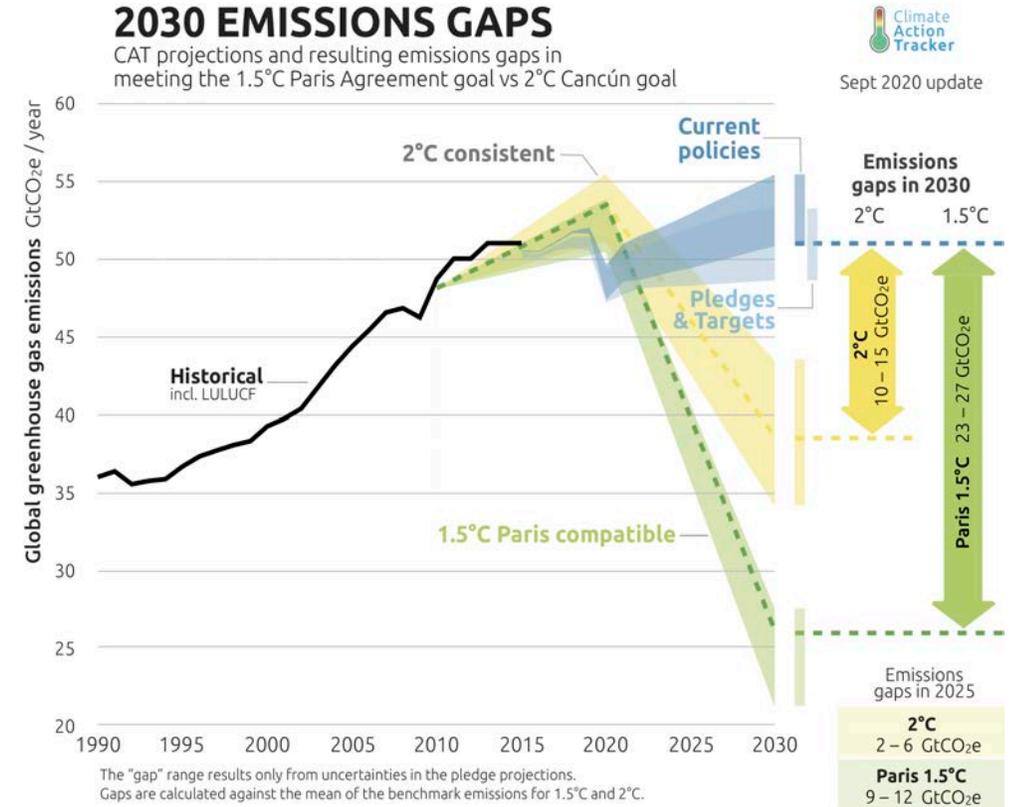
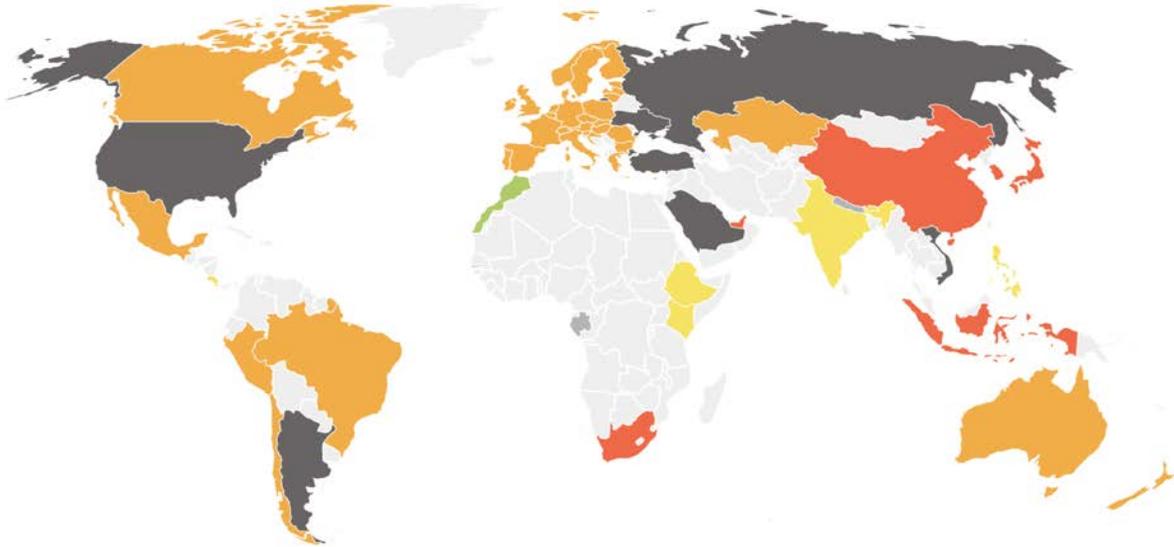
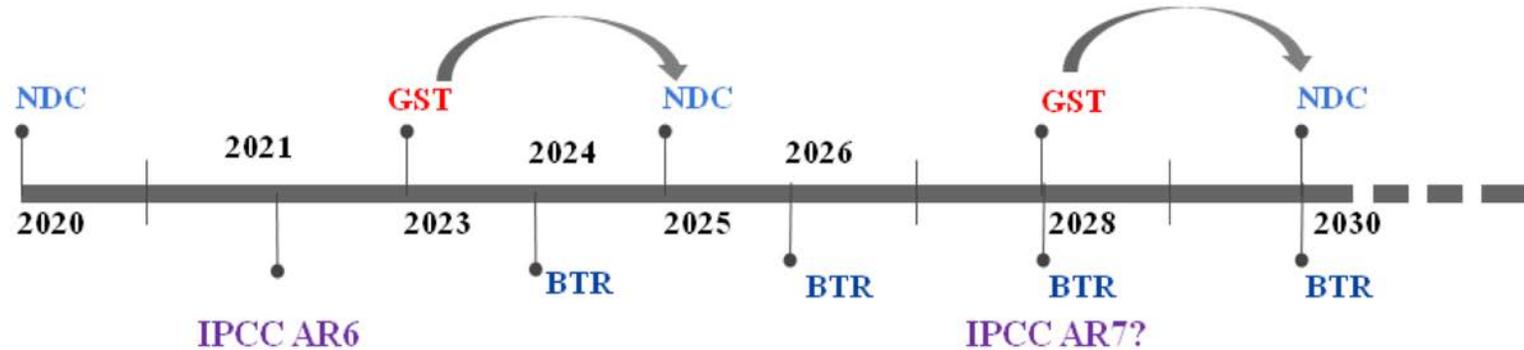


