



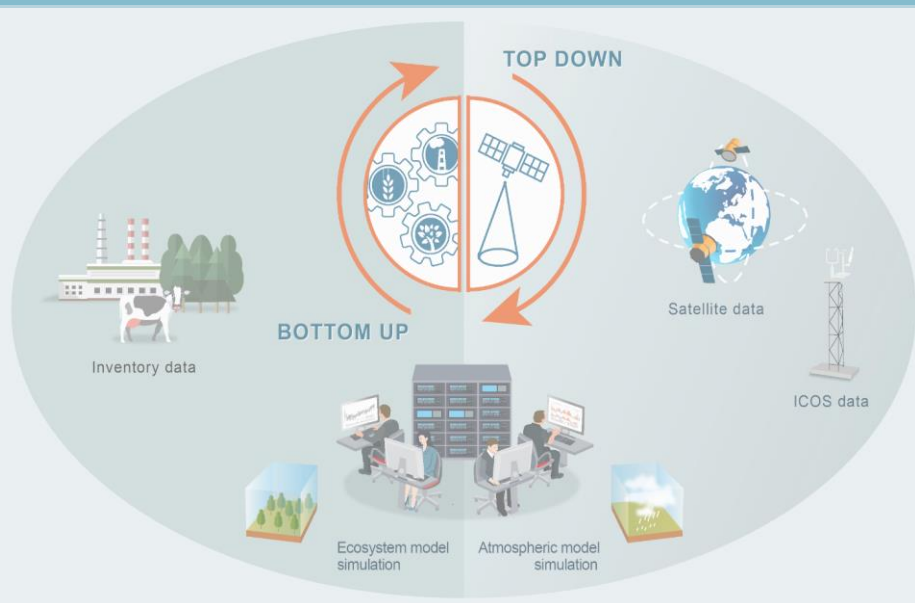
Towards a regular synthesis of carbon budgets at national scale

Thursday 12th, 2020

By Teleconference

Han Dolman, Matt McGrath, Roxana Petrescu, Robbie Andrew & VERIFY PI's

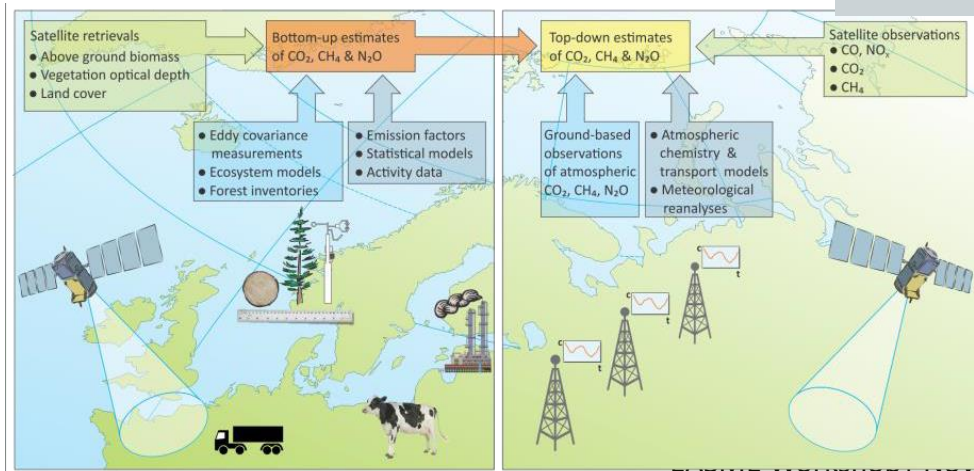
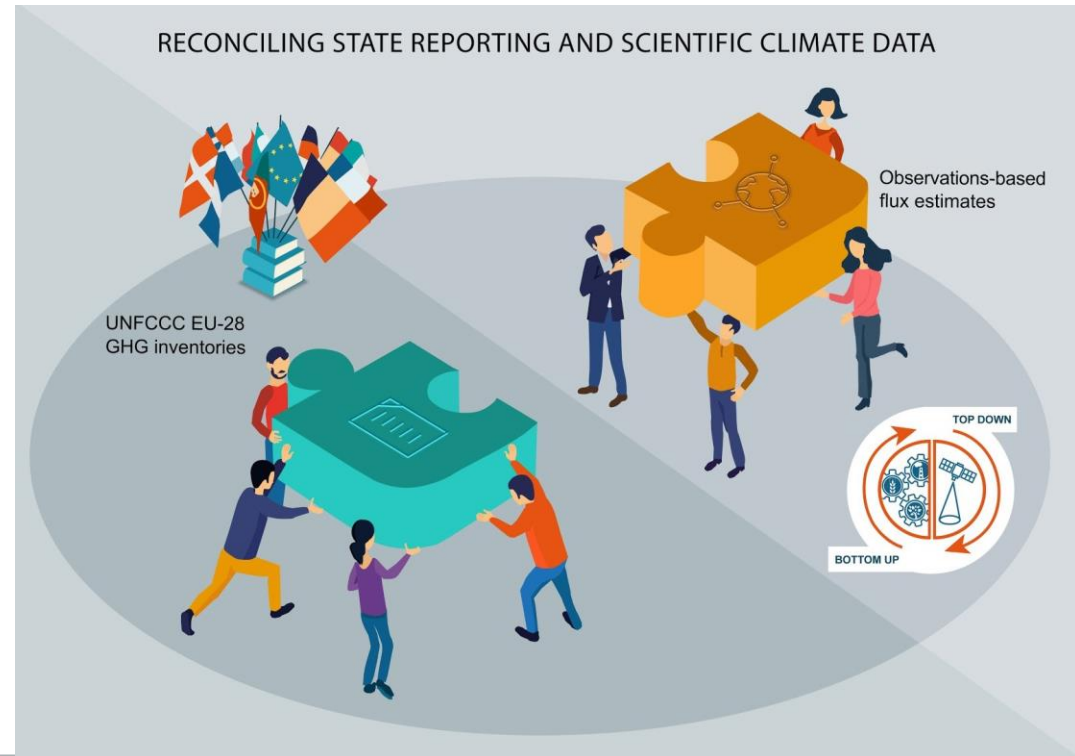
Vrije Universiteit Amsterdam



