catholique de Louvain for their support**

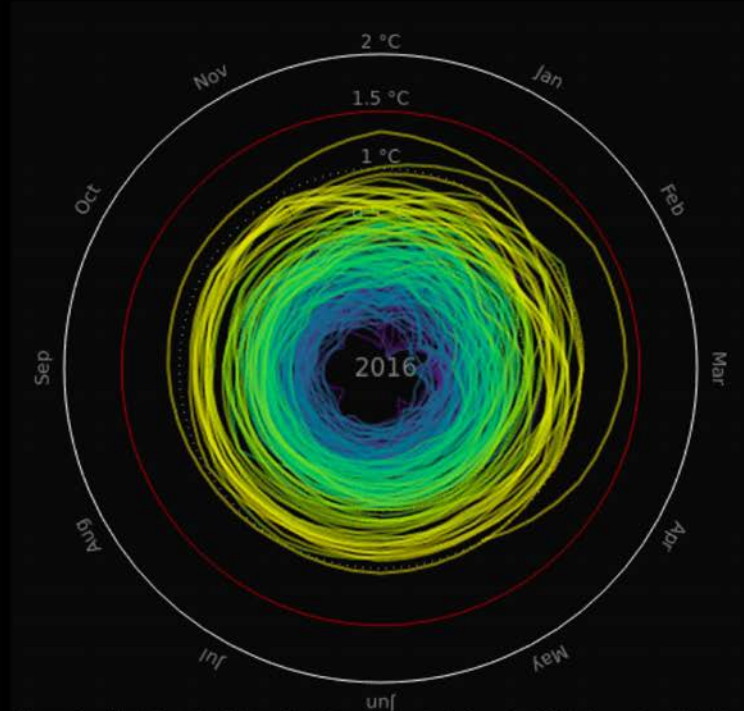
**We use the atmosphere as a dustbin for  
our greenhouse gases, and we thicken the  
insulation layer around the planet**

That is why we must cut net emissions  
to ZERO as soon as possible

# CO<sub>2</sub> Concentration and Temperature spirals



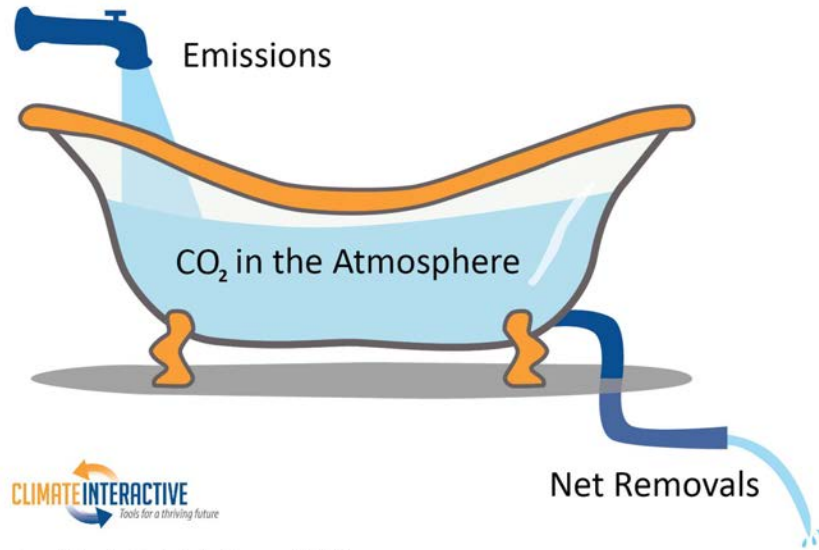
Concentration Spiral pik-potsdam.de/primap-live/ & climatecollege.unimelb.edu.au, Gieseke, Meinshausen. Thx to Ed Hawkins



Temperature Spiral pik-potsdam.de/primap-live/ & climatecollege.unimelb.edu.au, Gieseke, Meinshausen. Thx to Ed Hawkins

CO<sub>2</sub> Concentration since 1850 and Global Mean Temperature in °C relative to 1850 – 1900  
Graph: Ed Hawkins (Climate Lab Book) – Data: HadCRUT4 global temperature dataset  
Animation available on <http://openclimatedata.net/climate-spirals/concentration-temperature/>

