IPCC Expert Meeting on Reconciling land use emissions

9-11th July 2024, Ispra (Italy)

Introduction, scope and agenda

Giacomo Grassi
Joint Research Centre, European Commission
IPCC Task Force National GHG inventories

Joana Melo, Rosa Roman, Simone Rossi
Joint Research Centre, European Commission

Housekeeping rules

- Wi-fi "*JRC-Ispranet Guest*" is free - it can sustain 'standard' internet activity
- You may connect to Webex (link in the agenda):
  - Add your name & switch off your mic and video.
  - If you are in the meeting room, join without audio (mic and speakers)
- Plenary and Break Out Groups (BOG): rooms A, B and C
- The plenaries will be video-recorded, the BOGs will be audio-recorded
- Presenters of each session to sit in presenters' table
- Posters: social area next to coffee/buffet lunch area
- Transports: each of you should have received emails from Alessia
- Restrooms and water dispenser
- If you have doubts, ask the JRC team

What do you expect from this meeting...

What are the most significant knowledge gaps and uncertainties on land use emissions?

Join at

slido.com

#land1

Imagine you are in front of an important policy maker, that asks you the following questions …

Join at

slido.com

#land2

Have global emissions from deforestation increased or decreased in the period 2000-2020?

Increased
0%

Decreased
0%

Remained stable
0%

Not sure
0%

Now imagine you are the policy maker that heard these answers from the experts. What do you do?

Fire them all 😊

0%

Lock them all in a room until they find consensus

0%

Join at

slido.com

#land3

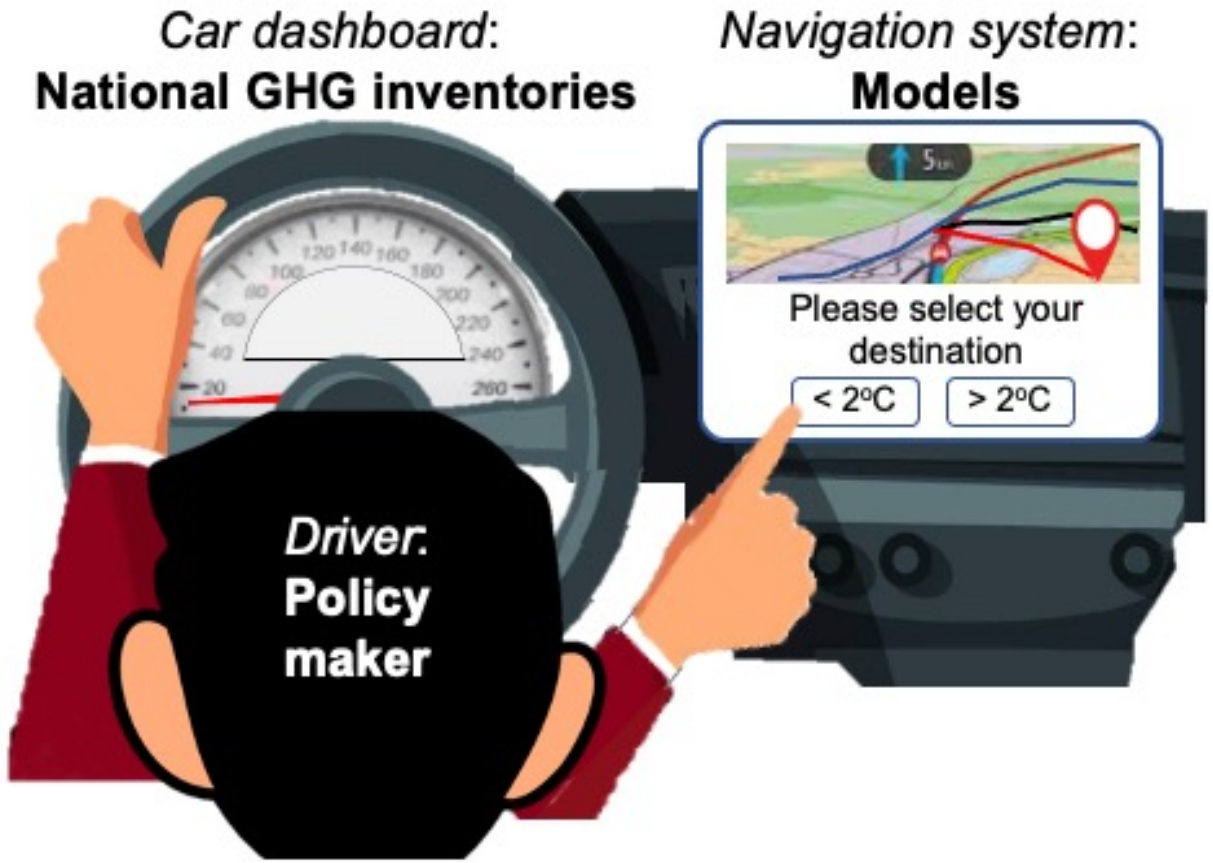
IPCC Expert Meeting on Reconciling land use emissions

We will focus on CO_2 fluxes, and especially on CO_2 removals

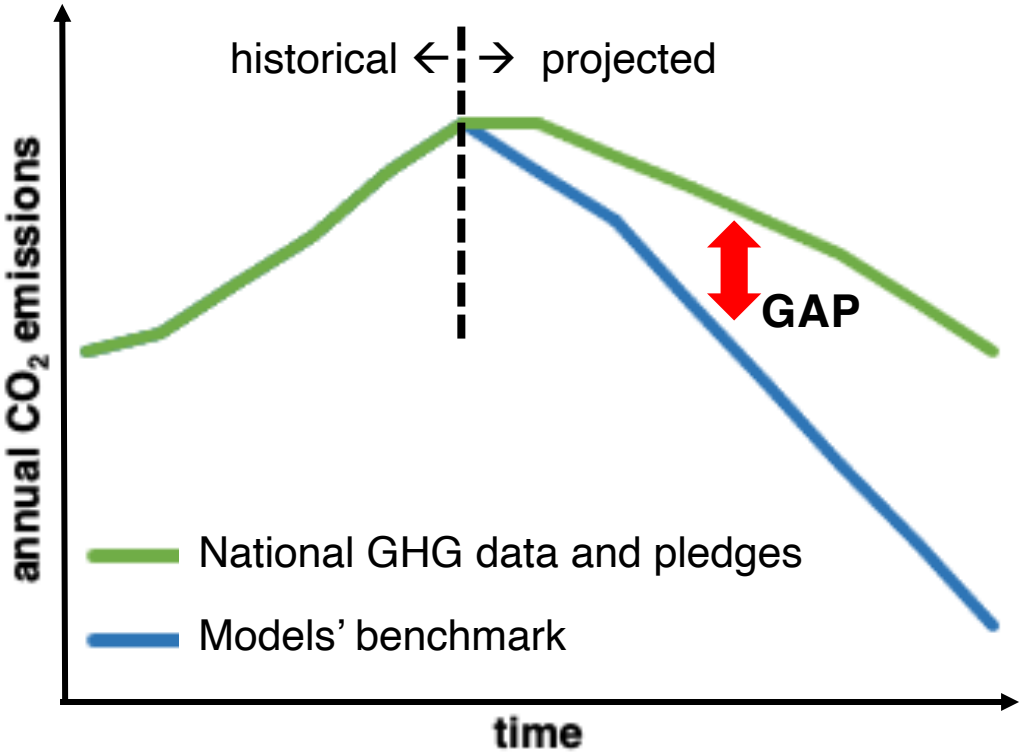
Thus, the scope of this meeting is the
Land Use, Land-Use Change and Forestry (LULUCF) sector,
not including the Agriculture sector

