Greenhouse gas emissions from corn-based cropland management: the Sustainable Corn CAP Approach

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U.S. Agriculture Sector GHG on a CO<sub>2</sub> Eq. basis; EPA 2013

As a sector, agriculture accounts for ~8% of U.S. GHG on a  $CO_2$  Eq. basis

### Mitigation: Global Technical Potential





## Mitigation: Global Economic Potential



Mitigation measure

**Figure 8.9:** Economic potential for GHG agricultural mitigation by 2030 at a range of prices of  $CO_2$ -eq Note: Based on B2 scenario, although the pattern is similar for all SRES scenarios. *Source: Drawn from data in Smith et al., 2007a.* 

## Mitigation: Global Economic Potential



**Figure 8.9:** Economic potential for GHG agricultural mitigation by 2030 at a range of prices of  $CO_2$ -eq Note: Based on B2 scenario, although the pattern is similar for all SRES scenarios. *Source: Drawn from data in Smith et al., 2007a.* 



## Measuring CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O





#### Gas Chromatography



#### Photoacoustic Spectroscopy



## Developing the methodology:



#### Global Change Biology

Global Change Biology (2012), doi: 10.1111/gcb.12021

#### TECHNICAL ADVANCE

# Evaluation of photoacoustic infrared spectroscopy for simultaneous measurement of N<sub>2</sub>O and CO<sub>2</sub> gas concentrations and fluxes at the soil surface

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#### Marsden Farm



Matt Liebman, Wallace Chair for Sustainable Agriculture





Soil moisture sensors

Continuous corn





0 = insufficient 135 = agronomic optimum 225 = excessive

- Cropland management is an economical source of GHG (N<sub>2</sub>O) mitigation.
- Nitrous oxide emissions highly variable in space and time – need more methods that are easily adopted.
- Nitrogen fertilizer management can play a significant role in N<sub>2</sub>O emissions mitigation.