



VERIFY:

Observation-based system for monitoring and verification of greenhouse gases

Philippe Peylin, CEA-LSCE, peylin@lsce.ipsl.fr

- Consortium of 40 institutes and inventory agencies
- Budget of 10 M€ ; Period: 4 years (2018 – 2022)
- Designed to :
 - **Advance the methods** for quantifying GHG emissions and sinks
 - Facilitate the development of a GHG verification system for **practical use for policy and societal stakeholders.**

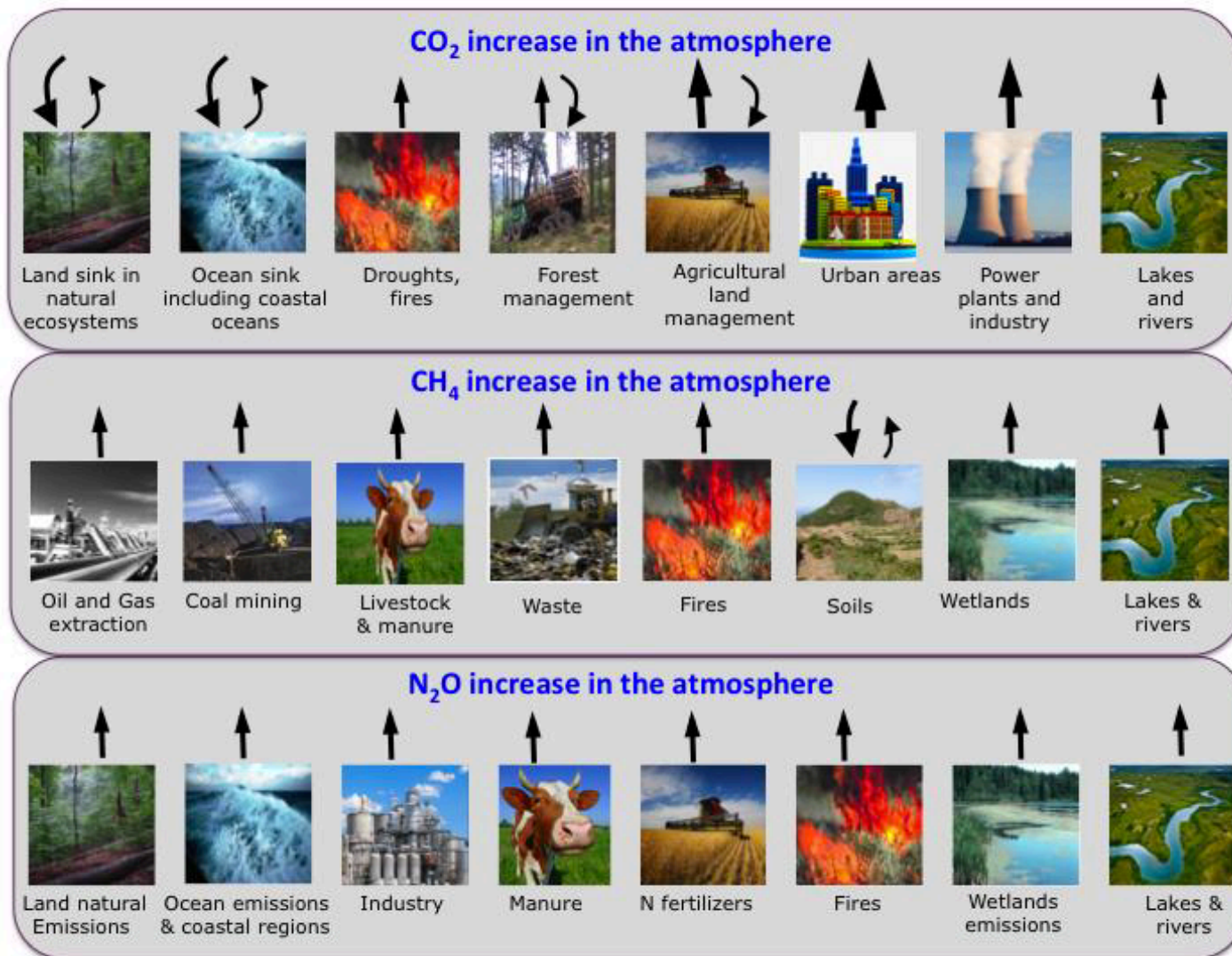
→ VERIFY develops a system to estimate GhG (CO₂, CH₄ and N₂O) to support countries' emission reporting to the UNFCCC.

