Ground-level ozone, O_3, reactive nitrogen compounds, Nr, and particulate matter, PM, have adverse impacts on human health, ecosystems, and climate. Over the eastern United States, these issues continue to be a problem, but in recent years substantial progress has been made in improving air quality. This talk will describe how in situ measurements, numerical models, and most recently sensing from space have provided the scientific basis for abatement strategies. Nitrogen dioxide, for example, is the key precursor to ozone production, and deposition of atmospheric Nr leads to eutrophication of the Chesapeake Bay estuary. Sulfur dioxide, SO_2, is a key precursor to PM. Both of these trace gases can be sensed with satellite-borne spectrometers. The results have proved useful for evaluating emissions inventories, numerical simulations, and for improving our fundamental understanding of atmospheric chemistry. Measurements and models will be compared to show which policies have been effective at reducing the controlling emissions and improving air quality.