

Dairy Emissions: Recent, Ongoing, and Future Research in California

A Technical Discussion

October 11, 2006

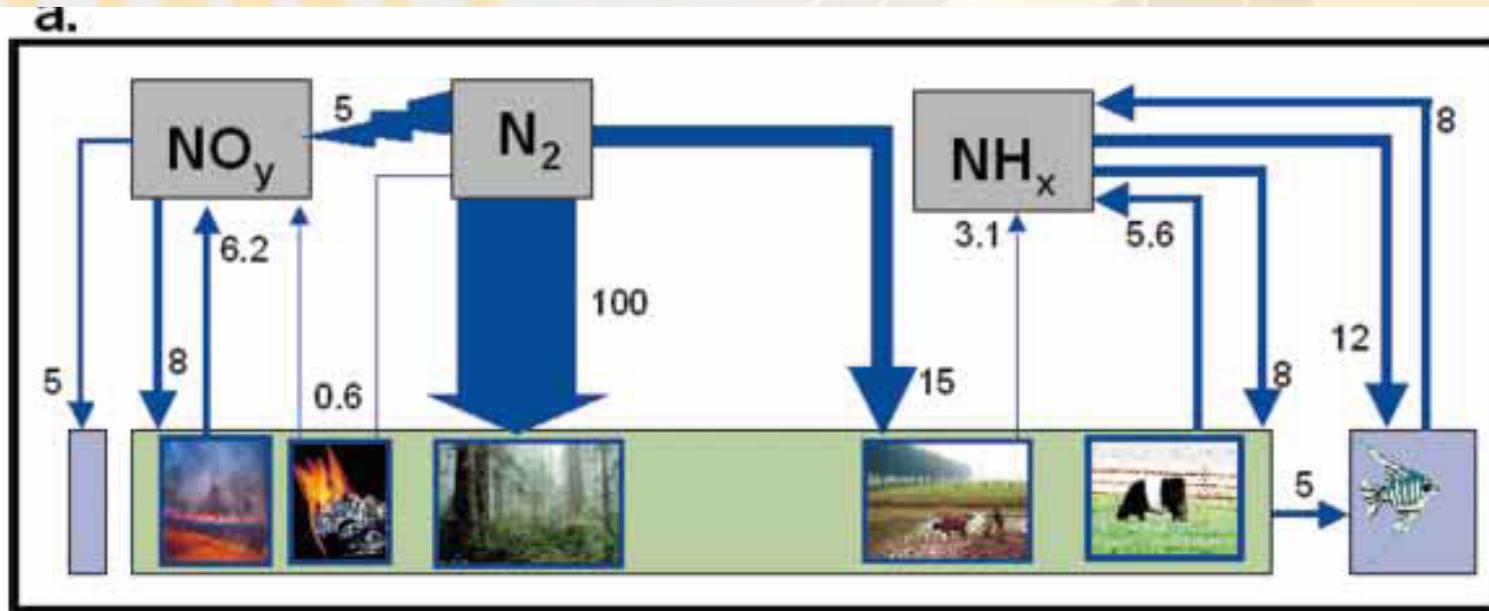
University of California, Davis

John Shears

