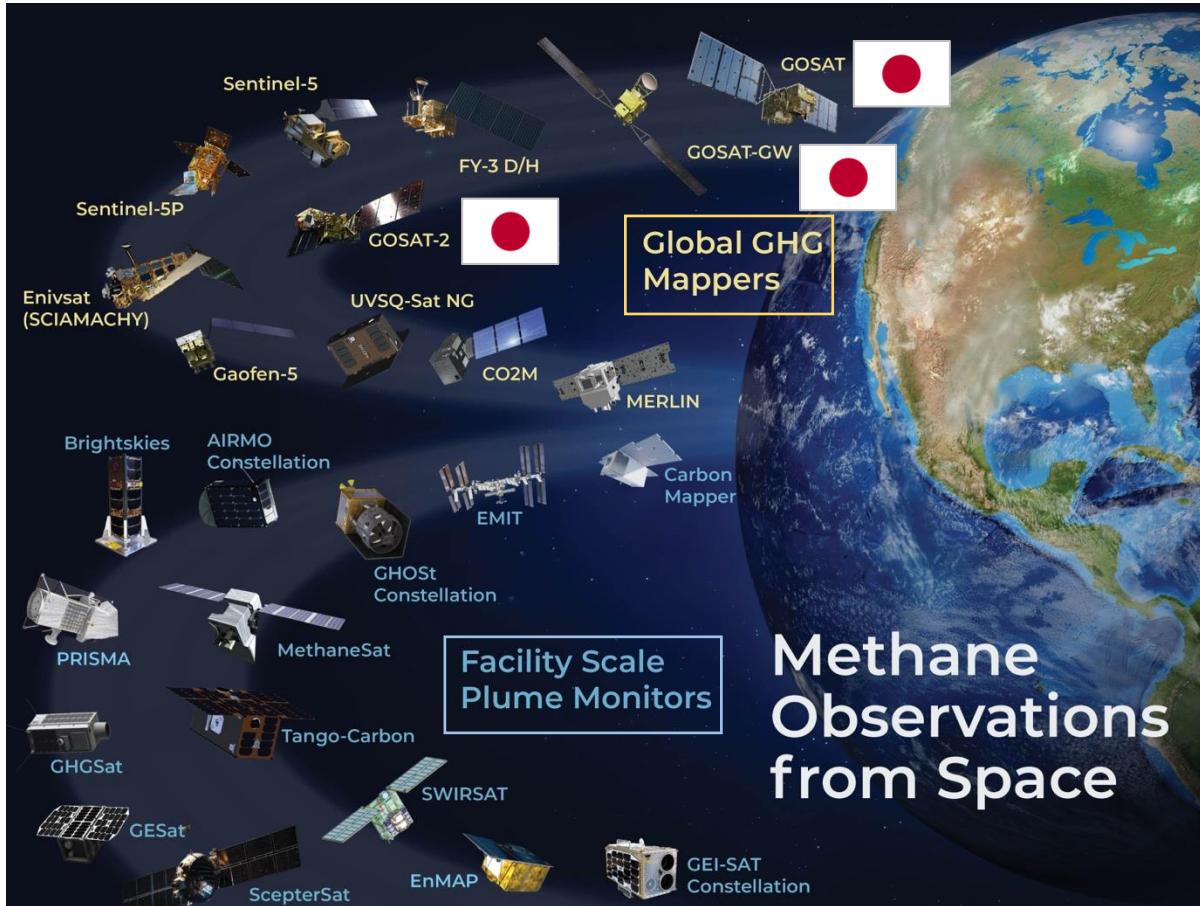


The GOSAT-GW greenhouse gas observation mission and the planning of the Japan GHG Center



Hiroshi Tanimoto
Director of Earth System Division
National Institute for Environmental Studies

Measurements of greenhouse gases from space



Growing constellation of GHG concentrations observations from the global to the facility scale



Successful launch of GOSAT-GW in June 2025



The GOSAT-GW satellite was launched at 1:33:03 am Japan time on 29th June at Tanegashima Space Center with the 50th H-IIA rocket, the last vehicle of the H-IIA series

3-day dense global coverage of CO₂, CH₄ & NO₂ observations

- Monitoring of whole atmosphere global-mean concentrations of GHGs – CO₂ and CH₄
- Verification of country-level anthropogenic emissions inventory of GHGs – CO₂ and CH₄
- Detection of GHGs emissions from large emission sources, such as megacities, power plants, and permafrost

