The Temporal and Spatial Distribution of Carbon Dioxide Emissions from Fossil-Fuel Use in North America

J.S. Gregg[1], L.M. Losey[2], R.J. Andres[3], T.J. Blasing[3] and G. Marland[3]

[1]Department of Geography, University of Maryland, College Park, MD 20742
[2]Department of Space Studies, University of North Dakota, Grand Forks, ND 58202
[3]Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, TN 37831

Refinements in temporal and spatial resolution of North American fossil-fuel carbon dioxide (CO_2) emissions provide additional information about anthropogenic aspects of the carbon cycle. Seasonal and spatial patterns are distinctive components of anthropogenic carbon emissions. The pattern of fossil-fuel-based CO_2 emissions on a monthly scale has greater temporal and spatial variability than the flux aggregated to the national annual level. The U.S. comprises the majority of North American fossil carbon emissions and the amplitude of the seasonal flux in emissions in the U.S. is greater than the total mean monthly emissions in both Canada and Mexico. Nevertheless, Canada and Mexico have distinctive seasonal patterns. For the continent, the monthly pattern of emissions vary on a both north-south and east-west gradient, and evolve through time. For many areas in North America, the magnitude of the month-to-month variation is larger than the total annual emissions from land use change, making the characterization of emissions patterns essential to understanding humanity's influence on the carbon cycle.

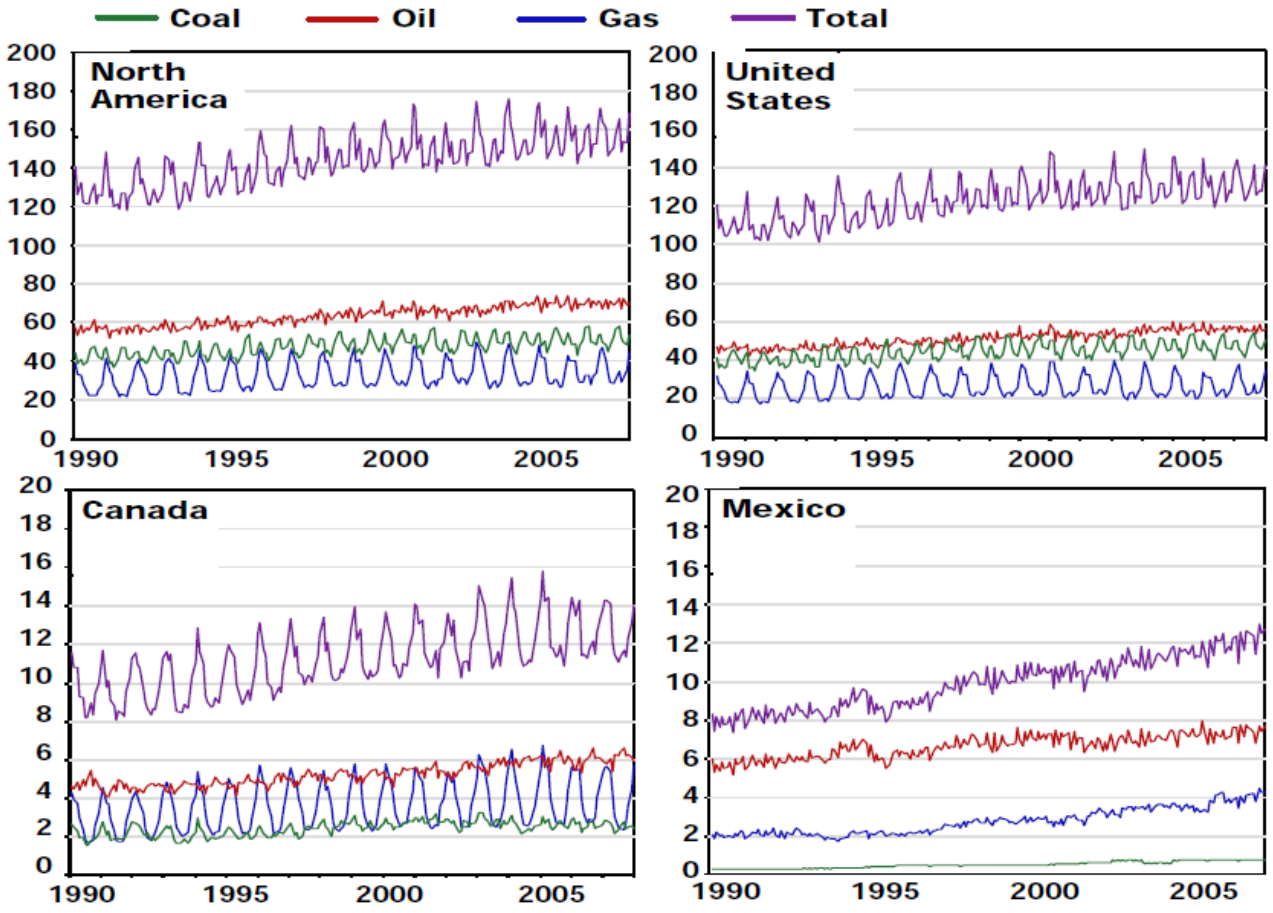

Figure 1. Monthly fossil fuel carbon emissions for North America, the U.S., Canada, and Mexico, by fuel type. Note that Canada and Mexico plots use a y-axis different from the one used for the North America and the U.S.