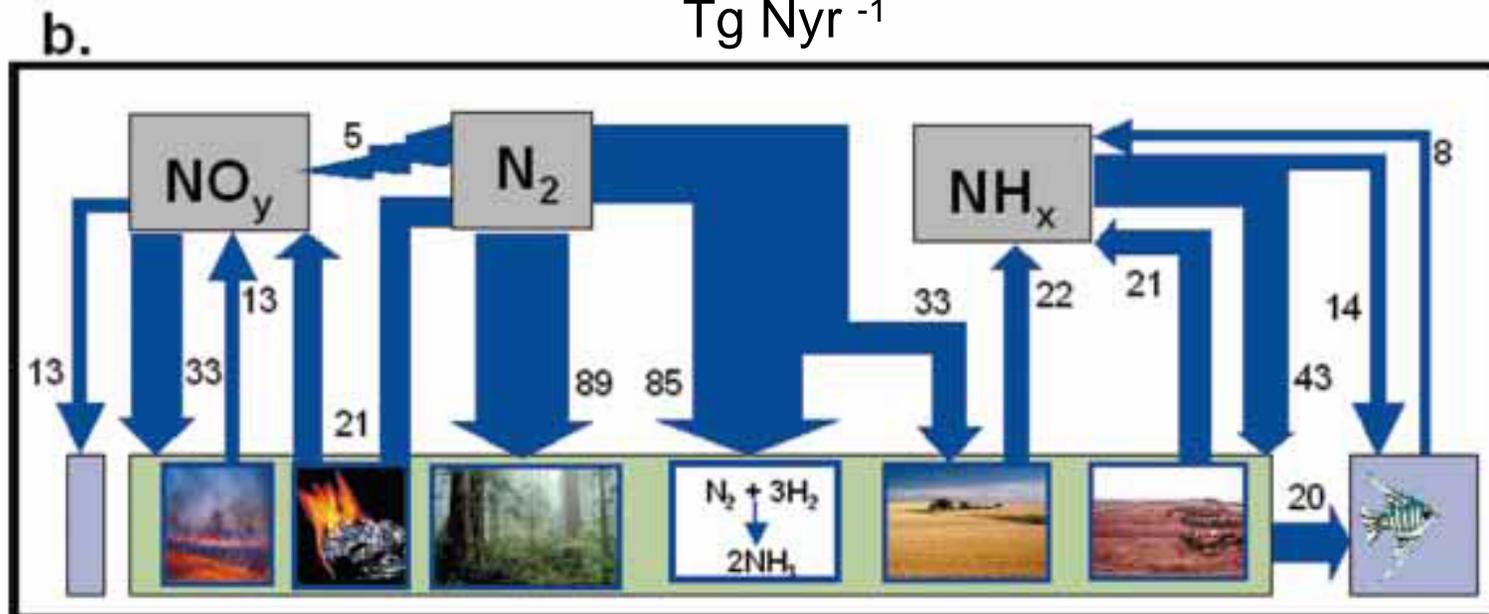
Research Coordinator

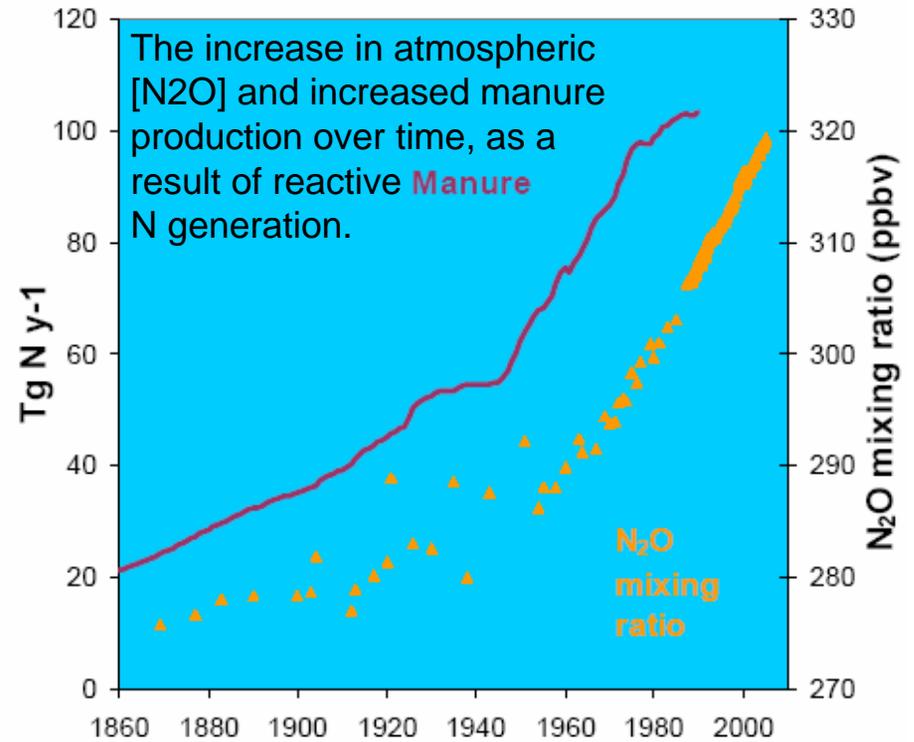
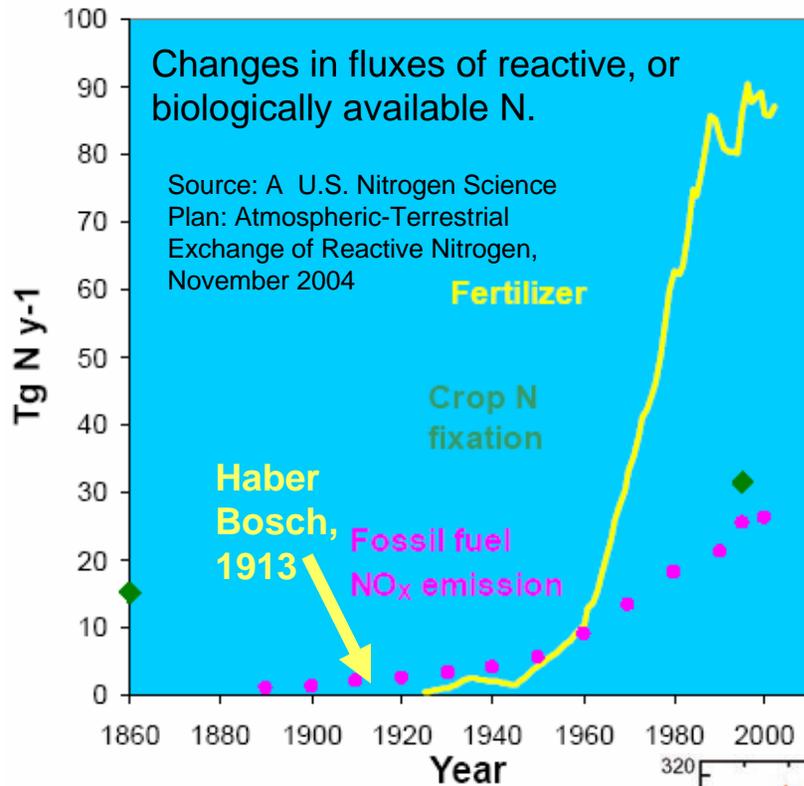
The Center for Energy Efficiency and Renewable Technologies



