

NOAA's Role in the US National Greenhouse Gas Strategy

Dr. Sarah Kapnick

Chief Scientist

National Oceanic and Atmospheric
Administration

chief.scientist@noaa.gov



Presented to the Maryland Space Business Roundtable, January 16, 2024

Chief Scientist Role & Priorities

Advancing policy and program direction for NOAA's S&T priorities.



Scientific Integrity

**Developing
Science
Program for
Future Needs**



**Communication
of NOAA's
Science**



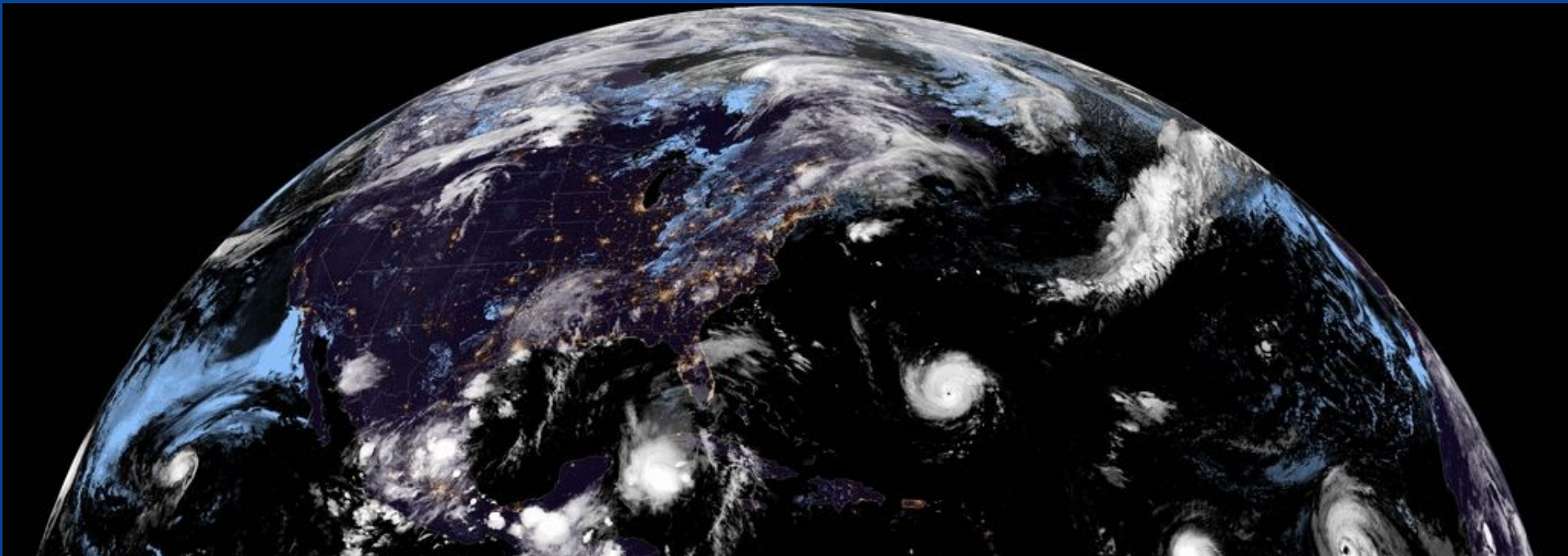
**Private Sector
Engagement /
Science to
Support
Commerce**



Climate-Ready Nation


2030 Vision

A thriving Nation whose prosperity, health, security, and continued growth benefit from and depend upon a shared understanding of, and collective action to reduce, the impacts of climate change



Opportunity: Emergence of the **Climate Economy**

- **Climate Economy = Mitigation + Adaptation activities** shifting current and driving new financial flows
 - Reaching net zero goals by 2050 is USD 4 trillion/year of investment
 - Estimates of future adaptation investment requirements are more difficult to calculate and depend on the urgency and level of emissions reductions
- Responding to the dual challenge of **mitigating and adapting to climate change will alter all economic sectors**



NATIONAL STRATEGY TO ADVANCE AN INTEGRATED U.S. GREENHOUSE GAS MEASUREMENT, MONITORING, AND INFORMATION SYSTEM

A REPORT BY THE GREENHOUSE GAS MONITORING AND
MEASUREMENT INTERAGENCY WORKING GROUP

NOVEMBER 2023



THE WHITE HOUSE
WASHINGTON

DRIVERS

U.S. commitment to reduce economy-wide net greenhouse gas (GHG) emissions 50-52% from 2005 levels in 2030 and to reach net-zero emissions by 2050

Paris Agreement

To hold “the increase in the global average temperature to well below 2°C above pre-industrial levels” and pursue efforts “to limit the temperature increase to 1.5°C above pre-industrial levels.”

Global Stocktake.

Global Methane Pledge

To reduce methane emissions by 30% from 2020 levels by 2030.

<https://www.whitehouse.gov/wp-content/uploads/2023/11/NationalGHGMMISStrategy-2023.pdf>



Vision for an Integrated U.S. GHG Measurement, Monitoring, and Information System (GHGMMIS)

NATIONAL STRATEGY TO
ADVANCE AN INTEGRATED
U.S. GREENHOUSE GAS
MEASUREMENT,
MONITORING, AND
INFORMATION SYSTEM



The U.S. GHGMMIS will quantify GHG emissions and removals to support public and private sector climate efforts in the United States at local, state, Tribal, and national levels. The GHGMMIS will be based upon scientifically validated methods, with sufficient granularity in space and time for acquisition, analysis, and dissemination of trusted, reliable, transparent, and accurate data. The GHGMMIS will be extensible to international efforts on sustained, coordinated global GHG monitoring.



Greenhouse Gases - A Focus Area for NOAA's Climate Ready Nation

Monitoring and Modeling for Climate Mitigation Five-year Outputs Areas*

Greenhouse gas observation and modeling capabilities

Models, tools and products for climate mitigation

Quantification of key emission sources products and services

*NOAA Weather, Water, and Climate Strategy FY 2023-2027



NOAA's Support for the National GHG Strategy

NOAA is well-positioned to objectively and transparently determine US GHG emissions changes:

- Unique combination of surface, aircraft, shipboard, and satellite observing networks
- Cross-cutting Earth Science expertise and measurement and modeling capabilities
- A clear mandate to provide sustained climate observations and information



U.S. Greenhouse Gas Center

Uniting Data and Technology to Empower Tomorrow's Climate Solutions

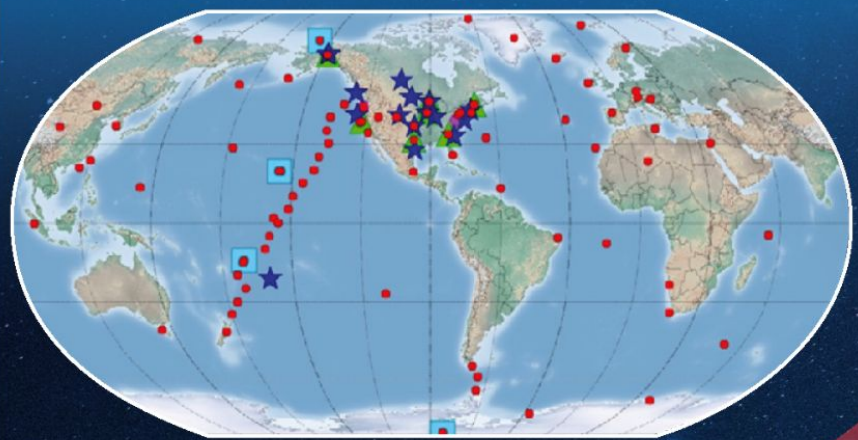


NIST NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY U.S. DEPARTMENT OF COMMERCE