The emissions are estimated based on land, ocean and atmospheric observations.

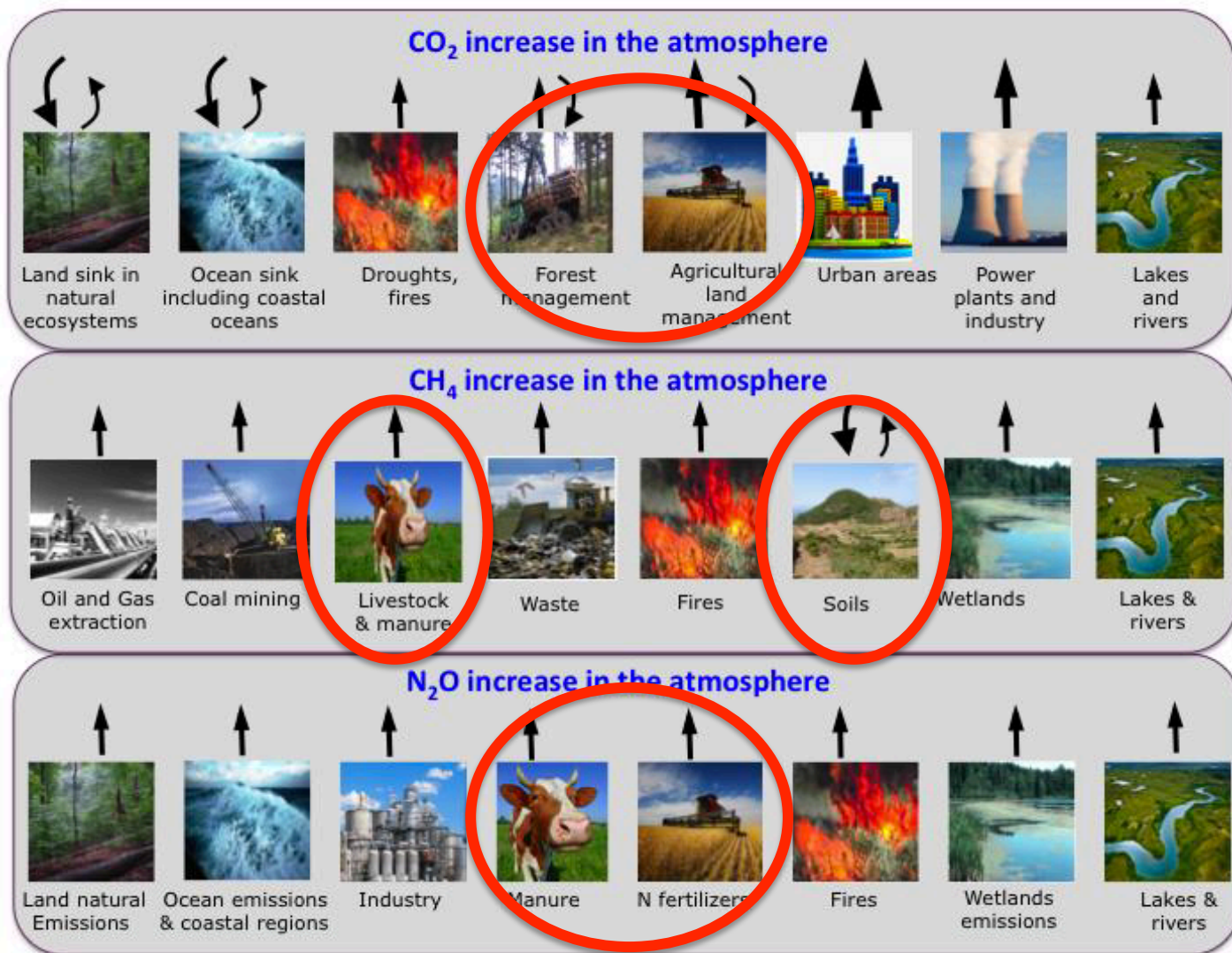
Focus on

3 GHG

- CO₂
- CH₄
- N₂O



Sources and sinks caused by different processes are **highly variable in space & time**