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776810

THE VERIFY SYNTHESIS

Do science based, observation based methods provide similar (better/worse) answers than the classic inventory (IPCC guideline based) estimates that are Part of the NGHGI's?

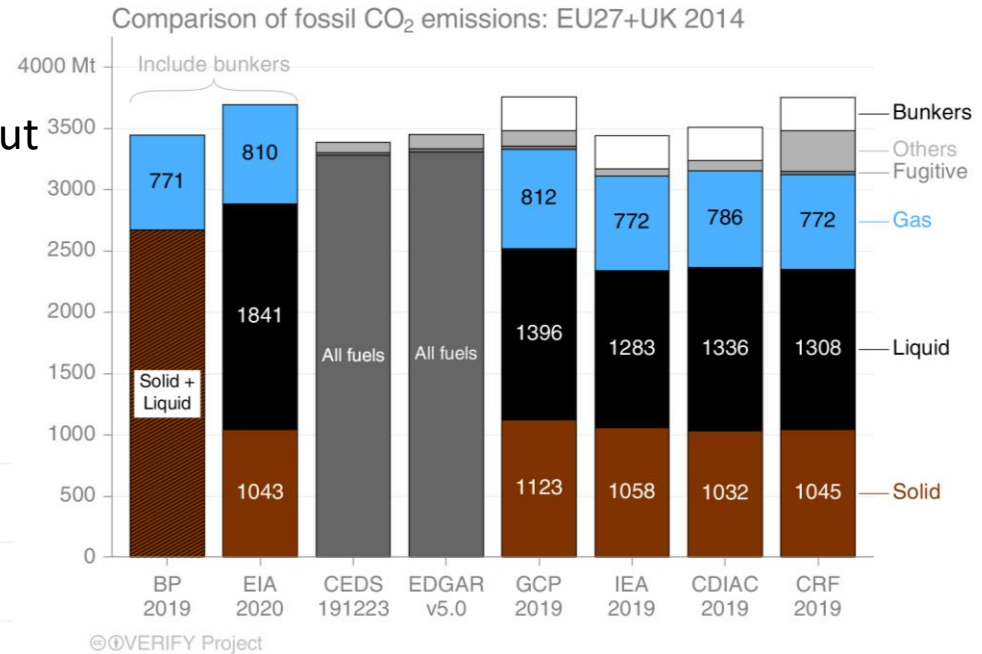
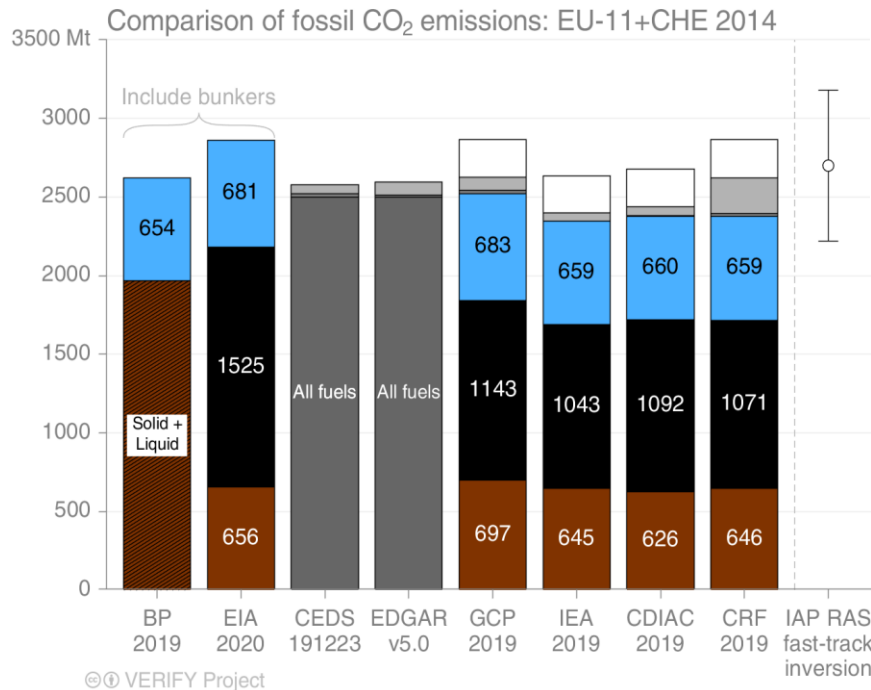


