Washington University in St. Louis

ACAG Atmospheric Composition Analysis Group

Advances in Simulating the Global Spatial Heterogeneity of Air Quality and Source Contributions

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with contributions from

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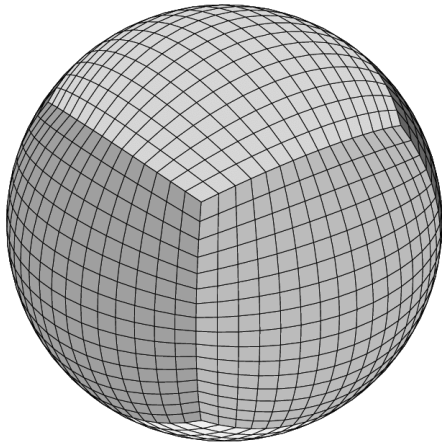
Spatial Heterogeneity of Air Quality and Sectoral Contributions

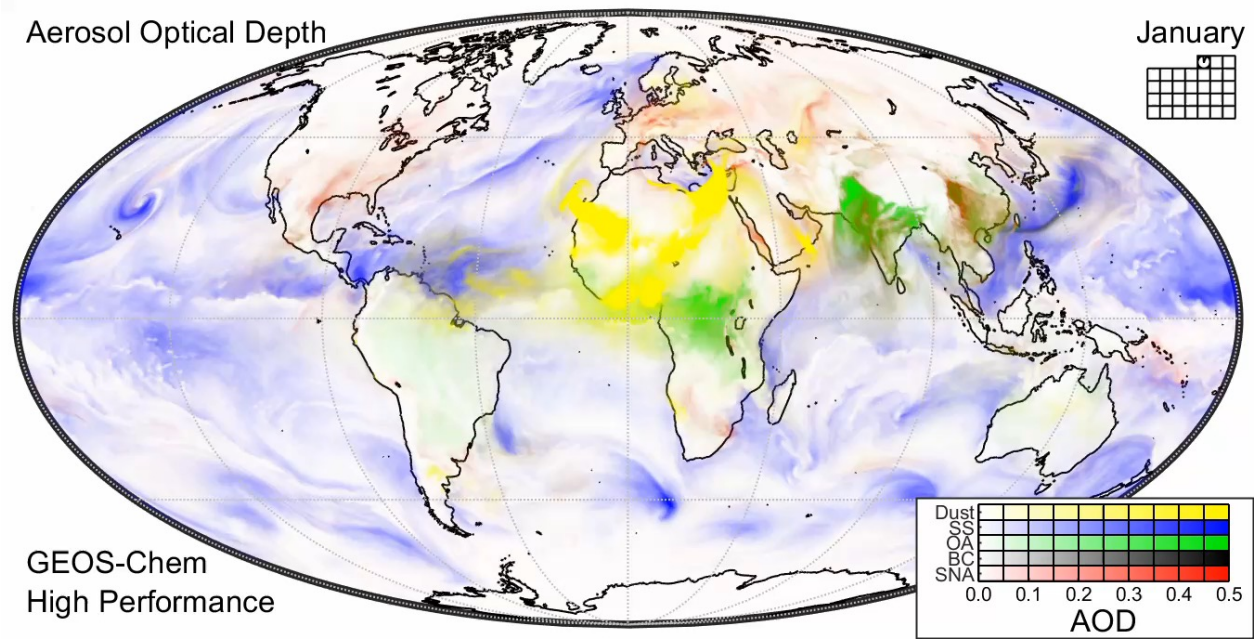


GEOS-Chem

Fine resolution (C360, 25 km)
Coarse resolution (C48, 200 km)

