

Annual Migrations of North American Centroids of Carbon Emissions from Fossil Fuels – What Do They Reveal About Causes and Future Trends?

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Mapping seasonal and regional components of North American fossil-fuel carbon emissions provides clues as to causes and potential future changes in some anthropogenic aspects of the overall carbon cycle. Gregg et al. (2009) have calculated monthly carbon emissions from fossil fuels in Mexico and from each state/province in Canada and the United States to facilitate studies of the changing North American carbon budget. Their report includes a figure (reproduced in modified form as Fig. 1, below) showing the seasonal migrations of the centroids of carbon emissions from coal, oil, natural gas, and total fossil fuel combustion on the North American continent. Here we explore how these migrations reflect seasonal changes in geographical patterns of energy supply, demand, and resulting carbon emissions in various regions of the continent. By providing insights on important variables to monitor, the results should be useful to policy makers and planners as well as carbon-cycle modelers.

Reference: Gregg, J.S., L.M. Losey, R.J. Andres, T.J. Blasing and G. Marland. (2009). The Temporal and Spatial Distribution of Carbon Dioxide Emissions from Fossil-Fuel Use in North America. *Journal of Applied Meteorology and Climatology*, 48(12) 2528-2542.

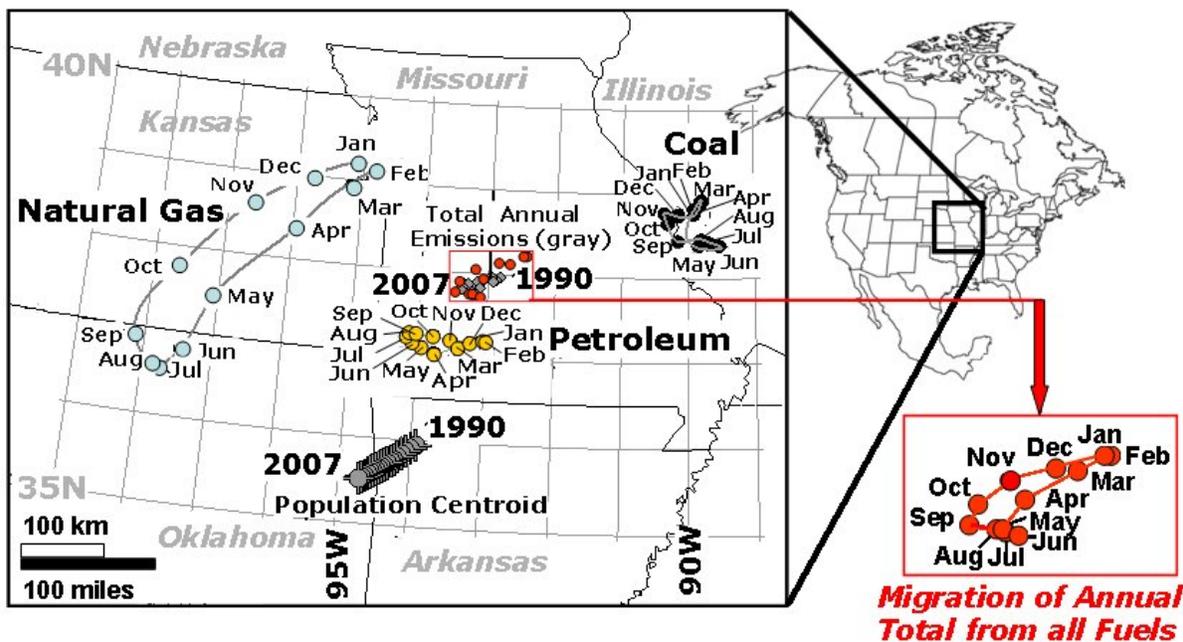


Figure 1. Annual migrations of the centroids of North American carbon emissions from coal products (black), petroleum products (gold), natural gas products (blue), and the total of all products (red), based on their 1990-2007 average spatial positions for each calendar month. West-southwesterly migration of the centroid of annual emissions (no monthly components) from all fuels from 1990-2007 is shown in gray, and overlaps the red dots representing the location of the centroid of all fuels collectively for each calendar month. The North American population centroid and its migration from 1990-2007 is also shown. Population figures used are from the U.S. Census Bureau (2001), Statistics Canada (2001), and the Instituto Nacional de Estadística y Geografía (INEGI) (2001).