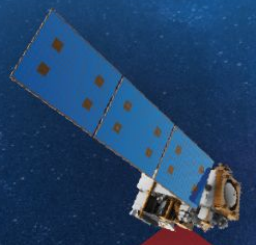




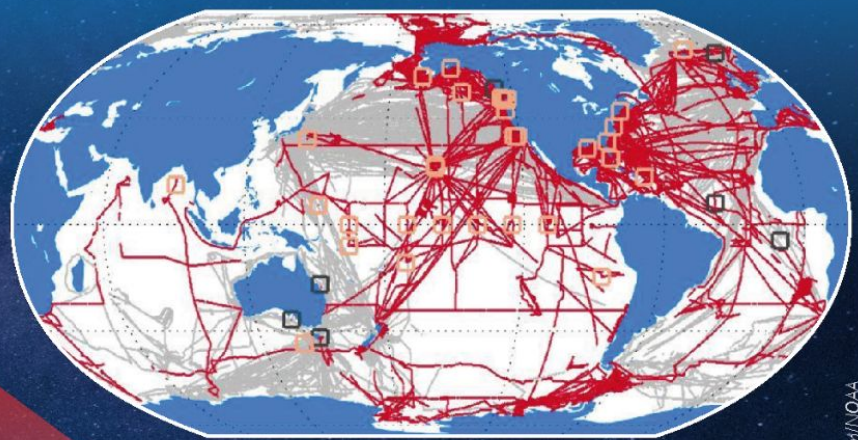
GREENHOUSE GAS MONITORING & MEASURING ACTIVITIES AT NOAA



Global Greenhouse Gas Reference Network

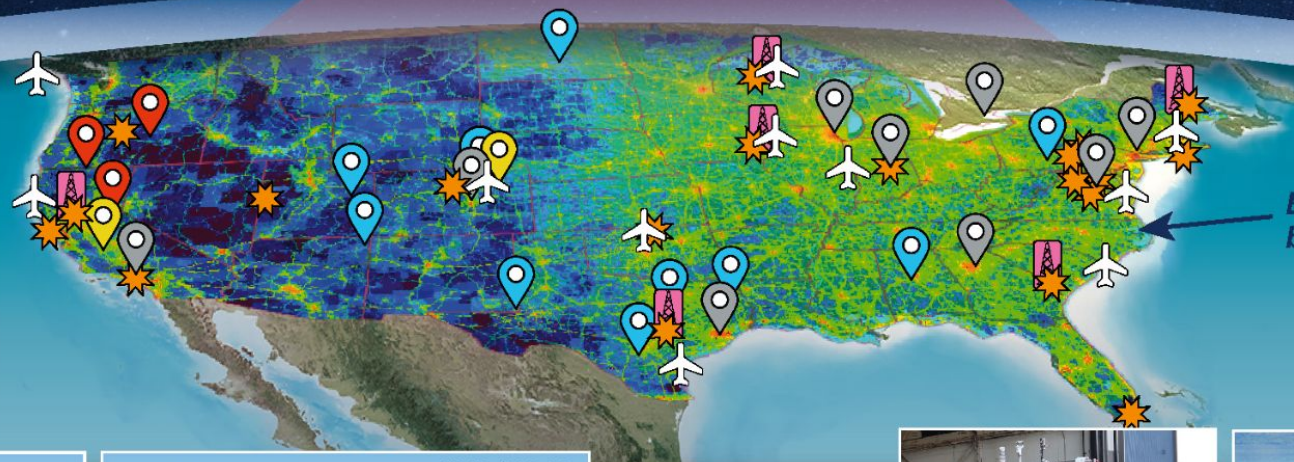


NOAA JPSS
NOAA GOES-R



Global Surface Ocean CO₂ Reference Observing Network

- U.S. Regional Observations:**
- Long-term Background:
- Aircraft
 - Tower
 - Surface (Flask & In situ)
- Targeted Campaigns:
- Urban
 - Oil & Gas
 - Wildfire
 - Agriculture



