



## Analysis of emission data from global commercial aviation: 2004 and 2006

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The global commercial aircraft fleet in 2006 flew 31.26 million flights, burned 188.20 million metric tons of fuel, and covered 38.68 billion kilometers. This activity emitted substantial amounts of fossil-fuel combustion products within the upper troposphere and lower stratosphere that affect atmospheric composition and climate. The emissions products, such as carbon monoxide, carbon dioxide, oxides of nitrogen, sulfur compounds, and particulate matter, are not emitted uniformly over the Earth, so understanding the temporal and spatial distribution is important for modeling aviation's climate impacts. Global commercial aircraft emission data for 2004 and 2006, provided by the Volpe National Transportation Systems Center, were computed using the Federal Aviation Administration's Aviation Environmental Design Tool (AEDT). Continuous improvement in methodologies, including changes in AEDT's horizontal track methodologies, and an increase in availability of data make some differences between the 2004 and 2006 inventories incomparable. Furthermore, the 2004 inventory contained a significant over-count due to an imperfect data merge and daylight savings error. As a result, the 2006 emissions inventory is considered more representative of actual flight activity. Here, we analyze both 2004 and 2006 emissions, focusing on the latter, and provide corrected totals for 2004. Analysis of 2006 flight data shows that 92.5% of fuel was burned in the Northern Hemisphere, 69.0% between 30N and 60N latitudes, and 74.6% was burned above 7 km. This activity led to 162.25 Tg of carbon from CO<sub>2</sub> emitted globally in 2006, more than half over three regions: the United States (25.5%), Europe (14.6), and East Asia (11.1). Despite receiving less than one percent of global emissions, the Arctic receives a uniformly dispersed concentration of emissions with 95.2% released at altitude where they have longer residence time than surface emissions. Finally, 85.2% of all flights by number in 2006 were short-haul missions, yet those flights were responsible for only 39.7% of total carbon from CO<sub>2</sub>. The following is a summary of these data which illustrates the global and regional aviation emissions footprints for 2004 and 2006, and provides temporal and spatial distribution statistics.

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