NASA Earth Observatory images by Joshua Stevens, using Suomi NPP VIIRS data from Miguel Román, NASA GSFC

THE NORTH-EAST CORRIDOR:
BALTIMORE / WASHINGTON
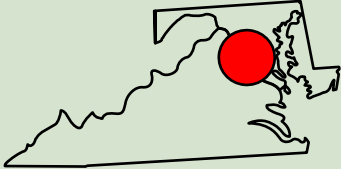### URBAN GREENHOUSE GAS MEASUREMENTS PROJECT

https://www.nist.gov/topics/northeast-corridor-urban-test-bed

Anna Karion

National Institute of Standards and Technology

NORTHEAST CORRIDOR – BALTIMORE/WASHINGTON

NIST	University of Maryland	Earth Networks	...and more
David Allen Subhomoy Ghosh Sharon Gourdji Israel Lopez Coto Kimberly Mueller Kuldeep Prasad Tamae Wong James Whetstone	Russ Dickerson Ross Salawitch Ning Zeng Kayo Ide DaLin Zhang Xinrong Ren Hao He Cory Martin Shaun Howe Doyeon Ahn Courtney Grimes & team	Steve Prinzivalli Clayton Fain Uran Veseshta Bryan Biggs Michael Stock Charlie Draper William Callahan GCWerks: Peter Salameh	Northern Arizona University: Kevin Gurney Boston University: Lucy Hutyra & team Bowdoin College: Barry Logan CUNY: Andrew Reinmann DOE/ORNL: Melanie Mayes & Jeff Warren Purdue University & Stony Brook University: Paul Shepson NOAA/ESRL: Colm Sweeney, John Miller, Isaac Vimont U. Michigan: Eric Kort & team U. Colorado/GNS Science: Jocelyn Turnbull Scripps & JPL: Kris Verhulst, Jooil Kim, & the LA Megacities team

Image: Bill Rankin - Citynoise

NEC-BW
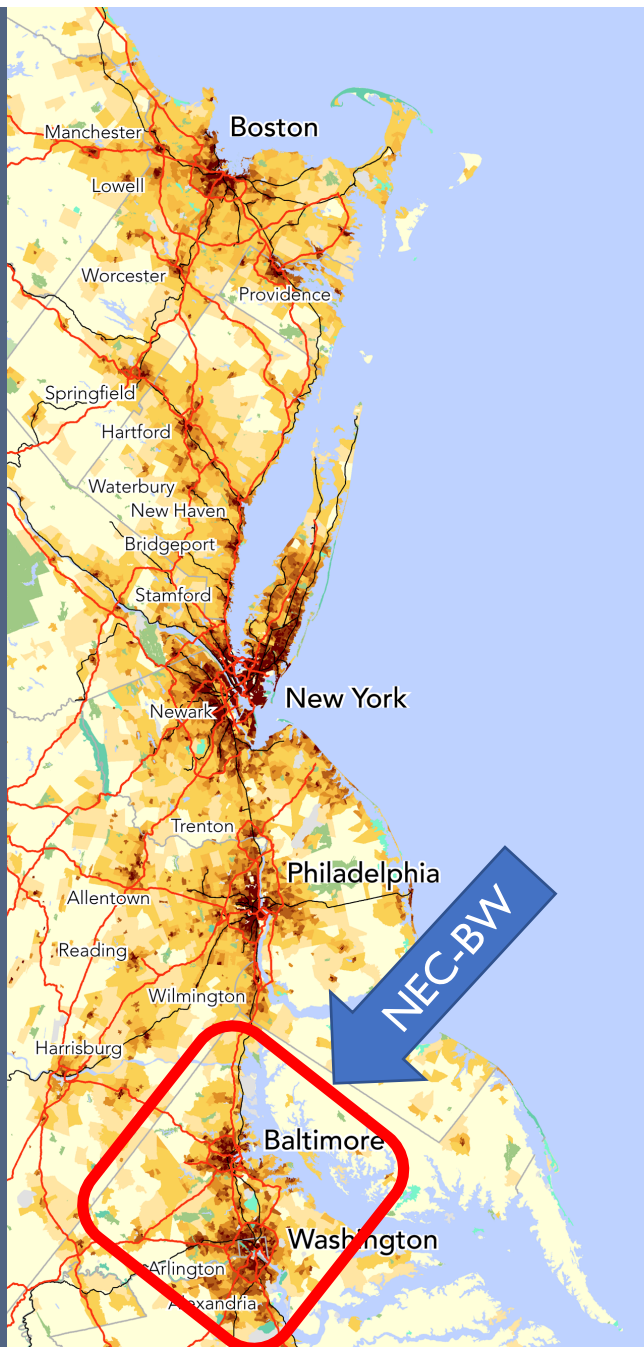
NORTHEAST CORRIDOR OBJECTIVES

- Determine whole-city emissions & separate influences from different cities (e.g. Baltimore vs. Washington)