Basemap colored by CO₂ emissions



NOAA P-3 Orion



NOAA Twin Otter

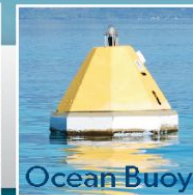
UMD/NOAA Cessna

Light Aircraft

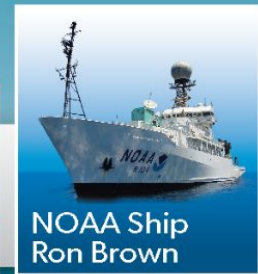
NOAA OBSERVING PLATFORMS



NOAA mobile labs



Ocean Buoy



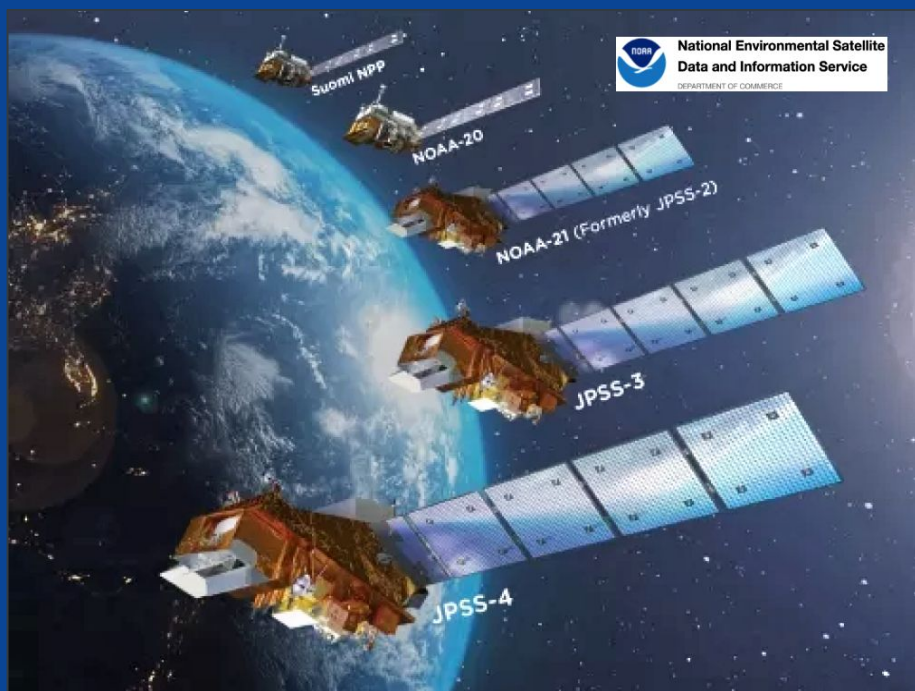
NOAA Ship Ron Brown

Greasea R.Thompson/NOAA



NOAA's Operational Satellites

Low Earth Orbit - JPSS



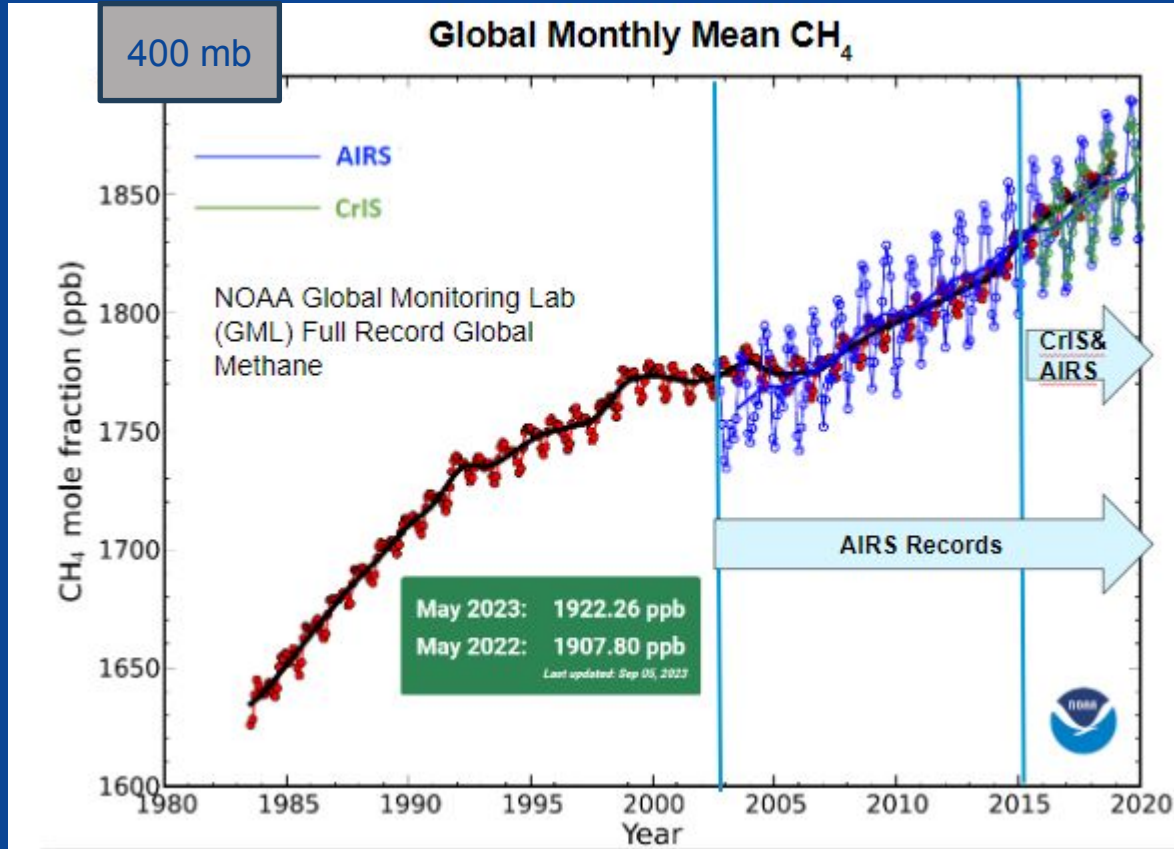
- Full global coverage
- At least twice a day