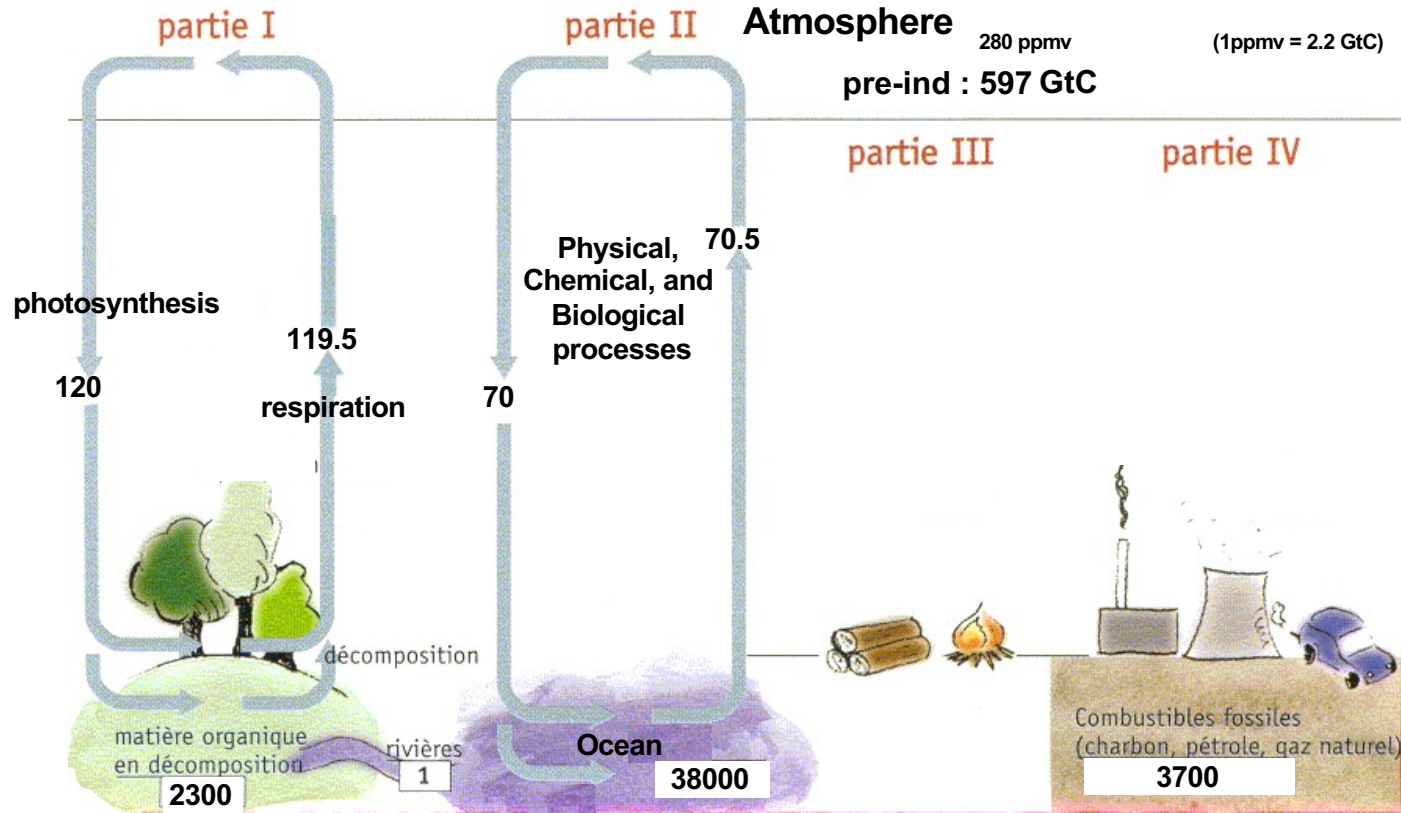
# The Carbon Bathtub



Overall framing by Dr. John Sterman, MIT Sloan

Source: @CarbonInteractive

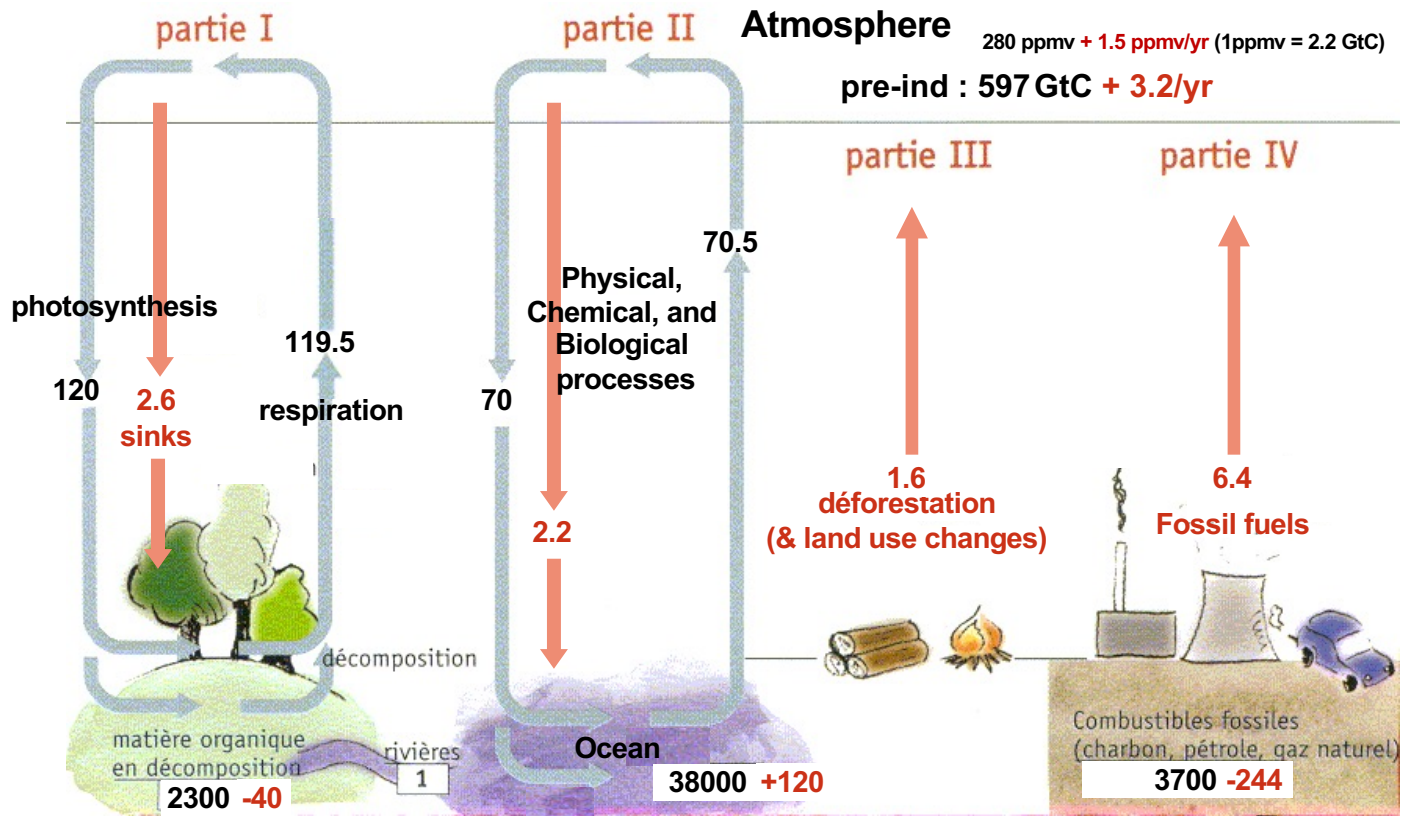
# Carbon cycle: unperturbed fluxes



Units: GtC (billions tons of carbon) or GtC/year (multiply by 3.7 to get GtCO<sub>2</sub>)

# Carbon cycle: perturbed by human activities

(numbers for the decade 1990-1999s, based on IPCC AR4)



