Co-ordinated by ECMWF

CoCO2
Prototype system for a Copernicus CO_2 service

1ST GENERAL ASSEMBLY

WP8 (User Engagement)

Glen Peters, Richard Engelen, Roxana Petrescu, Robbie Andrew, Carla Marino, Sander Houweling, and Han Dolman

16-18 November 2021, online

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 958927.

Task and deliverable overview

- **T8.1 Production of consistent estimates of emissions of CO_2 and CH_4 (VUA)**
  - D8.1 (M12), D8.2 (M24), D8.3 (M36) – Report (with updates)
- T8.2 Blueprint for a decision support system (CICERO)
  - D8.4 (M24), D8.5 (M30) – Decision Support Blueprint
- **T8.3 Engagement with user communities (JRC)**
  - D8.6 (M24) – Hot spot catalogue of studies
  - D8.7 (M12), D8.8 (M36) – Engagement & Implementation Plan
- T8.4 Priority needs for national inventory-based reporting (ECMWF)
  - Ensure a smooth transition of VERIFY activities into CoCO2
  - More information in WP6 and on Thursday

T8.1: Preliminary results on the first report on GHG budget estimates (D8.1)

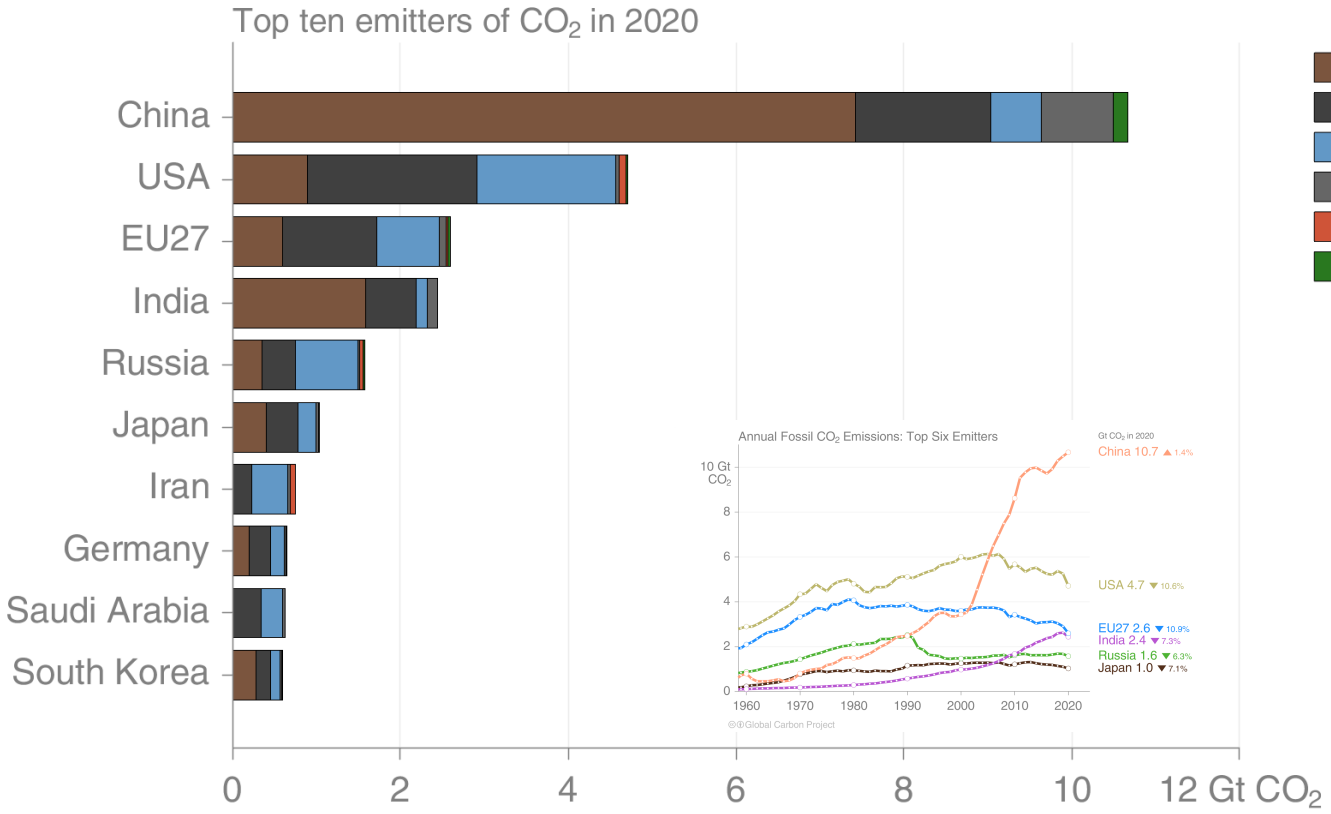
Aim:

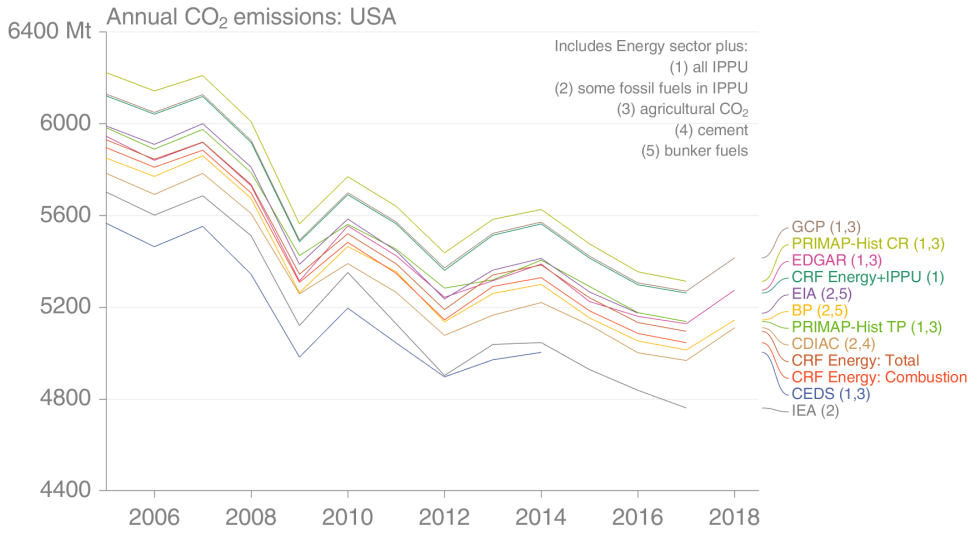
Production of consistent estimates of emissions of CO_2 and CH_4, with reference to UNFCCC. Detailed estimates will be produced for the top 10 emitters (i.e., US, China, India, Brazil, ...) and countries within the EU-27:

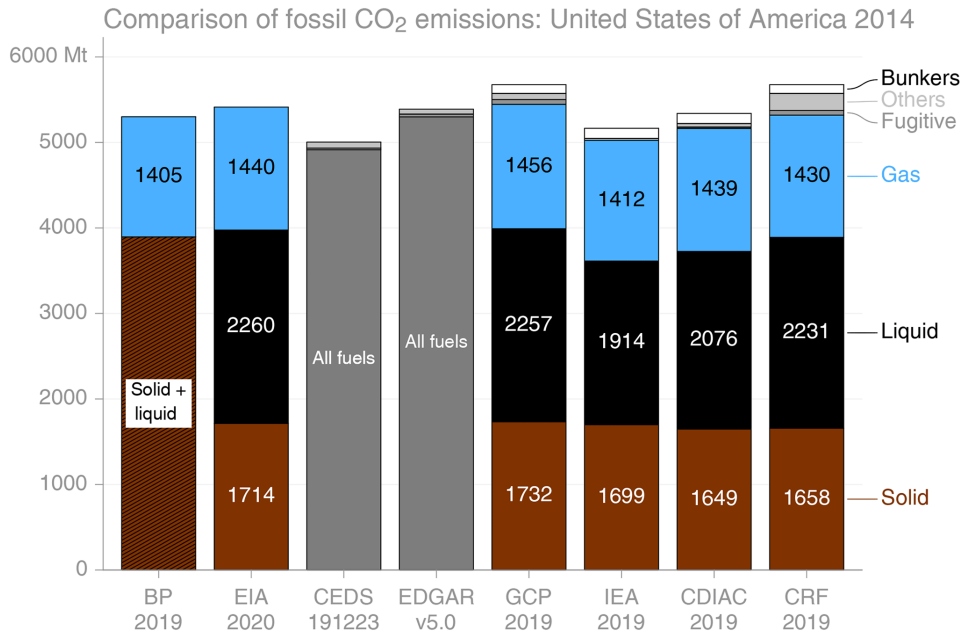
- CICERO is responsible for the fossil fuel emission estimates.
- VUA is responsible for the AFOLU estimates of CO_2 and CH_4 and the development and streamlining of the workflow in $CoCO_2$ to produce the relevant data

