

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

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**Presented by
Jun Wang, University of Iowa**



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Project Team



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- ❑ Kevin Cromar (Co-I), New York University:

- ❑ Collaborators
 - ❑ Tao Zeng, Georgia EPD
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 - ❑ Hyung Joo Lee, California ARB
 - ❑ David Diner, PhD, JPL
 - ❑ Xiong Liu, PhD, SAO
 - ❑ Michael Newchurch, UAH
 - ❑ Shobha Kondragunta, NOAA

Project Goals



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- Prepare air quality and public health stakeholders for data from the next-generation satellite instruments such as MAIA, TEMPO, and GOES-R series
- Use actual or synthetic data of these instruments to demonstrate how the new information can enhance stakeholders' decision support activities

Decision Support Systems and Needs



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- GA EPD - Air Quality Exceedance Report System - helps the EPD better understand the complex conditions leading to exceedances and develop effective emission control strategies (if warranted) to prevent future exceedances
- Proposed enhancement: (1) upgrade GA EPD's O₃ and NO₂ modeling analysis; and (2) introduce PM_{2.5} mapping capabilities.
- Satellite data products: synthetic TEMPO O₃ and NO₂, GOES-16 AOD



Decision Support Systems and Needs

- NYC - (1) Community Air Survey (NYCCAS) - to evaluate how air quality differs across New York City and characterize their temporal trends annually, (2) Syndromic Surveillance of emergency department (ED) visits for emergency response and situational awareness
- Proposed enhancement: (1) upgrade the $PM_{2.5}$ LUR to a downscaler model, and (2) to develop the asthma syndromic surveillance prediction model
- Satellite data products: synthetic MAIA SO₄ and NO₃, GOES-R AOD

Decision Support Systems and Needs



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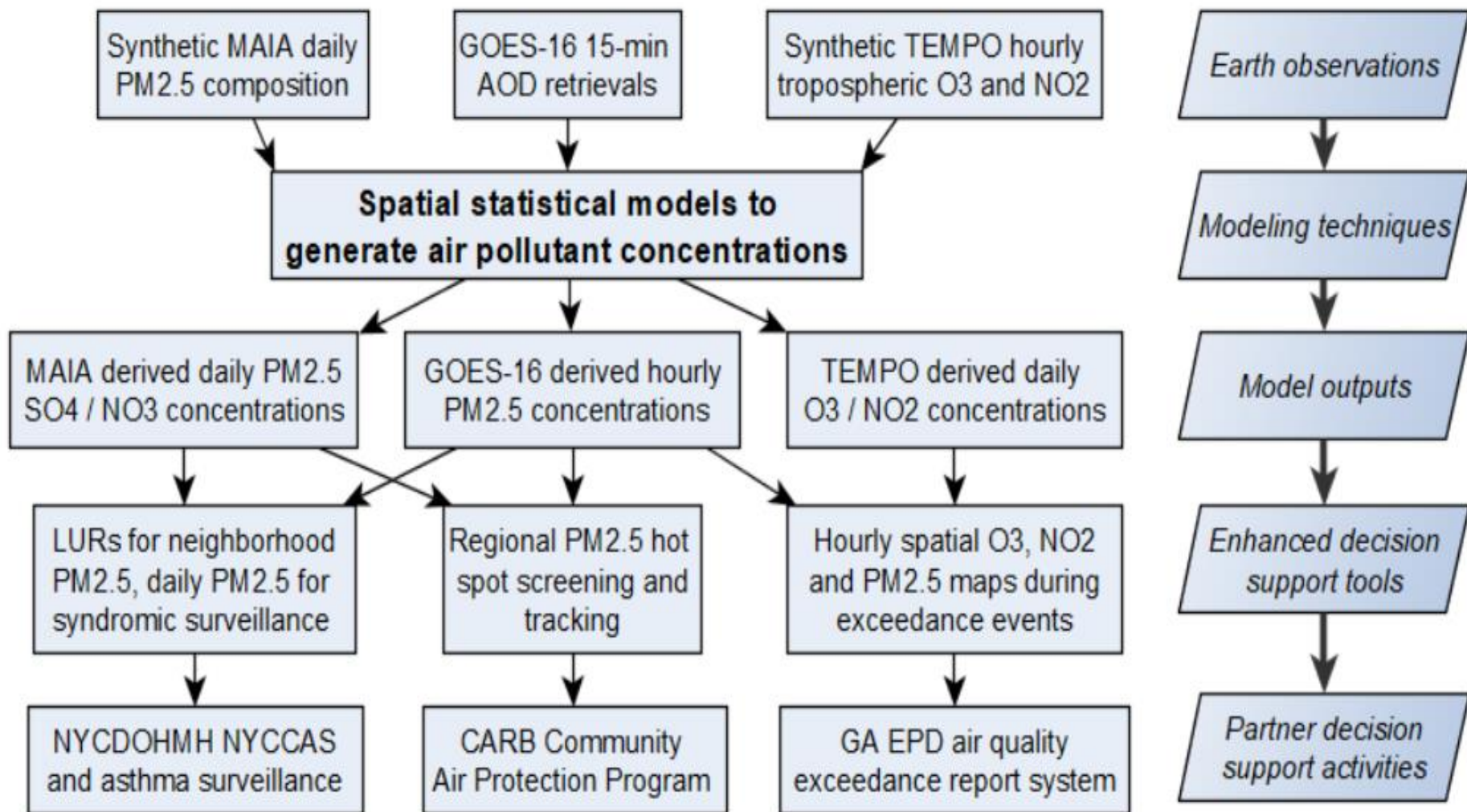
- CARB - Community Air Pollution Monitoring Networks to reduce exposure in communities most impacted by air pollution
- Proposed enhancement: (1) a statewide $PM_{2.5}$ screening tool using GOES-16 AOD data to prioritize monitoring locations, (2) a seasonal $PM_{2.5}$ NO_3 and SO_4 model in Southern California
- Satellite data products: synthetic MAIA SO_4 and NO_3 , GOES-R AOD