"Anthropogenic" = human-induced

How the Paris Agreement works



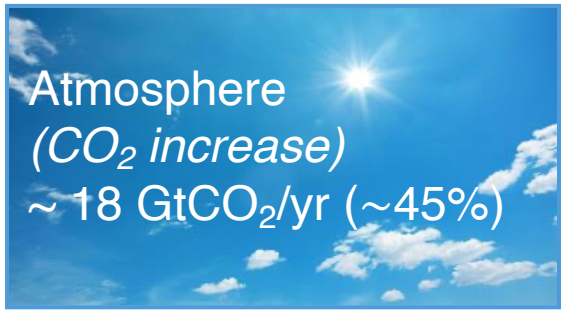
Global Stocktake

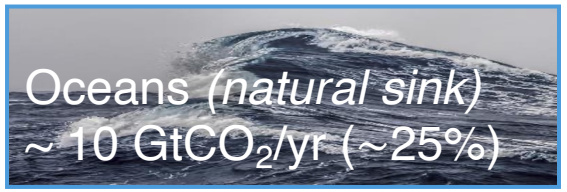


Global Carbon budget (2013–2022)

Sources *(anthropogenic)*

Sinks

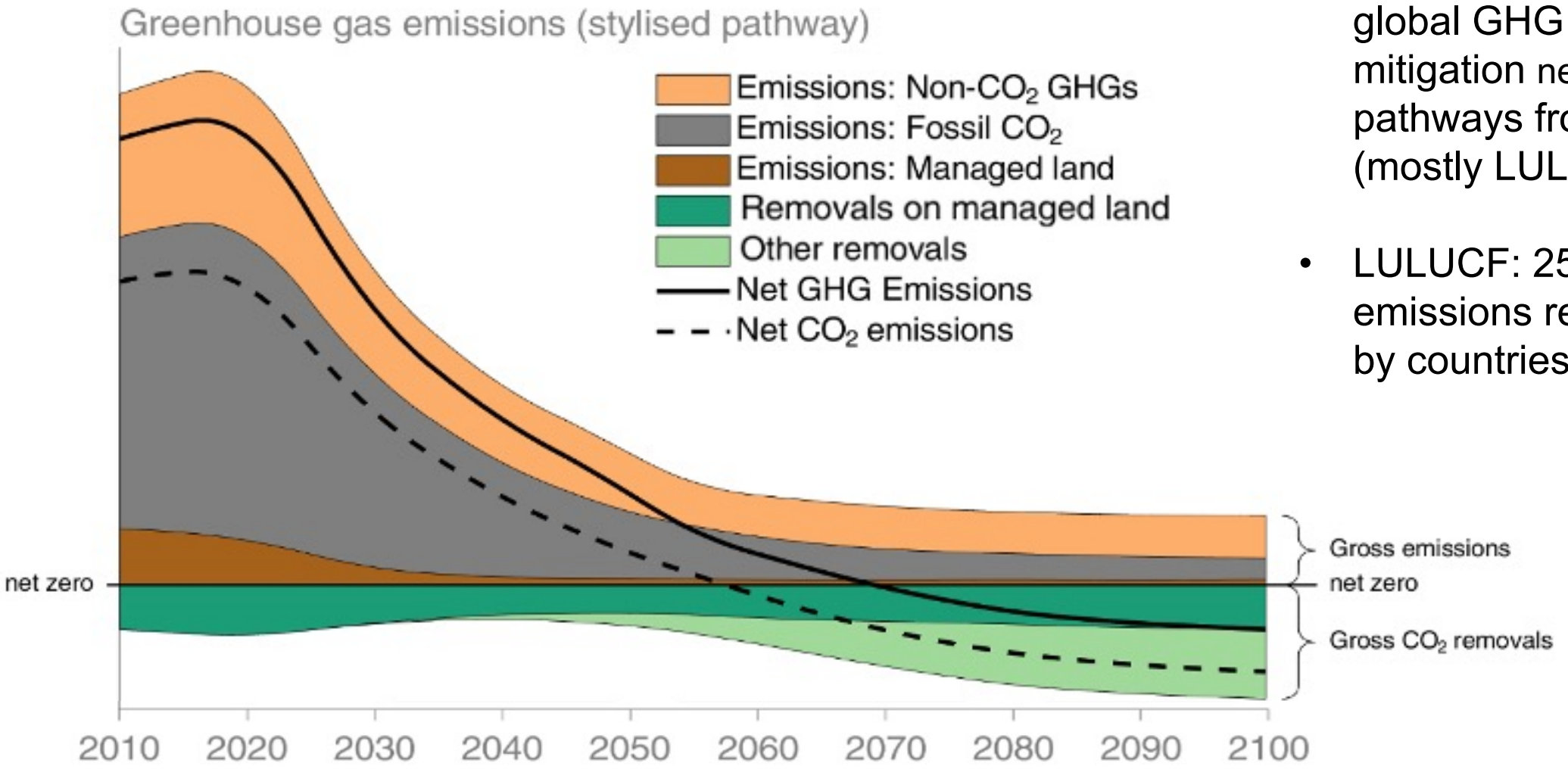




Land plays a significant role on both the source and sink sides

Approximated numbers from Friedlingstein et al 2023; Global Carbon Project 2023

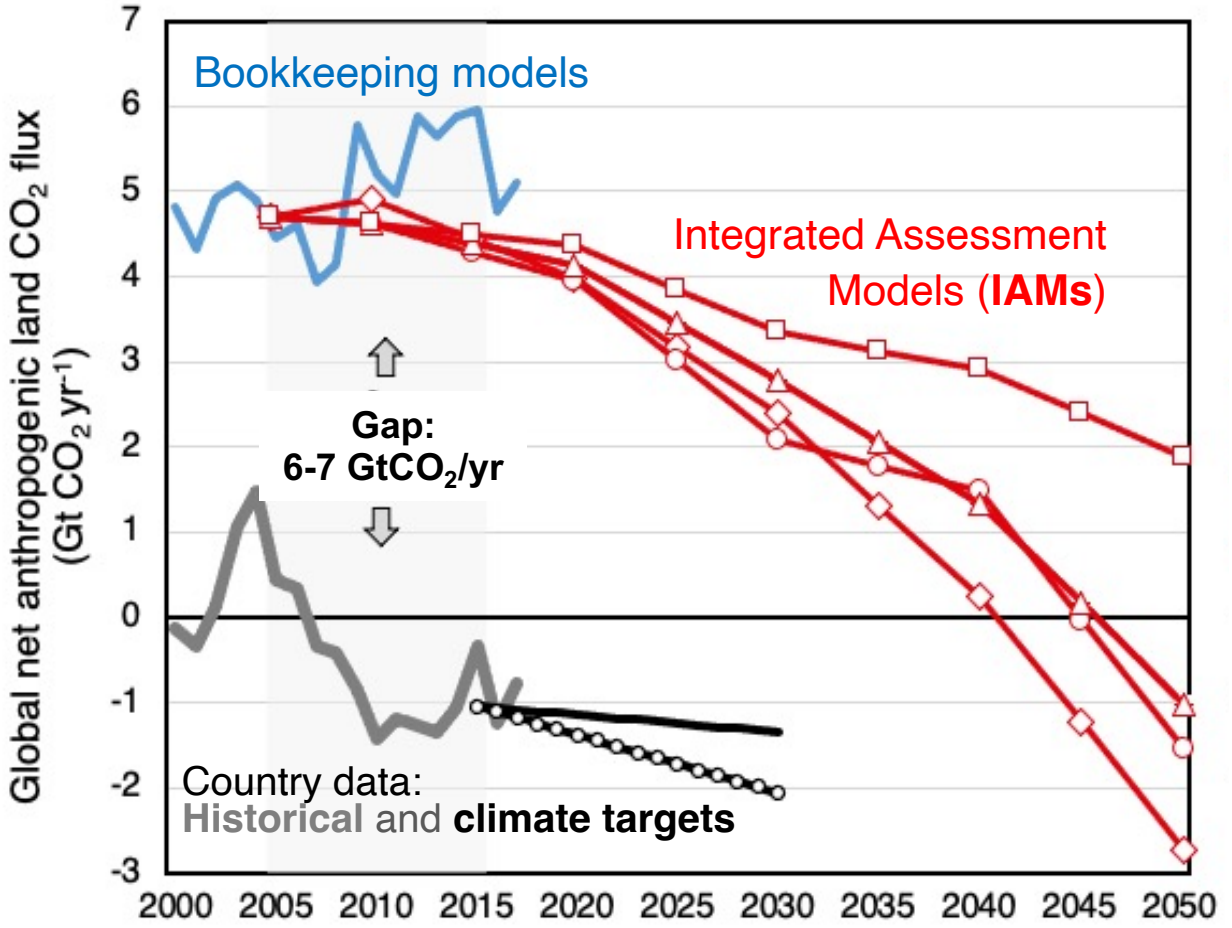
Future mitigation role of land-use CO_2 flux (LULUCF)