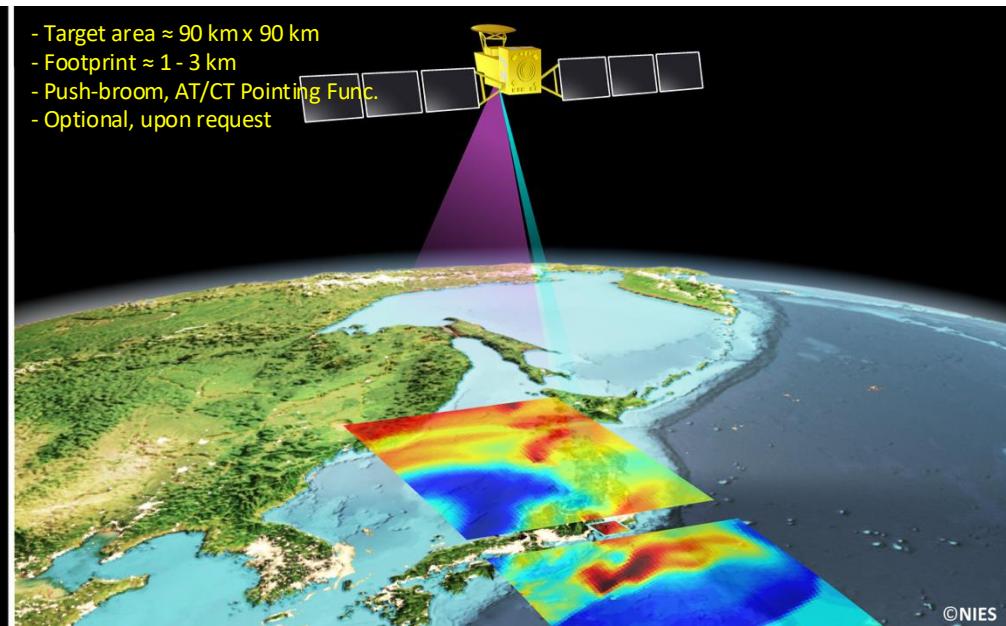
Wide Mode

- Wide swath \approx 911 km
- Footprint \approx 10 km
- Push-broom, No AT/CT Pointing
- Standard operation



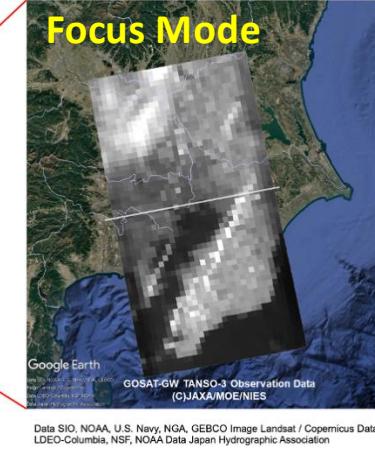
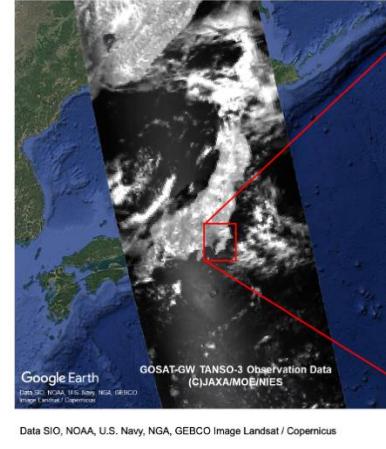
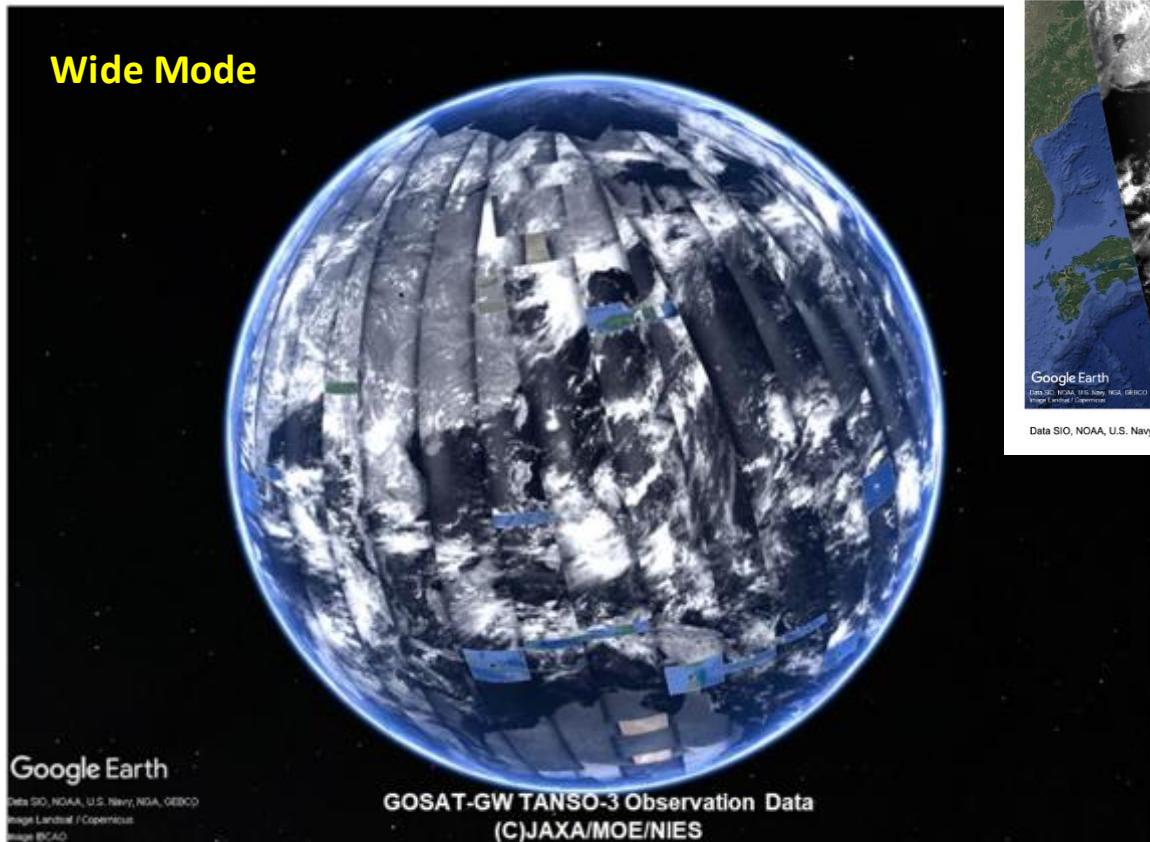
Focus Mode