CCI RECCAP-2

Laboratoire des Sciences du Climat et de l'Environnement – Université Paris Saclay (LSCE UVSQ)
University of Exeter (UNEXE)
Max Planck Institute for Biogeochemistry (MPI-BGC)







NDC: Focus on Mitigation, Adaptation on voluntary basis (every 5 years)

GST: assess the collective progress against long term targets (every 5 years)

BTR: GHG inventories - Track progress of NDC implementation (mitigation and financial support)

IPCC AR: Assessment Reports about knowledge on climate change, its causes, potential impacts and response options

- The GST shall include information about **mitigation and adaptation processes**, and the **means of implementation and support**, based on the best available science and the equity concept.
- The process should inform Parties whether the **cumulated efforts** of all the Parties is in track with the “well-below 2°C” trajectory, thus providing indication on how to enhance and update their actions at national level and through cooperation.
- The outputs of the GST should, thus, provide indication of opportunities and challenges for **enhancing action and support**.
- The process needs to be **transparent**, in the light of **equity and best available science** and it is strictly Party driven, although external experts are invited to participate to support the process.

GCP
Friedlingst
ein et al.,
2019



87%

34.4 GtCO₂/yr



13%

5.3 GtCO₂/yr

≈

5%

1.9 GtCO₂/yr

Budget
Imbalance



44%

17.3 GtCO₂/yr



29%

11.6 GtCO₂/yr



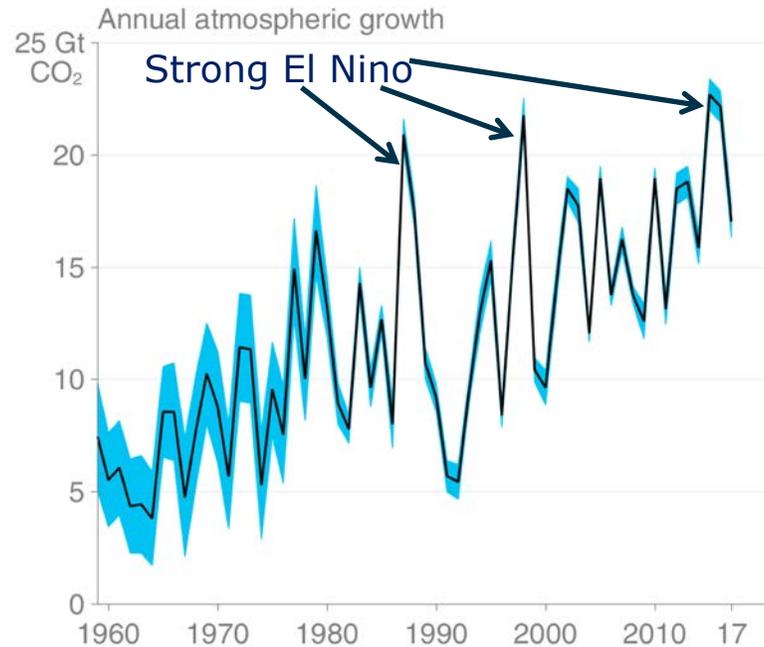
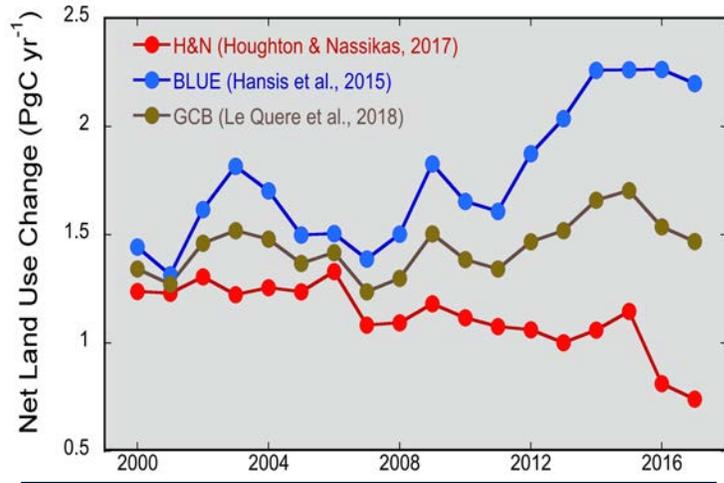
22%