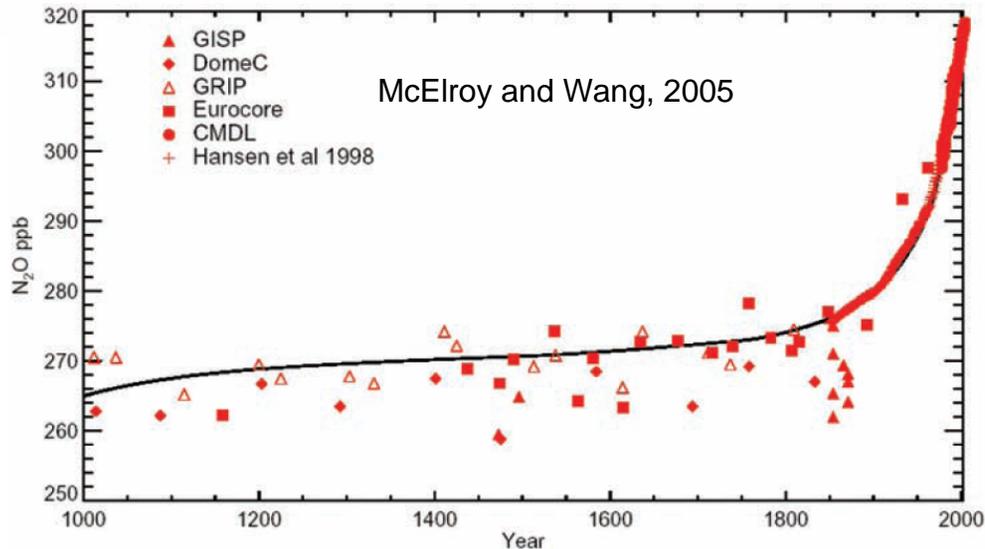


Tg N yr⁻¹

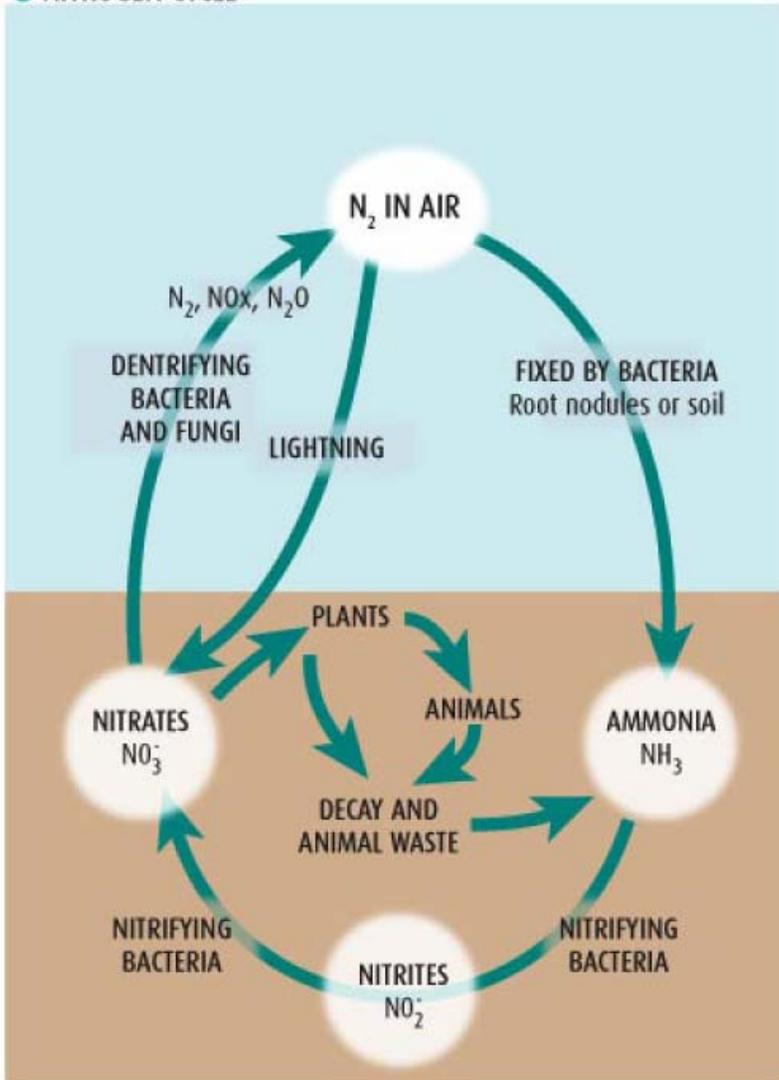




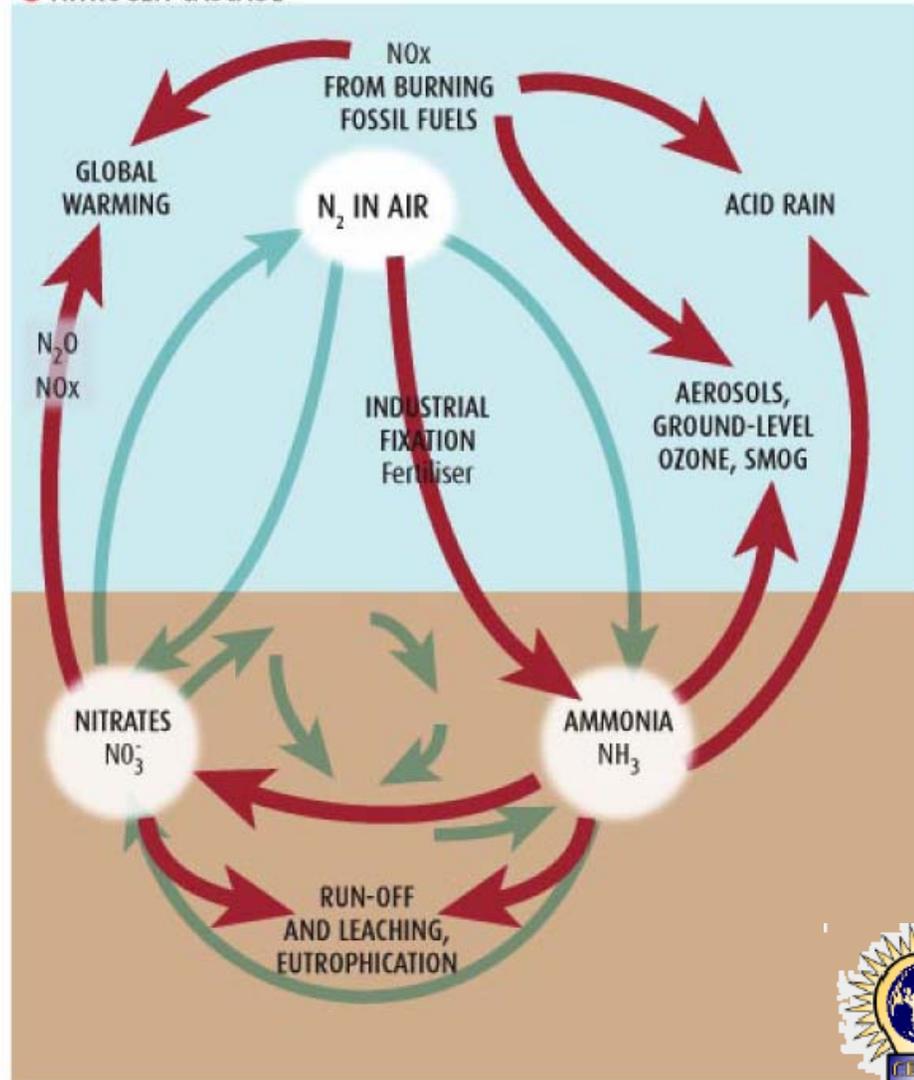
Observed atmospheric concentrations of N₂O for the period 1000–2001. Proxy observations are taken from ice core measurements.



