Development of the Japan Greenhouse Gas Center and its stakeholder engagement

Hiroshi Tanimoto
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Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
Meteorological Research Institute (MRI)
Hiroshima University
The University of Tokyo
Japan Aerospace Exploration Agency (JAXA)
Ministry of the Environment, Japan (MOEJ)
Japan Meteorological Agency (JMA)

Active research – Basis of GHG Center

ground

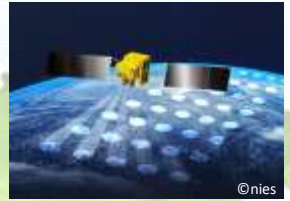
Cape Ochi-ishi

Hateruma Island

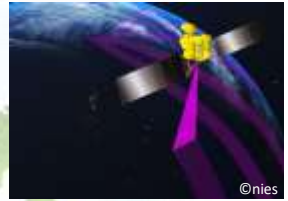
Mt. Fuji

satellite

GOSAT



GOSAT-2



GOSAT-GW

ship

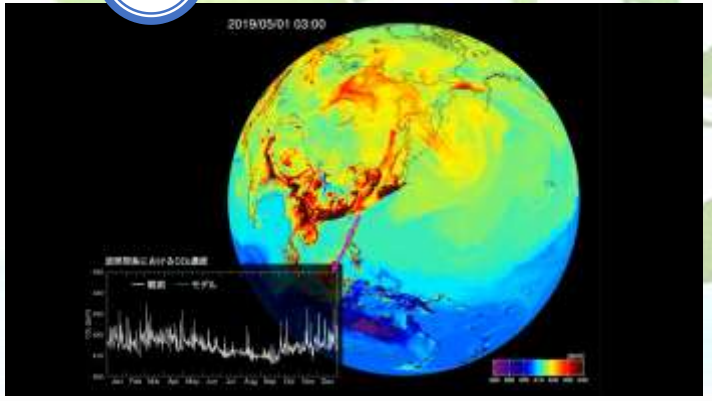
TRANS FUTURE 5

NEW CENTRY 2

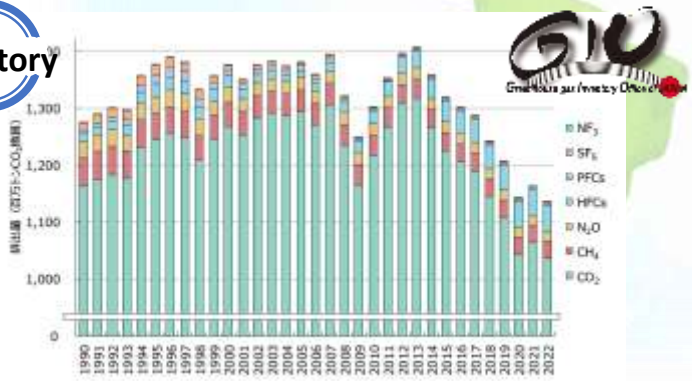
FUJITRANS WORLD

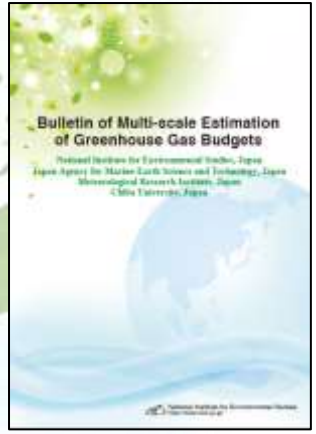
aircraft

model



inventory





Note: These items are NIES-led ones only. There are many other activities by other institutes.

Climate change research by multiple institutes in Japan

CEOS

United Nations
Climate Change

WORLD METEOROLOGICAL ORGANIZATION

Education, Science and Technology + Funding

Environment, Regulation + Funding

Weather, Forecasting

文部科学省

Ministry of the Environment

UTokyo

HIROSHIMA

JAMSTEC

JAXA

NIES

気象研究所
METEOROLOGICAL RESEARCH INSTITUTE
JMA

Research & Development

Researched Operation

Monitoring, Operational

Note: This sketch is NOT perfect. Some other institutes, universities and ministries are, of course, relevant.

