Comparison of Asian Emissions Inventories

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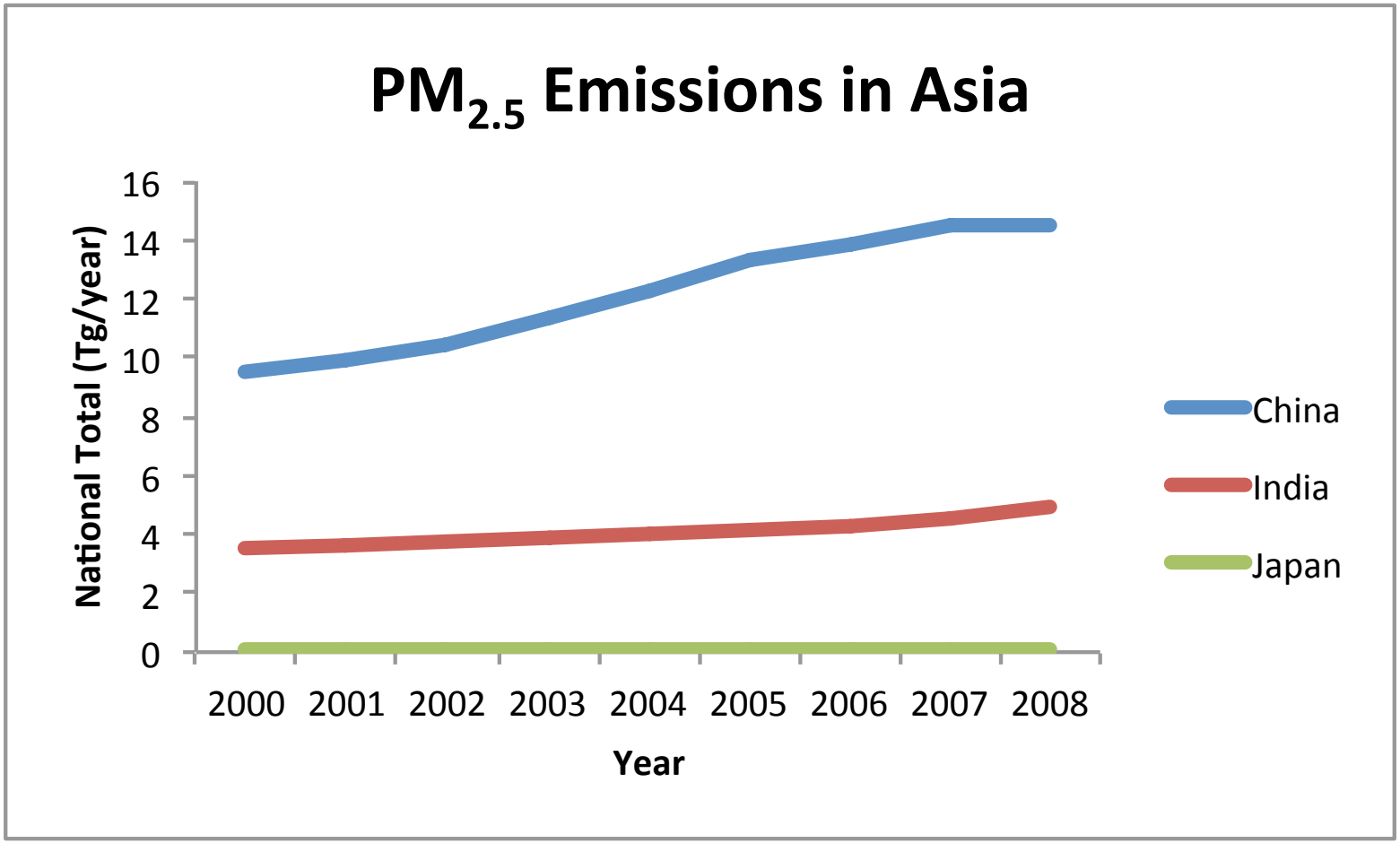
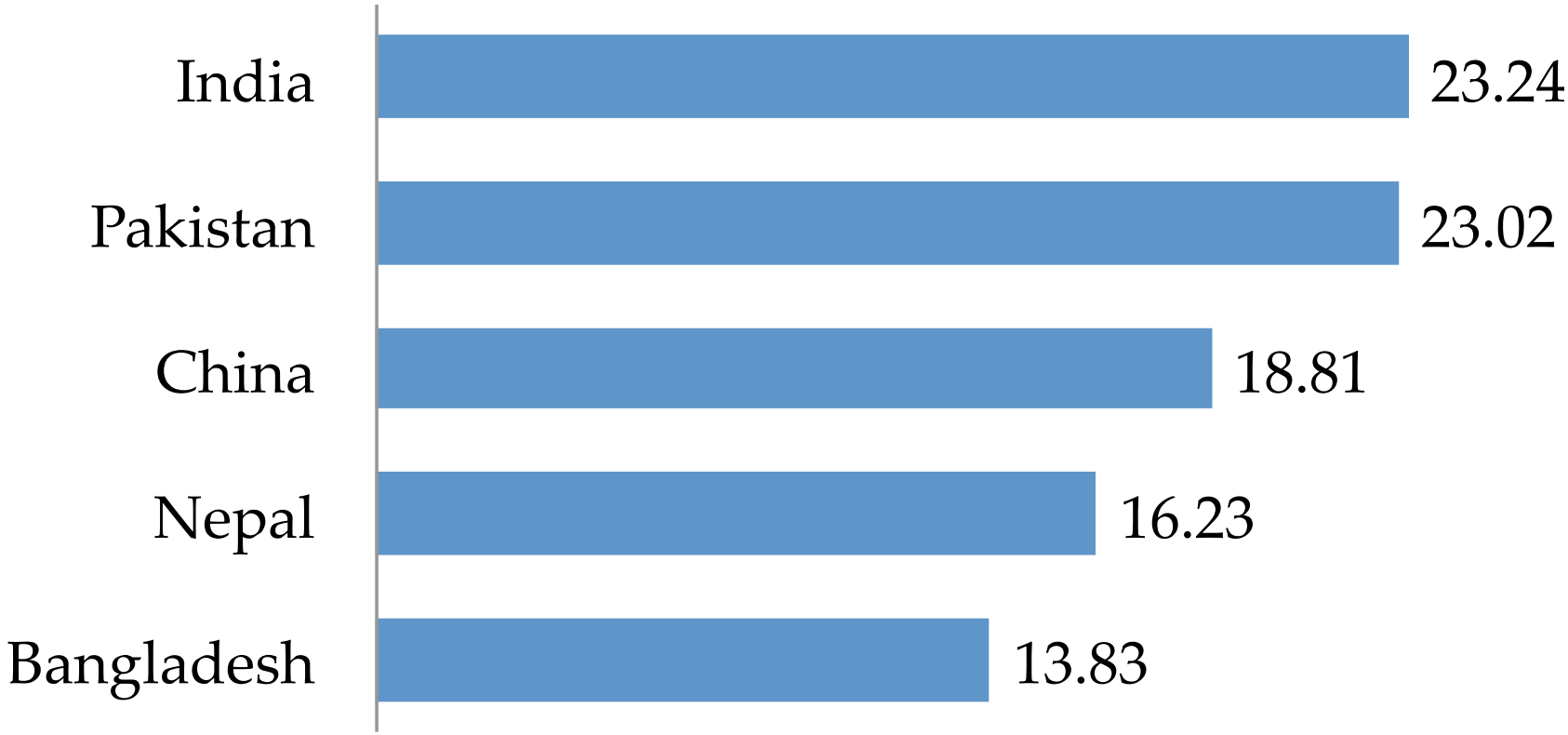
Increasing Emissions in Asia



