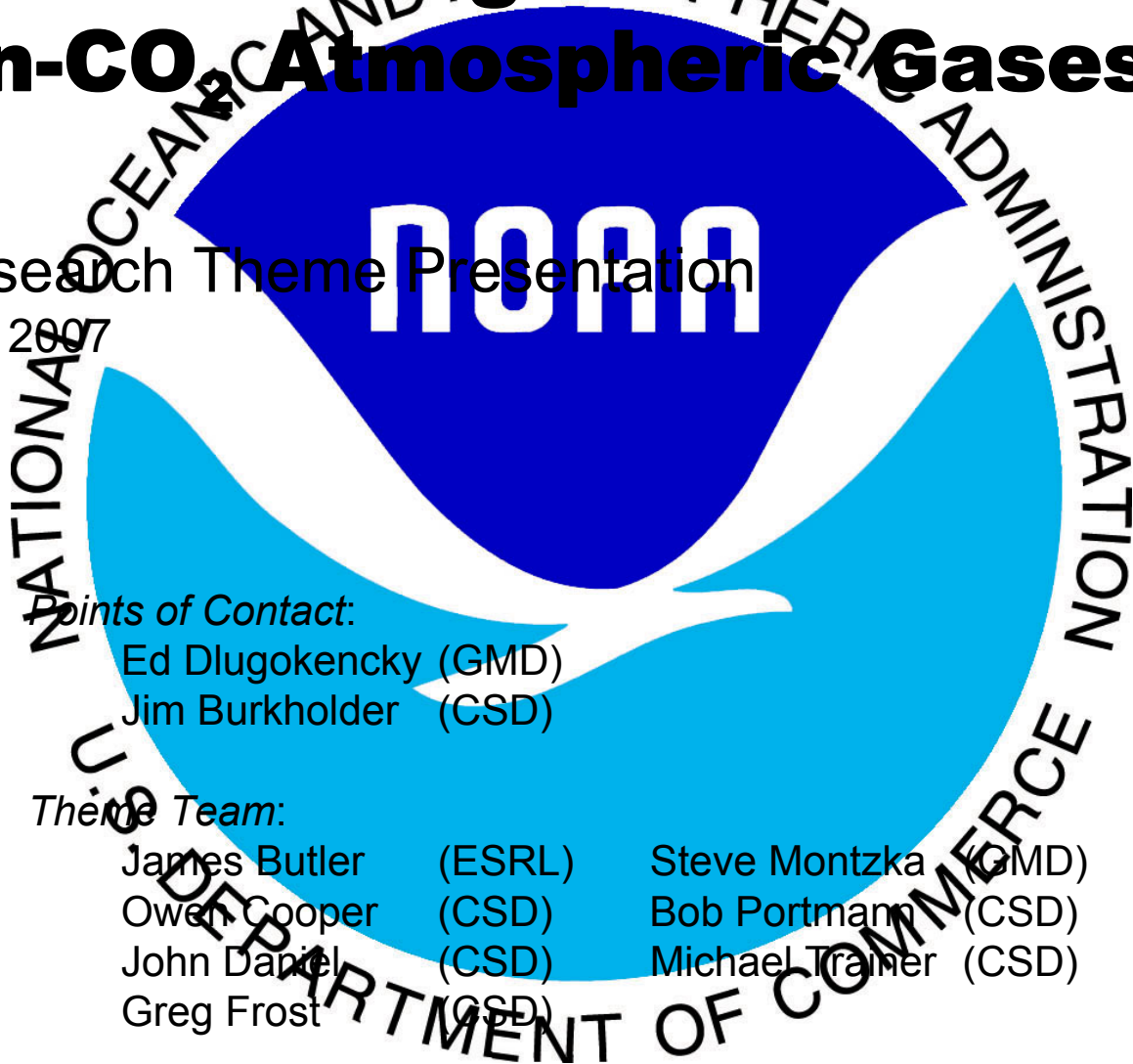


Radiative Forcing of Climate by Non-CO₂ Atmospheric Gases

ESRL Research Theme Presentation
6 September 2007



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)

Radiative Forcing of Climate by Non-CO₂ Atmospheric Gases

Presentations:



Introduction

Jim Burkholder, CSD



CH₄

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

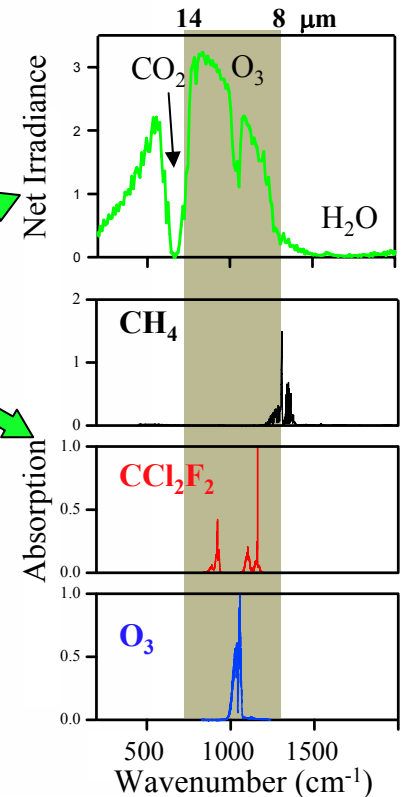
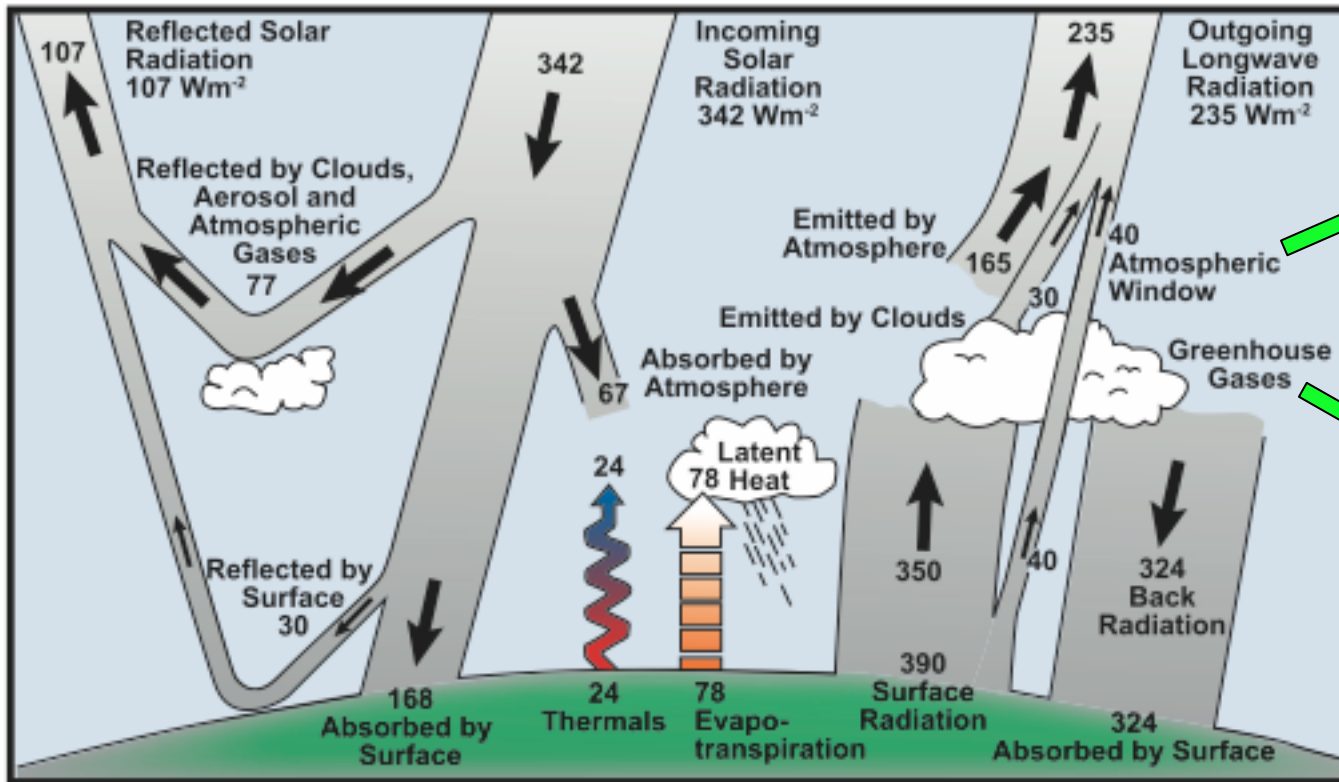
10-15 min. presentations

