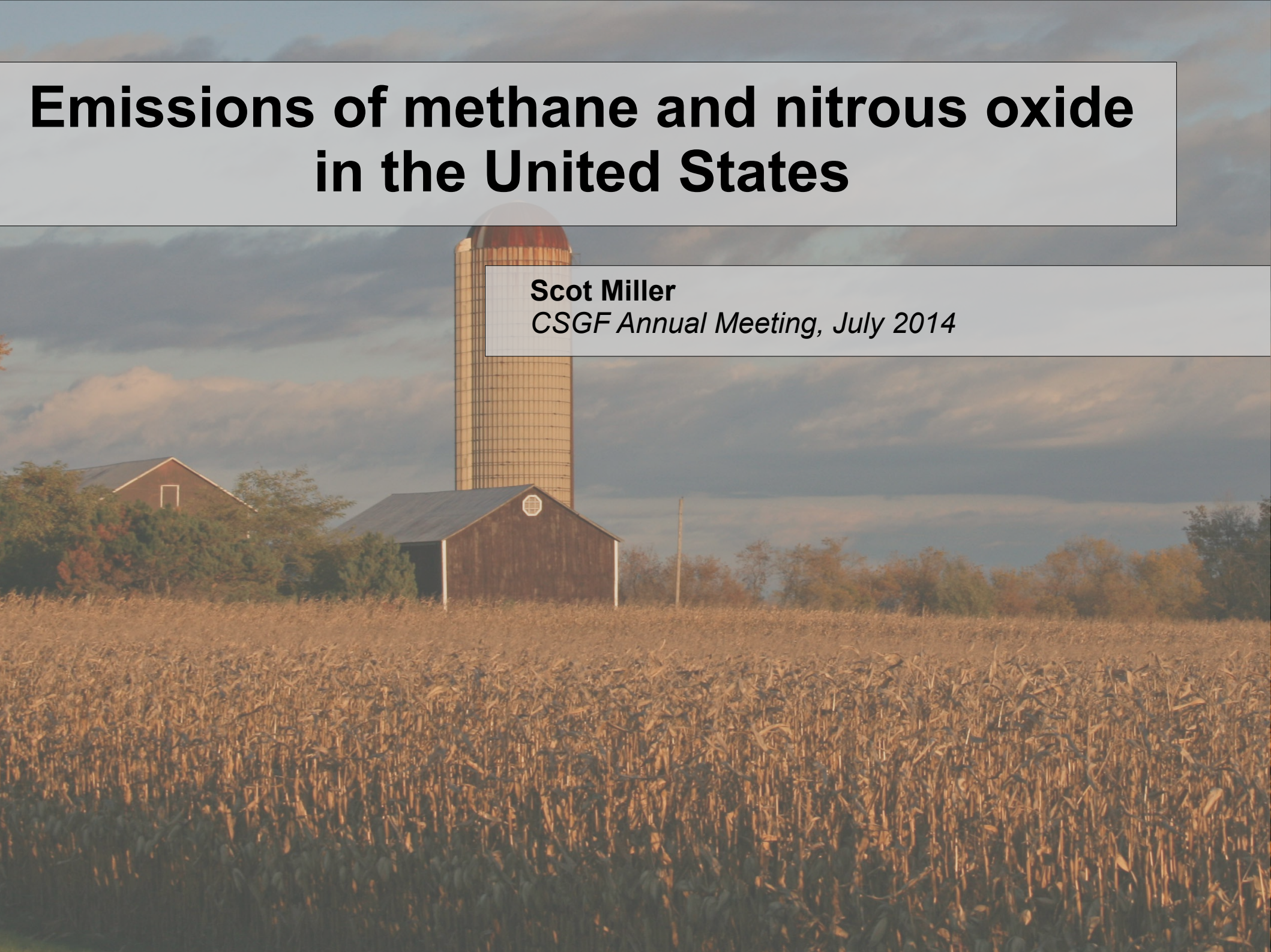
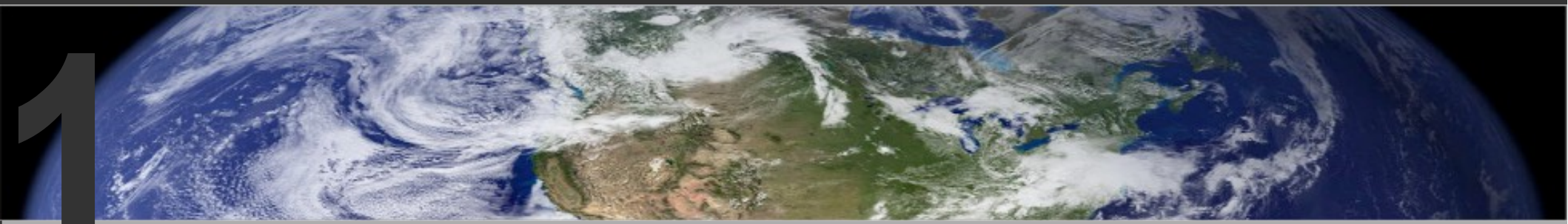
Emissions of methane and nitrous oxide in the United States