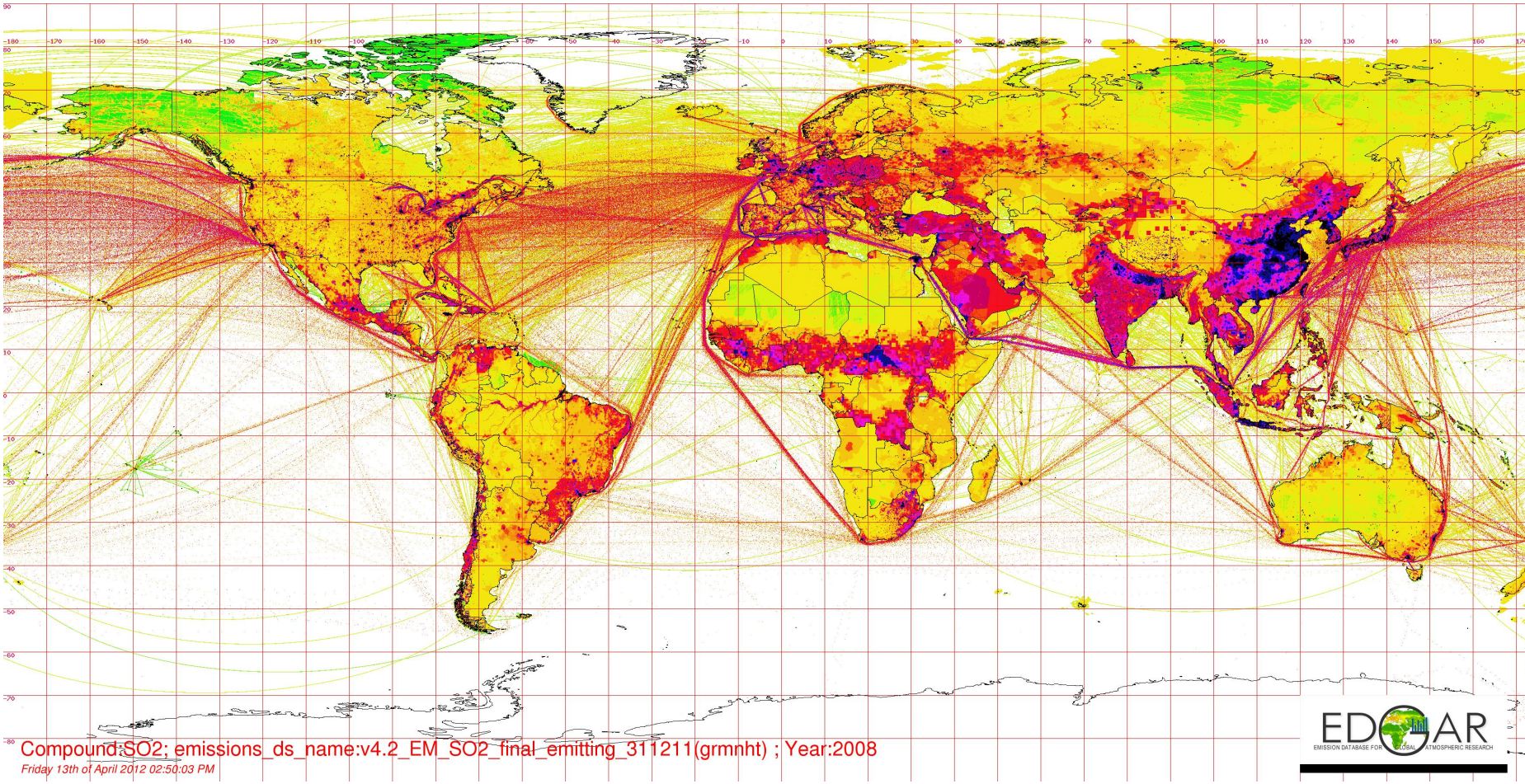
Source Kurokawa et al., 2013

Countries with Lowest Air Quality Score

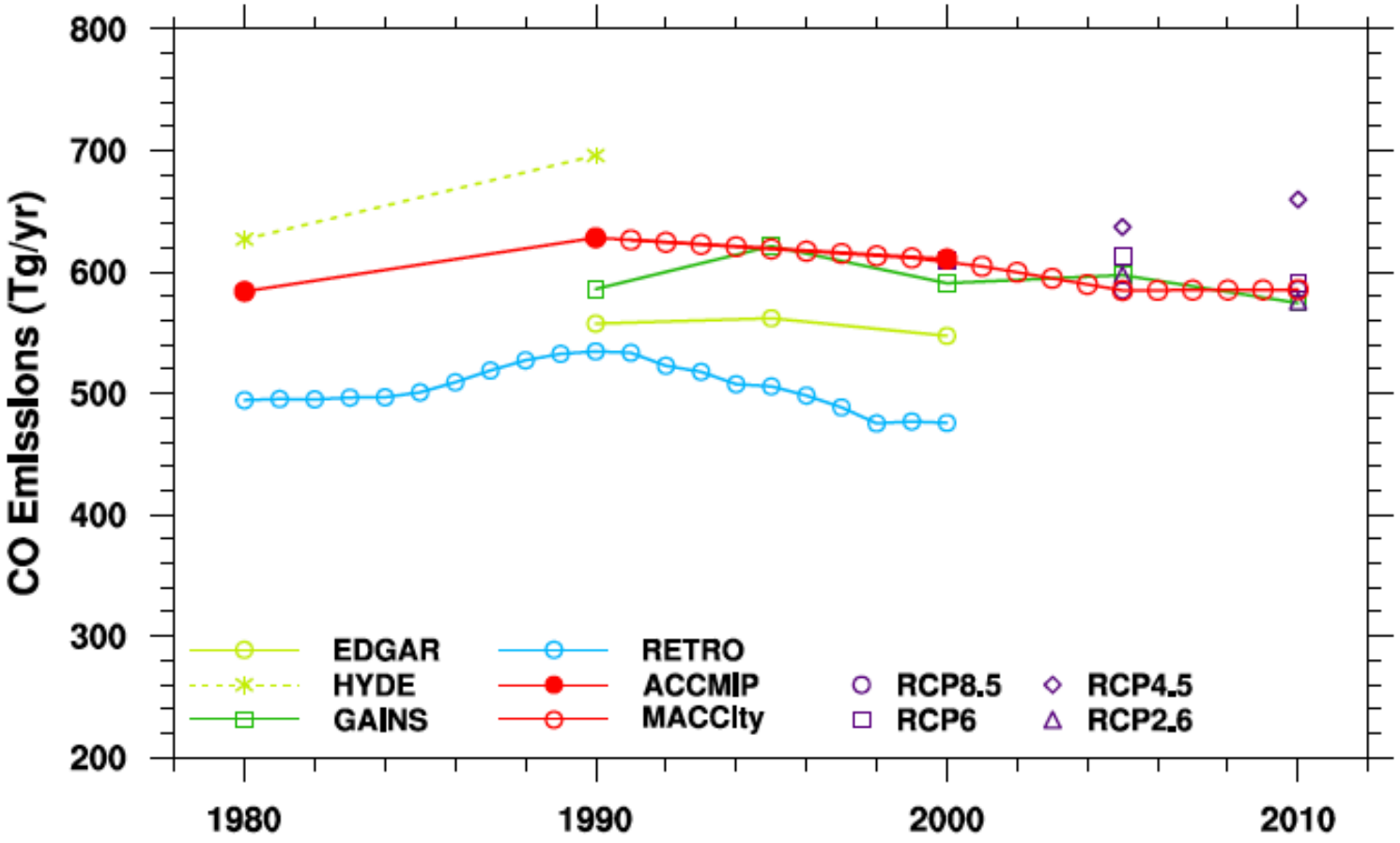


Source Yale University, 2014 Environmental Performance Index

Importance of Emissions Inventories

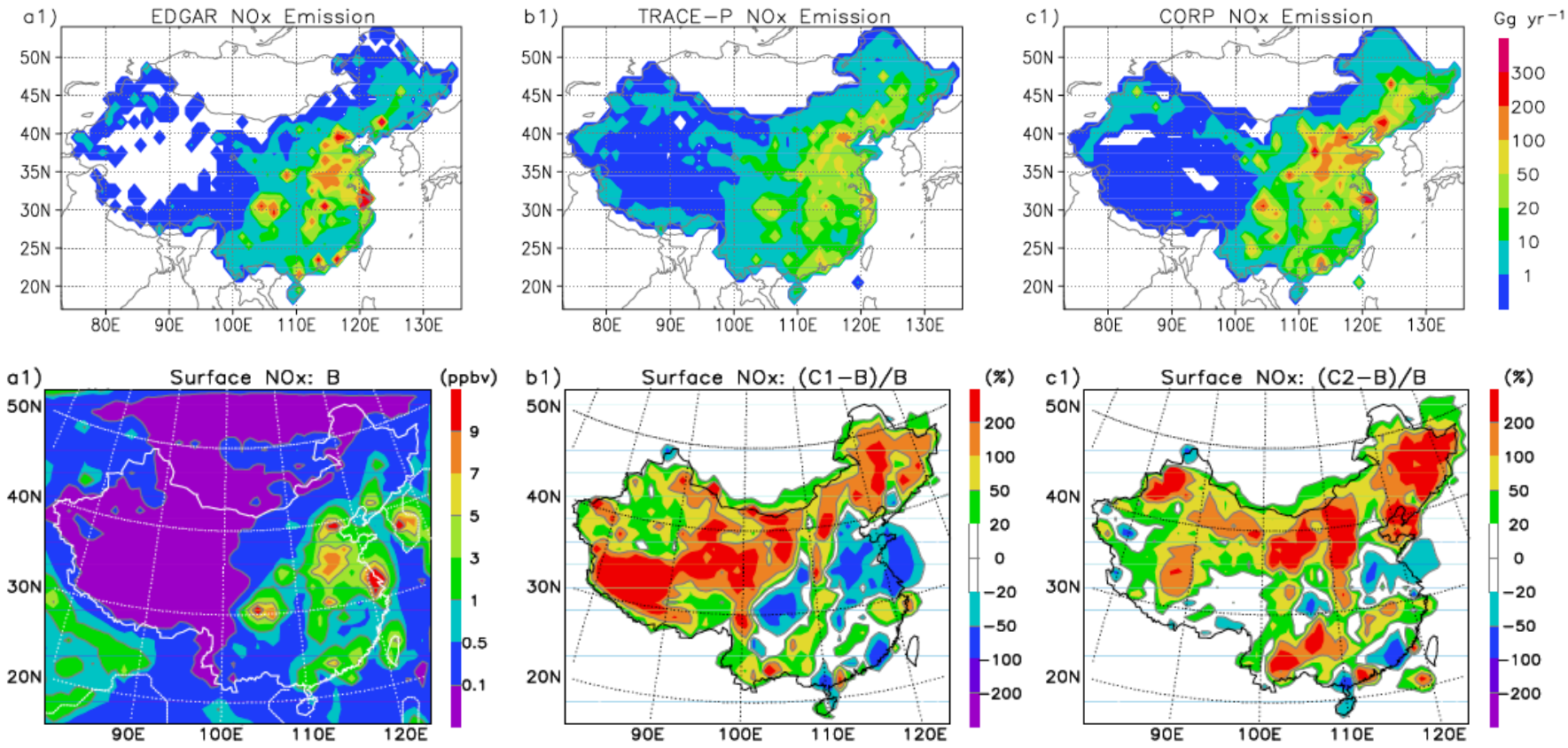


Difference in Global Emissions Inventories



Source Granier et al., 2011

Impacts on Modeling



Source Ma and van Aardene, 2004

Research Questions

- How much differences are there among emissions inventories in Asia?
- Which sector/species do we see the largest difference and why?

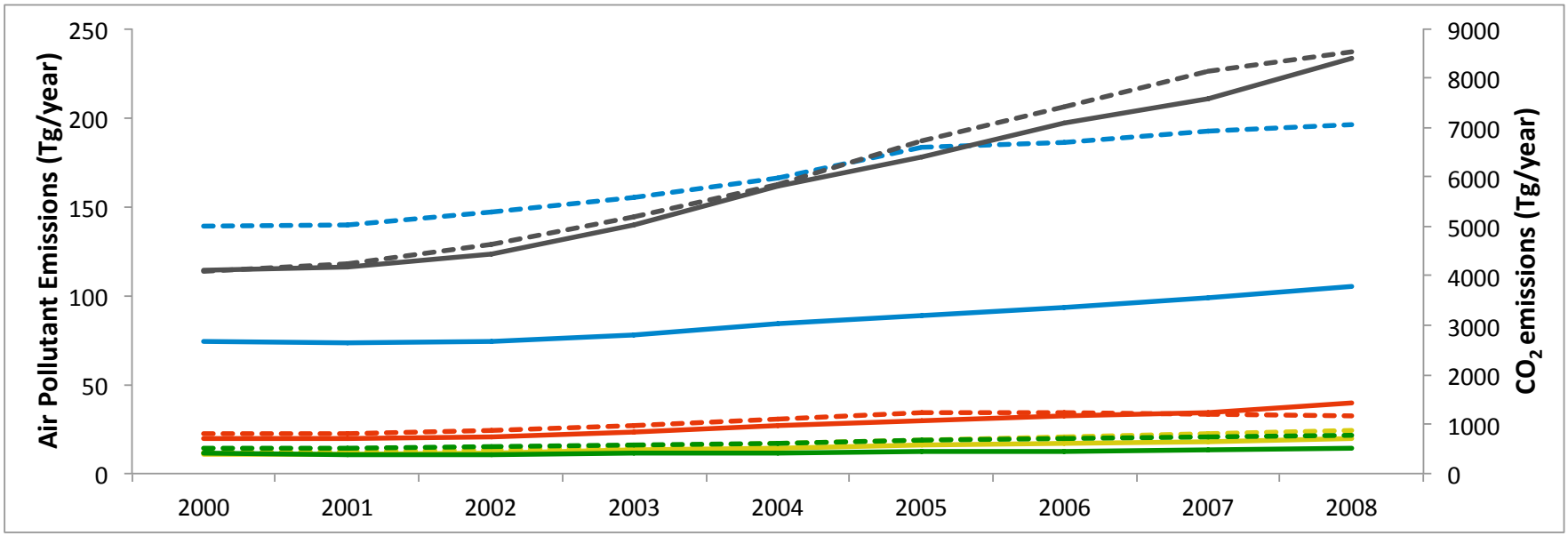
Emissions Inventories

- Emissions Database for Global Atmospheric Research (EDGAR) v4.2 - Global
- Regional Emissions in ASia (REAS) v2 - Asia
- Multi-resolution Emission Inventory for China (MEIC) - China
- Zhao Yu's - China
- Ajay Nagpure's - India
- Pandey et al. (2014) and Sadaverte and Venkataraman (2014) - India