8.9 GtCO₂/yr

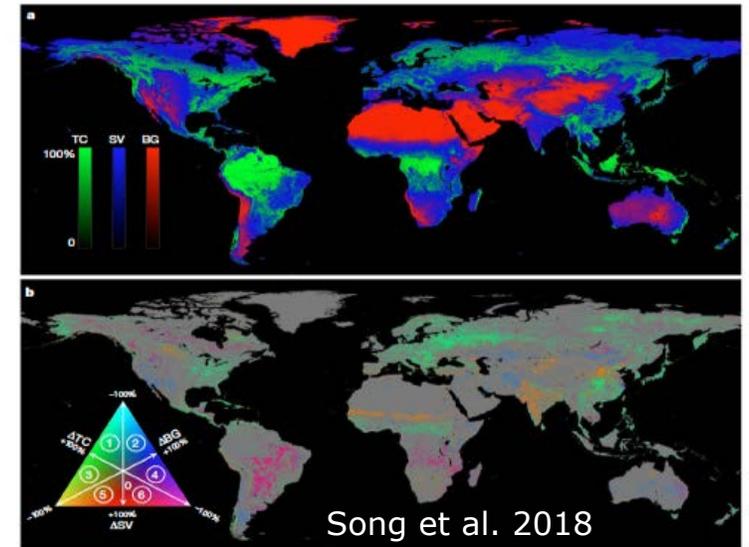
Sources

Sinks

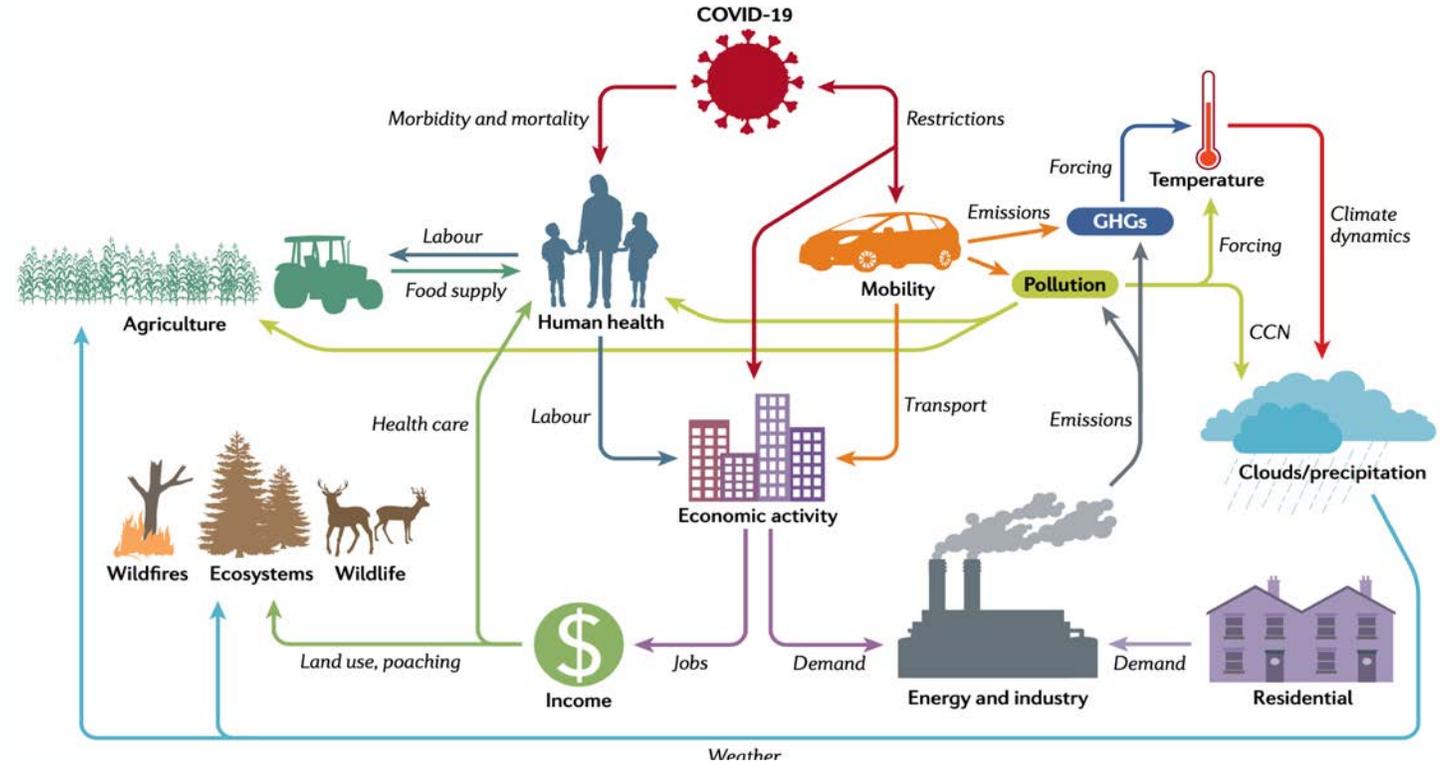
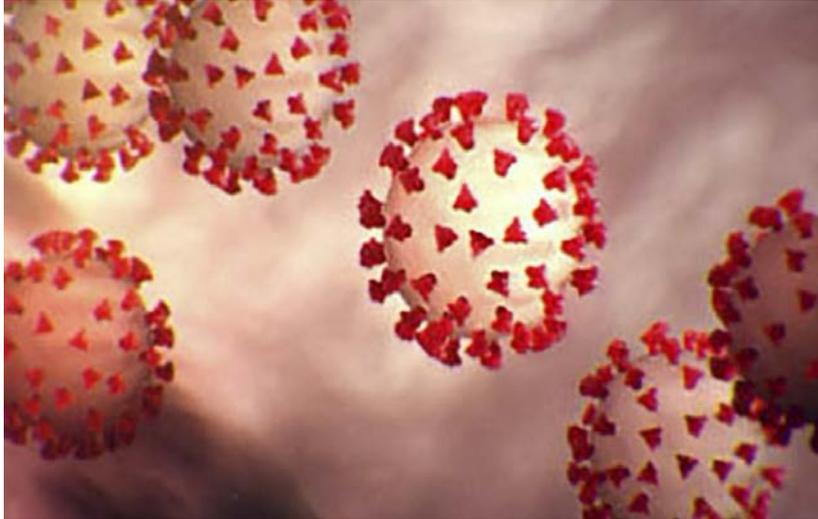
Emissions from Land Use Remain Uncertain



