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Historical and future (1850-2100) gridded anthropogenic and biomass burning emissions of reactive gases and aerosols for IPCC AR5: methodology and application.

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We present and discuss a new dataset of gridded emissions covering the historical (1850-2000) and future (2000-2100, for each of the four Representative Concentration Pathways) periods, in decadal increments at a horizontal resolution of 0.5° in latitude and longitude. The primary purpose of this inventory is to provide consistent gridded emissions of reactive gases and aerosols for use in chemistry model simulations needed by climate models for the Climate Model Intercomparison Program #5 (CMIP5) in support of the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment report. Our best estimate for the year 2000 inventory represents a combination of existing regional and global inventories to capture the best information available at this point; 40 regions and 12 sectors were used to combine the various sources. The historical reconstruction of each emitted compound, for each region and sector, was then forced to agree with our 2000 estimate, ensuring continuity between past and 2000 emissions. Application of these emissions into several chemistry-climate models (under the Atmospheric Chemistry and Climate Activity #4) is used to test their ability to capture long-term changes in atmospheric ozone, carbon monoxide and aerosols distributions. In particular, comparison of simulated trends using recent surface, tropospheric and ice-core measurements will be shown.