Analysis

- Years: 2000 - 2008 (2011 for India)
- Pollutants: CO, SO_2, NO_x, PM_{10}, CO_2
- Sectors: industry, transport, power, and residential
- Countries: China, India, Pakistan, and Nepal

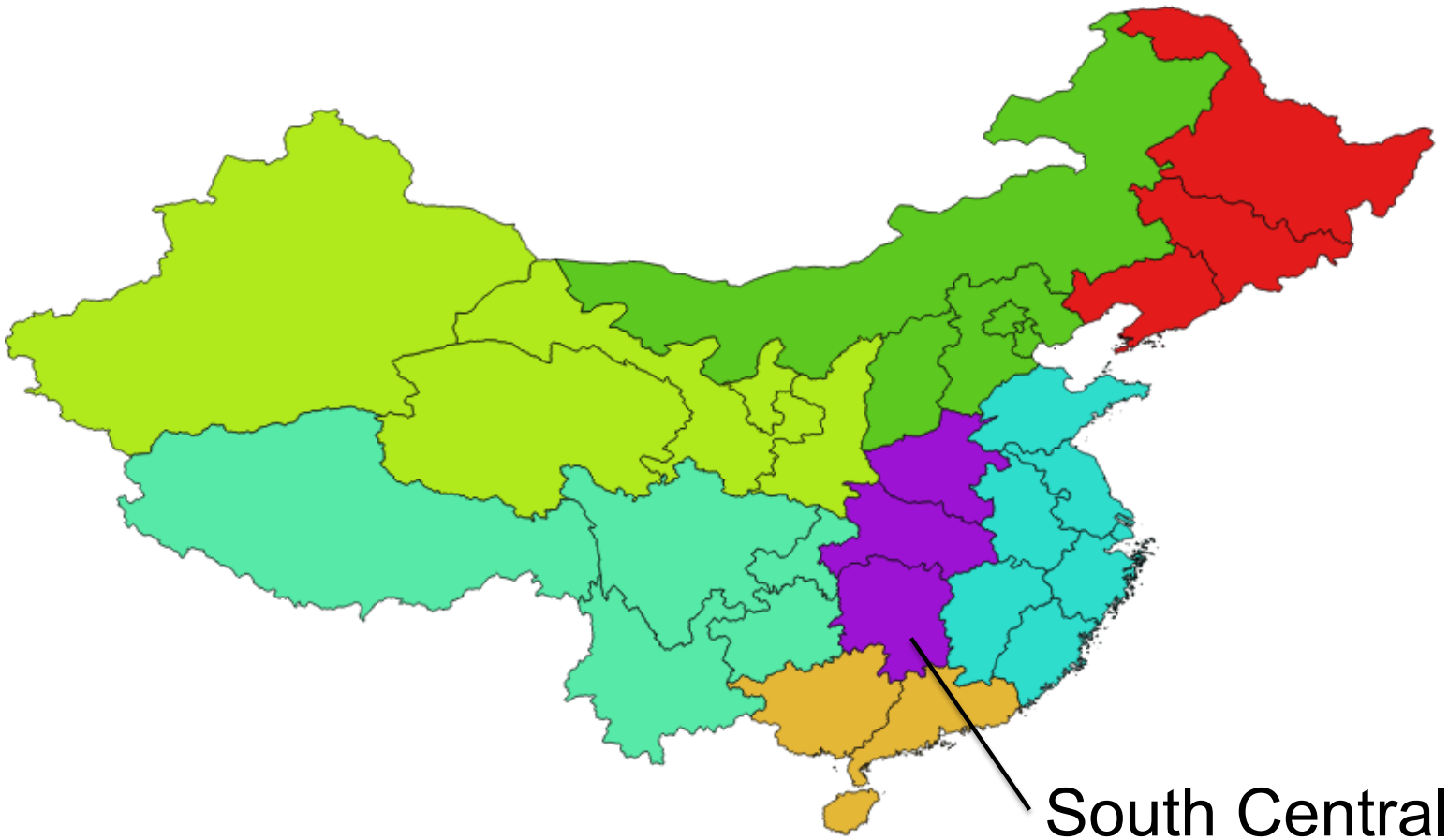
China Total Emissions



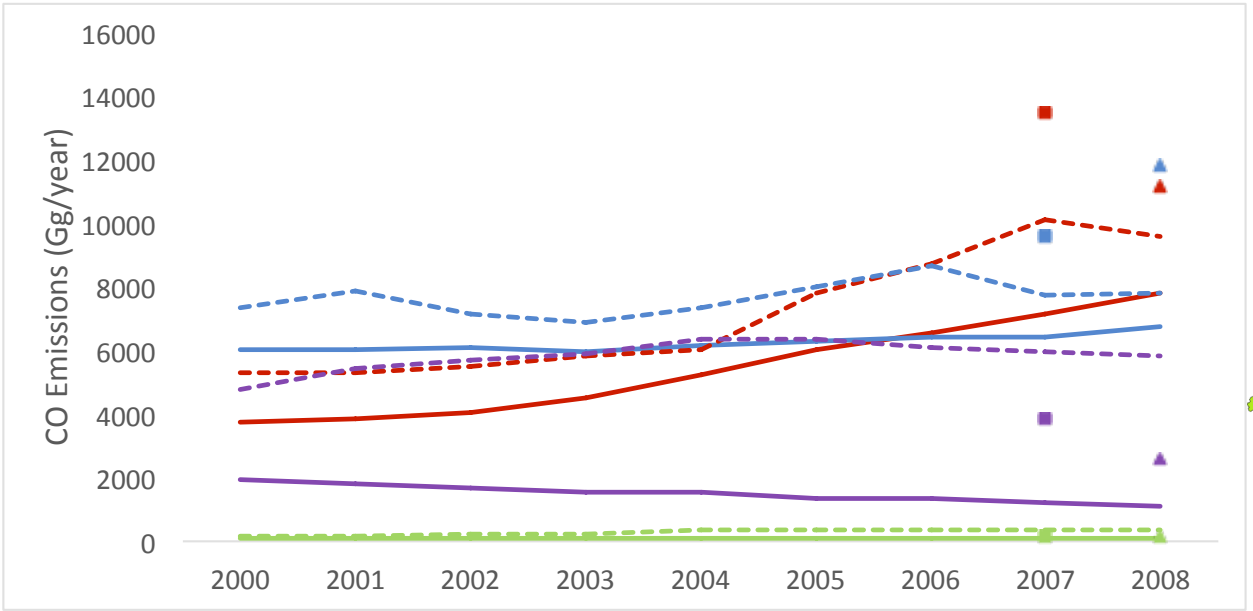
Solid: EDGAR, Dash: REAS

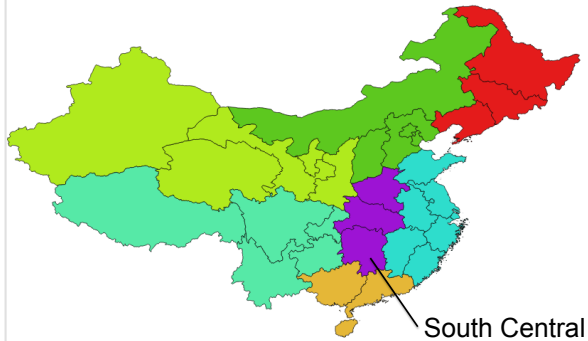
Blue: CO, Red: SO_2, Yellow: NO_x, Green: PM_{10}, Brown: CO_2