Scot Miller

CSGF Annual Meeting, July 2014



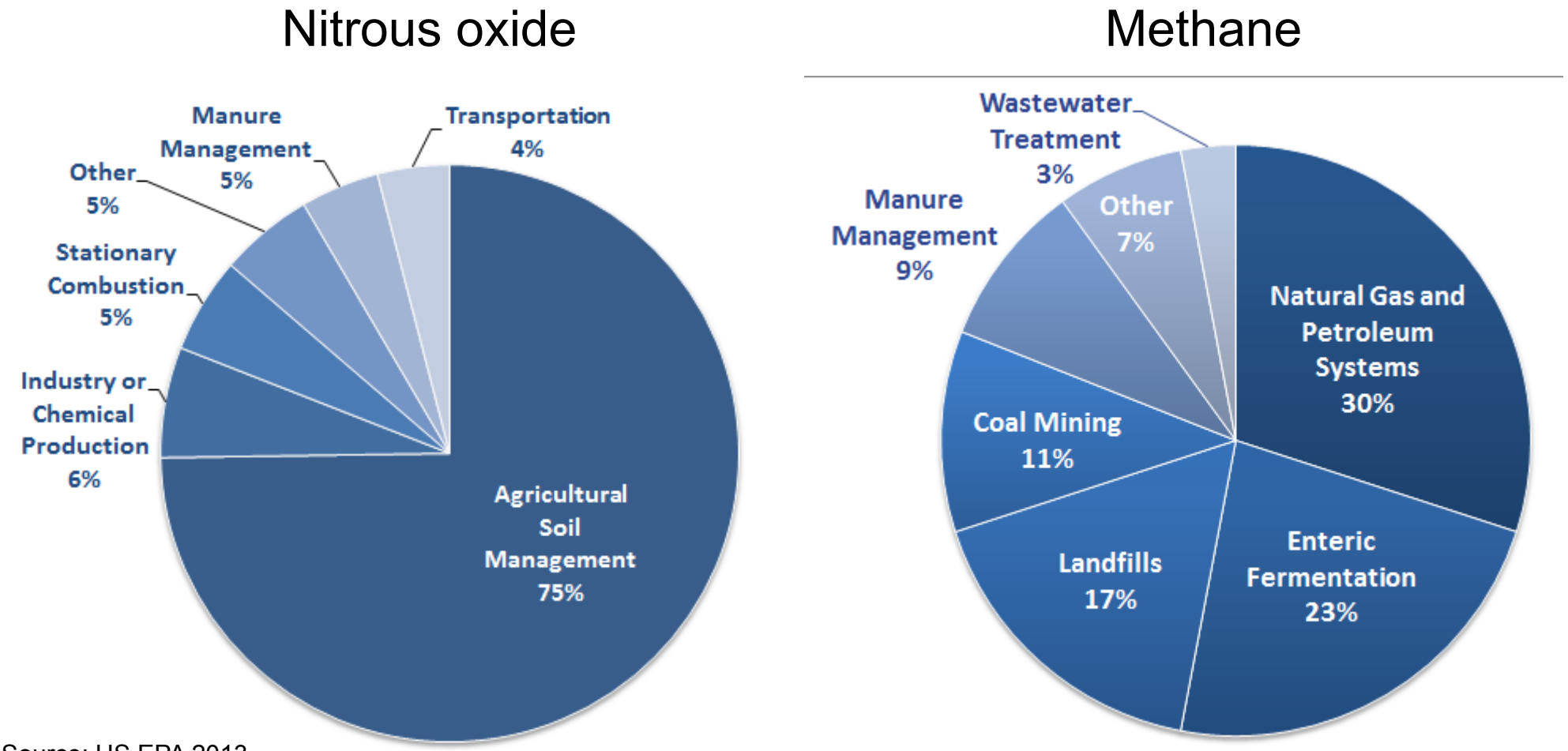
1 **Context** on emissions

2 Our **approach**