- Target area \approx 90 km x 90 km
- Footprint \approx 1 - 3 km
- Push-broom, AT/CT Pointing Func.
- Optional, upon request



©NIES

First light: Wide Mode, July 14-16

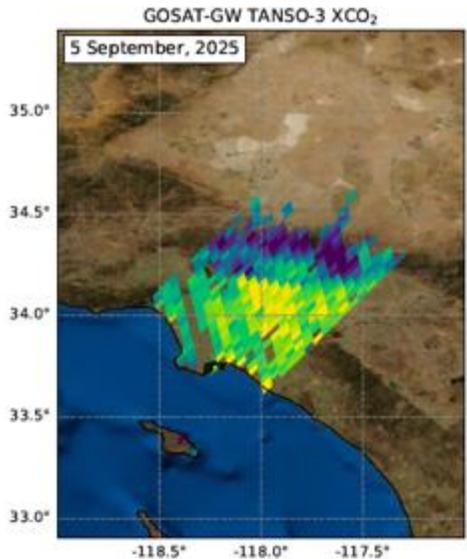


Ministry of the Environment Government of Japan

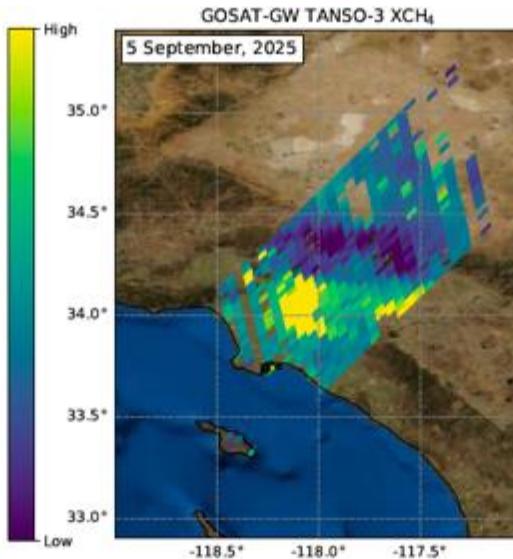
First results of co-located CO_2 , CH_4 , and NO_2 from GOSAT-GW