Geostationary Earth Orbit - GOES

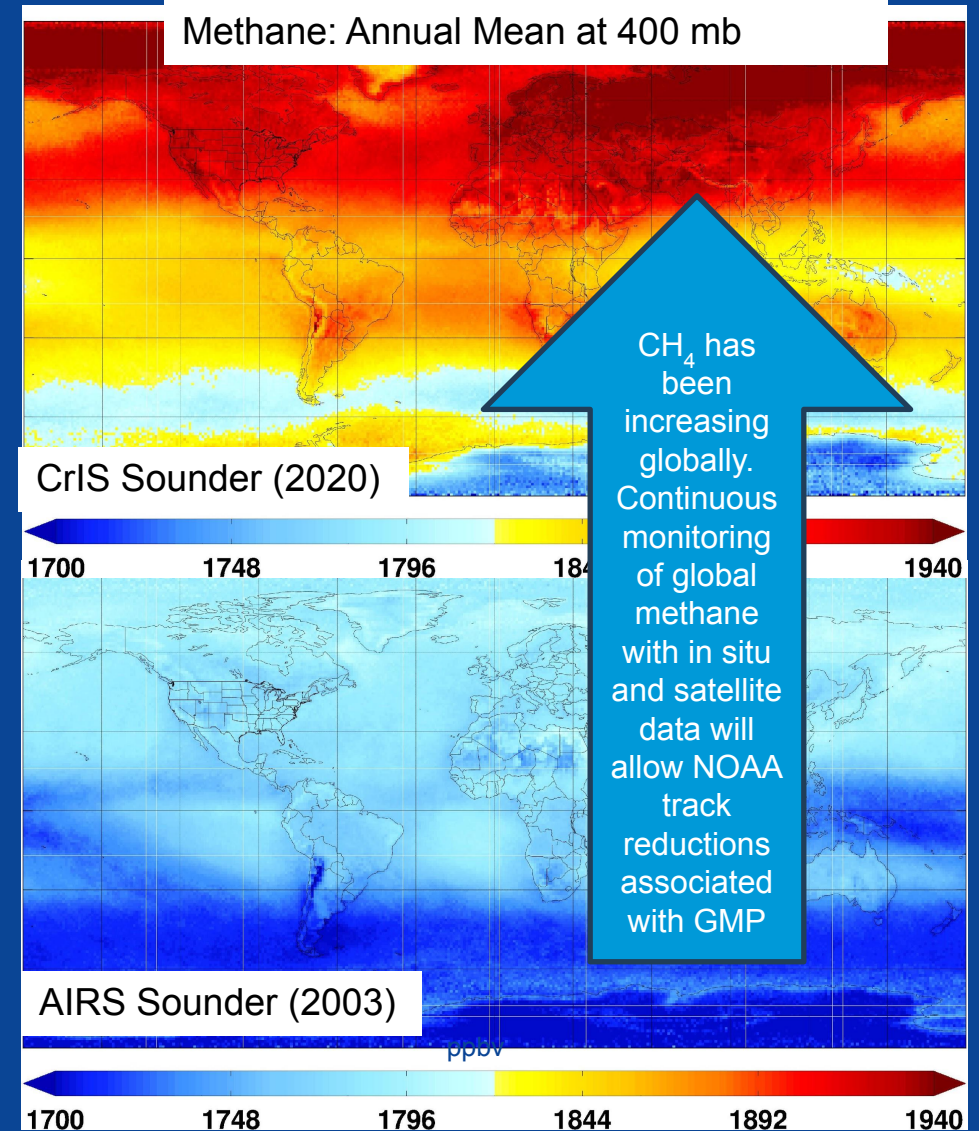


- Regional coverage
- Every 10 minutes full disk and 5 minutes over CONUS

NOAA Satellites' GHG Capabilities - Methane

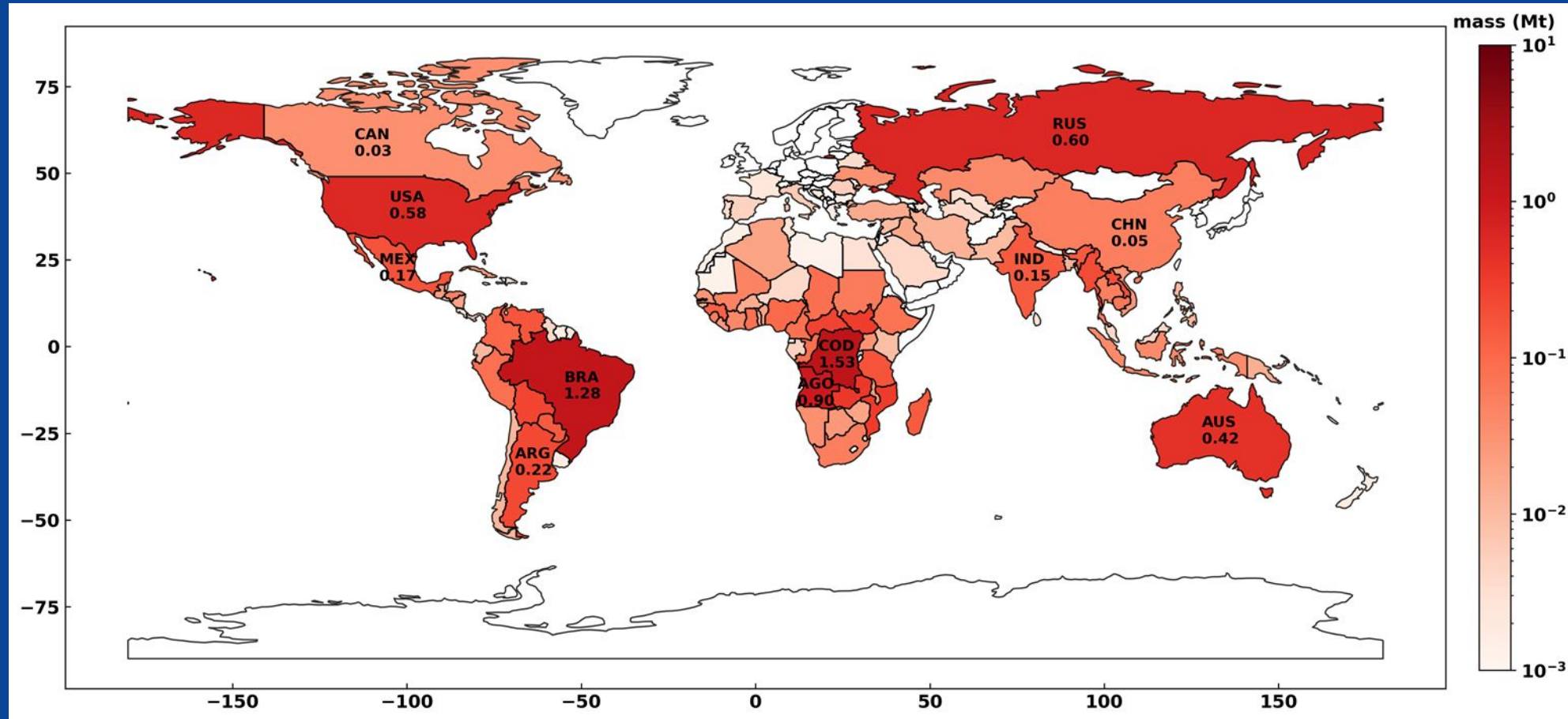


NASA Aqua satellite AIRS: Atmospheric Infrared Sounder
NOAA-NASA Suomi NPP satellite CrIS: Cross-track Infrared Sounder



NOAA Satellites' GHG Capabilities – Biomass Burning Methane

NOAA uses its satellites' fire detections (Visible Infrared Imaging Radiometer Suite on SNPP and JPSS series) and their intensities to estimate GHG fluxes. When extreme fires like the 2020 “gigafire” in California occur, years of progress made from cutting down fossil fuel emissions is undone.



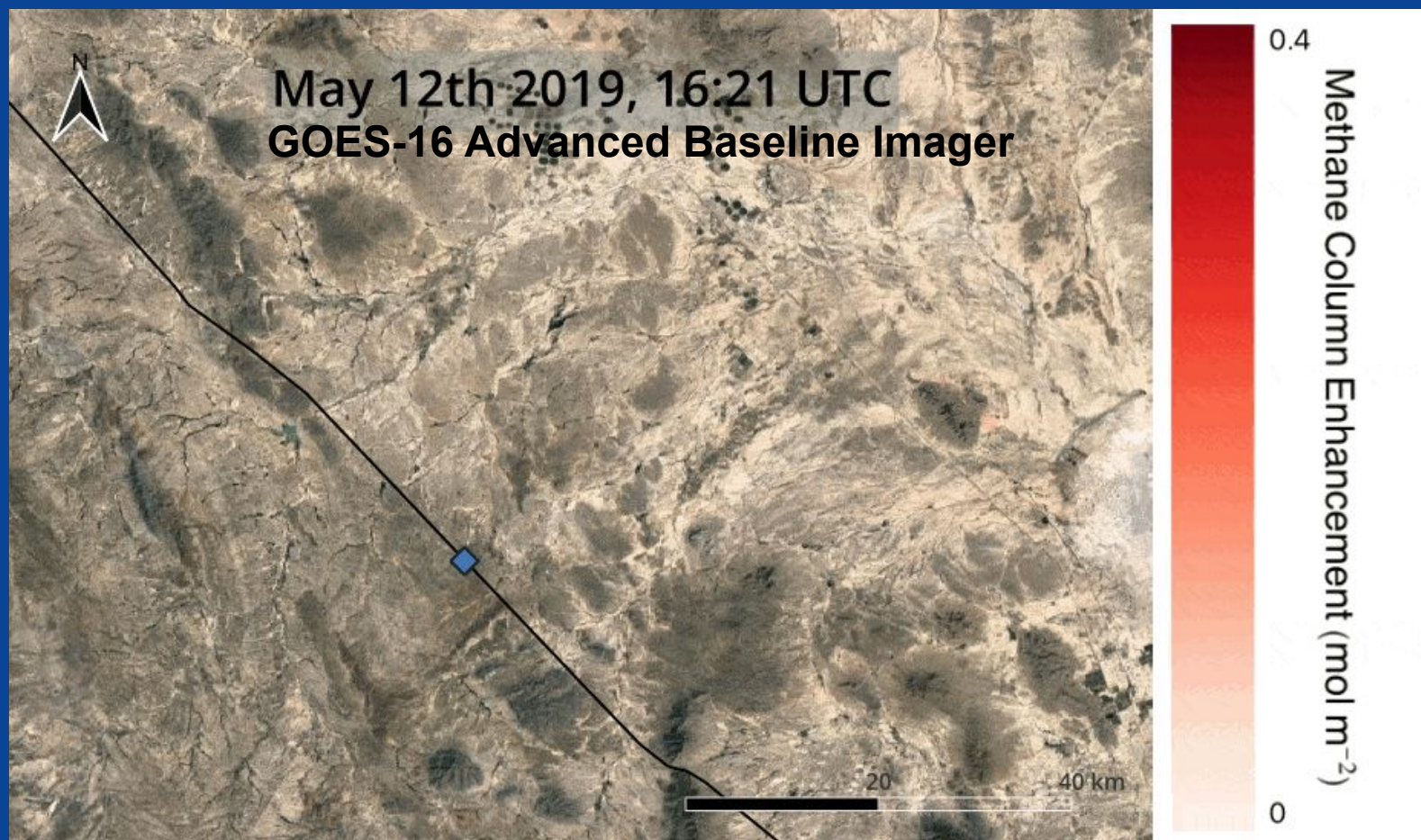
NOAA-20 satellite data (for 2020 shown as an example) show that central Africa ranks number one in GHG emissions from fires, mostly due to its crop residue burning.