3 **Results** and **policy context**

1. **Context** on emissions

US anthropogenic emissions by sector

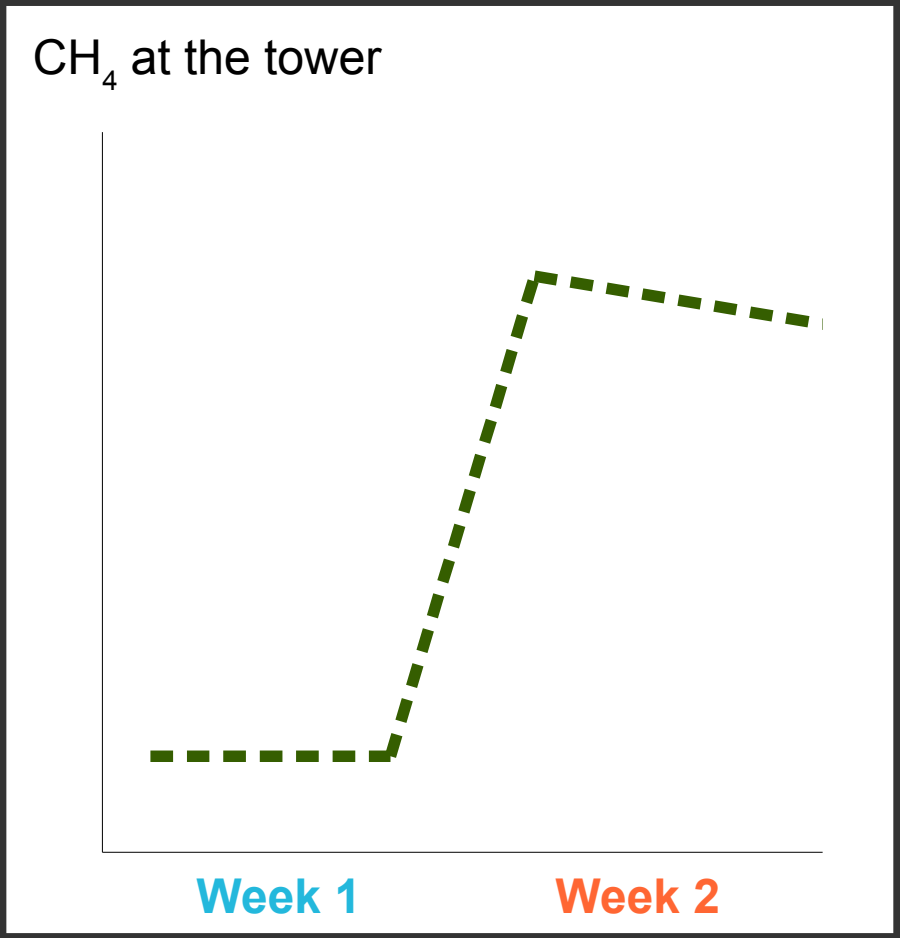


Source: US EPA 2013