Focus Mode

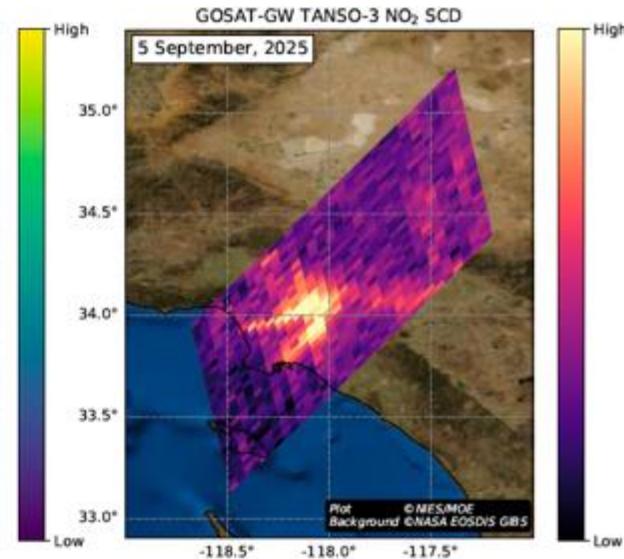
CO_2



CH_4



NO_2



Yu Someya, Tamaki Fujinawa, Hyunkwang Lim, NIES

!! CAUTION !! Initial analysis based on preliminary data



NIES



Ministry of the Environment
Government of Japan

Many research activities provide scientific supports for policy



NIES

- Research-based long-term monitoring
- Japan's emission inventory
- GOSAT series L2+, Carbon cycle modeling

ground



ship

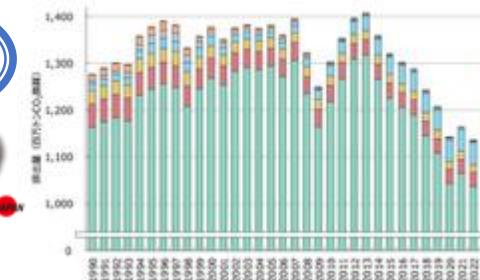


Cape Ochi-ishi

Hateruma Island

Mt. Fuji

inventory



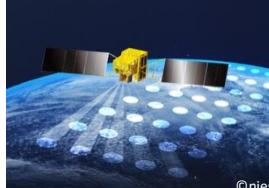
Ministry of the Environment, Japan

- Climate change policies
- GOSAT series operation and funding

satellite



GOSAT



GOSAT-2

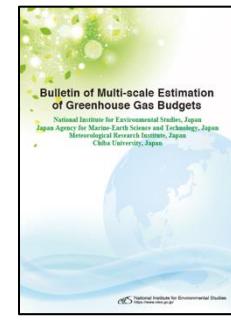
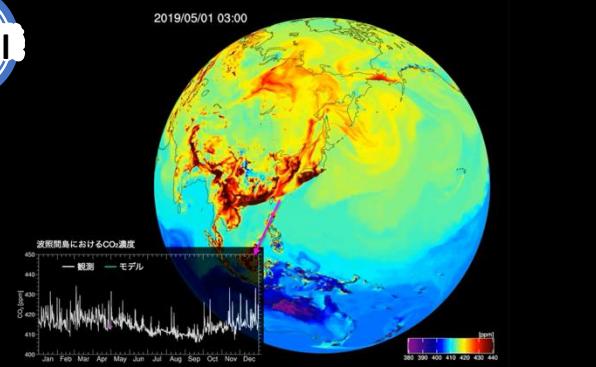


GOSAT-GW

aircraft



model



Many research activities provide scientific supports for policy



Japan Meteorological Agency

- Operational monitoring for GAW
- WDCGG database

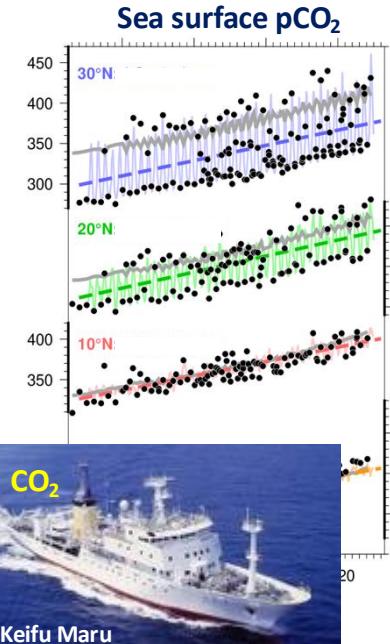
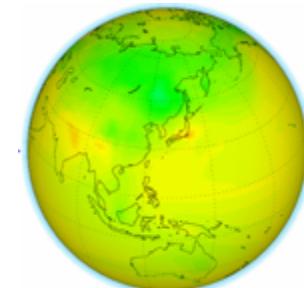
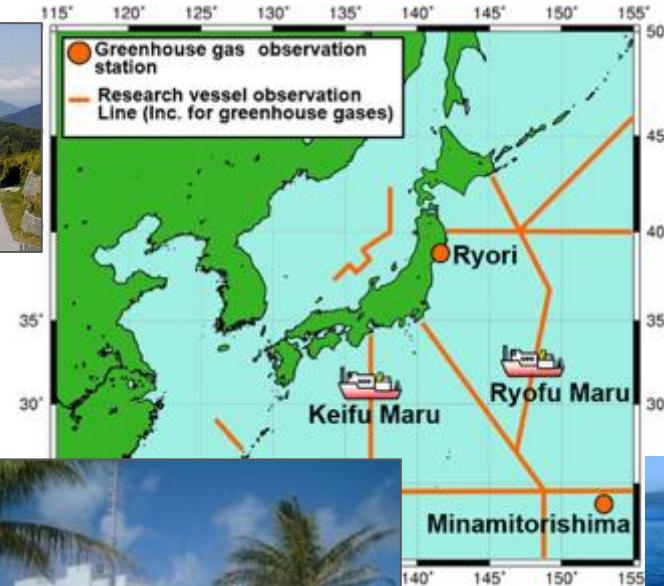