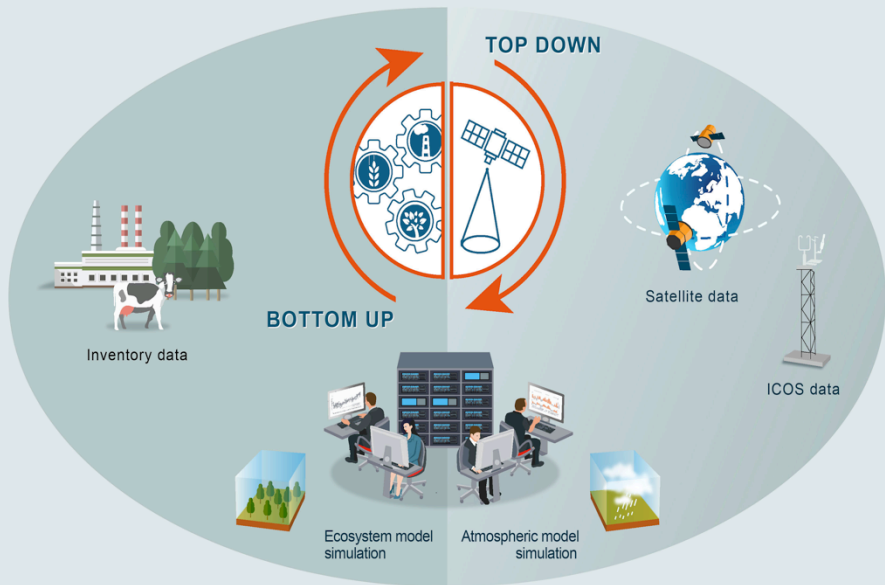
Focus on

3 GHG

- CO₂
- CH₄
- N₂O

Sources and sinks caused by different processes are **highly variable in space & time**

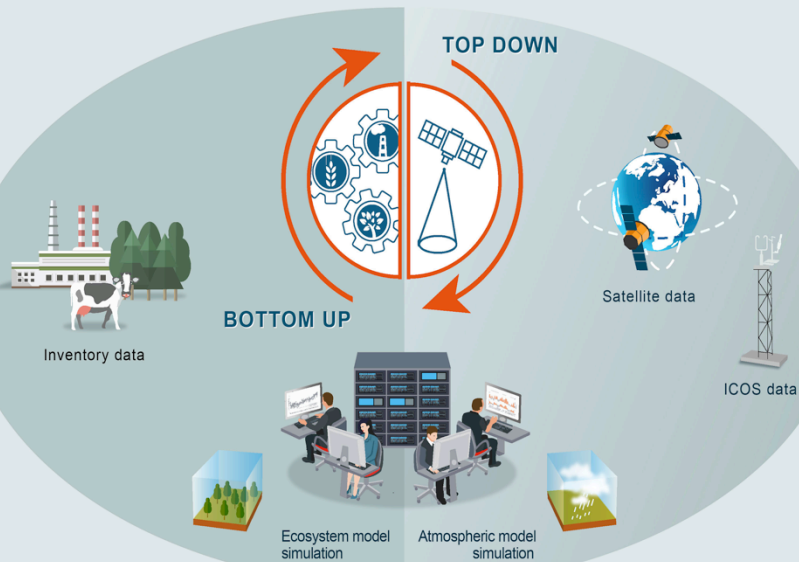
ESTIMATING GREENHOUSE GAS FLOWS



1) Estimate CO₂ - CH₄ - N₂O GHG fluxes at European country scales from bottom up / top down observation-based approaches