Comparing top down and bottom up



FOSSIL FUEL EMISSIONS

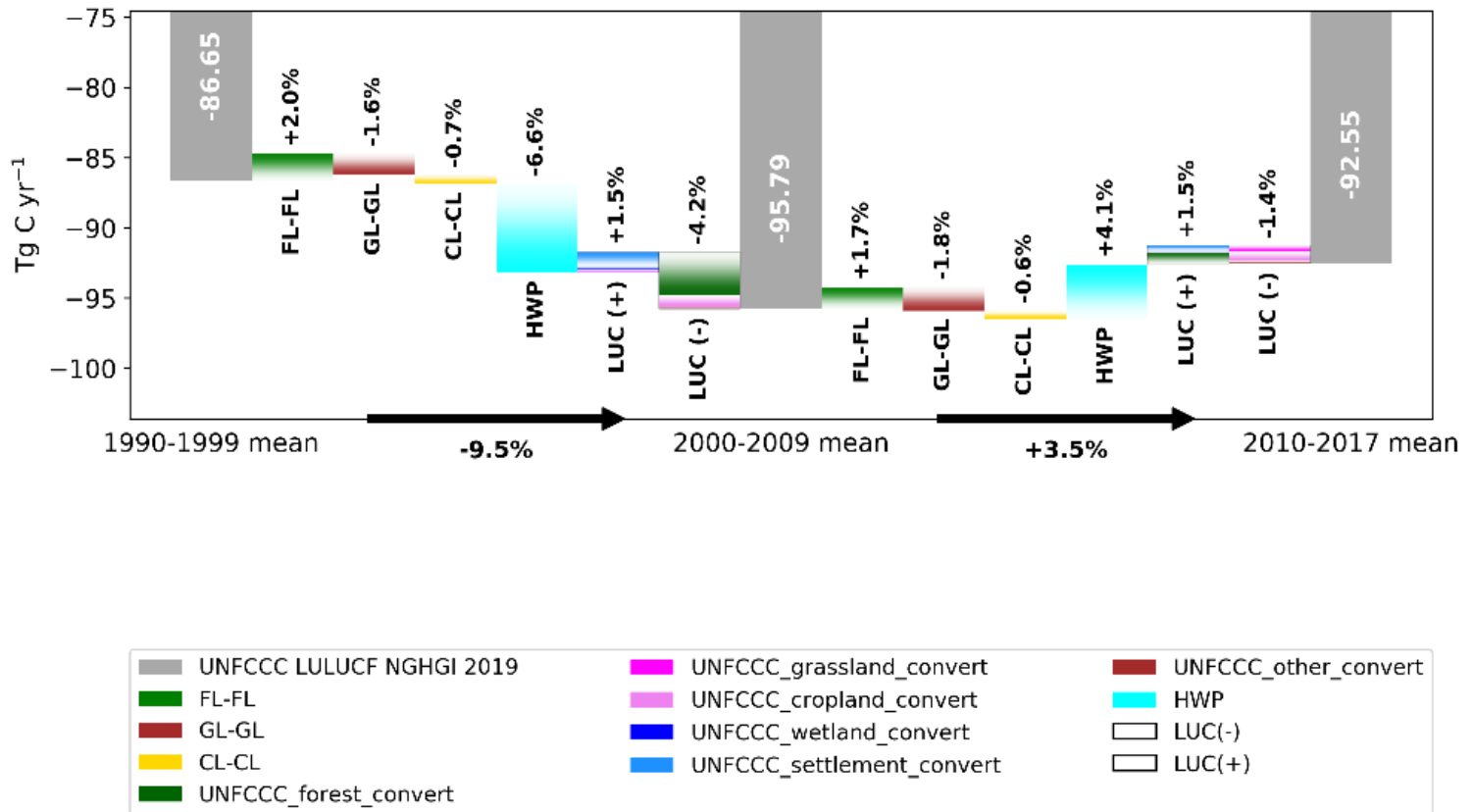
Fossil fuel emissions are generally better known than land emissions, but uncertainty creeps in through the distribution among fuel type