(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)

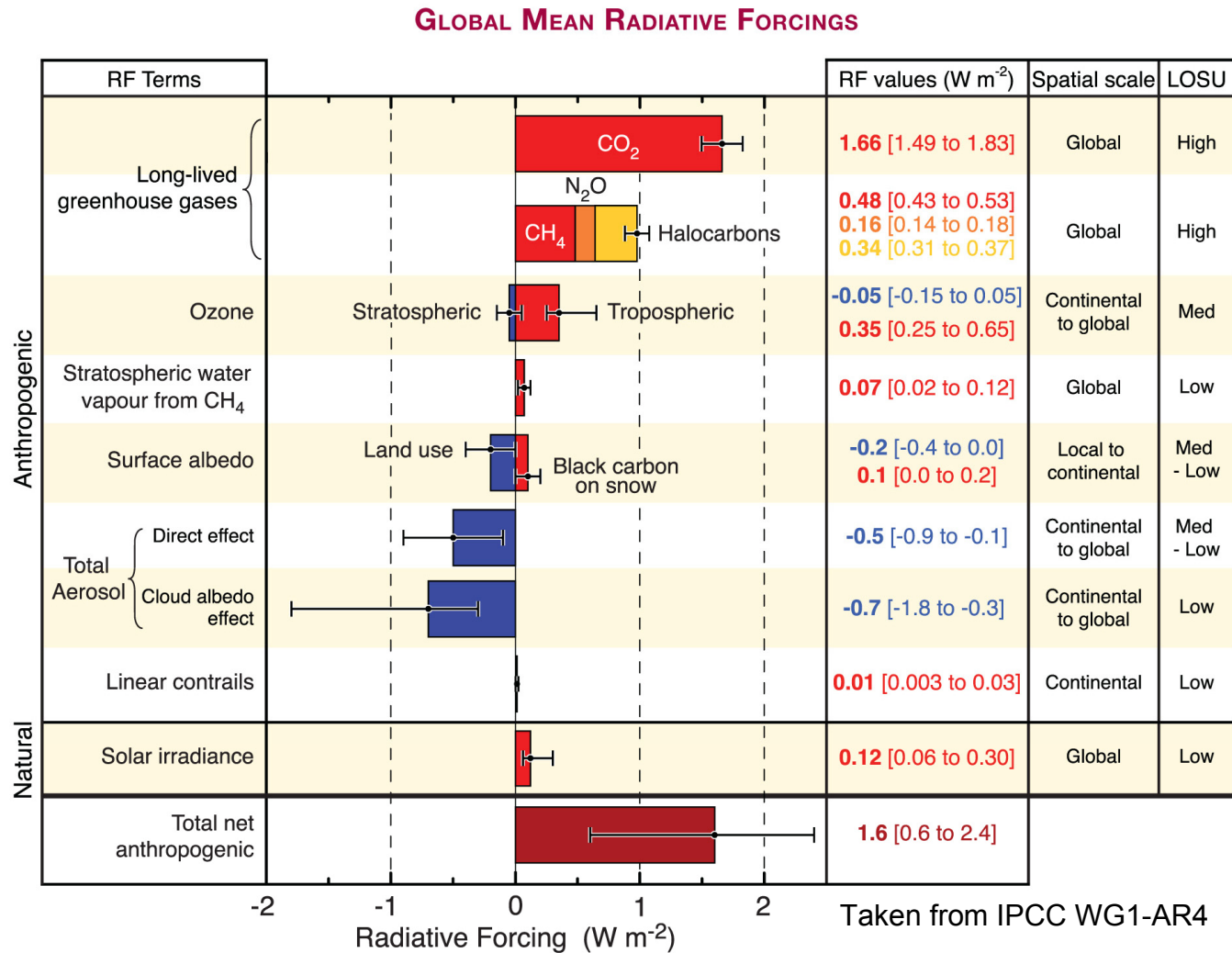
Radiative Forcing $\Rightarrow \Rightarrow$ Climate Impact

“The Greenhouse Effect”