ESTIMATING GREENHOUSE GAS FLOWS

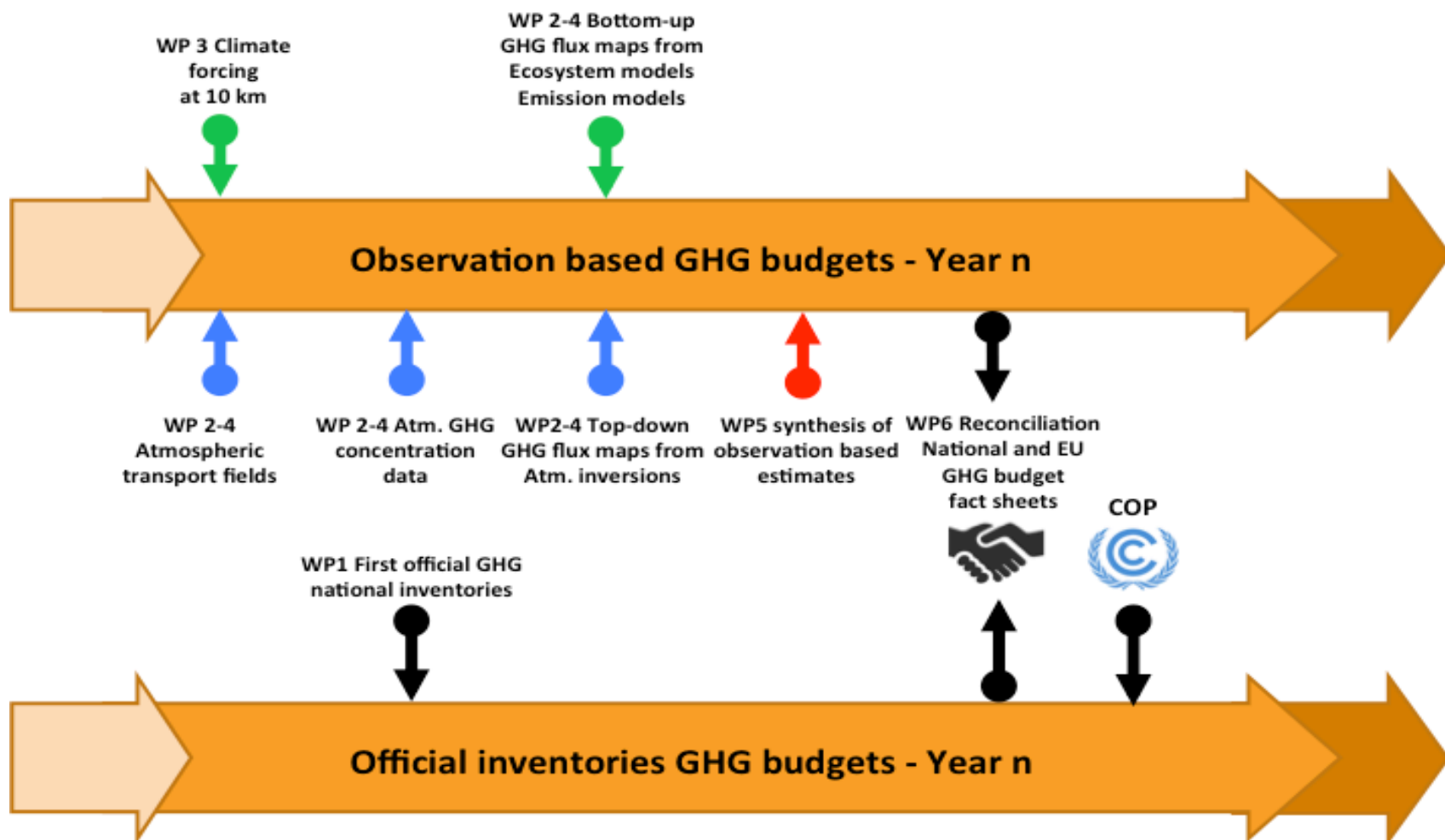


1) Estimate CO₂ - CH₄ - N₂O GHG fluxes at European country scales from bottom up / top down observation-based approaches

2) Compare observation-based estimates with the reported fluxes by each country to UNFCCC