- Estimate emissions for CO_2 & CH_4 at appropriate spatial & temporal resolutions (need to be identified)

- Develop methods for background (incoming air) determination (isolating concentration enhancements due to urban influence)

- Extend and compare inversion methods

- Investigate application of low-cost sensors in a high-density, hybrid network

- Link biological GPP, respiration, and uptake to solar induced fluorescence (SIF) & other optical remote sensing methods

NEC-BW PROJECT ELEMENTS

Aircraft (FLAGG-MD)
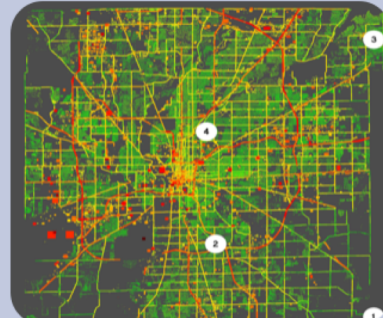- Mass balance
- Inversion modeling

(see 2 posters)

Tower Network

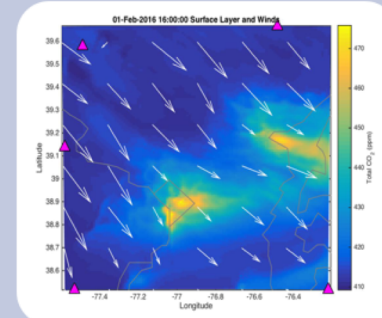High-accuracy CO_2, CH_4 measurements

(see 1 poster)

