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U.S. DEPARTMENT OF COMMERCE



EPA Contributions to the U.S. GHG Center

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CMS Policy Speaker Series
February 20, 2024

A satellite view of Earth from space, showing the Western Hemisphere. The image is partially obscured by a large, dark blue circular graphic on the left side. The text 'Outline' is written in white on the blue background.

Outline

- GHG Inventory Background
- EPA perspective on initial three Use Cases
- EPA contributions to UC 1 & Demo

Background – U.S. GHG Inventory

Inventory of U.S. Greenhouse Gas Emissions and Sinks (U.S. GHGI)

What?

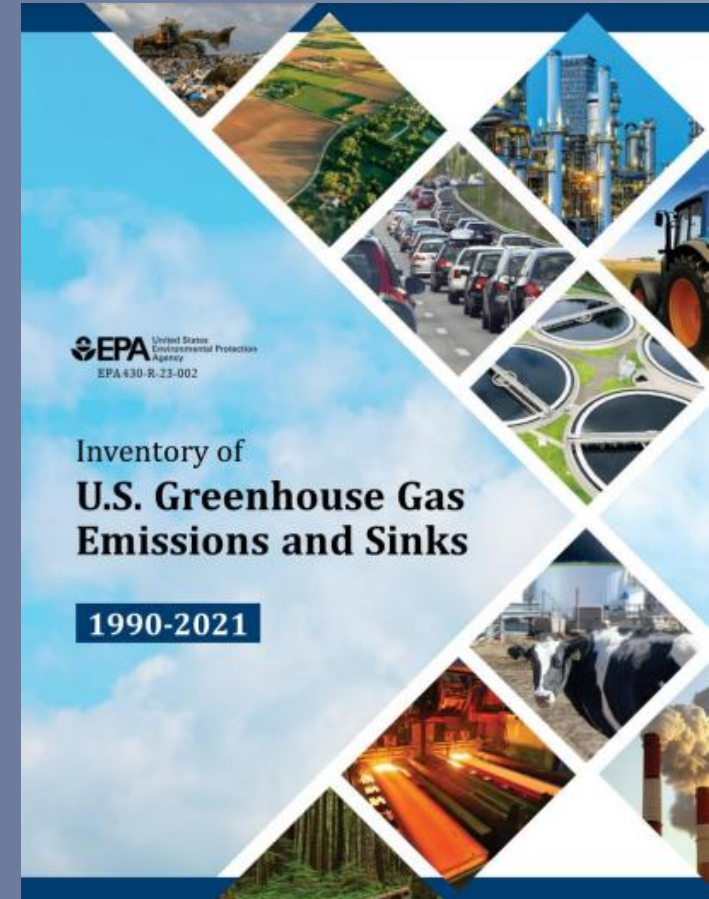
Annual report of national *anthropogenic* GHG emissions and sinks, by gas and economic sector, overtime from 1990 to current year-2.

How?

For over 30 years, the USEPA (OAP) has worked with partner agencies, institutions, and organizations to develop a national inventory of GHG emissions, using tiered methods from the IPCC (e.g., country- or activity-specific Emission Factors, modeling, etc.)

Why & When?

Developed and submitted to United Nations as part of the Framework Convention on Climate Change (UNFCCC), annually by April 15th, intended to ensure *transparent, accurate, complete, consistent, and comparable* inventories across countries to help track progress towards collective climate goals (e.g., Nationally Determined Contribution)



U.S. Greenhouse Gas Center – Current Use Cases

U.S. GHG Center - data portal & convening platform



Gridded Anthropogenic Greenhouse Gas Emissions

Emission estimates from human activities including the energy, agriculture, waste, and industry sectors

