Abstract:
Exposure to ambient air pollution is a major risk factor for global disease. Assessment of the impacts of air pollution on population health and evaluation of trends relative to other major risk factors requires regularly updated, accurate, spatially resolved exposure estimates. We combined satellite based estimates, chemical transport model simulations, and ground measurements from 79 different countries to produce global estimates of annual average fine particle (PM2.5) and ozone concentrations at 0.1° × 0.1° spatial resolution for five-year intervals from 1990 to 2010 and the year 2013. These estimates were applied to assess population-weighted mean concentrations for 1990–2013 for each of 188 countries. In 2013, 87% of the world’s population lived in areas exceeding the World Health Organization Air Quality Guideline of 10 µg/m3 PM2.5 (annual average). Between 1990 and 2013, global population-weighted PM2.5 increased by 20.4% driven by trends in South Asia, Southeast Asia, and China. Decreases in population-weighted mean concentrations of PM2.5 were evident in most high income countries. Population-weighted mean concentrations of ozone increased globally by 8.9% from 1990–2013 with increases in most countries except for modest decreases in North America, parts of Europe, and several countries in Southeast Asia.

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