NOAA Satellites' GHG Capabilities – Facility Level Methane Leaks

NOAA's geostationary GOES-E/-W Advanced Baseline Imager (ABI) can detect high point source emissions of methane.

NOAA is in the process of transitioning this capability, developed by Harvard University, to its operations.

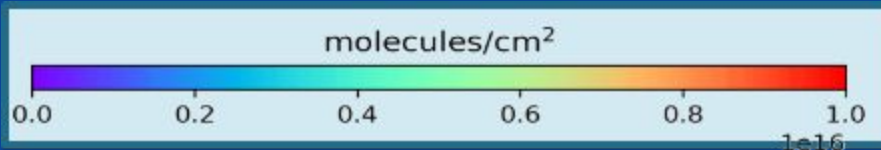
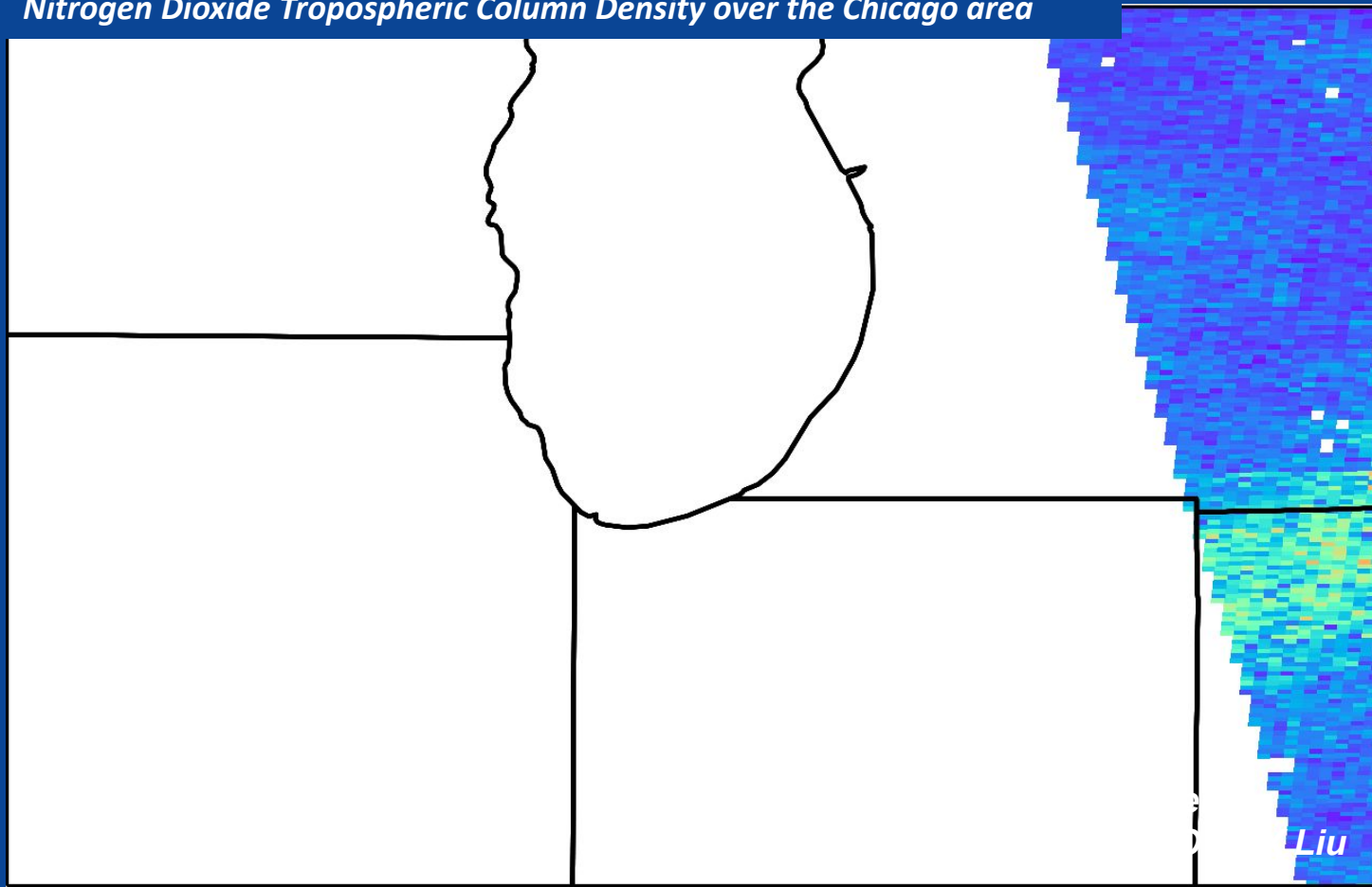
Monitoring facility-level leaks will be key going forward given EPA's new methane rule.



Daniel Varon (Harvard University)

