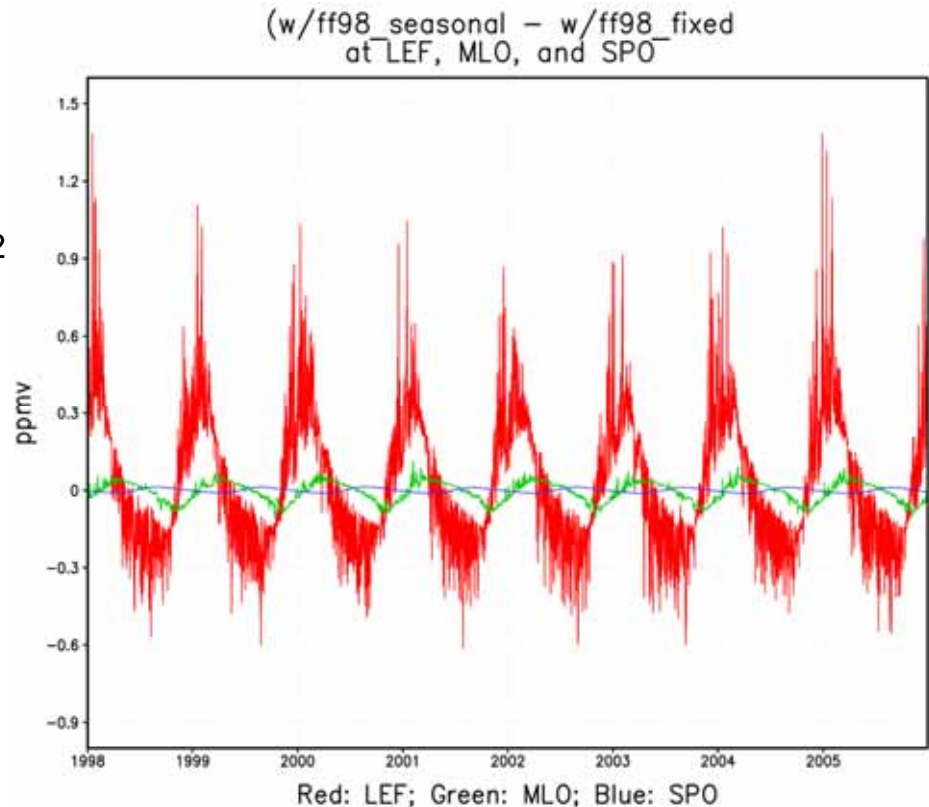


Modeling study of atmospheric CO₂ to be used to study global warming and support NASA satellite mission

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DOE/Office of Science

- Global model of atmospheric CO₂ distributions uses new monthly anthropogenic CO₂ emissions
- These new monthly emissions impacts atmospheric CO₂ concentration
- These model simulations are being used as input to a satellite evaluation system for the NASA OCO satellite to be launched in June 2008



Modeled differences in surface level CO₂ concentrations when using annual mean versus monthly CO₂ emissions for three sites (LEF = Park Falls, WI; MLO=Mauna Loa, HI; SPO=South Pole)

Modeling study of atmospheric CO₂ at ORNL to be used to study global warming and support NASA satellite mission

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A new carbon cycling modeling study led by David Erickson of the Computational Earth Sciences Group, Computer Science and Mathematics Division, Oak Ridge National Laboratory will appear in the American Geophysical Union publication *Journal of Geophysical Research* in early 2008.

The monthly anthropogenic CO₂ flux estimates are used to model atmospheric CO₂ concentrations using meteorological fields from the NASA GEOS-4 data assimilation system. The study found that the use of monthly resolved fluxes makes a significant difference in the seasonal cycle of atmospheric CO₂ in and near those regions where anthropogenic CO₂ is released to the atmosphere. An additional finding was that in the mid latitudes near the sources, synoptic scale atmospheric circulations are important in the winter and that boundary layer venting and diurnal rectifier effects are more important in the summer. These findings have implications for inverse-modeling efforts that attempt to estimate surface source/sink regions especially when the surface sinks are co-located with regions of strong anthropogenic CO₂ emissions. These results will be used in simulations of the data to be collected by the NASA carbon-sensing satellite schedule for launch in June 2008. Support for this research was provided by the US Department of Energy, Office of Science and NASA.

D. J. Erickson III, R. T. Mills, J. Gregg, T. J. Blasing, F. M. Hoffman, R.J. Andres, M. Devries, Z. Zhu and S. R. Kawa. 2007. An estimate of monthly global emissions of anthropogenic CO₂: The impact on the seasonal cycle of atmospheric CO₂. *Journal of Geophysical Research* (in press).