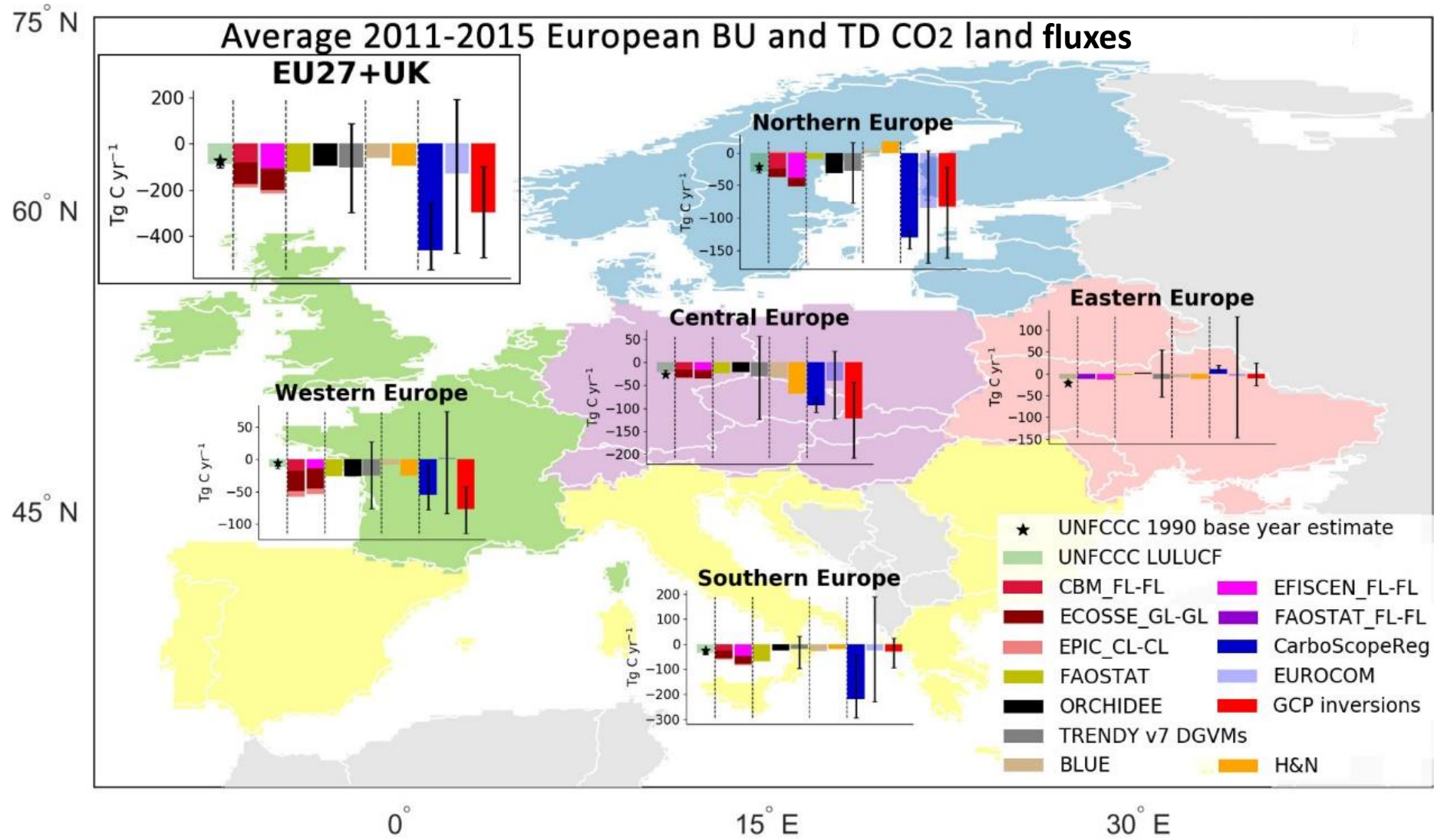
Fast track inversion (based on CO and NO_x) yields credible numbers
With large uncertainty (17%)

TRENDS IN CO₂ LAND FOR UNFCCC (2019)