Population Exposure Estimate

Courtesy of Yazhen Wu

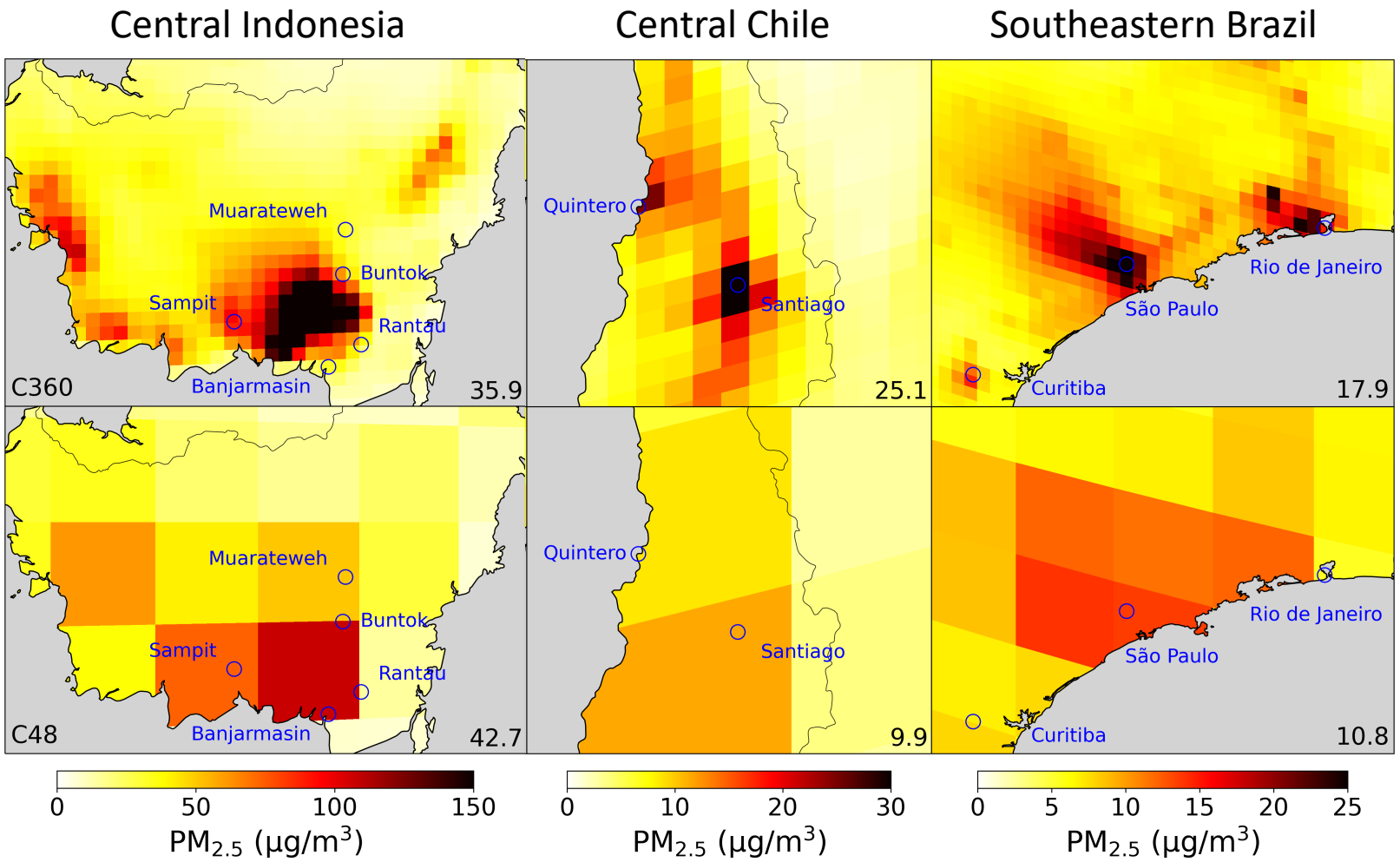


Courtesy of Aaron van Donkelaar

Sectoral Contributions