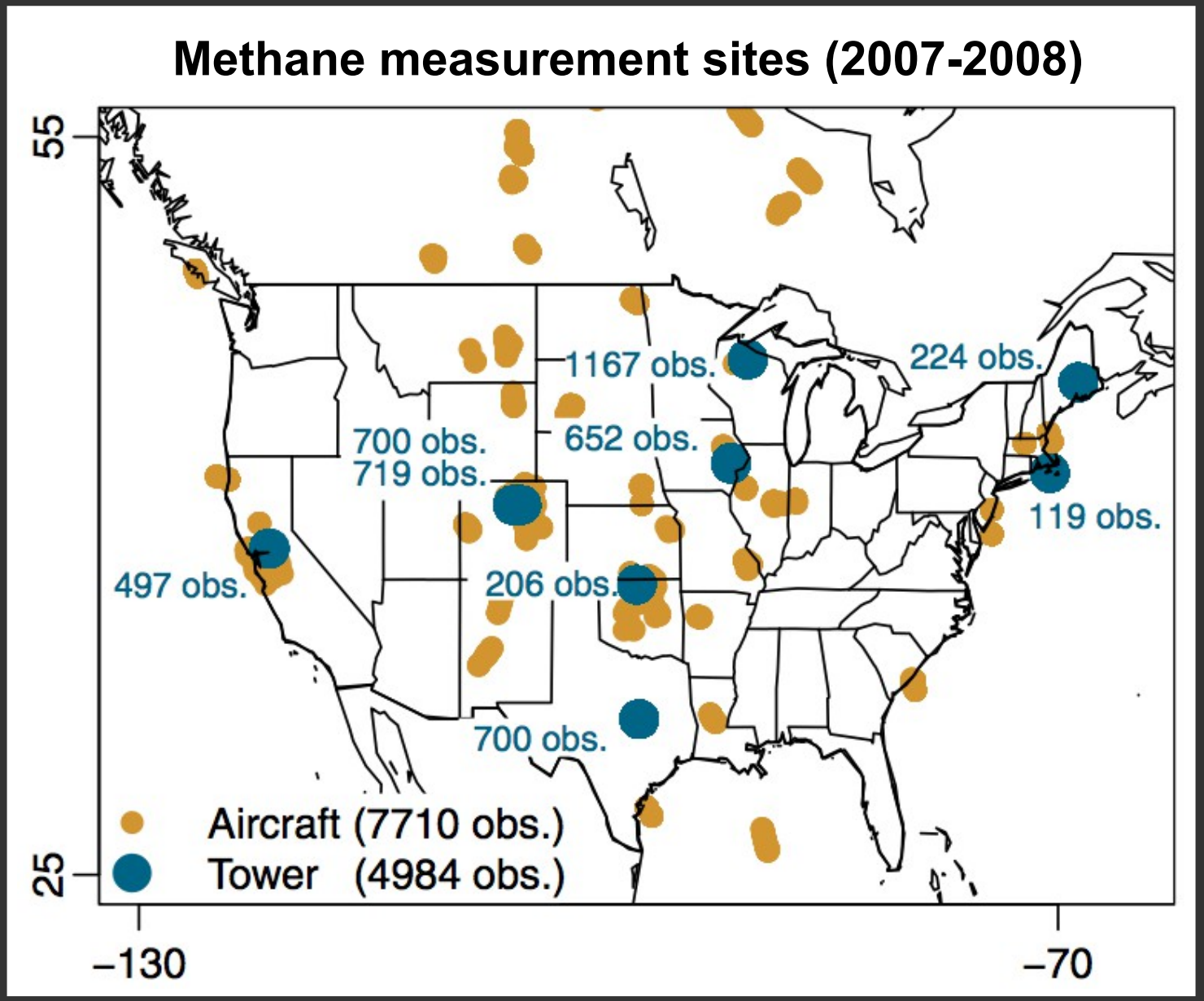
1. **Context** on emissions

2. Our **approach**

How do we estimate emissions using atmospheric observations?