Washington Post

Top 10 from fossil CO_2 emissions

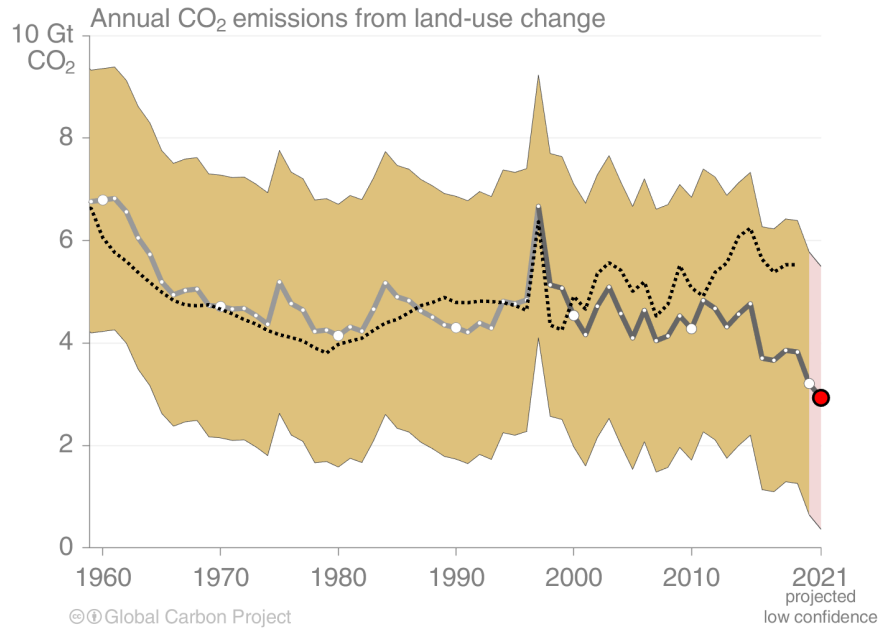


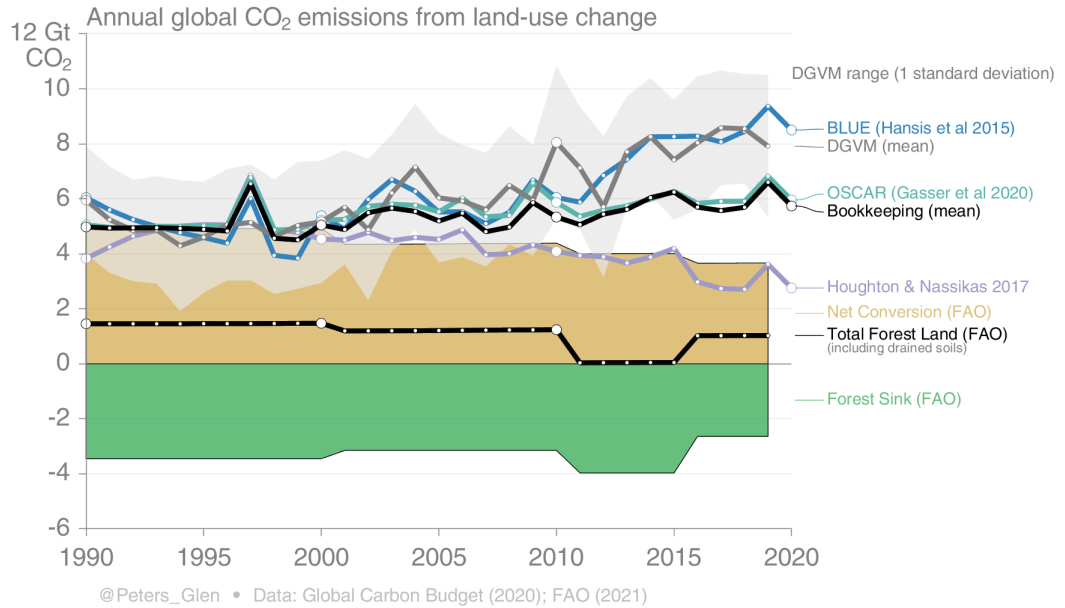


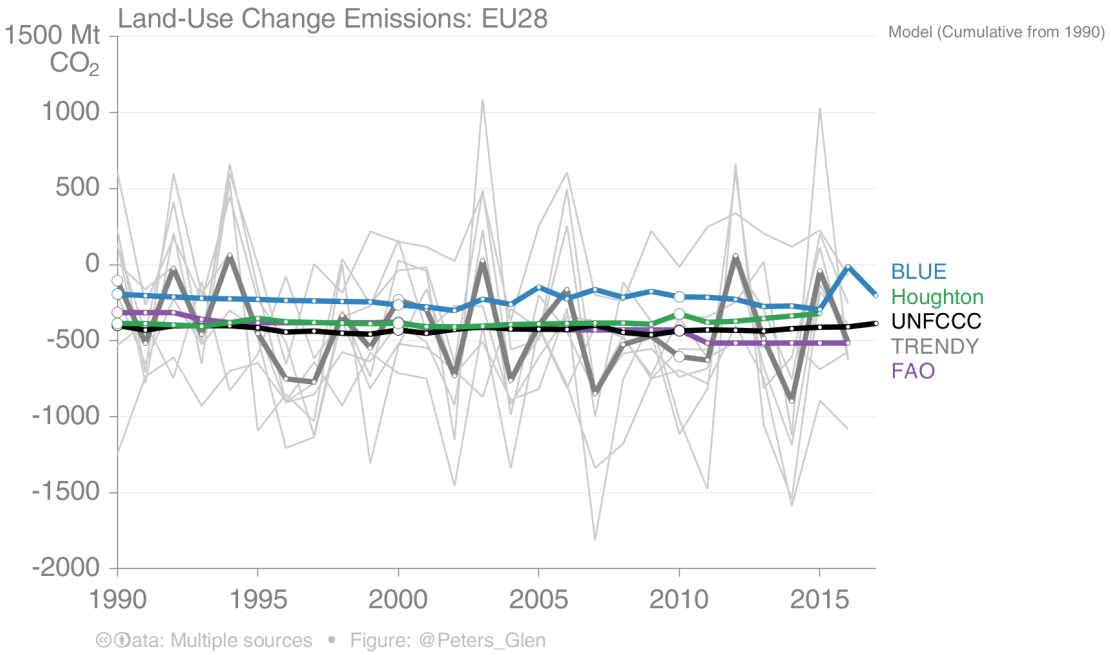


Why are estimates different?
What is the data situation / quality?
What are the trends?
(also stocktakes, 5 year periods)