Emissions Modeling
- Hestia

Anthropogenic CO_2 inventory

Modeling
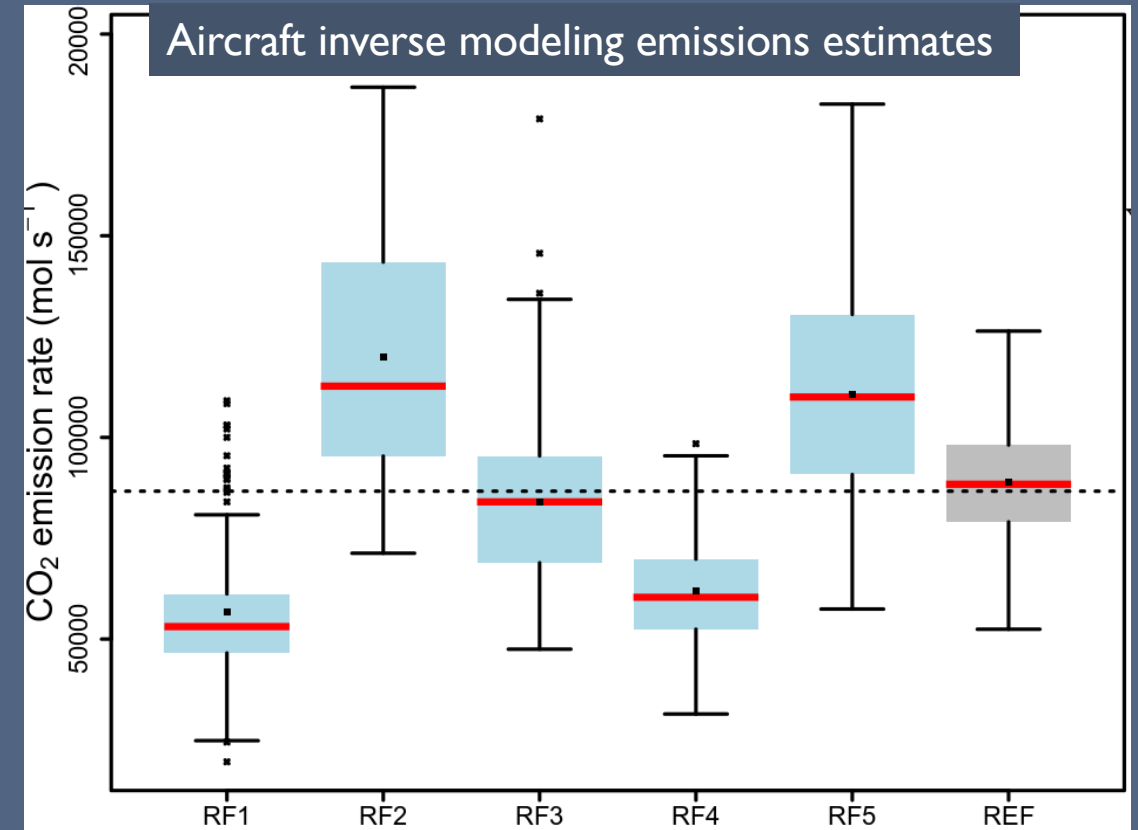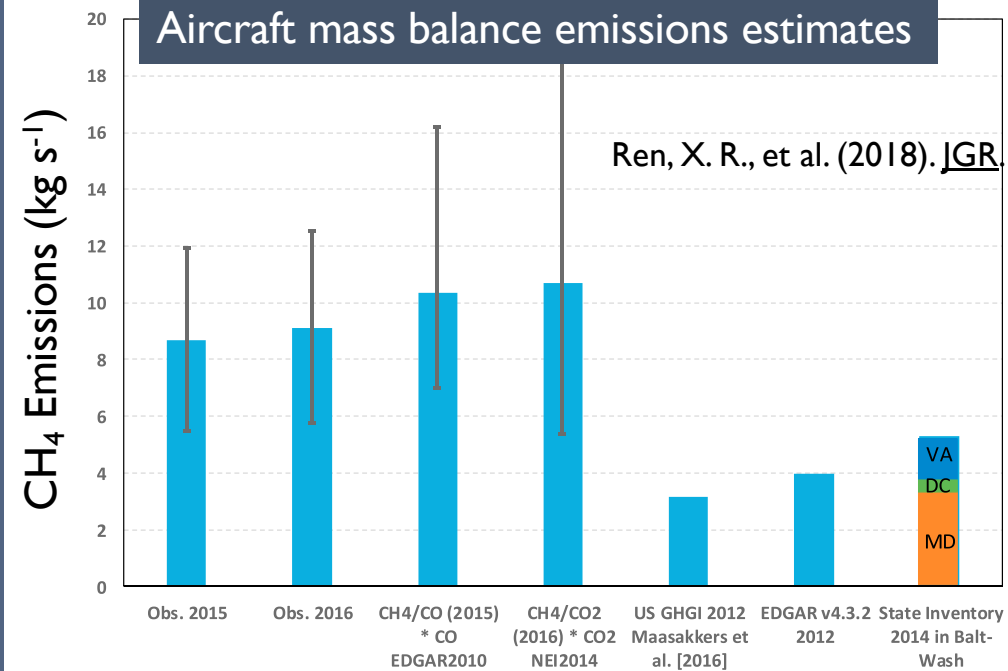- WRF-Stilt
- WRF-Chem, LES
- Inversions
- LETKF

Urban and regional inverse models
(see 1 poster)

Also:
- Low-Cost Sensors
- Biogenic fluxes & SIF testbed

RECENT SUCCESSES USING AIRCRAFT DATA (FLAGG-MD)

Aircraft mass balance emissions estimates

Ren, X. R., et al. (2018). JGR.

Aircraft inverse modeling emissions estimates

Also:

Salmon, O. E., et al. (2018). "Top-Down Estimates of NOx and CO Emissions From Washington, DC-Baltimore During the WINTER Campaign." JGR-A **123**(14): 7705-7724

Ahn, D. et al., in prep and poster "Emissions of CO2 from Baltimore-Washington area: Results from FLAGG-MD 2015 campaign".

Lopez Coto et al., "GHG flux inversions in the Washington DC / Baltimore metropolitan area: FLAGG-MD 2016 flight campaign", in prep. (and poster later today).

- Ahn et al., poster session

- Lopez Coto et al., poster session

BALTIMORE/WASHINGTON NIST TOWER NETWORK

- 16 sites inside and around Washington/Baltimore region

- Established & Operated by Earth Networks

- Additional sites throughout the Northeast for regional studies

- Flasks for $^{14}CO_2$ & other gases at 4 sites (1 BG, 3 urban)