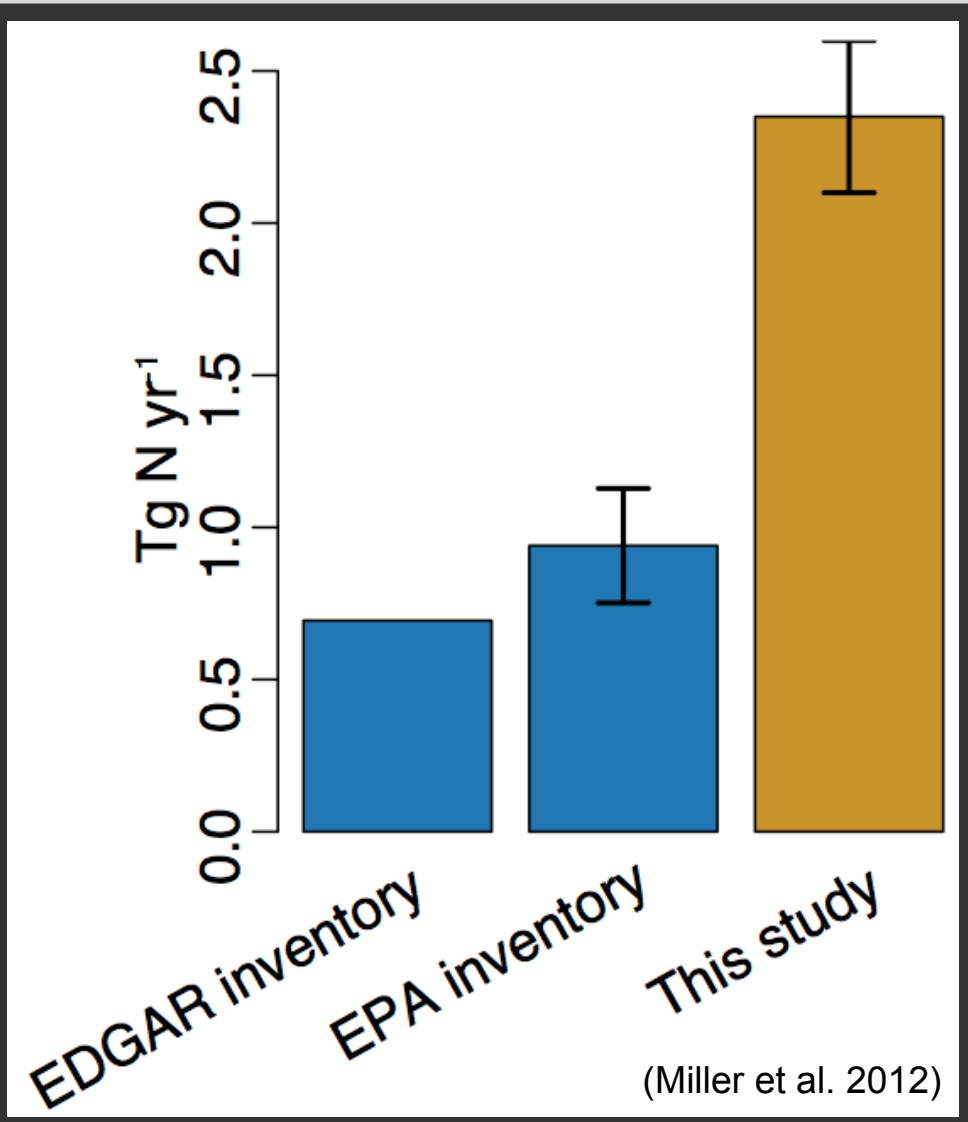


2. Our **approach**



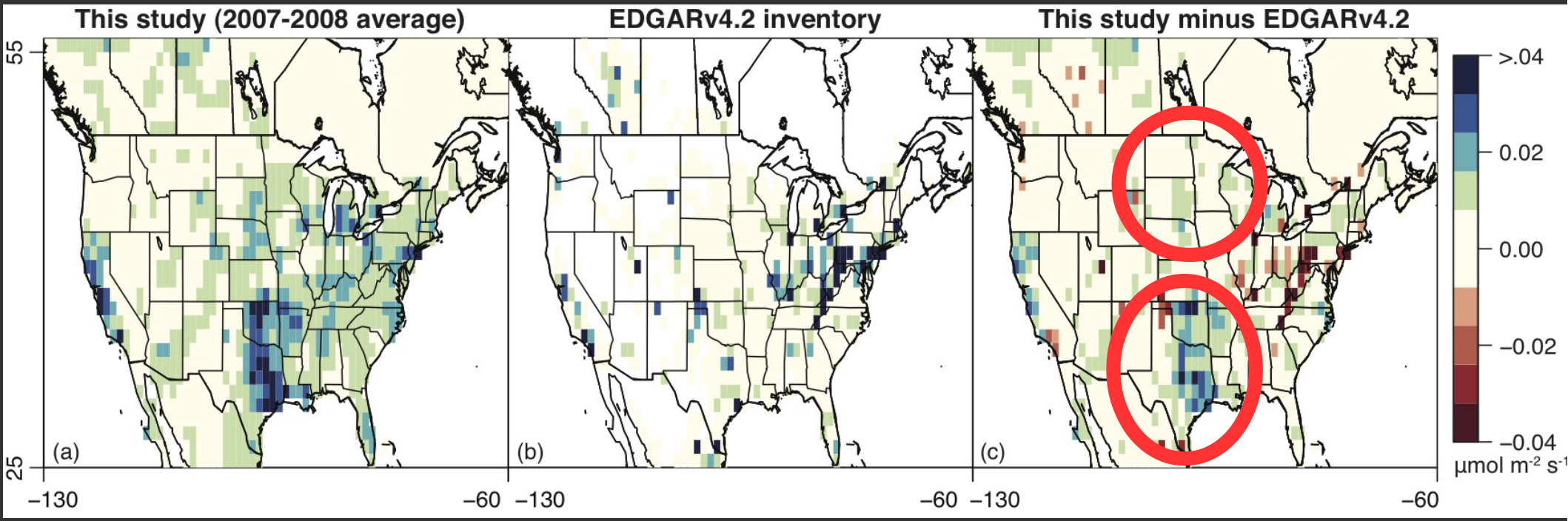
3. **Results** and **policy context**

Nitrous oxide emissions in the US and Canada (2008)