Overall Research Strategy



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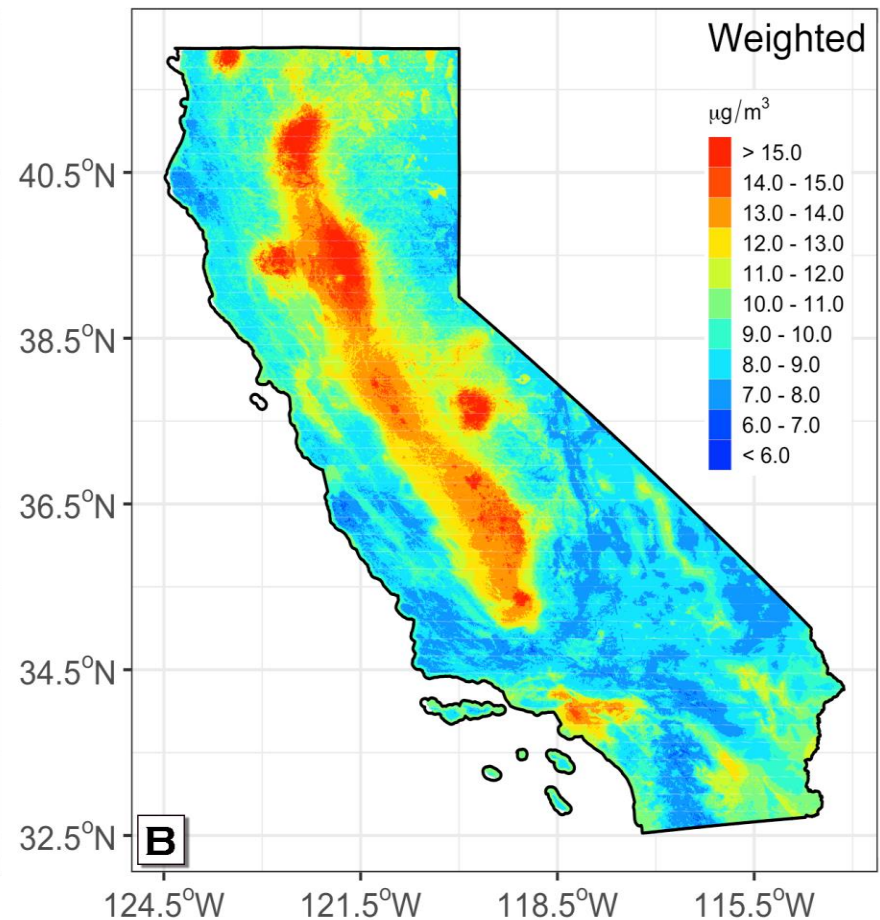
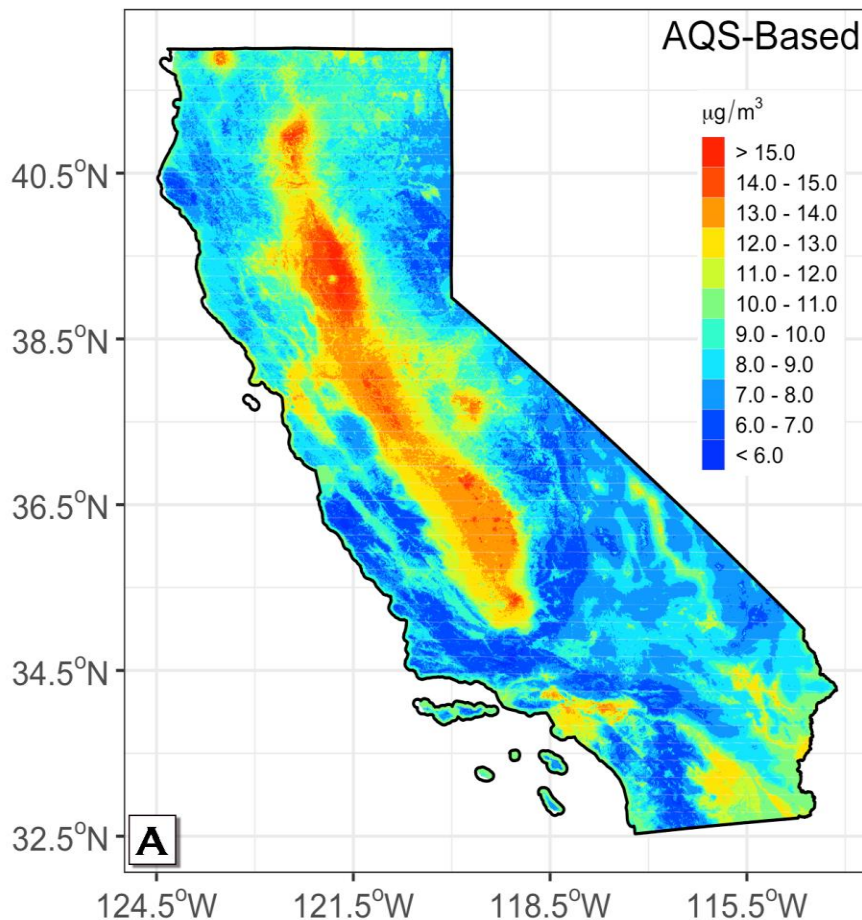


Preliminary Modeling Effort – CA statewide PM_{2.5} model integrating MAIAC and PurpleAir data



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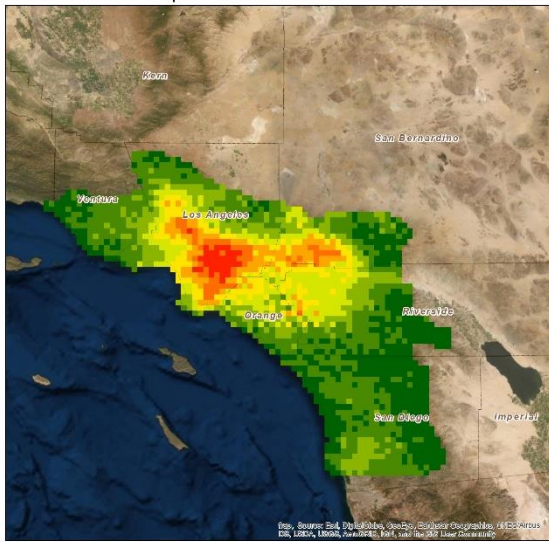
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Preliminary Data Exploration – TROPOMI NO2 and O3 Column



Tropospheric NO2 Column Monthly Distribution
August, 2018 Los Angeles
Spatial Resolution: 4 * 4 km