Top 10 from LULUCF CO_2 emissions



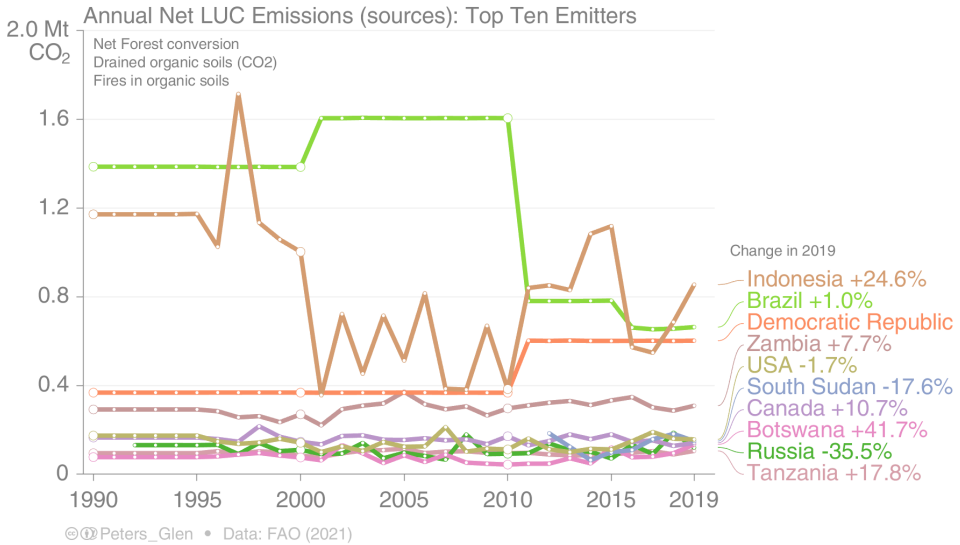


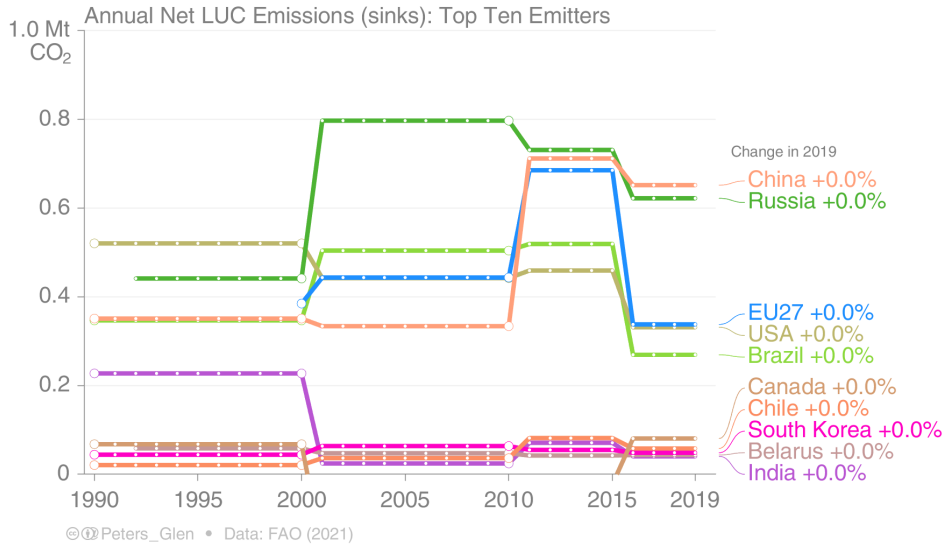


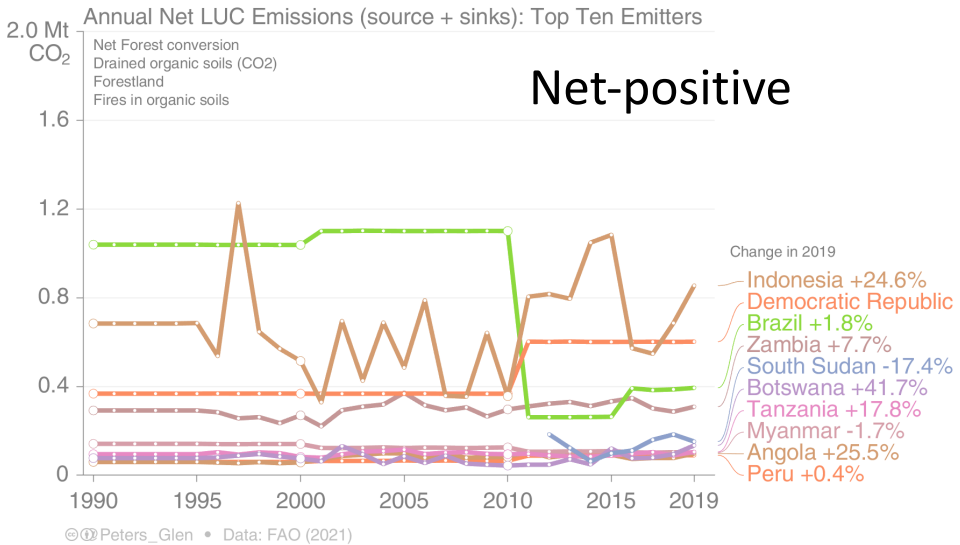
No simple comparison:

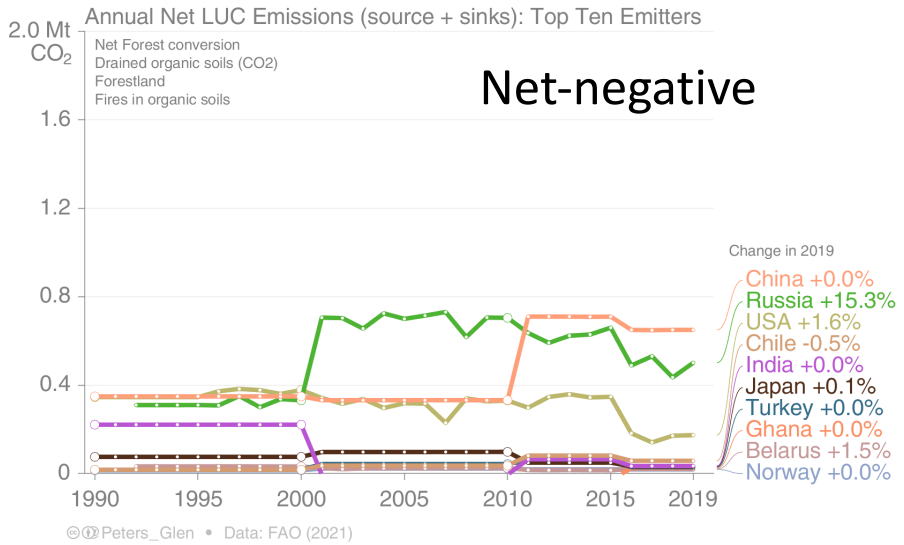
- Significant updates in 2021…
- How is LULUCF defined?
- Dealing with variability?
- Country rankings highly uncertain…