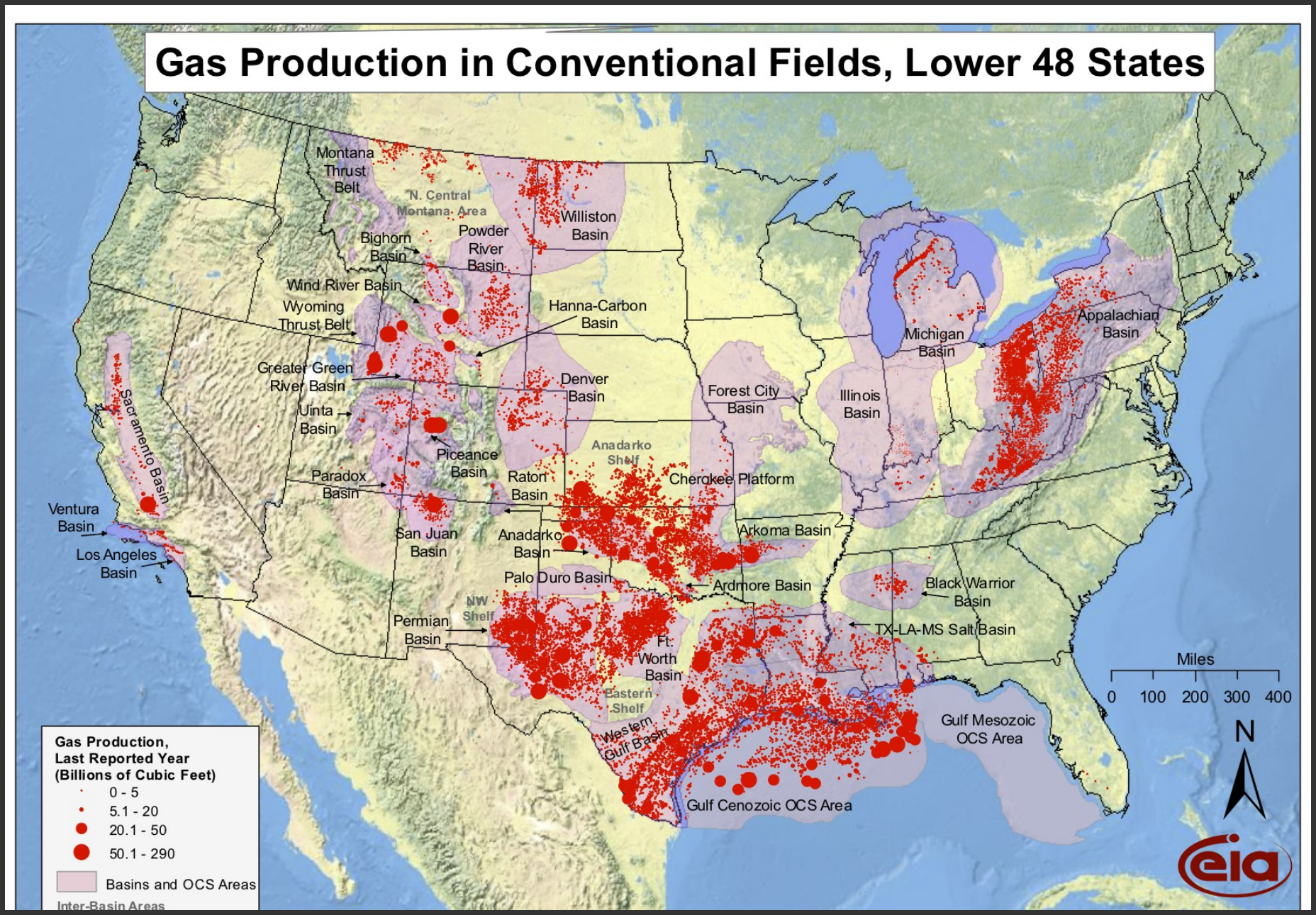
(Miller et al. 2012)