● **NITROGEN CYCLE**

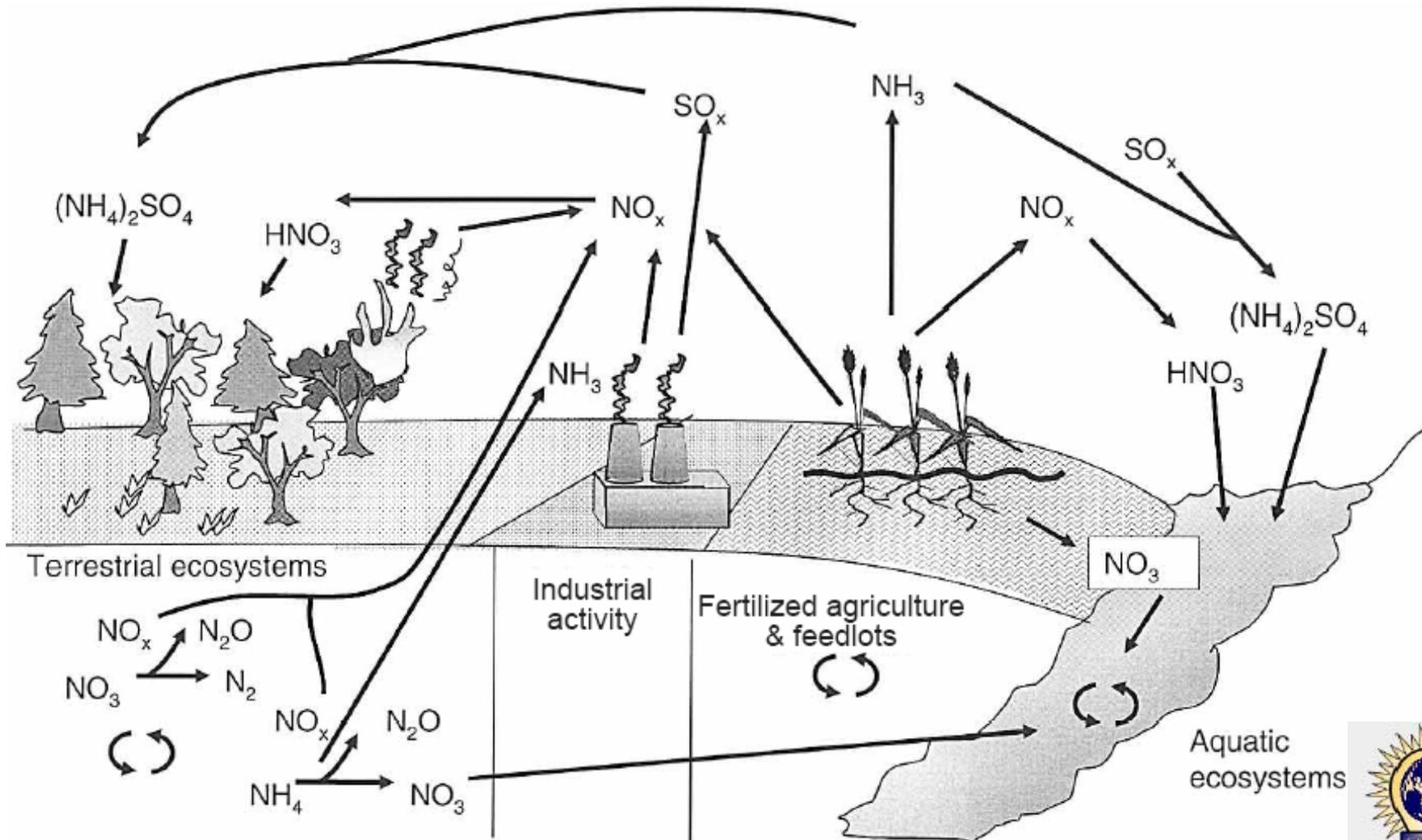


● **NITROGEN CASCADE**



Reactive Nitrogen: Its many guises

Not Shown – Ammonium Nitrate - NH_4NO_3 formed under humid conditions in air by the reaction of NH_3 and NO_x



Matson, Lohse, and Hall, 2002

What is Our Understanding of Soil NOx Emissions?