- IPCC AR6 WGIII: 20-30% of global GHG emissions mitigation needed for 1.5C/2C pathways from AFOLU (mostly LULUCF CO_2)
- LULUCF: 25% of net emissions reductions pledged by countries in their NDCs

The relative importance of land/forest CO_2 removals will increase with time

PROBLEM: large gap on land-use CO_2 flux (LULUCF) models vs. countries

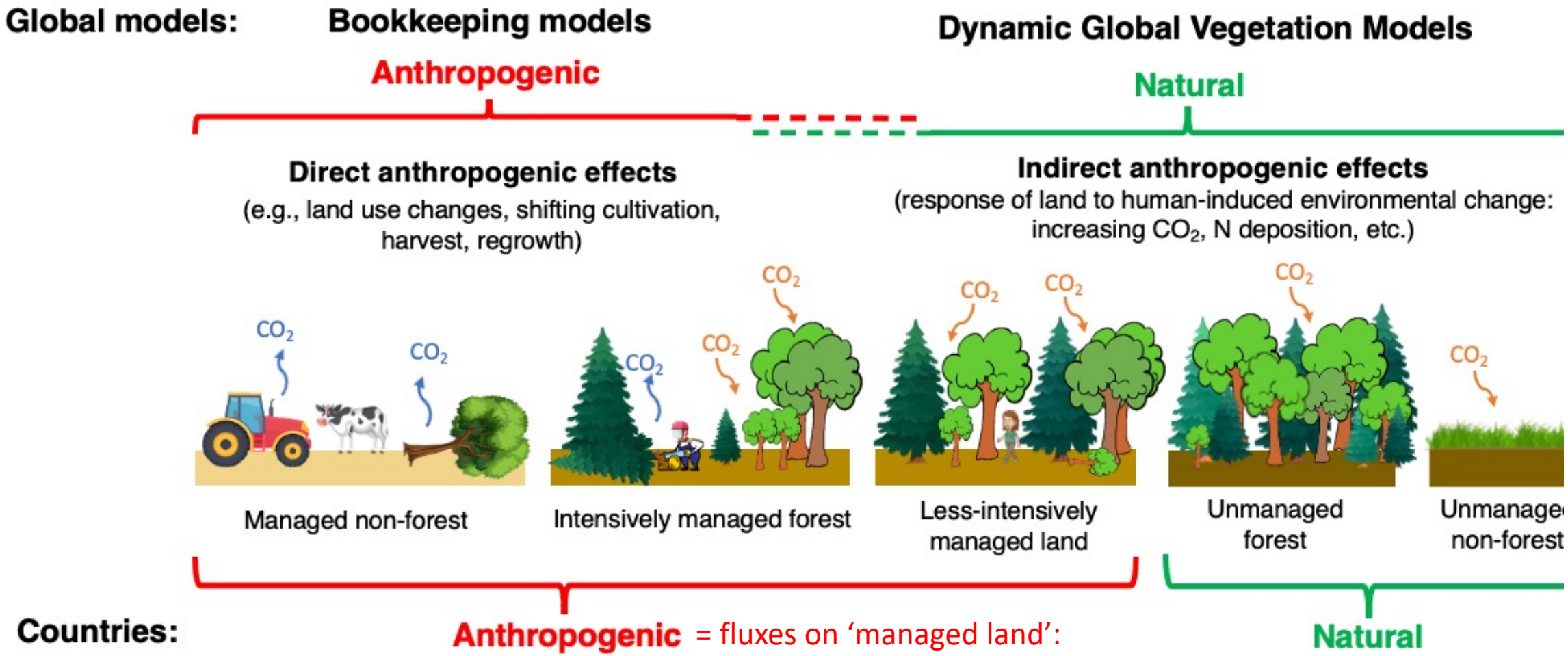


This large gap is confusing policy makers:

- Why do we have this gap?
- Is this gap a problem?
- How to reconcile the difference?

