The Big Picture

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Dedication and Perseverance

• Long term records begin with a vision

• Many started in the International Geophysical Year (1957-58)

• All require partnerships and collaborations

(Dedication of the Keeling Building, MLO, 1997)

Dave Keeling  John Chin
NOAA Program Plan 71-1
“Geophysical Monitoring for Climatic Change”

• “This plan, *Geophysical Monitoring for Climatic Change*, is NOAA’s program for global monitoring of man’s inadvertent modification of weather and climate.”
  – Robert White, Acting Administrator, NOAA

• “Determination of the trends of the climatically important burden of atmospheric contaminants and resolution into natural vs. man-induced sources is essential to the preservation of environmental quality.”
GHGs and Carbon Cycle Feedbacks

✓ How do oceanic and terrestrial carbon fluxes vary in a changing climate?

✓ How spatially and temporally variable are anthropogenic inputs of greenhouse gases?

✓ How is upper tropospheric and lower stratospheric water vapor interacting with climate change?
Surface Radiation, Clouds and Aerosols

- How does surface radiation vary in space and time?
- How do climate change and variability work to redistribute clouds?
- How do aerosol optical properties vary as a function of location, time, and atmospheric conditions?
- How does black carbon influence lower atmospheric heating and cloud prevalence?
- How do changing sky conditions affect ultraviolet radiation at the Earth’s surface?
- How can information on surface radiation improve renewable energy predictions?
Stratospheric Ozone Recovery

✓ How well is the Montreal Protocol working to reduce ozone depletion?

✓ Is stratospheric ozone recovering as expected?

✓ How is climate influencing Brewer-Dobson circulation and its feedbacks?

✓ How sensitive is the oxidative capacity of the atmosphere and how is it changing over time?
Supporting Research Infrastructures

- Calibrations
- Quality Control
- Baseline Observatories
- Key Collaborations
  - WMO Global Atmosphere Watch
  - Metrology Institutes (e.g., NIST, BIPM)
  - Research Infrastructures and Agencies (e.g., ICOS, IAGOS, DWD, NASA, DOE, et al.)
Many Applications Derive from This Work We All Do Together

- Radiative Forcing
- Renewable Energy Support
- Climate Sensitivity
- Climate Intervention
- Air Quality
- Arctic Processes

Tracking Greenhouse Gases and Understanding Carbon Cycle Feedbacks
Monitoring and Understanding Trends in Surface Radiation, Clouds, and Aerosols
Guiding Recovery of Stratospheric Ozone

Standards
Observatories
Thank You!