China South Central Region



China CO Emissions in South Central Region

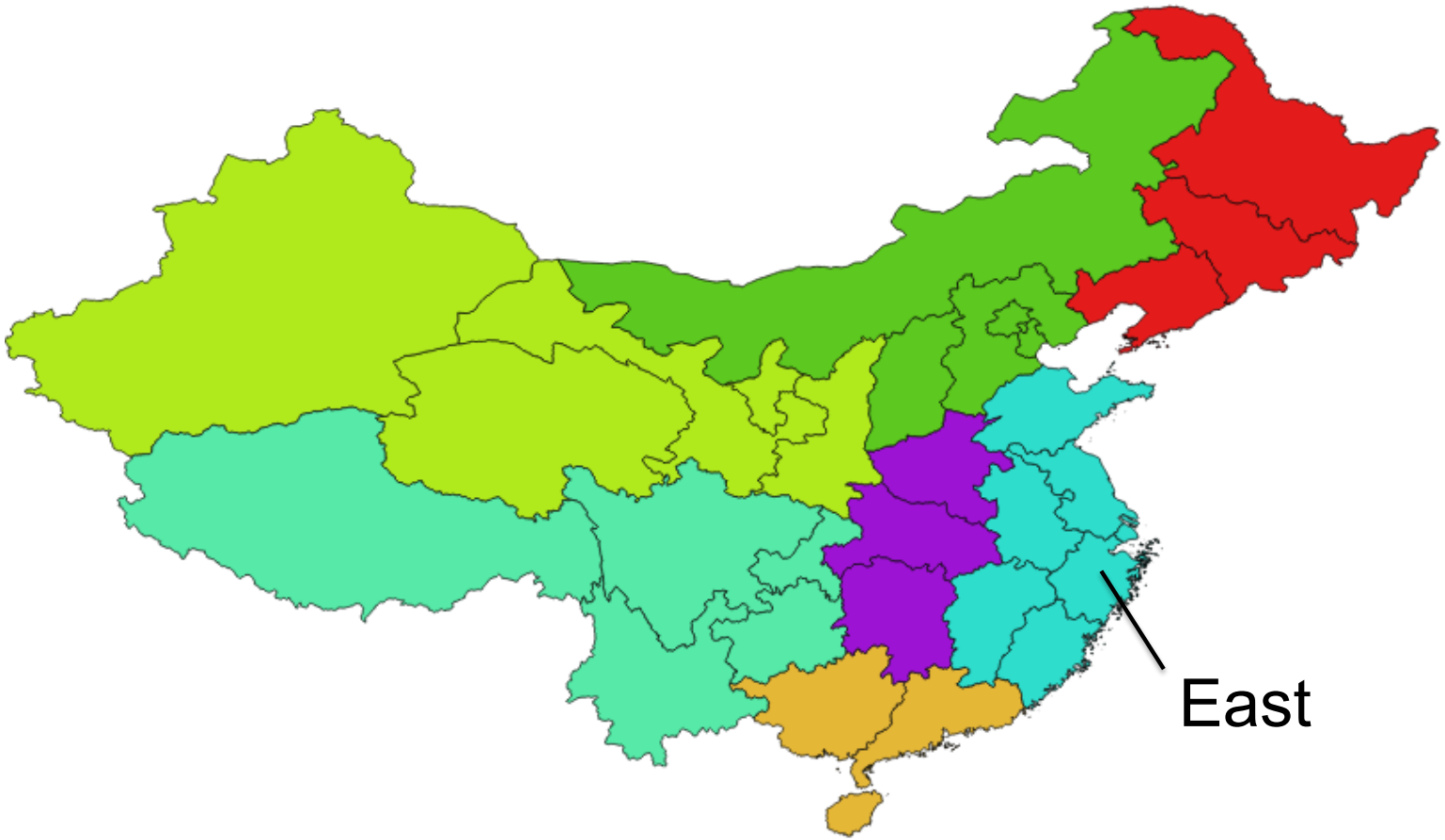




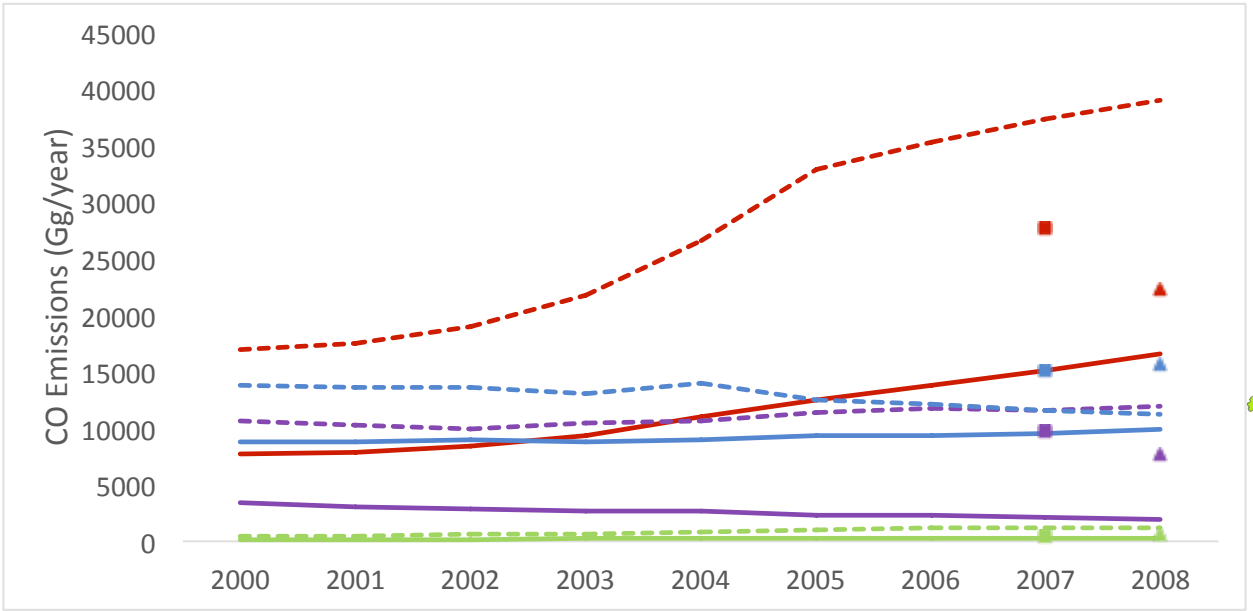
Solid: EDGAR, Dash: REAS

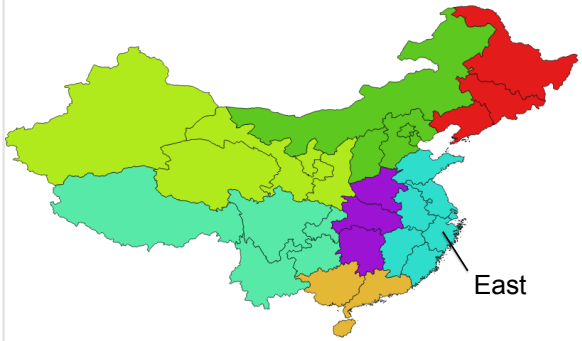
Red: industrial, Purple: transport, Green: power, Blue: residential

China East Region



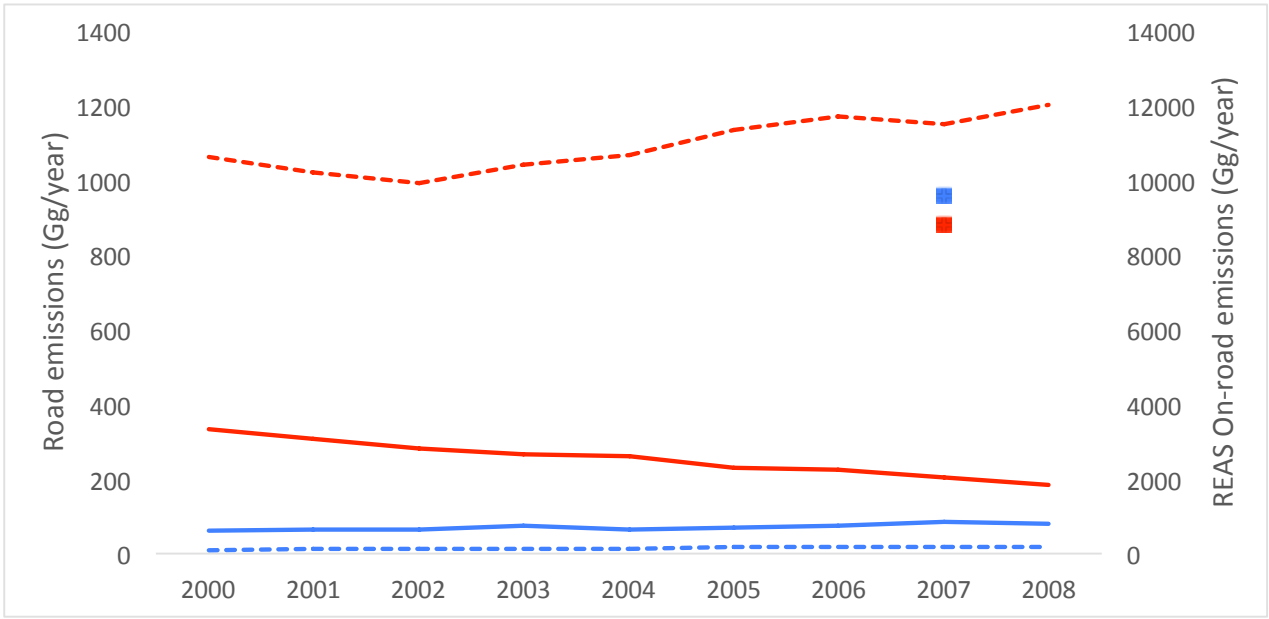
China CO Emissions in East Region

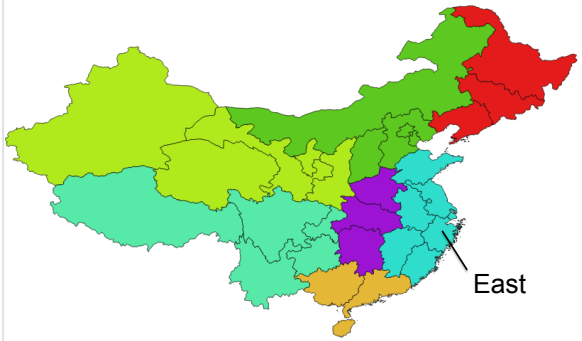




Solid: EDGAR, Dash: REAS, Square: Zhao Yu, Triangle: MEIC
Red: industry, Purple: transport, Green: power, Blue: residential