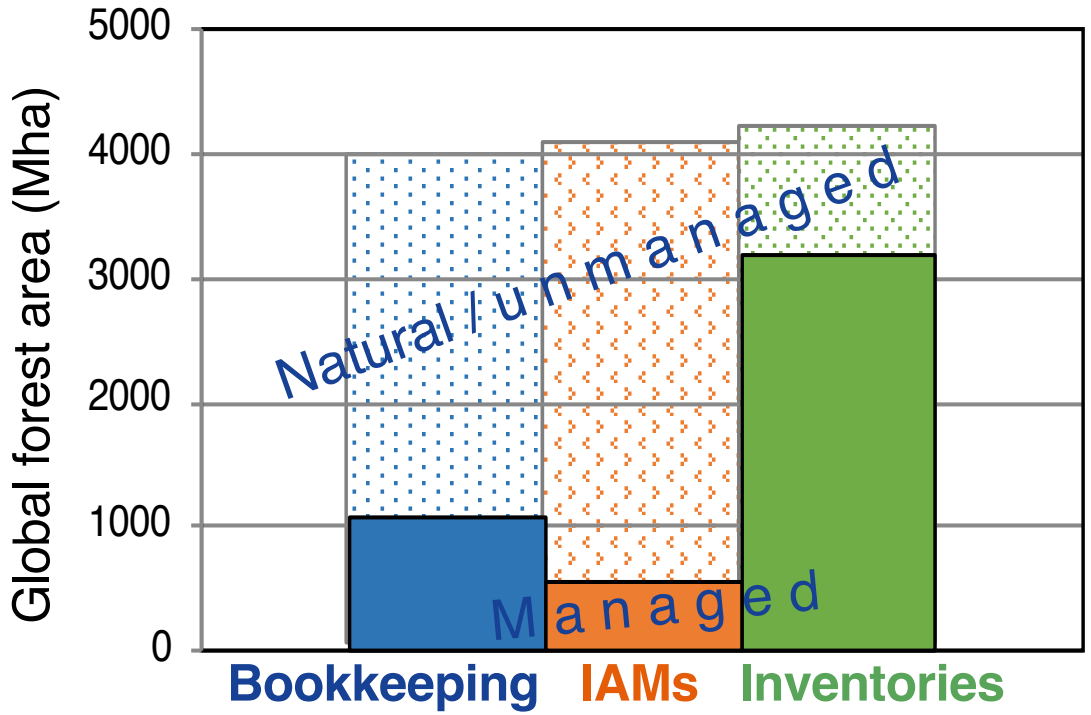
Grassi et al. 2021

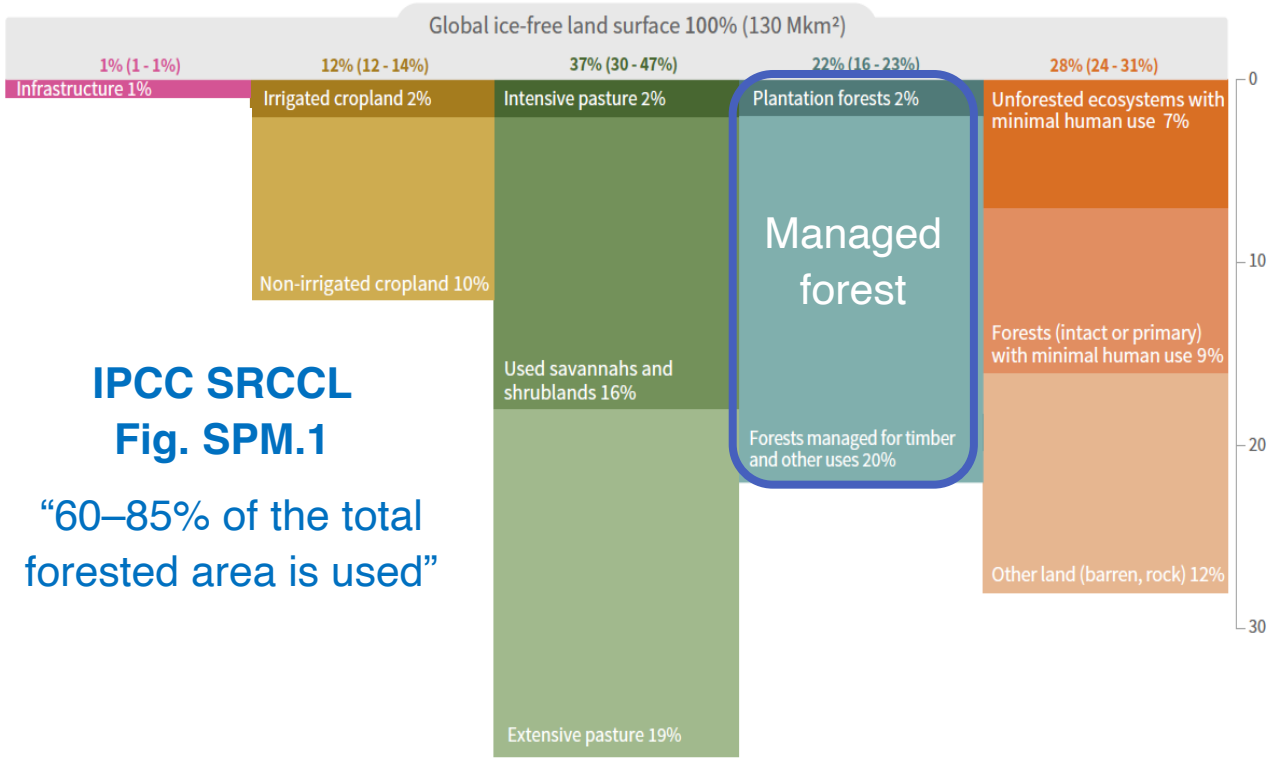
Why do we have this gap? Mostly due to **different definitions of anthropogenic forest sink**



Grassi et al. 2023

Not only an issue of direct/indirect effects on a given area…
also a matter of **different areas**…





IPCC SRCCL
Fig. SPM.1

"60–85% of the total forested area is used"

- Total forest area similar (around 4000 Mha)
- 'Managed' area in **Bookkeeping models** and **IAMs** **much smaller** than **Countries'** 'managed' area

Grassi et al. 2018

Global Carbon budget (2013–2022)

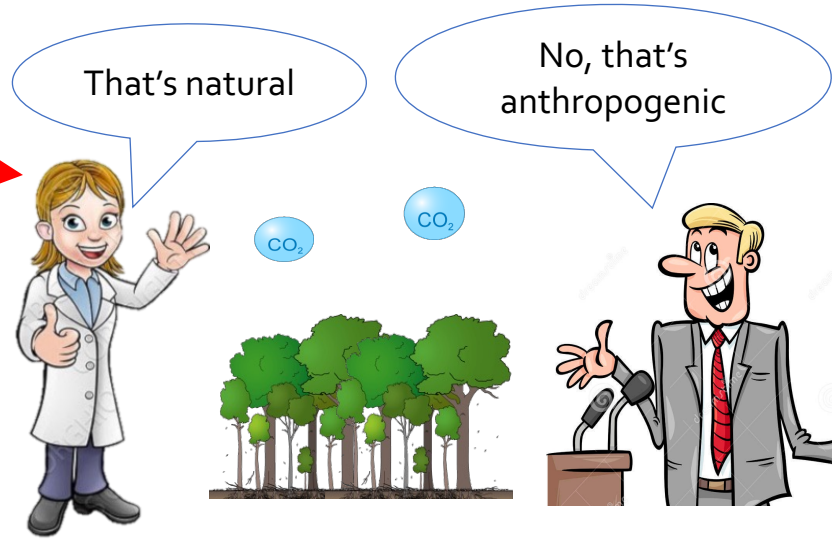
Sources

Sinks

LULUCF in global models:
land-use change, harvest, regrowth

LULUCF in national inventories:
GHG flux from managed lands*

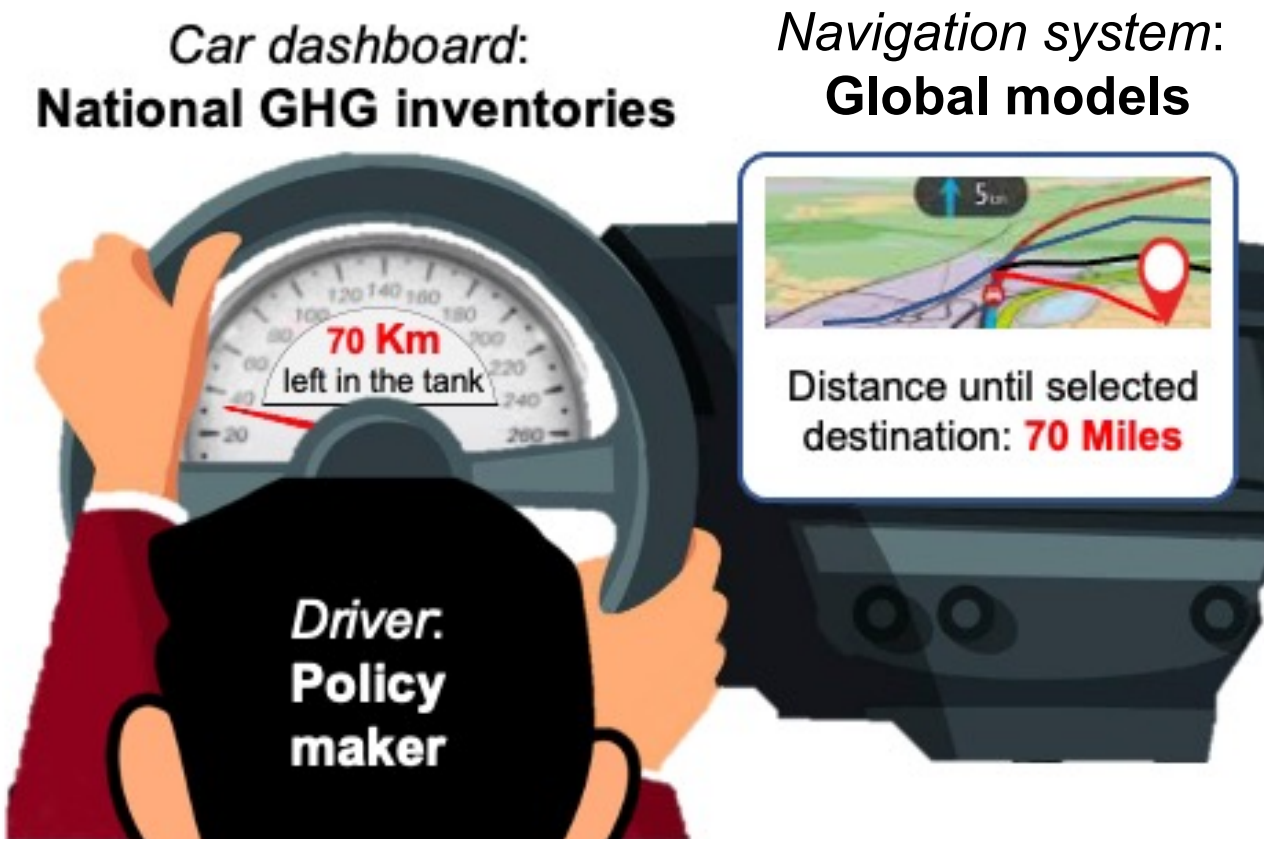
* Where human interventions and practices have been applied to perform production, ecological or social functions.