Fate of Land Sink is Uncertain



Song et al. 2018

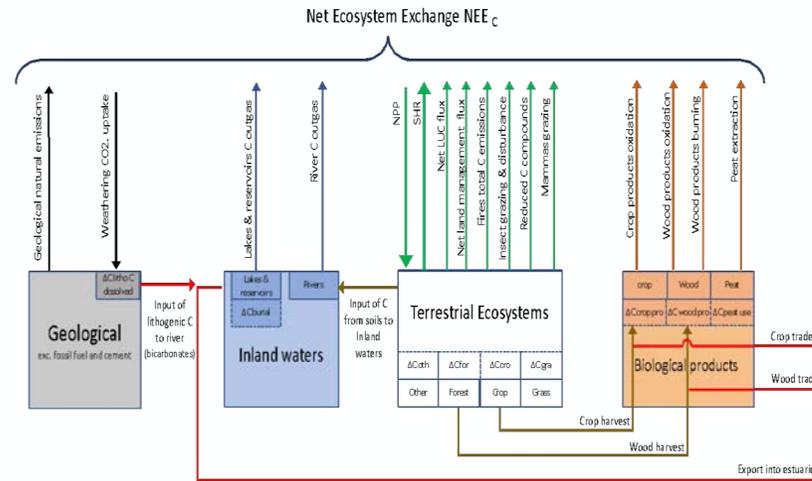
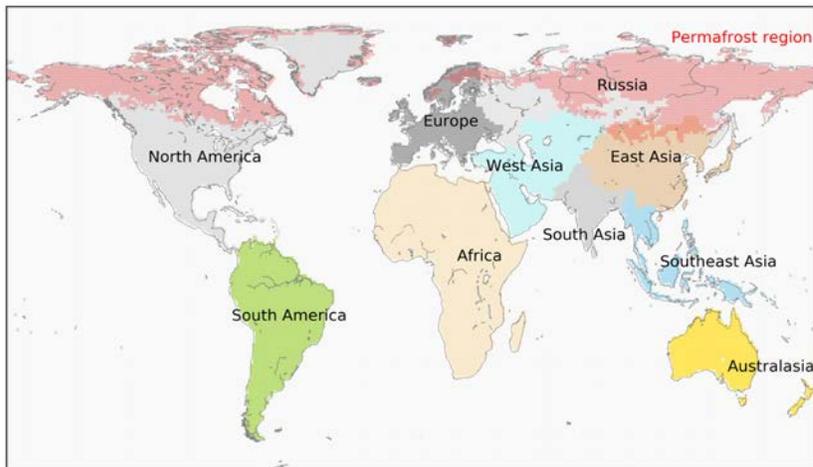
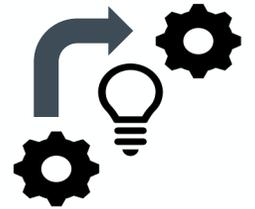