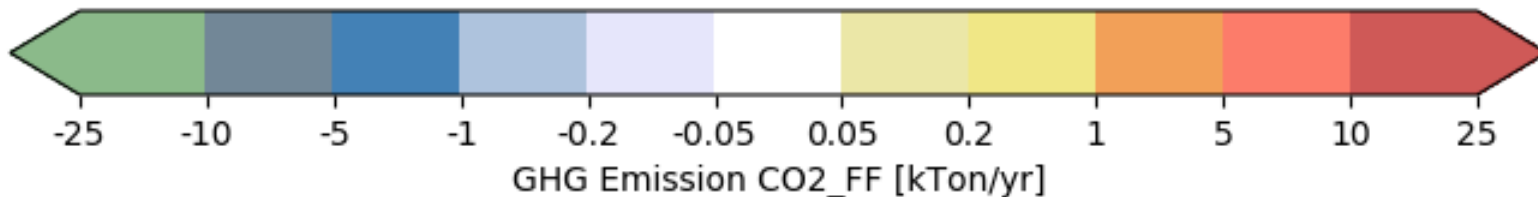
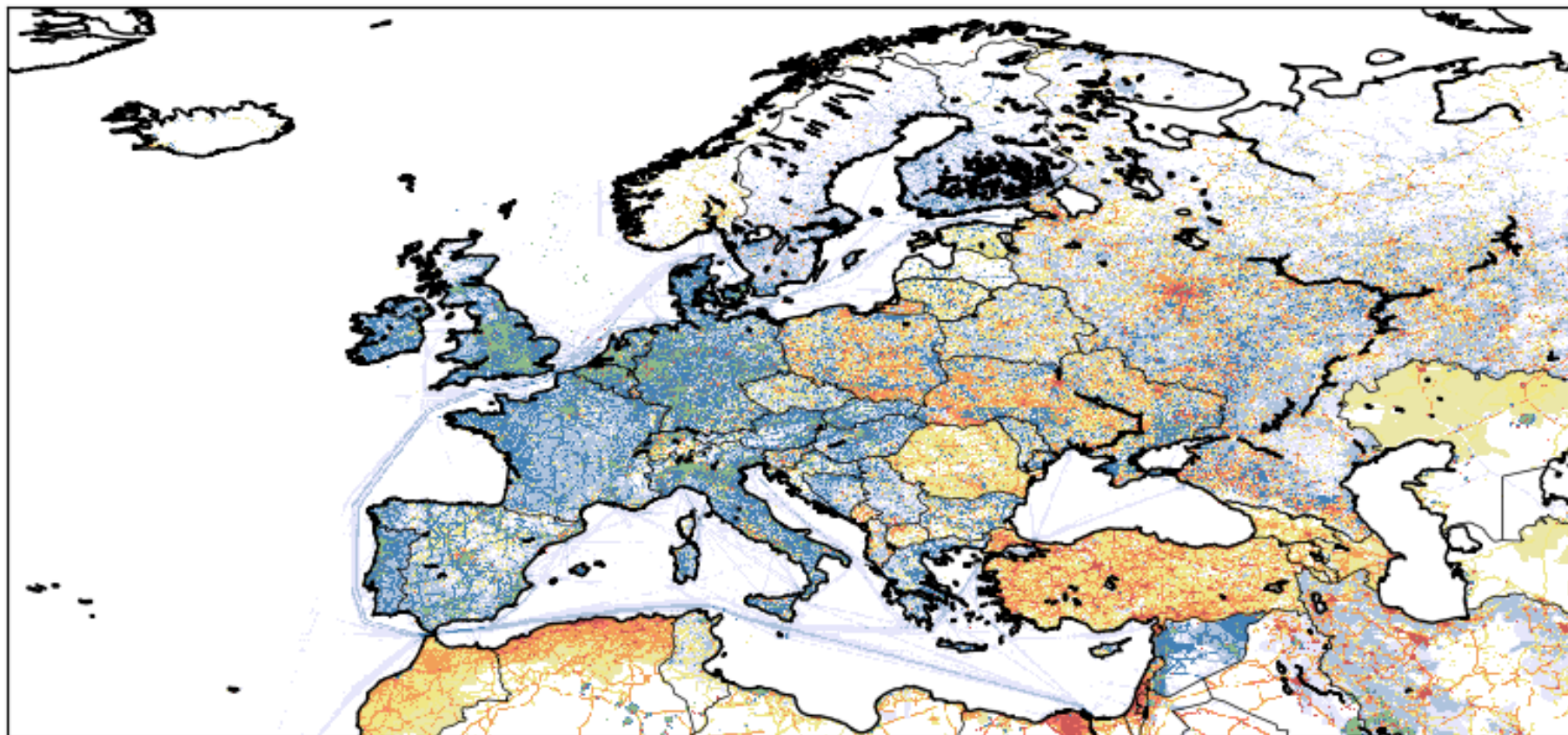
RECONCILING STATE REPORTING AND SCIENTIFIC CLIMATE DATA