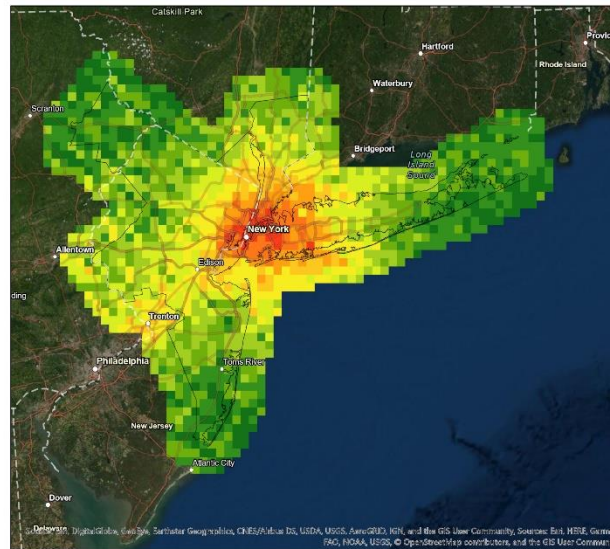


Tropospheric NO2 column

0.000008 - 0.000027	0.000067 - 0.000086
0.000028 - 0.000037	0.000087 - 0.000111
0.000038 - 0.000051	0.000112 - 0.000143
0.000052 - 0.000066	0.000144 - 0.000194

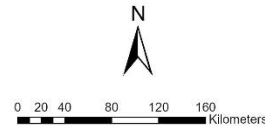


Tropospheric NO2 Column Monthly Average
August, 2018 New York City Metropolitan
Spatial Resolution 7 * 7 km

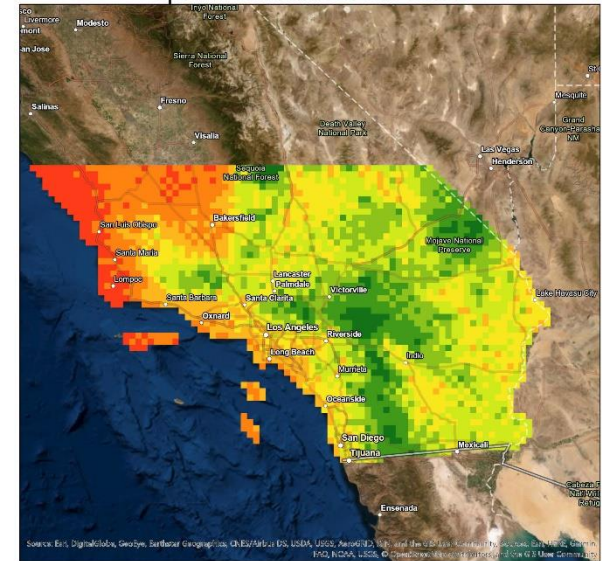


Tropospheric NO2 Monthly Column

≤0.000031	≤0.000063
≤0.000036	≤0.000076
≤0.000041	≤0.000093
≤0.000047	≤0.000122
≤0.000054	≤0.000191

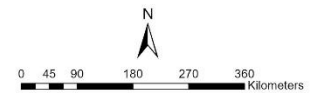


Ozone Total Column Monthly Average
August, 2018 Southern California
Spatial Resolution: 10*10km