Most of the discrepancy is in "forest remaining forest"

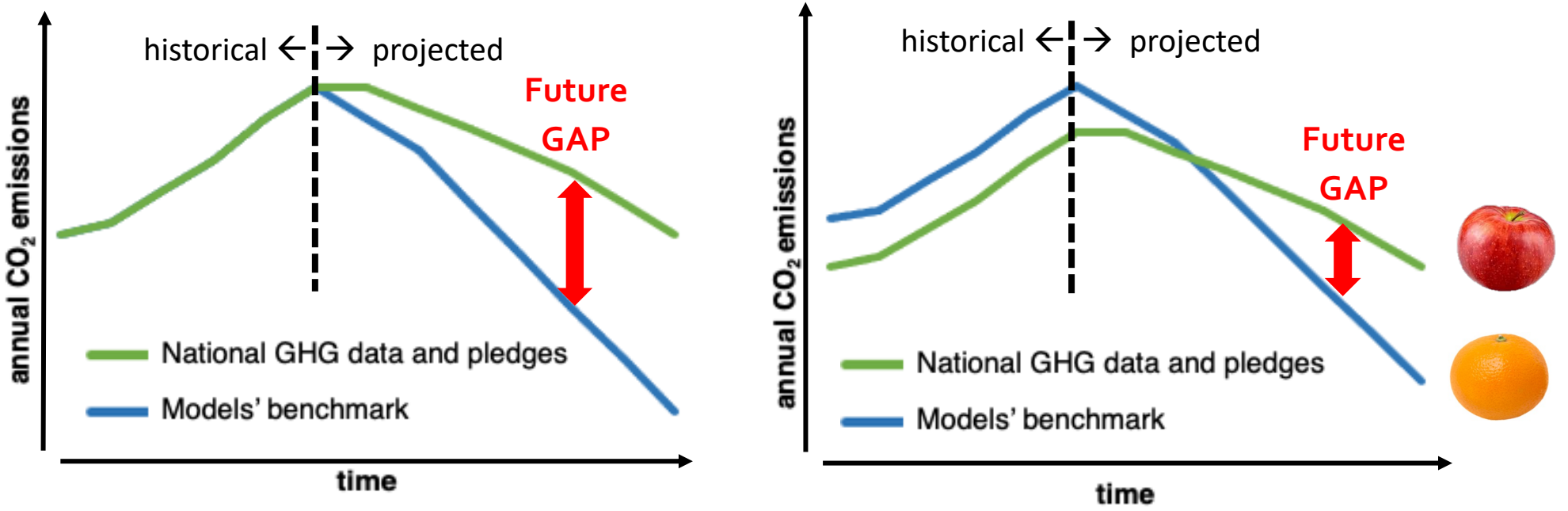
Natural sink in global models:
response of land to human-induced environmental changes (increased atm. CO_2, etc.)

..but then: who is right, who is wrong?



The two approaches were developed for different scopes – both valid in their context, but **not comparable**

Is this gap a problem?



The gap in land use emission estimates has relevant implications for:

(i) assessing the collective progress and the remaining carbon budget/net zero → **countries' progress would look better than what actually is**

(ii) the credibility on land use estimates under the Paris Agreement.

Grassi et al. 2021

How did this situation arise?

UNFCCC and IPCC guidance for national inventories

2003 IPCC Good Practice Guidelines: managed land proxy (MLP) on **anthropogenic** emissions

2002, 2003: IPCC Expert Meetings (EM): "*currently not possible to develop a practicable method*"

2005 Countries start to report using the MLP

2006 IPCC Guidelines: MLP confirmed

2009 IPCC EM: Can the MLP be revisited?" No: the MLP remains the "*only widely applicable method to separate anthropogenic and natural fluxes*"

2019 IPCC Refinement. MLP confirmed and complemented by optional disaggregation of natural disturbances (ND)

Papers noting the inconsistency in definitions and proposing solutions

2024. Land use accounting mostly based on MLP. KP rules largely abandoned (except ND), also due to *lack of comparability, complexity, limited effectiveness in ensuring additionality.*

1992, **UNFCCC**: Parties to **report** inventories of **anthropogenic** em./rem. using comparable methodologies

1997, Kyoto Protocol (KP)

2001, UNFCCC asks IPCC "*methods to factor out direct vs indirect effects*"

1st period KP 2008-2012

2nd period KP 2013-2020

2001. KP (AI countries) LULUCF accounting rules for the 1st period

2011. KP negotiated LULUCF accounting rules for the 2nd period (AI countries): For. Man. Ref. Level

2013 IPCC KP Supplement

2015 Paris Agreement (AI and NAI countries):

- Leaves country free on LULUCF accounting (vast majority use LULUCF reporting in [illegible])
- Balance emissions/ removals to stay well below 2°C

inconsistent

Global models and IPCC ARs

2003. Bookkeping Model (BM) that separates **anthropogenic** (direct human activity) and natural fluxes

2006. 1st Global Carbon Budget

2009. Papers establish the need to reach net zero CO_2 emissions to halt global warming, using BMs' definition

2014. IPCC AR5 confirms the net zero concept

IPCC SR 1.5°C (**2018**) and AR6 (**2022**): all emissions pathways, carbon budgets and net zero use BMs' definition

by including the natural sink in your accounts, you're are overestimating your climate progress

your "net zero" won't be enough to stabilize global temperatures

WHY you don't follow my approach??

you should definitely follow my approach

Natural or human-induced ?

I am following the IPCC and UNFCCC guidelines

WHY you don't follow MY approach?!

actually, the sink that you call "natural" is indirectly human-induced, and exists because I protect it

sorry, with my measurements, which are the basis of my policies, I cannot follow your approach

Issue well ackowledged

IPCC AR6 SPM Synthesis report (2023): "*Global databases make different choices about which emissions and removals occurring on land are considered anthropogenic. Most countries report their anthropogenic land CO2 fluxes including fluxes due to human-caused environmental change (e.g., CO_2 fertilisation) on 'managed' land in their national GHG inventories. Using emissions estimates based on these inventories, the remaining carbon budgets must be correspondingly reduced.*"

UNFCCC's synthesis report for the GST (2022): "*Adjustments should be made where any comparison between LULUCF data reported by countries and the global emission estimates of the IPCC is attempted.*"

Preliminary approaches for reconciliation are available… but lots of work still to be done *(also on the **communication** side)*

Harmonising the land-use flux estimates of global models and national inventories for 2000–2020

Giacomo Grassi[1], Clemens Schwingshackl[2], Thomas Gasser[3], Richard A. Houghton[4], Stephen Sitch[5],

Critical adjustment of land mitigation pathways for assessing countries' climate progress

