The Possibility of Large Temperature Increases With CO2 Doubling

Alexander E. MacDonald
DAA, NOAA OAR LCI
Director, Earth System Research Laboratory

November 28, 2007
Climate models run with different parameterizations show the possibility of very large temperature changes.
What is the probability of very large increases of earth's average temperature for a doubling of CO2?
Main Points

• New evidence suggests the earth’s climate system has the potential for large increases in global temperature for CO2 doubling.

• By reducing uncertainty in feedback, we can determine the danger of overwhelming temperature change.
Climate Feedbacks

- Ice/albedo
- Water vapor
- Carbon release from high latitudes
- Clouds
- Aerosols (Negative)
- etc.
Feedback: Ice/Albedo

The 2007 loss of Arctic ocean ice indicates that the ice/albedo feedback has been underestimated.
Feedback: High latitude carbon release

"About 500 Gt C remain preserved in the Yedoma ice-complex in northeast Siberia."

(If it) "warms more more rapidly in the future, (it) could again become a powerful positive feedback . . ."
Main Points

• New evidence suggests the earth’s climate system has the potential for large increases in global temperature for CO2 doubling.

• By reducing uncertainty in feedback, we can determine the danger of overwhelming temperature change.

• We need a “Manhattan Project” to quantify climate feedbacks, and determine the “acceptable” level of CO2 stabilization.