WMO-GAW regional station
Ryori (RYO)



Meteorological Research Institute

- Research observations and modeling
- Joining CONTRAIL, RECCAP and TransCOM



WMO-GAW global station Minamitorishima (MNM)



World Data Centre
for Greenhouse Gases



Many research activities provide scientific supports for policy

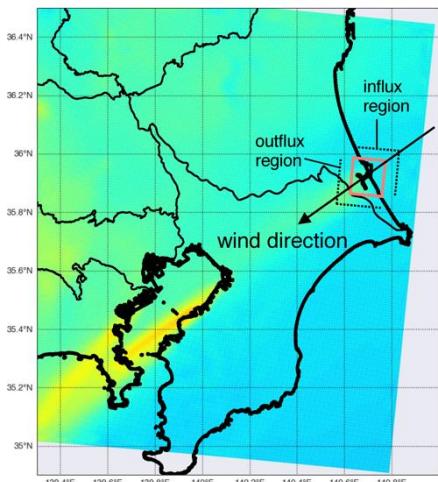


JAMSTEC

- Research vessels
- Carbon cycle modeling, GOSAT-GW modeling

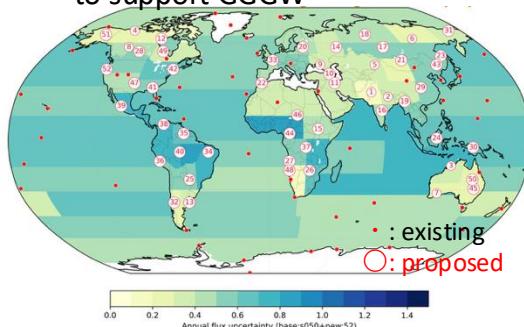


Mirai II (icebreaker):
Arctic research vessel
to start in 2027



Emissions estimation from point sources using $1 \times 1 \text{ km}^2$ model

Advanced flux estimation system
to support GGGW



JAXA

- GOSAT series L1
- Long-term vicarious calibration for space-based GHG data



文部科学省

A screenshot of the "Vicarious Calibration Portal for Space-borne GHGs Sensors" website. The page shows a landscape image of the Railroad Valley Desert Playa, NV, USA, with mountains in the background. The navigation bar includes "HOME", "Methodology", "Satellite Orbit", "Team Meeting", "Documents", "Gallery", and "Links". The main content area is titled "Objectives" and includes sections on "Radiometric calibration" and "Vicarious calibration campaign". It features a diagram of the calibration setup with various instruments like cameras, radars, and sensors. The footer includes "Earth Observation Research Center, Japan Aerospace Exploration Agency" and logos for "JAXA EORC" and "CEOS".

- 6 instruments joined (GOSAT/OCO-2/OCO-3/TROPOMI/GOSAT-2/TEMPO)
- 16 years of campaign data (mainly surface reflectance) were reprocessed with the JAXA's improved processing algorithm

The Japan GHG Center initiative (under discussion)

to help support climate change mitigation policies



<https://esd.nies.go.jp/ghg-information/en/index.html>

• Latest News and Updates

Find the latest updates and important announcements on greenhouse gases.



COP30 JAPAN PAVILION

SEMINAR

In Belém, Brazil 2025

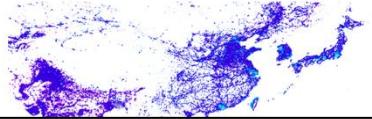


COP29 JAPAN PAVILION

Find out our seminar at COP29 JAPAN PAVILION in 2024.

Overview

Information on emissions, atmospheric and oceanic observations (from ground, aircraft, ship, and satellite platforms), and model simulations of greenhouse gases (GHGs) provide the scientific basis necessary for policy decisions on global climate change. These data have been acquired or created by individual research institutes and universities, as well as operational agencies, but have been independently published by each organization. Therefore, we are planning to establish the Japan Greenhouse Gas Center (provisional), with the aim of accelerating climate change mitigation policy by consolidating scientific information on GHGs and spreading the information both domestically and internationally, so that it can be used for policy decisions and research aimed at reducing GHG emissions, and for the development of private businesses.