China CO Road Emissions in East Region

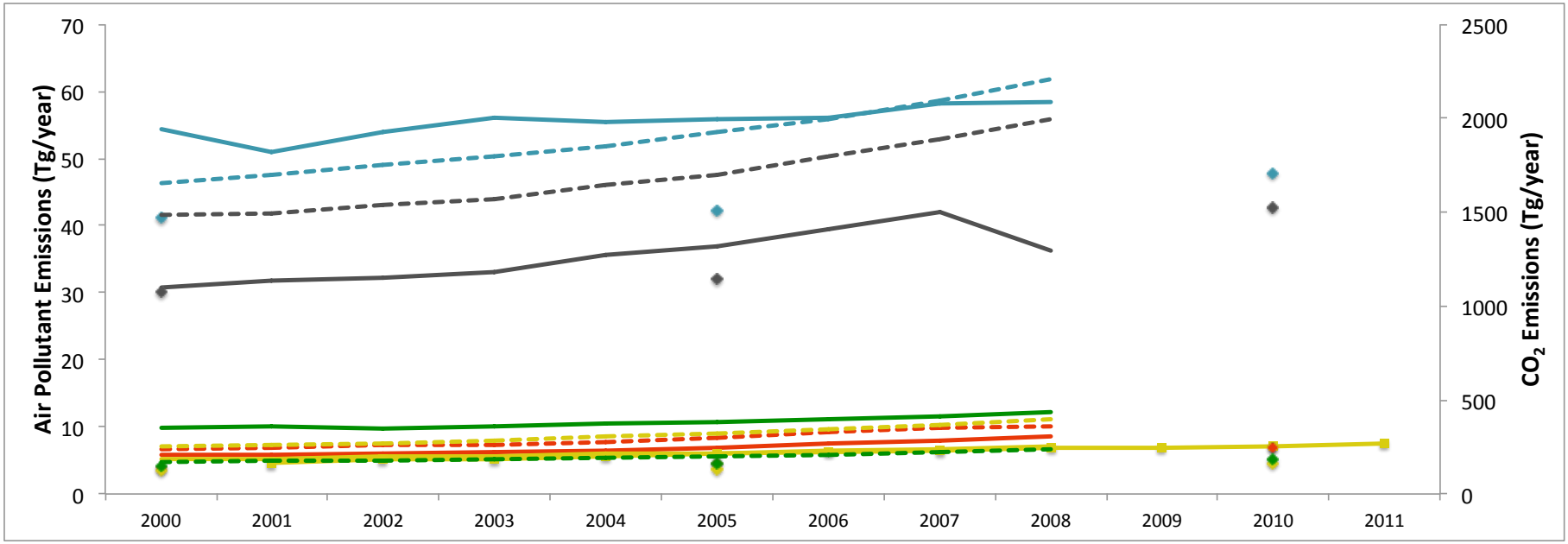




Solid: EDGAR, Dash: REAS, Circle: Zhao Yu

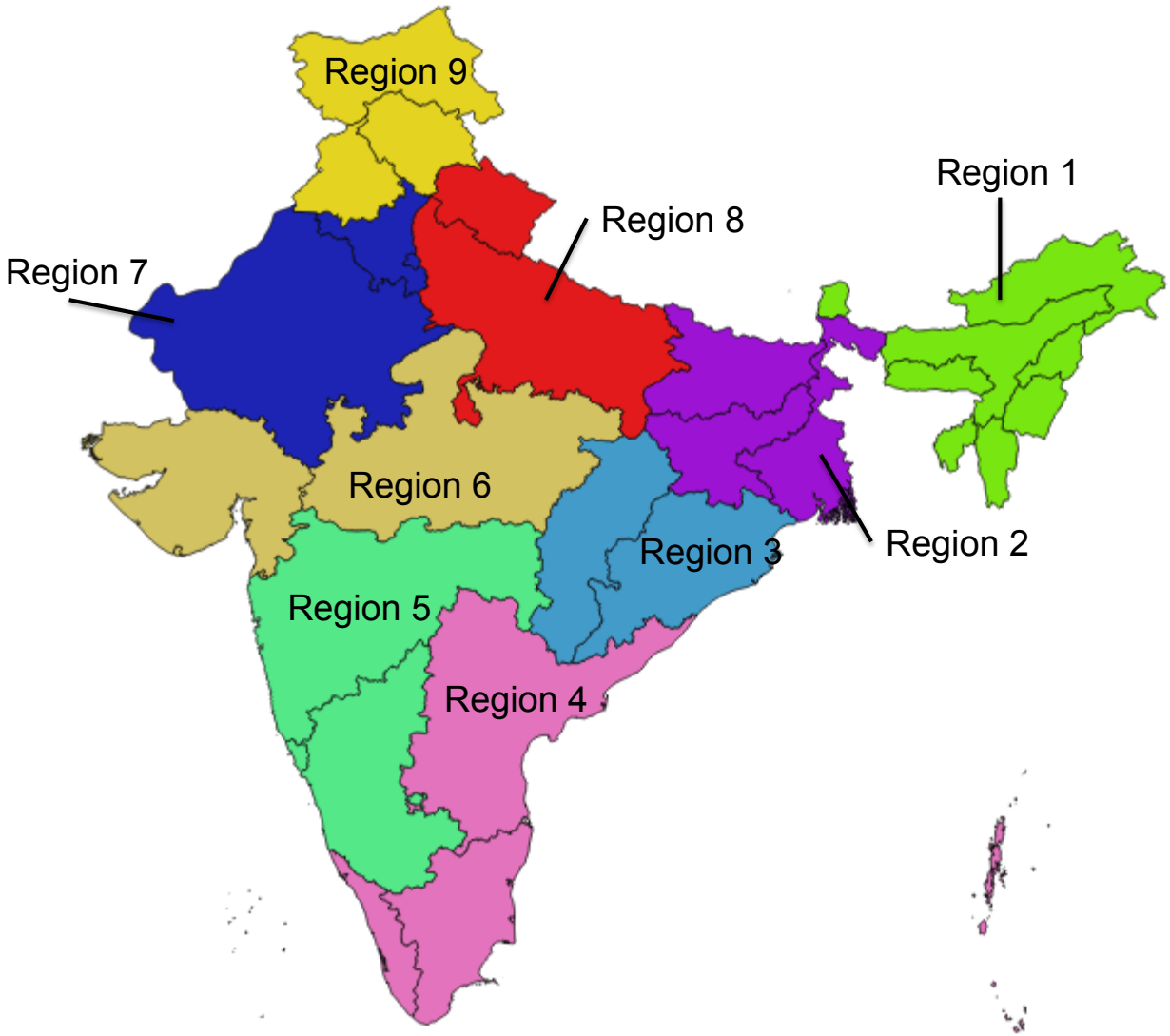
Red: On-road, Blue: Off-road

India Total Emissions

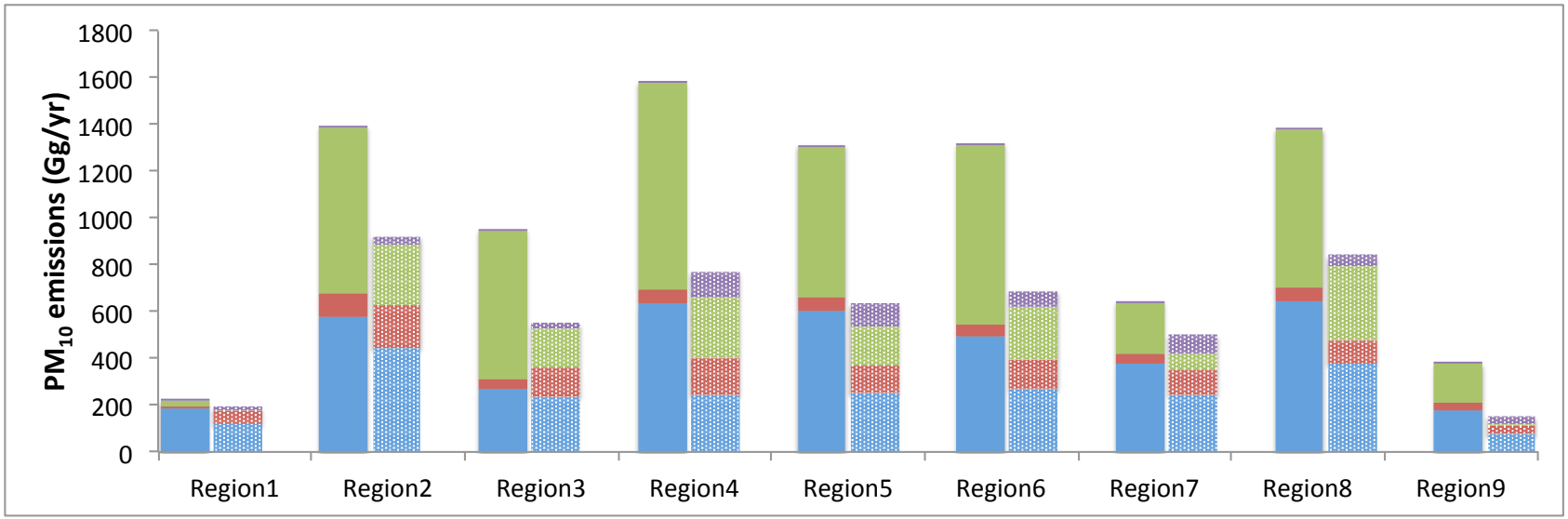


Solid: EDGAR, Dash: REAS, Diamond: Pandey et al.
Blue: CO, Red: SO_2, Yellow: NO_x, Green: PM_{10}, Brown: CO_2

