

Preparing Key State and Local Health and Air Quality Agencies for Upcoming Earth Observations

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Health and Air Quality Applications
Program Review

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HEALTH

EMORY

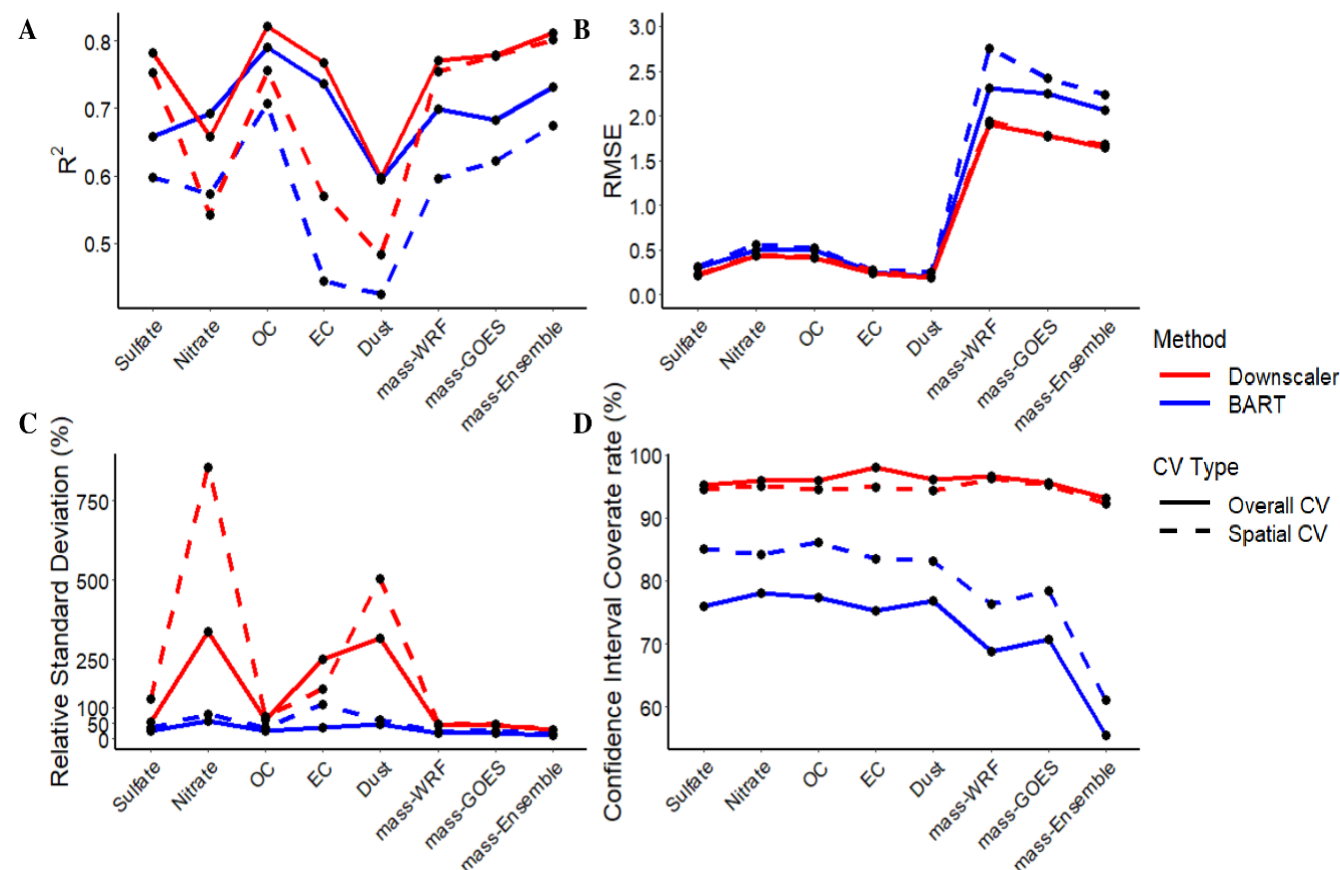
Project Goals

- Prepare air quality and public health stakeholders for data from the next-generation satellite instruments such as MAIA, TROPOMI, and GOES-R series
- Use actual or synthetic data of these instruments to demonstrate how the new information can enhance stakeholders' decision support activities
- Stakeholders: GA EPD, NYC Department of Health and Mental Hygiene
- Current ARL = 6