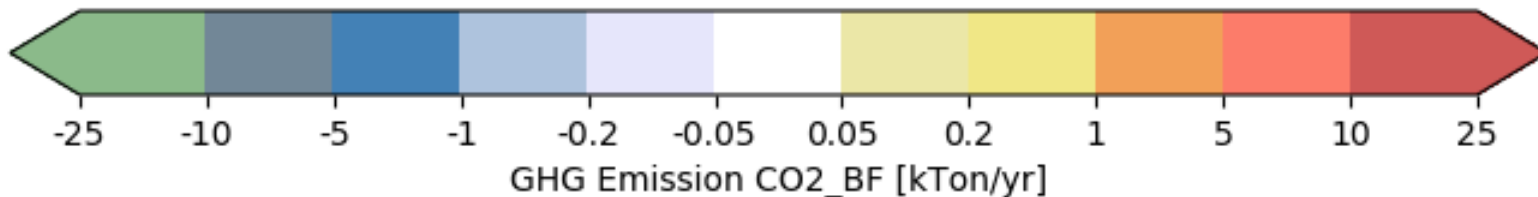
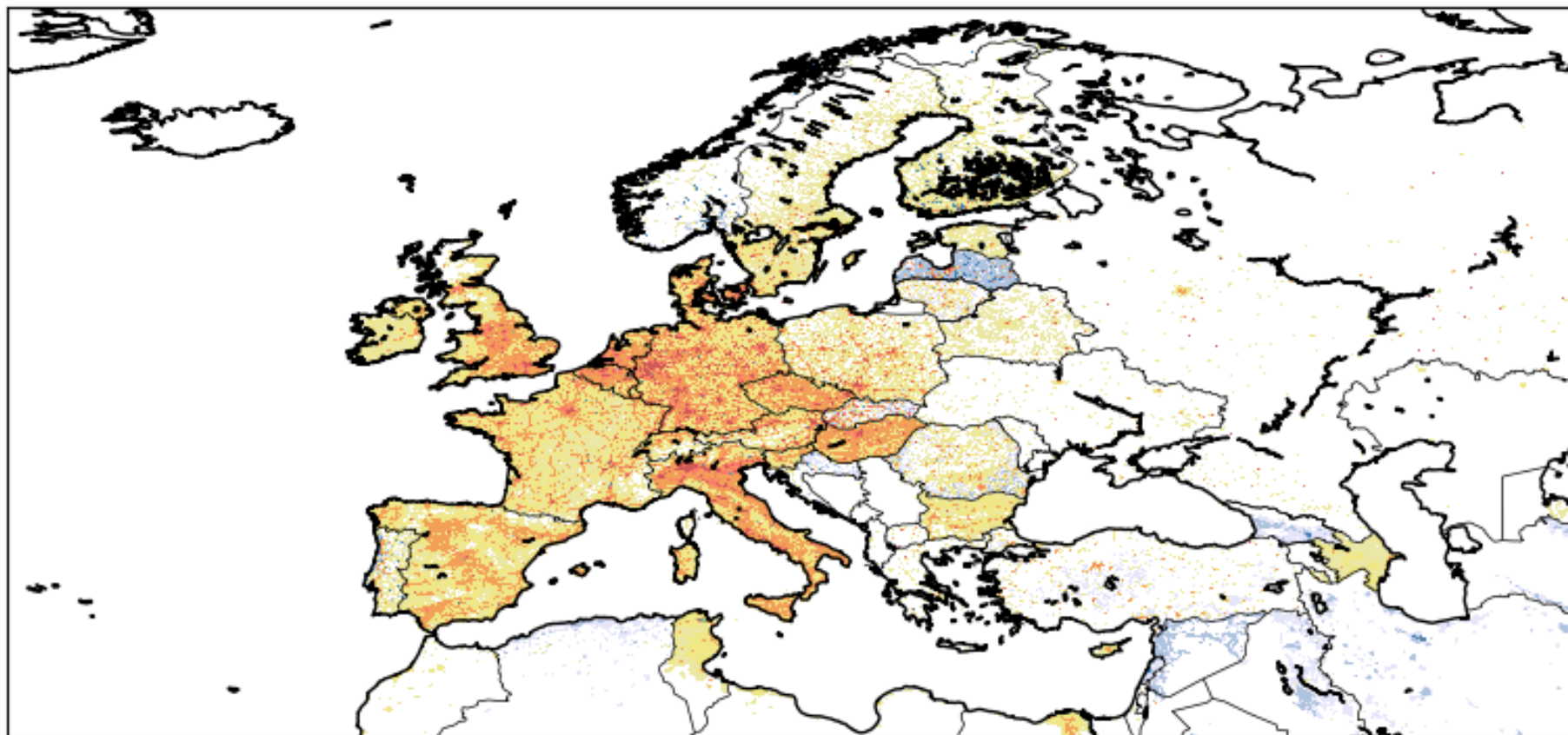