Giacomo Grassi[1], Elke Stehfest[2], Joeri Rogelj[3,4], Detlef van Vuuren[2,5], Alessandro Cescatti[1],

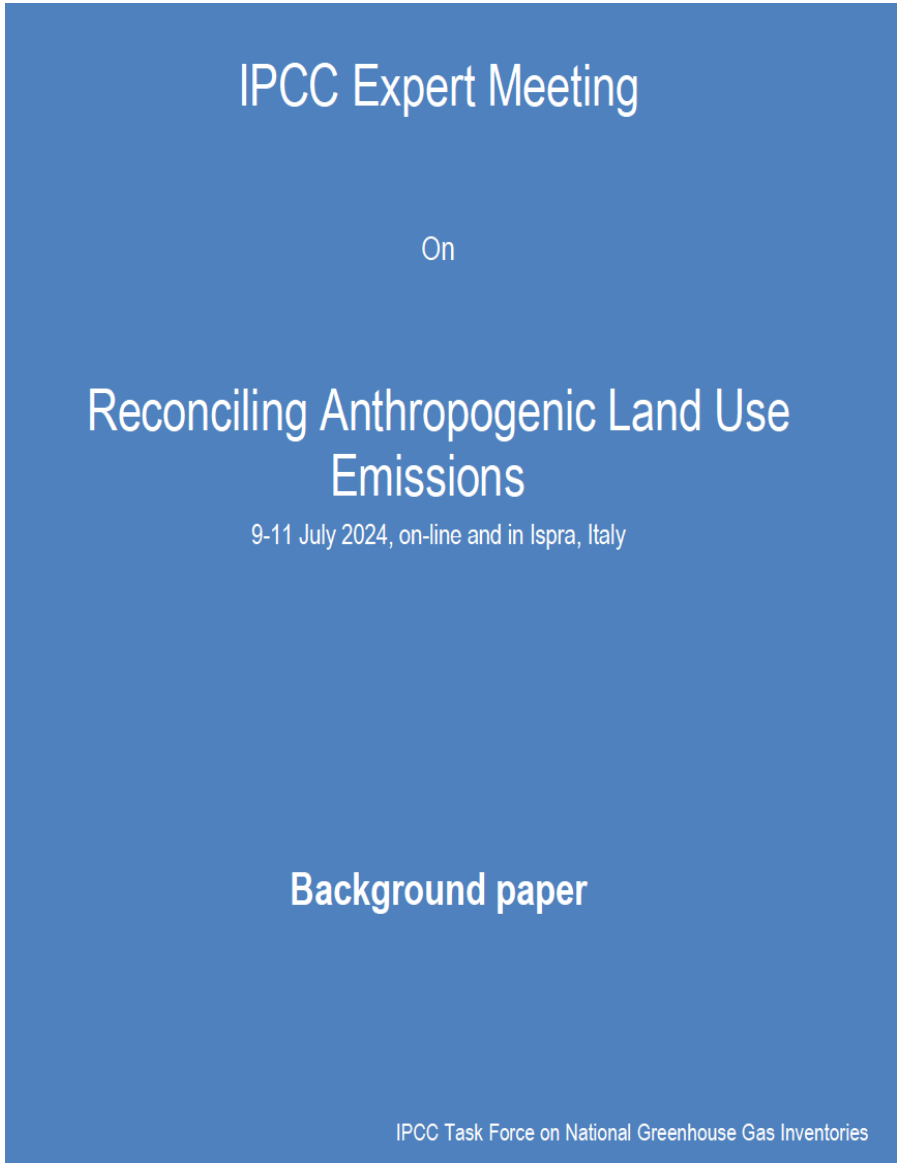
Global Carbon Budget 2023

Pierre Friedlingstein[1,2], Michael O'Sullivan[1], Matthew W. Jones[3], Robbie M. Andrew[4],

Aligning climate scenarios to emissions inventories shifts global benchmarks

Matthew J. Gidden[1,2,10], Thomas Gasser[1,10], Giacomo Grassi[3], Nicklas Forsell[1], Iris Janssens[1,4], William F. Lamb[5,6], Jan Minx[5,6], Zebedee Nicholls[1,7,8], Jan Steinhauser[1,9] & Keywan Riahi[1]

Background paper

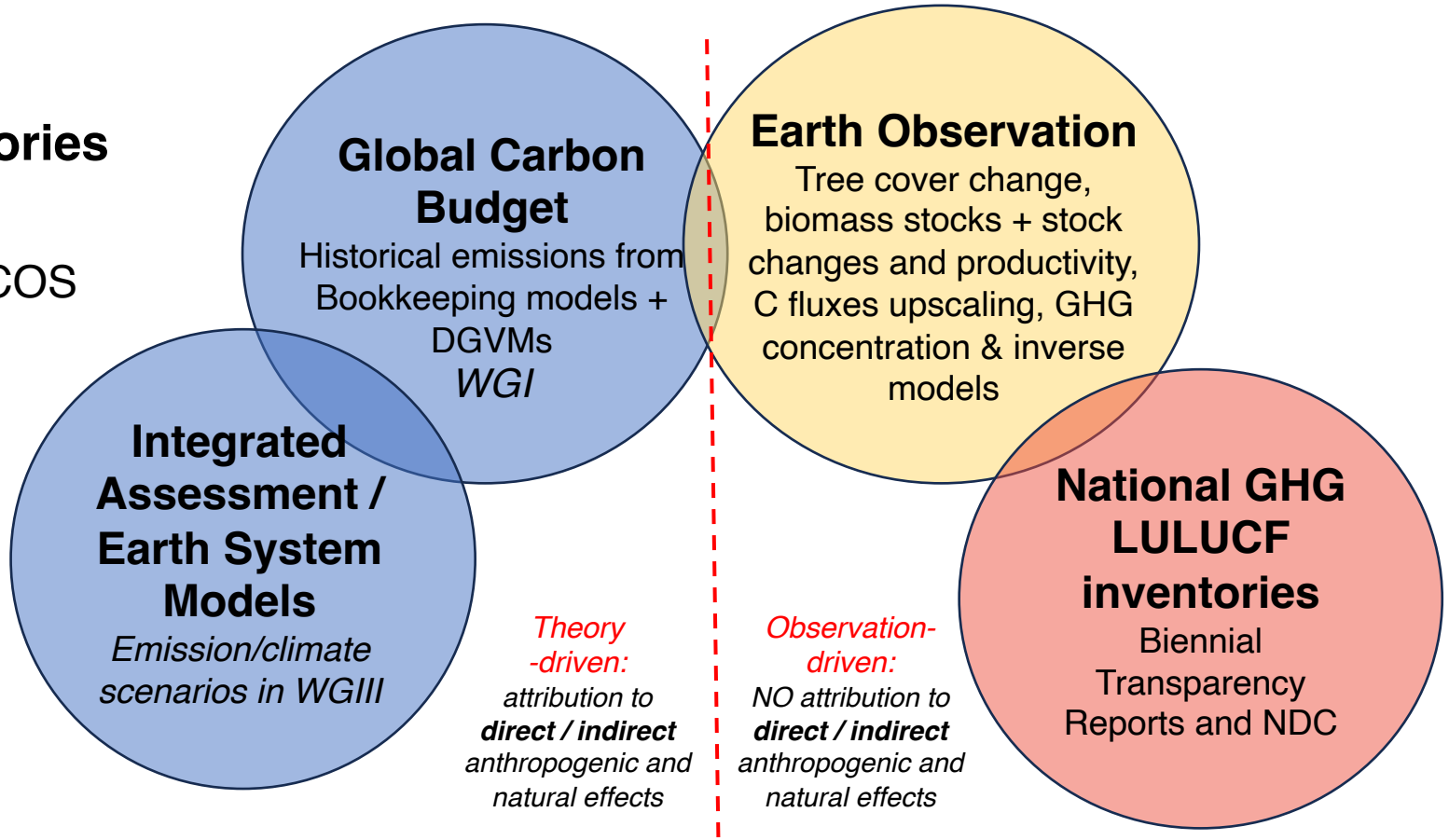


Webinar

Participants and communities in this Expert Meeting

- **Global carbon modelling** supporting the IPCC assessment reports, including the Global Carbon Budget (Bookkeeping Models and Dynamic Global Vegetation Models) and the Integrated Assessment Models
- **Earth Observation**
- **Country LULUCF GHG inventories**

