



Direct space-based observations of decadal changes in NO_x emissions and lifetime: Implications for oxidative capacity

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The NO_x chemical lifetime in the atmosphere is nonlinearly related to its concentration and is strongly coupled to the available OH. Direct observation of changes in the urban NO_x lifetime over the past decades therefore provides information about the oxidative capacity of the urban atmosphere. Doing so required the development of a new satellite NO₂ retrieval (BEHR v3.0B; <http://behr.cchem.berkeley.edu/>) with sufficiently detailed a priori data to resolve these changes. Using the new BEHR retrieval, we observe shifts trends in NO_x lifetime chemistry in several US cities, showing that OH concentrations have peaked in almost every locations and will decrease in step with future NO_x emissions reductions. We compare the observed changes in NO_x lifetime with those computed in a state-of-science model and discuss the implications for our current understanding of the emissions and kinetics governing the NO_x and HO_x cycles.