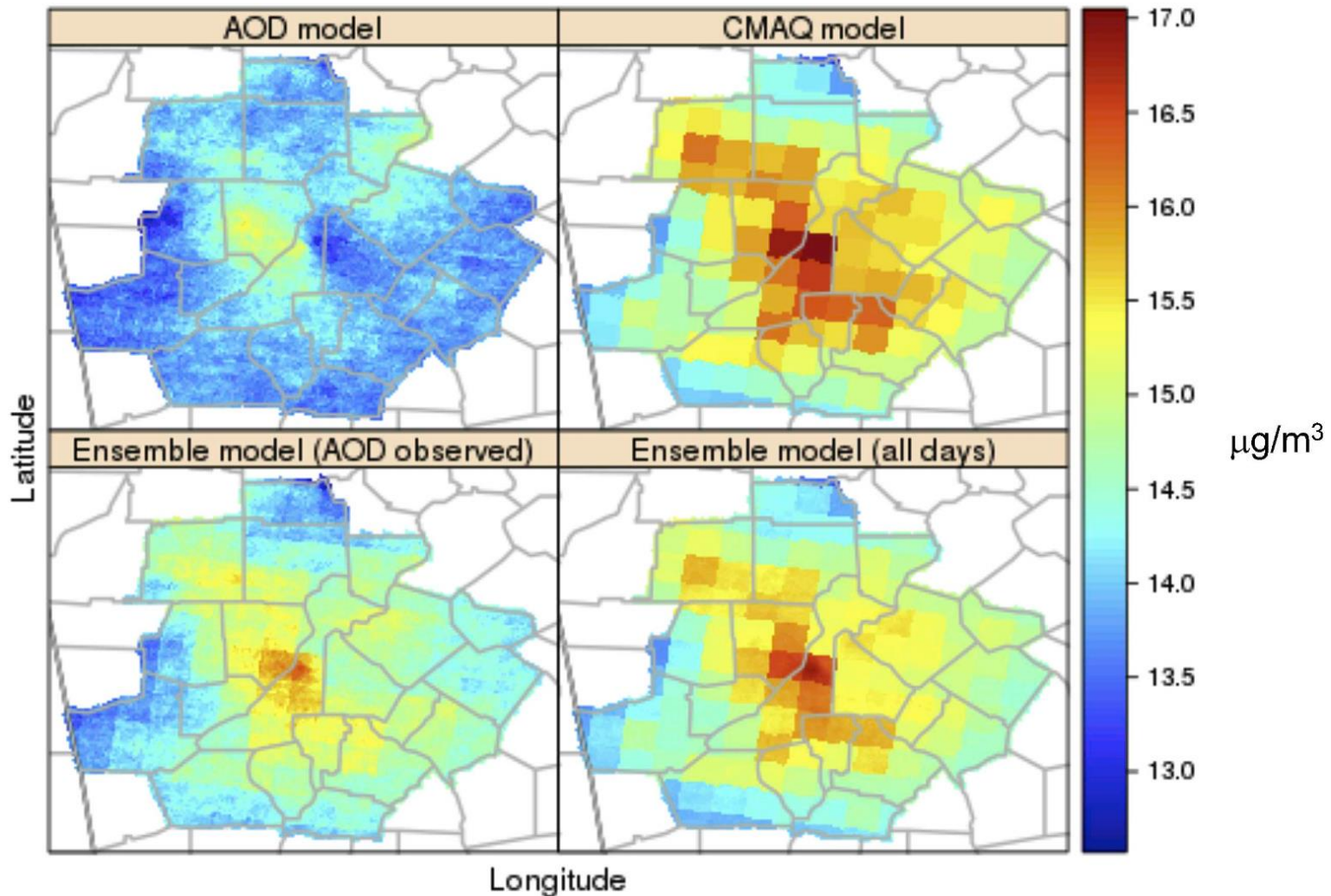


Total Ozone Column

≤0.129983	≤0.131890
≤0.130656	≤0.132420
≤0.131121	≤0.133008
≤0.131488	≤0.134102



Preliminary data exploration – GA PM_{2.5} downscaler model



TEMPO O₃ Synthetic Data



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