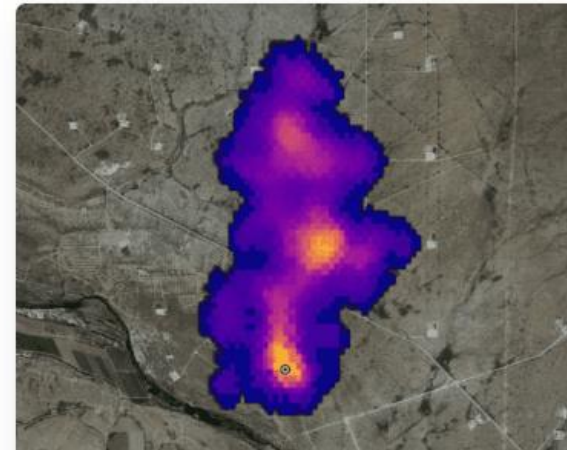
→ [Check out relevant datasets](#)



Natural Greenhouse Gas Sources and Sinks

Naturally-occurring greenhouse gas fluxes from land, ocean, and atmosphere

→ [Check out relevant datasets](#)



New Observations for Tracking Large Emission Events

Identify and quantify large methane leak events leveraging aircraft and space-based data

→ [Check out relevant datasets](#)

↖ EPA contributions to data portal to-date

EPA contributions to Use Case 1

EPA Gridded Methane Inventory

What?

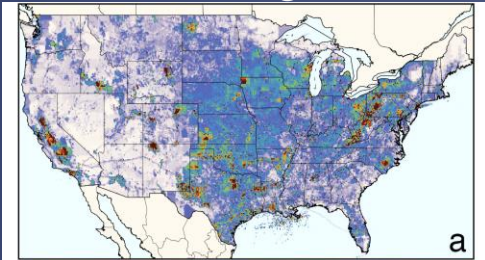
- The gridded methane GHGI is a temporal and geographic representation of the annual U.S. methane GHGI and includes annual 2012-2020* gridded (~10 x 10 km) maps of methane emission fluxes from over 25 source sectors

Why?

- Major CH₄ sources are fugitive or biogenic (agriculture, oil & gas), which are more uncertain than many other GHG sources (e.g., fossil CO₂).
- Emissions derived from atmospheric observations can help reduce inventory uncertainties, but direct comparisons are difficult because of a scale mis-match between observations (sub-national, temporal snapshot) and the inventory (national, annual).



Example Satellite-Observed
CH₄ Mixing Ratio



Gridded National Estimates

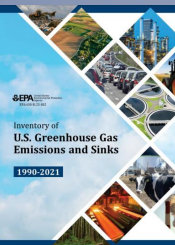
Atmospheric observations (top-down)

Gridded emissions
needed as Prior estimate
for inverse analysis

Process-based emission inventory (bottom-up)



National CH₄ Emissions



EPA contributions to Use Case 1

EPA Gridded Methane Inventory

What?