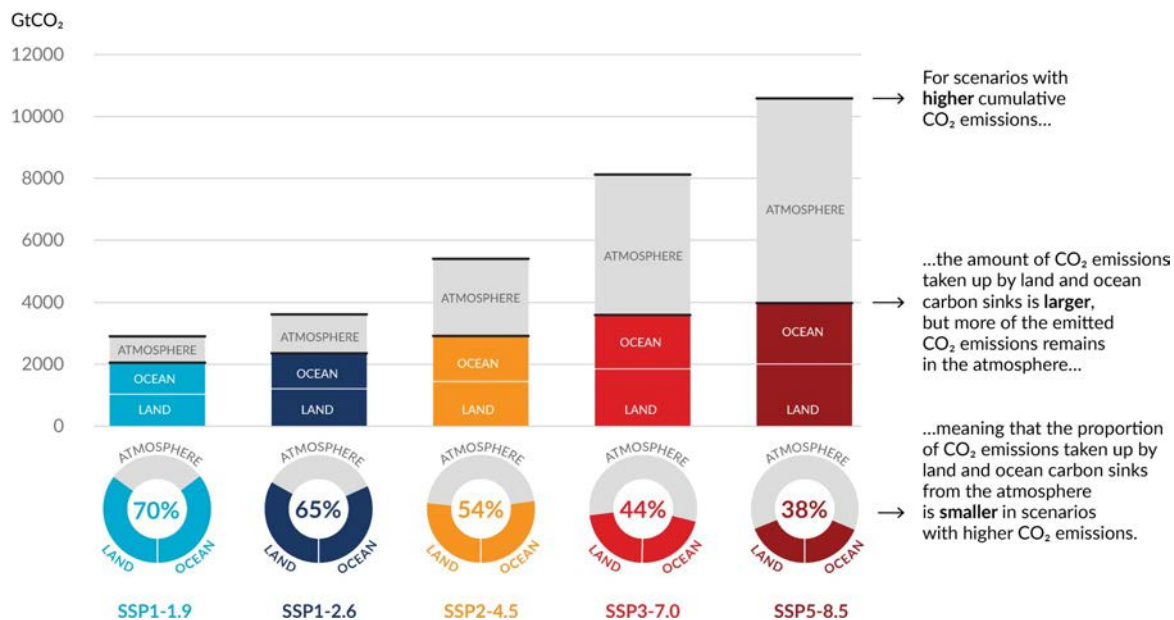
Units: GtC (billions tons of carbon) or GtC/year

Stocks!

## The proportion of CO<sub>2</sub> emissions taken up by land and ocean carbon sinks is smaller in scenarios with higher cumulative CO<sub>2</sub> emissions

Figure SPM.7

Total cumulative CO<sub>2</sub> emissions **taken up by land and oceans** (colours) and remaining in the atmosphere (grey) under the five illustrative scenarios from 1850 to 2100



# 'Blah, blah, blah': Greta Thunberg lambasts leaders over climate crisis

**Exclusive: Activist says there are many fine words but the science does not lie - CO2 emissions are still rising**



📺 'All we hear is blah blah blah': Greta Thunberg takes aim at climate platitudes - video

Greta Thunberg has excoriated global leaders over their promises to address the climate emergency, dismissing them as “blah, blah, blah”.

Source: The Guardian,  
28 September 2021



INVISIBLE

# Countries' climate pledges built on flawed data, Post investigation finds

By [Chris Mooney](#), [Juliet Eilperin](#), [Desmond Butler](#), [John Muyskens](#),  
[Anu Narayanswamy](#) and [Naema Ahmed](#)

Nov. 7, 2021

Source: [Washington Post, 7 November 2021](#)

<https://twitter.com/eilperin/status/1457505075035787265>



Juliet Eilperin ✓

@eilperin

1/ Our analysis of nearly 200 country UN reports finds a major gap b/w what greenhouse gas emissions countries say they emit & what they're putting into the atmosphere. W/ [@chriscmooney](#) [@JohnMuyskens](#) [@desmondbutler](#) [@anu\\_narayan](#) [@NaemaAhmed](#)

# Giant gap between reported and real emissions

- An examination of 196 country reports reveals a **giant gap** between what nations declare their emissions to be versus the greenhouse gases they are sending into the atmosphere.
- The gap ranges **from at least 8.5 billion to as high as 13.3 billion tons a year** of underreported emissions in 2019
- At least **59 percent of the gap stems from** how countries account for emissions from **land**

# Giant gap between reported and real emissions

- Many countries attempt to offset the emissions from burning fossil fuels by **claiming that carbon is absorbed by land** within their borders.
- Many scientists say countries **should only claim these greenhouse gas reductions when they take clear action**, as opposed to claiming natural forest regrowth unrelated to national policies.
- And **some of this carbon absorption isn't even happening** — or at least not on the scale that countries assert.

# Giant gap between reported and real emissions

- **Methane** emissions comprise a second major portion of the missing greenhouse gases in the U.N. database (between 1.6 billion and 2.1 billion tons of CO<sub>2</sub>-equivalent emissions.)
- Countries are **undercounting methane of all kinds**: [in the oil and gas sector](#) (leaks from pipelines and other sources); [in agriculture](#) (burps and waste of cows and other ruminants); and [in human waste](#), (landfills are a major source).