3. **Results** and **policy context**



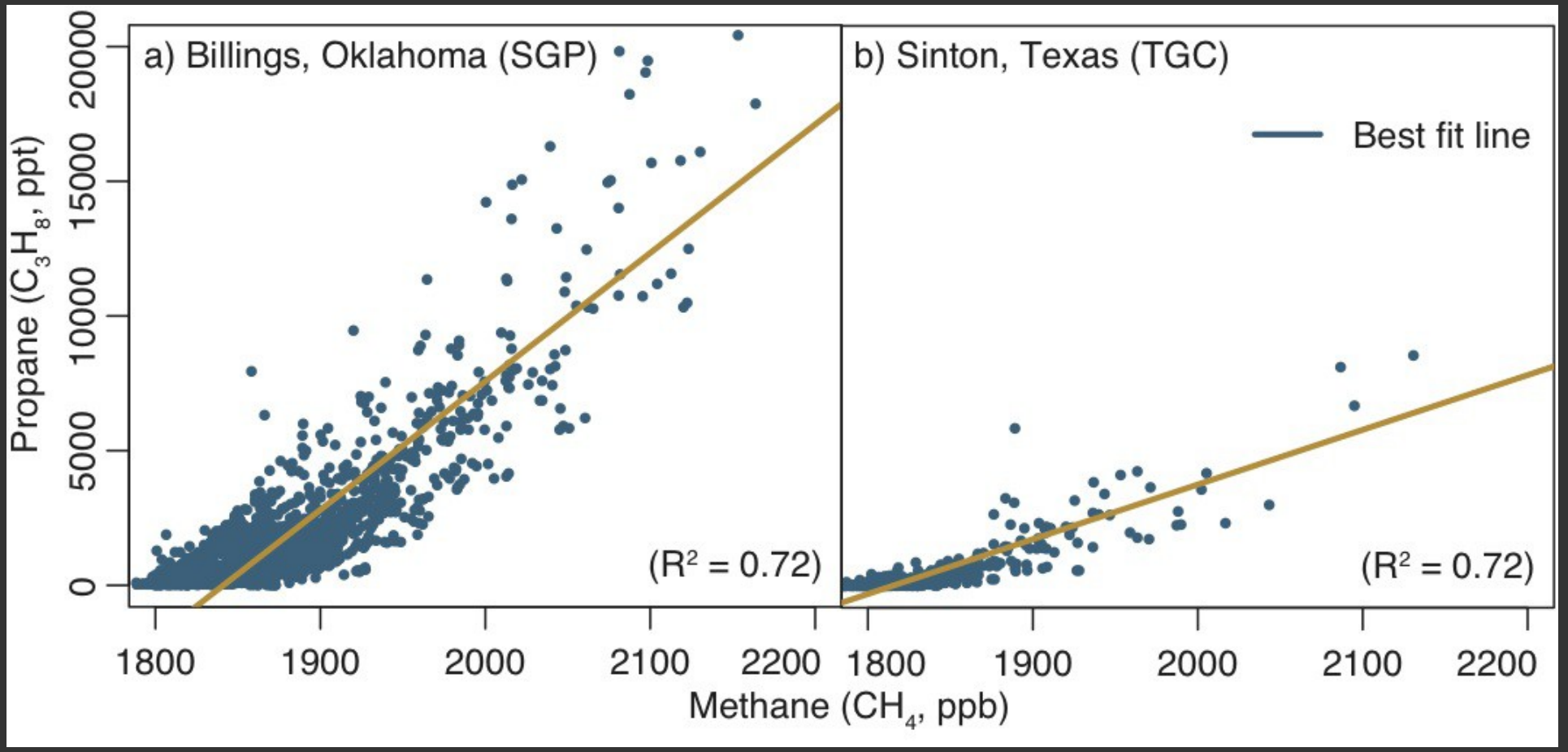
- National emissions ~50% higher than estimated by US EPA
- 25% of all US emissions from Texas, Oklahoma, and Kansas
- Emissions from cattle & manure ~2x higher

3. **Results** and **policy context**



3. **Results** and **policy context**

Propane: a signature of the oil & gas industries



3. **Results** and **policy context**

Subsequent studies:

- On-road and airplane based sampling: leaks rates of ~2.6 – 17.3% compared to EPA's estimate of 0.88%.
  (Karion et al. 2013, Caulton et al. 2014, Petron et al. 2014)

- Leak rate >3.2% makes for GHG impact worse than coal.
  (Alvarez et al. 2012)

EPA:

- Decreased its estimate of natural gas emissions by 25-30% in response to an industry report (in 2013).

3. **Results** and **policy context**

Recent policy actions:

- March 2014: White House announces methane strategy under Climate Action Plan
- EPA to develop regulations for natural gas sector by 2016. Additional rules for coal mining and landfills.

Conclusions:

- Nitrous oxide and methane emissions higher than existing inventory estimates
- Large methane emissions from ruminants and from the natural gas/oil sectors.

Thank you!

Anna Michalak, Steve Wofsy, Eric Kort, Arlyn Andrews, Sebastien Biraud, Ed Dlugokencky, Marc Fischer, Greet Maenhout, Ben Miller, Stephen Montzka, Colm Sweeney, and Adam Hirsch.