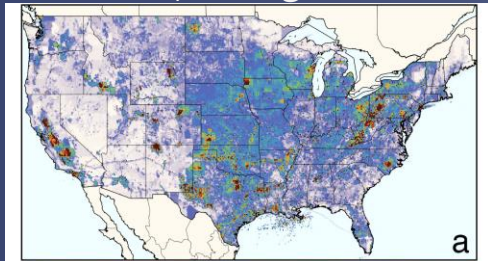
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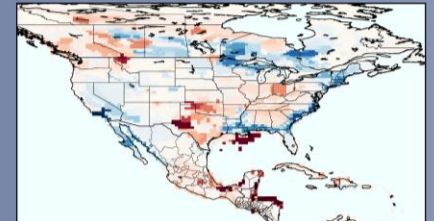
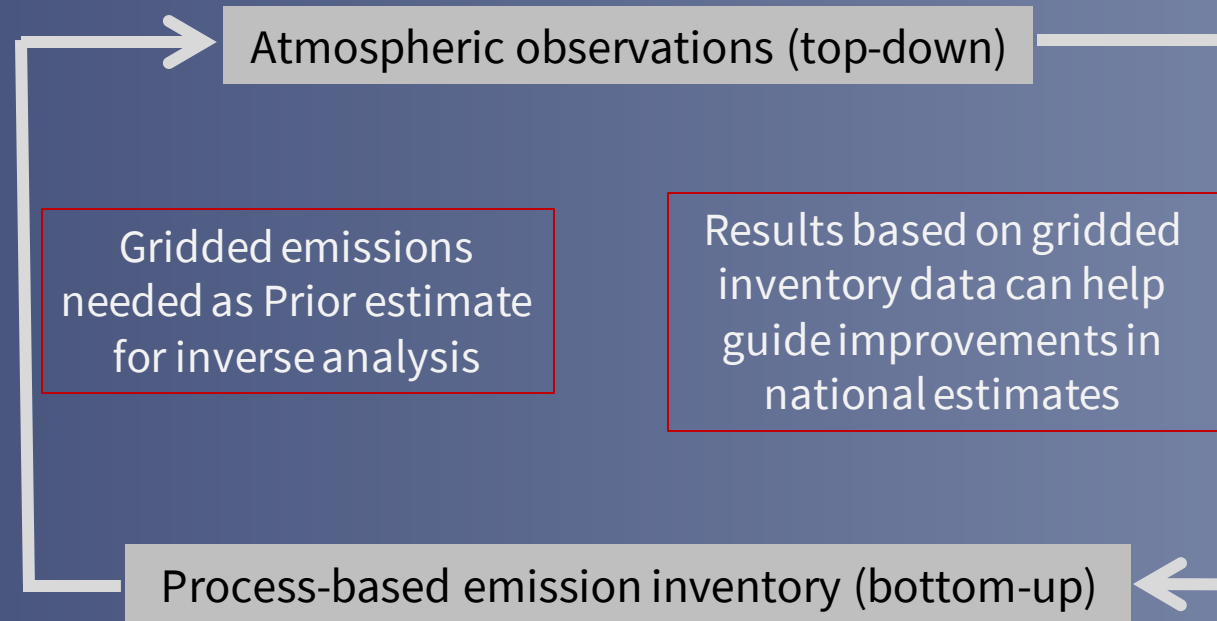
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Example Satellite-Observed CH₄ Mixing Ratio



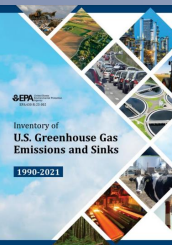
Gridded National Estimates



Example ratio of observation-based/prior emissions



National CH₄ Emissions



U.S. Greenhouse Gas Center

Uniting Data and Technology to Empower Tomorrow's Climate Solutions



Welcome

The U.S. Greenhouse Gas Center opens up access to trusted data on greenhouse gases. This multi-agency effort consolidates greenhouse gas information from observations and models. The goal of the US GHG Center is to provide decision-makers with one location for data and analysis.

This initial two-year demonstration phase creates a way to explore and analyze U.S. government and other datasets, targeting three greenhouse gas areas of study, as shown below. The US GHG Center also encourages stakeholder feedback and ideas for future expansion.

→ [Introduction to the US GHG Center](#)

Thank you!

For more information:

Visit the EPA Gridded Methane Emissions website:
<https://www.epa.gov/ghgemissions/us-gridded-methane-emissions>

New! US GHG Center
earth.gov/ghgcenter



ENVIRONMENTAL Science & Technology
pubs.acs.org/est

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A Gridded Inventory of Annual 2012–2018 U.S. Anthropogenic Methane Emissions

Joannes D. Maasakkers,* Erin E. McDuffie,* Melissa P. Sulprizio, Candice Chen, Maggie Schultz, Lily Brunelle, Ryan Thrush, John Steller, Christopher Sherry, Daniel J. Jacob, Seongeun Jeong, Bill Irving, and Melissa Weitz

Cite This: *Environ. Sci. Technol.* 2023, 57, 16276–16288

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Code Issues Pull requests Actions Projects Security Insights

emcduffie Update data_plot_functions.py 16d4fx last month 3 commits

- code Update data_plot_functions.py last month
- .gitignore Initial commit of public repository last month
- LICENSE Initial commit of public repository last month
- README.md Initial commit of public repository last month
- README.md