# Giant gap between reported and real emissions

- **Fluorinated gases**, which are exclusively human-made, also are underreported. Known as “F-gases,” they are used in air conditioning, refrigeration and the electricity industry. The Post found that dozens of countries don’t report these emissions at all.

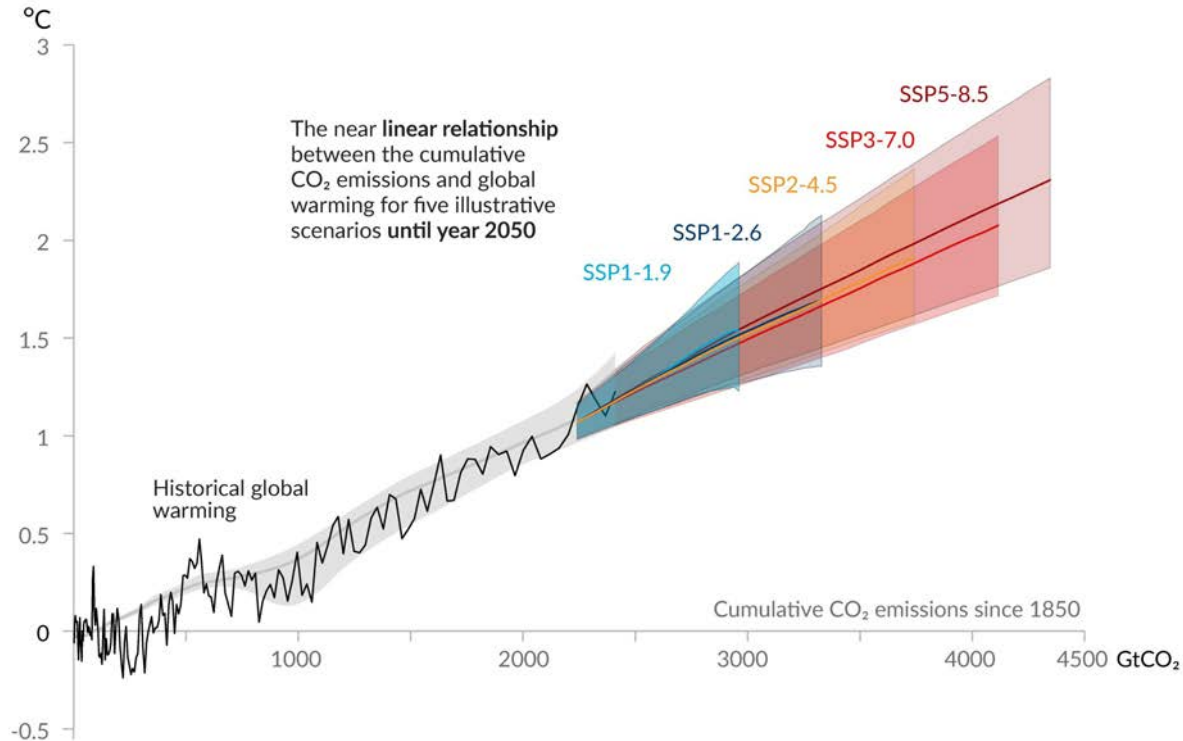
# Giant gap between reported and real emissions

- The gap is the result of **questionably drawn rules, incomplete reporting** in some countries and apparently **willful mistakes** in others — and the fact that in some cases, humanity’s full impacts on the planet are not even required to be reported.
- A key problem is that the U.N. reporting guidelines [don't currently require](#) any atmospheric or **satellite** measurements, known as a **“top-down” approach**.

# Every tonne of CO<sub>2</sub> emissions adds to global warming

Figure SPM.10

Global surface temperature increase since 1850-1900 (°C) as a function of cumulative CO<sub>2</sub> emissions (GtCO<sub>2</sub>)



# Conclusion

- The climate system only understands real emissions
- Underreporting and dubious accounting is pervasive, and does not help to build trust
- Top-down methods (including satellite monitoring) are useful complement to bottom-up methods
- There is one thing COPs cannot negotiate with:  
the laws of nature



# My slides are available here:



- [www.climate.be/vanyp/conferences](http://www.climate.be/vanyp/conferences)
- See also on Twitter: [@JPvanYpersele](https://twitter.com/JPvanYpersele)