Data Catalog

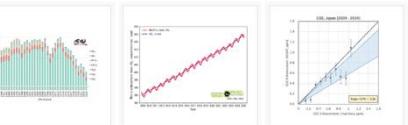
Explore our data catalog to find the latest information on greenhouse gas emissions, measurements, modeling, and more.

Search Data Catalog (OR Search)

▼ Category

- Emission Data
- Observation Data
- Policies and Targets
- Technological Innovation

*Before quoting or reproducing any diagrams, images, or text from this website, please review our Site Policy and follow the usage guidelines provided for each source.



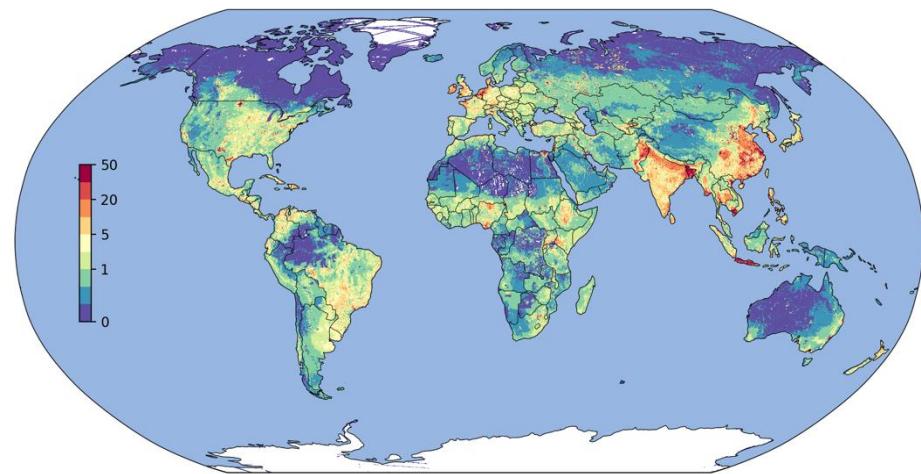
High-level objective (under discussion)

- “One stop” information hub for scientists, policymakers and business leaders, for strong messaging on urgency of climate change mitigation
- Multi-agencies/institutes’ efforts for the “all-Japan, one-team” national initiative to better serve for the global society
- We will advance integrated assessments of GHG emissions/fluxes for Global Stocktake, WMO’s GGGW, UNEP’s IMEO, and business

“Flux” information for climate change mitigation policy

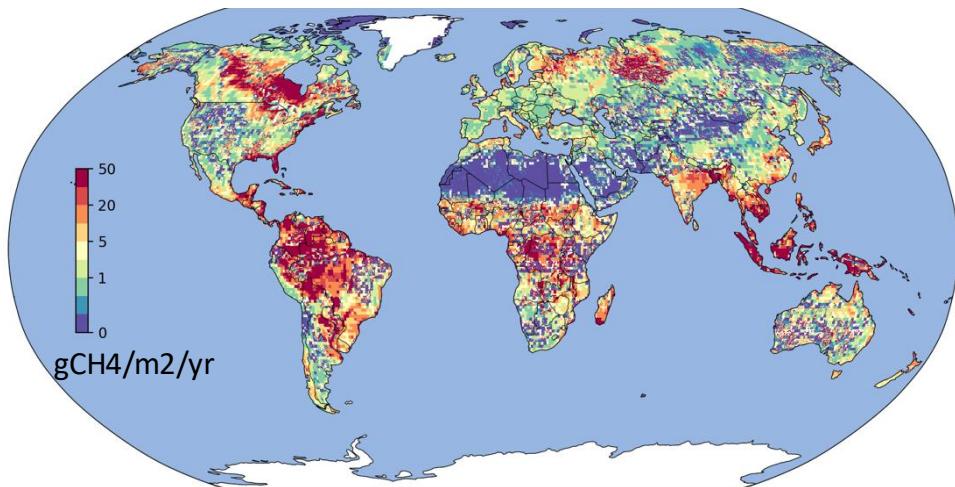
CH_4 emissions derived from GOSAT data, 2009-2022