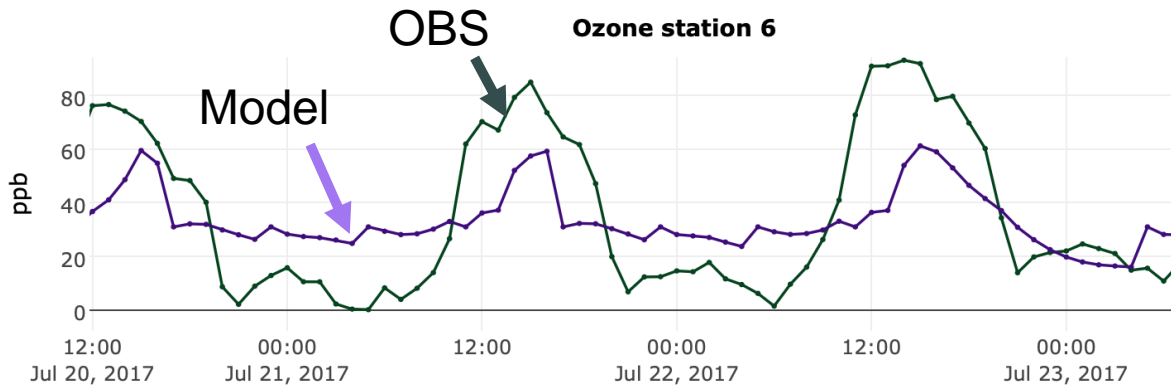
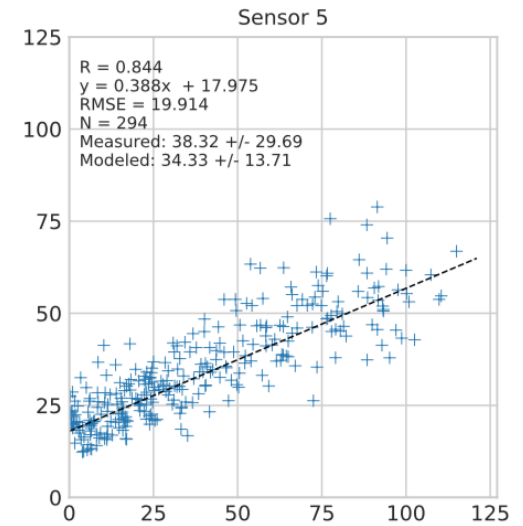
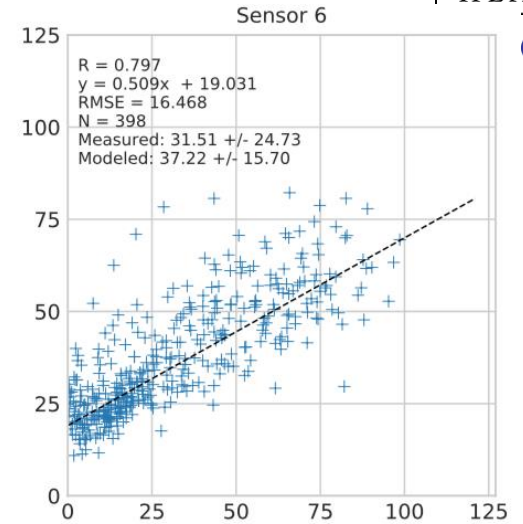
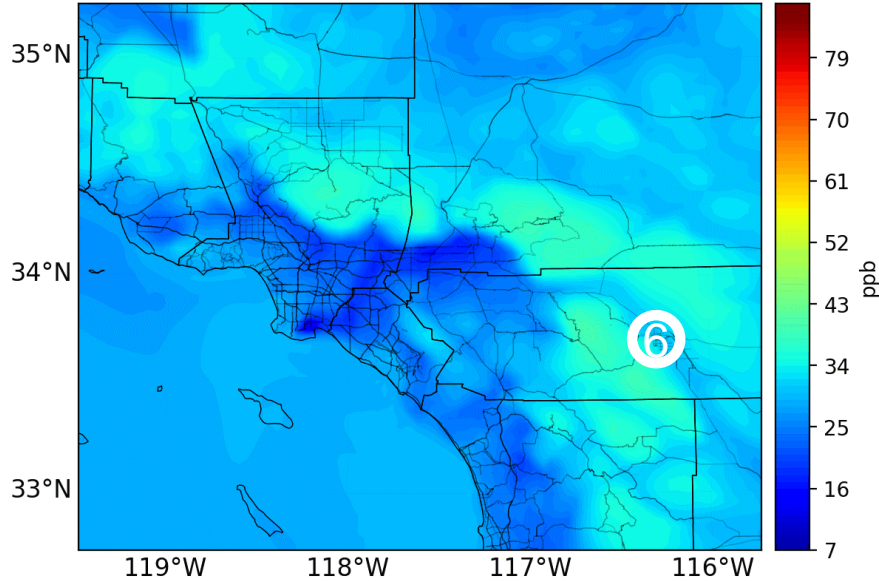
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UIOWA WRF-Chem

O₃ (ppb)

2017-07-22 00:00 PST



Obs. O₃ (ppb)

