EYE-CLIMA
Developing inverse modelling approaches for monitoring national GHG inventories

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SUMMARY

Countries' greenhouse gas (GHG) emissions, reported in their GHG inventories, represent the central information used in international policies based on the Paris agreement and in the Global Stocktake process to help curb global GHG emissions. Quantifying emission fluxes via atmospheric measurements and inverse modelling can help determine the quality of national inventories and provide a link between atmospheric composition and GHG emissions/removals. EYE-CLIMA aims to develop inverse modelling into a tool supporting national inventory agencies.

OBJECTIVES

1. Develop the **atmospheric inversion methodology** to operationally support National Greenhouse Gas Inventories (NGHGIs).
2. Establish **guidelines** on how to perform atmospheric inversions and evaluate the results.
3. Better understand the **needs of NGHGI compilers** by working together in pilot projects.
4. Develop methodologies to **detect and quantify large emissions of CH_4** using high resolution satellite data.
5. Improve estimates of **CO_2 land biosphere fluxes** and emissions and removals of CO_2 in the LULUCF sector.
6. Support the **implementation and monitoring of EU policy** through providing accurate estimates of GHG fluxes and BC emissions.
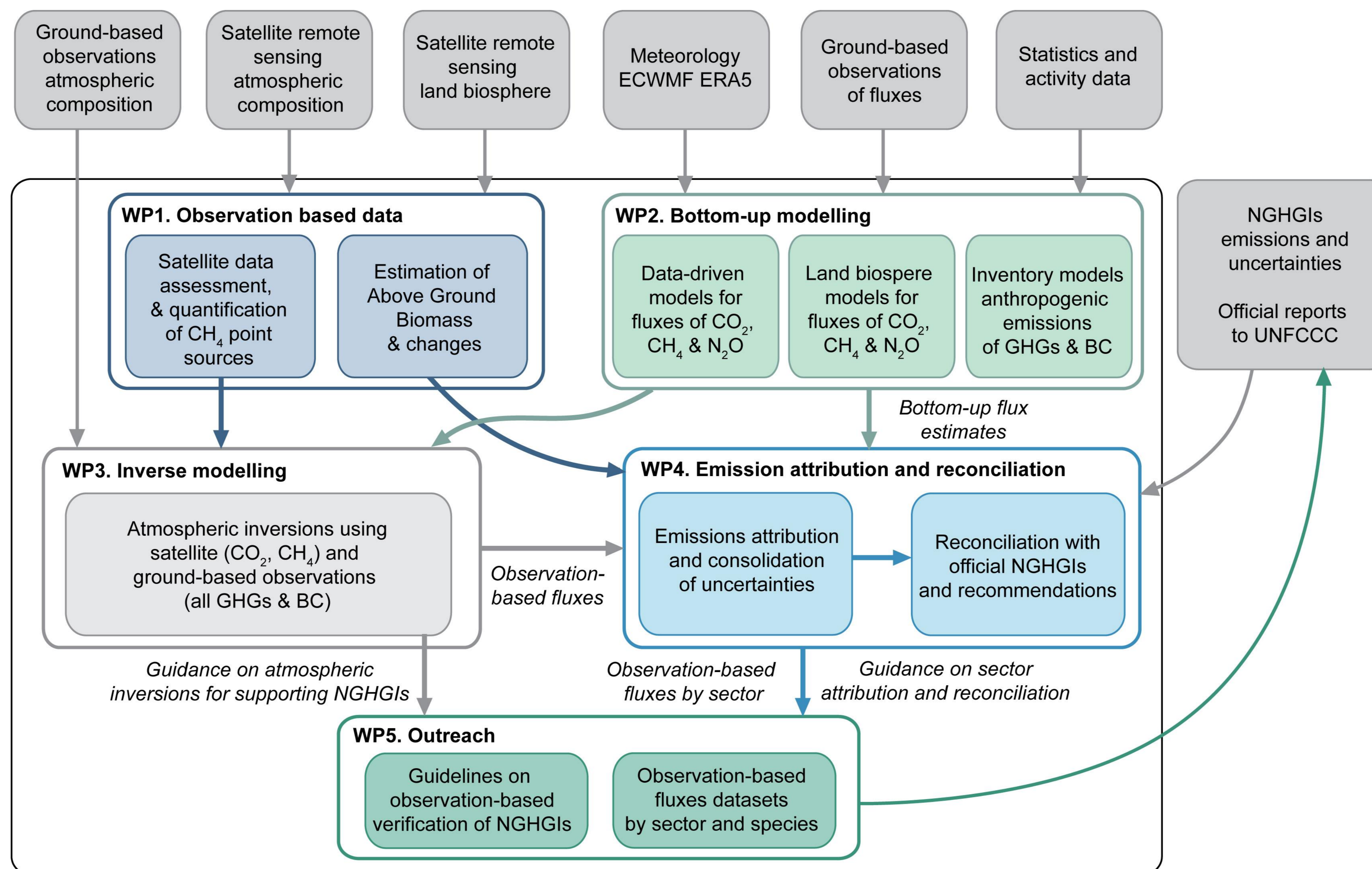7. Disseminate **methodology towards application** by NGHGI compilers

Figure 1: EYE-CLIMA Work Package Structure – a blueprint for a GHG emission verification system

PROJECT FOCUS

CO_2, CH_4 and N_2O fluxes focusing on the land-use, land-use change and forestry (LULUCF) sector as well as on energy, agriculture and waste sectors. Selected F-gases (SF_6, HFC-23, HFC-143a, HFC-125, HFC-134a, and HFC-32), and Black Carbon (BC).

Regional focus on Europe (EU27 plus Switzerland, Norway and UK = EU27+3)

INNOVATIONS

Use of hi-res satellite instruments for CH_4
Develop a preoperational system for estimating emissions from mega-emitters for NGHGIs.

Black Carbon
Use inversions to estimate BC emissions and attribute to two main source categories.

Data-driven estimates of LULUCF fluxes
Estimate CO_2 fluxes from forests using satellite remote sensing of above ground biomass and compare with inversion estimates derived from atmospheric CO_2 mixing ratios.

Atmospheric inverse modelling
Improve accuracy and resolution of regional inversions with error propagation towards a a more complete posterior flux uncertainty estimate.

OUTREACH AND PRODUCTS

For scientists
- Gridded emission (and uncertainty) maps at 0.2° and monthly resolution for Europe from 2018 (and at 0.5° and monthly from 2005).
- National emission estimates and uncertainties for EU27+3. For CH_4 these will separated into broad source categories.
- Best practice guidance (and code) for atmospheric inversions

For policy makers
- Two Progress on Targets Reports based on inverse modelling results, harmonized with the Global Stocktake 2023 and with the COP meeting 2026.
- Dedicated policy meetings to elucidate these reports

For NGHGI compilers
- Guidelines on use of inversion estimates for supporting NGHGIs (published with IG³IS)
- Training about the atmospheric inversion method and how to use EYE-CLIMA products for supporting NGHGIs.

FURTHER INFORMATION

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Consortium: 17 partners in 8 countries

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