Plus: UNFCCC, FAO, WMO, GFOI, GCOS



Objectives of this IPCC Expert Meeting

- Develop a **common understanding of the gap** in land use estimates between the communities that support the IPCC Assessment Reports and national GHG inventories, including its origin, magnitude and implications (e.g., for remaining global C budget, net zero) → ***Where are we?***
- Set the basis for **greater collaboration** between various communities, aimed at developing a **greater confidence in *anthropogenic* land use estimates** → ***Where do we want to go?***
- Outline concrete **steps that each community can take to ensure a greater comparability** between future IPCC products and national GHG data, for both the historical period (Bookkeeping models vs. NGHGIs) and the future (IAMs vs. NDCs)→ ***How do we get there?***
- **How to communicate the implications of any reconciliation?** → ***How do we explain it?***

The challenge is to achieve more credible and comparable LULUCF estimates across communities, allowing the next IPCC Assessment Report and the next Global Stocktake to assess the role of land use with more precision, confidence and consistency.

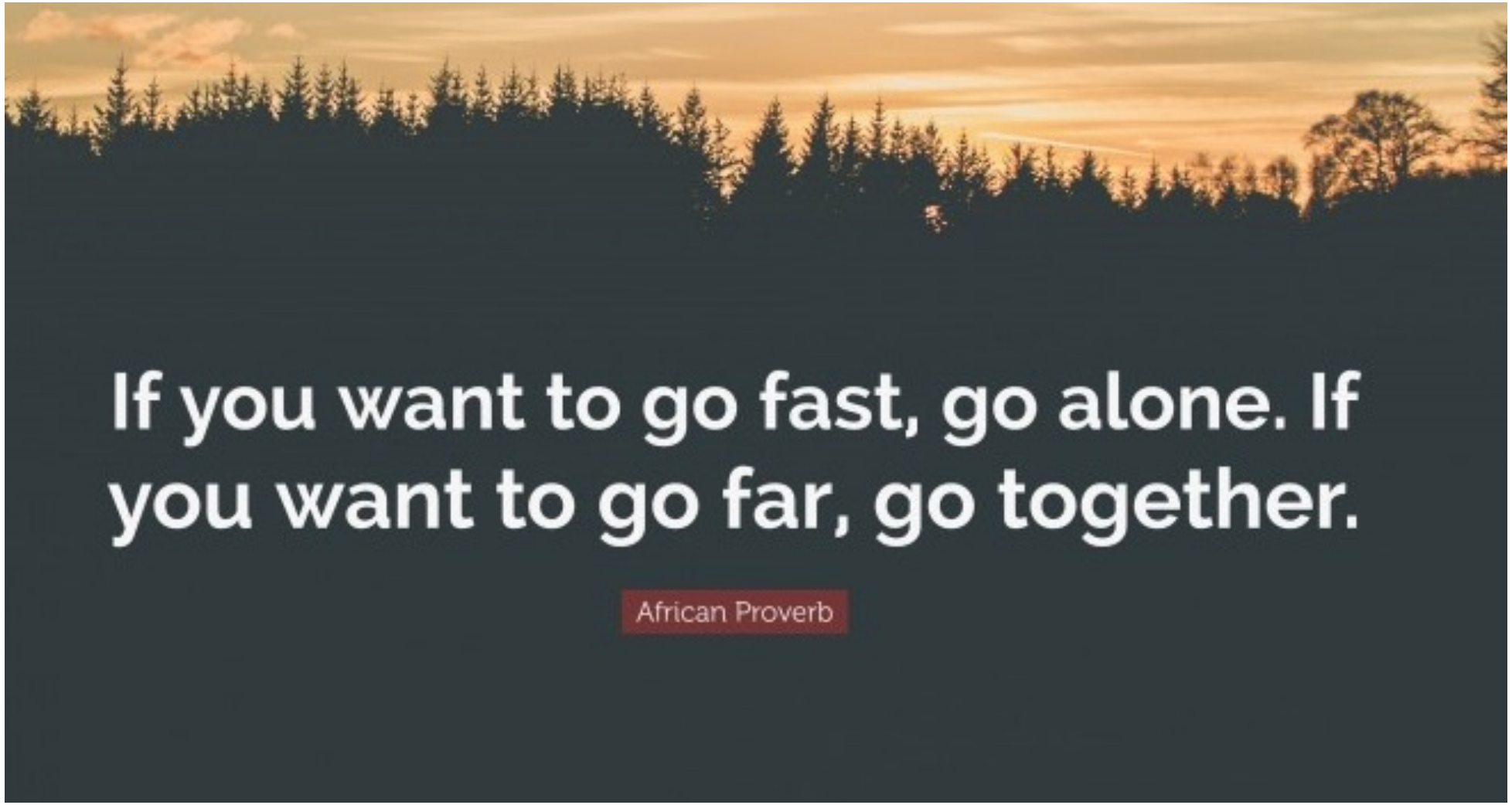
What can we expect to find in the Expert Meeting report?

(*tentative* thoughts!)

- **Where we are:** sum up the common understanding on the "two languages" for land use estimates and on the related implications.
- **Where we want to go, and how:** potential specific recommendations for each community
  - **NGHGI**: better implementation of managed land proxy using *existing* IPCC guidelines; transparency on data/methods to understand better the extent to which direct and indirect human-induced effects are captured – any lesson learnt from past work on additionality?
  - **Global models / Earth Observation**: in scientific literature and IPCC products that *primarily* targets countries/policies, use the "language" of NGHGI as *complementary* approach to land use CO_2 estimates
- **Communicate the implications**: clarifying the open questions

→ **EM report to inform AR7 Scoping meeting and countries' efforts in preparing their BTR**

"We speak two different languages, we need a translator,
these are the implications and steps to get the translation done"


If you want to go fast, go alone. If you want to go far, go together.
African Proverb

Agenda

Day 1 - 9th July 24

Session 1. Where are we? *The land emissions gap, national GHG inventories, global carbon models*		
Morning 08:00-12:45	08:00/08:30 Bus pick up at hotels (time depends on hotel)	
	08:30-9:45 Security check and welcome coffee	
	Plenary 9:45-12.45	Welcome • *Director Alessandra Zampieri (JRC – Sustainable Resources Directorate)* • *Acting Deputy Director General Yvon Slingenberg (DG CLIMA, online)* • *Jim Skea (IPCC chair, online)* Background on the IPCC Task Force on National Greenhouse Gas Inventories (TFI) - *Takeshi Enoki, Mazhar Hayat, Co-Chairs of IPCC TFI* Introduction, scope and agenda of the Expert Meeting - *Giacomo Grassi (IPCC TFI Bureau (TFB) and Joint Research Centre (JRC))*
		Land use in the Paris Agreement and in country reporting *Chaired by Thelma Krug (Chair of GCOS Steering Committee)* • Land use in the Paris Agreement and in the Global Stocktake - *Dirk Nemitz (UNFCCC secretariat)* • The managed land proxy in the IPCC Guidelines and previous IPCC meetings - *Maria Sanz (IPCC TFB, Basque Centre for Climate Change) and Thelma Krug* • Overview of current reporting in National GHG inventories - *Joana Melo (JRC)* • Global Forest Resources Assessment 2025: what's new and how can it help estimating forest emissions - *Marieke Sandker (FAO)* • Discussion