GOME

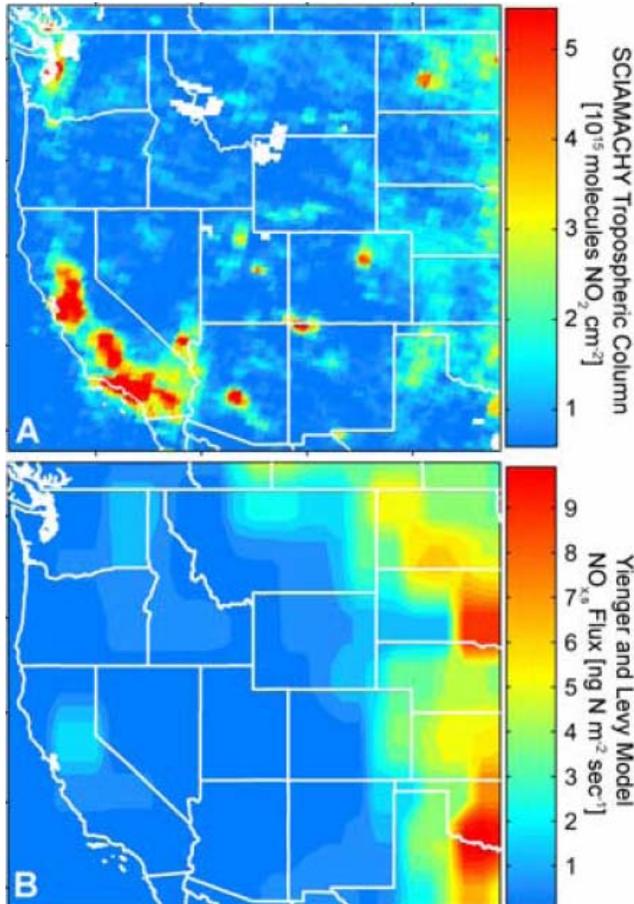
A priori

A posteriori

10^{10} atoms N $\text{cm}^{-2}\text{s}^{-1}$



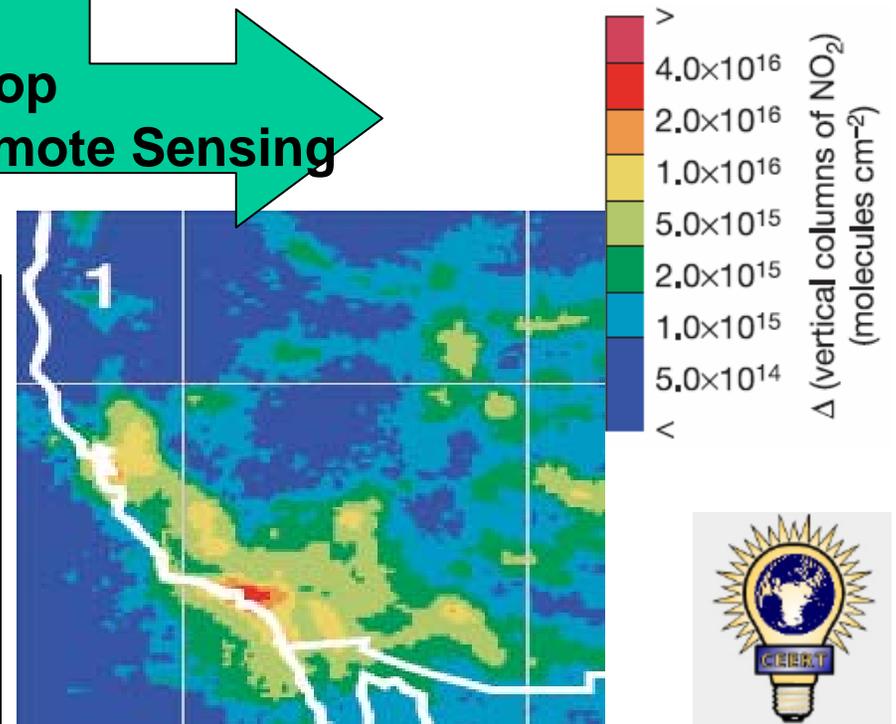