EPA U.S. Gridded Methane Emissions Inventory (gridded GHGI)

This code accompanies the peer-reviewed manuscript *Maasakkers, J. D., et al., A gridded inventory of 2012–2018 U.S. anthropogenic methane emissions*.

zenodo

Published October 19, 2023 | Version v1.0

566 VIEWS

Gridded EPA U.S. Anthropogenic Methane Greenhouse Gas Inventory (gridded GHGI)

McDuffie, Erin, E.¹ Maasakkers, Joannes, D.² Sulprizio, Melissa, P.³ Chen, Candice²; Schultz, Maggie²; Brunelle, Lily²; Thrush, Ryan²; Steller, John¹; Sherry, Christopher¹; Jacob, Daniel, J.³ Jeong, Seongeun⁴; Irving, Bill¹; Weitz, Melissa¹

Version v1.0
10.5281/zenodo.8367082

EPA United States Environmental Protection Agency

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Greenhouse Gas Emissions

- GHG Emissions and Removals Home
- Overview of Greenhouse Gases
- Sources of GHG Emissions and Removals
- Global Emissions and Removals
- National Emissions and Removals
- State and Tribal GHG Data and Resources
- Facility-Level Emissions
- Gridded Methane Emissions**
- Carbon Footprint Calculator
- GHG Equivalencies Calculator
- Capacity Building for GHG Inventories

U.S. Gridded Methane Emissions

The gridded EPA U.S. methane greenhouse gas inventory (gridded methane GHGI) includes time series of annual methane emission maps with 0.1° x 0.1° (~10 x 10 km) spatial and monthly temporal resolution for the contiguous United State (CONUS). This gridded methane inventory is designed to be consistent with methane emissions from the U.S. EPA [Inventory of U.S. Greenhouse Gas Emissions and Sinks](#) (U.S. GHGI).

The gridded methane GHGI dataset includes annual methane emission fluxes for over 25 inventory emission source categories, including those from agriculture, petroleum and natural gas systems, coal mining, and waste. Gridded methane emissions data are generated by allocating national annual U.S. GHGI methane emissions from individual source categories to a 0.1° x 0.1° CONUS grid, using a series of spatial and temporal "proxy" datasets at the state, county, and grid levels. Where possible, proxy data are the same data used to develop the U.S. GHGI so that the gridded emissions can be, as closely as possible, a spatial and temporal representation of the national-level U.S. GHGI. Monthly scaling factors are also provided for a subset of emissions categories with strong temporal variation (e.g., manure management, petroleum and natural gas production, etc.).

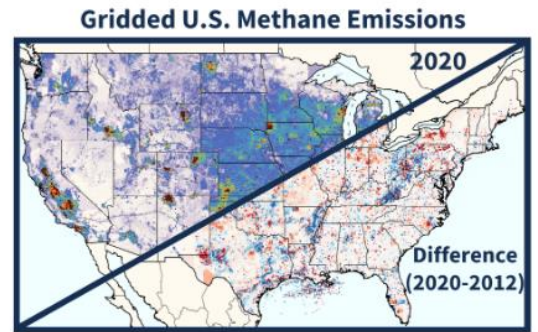
The gridded methane GHGI dataset can be used by researchers to better compare the national U.S. GHGI with emission estimates from more regional and local observations of atmospheric methane. Users of the gridded GHGI are asked to cite the original reference ([Maasakkers et al., 2023](#)) in their publications. Error estimates are also described in that reference. Manuscripts describing the gridded GHGI have been peer-reviewed, but are not part of the same annual expert and public review processes as the U.S. EPA National and State-level Inventory.

U.S. GHG CENTER

U.S. Greenhouse Gas Center

Uniting Data and Technology to Empower Tomorrow's Climate Solutions

NASA EPA NIST NOAA



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