COVID 19 led to a direct short term CO2 emissions reductions of 9% and will have deep and long lasting effects on economies
 The direct effect on climate is small, but indirect impacts through land use and energy systems can be large
 Current stimulus recovery funds dwarf clean energy investment needs – a last chance to meet the Paris goals

We enter into an uncharted territory : can we monitor GHG emissions and sinks with high precision and low latency to inform policy ?

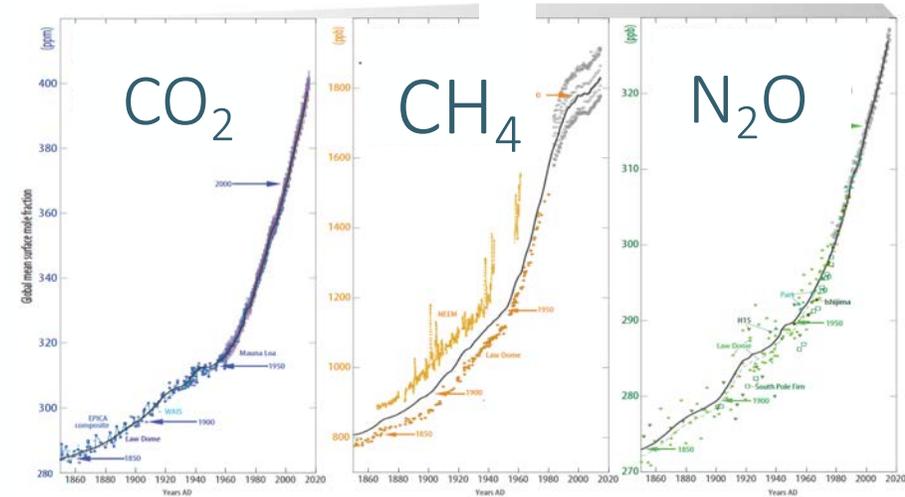
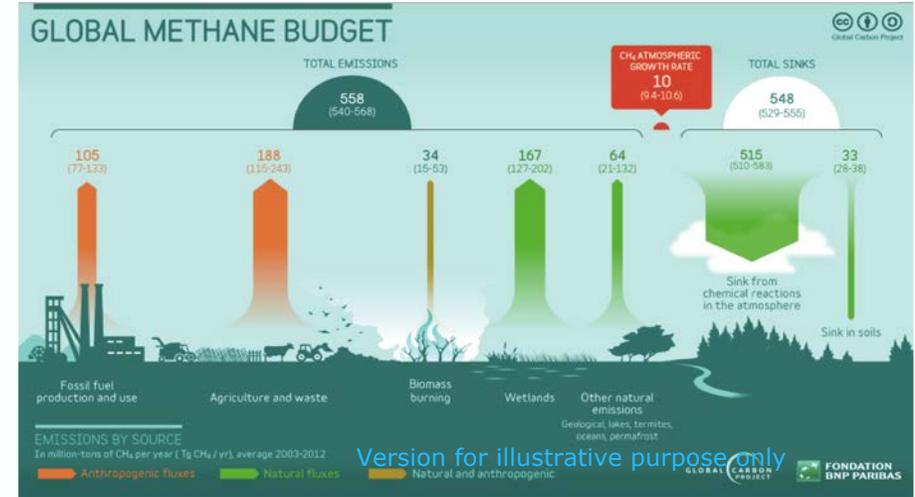
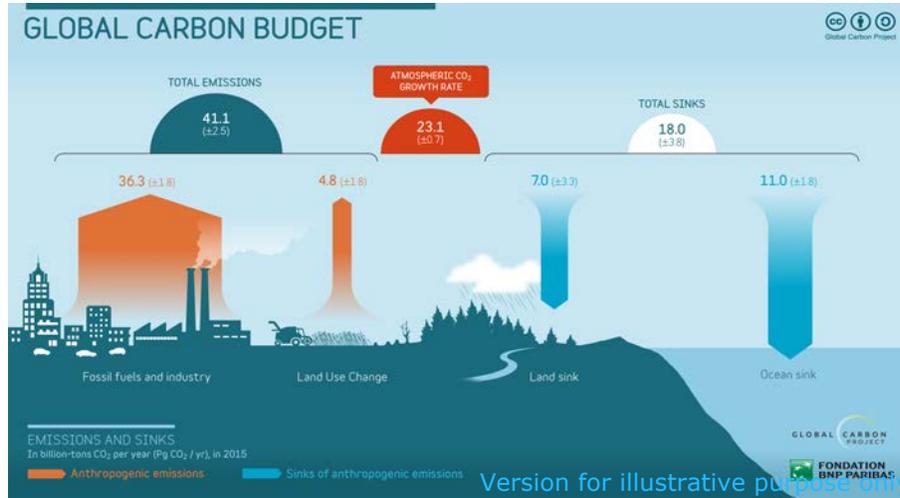
RECCAP2 is an international initiative led by the Global Carbon Project that aims to:

- Assess global sources and sinks of the three major GHGs for ten large regions
- Provide details of the contribution of different sectors
- Quantify trends and uncertainties
- Provide new insights on mechanisms and drivers
- Use recent trends to constrain future changes



Definitions and methods to estimate regional land carbon fluxes for the second phase of the REgional Carbon Cycle Assessment and Processes Project (RECCAP-2)

Philippe Ciais¹, Ana Bastos², Frédéric Chevallier¹, Ronny Lauerwald¹⁻³, Ben Poulter⁴, Pep Canadell⁵, Gustaf Hugelius^{6,7}, Robert B. Jackson⁸, Atul Jain⁹, Matthew Jones¹⁰, Masayuki Kondo¹¹, Ingrid T. Luijkx¹², Prabir K. Patra¹³, Wouter Peters^{12,14}, Julia Pongratz¹⁵, A. M. Roxana Petrescu¹⁶, Shilong Piao^{17,18}, Chunjing Qiu¹, C. Von Randow¹⁹, Pierre Regnier³, Marielle Saunois¹, Robert Scholes²⁰, A. Shvidenko^{21,22}, Hanqin Tian²³, Hui Yang¹, Xuhui Wang¹⁷ and Bo Zheng¹



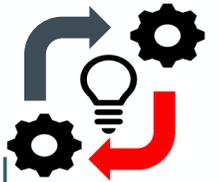
‘Pathfinder’ project to use ESA-CCI products to support RECCAP-2 and the Global Stock-take

Evaluate consistency in country-level **GHG budgets from satellite-based & in-situ inversions**

Separate natural and anthropogenic components and analyze trends

Non-Annex 1 country level budgets and **consistency with UNFCCC reporting**

- Integration of CCI Biomass, LC, Fire & SMOS VOD products to reduce uncertainty on LULUCF fluxes in Brazil



Variability in **anthropogenic and natural biogenic surface fluxes across European countries**

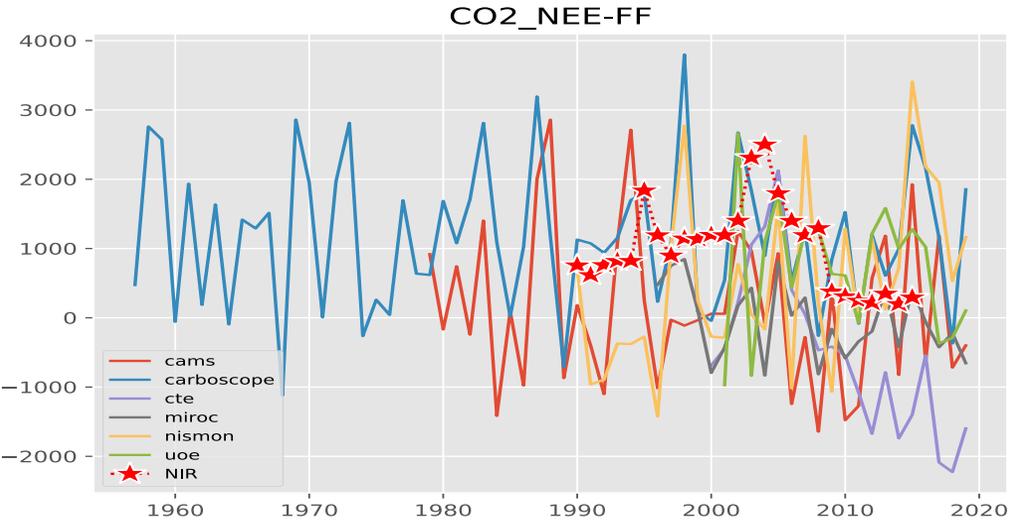
- Use of CCI LC products in Europe for supporting national agencies for including spatially explicit LULUCF data
- UE LULUCF Regulation 841/2018 requires to MS to report using a spatially explicit method in the post 2022 (article 18(4)), referring to "Approach 3: Geographically-explicit land-use conversion data in accordance with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories."
- "APPROACH 3: SPATIALLY-EXPLICIT LAND-USE CONVERSION DATA Approach 3 is characterized by spatially-explicit observations of land-use categories and land-use conversions, often tracking patterns at specific point locations and/or using gridded map products, such as derived from remote sensing imagery" – IPCC 2006 Guidelines, Vol 4. Ch 3
- Impact of recent droughts on national carbon budgets