Jaeglé et. al., 2005



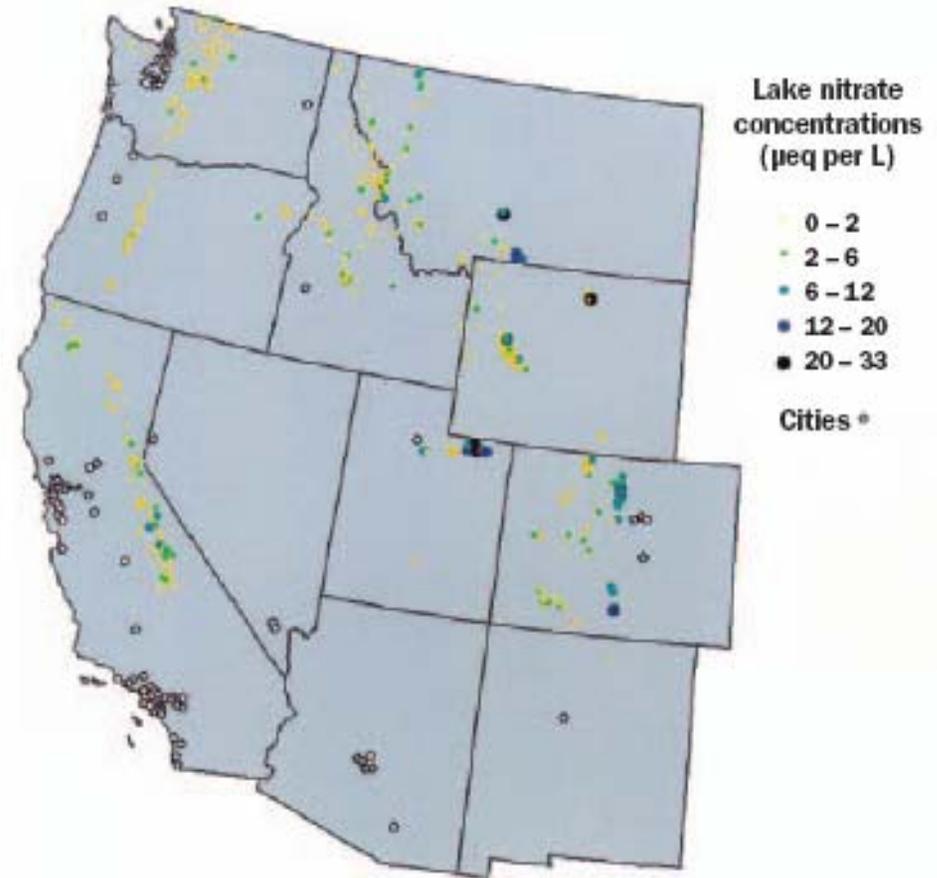
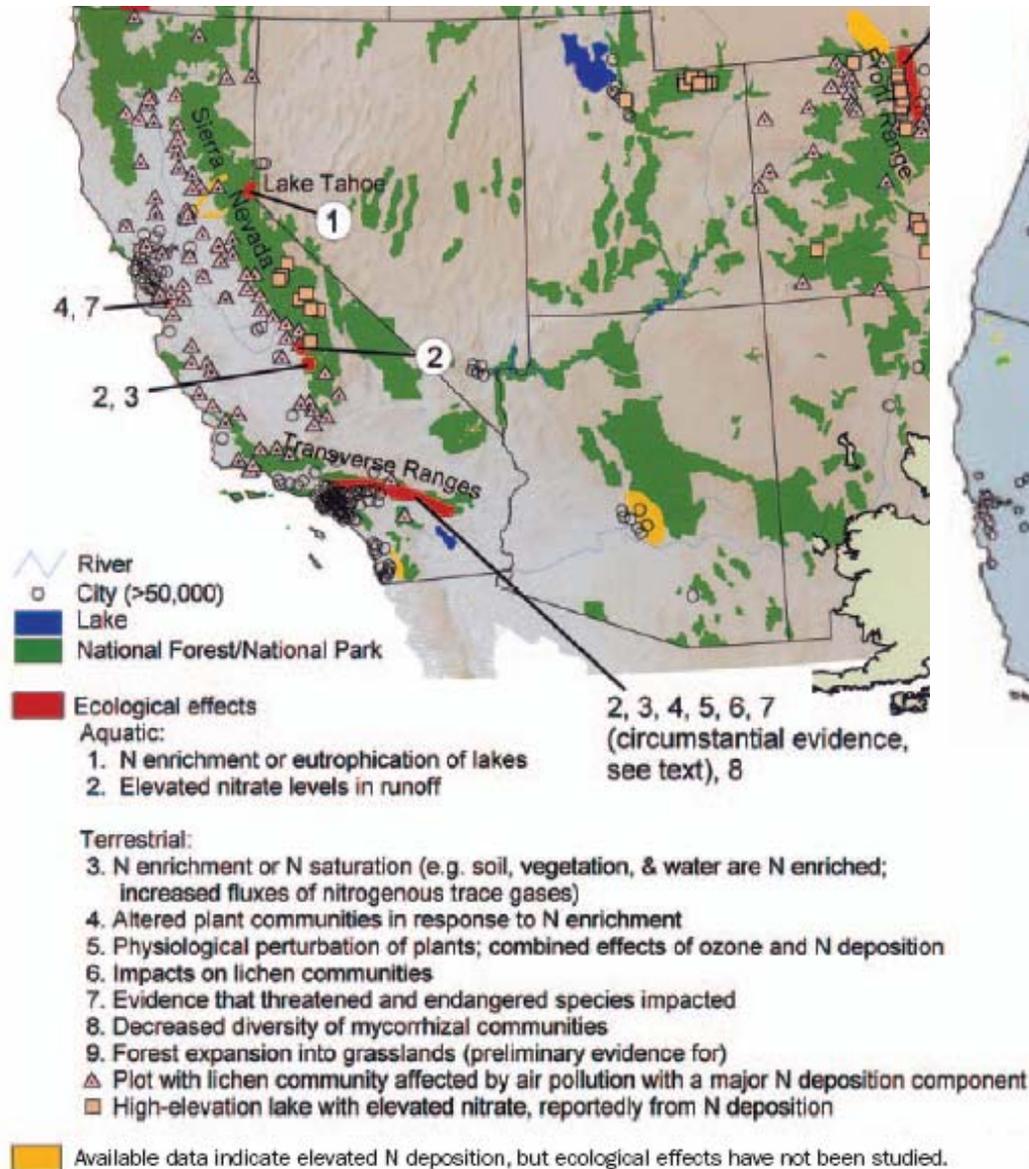
Bertram et. al., 2005