India Regions



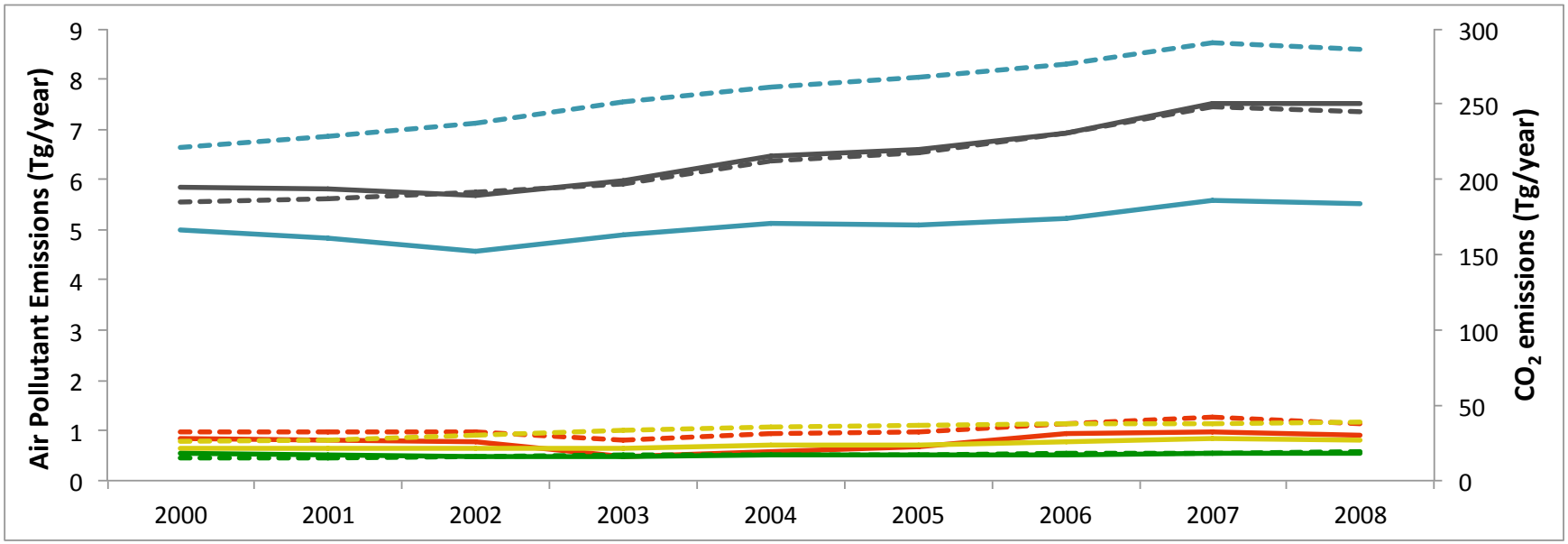
India Regional PM_{10} Emissions



Left: EDGAR, Right: REAS

Red: industry, Purple: transport, Green: power, Blue: residential

Pakistan Total Emissions



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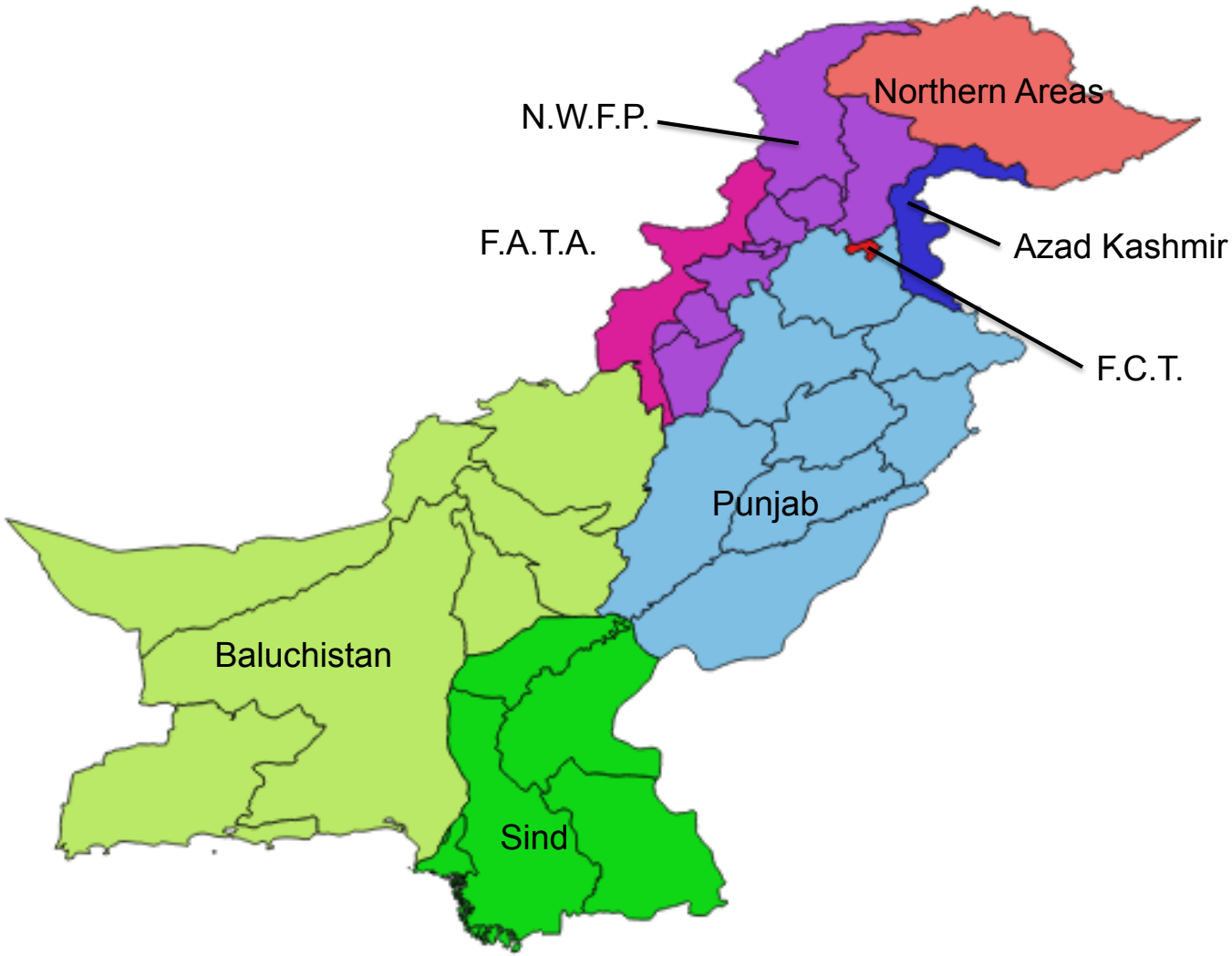
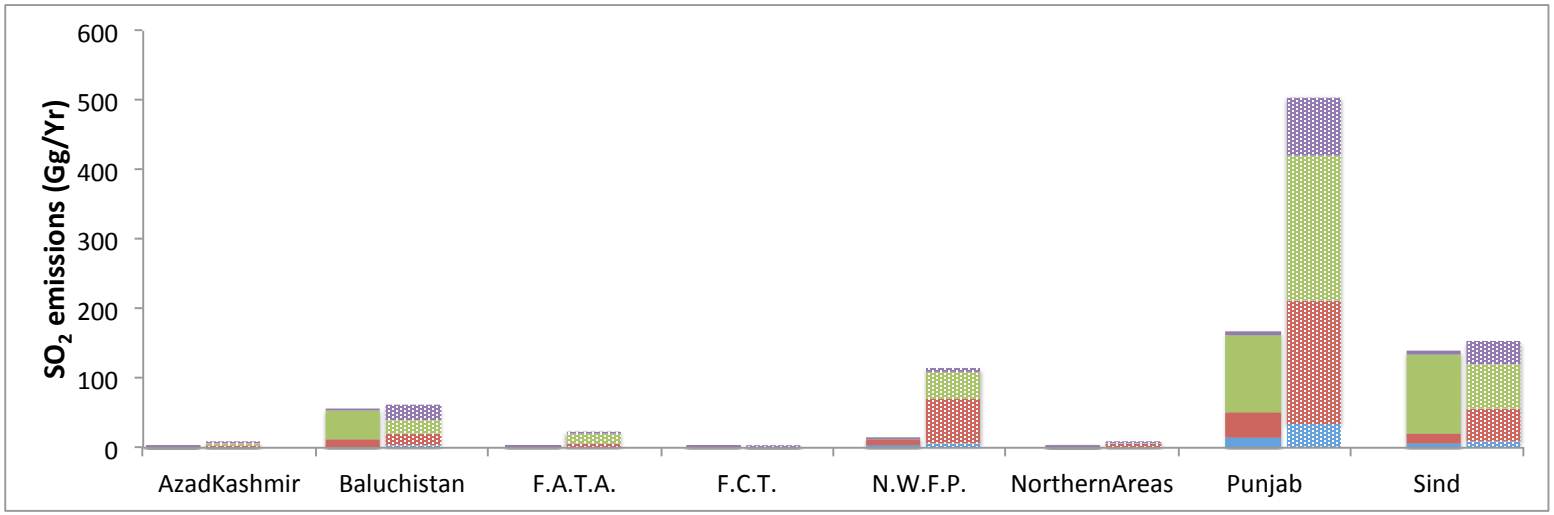
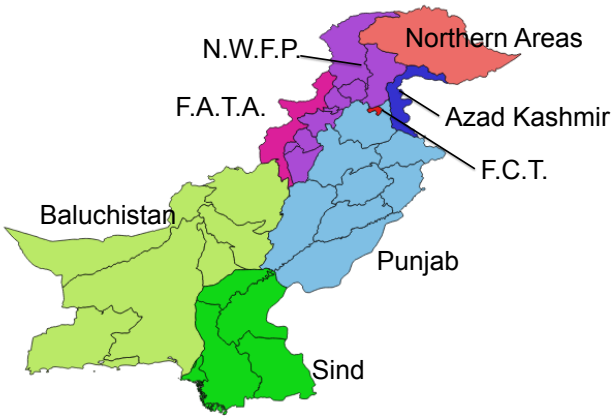