Involves national inventory agencies to provide GHG information that matches user needs

- INPE Brazil, INEA Columbia, UKNAEI UK, CMCC Italy, UBA Germany & CITEPA France

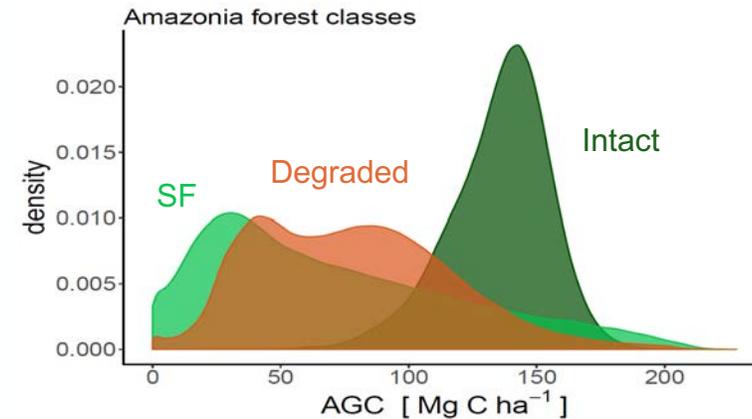




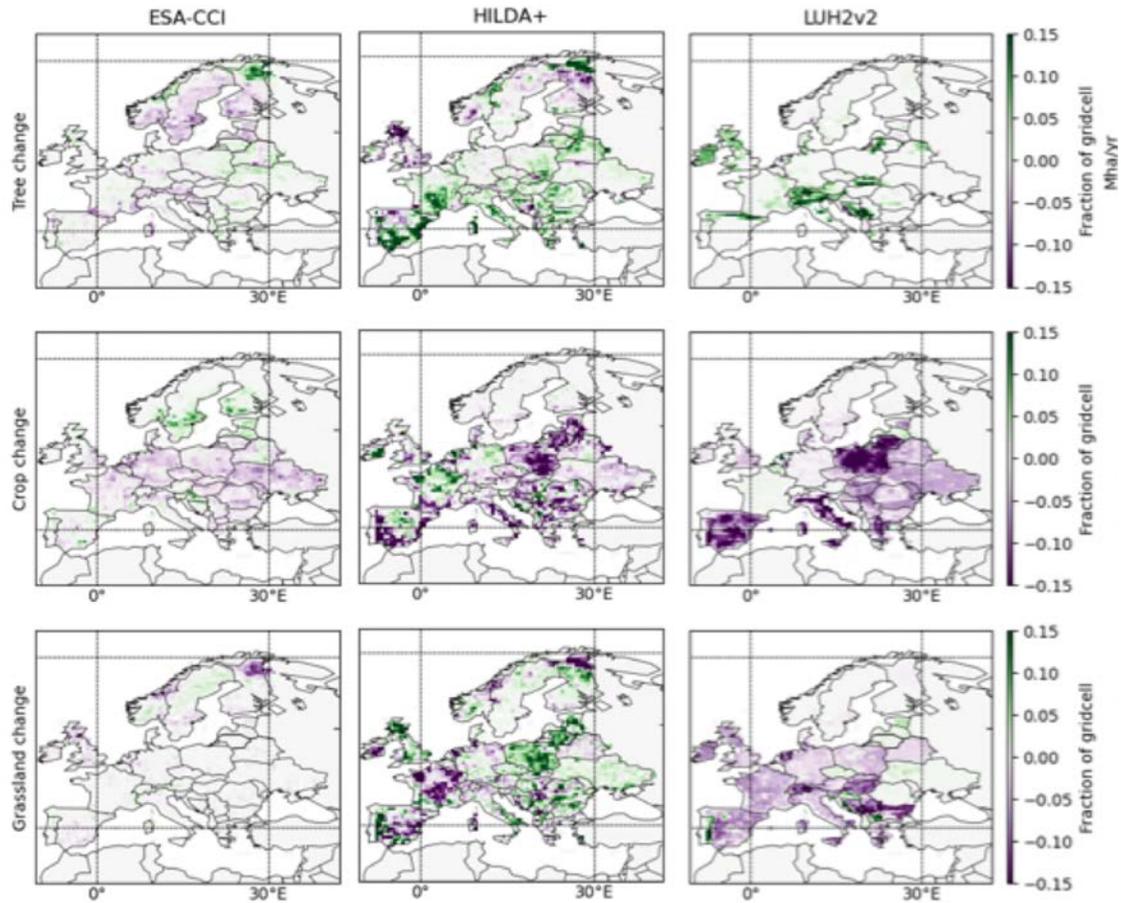
- Brazil LULUCF national communications vs atmospheric CO₂ inversions