- Enhancing policy contributions | strengthening individual activities | building capacity of next generation

Scoping of Japan GHG Center

- *Information* on emissions, atmospheric and oceanic observations (from ground, aircraft, ship, satellite platforms), model simulations, etc. on greenhouse gases (GHGs) provide the scientific basis necessary for policy decisions on global climate change
- *Data* are obtained or created by research institutes and some universities, as well as operational agencies, but have been published separately and independently
- *Consolidating* scientific information on GHGs and *spreading* the information as "one voice" would help accelerate climate change mitigation policy both domestically and internationally, and also help the actions in private sectors

- In preparation for this, we have had a scoping period and several institutes and ministries in Japan made a series of discussions on what it should/could be

Brainstorming exercise

Tokyo, April 12th, 2024

Future Collaboration between the United States and Japan for Possible Development of a Japan GHG Center

Hiroshi Tanimoto,[a] Toshinobu Machida,[a] Tomoko Shirai,[a] Yosuke Niwa,[a] Tsuneo Matsunaga,[a] Tazu Saeki,[a] Hisashi Yashiro,[a] Nobuko Saigusa,[a] Yu Someya,[a] Taku Umezawa,[a] Yugo Kanaya,[b] Prabir Patra,[b] Atsushi Sato,[b] Yosuke Sawa,[c] Kazuto Suda,[c] Masayuki Kondo,[d] Akihiko Ito,[e] Osamu Ochiai,[f] Hiroshi Suto,[f] Shohei Okano,[g] Hironari Ishihara,[g] Kazuhiro Tsuboi,[h] Koji Ohara,[h] Shinya Takatsuji,[h] Teruo Kawasaki,[h] Argyro Kavvada,[i] Barry Lefer,[i] Sid Ahmed Boukabara,[i] John Worden,[j] Charles Wooldridge,[k] Shobha Kondragunta,[l] Wenying Su,[m] and Jeff Privette[n]

https://journals.ametsoc.org/view/journals/bams/aop/BAMS-D-24-0275.1/BAMS-D-24-0275.1.xml

BAMS
Meeting Summary

Published on January 30, 2025

Vision, Mission

- ***Vision***: Multi-organizations' national initiative to accelerate global climate change mitigation policy and contribute to achieving carbon neutral society as early as possible

- ***Mission***: To advance integrated assessments of GHG emissions (or fluxes) and spread unified information and strong messages as "one voice" to help support climate change mitigation policies such as Global Stocktake, WMO's GGGW, UNEP's IMEO, and also business applications.

- Specific missions include:
  - Coordinate the results of GHG research in Japan through collaboration between relevant domestic institutions and disseminate them as an "all-Japan" effort to effectively communicate them to domestic and international stakeholders, including scientific communities, policymakers, private companies, and NPO/NGOs.
  - In particular, improve the accuracy of GHG emission inventories by comparatively evaluating top-down estimates (using observational data and models) and bottom-up estimates.
  - Improve the accuracy of top-down estimates of GHG emissions through international collaboration, and contribute to the Paris Agreement and Global Stocktake.

Highlights

- *Global*: Quantitative assessment of natural and anthropogenic GHG emissions and uptakes on a global scale

- *Japan*: Quantitative assessment of anthropogenic GHG emissions in Japan and its cities (prefectures)