Pakistan Regional SO_2 Emissions

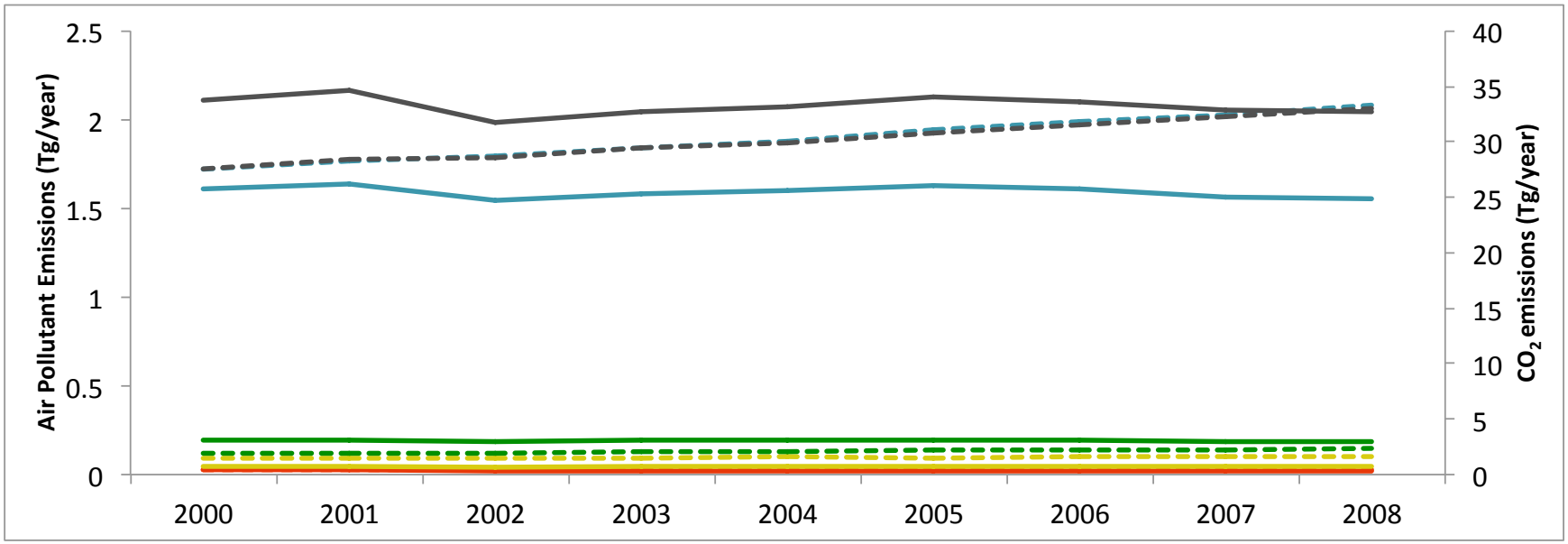




Left: EDGAR, Right: REAS

Red: industry, Purple: transport, Green: power, Blue: residential

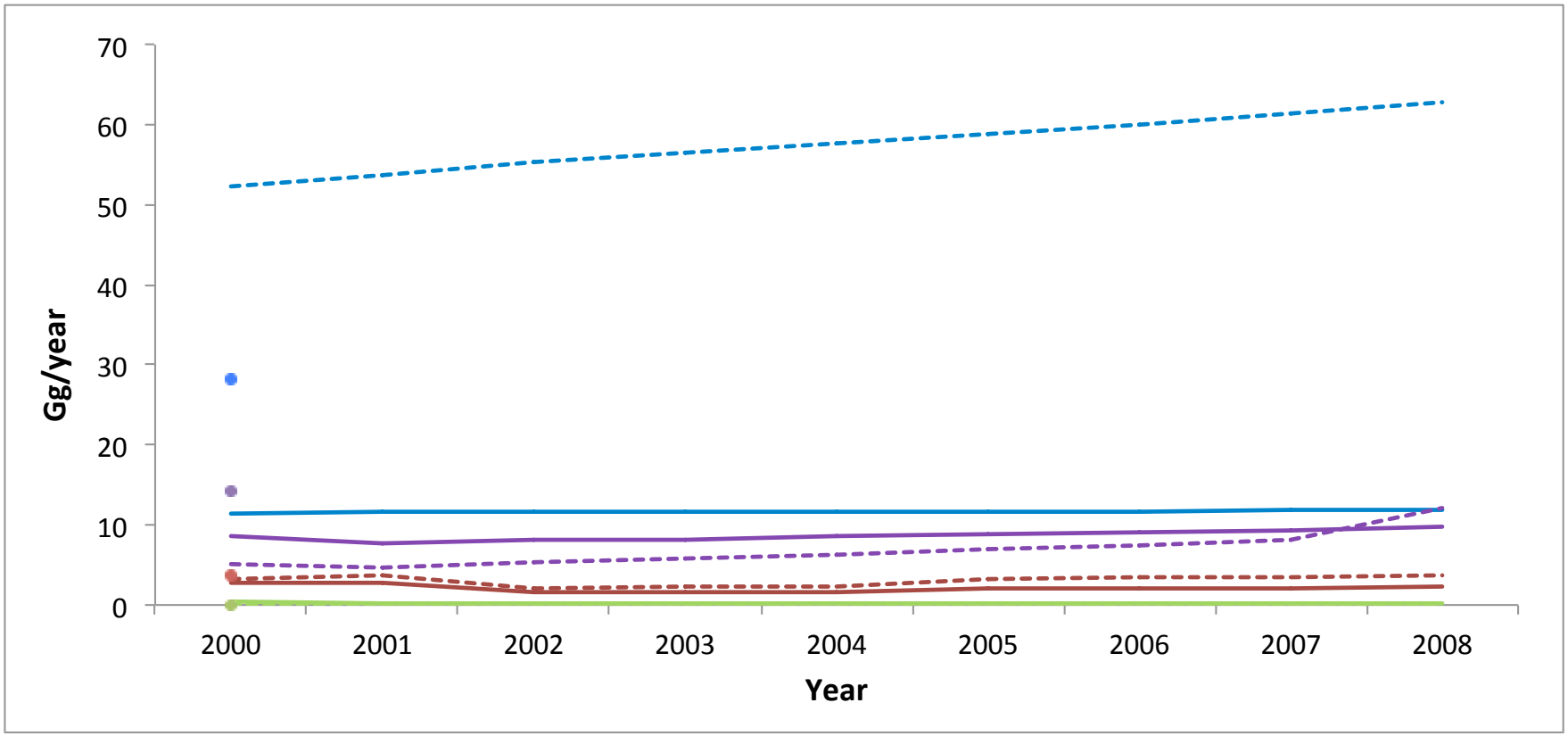
Nepal Total Emissions



Solid: EDGAR, Dash: REAS

Blue: CO, Red: SO_2, Yellow: NO_x, Green: PM_{10}, Brown: CO_2

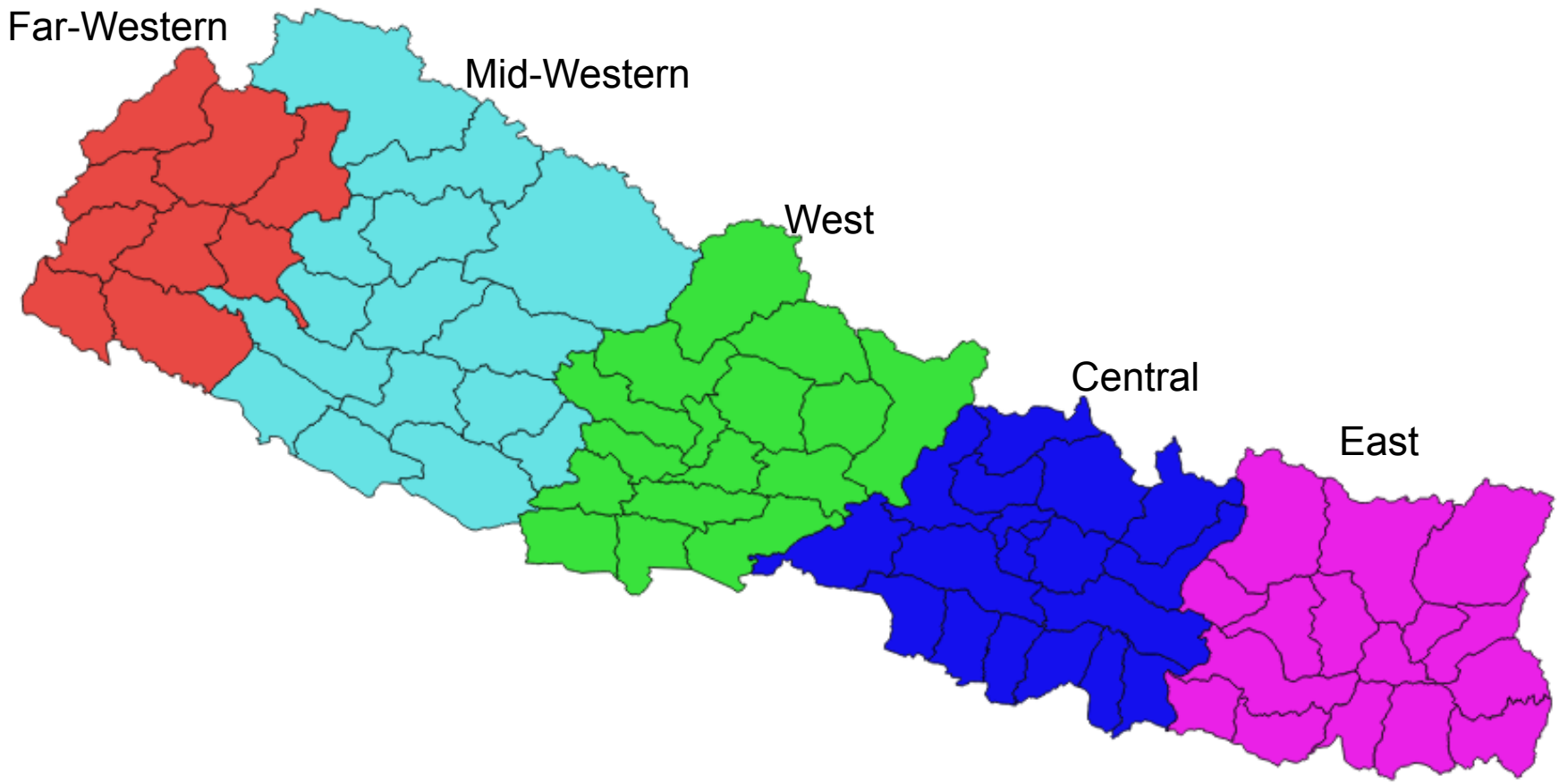
Nepal Sectoral NO_x Emissions



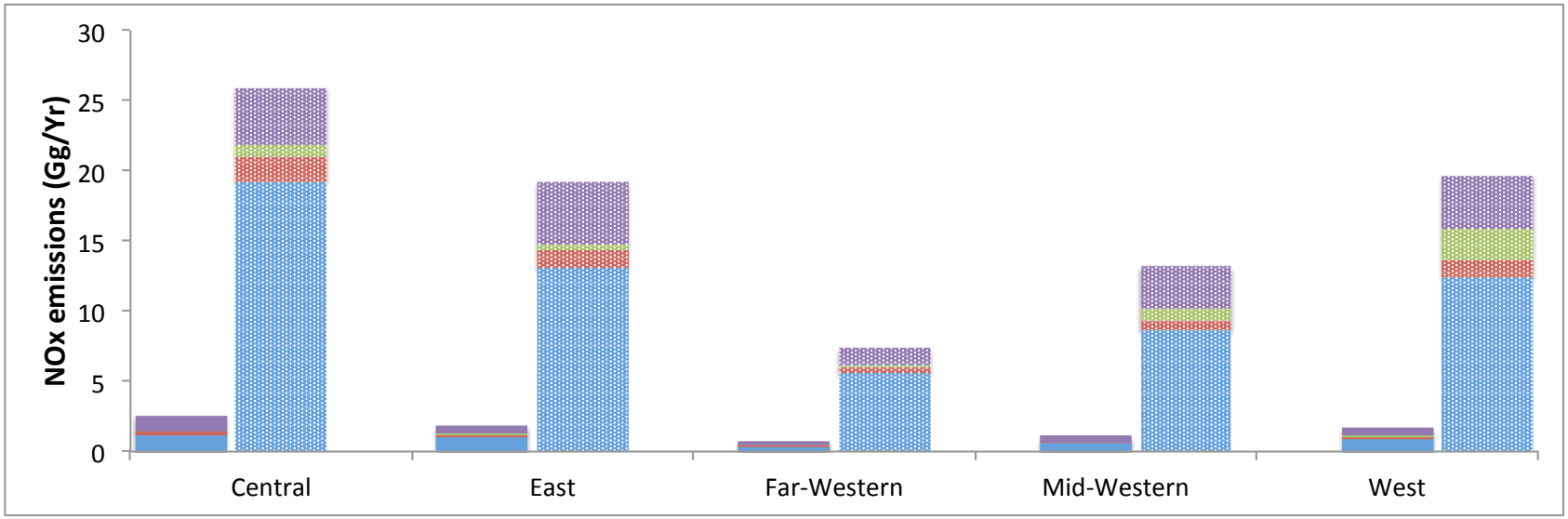
Solid: EDGAR, Dash: REAS, Circle: MALÉ

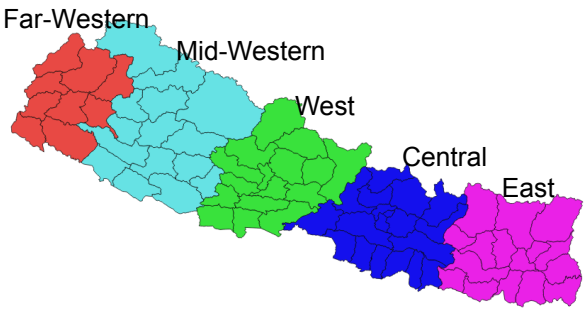
Red: industry, Purple: transport, Green: power, Blue: residential