Top 10 from LULUCF CO_2 emissions – FAO

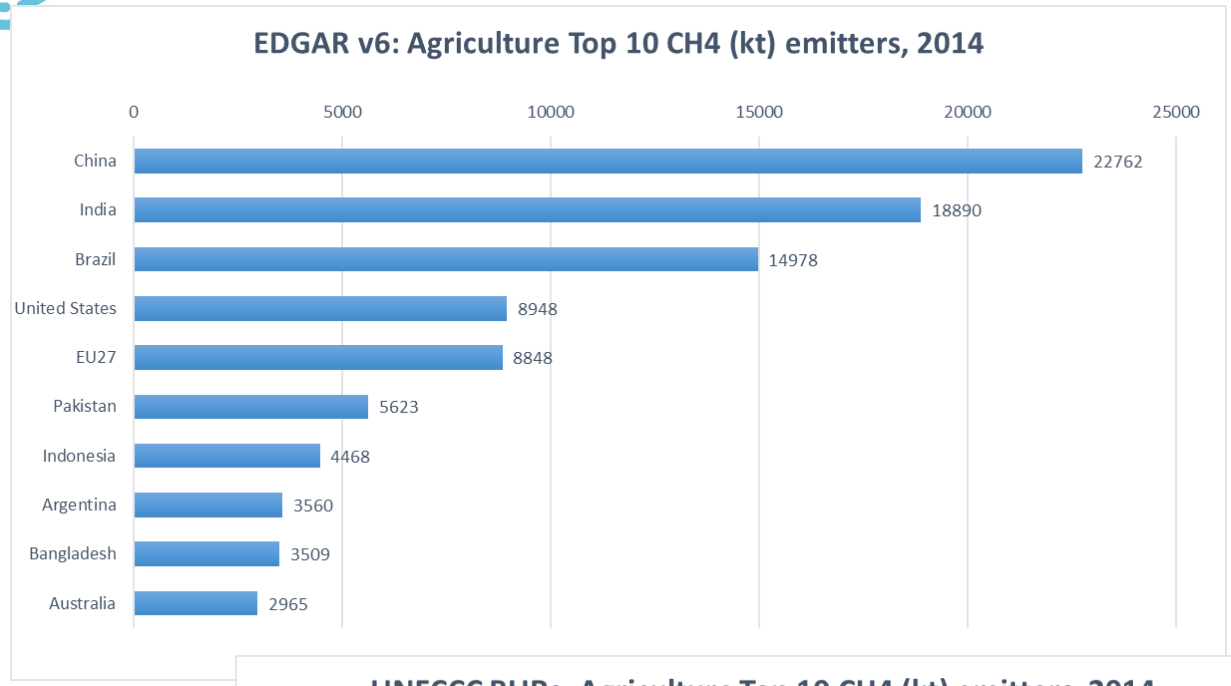


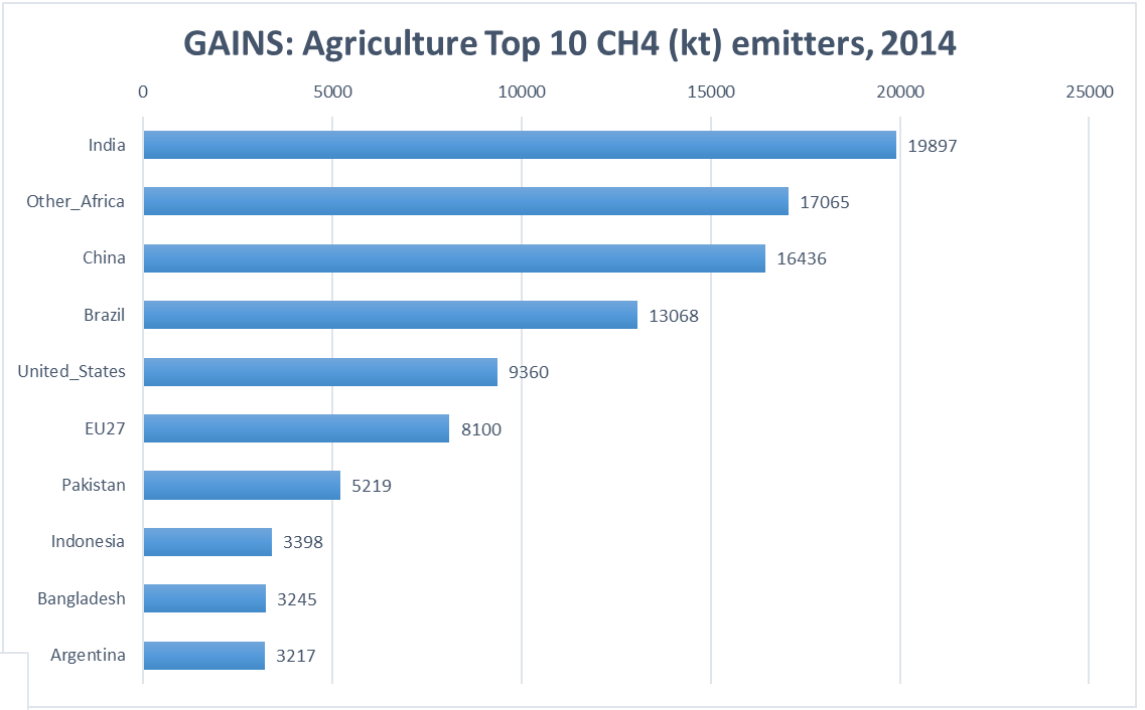


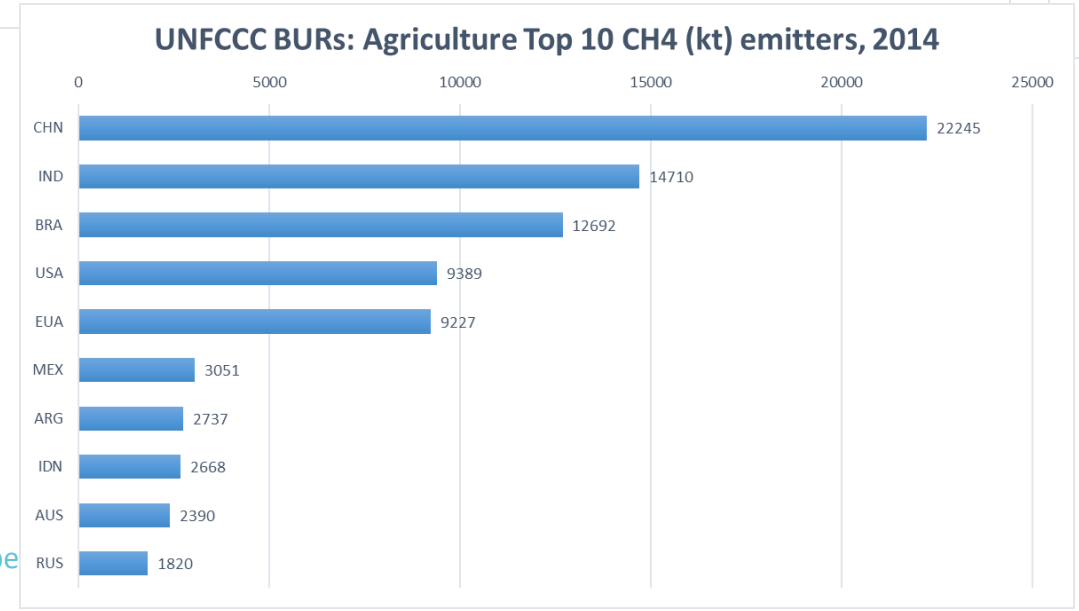




Agriculture CH_4 top 10 ranking: EDGAR v6.0, GAINS and UNFCCC BURs/BRs - 2014

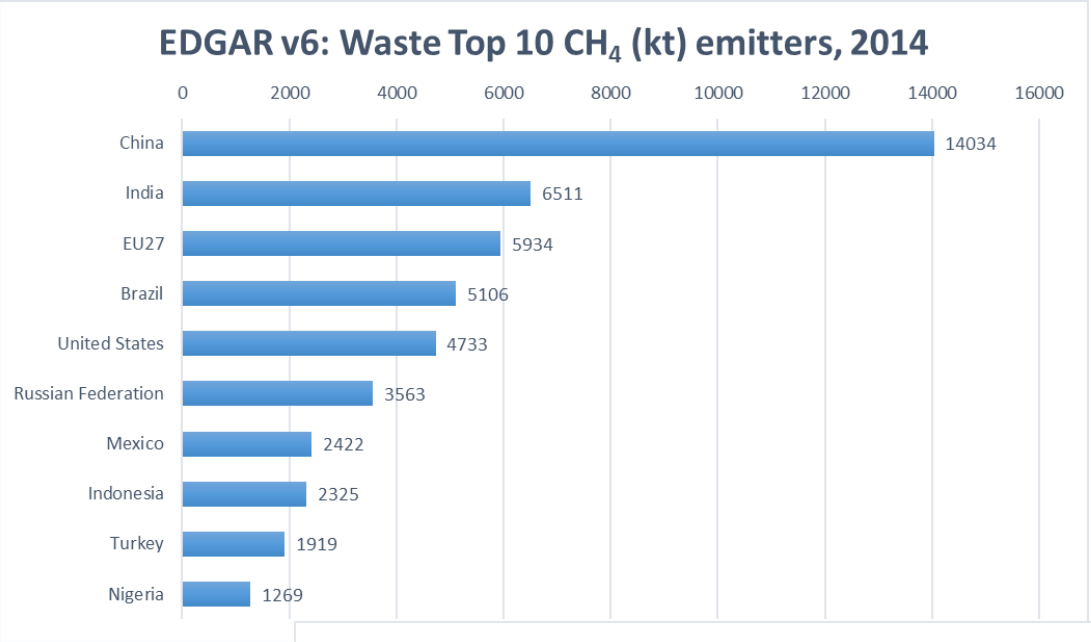


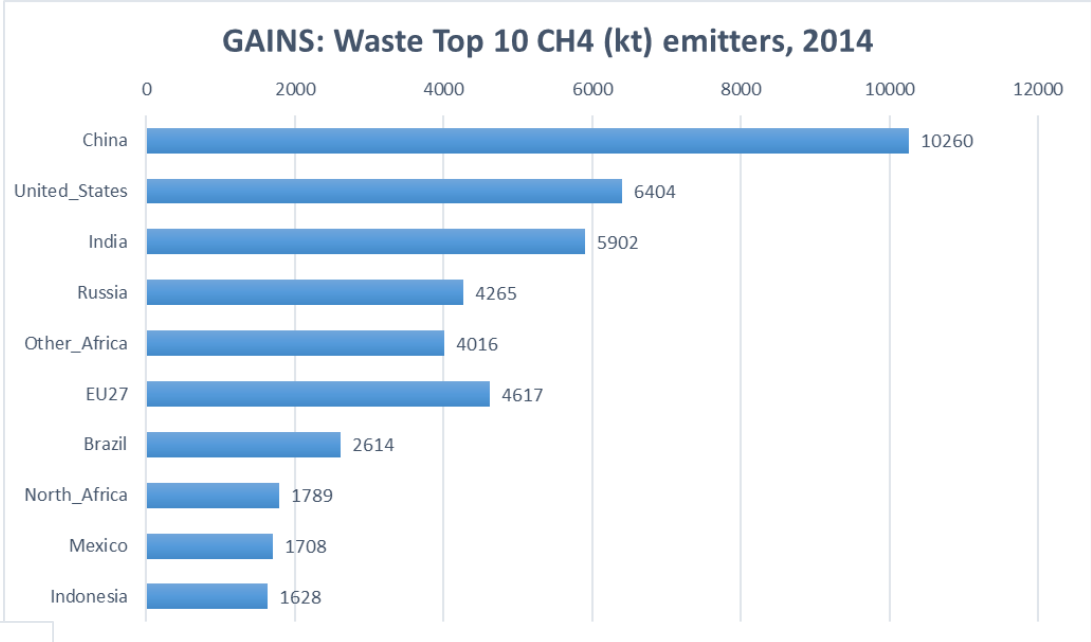


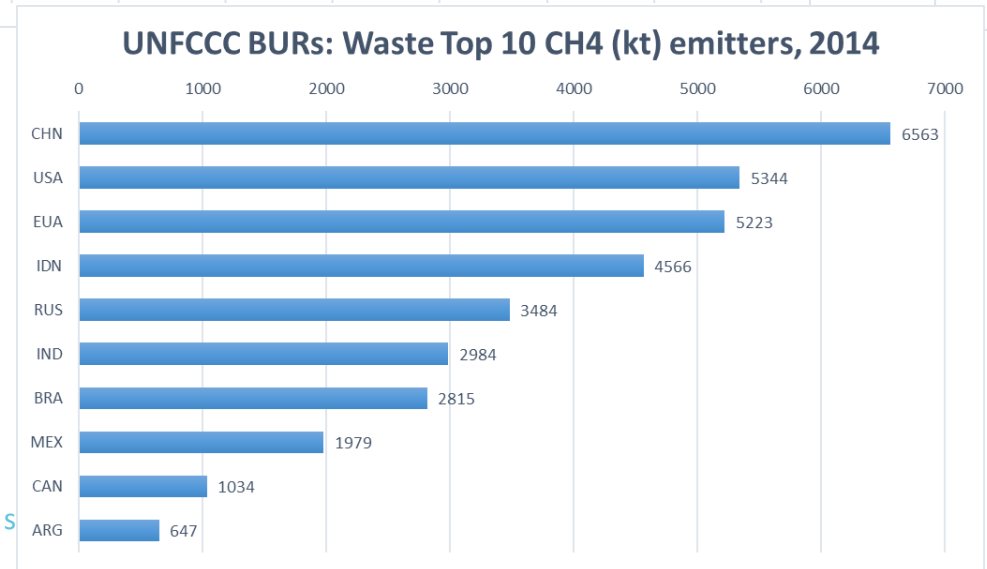


UNFCCC BURs data from Zhu Deng et al., 2021
https://essd.copernicus.org/preprints/essd-2021-235/

Waste CH4 top 10 ranking: EDGAR v6.0, GAINS and UNFCCC BURs/BRs - 2014







UNFCCC BURs data from Zhu Deng et al., 2021
https://essd.copernicus.org/preprints/essd-2021-235/

T8.3 Engagement with user communities (policy, industry and others)

- First workshop with stakeholders (with ICLEI)
  - “How can atmospheric observations support city scale GHG inventories?”
  - Virtual, 6 October 2021
  - Presentation from ICLEI (Carla Marino)

- A catalogue of published studies on hot spot detection of emissions for CO_2 (cities, powerplants) and CH_4 (gas leaks etc)
  - Presentation from Roxana Petrescu

- Active in various events:
  - COP26 side events, Earth Information Day, various meetings, etc
  - Need more engagement with UNFCCC, IPCC, GEIA, UNEP, etc

1st User consultation workshop

"How can atmospheric observations support city scale GHG inventories?"

Summary and outcomes

Carla Mariño

ICLEI World Secretariat

Summary of program

- October 6th, virtual format.
- ECMWF: relationship between earth observations and estimation of anthropogenic emissions.
- City of Quezon, Philippines: city's 2016 GHG inventory.
- ICLEI: issues around data quality and availability for the estimation of community-level GHG inventories.
- Vrije Universiteit Amsterdam: hot spot detection, activities and locations for CO_2 and CH_4 emissions. Case studies.
- CICERO: discussion.

