## Synergistic applications of new data and technology to characterize the health impact of smoke PM<sub>2.5</sub>



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- Wildland fires often start in remote locations far away from regulatory monitors
- Chemical Transport Models alone often can't estimate the spatiotemporal patterns of smoke due to imperfect emissions, complex terrain, coarse resolution, and chemistry
- Translating knowledge from field campaigns into models will take time

## Satellite remote sensing can be used together with CTM simulations to characterize smoke distribution



Geng et al. 2018

ROLLINS SCHOOL OF PUBLIC HEALTH

EMORY

## Colorado study found greater health risks associated with more precise smoke exposure



Smoke  $PM_{2.5}$  = Satellite total  $PM_{2.5} \times \frac{C}{2}$ 

CMAQ smoke PM <sub>25</sub>
CMAQ total PM <sub>25</sub>

Outcomo	Age	Cases	Fire PM			•	
Outcome			3-day average OR				
Asthma	Child	10,184	1.075 (1.035, 1.115)		-•-		
	Adult	10,448	1.091 (1.060, 1.122)	1			
	Elderly	1,286	1.009 (0.920, 1.106)				
	All	21,918	1.081 (1.058,1.105)		-		
Bronchitis	Adult	6,772	1.044 (1.005, 1.085)				
COPD	Adult	4,491	1.056 (1.015, 1.100)				
Respiratory Disease	Child	61,713	1.016 (1.001, 1.032)	1	•-		
	Adult	56,529	1.030 (1.017, 1.044)		•		
	All	135,363	1.021 (1.012, 1.031)		•		
			0	.8 1.	0 1.	2	
Stowell et al. 2019							

## Low-cost sensors can help capture remote smoke hotspots







Bi et al. 2020