CO₂ LULUCF flux decadal change from UNFCCC NGHGI (2019) for EU27 + UK

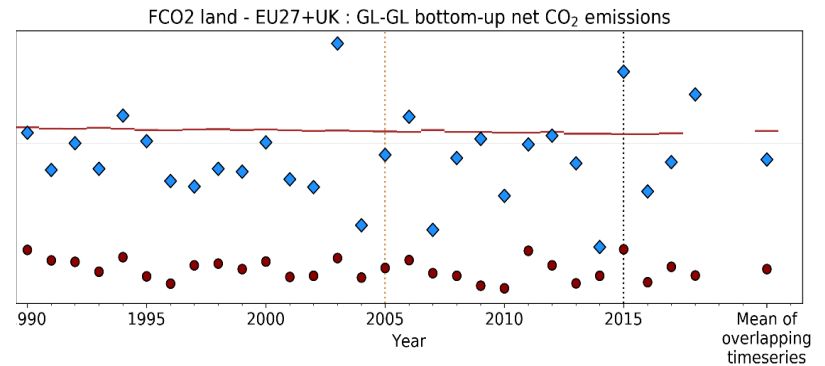
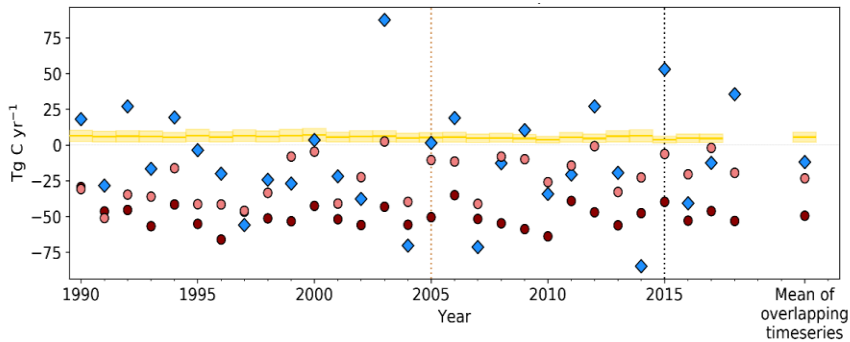
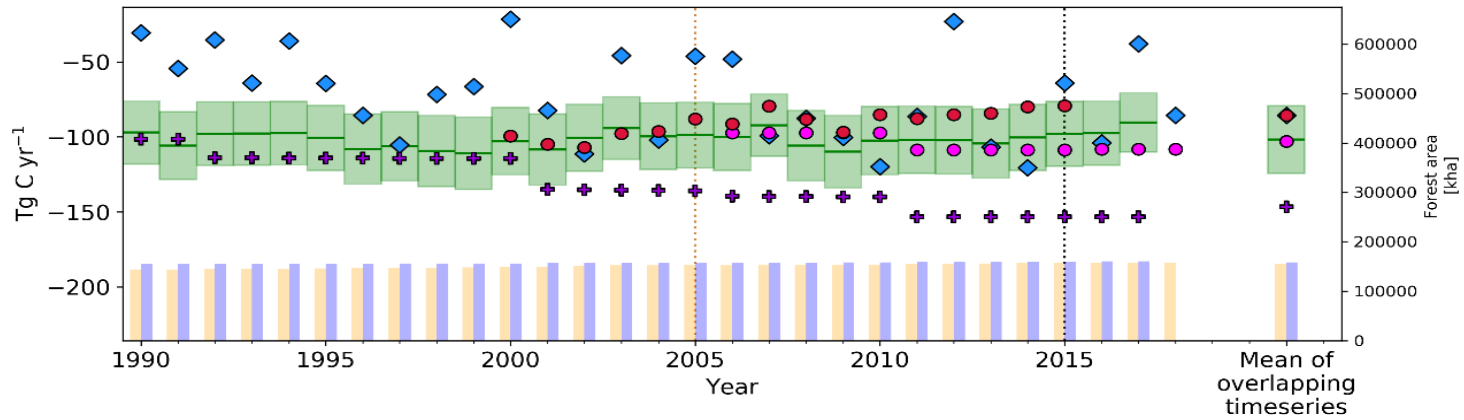


OVERALL CO₂ LAND LULUCF FLUXES





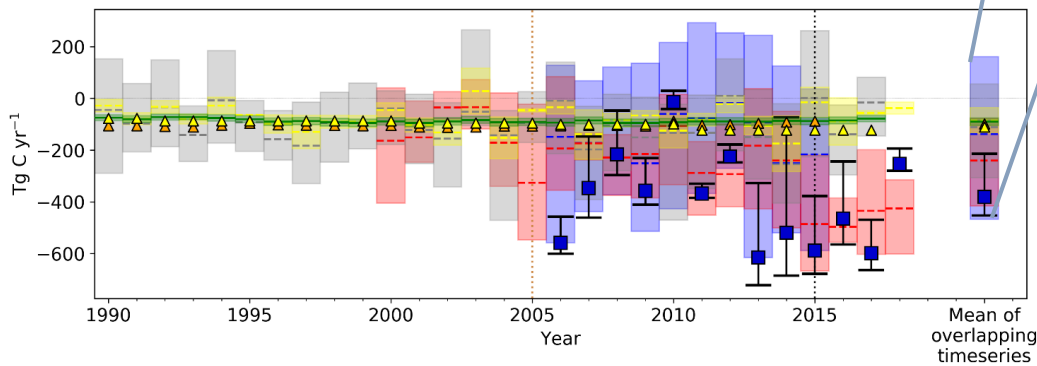
FL, CL, GL UNFCCC AND OTHER BOTTOM-UP FLUXES



