

5.018 Trends in air quality over the eastern US and China: Policy relevant science.

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Abstract:

Over the past few decades, the eastern US has seen remarkable improvements in air quality, driven by policies guided by numerical simulations constrained by observations. Can these success stories be useful to Asian air pollution problems? This talk will briefly review progress of controlling ozone through NO_x emissions reductions and controlling particulate matter through SO₂ emissions reductions, with evidence from in situ and remotely sensed data. The current state of the science involves renewed focus on emissions inventories – evaluated through field experiments such as aircraft mass-balance analyses and ratios of short lived pollutants such as NO_x to greenhouse gases. Emissions from both power plants and vehicles were discovered to be sensitive to ambient temperature, but with opposite sign. State emphasis has shifted to include smaller NO_x sources, anthropogenic VOCs in urban areas, as well as the interplay of photochemistry with air/water interactions (the sea breeze) that can create hot spots of ozone. Comparison to the atmospheric chemistry of China, reveals that the emissions of SO₂ have improved substantially, but PM loading remains high due to SOA, BC, and mineral dust. Transport both to and from China was observed. The precursor mix in Hebei is dramatically different from that of the US with CO and anthropogenic alkenes playing a greater role and biogenic isoprene less important. NO_x, CO, and VOC controls will be necessary to control ozone formation.