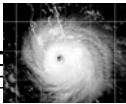


## Greenhouse Warming

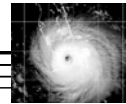
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## Assignment:

- Read Read Ahrens (*Meteorology Today*) pp. 520-527 (These are the page numbers in the 6<sup>th</sup> edition. The pages may be different in later editions.)

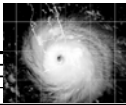
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## Greenhouse Gases

- Carbon Dioxide strongly absorbs infrared radiation emitted by the Earth and may play a major role in warming the lower atmosphere.
  - Carbon Dioxide is steadily increasing because of:
    - » Burning of Fossil Fuels
    - » Deforestation
- Methane
- Nitrous Oxide
- CFCs
- Water Vapor
  - Most abundant greenhouse gas
  - Feedback mechanism

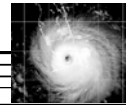
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## Greenhouse Warming Uncertainties: Cooling Agents?

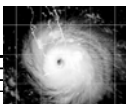
- Sulfate Aerosols
  - produced by burning fossil fuels
- Clouds
  - Feedback mechanism
    - » Reflection of solar radiation
    - » Absorption of longwave radiation
      - Low clouds have cooling effect
      - High clouds have warming effect
  - Models cannot handle clouds well at all
    - » Model forecasts of greenhouse warming vary tremendously depending on how they treat clouds

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- Oceans
  - Huge carbon dioxide storehouse.
    - » Phytoplankton
    - » Cold Ocean
  - Huge Specific Heat
    - » Retards global temperature changes
  - Ocean Circulation

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## GLOBAL WARMING EPA WEBSITE

- Please refer to the following web site for more specifics on Global Warming.
- <http://yosemite.epa.gov/OAR/globalwarming.nsf/content/index.html>

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