**Top
down w/ Remote Sensing**

**versus
Bottom
Up
modeling
w/ local
Measure-
ments**

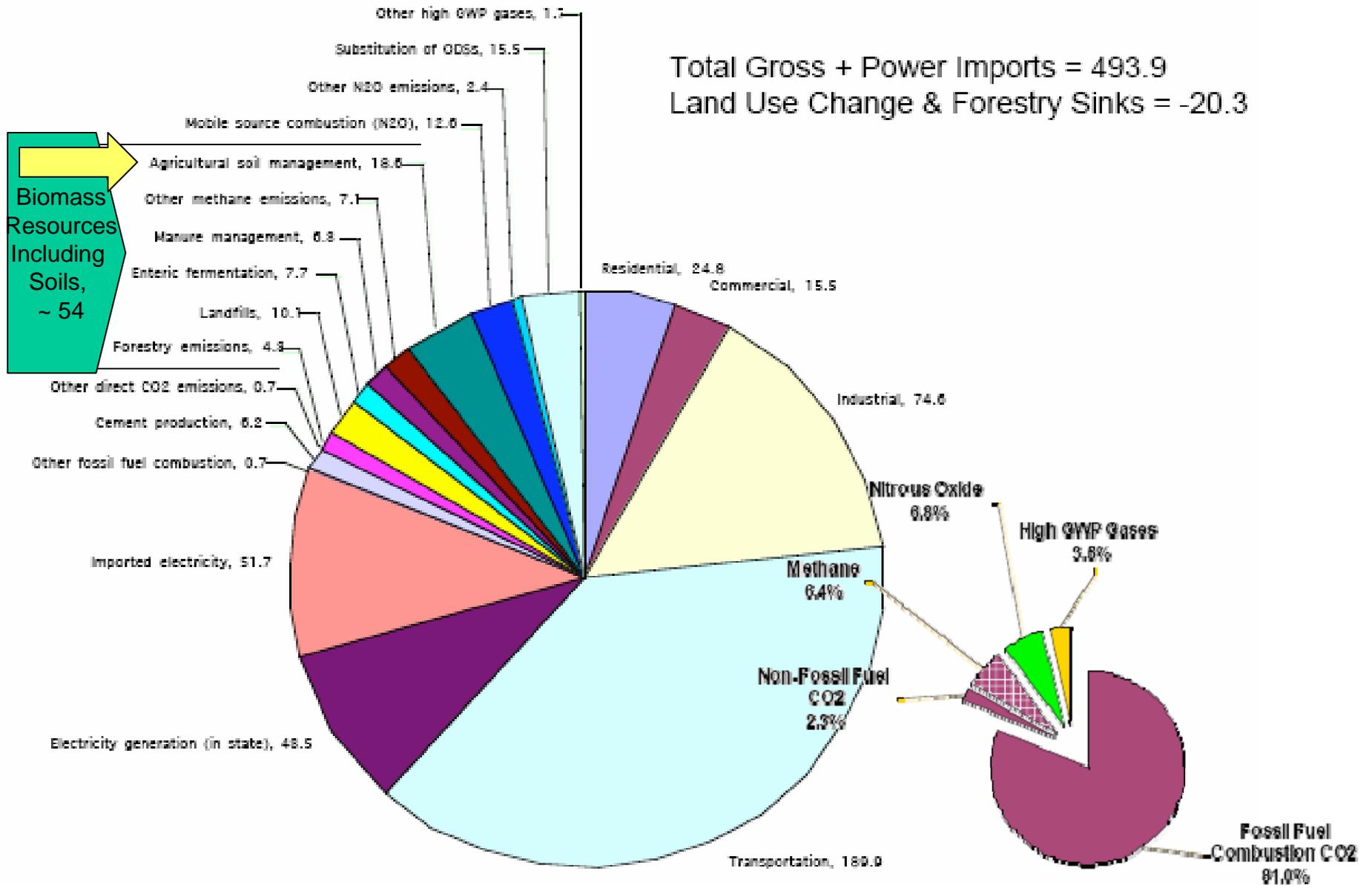


Richter et. al., 2005

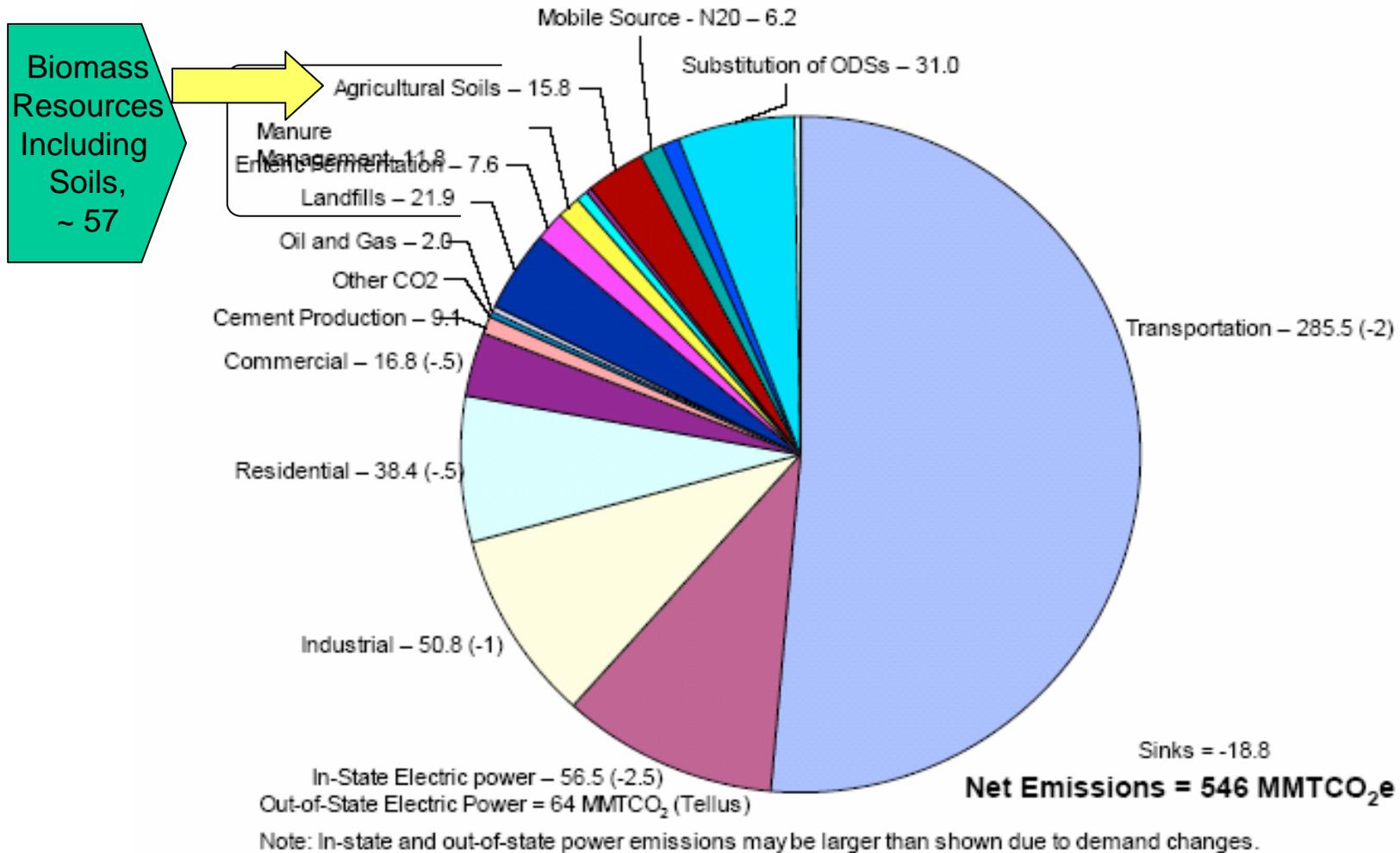


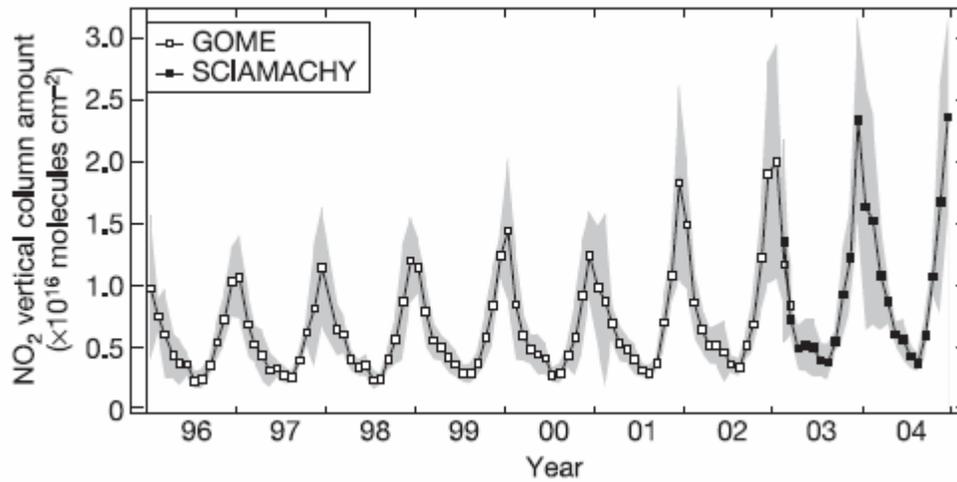
Lakes

Implications for everything from Changes in Species Makeup, and Success of Invasive Species, to Alterations in Wildfires

