Atmospheric Impacts of Oil and Natural Gas Operations

AGU Press Workshop  12-11-2013
Introduction

Gaby Pétron
CIRES, University of Colorado Boulder and NOAA
US Natural Gas Systems: A large infrastructure

- ~ 500 processing plants
- 300,000 miles of transmission pipelines
- > 1400 compressor stations
- 2,000,000 miles of distribution pipeline
- 400 underground storage sites

US Statistics: EIA, DOT, OGJ

- 20,000 miles of gathering pipelines
- >1 million oil and gas wells in US

Production Process Processing Transmission Distribution

Raw Natural Gas
- > 70% methane in volume

Processed Natural Gas
- > 90% methane in volume

Processed Natural Gas
- > 90% methane in volume
Example of impact: Ozone Pollution in Producing Basins

Raw natural gas contains varying amounts of methane and other air contaminants, including ozone precursors.

When raw natural gas is leaked or vented, all these ingredients are released.

**Wintertime Ozone:**
- Green River Basin, WY
- Uintah Basin, UT

**Summer time Ozone:**
- Denver Basin, CO

EPA Region 8 non attainment areas for surface ozone

April 2012
Emissions of air pollutants from fossil fuels production and combustion have atmospheric impacts at the local, regional and global scales.

- Emissions from cars and power plants and their impacts have been studied extensively in the US.
- Emissions and impacts from natural gas and petroleum production systems not as much.
Overview of Panelists

- **Gaby Pétron**, CIRES, University of Colorado Boulder and NOAA
  - Measurement-based studies of methane and VOC emissions at the regional scale
- **Jeff Peischl**, CIRES, University of Colorado Boulder and NOAA
  - Measurement-based methane emissions estimates for three major shale gas producing regions in the US
- **David Allen**, University of Texas Austin
  - Direct methane emissions measurement at a subset of production sites to update EPA Greenhouse Gases inventory emission factors
- **Sam Oltmans**, CIRES, University of Colorado Boulder and NOAA
  - Winter-time surface ozone pollution in the Uintah Basin, UT
Underlying research questions

• How much methane, ozone precursors and other air pollutants are emitted by various oil and gas sources?
  • **Inventory (bottom-up) approach**: extrapolating direct measurements at a subset of operations to larger scales
  • **Top-down approach**: estimating regional or national emissions based on atmospheric concentrations measurements

• How can these emissions impact local and regional air quality?
AGU Scientific Sessions

• ORALS    - - -  Moscone West 3004
  • Thursday 4-6pm  A44A
  • Friday 8-10am:  A51H
  • Friday 1:40-3:40pm:  A53H

• POSTERS   - - -  Moscone South, Hall A-C
  • Friday 1:40-6pm:  A53A