

Science & Research

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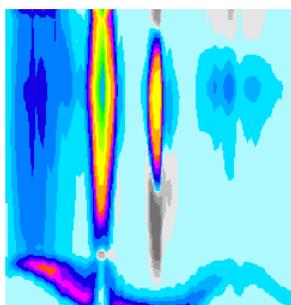
Breakthrough Science

Radiative Transfer

The AER Radiation and Climate Group is centrally focused on the study of atmospheric radiative processes and their relationship to changes in the earth's climate system. Particular emphasis is placed on the spectral characteristics of radiative processes to attain a better understanding of radiative effects associated with atmospheric processes. A principal objective of our research is the interpretation and improvement of model performance based on spectral radiative observations. The research efforts of the program have four principal themes:

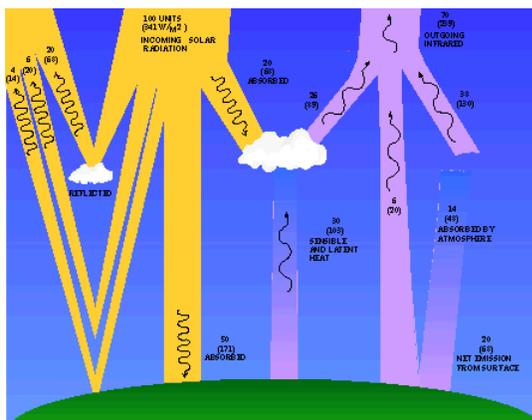
- the development of detailed spectral models incorporating the effects of atmospheric constituents including molecules, clouds and aerosols
- the detailed spectral validation of these models against atmospheric data
- the development of radiatively accurate but computationally efficient radiative transfer models
- research studies on the effects of improved physics including improved radiation in climate models

A major effort is directed to the study of spectral cooling rates and the radiative forcing to be expected from effects due both to human and natural influences. This research is currently focused on water vapor, carbon dioxide, ozone and the halocarbons. The studies and related models span the full spectral regime from the microwave to the ultraviolet and include scattering as well as absorption processes. Results of these research efforts have been incorporated into a radiation model for climate studies of cloud-radiation feedback and climate-chemistry interaction.



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A second area of research is directed to the application of detailed physically based models for the retrieval of temperature and constituent profiles from remotely sensed spectral measurements. Retrievals from ground based, aircraft and space based measurements are being studied. Particular emphasis is placed on the retrieval of ozone profile information from space based spectral measurements.



The annual mean global energy balance for the earth-atmosphere system.

AER has developed many publicly available radiative transfer models that include LBLRTM, RRTM, MonoRTM, and the continuum model (MT-CKD). For recent developments and more information on our models and databases please visit <http://www.rtweb.aer.com>. The research program of the AER Radiation and Climate Group is principally supported by the Department of Energy and the Jet Propulsion Laboratory/National Aeronautics and Space Administration.

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