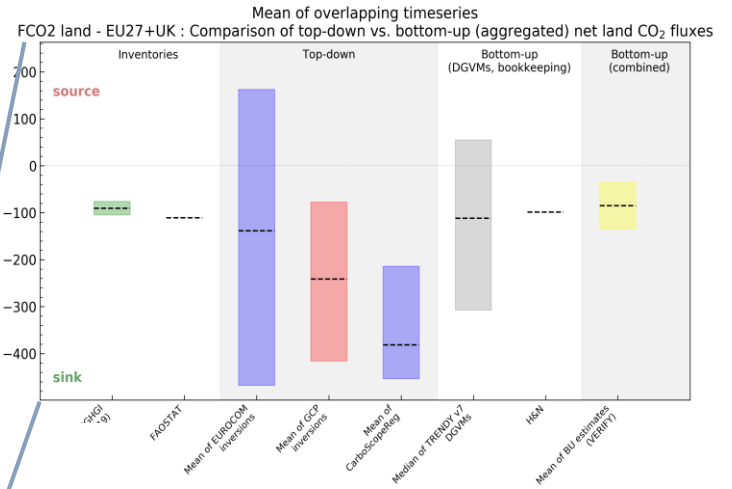


BOTTOM-UP AND TOP-DOWN CO₂ LAND ESTIMATES

Total CO₂ flux from UNFCCC, BU and TD estimates for EU27+UK



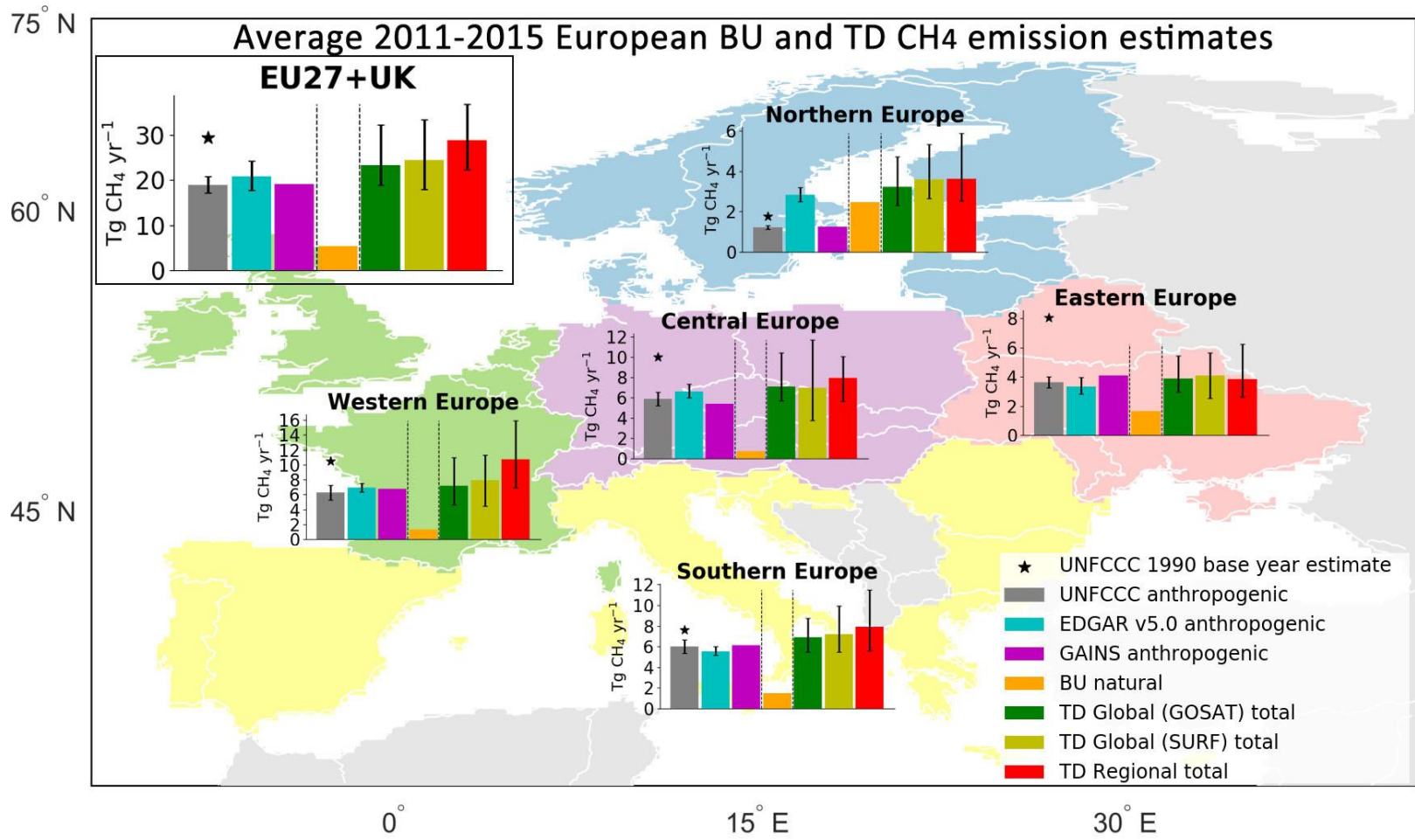
- Kyoto Protocol (entering into force)
- Paris Agreement
- UNFCCC LULUCF NGHGI (2019)
- UNFCCC LULUCF NGHGI (2019) uncertainty
- Mean of EUROCOM inversions
- Min/Max of EUROCOM inversions
- Mean of GCP inversions
- Min/Max of GCP inversions
- Mean of CarboScopeReg
- Median of TRENDY v7 DGVMs
- Min/Max of TRENDY v7 DGVMs
- FAOSTAT
- H&N
- Mean of BU estimates (VERIFY)