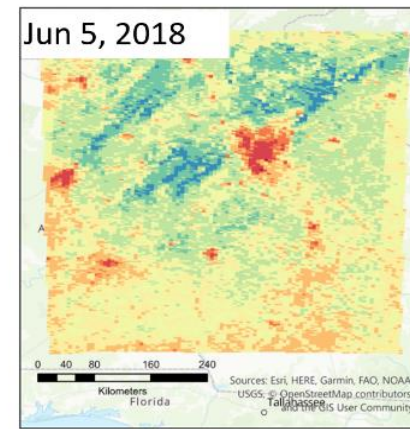
Project Updates - MAIA-like PM product for NYC

- Compared the performance of Bayesian additive regression tree (BART) with MAIA Bayesian downscaler as benchmark.
- In CV experiments, BART (R^2 from 0.59 to 0.79) performed comparably with the Bayesian downscaler (R^2 from 0.60 to 0.82). The BART-based ensemble model performed slightly worse (WRF-Chem [$R^2 = 0.70$]; GOES-16 [$R^2 = 0.68$]) than the downscaler-based ensemble (WRF-Chem [$R^2 = 0.77$]; GOES-16 [$R^2 = 0.78$]).

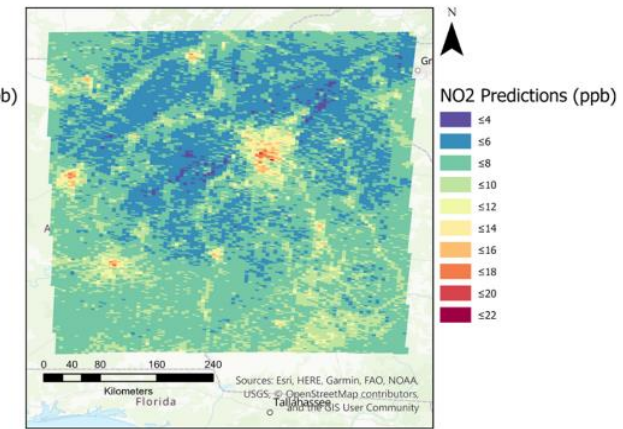


Project Updates - NO₂ model in Georgia with the latest TROPOMI data

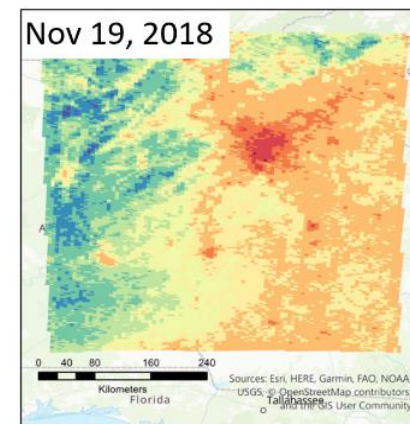
- Improving NO₂ model for the MAIA Southeastern US domain
- Used the latest TROPOMI NO₂ tropospheric column, daily NO₂ predictions improve slightly
 - OOB $R^2 = 0.72$, RMSE = 2.98 ppb
- Prediction map has missing pixels due to missing TROPOMI data



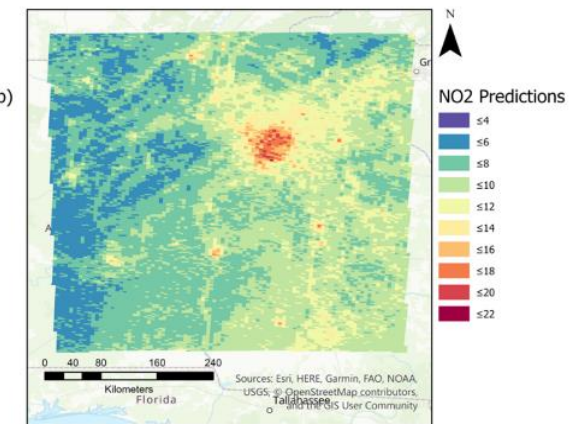
Maximum Hour NO₂ Predictions (ppb)



Daily NO₂ Predictions (ppb)



Maximum Hour NO₂ Predictions (ppb)



Daily NO₂ Predictions (ppb)

NCE Plans

- NYC
 - Make sure NYC can adopt model code to update MAIA-synthetic data
 - Establish automated data delivery pipeline between LARC and NYC
- GA EPD
 - Collaborate with GA EPD to demonstrate satellite capabilities in monitoring NO₂ levels in GA
 - Complete Jan – Apr 2019 WRF-Chem simulation to generate a 1-yr NO₂ dataset driven by TROPOMI