Anthropogenic emissions, total



Total = oil and gas, fossil, agriculture, landfill, biomass burning

Natural wetland emissions

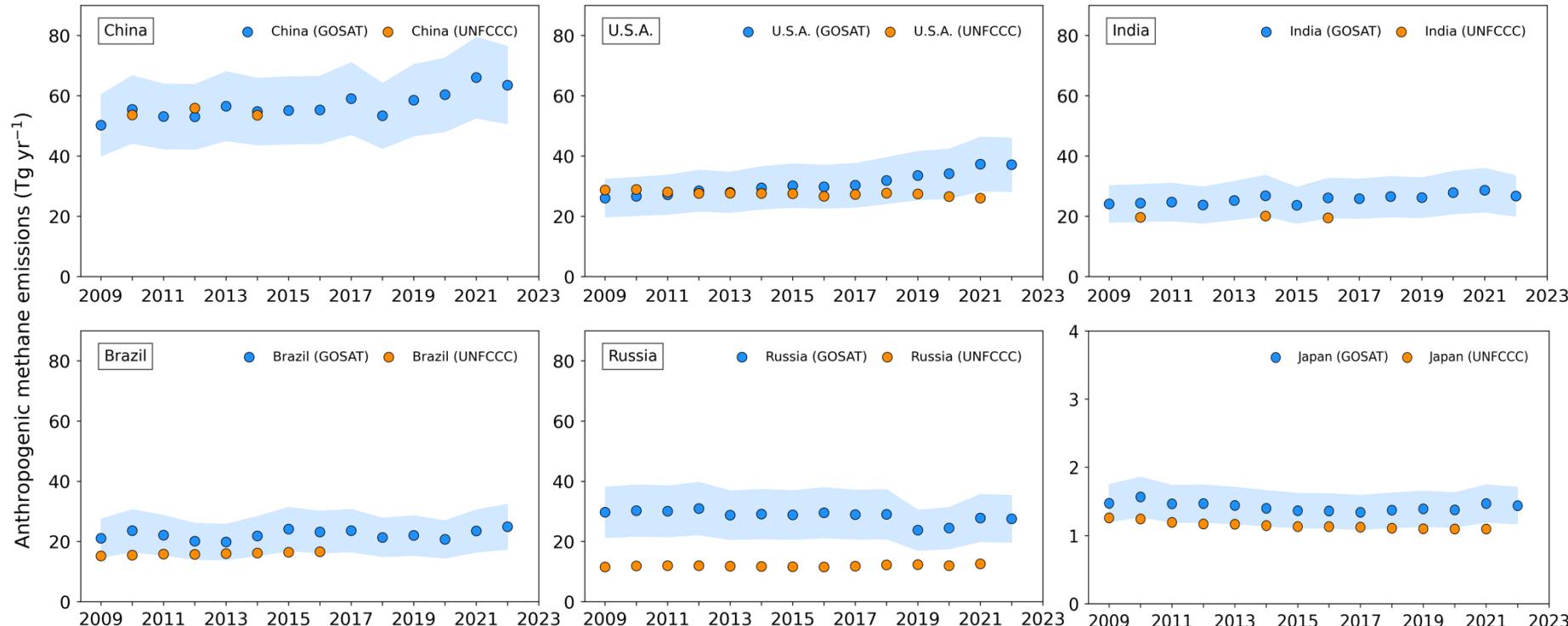


Janardanan et al., 2024, 2025

Anthropogenic emissions in Asia are substantial contributors to the global total emissions

“Flux” information for climate change mitigation policy

Anthropogenic CH₄ fluxes from inversion analyses of GOSAT data (Janardanan et al. 2024, 2025) and UNFCCC inventories