- **Annual updates** of measurement-based GHG national budgets and inventories
- Regional changes in GHG budgets and drivers and uncertainties analysis
- **Tracking progress towards EU mitigation targets (Paris Agreement NDCs, stocktake)**

Change in Fossil Fuel emission from 2005 to 2015



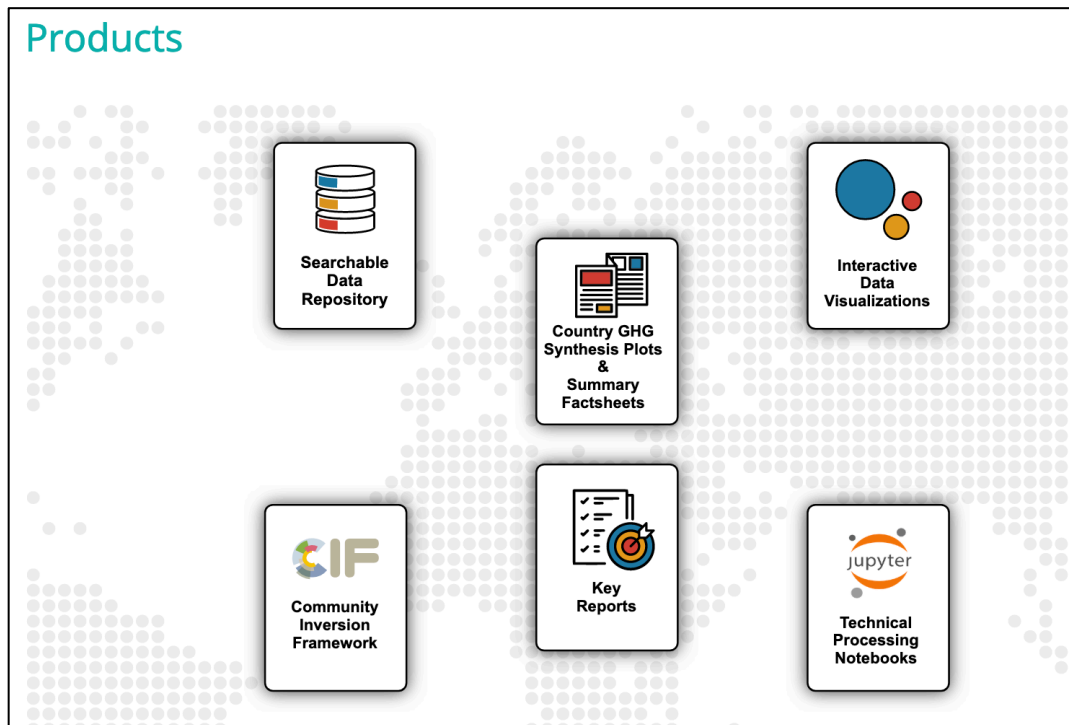
Change in Biofuel emission from 2005 to 2015