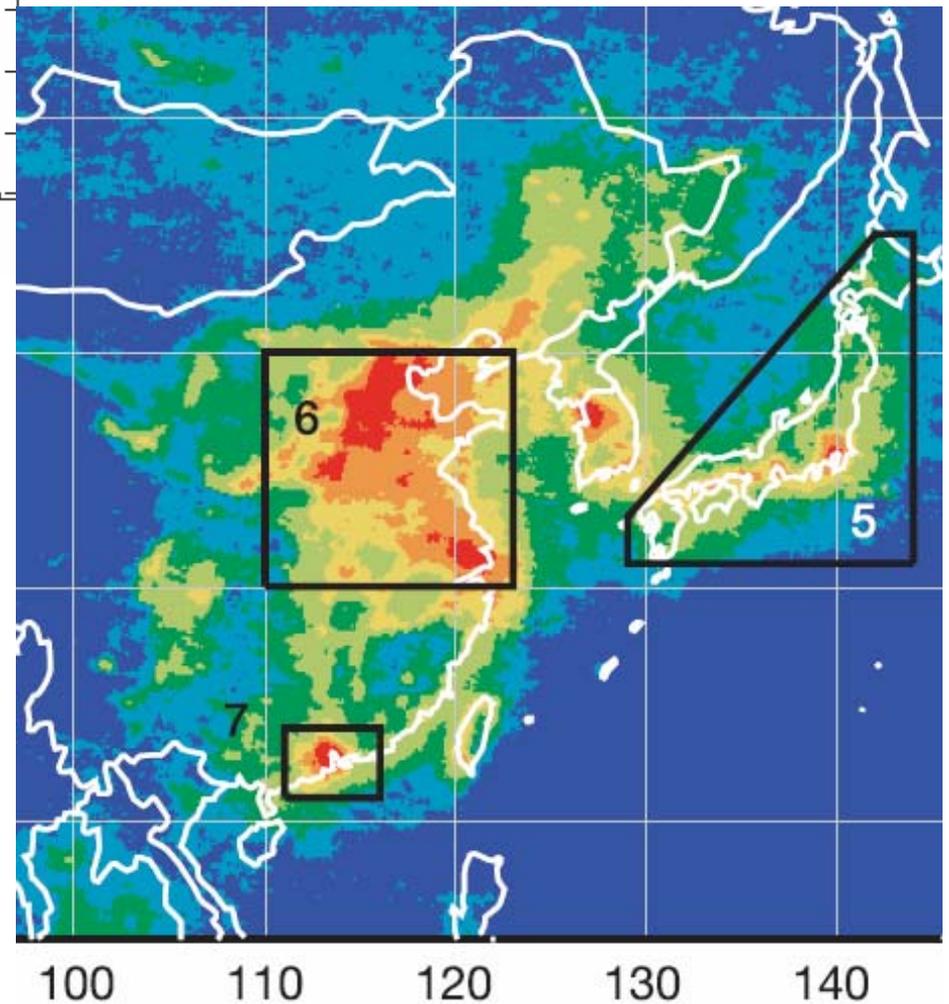
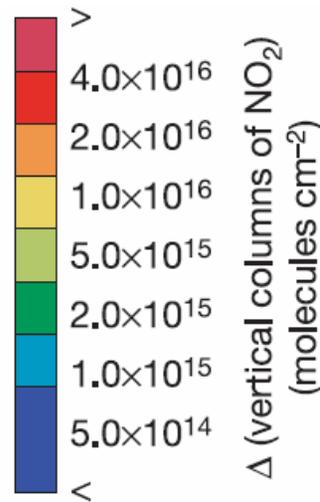


Est. CA GHG Projections – 2020 (Gross Emissions = 564 MMT CO_2e)
 Assumes 6.5 MMTCEs reduced from recent policies (shown in parentheses).

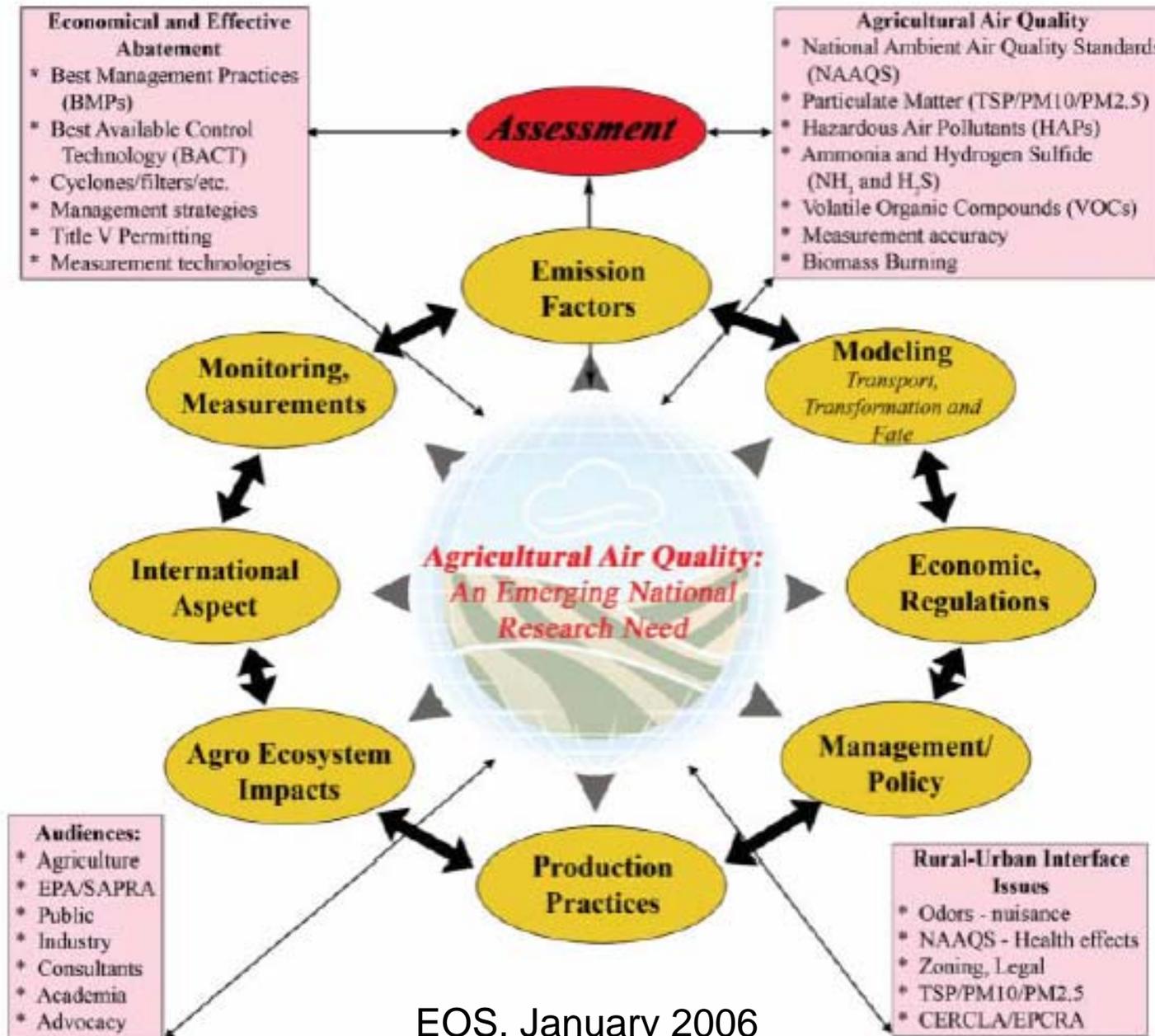




NO_x Plumes over China



Richter et al, 2005



EOS, January 2006