NOAA's Future GeoXO Satellite Mission

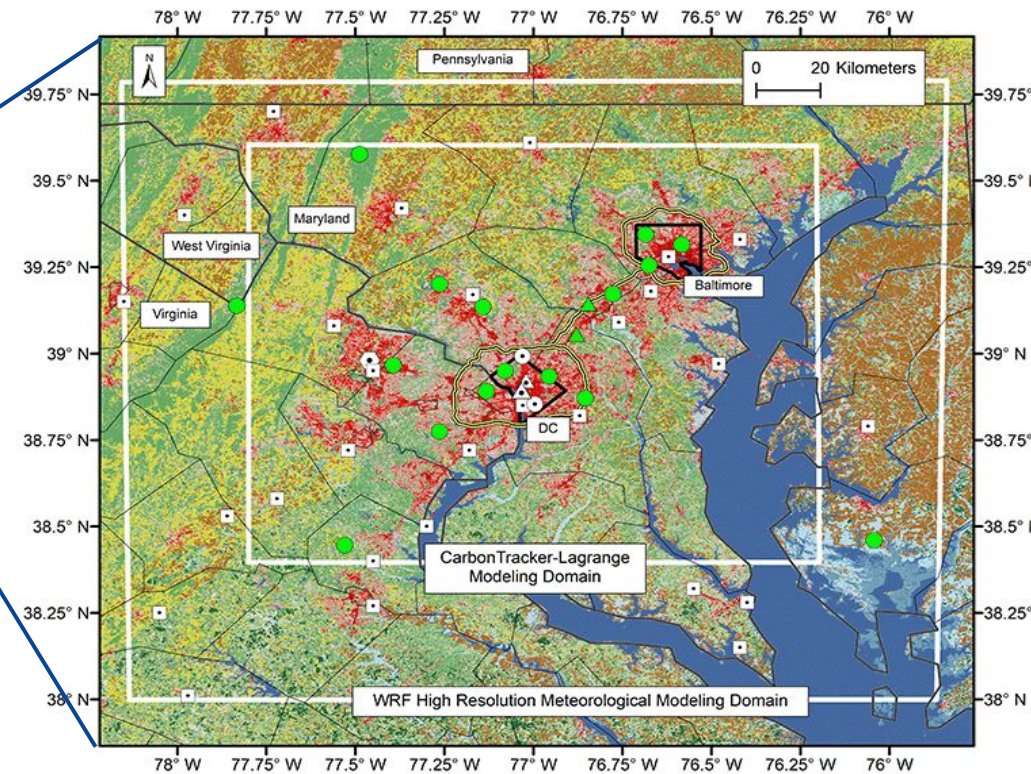
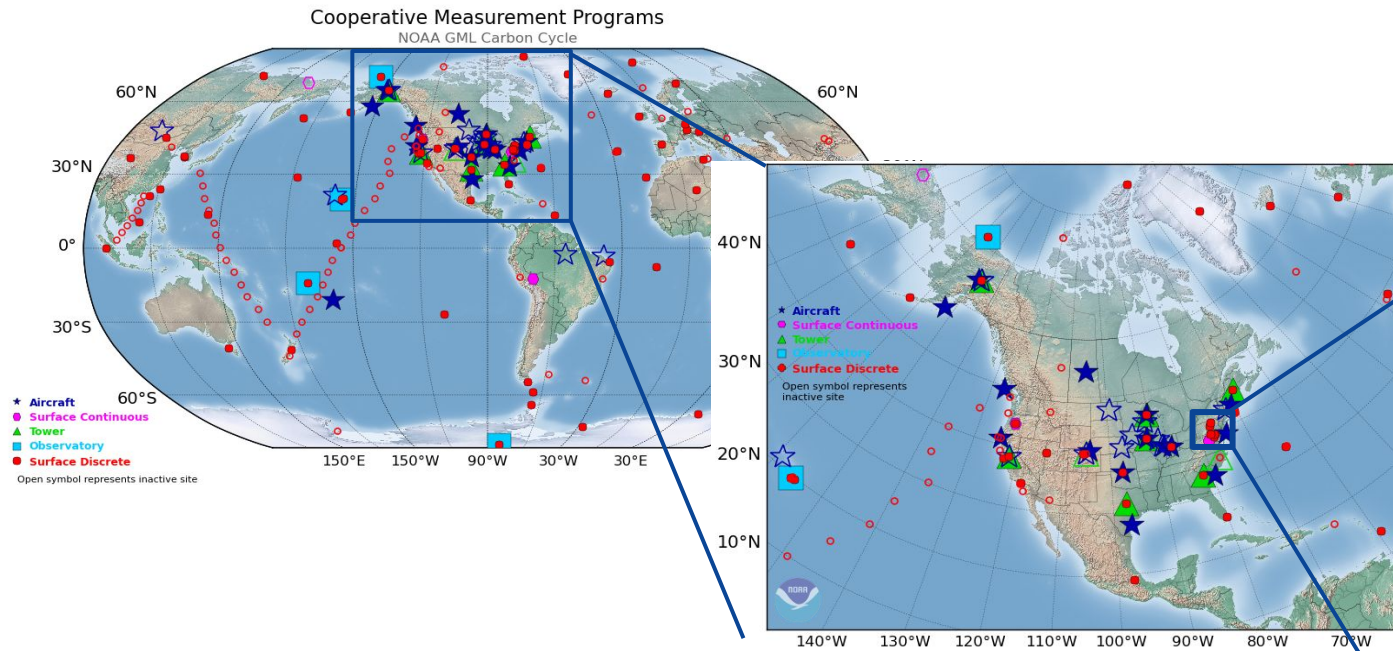
TEMPO (pathfinder for GeoXO Atmospheric Composition instrument)
Nitrogen Dioxide Tropospheric Column Density over the Chicago area



Megacities co-emit CO₂ and NO₂ along with other pollutants

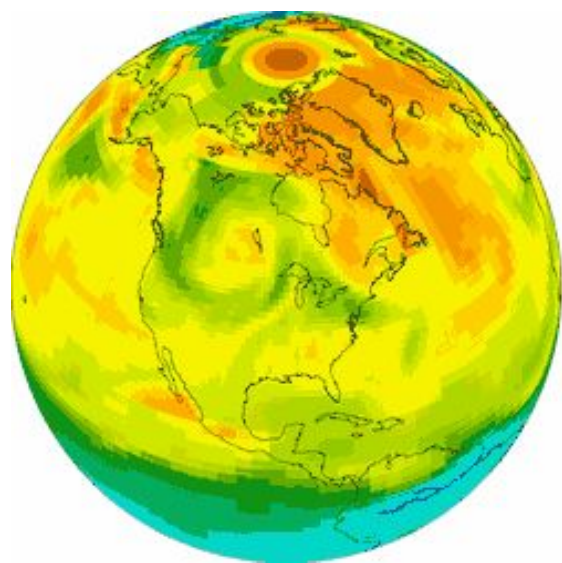
Knowing NO₂ fluxes will allow us to obtain CO₂ fluxes

GHG Observing Systems from Global to Urban Scales

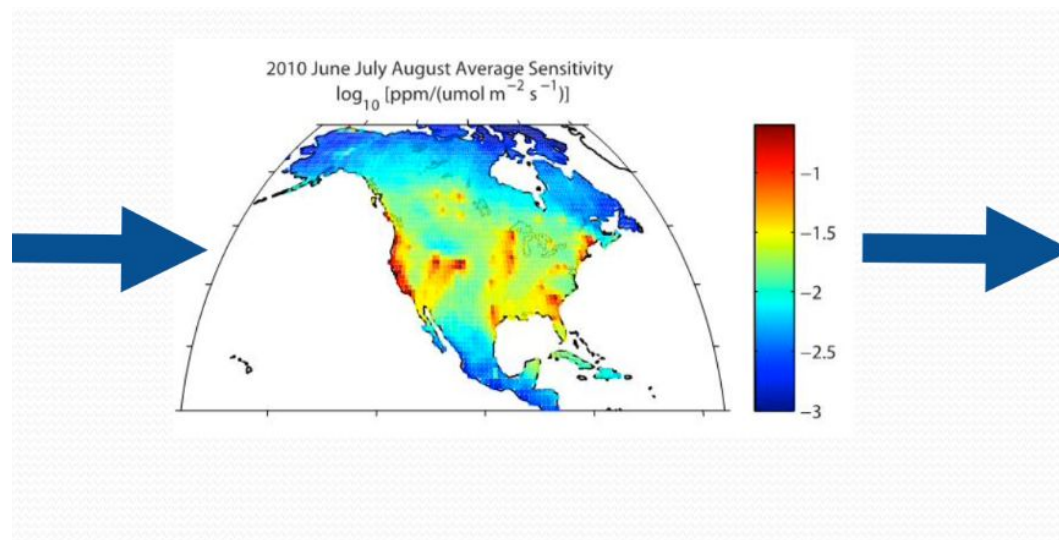


- The GHG observing network leverages observations from ground, airborne and satellite-based observing systems.
- The global network informs the boundary condition for higher resolution observation networks and estimates of emissions using models.