Residential Combustion | Industry | Energy | Transportation

Spatial Heterogeneity of Population Exposure



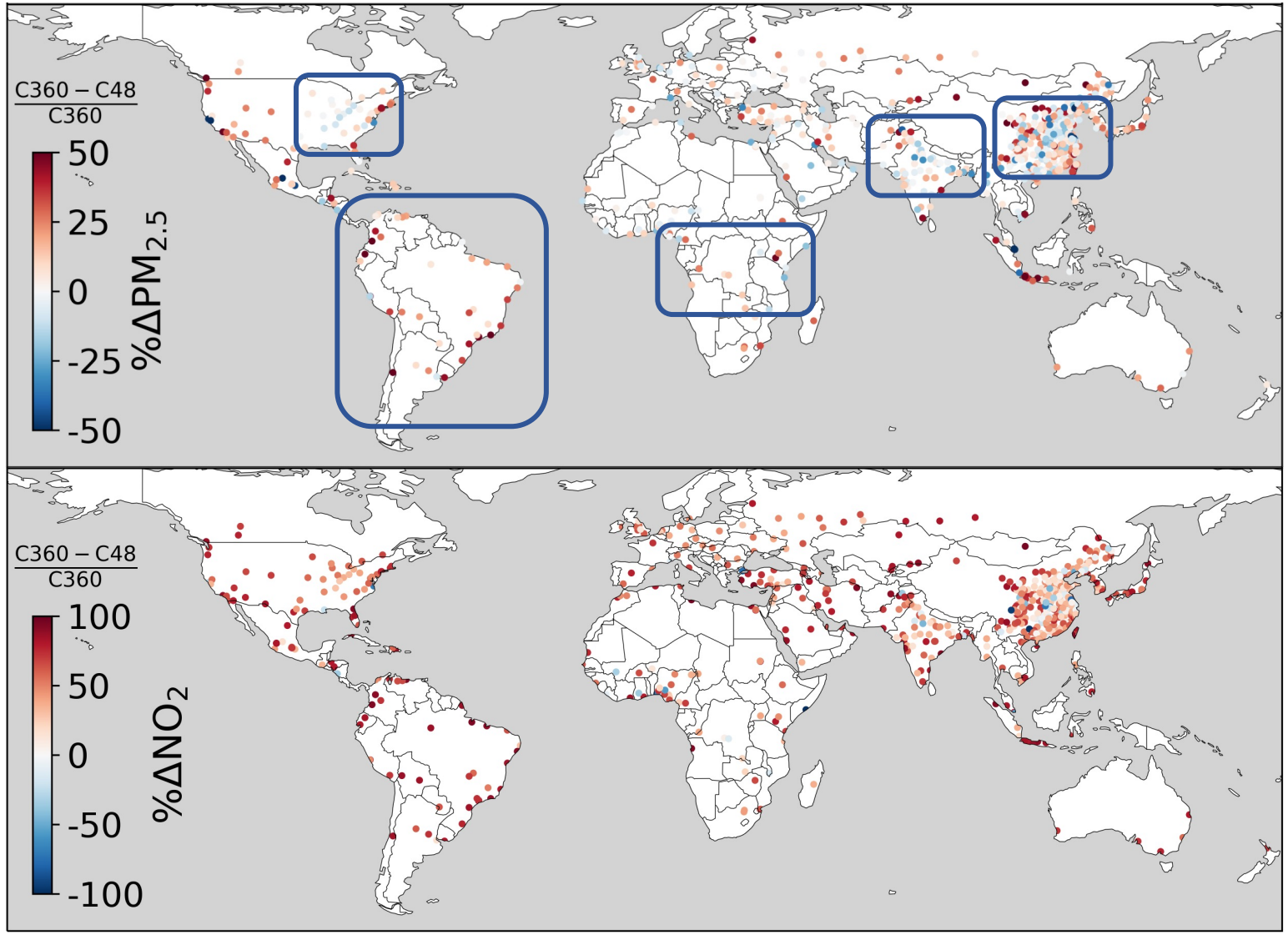
Biomass burning:
Separate fires from adjacent cities