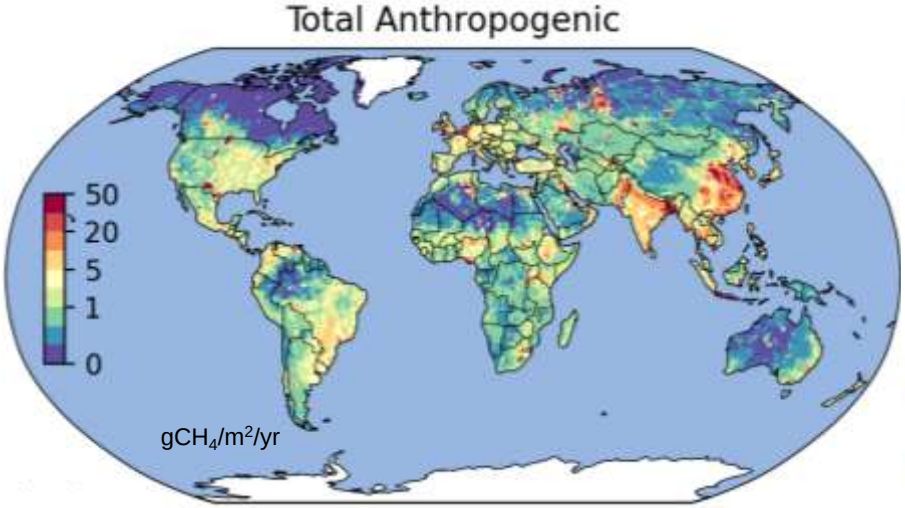
- *Asia*: Quantitative assessment of anthropogenic GHG emissions in Asian countries and cities

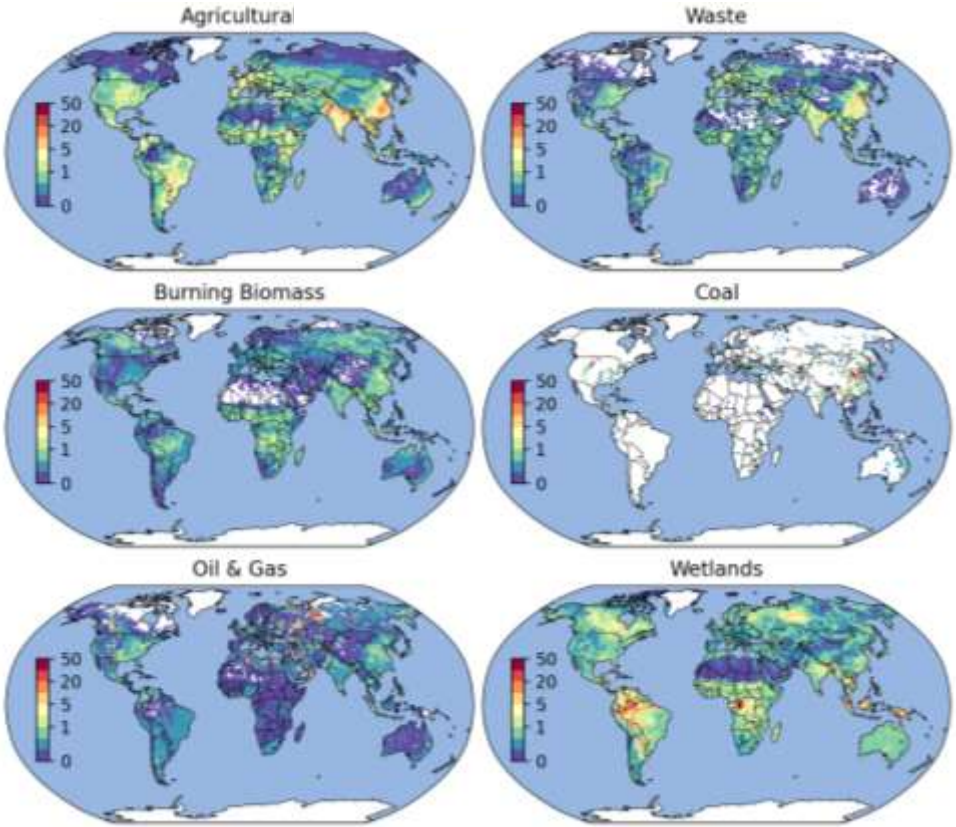
Planning of the Japan GHG Center

- “One stop” information hub/platform for scientists, policymakers, business leaders, and more
- Unified, strong messaging on urgent needs of climate change mitigation
- Global Stocktake, WMO’s GGGW, UNEP’s IMEO, and business applications