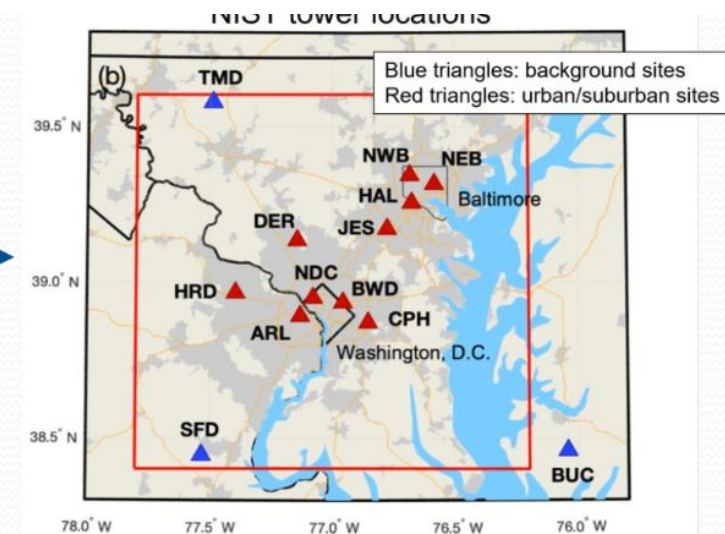
Development of an Operational GHG Flux Estimation System from Global to Urban Scales



Global Scale:
CarbonTracker data assimilation system



National and regional scale:
HYSPLIT transport model and CarbonTracker system

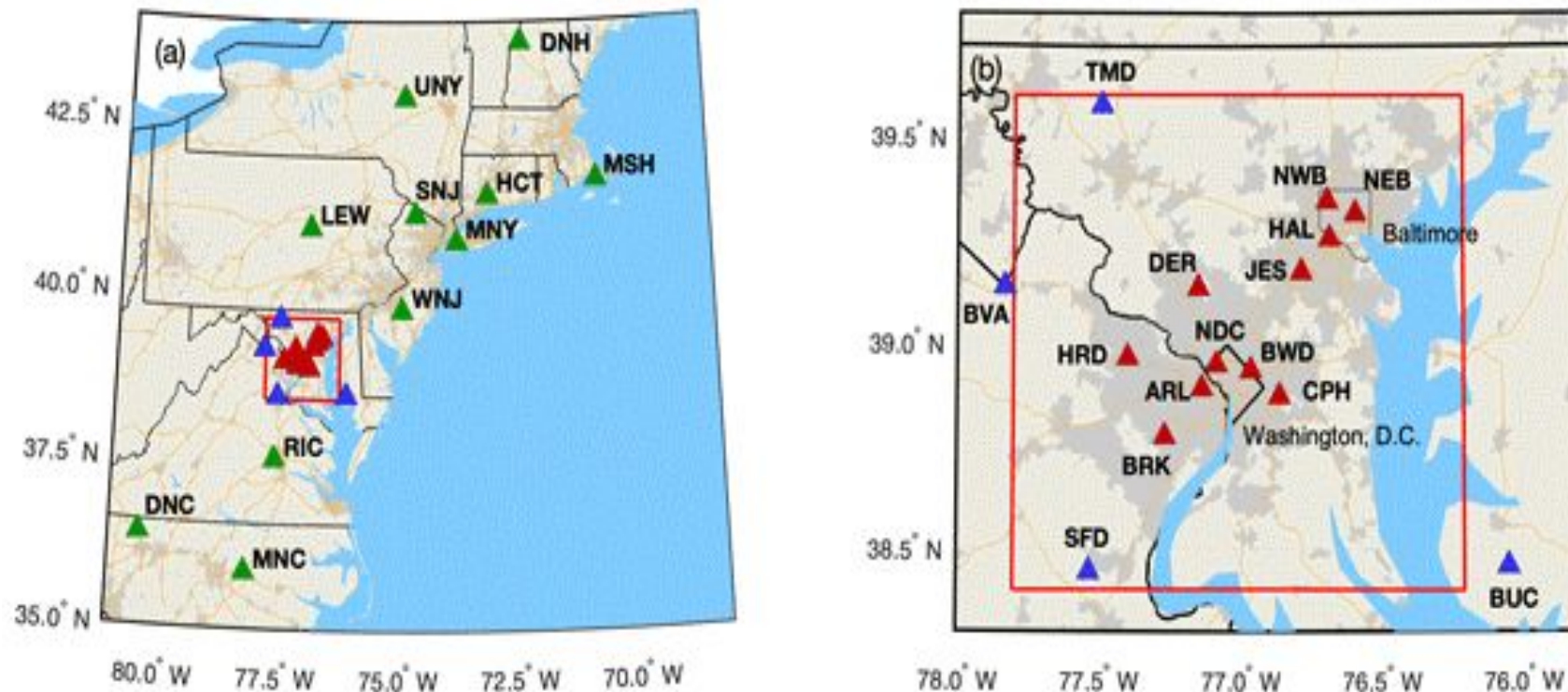


Urban scale:
HYSPLIT and CarbonTracker systems

A NOAA, NIST collaboration

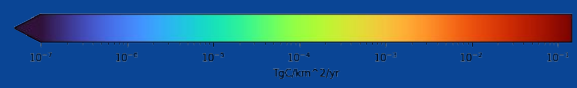
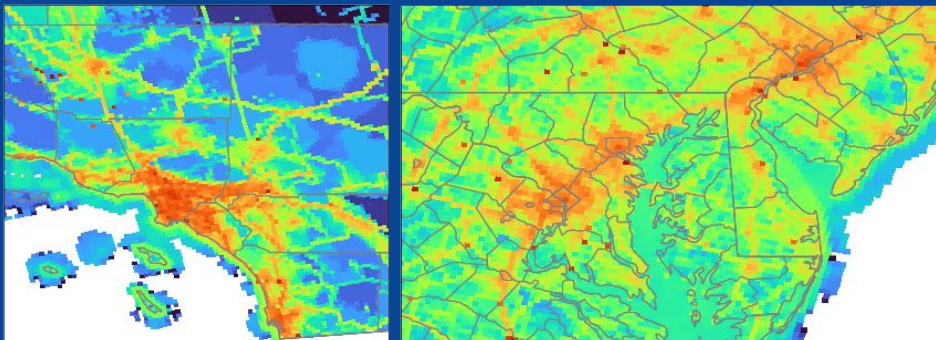
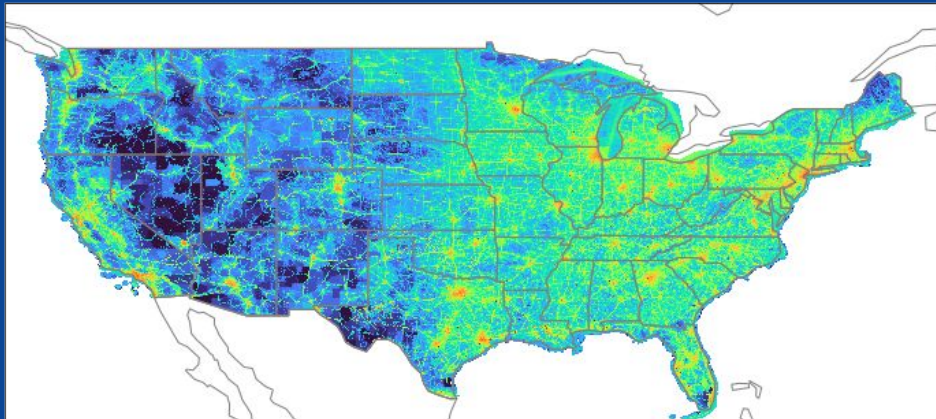
Urban-scale Greenhouse Gas Measurement, Monitoring, and Information System (GGMMIS)

A prototype for the Washington, D.C.- Baltimore metro regions. A NOAA/NIST collaboration.