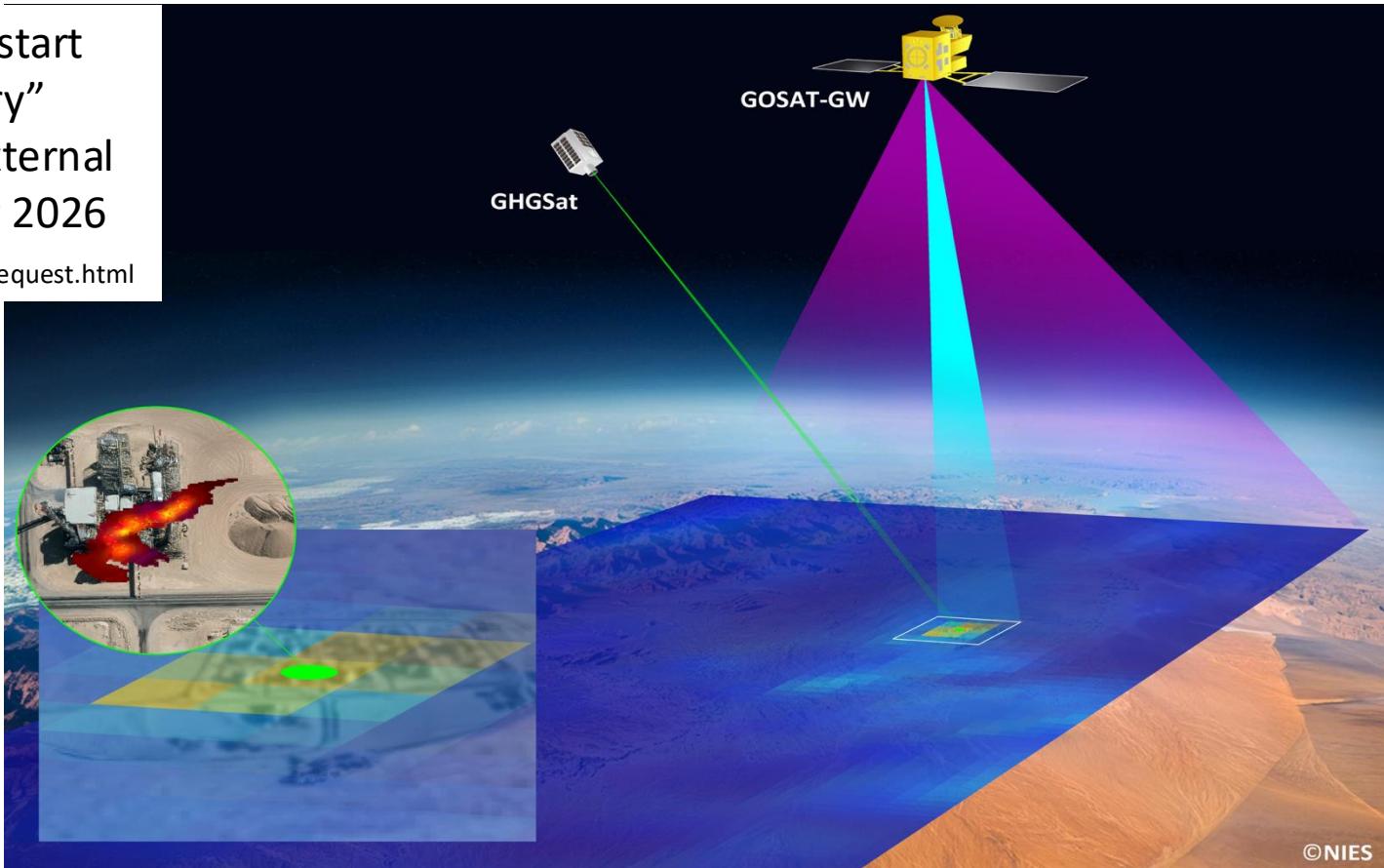


Satellite-based estimates are helpful as a supplement to the UNFCCC emission inventories

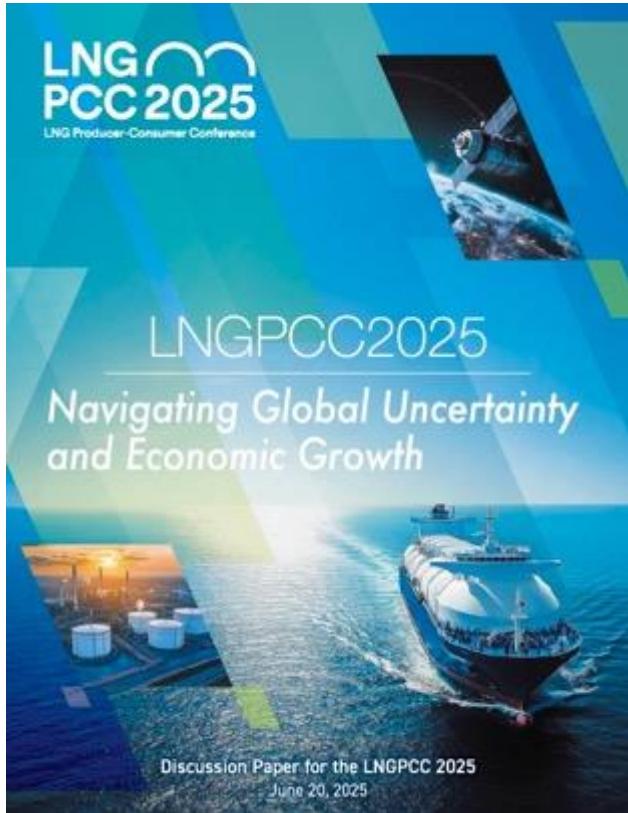
International collaborations to better identify/quantify CH₄ emissions

NIES and MOE will start sharing “preliminary” TANSO-3 data to external partners in January 2026

<https://gosat-gw.nies.go.jp/en/request.html>



Japan's inter-agency collaboration with IMEO on methane



Joint Statement on Technical Collaboration and Data Transparency on Methane Abatement from LNG Value Chain

by

Ministry of Economy, Trade and Industry of Japan (METI)

Ministry of Environment of Japan (MOE)

Japan Organization for Metals and Energy Security (JOGMEC)

National Institute for Environmental Studies (NIES)

“MOE, NIES and UNEP’s IMEO will collaborate on the usage of data from GOSAT-GW when it becomes available, and IMEO will integrate the data from GOSAT-GW into IMEO’s Methane Alert and Response System (MARS), which notifies government and industry stakeholders of large emissions to enable swift mitigation.”