Interim conclusions

- Reporting of city GHG inventories (GHG, sectors): responds to reporting frames and international climate initiatives.

- Local and regional governments currently have looked into different approaches to overcome the lack of data or access to data: scaling down national/regional data, data exchange arrangements to support the collection of data from different stakholders.

- Current approaches used to overcome lack of data: might not always be appropriate at the local level.

Further discussion needed

Potential data needs and considerations

- Need to have estimates on data from more recent years.

- Limitations/implications of data estimates that focus on Scope 1 emissions: control over emissions and relevance of GHG inventories to address local and regional level complexities. Complementary approach.

- AFOLU: increasing interest but somewhat limited potential at the local level.

Further discussion needed

Application

- Can emissions from observations be matched with GHG inventory emissions from a few years ago to support policy implementation?
- Help understand the relationships between activities and emissions, and to model effective climate action planning.
- Engage the urban population by informing them about local climate action impacts.
- What are the challenges associated to tracking policy progress using GHG inventories.
- Are there any anticipated risks emerging from using fast-track GHG inventories?
- *What sort of tool will the CoCO2 project develop?*

D8.6: Engagement with user communities (policy, industry and others)

Compilation of a catalogue of published studies on hot spot detection of emissions for CO_2 (cities, power plants) and CH_4 (gas leaks etc.) to assist at local scale cities and regional councils in implementing plans for CO_2 emission reductions.

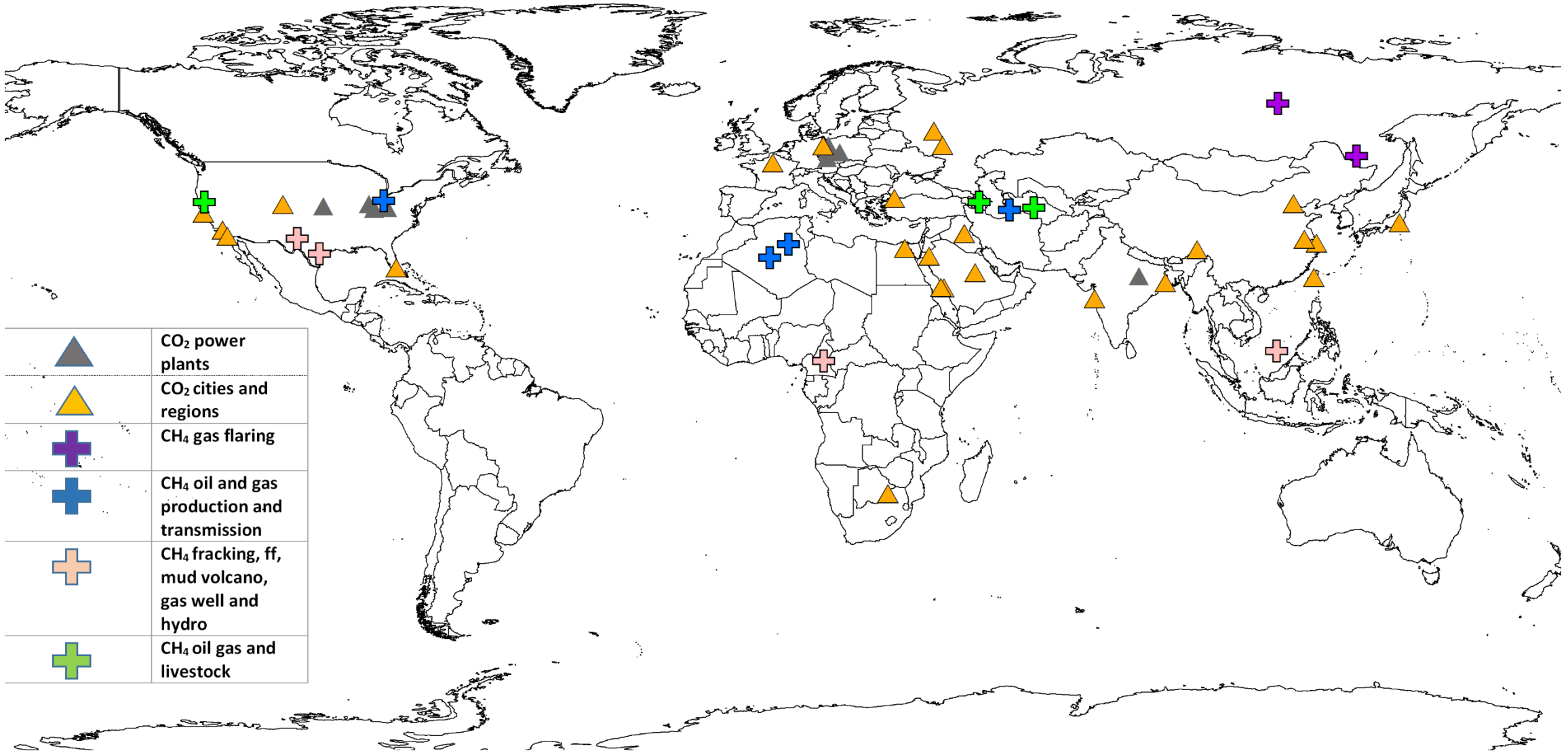
Background information

Hot spot detection of emissions uses independent satellite observations

(*e.g. Orbiting Carbon Observatory-2 (**OCO-2**) for CO_2, Sentinel-5 Precursor **(S5P)** for NO_2, Greenhouse gases Observing SATellite **(GOSAT)** CO_2 and CH_4, TROPOspheric Monitoring Instrument (**TROPOMI)** for CH_4 and N_2O, **GHG-Sat, PRISMA, SCIAMACHY/ENVISAT** and **TANSO-FTS/GOSAT** for CH_4, Sentinel 2 Multi Spectral Instrument **(MSI)** for CH_4)*

