Radiative Forcing of Climate by Non-CO₂ Atmospheric Gases

Points of Contact:
Ed Dlugokencky (GMD)
Jim Burkholder (CSD)

Theme Team:
James Butler (ESRL)  Steve Montzka (GMD)
Owen Cooper (CSD)  Bob Portmann (CSD)
John Daniel (CSD)  Michael Trainer (CSD)
Greg Frost (CSD)

ESRL Research Theme Presentation
6 September 2007
Radiative Forcing of Climate by Non-CO$_2$ Atmospheric Gases

Presentations:

- Introduction
  - Jim Burkholder, CSD

- CH$_4$
  - Ed Dlugokencky, GMD

- Long-lived GHGs
  - Steve Montzka, GMD

- Tropospheric Ozone
  - Owen Cooper, CSD

- Future Forcing Agents
  - Bob Portmann, CSD

General Q&A
Poster Viewing

10-15 min. presentations
(1) What is Radiative Forcing?

A measure of the influence that a **forcing agent** has in altering Earth’s radiative energy balance

(Usually relative to the pre-industrial conditions, 1750)

Radiative Forcing ➔ Climate Impact

“The Greenhouse Effect”

(2) What are the Forcing Agents?

H$_2$O: Not a Forcing Agent (Feedback)

5 June 2008: Aerosols: Climate and Air Quality (Ogren, Senff)
(3) What are the important non-CO₂ RF gases?

- **Chemically Active Gases**: OH radical/photochemistry
- **Anthropogenic and Natural Sources**
- **Atmospheric Lifetimes**: weeks - centuries
- **Global Warming Potentials**
- **Atmospheric Response/Trends**
- **Positive RF**: 1.33 W m⁻², RF(CO₂) = 1.66 W m⁻²
- **CH₄, N₂O/Halocarbons, O₃** have similar RF
- **Long-lived GHGs**
  - Large and Important Driver of Climate Change
  - Understanding Trends of Fundamental Importance!

---

3 January 2008: Tropospheric Ozone and Air Quality (Wilczak, DeGouw)
6 March 2008: Stratospheric Ozone Layer Recovery (Montzka, Daniel)
All radiative forcing species are related through atmospheric chemistry
Climate forcing occurs through chemically active species

Goal: Predict/Forecast Climate
Need: Understanding Present and Past Climate

Climate

ESRL website: http://www.esrl.noaa.gov/research/themes/.
Radiative Forcing of Climate by Non-CO$_2$ Atmospheric Gases

Presentations:
- CH$_4$
  Ed Dlugokencky, GMD
- Long-lived GHGs
  Steve Montzka, GMD
- Tropospheric Ozone
  Owen Cooper, CSD
- Future Forcing Agents
  Bob Portmann, CSD

General Q&A
Poster Viewing

10-15 min. presentations