https://esd.nies.go.jp/ghg-information/

Global CH_4 flux maps derived from GOSAT inversion, 2009-2020

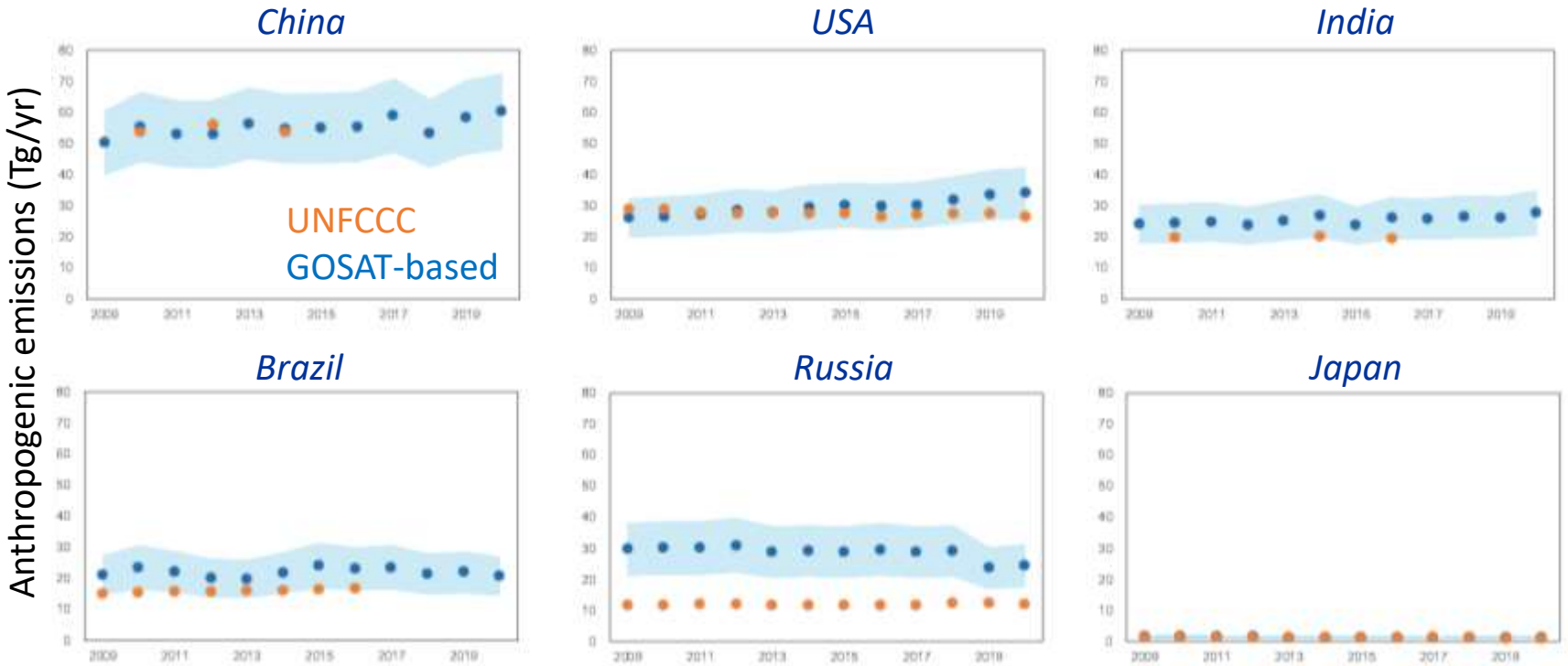




- High-resolution NTFVAR inversion (biweekly, 0.1 x 0.1 deg.) using GOSAT and ground-based obs.
- "Natural" = "Wetland"
- "Total Anthropogenic" = "Agriculture" + "Waste" + "Biomass Burning" + "Coal" + "Oil & Gas"

