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Aspects of the interactions and feedbacks of radiation-cloud and dynamic and climate processes are discussed using a hierarchy of atmospheric models. Radiometric data obtained from the ground, the air, and space are frequently employed to illustrate physical processes in the atmosphere as well as to cross check theoretical results.

Radiation and Cloud Processes in the Atmosphere: Theory ...

Description. The field of atmospheric radiation and remote sensing has seen significant advances in recent years. This monograph addresses those advances and fills the need for an up-to-date, cohesive integration of radiative transfer and cloud physics, allowing for the better forecast of weather on medium and long-range levels. The author here offers a systematic discussion of the transfer of solar and thermal infrared radiation in the atmosphere, and of aspects of cloud processes pertinent ...

Radiation and Cloud Processes in the Atmosphere - Kuo-Nan ...

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9780195049107: Radiation and Cloud Processes in the ...

@article{osti_7081459, title = {Radiation and cloud processes in the atmosphere. Theory, observation, and modeling}, author = {Liou, K N}, abstractNote = {Following an introductory chapter on the global energy balance, there are separate chapters on the theory and parameterization of thermal and of solar radiation. Clouds as such hardly feature in these two chapters, which are principally ...

Radiation and cloud processes in the atmosphere. Theory ...

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Radiation and Cloud Processes in the Atmosphere: Physics ...

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Radiation and Cloud Processes in the Atmosphere

Clouds can act as a greenhouse ingredient to warm the Earth by trapping outgoing longwave (LW) infrared radiative flux at the top of the atmosphere (TOA). Clouds can also enhance the planetary albedo by reflecting shortwave (SW) solar radiative flux back to space to cool the Earth.

Cloud Radiative Effect - Geophysical Fluid Dynamics Laboratory

Processes. Young stars in and around molecular cloud Cepheus B. Radiation from one bright, massive star is destroying the cloud (from top to bottom in this image) while simultaneously triggering the formation of new stars. Star formation. The formation of stars occurs exclusively within molecular clouds. This is a natural consequence of their ...

Molecular cloud - Wikipedia

Clouds and aerosols in the atmosphere can scatter and absorb all radiation bands 9. As cloud cover increases, the angle of the sun becomes less important when measuring irradiance. This is due to the increase of radiation diffusion (scattering) 10. Increased cloud cover decreases irradiance, causing sunlight to feel less intense.

Solar Radiation & Photosynthetically Active Radiation ...

Clouds affect both solar (shortwave) and infrared (longwave) radiation. Shortwave cloud radiative forcing depends on the LWP and IWP, as well as on cloud particle size and habit, and is usually negative at the TOA as clouds reflect sunlight. Longwave cloud radiative forcing at the TOA depends on the cloud top temperature.

Cloud Radiative Forcing - an overview | ScienceDirect Topics

The deep clouds that make up tropical disturbances, the precursors to more intense tropical cyclones (TCs) (including hurricanes and typhoons), effectively trap infrared radiation emitted by Earth's surface and lower atmosphere. Our results demonstrate that the local atmospheric warming caused by this "cloud greenhouse effect" is a key trigger for promoting and accelerating the evolution of such precursor storms into intense TCs.

The critical role of cloud-infrared radiation feedback in ...

Earth Radiation Budget as Viewed from Space. 6.5. Energy Budget of the Atmosphere and the Surface --7. The Role of Radiation and Cloud Processes in Atmospheric Models. 7.1. Radiation and Cloud Effects in One-Dimensional Radiative-Convective Models. 7.2. The Role of Radiation in One-Dimensional Energy Balance Climate Models. 7.3.

Radiation and cloud processes in the atmosphere : theory ...

In meteorology, cloud forcing, cloud radiative forcing or cloud radiative effect is the difference between the radiation budget components for average cloud conditions and cloud-free conditions. Much of the interest in cloud forcing relates to its role as a feedback process in the present period of global warming. This image depicts the effects of clouds scattering incoming shortwave radiation from the sun. This tends to result in overall cooling of the Earth during the daytime as well as in gen

Cloud forcing - Wikipedia

Published Mar 1, 1999. Atmosphere Heat. The study of clouds, where they occur, and their characteristics, play a key role in the understanding of climate change. Low, thick clouds primarily reflect solar radiation and cool the surface of the Earth. High, thin clouds primarily transmit incoming solar radiation; at the same time, they trap some of the outgoing infrared radiation emitted by the Earth and radiate it back downward, thereby warming the surface of the Earth.

Clouds & Radiation Fact Sheet - NASA

Clouds modify the radiative balance of Earth by reflecting and scattering incoming solar radiation (cooling effect) and by trapping outgoing terrestrial radiation (warming effect). Clouds produce rainfall, a key process in hydrological cycle.

Meteorological Process Overview | CMAQ: The Community ...

ARCPAC Aerosol, Radiation, and Cloud Processes affecting Arctic Climate A NOAA Climate Program Project for the International Polar Year 2008. Where: Fairbanks, Alaska When: late March - April 2008 What: The focus of NOAA's field experiment includes ESRL CSD airborne measurements using the NOAA WP-3D aircraft. This experiment will be coordinated with the POLARCAT activity of the IPY, with the ...

(none)NOAA ESRL CSD Projects: ARCPAC 2008

In this study, the radiation process in the Korean Integrated Model (KIM) is modified to calculate the cloud radiative forcing keeping a physical consistency with the microphysics, convection, and cloudiness schemes in an aspect of hydrometeor.

Consistency between the cloud and radiation processes in a ...

It is well recognized that cloud changes and their influence on the Earth's radiation budget in a warmer climate comprise the largest source of uncertainty in state-of-the-art climate models. Observations of CREs provide the only meaningful constraints on the climate model representation of cloud processes.

Earth Radiation Budget - an overview | ScienceDirect Topics

Similar to other aerosols, the two major ways dust can alter ambient meteorological conditions, formation and development of cloud, and large-scale circulations are by interacting with 1) radiation (i.e., the dust-radiation interaction, dust-direct effect, or dust-radiative effect) and 2) clouds (i.e., the dust-cloud interaction, dust-indirect effect, or dust-microphysical effect) (Shi et al. 2014, Fan et al. 2016).