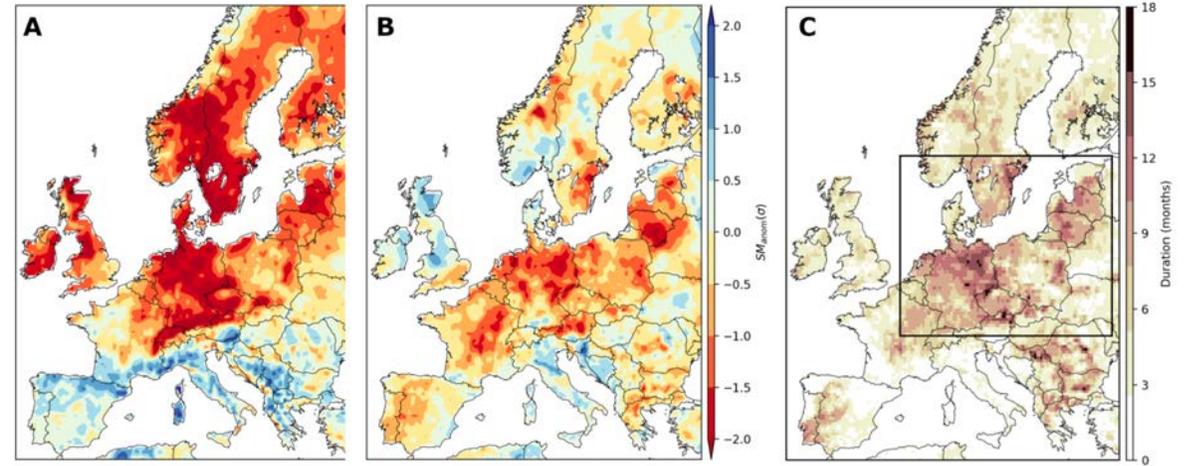
- Statistics of intact and degraded forest C density from landcover + disturbance detection and ESA CCI data (100 m spatial resolution)
- Bullock et al. (2020) and map-biomass or alternative products.



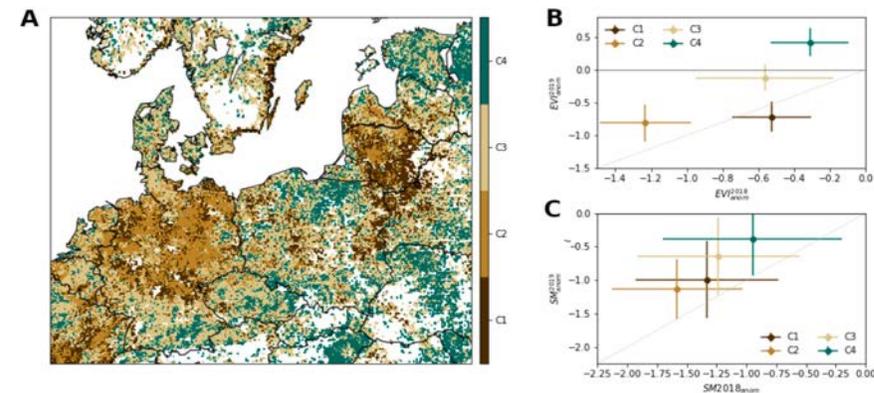
Variability in anthropogenic and natural biogenic surface fluxes across European countries



- Land cover change in Europe from different datasets



- 2018 and 2019 droughts patterns and duration (right)



- Degradation and recovery trajectories from 2018 to 2019

The European CO₂ Copernicus initiative is focused on anthropogenic emissions and atmospheric monitoring of GHG budgets with an operational system, less is done on process attribution & terrestrial carbon accounting

The next GSTs will arrive before such a system is in place : can we track trends between 2020 and 2028 ?

CCI projects can be harnessed to attribute changes of carbon and other biogeochemical cycles to multiple drivers : warming, water stress, fires, permafrost changes, land use change

- ✓ Uptake by Earth System Models & IPCC projections → CMUG
- ✓ Data driven carbon models can be built upon CCI products
- ✓ Combining ground based and satellite information is often under-appreciated

Low latency & high accuracy information is needed -> What are the low hanging & high-impact fruits ?

- ✓ Fast-track updates deforestation & fire C emissions
- ✓ Annual updates of biomass changes and patterns attribution
- ✓ Analysis of GHG anomalies during recent extreme climate events : droughts, arctic heatwaves, ocean C shifts
- ✓ EO-based annual updates & assessments of regional GHG budgets with available data and models -> must have before GST



climate.esa.int

Contact : Philippe Ciais Philippe.ciais@lsce.ipsl.fr and Ana Bastos abastos@bgc-jena.mpg.de