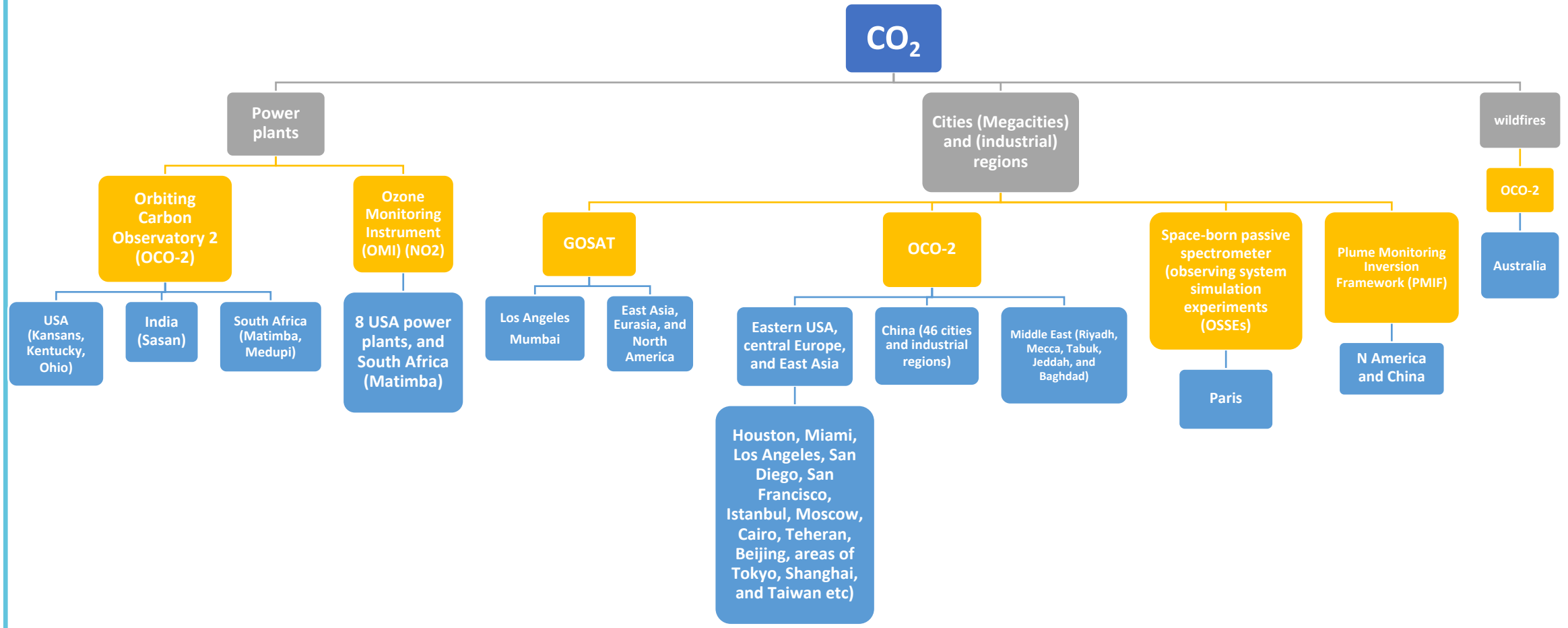
to evaluate the inventory representations of emissions with help from transport models **(e.g. X-STILT, COSMO-GHG)** to account for atmospheric transport and link emissions to observations.

Mapping of some existing studies on hot-spot GHG detection



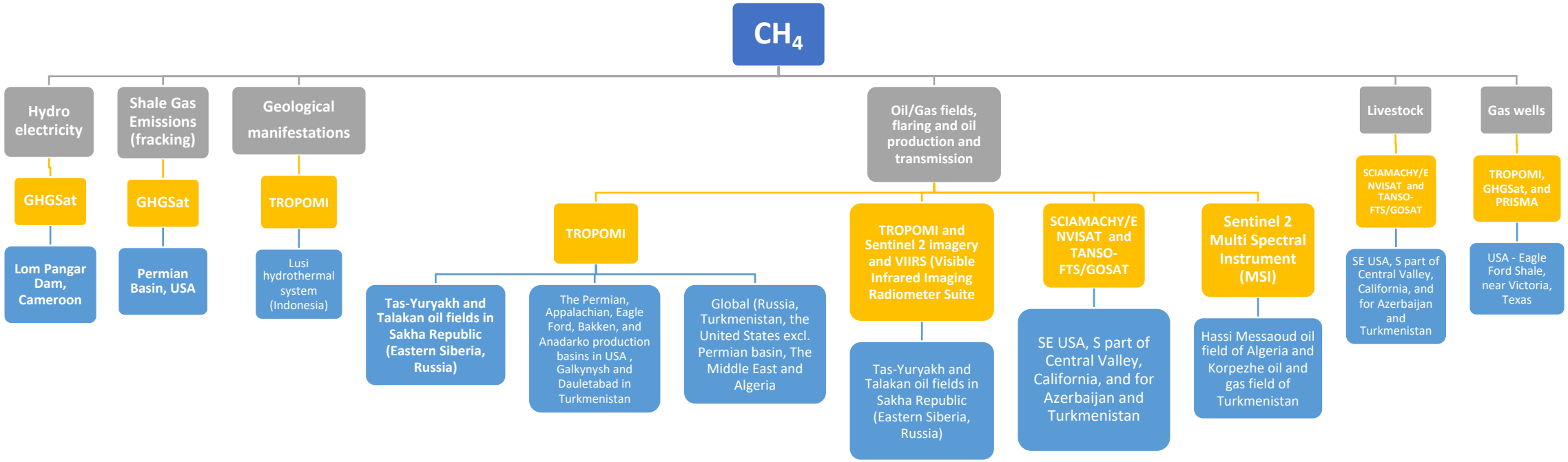
Preliminary results CO_2 hot spot detection

Representation of CO_2 activities detected by satellites and their locations



Preliminary results CH_4 hot spot detection

Summary of CH_4 activities detected by satellites and their locations



Task and deliverable overview

- **T8.1 Production of consistent estimates of emissions of CO_2 and CH_4 (VUA)**
  - D8.1 (M12), D8.2 (M24), D8.3 (M36) – Report (with updates)
- T8.2 Blueprint for a decision support system (CICERO)
  - D8.4 (M24), D8.5 (M30) – Decision Support Blueprint
- **T8.3 Engagement with user communities (JRC)**
  - D8.6 (M24) – Hot spot catalogue of studies
  - D8.7 (M12), D8.8 (M36) – Engagement & Implementation Plan
- T8.4 Priority needs for national inventory-based reporting (ECMWF)
  - Ensure a smooth transition of VERIFY activities into CoCO2
  - More information in WP6 and on Thursday

Thanks for your attention!!!

CoCO2

Prototype system for a Copernicus CO_2 service

With support from:

CO2 Monitoring Task Force

External Expert Group

Inventory Agency Advisory Board

CoCO2 reviewers

REA

Period: January 2021 – December 2023