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**Article:** "Atmospheric implications of large light alkane emissions from the U.S. oil and gas industry"

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**Abstract:**

Emissions of non-methane light alkanes from the U.S. oil and gas sector have changed rapidly over the last decade. We use a nested GEOS-Chem simulation driven by updated atmospheric abundances of light alkanes over the U.S., and 2) estimate the contribution of emissions from the U.S. oil and gas industry to these patterns. The oil and gas sector in the updated NEI 2011 contributes >80% of the total U.S. emissions of ethane (C<sub>2</sub>H<sub>6</sub>) and propane (C<sub>3</sub>H<sub>8</sub>), and emissions of these species are largest in the central U.S. Observed mixing ratios of C<sub>2</sub>-C<sub>5</sub> alkanes show enhancements over the central U.S. below 2 km. A nested GEOS-Chem simulation underpredicts observed C<sub>3</sub>H<sub>8</sub> mixing ratios in the boundary layer over several U.S. regions and the relative underprediction is not consistent, suggesting C<sub>3</sub>H<sub>8</sub> emissions should receive more attention moving forward. Our decision to consider only C<sub>4</sub>-C<sub>5</sub> alkane emissions as a single lumped species produces a geographic distribution similar to observations. Due to the increasing importance of oil and gas emissions in the U.S., we recommend continued support of existing long-term measurements of C<sub>2</sub>-C<sub>5</sub> alkanes. We suggest additional monitoring of C<sub>2</sub>-C<sub>5</sub> alkanes downwind of northeastern Colorado, Wyoming and western North Dakota to capture changes in these regions. The atmospheric chemistry modeling community should also evaluate whether chemical mechanisms that lump larger alkanes are sufficient to understand air quality issues in regions with large emissions of these species.

**Description:**

This repository contains twelve directories corresponding to each month in 2011. Inside each monthly directory there are daily emission files for emission sources over the continental U.S.

- dataset\_1.zip (29.93Gb) contains January 2011 data
- dataset\_2.zip (27.04Gb) contains February 2011 data
- dataset\_3.zip (29.95Gb) contains March 2011 data
- dataset\_4.zip (28.94Gb) contains April 2011 data
- dataset\_5.zip (29.88Gb) contains May 2011 data
- dataset\_6.zip (28.84Gb) contains June 2011 data
- dataset\_7.zip (29.71Gb) contains July 2011 data
- dataset\_8.zip (29.71Gb) contains August 2011 data
- dataset\_9.zip (28.81Gb) contains September 2011 data
- dataset\_10.zip (29.92Gb) contains October 2011 data

- dataset\_11.zip (29.00Gb) contains November 2011 data
- dataset\_12.zip (29.94Gb) contains December 2011 data

The data files are in NetCDF (.nc) format  
(<https://www.unidata.ucar.edu/software/netcdf/>)

The file names are formatted NEI2011ek\_0.1x0.1\_YYYYMMDD\_source.nc where

- YYYYMMDD is the corresponding emissions' date and
- Source is the emission source:
  - ag – agricultural ammonia
  - cmv – commercial marine vessels
  - nonpt – stationary nonpoint sources
  - np\_oilgas - drill rigs, workover rigs, artificial lift, hydraulic fracturing engines, pneumatic pumps and other devices, storage tanks, flares, truck loading, compressor engines, and dehydrators.
  - nonroad – nonroad mobile equipment sources
  - onroad – onroad mobile sources
  - pt\_oilgas – oil and gas extraction, distribution, and pipelines.
  - ptegu – electrical generation units
  - ptnonipm – other point sources, including aircraft emissions and rail yard emissions.
  - rail – railroad sources
  - rwc - residential wood combustion

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