Combines atmospheric measurements with emissions inventories for whole and sub-city emissions. Increases annual reporting to biannual or quarterly updates.

Greenhouse Gas and Air Pollutant Emissions System (GRAAPES) using satellite data



Map of fossil CO₂ emissions from GRAAPES for 2017

Satellite Products to be Used in GRAAPES

S5P TROPOMI Methane

JPSS Series CrIS Methane

GOSAT Series Methane

TEMPO Nitrogen Dioxide

OCO-2/3 Carbon Dioxide

GOSAT Series Carbon Dioxide

- NOAA / NIST led initiative, with additional interagency contributors
- Measure, model, and map emissions of greenhouse gases and air pollutants in consistent spatial/temporal pattern
- Development of uncertainty analyses for emission inventories
- Enable nowcasting, forecasting, or hindcasting of GHGs and air pollutants at multiple spatial scales – city, state and national

Commercial Engagement: Data and Systems

Commercial Data
Purchase

Weather Data
Pilots

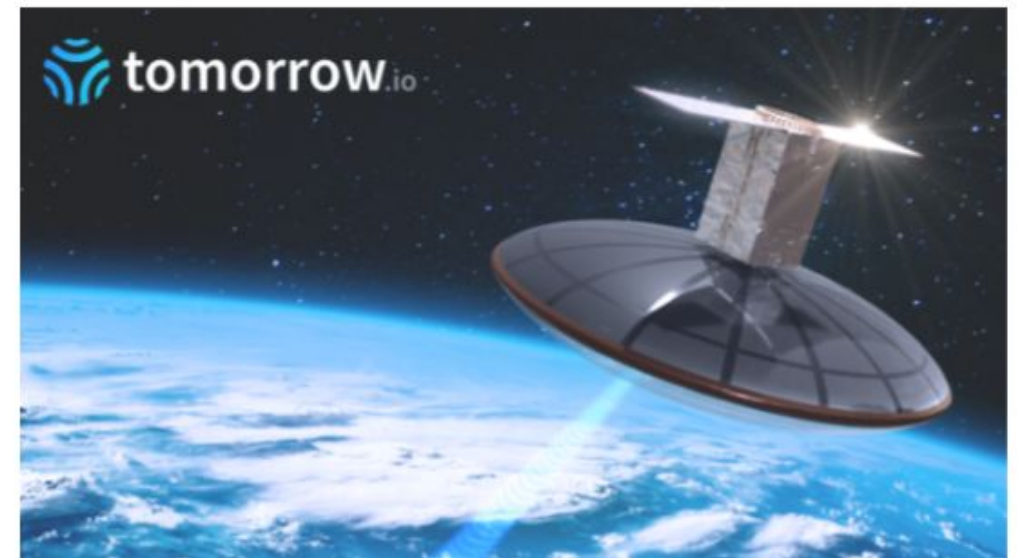
Commercial
Enterprise
Partnering

- ❖ Multi-year agreements for commercial data buys (e.g., Radio Occultation)
- ❖ Licensing for unlimited distribution rights (e.g., contract with Spire Global Subsidiary Inc)
- ❖ Commercial Weather Data Pilot with Spire Global for Ocean Surface Winds
- ❖ Handover of operations of legacy “still functioning” but retired fleet of NOAA satellites to Parsons
- ❖ Organize “Industry Day” events with commercial sector on future NOAA-Commercial sector observation partnership opportunities

NOAA partners with Tomorrow.io to assess impact of weather satellite data

By DAN SYMONDS — February 28, 2022 2 Mins Read

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Tomorrow.io is developing a constellation of radar-equipped weather satellites, planned for launch in late 2022 - credit: Tomorrow.io

Emerging Partnerships: Infrastructure, Engineering, Tech (among others)

Opportunity

NOAA General Request For Information on sam.gov highlighting "greenhouse gas" as a high priority category.

Responses are due on January 20, 2024 with an expectation of a "go-no go" decision to move forward with a new measurement pilot project (TBD) in the Spring 2024.



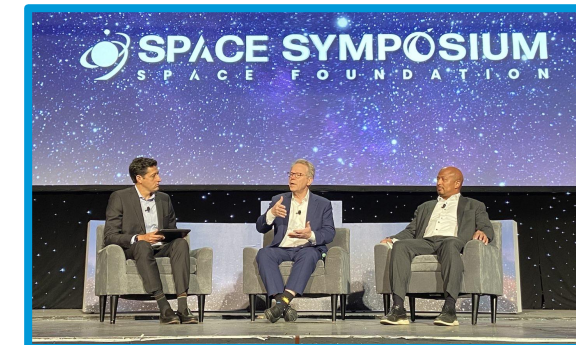
NOAA's Office of Space Commerce: *An Advocate & Regulator*

We're hiring! Openings [here](#)

The Office of Space Commerce (OSC) is the U.S. space industry's advocate within the U.S. government. OSC also licenses and oversees private “remote sensing” (imaging) space systems.

Our work includes:

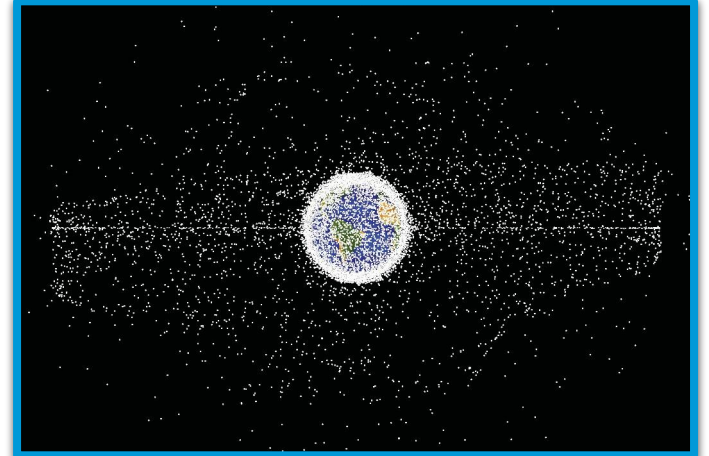
- Coordinating government-wide space commerce policy issues and actions...
- Pursuing the removal of legal, policy, and institutional impediments to space commerce...
- Acting as an industry advocate within the Executive Branch...
- Providing commercial remote sensing licensing...
- Monitoring licensees for compliance with U.S. law and regulation...
- Protecting national security, foreign policy, and international obligations....





OSC's *TraCSS* Program - Enabling Space Safety

- The **White House's Space Policy Directive-3** (2018) transferred responsibility for providing basic space situational awareness (SSA) services - monitoring and tracking objects in orbit - from the Department of Defense to the Department of Commerce.
- The Office of Space Commerce is standing up a SSA program - **the Traffic Coordination System for Space (TraCSS)** - to fulfill this critical responsibility.
- OSC is executing TraCSS' implementation **in coordination with DoD, NASA, and commercial industry.**





Summary



GHG Strategy

NOAA's GHG capabilities, as part of Climate Ready Nation, are key components of the national GHG strategy.

Long-standing GHG Experience

NOAA has more than 50 years of experience in GHG observations, research, modeling and data services.



Operational Satellites Programs

NOAA's satellite fleet, including partner assets, routinely monitor atmospheric composition globally.



Partnership & Public/Private

NOAA partners across the public and private sectors on science and observations, including through its Office of Space Commerce.