Overlapping period 2006-2015

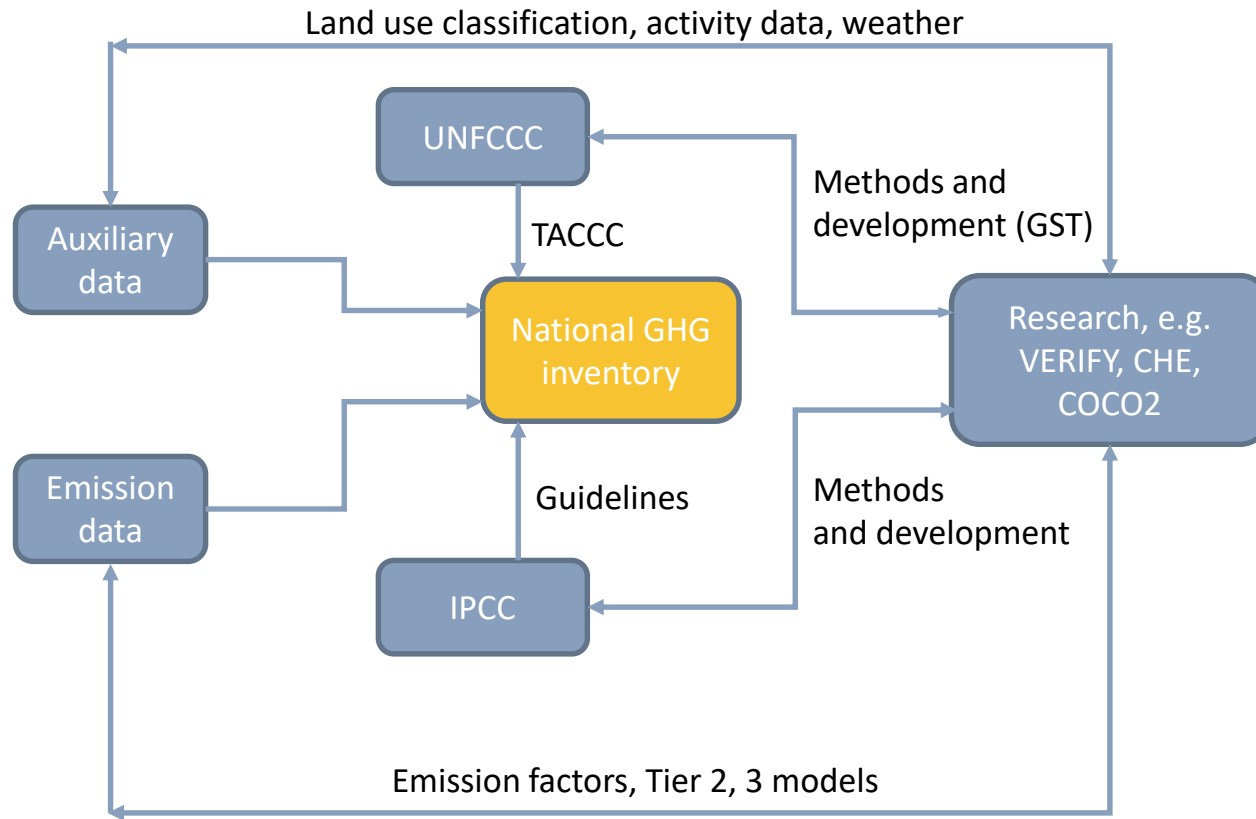
BU estimates (VERIFY) include ORCHIDEE and BLUE

CH₄ TOP DOWN AND BOTTOM UP





INVENTORIES AND RESEARCH PROJECTS





MAIN FINDINGS

- The fossil CO₂ estimates agree well at EU level, but allocation among fuel causes discrepancies
- Land CO₂ bottom-up mean agrees generally well with the UNFCCC estimates, but show larger (climate) variability (i.e. ORCHIDEE)
- The top-down ensemble estimates of CO₂ show large variability and uncertainty
- Regional EUROCOM ensemble mean seems to be the closest to the NGHGI but it shows high variability
- For CO₂ and LULUCF sector, there is the need to reduce the gap between inventories and models by defining common definitions in land use reporting