Janardanan et al., Environ. Res. Lett., 2024

Verification of country-level emissions of CH_4, 2009-2020

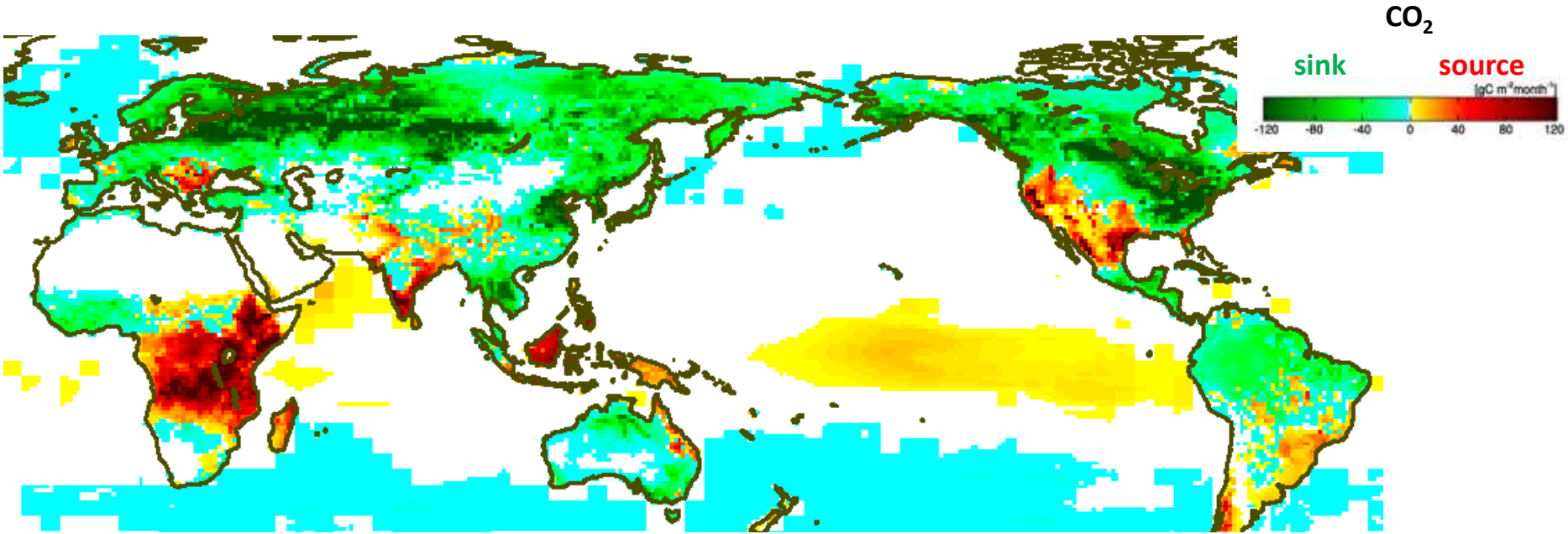


- We will strive to update the verifications/evaluations of the country-level CO_2 and CH_4 emissions
- New research for more years and more countries/areas

Janardanan et al., Environ. Res. Lett., 2024

UNFCCC Data (https://unfccc.int/topics/mitigation/resources/registry-and-data/ghg-data-from-unfccc)

High-resolution simulations of global carbon cycle



Niwa et al., Prog. Earth Planet. Sci., 2022

- Inverse analysis of the sources and sinks of CO_2 on the global scale
- New, high-resolution (1x1 deg) estimates reveal detailed features of the emissions in North America and the uptake in western Siberia
- Further work will contribute to the operational monitoring of CO_2 sources and sinks on the globe

COP-29 – Japan Pavilion Seminar

New Developments of GOSAT Series - Japanese GHG Center and Use of Satellite Data for Business
https://www.env.go.jp/earth/cop/cop29/pavilion/exhibition/details/016/

https://esd.nies.go.jp/COP29/ja/index.html

MOEJ, NIES, JAMSTEC, METI, Copernicus, UNEP/IMEO, Carbontribe, Sompo Japan, Momentick, MUFG, GHGSat, Emory Univ.

Summary

- We continue discussions on overall shape/framework and individual roles
- Short-term goal: agreement at multi-institutes/ministries
- Long-term goal: improving bottom-up and top-down comparisons, contributing to transparency in inventory verification, improving the accuracy of national emission inventories

- The value of data. Emissions/fluxes (also concentrations), not individual data nor analysis, but higher-level data or integrated analysis/information
- We will continue involving other relevant institutes, universities, ministries, and stakeholders
- Activities to the society, for the society, and with the society