TEMPO NO₂ Synthetic Data

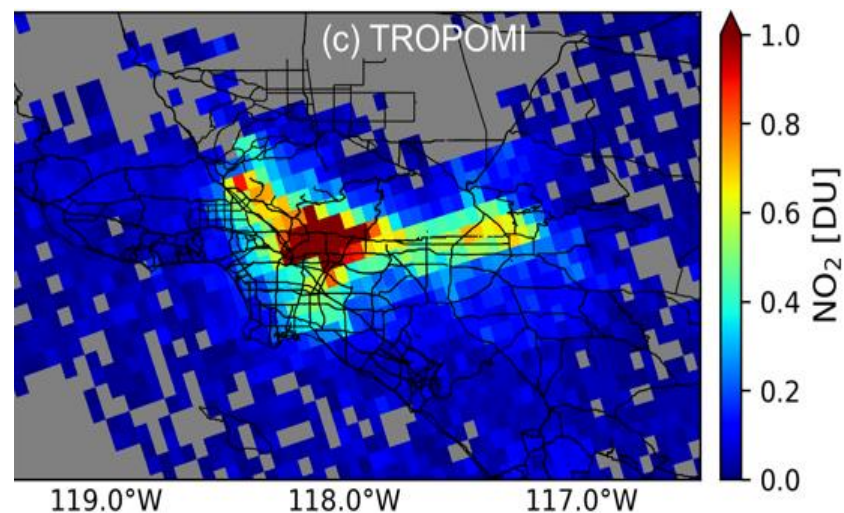
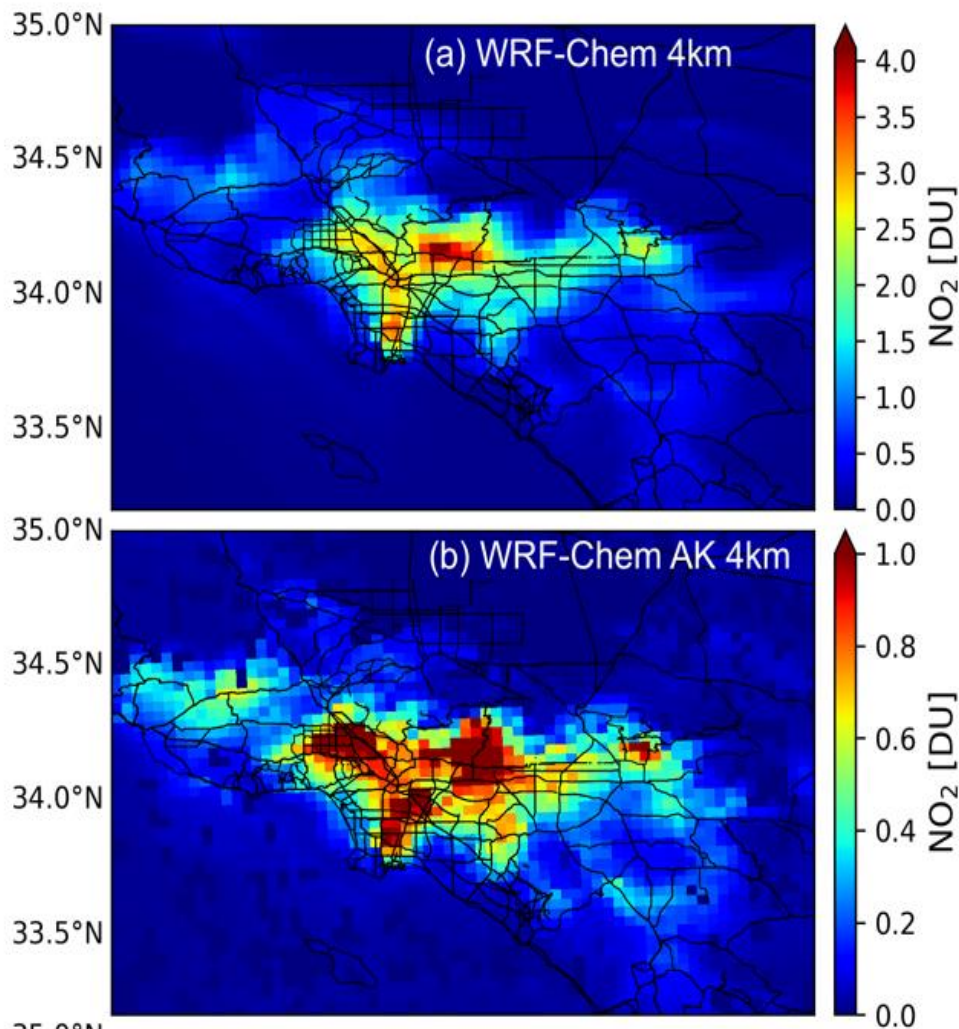
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08 April 2018