From the VERIFY web page:

<http://verify.lsce.ipsl.fr/index.php/products>

(Free registration)



- Data base with access to all gridded products
- Synthetic plots: GHG time evolution per country, including all estimates
- Key reports and factsheets
- Interactive visualisation tool



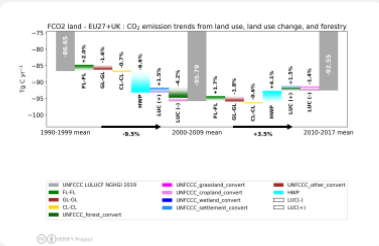
Fact Sheet - E28
November 2020

CO₂land

E28 = EU27 + UK

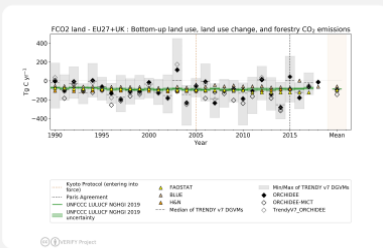


E28: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom

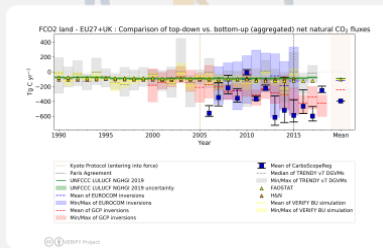


Summary of decennial trends from data reported to the UNFCCC

Carbon dioxide emissions reported to the UNFCCC from the land use, land use change, and forestry sector are a **strong sink** over the past three decades, with variation resulting primarily from harvested wood products.



Comparison between bottom-up approaches



Comparison between top-down and bottom-up approaches

Top-down and bottom-up scientific research models **agree** that the sector is a strong sink of atmospheric CO₂, showing much greater year-to-year variability than NGHGs due to **heighted response to climatic variation**.



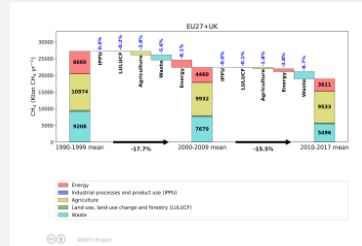
Fact Sheet - E28
November 2020

CH₄

E28 = EU27 + UK

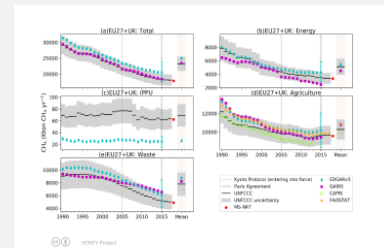


E28: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom

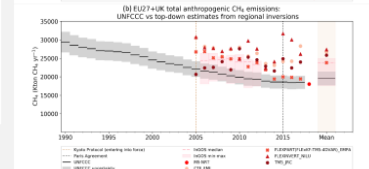
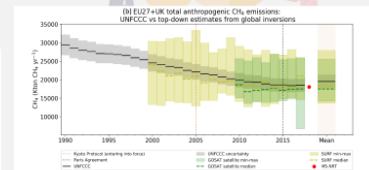


Summary of decennial trends from data reported to the UNFCCC

Methane emissions reported to the UNFCCC show a **significant reduction** over the past three decades, with reductions occurring primarily in the **waste sector** supported by smaller reductions in energy and agriculture.



Temporal evolution of sectoral emissions



Comparison between top-down and bottom-up approaches

Top-down and bottom-up scientific research models **agree** that the sector is a strong sink of atmospheric CO₂, showing much greater year-to-year variability than national greenhouse gas emissions inventories due to **heighted response to climatic variation**.

Roadmap