Thank you for your attention

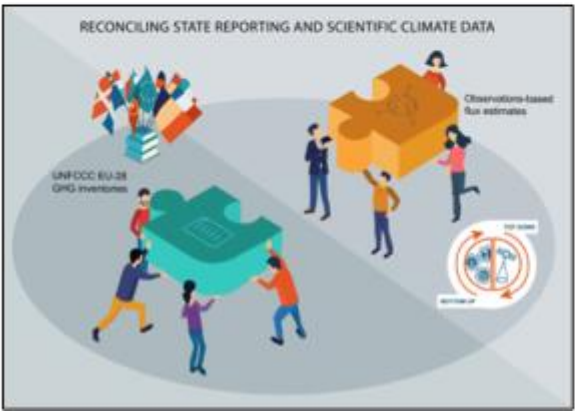
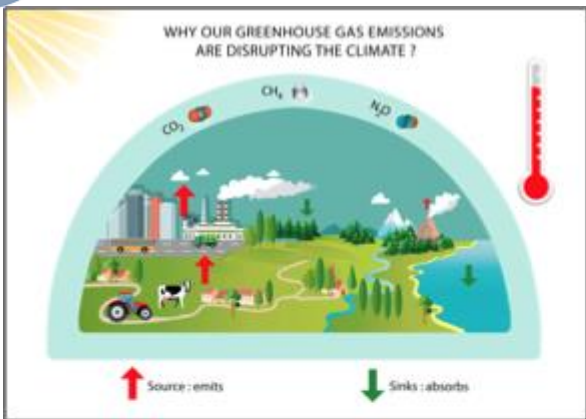
For questions/comments please send an email to:
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VERIFY: Observation-based system for monitoring - verification of GHG



- Estimate CO₂ - CH₄ - N₂O GHG fluxes at European country scales from bottom up / top down observation-based approaches
- Compare observation-based estimates with the reported fluxes by each country to UNFCCC





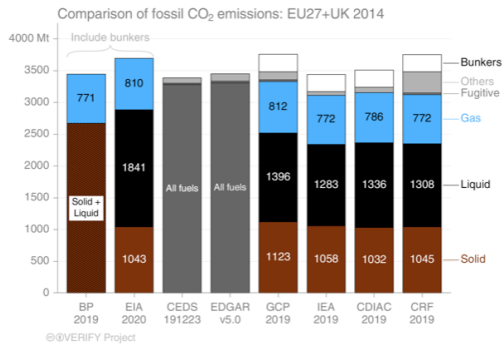
Obs - based vs UNFCCC carbon flux estimates (EU27+UK)

⇒ All country scale GHG flux synthesis (for EU) available at:

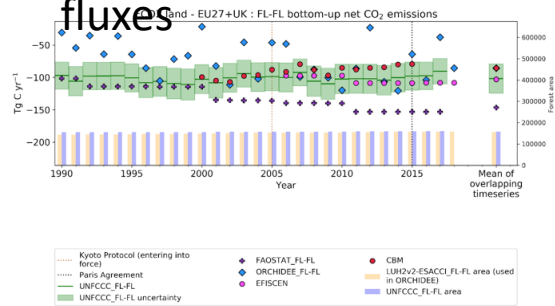
<http://webportals.ipsl.jussieu.fr/VERIFY/FactSheets/>

CO2 fossil emissions

- Differences in inventory estimates due to accounting differences

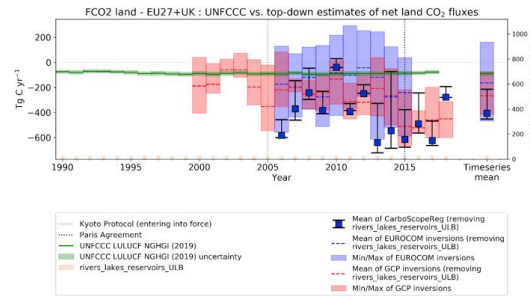


CO2 land biosphere fluxes



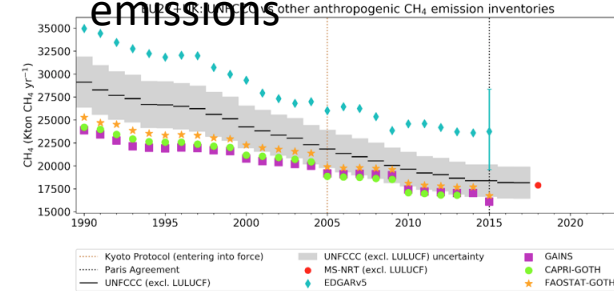
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- Process-models and inversions show larger yr-2-yr variability
- Inversions show stronger sink



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CH4 anthropogenic emissions



- Inversions show larger total emissions
- Differences due to natural sources or underestimated anthropogenic sources