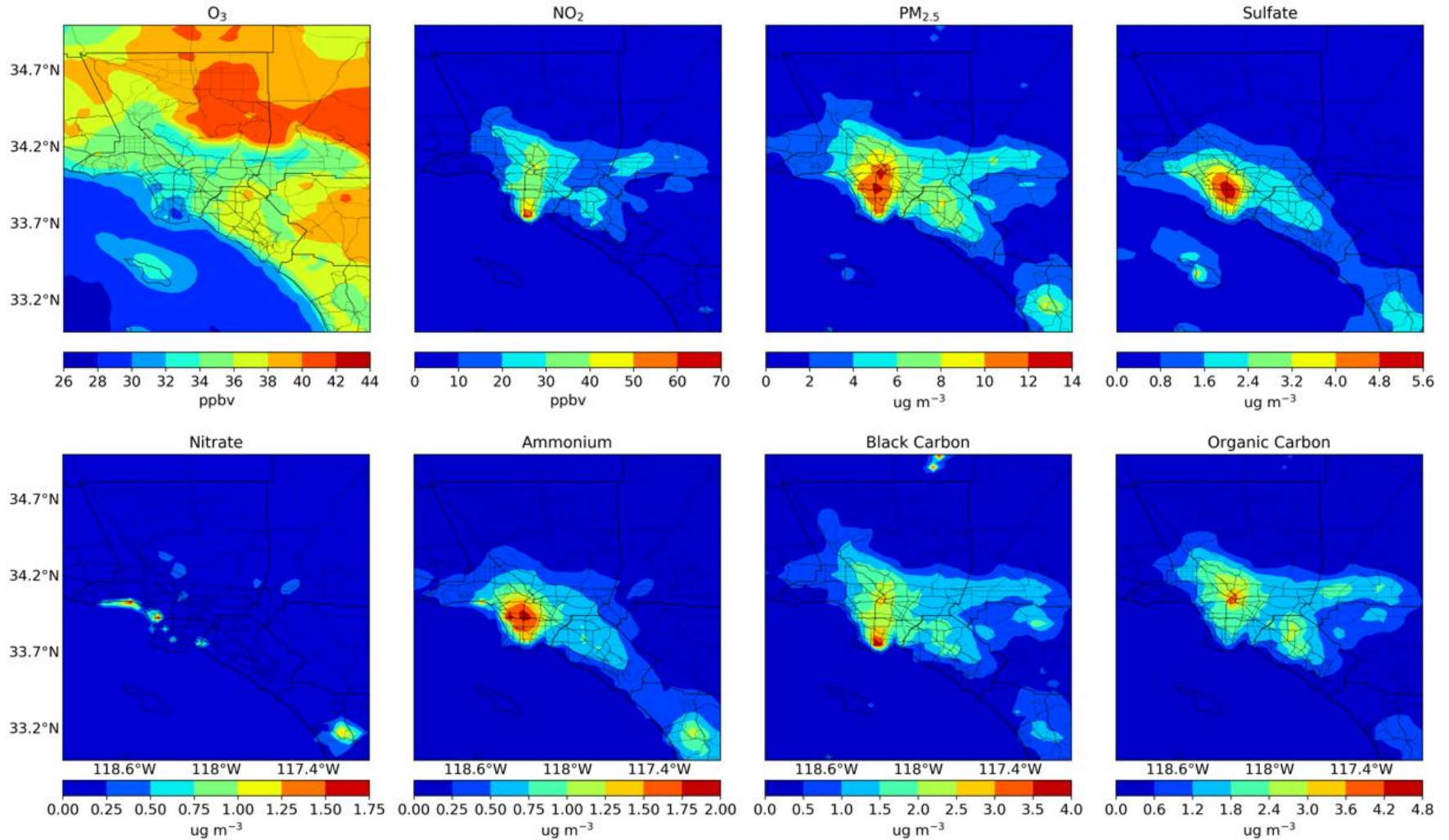
MAIA & TEMPO Synergy

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Milestones



Milestones	Deadline	Team	Status
WER-Chem simulation	11/19	Iowa	In progress
GOES AOD data collection	4/19	Emory	Complete
GOES AOD downscaler	11/19	Emory	In progress
MAIA synthetic data	11/19	Iowa/JPL	In progress
TEMPO synthetic data	11/19	Iowa/SAO	In progress
Stakeholder connection	8/19	NYU	GA EPD, NYC complete, CARB in progress

Risks and Mitigation



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- Risk: Personnel change at all three stakeholder organizations – three lead collaborators left their organization or changed position
- Mitigation: We have established new connections at the stakeholder organizations through on-site meetings and conference calls