Agenda

Day 1 - 9th July 24

12:45-14:15 Buffet lunch and *Poster session* (next to buffet area)		
Afternoon 14:15- 17:45	**Plenary** 14:15- 15:15	Land use emissions in the Global Carbon Budget and the IPCC AR6 – WGI *Chaired by Sonia Seneviratne (WGI Vice-Chair)* • The Global Carbon Project and RECCAP – *Glen Peters (CICERO)* • Estimating the terrestrial global carbon budget by global models - *Julia Pongratz (Munich University) and Mike O'Sullivan (Exeter University)* • Discussion
	15:15-15:45 Coffee break	
	Plenary 15:45- 16:45	Land use emissions in the IPCC AR6 - WGIII *Chaired by Jan Fuglestvedt (WGIII Vice-Chair)* • Emission scenarios with Integrated Assessment Models and links with Earth System Models - *Detlef Van Vuuren (Utrecht University)* • Land-related mitigation options - *Stephanie Roe (WWF)* • Role of the land use sector in NDCs - *Rosa Roman-Cuesta (JRC)* • Discussion
	16:45- 17:45	Reconciling land use emissions between global models and national inventories *Chaired by Andy Reisinger (Australian National University)* • Reconciliation efforts done so far - *Giacomo Grassi (IPCC TFB, JRC) and Thomas Gasser (IIASA)* • Impacts of different definitions of CO_2 removal for net zero and remaining carbon budget - *Glen Peters (CICERO)* • Discussion
18:00 Bus to the Restaurant in Angera (hotel Lido)		
Evening	19:00 Social dinner in Angera, hotel Lido	

Agenda

Day 2 - 10th July

Session 1. Where are we? *Earth observation tools*		
Morning 08:00-12:30	08:00/08:30 Bus pick up at hotels (time depends on hotel)	
	08:30-09:45 Security check and welcome coffee	
	Plenary 09:45-12.30	Recap from day 1 Role of Earth Observation (EO) for estimating land use emissions *Chaired by Alessandro Cescatti (JRC)* • Satellite remote sensing for land characterisation - *Martin Herold (GFZ Potsdam)* • Use of remote sensing to produce biomass maps: the case of Brazil – *Jean Pierre Ometto (INPE)* • Revised geospatial monitoring of 21st century forest carbon fluxes by Global Forest Watch - *Nancy Harris (World Resource Institute)* • New tools for estimating emissions from land use - *Sassan Saatchi (JPL, California Institute of Technology)* • Combining satellite biomass and disturbances observations to project current and future carbon sink - *Philippe Ciais (LSCE)* • G3W, the WMO Global Greenhouse Gas Watch enters its Implementation and Pre-Operational Phase 2024-27: a proposed framework for enhancing collaboration – *Giampaolo Balsamo (WMO)* • Discussion: how can EO links with other communities and support the reconciliation efforts?
		• The JRC's Global land use carbon flux data hub - *Joana Melo (JRC)*
12:30-14:30 Buffet lunch and *Poster session* (next to buffet area)		

Agenda

Day 2 - 10th July

Session 2. Where do we want to go? *Increased understanding among communities, more confidence in estimates*		
Afternoon 14:30 - 17:30	**Break-out rooms** 14:30-16:00	Three groups with a balanced representation of the various communities will discuss challenges related to emissions/removals estimates, including e.g.: - Attribution to anthropogenic and natural drivers/effects, spatial and temporal resolution, level of disaggregation of estimates, completeness (in terms of land uses and carbon pools); verification; - Challenges related to the conceptual comparability of emissions/removals across communities; - 'Wish list' of info/data that each community would like to have from others;
	16:00-16:30 Coffee break	
	Plenary 16:30-17:30	Each group report back to the plenary Discussion and recap from day 2
17:45 Bus to the hotels		

Optional outreach activity in the evening (20:30): 'Citizens and activists meet scientists', Angera

Agenda

Day 3 - 11th July

Session 3. How do we get there? *Concrete further steps towards reconciliation*		
Morning 08:00-12:45	08:00/08:30 Bus pick up at hotels (time depends on hotel)	
	08:30-9:45 Security check and welcome coffee	
	Break-out rooms 9:45-11:30	Three groups separating the communities (global carbon modelling, Earth Observation, GHG inventories) will discuss challenges ahead and concrete improvements that each community could realize in the next 3-4 years, to advance towards reconciliation for IPCC AR7 products and the 2nd Global Stocktake. Examples of topics to be discussed include: - Global carbon models: land use maps, representation of management, consistency in the separation of anthropogenic and natural fluxes (loss of additional sink capacity), verification, etc. - Earth Observation: time series consistency, spatial resolution, use/accessibility of ground data, verification, masking results with managed areas, etc. - NGHGIs: information on managed land (including implications of reporting all land as managed or not), level of disaggregation of estimates (e.g., shifting agriculture), quality of data, interannual variability, time series consistency, completeness, verification, natural disturbances, extent to which methods capture the different drivers/effects, use of tier-3 methods, etc.
	Break of 15 minutes to swap people among groups for the next BOGs	
	Break-out rooms 11:45-12:45	Three groups with a balanced representation of the various communities will discuss the 'communication challenge': how to explain the implications of any reconciliation (on remaining carbon budget, net zero, etc.), which risks of misunderstandings exist?
12:45-13:00 Group photo		

Agenda

Day 3 - 11th July

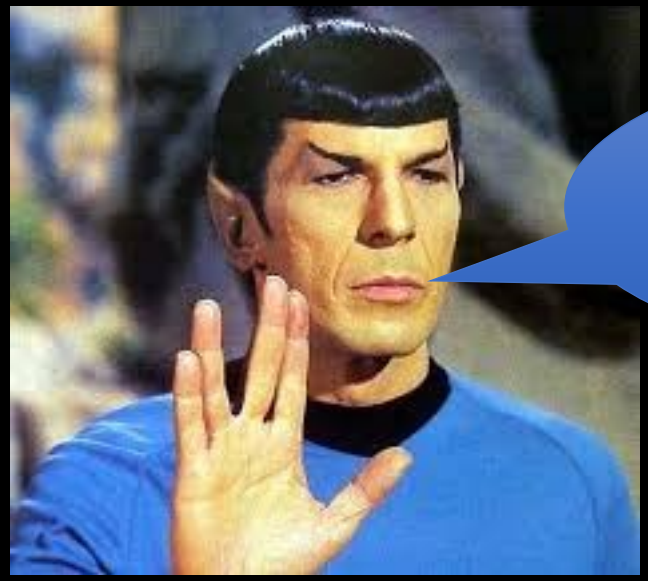
13:00-14:30 Buffet lunch and *Poster session* (next to buffet area)		
Afternoon 14:30-17:00	**Plenary** 14:30-16:00	Wrap-up from the two morning Breakout sessions Discussion
	16:00-16:30 Coffee break	
	Plenary 16:30-17:00	Final Discussion and next steps – *Greet Maenhout and Giacomo Grassi (JRC)* Conclusions - *Alessandra Zampieri (JRC) and IPCC TFI co-chairs*
17:15 Bus to the hotels / airports / trains		

MISUNDERSTADINGS

CNN, September 30, 1999

Metrics mismatch causes NASA losing a $125 million Mars orbiter

Misunderstanding occurred because one team of spacecraft engineers used English units (pound-seconds), while the other team used more conventional metric (newton-seconds)



CNN, **December 15, 2028**
Paris Agreement at risk.

A large gap in land use CO_2 emissions between IPCC AR7 and National inventories causes the failure of the UNFCCC 2nd Global Stocktake

Misunderstandings occurred on the concept of "anthropogenic sink"