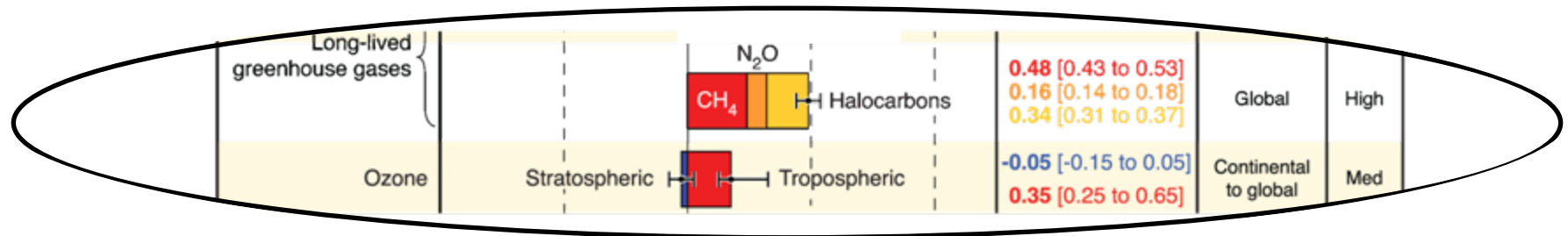
Taken from IPCC WG1-AR4

(2) What are the Forcing Agents ?



H_2O : Not a Forcing Agent (Feedback)

(3) What are the important non-CO₂ RF gases ?



CH₄

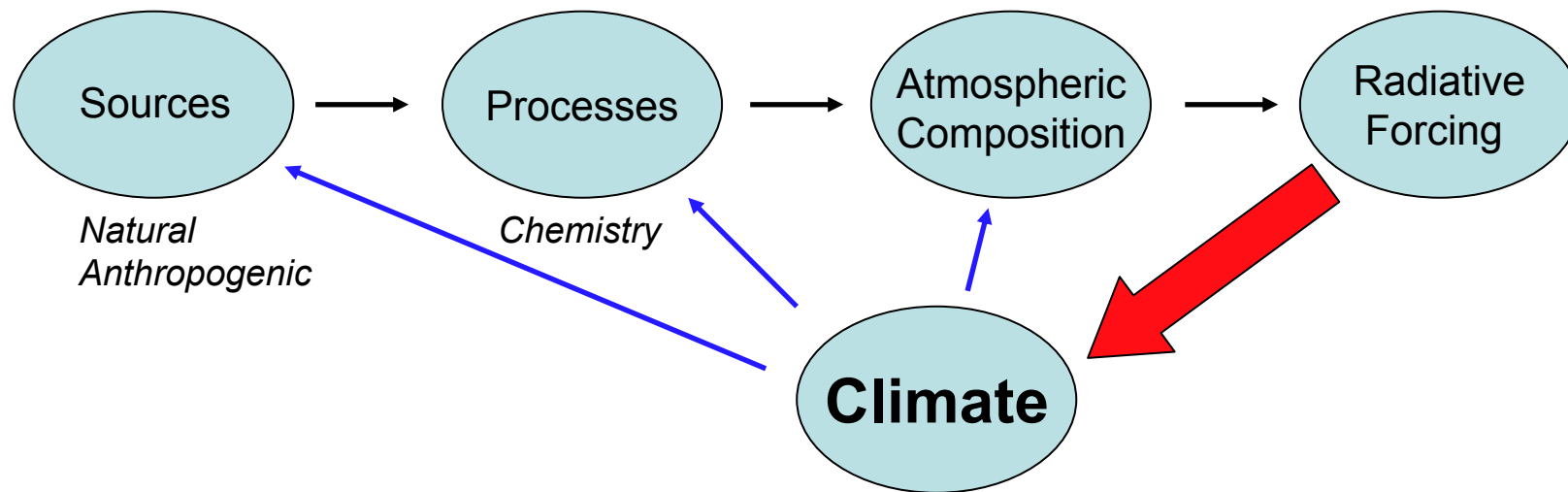
N₂O/Halocarbons

Ozone

- ✓ **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** Levels of Uncertainty
- ✓ **Long-lived GHGs**
- Large and Important Driver of Climate Change**
- Understanding Trends of Fundamental Importance !**

(4) What is the role of ESRL research ?

- 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

- **Chemistry of the Atmosphere**
Laboratory and Modeling Studies
RF/Lifetimes/GWPs
Field Campaigns
- **Monitoring the Composition of the Atmosphere**
Budgets/Attribution of GHGs
Abundances of GHGs
Trends in GHGs
Networks

Radiative Forcing of Climate by Non-CO₂ Atmospheric Gases

Presentations:



CH₄

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