Nepal Regions



Nepal Regional NO_x Emissions





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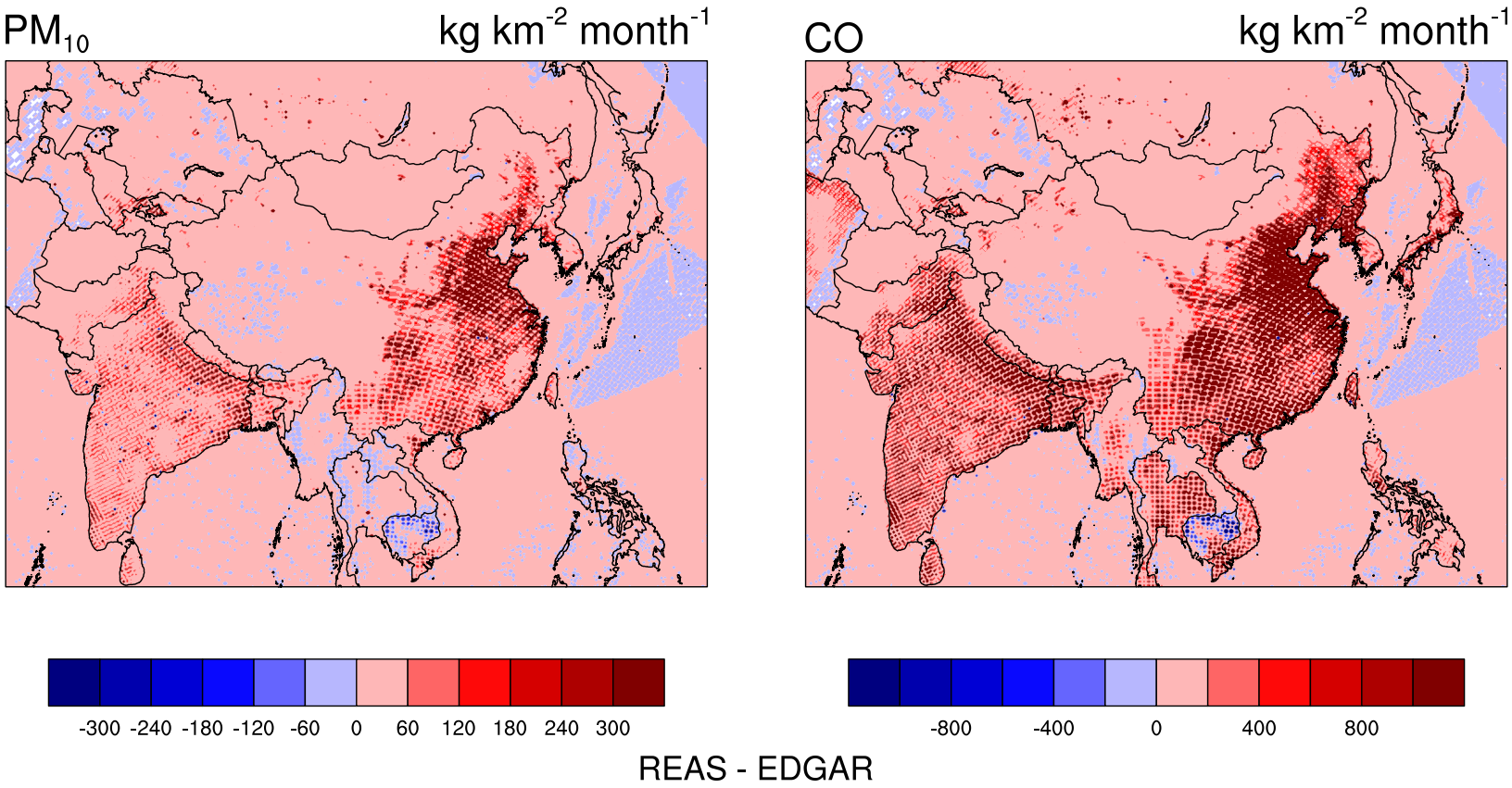
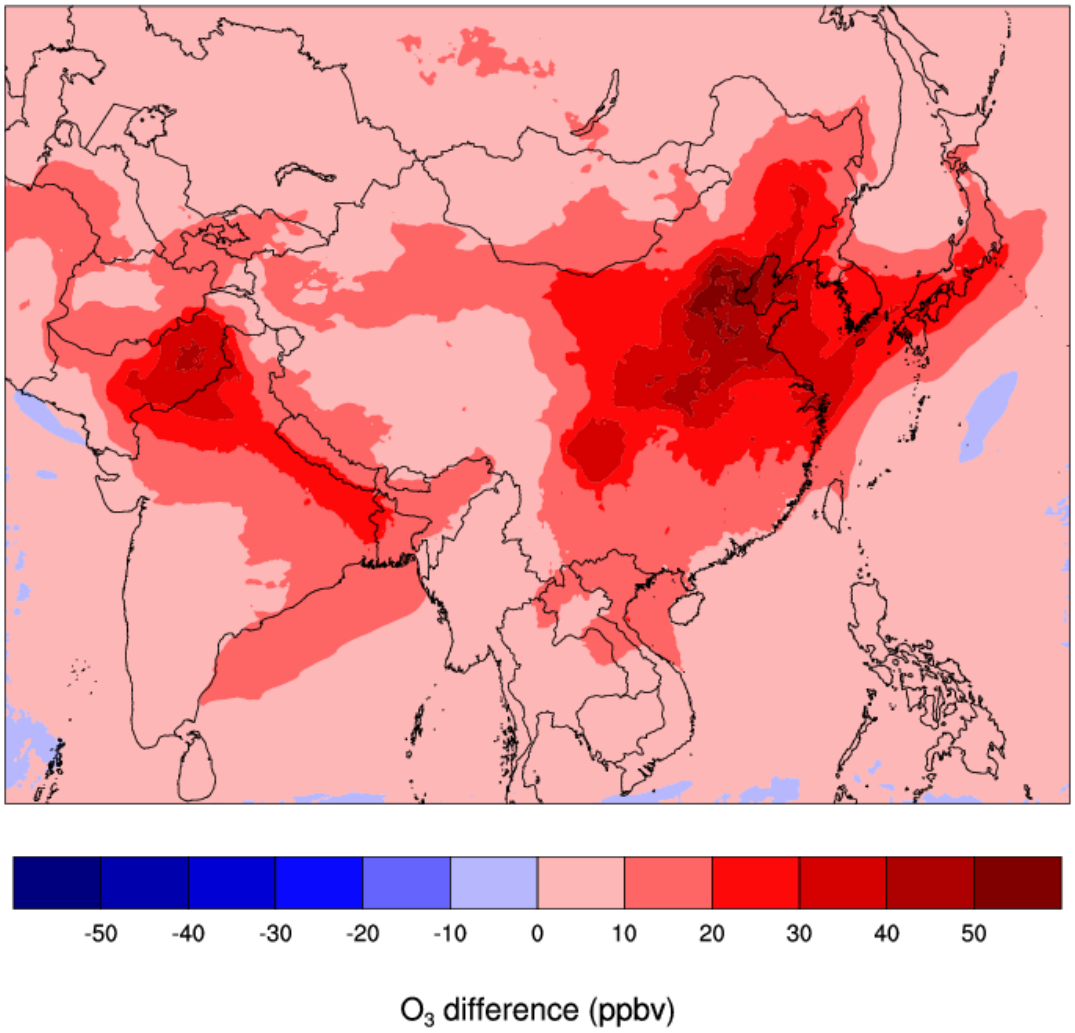
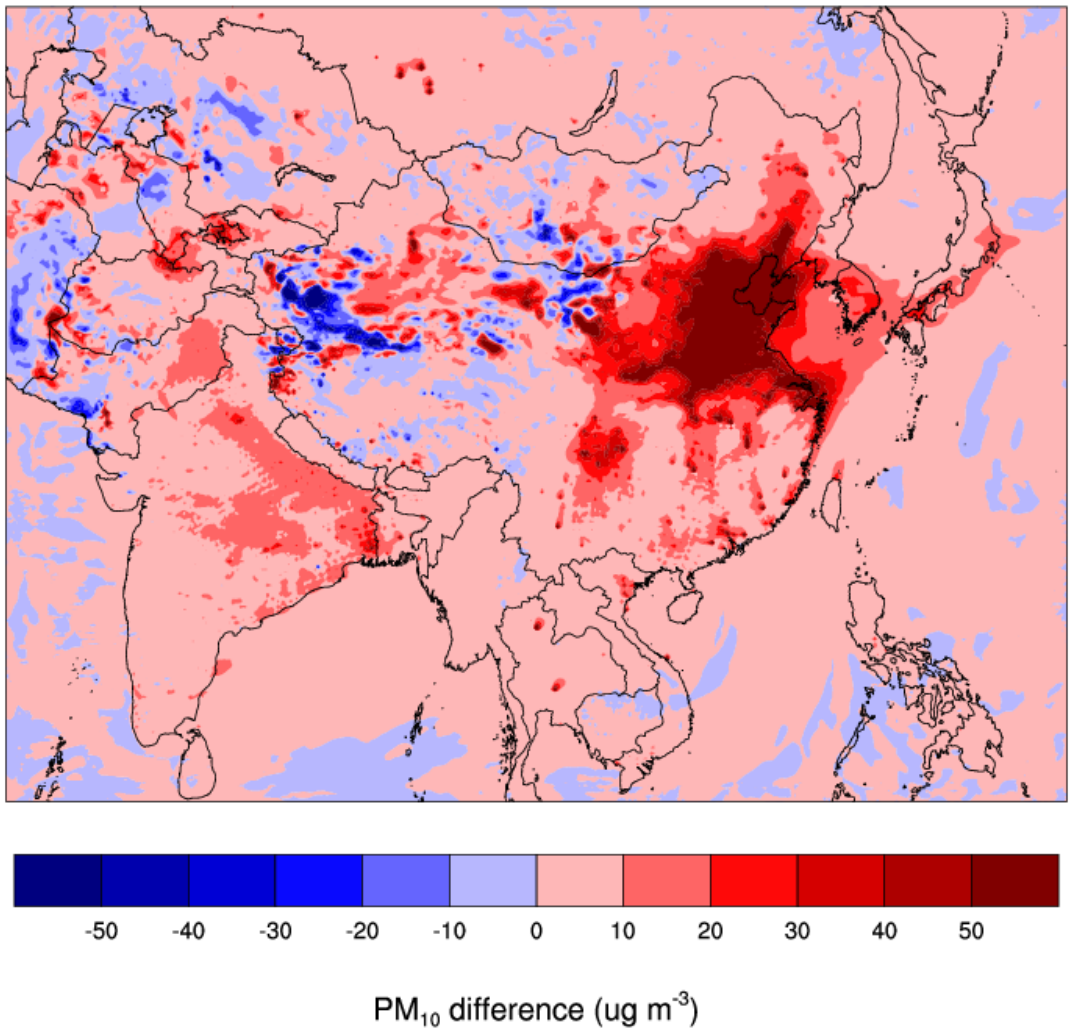
Spatial Distribution: REAS - EDGAR PM_{10} and CO



Impacts on Modeling: REAS - EDGAR O_3



Impacts on Modeling: REAS - EDGAR PM_{10}



Conclusion

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- Model results are influenced significantly by the difference in emissions used as inputs.

Acknowledgments

My Group Members at Emory

- Hankyul Kim, Rita Korobkov, Marcus Trail
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- Greet Maenhout, Ajay Nagpure
- Qiang Zhang, Yu Zhao

Funding

- Energy Foundation, NSF, Emory University

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Questions?