Mountainous regions:
Resolve hotspots in complex terrain

Coastlines:
Resolve gradients against cleaner oceans

Note: Inset values are population weighted $PM_{2.5}$ concentrations

Spatial Heterogeneity of Population Exposure in populous cities



Intensive city clusters:
Cumulative emissions & enhanced mixing

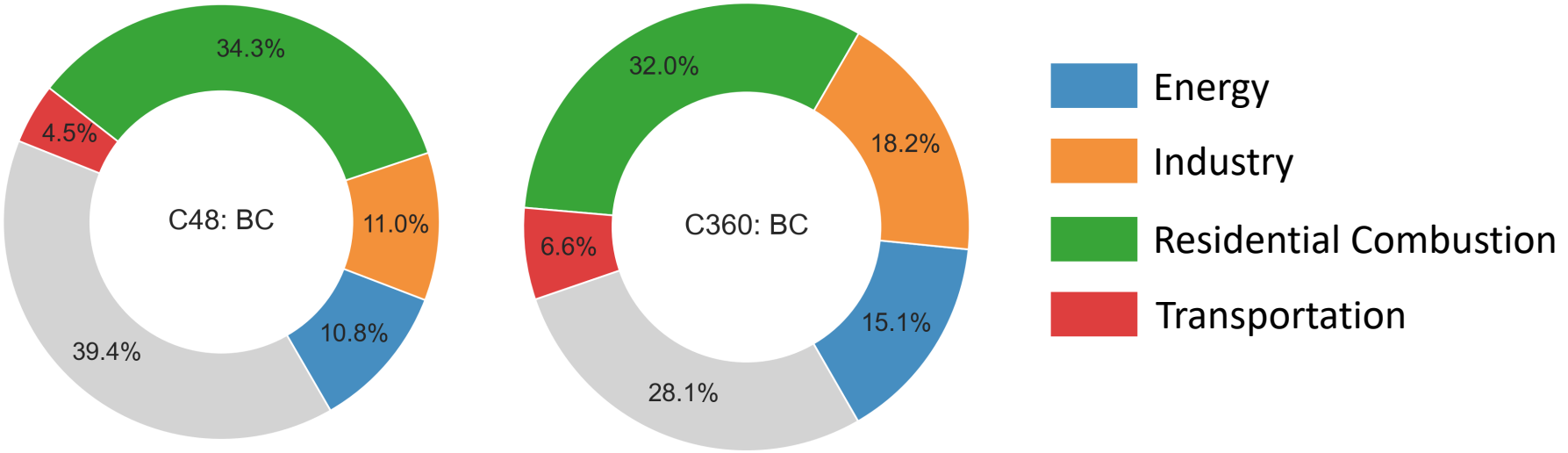
Secondary dominated:
SO_2/NH_3 constraints

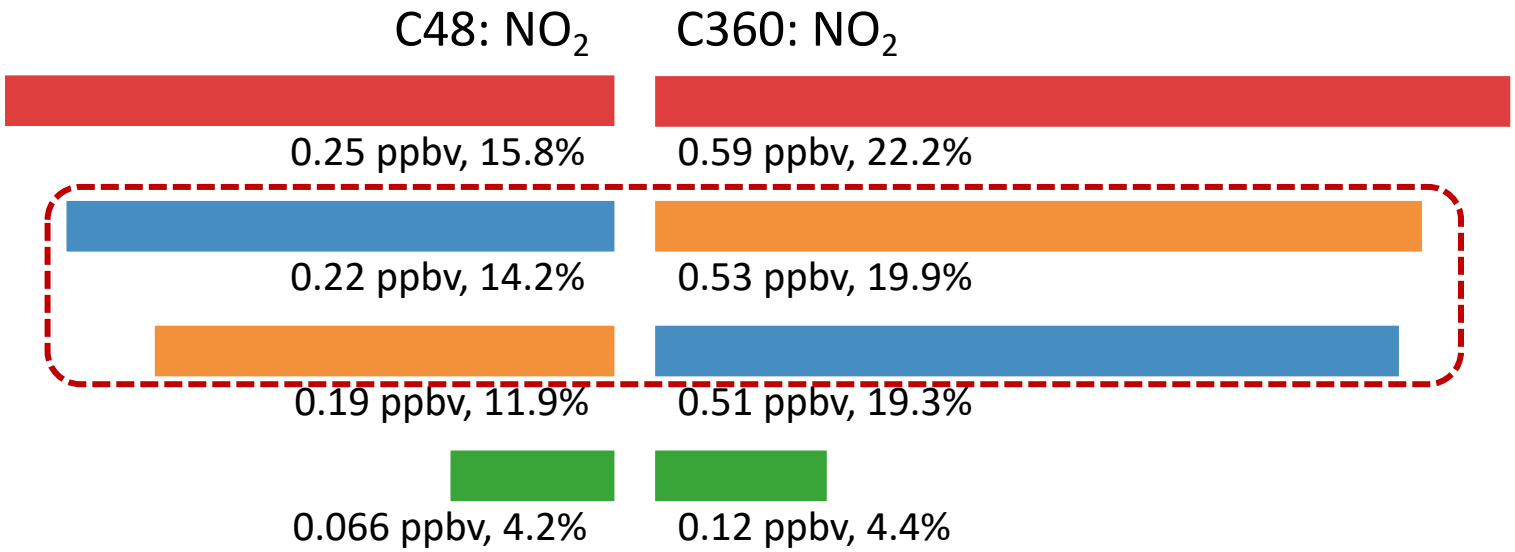
Isolated cities:
Gradients/hotspots resolving

Higher estimation at fine resolution:
Short NO_x lifetime and local emissions

Resolution Effect on Sectoral Contributions in the Global South

Enhanced relative importance of the industry to energy emissions





Relative sectoral importance changes


Thank You!