- Began in Fall 2015

- Observations being used for CO_2 & CH_4 top-down emissions estimates
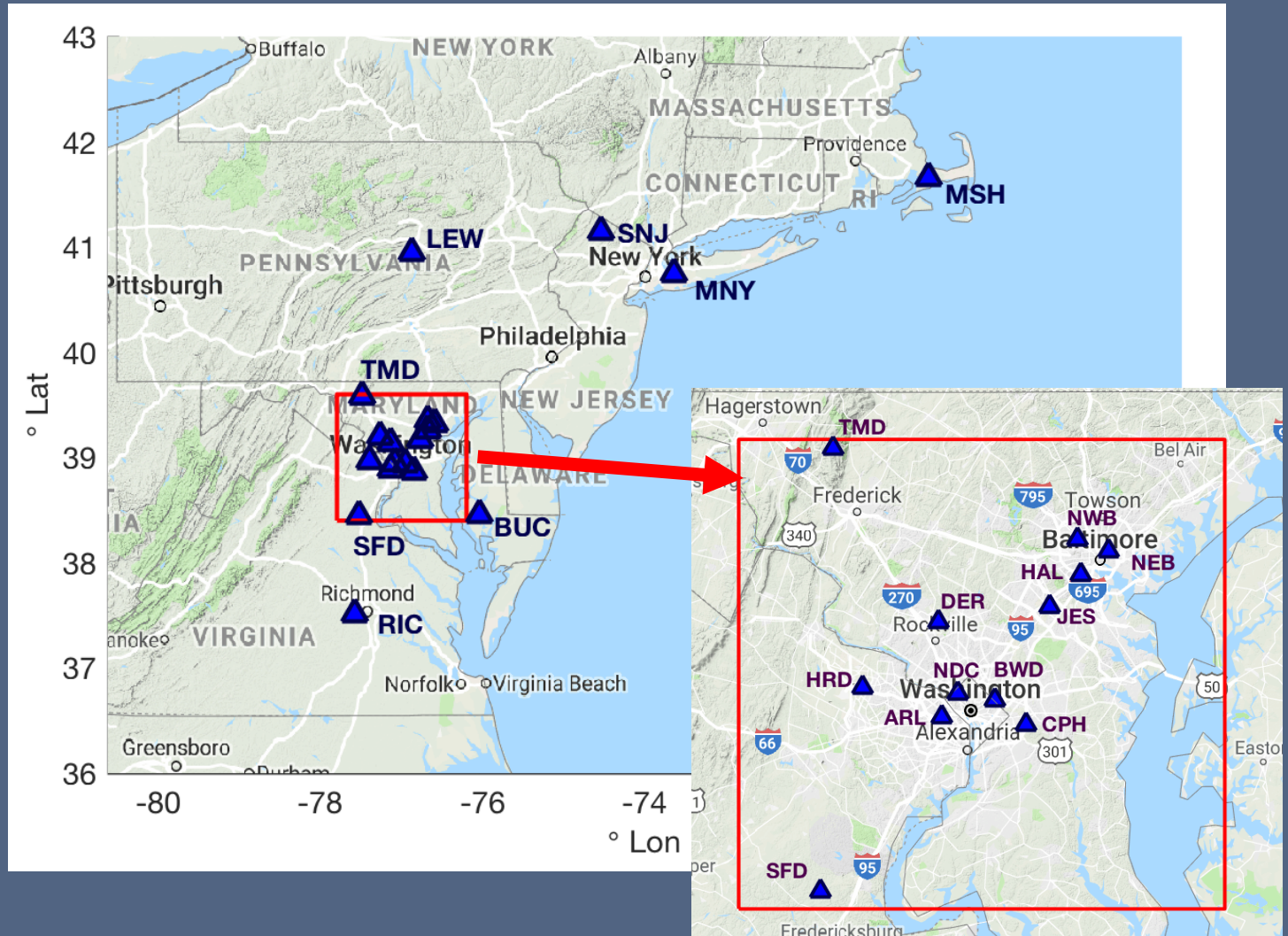
NEC-BW PROJECT ELEMENTS

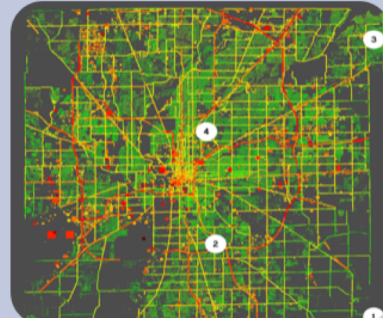**Aircraft (FLAGG-MD)**
- Mass balance
- Inversion modeling

(see 2 posters)

Tower Network

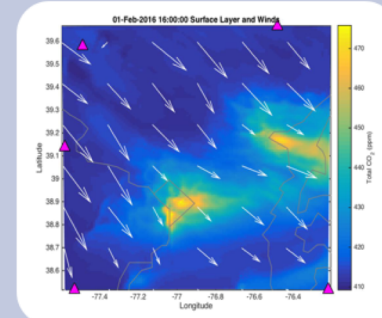High-accuracy CO_2, CH_4 measurements

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