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A Study of the Impact of Cirrus Clouds on High Altitude, Long Horizontal Path Laser Transmission

Dec 23, 1993 38 pages

Authors: G. G. Koenig, D. R. Longtin, J. R. Hummel; SPARTA INC LEXINGTON MA

... environmental factors of particular concern is cirrus clouds which can be found at the proposed levels ... range of optical properties. Even cirrus clouds that have very low extinction coefficients, ... EO system is fairly long. Cirrus clouds with low extinction coefficients are difficult to remotely ... incomplete information about optically thin cirrus clouds. The problem of determining cirrus cloud physical ... compounded by the high altitude location of these clouds. Recently, a number of programs have been ... physical and optical properties of cirrus clouds because of their unique impact on the global ...

Project SESAMISEED, Experiments to Demonstrate the Practical Uses of Artificial Plasma Clouds in the Lower Ionosphere

May 21, 1970 24 pages

Authors: John R. Davis; Derrill C. Rohls; Frederick E. Wyman; NAVAL RESEARCH LAB WASHINGTON DC

... of the ionosphere by rockets and by a 7-in. gun. These clouds have been studied by coherent-pulse-doppler, high-frequency radar for three purposes: (a) to investigate neutral gas and magnetohydrodynamic motions in the clouds, (b) to investigate the role of such motions in forming the plasma clouds into ... artificial, sporadic-E patches, and (c) to investigate the potential of such clouds for illuminating the near-over-the-horizon region and detecting small targets in that ... targets. Examples are given of earth backscatter and probable over-the-horizon aircraft echoes from cesium plasma clouds.

Observed Microphysical and Radiative Structure of Mid-Level, Mixed-Phase Clouds

May 2001 190 pages

Authors: Robert P. Fleishauer; AIR FORCE INST OF TECH WRIGHT-PATTERSONAFB OH

Airborne measurements of six mid-level clouds observed over the Great Plains of the United States in late ... streams. Data show that these innocuous looking clouds display complicated microphysical and thermodynamic structures. ... are multi-layered systems. Of particular note, in single-layered clouds, there is an increase of liquid water content with ... lack of temperature inversions in these mid-level clouds is a major difference from the thermodynamic structure of most stratuscumulus ... the best discriminator of cloud interfaces for mid-level clouds, with 1-2 C differences between ambient and cloud ...

Hyperspectral Atmospheric Compensation Through Clouds and Aerosols with Physics-Based Radiative Transfer Algorithms

Jan 1998 10 pages

Authors: Thomas R. Caudill; Gail P. Anderson; Laila S. Jeong; Robert P. d'Entremont; Gary B. Gustafson; Alexander Berk; Larry S. Bernstein; AIR FORCE RESEARCH LAB HANSCOM AFB MA

... nearly ideal atmospheric viewing conditions. In reality clouds and aerosols will be important considerations for military operations ... virtually no information about what is occurring below the clouds. However, the situation is different for thin cirrus clouds and tenuous aerosol plumes, where energy from the surface is transmitted through the obscuring to the observing ... 1 (~30% additional extinction due to thin clouds or aerosols) with appropriate SNR ratios will increase the effective ... algorithms can be used to quantify the effect of clouds/aerosols on system performance. In particular, new ...

Implications of the Khrgian-Mazin Distribution Function for Water Clouds and Distribution Consistencies With Aerosols and Rain

Dec 6, 1991 200 pages

Authors: Vernon G. Plank; PHILLIPS LAB HANSCOM AFB MA

... the Khrgian-Mazin (KM) distribution function for water clouds are discussed. The equations for the number concentration, cross-sectional ... lidar distribution equations are presented that specify the detectability of clouds, in general and for natural cloud types, ... also presented that is undoubtedly the first to be developed for water clouds. Truncation effects, primarily involving instruments that ... Composite distribution equations for aerosols plus clouds plus rain, or any combination, are described ... utility. It is concluded that the KM function for water clouds is highly versatile and useful and ...

Initialization of Clouds in the PSU/NCAR Mesoscale Model Using the Air Force's Real-Time Nephraly

May 2002 254 pages

Authors: Louis E. Cantrell Jr.; TEXAS A AND M UNIV COLLEGE STATION

... Force Weather Agency (AFWA). MMS is used to forecast clouds evolving around a stationary front along the...
Texas ... the Eta model provides the framework for converting RTNEPH clouds to data that can be used to initialize MMS. Modifications to ... grid to which it is applied. The technique used to initialize clouds is called the Cloud Initialization Scheme (CIS). Cloud ... sensitive MMS forecast cloud distributions are to the initial distribution of clouds. Analyzed cloud is also compared to MMS forecast of clouds to determine if cloud forecasts are improved using this technique, and to determine if model ...
Qualitative comparisons have been made of water drop sampling methods for sprays and clouds, employing slides coated with oil, gelatin and soot. Oil-wetted and soot coated slides have been compared quantitatively when exposed in nominally identical water sprays simulating natural clouds. When compared with gelatin and oil-wetted slides, soot slides are more convenient to prepare, ... of the oil-wetted method are allowed for. Soot slides appear to be capable of detecting ice particles in clouds; quantitative calibrations relating ice impingement impressions to crystal size are required. (Author)

Atmospheric clouds can adversely affect the operation of military electro-optical systems, particularly under slant path scenarios. The probing of clouds by the lidar technique, in which a short pulse of laser radiation scattered backwards by the cloud droplets is detected, is attractive for two ... with Mie calculations of extinction and backscatter coefficients based on 156 measurements of cloud droplet spectra in cumulus and stratus type clouds. The relation suggests that visible or near-infrared extinction coefficients in a cloud of unknown type could be inferred from lidar backscatter ...

The primary objectives of the research are to numerically simulate stratus, stratocumulus, and cumulus clouds in the marine boundary layer. This included the formation, evolution, and dissolution of the clouds and the area covered, then the change from one type convection and the formation of cloud streets could be ... in space and time? What causes the changing depth of the boundary layer? What are its interaction with the clouds in and out of the boundary layer? A third objective is to compare various numerical models among themselves ...

The significant findings reported in this paper are: (1) Cirrus clouds are very common and were found in 42% of the satellite data. There are seasonal changes in the locations of the most frequent cirrus which follow seasonal changes in convective clouds. However, very thin cirrus occurred at least 10% of the time in all areas. The diurnal cycle ... of cirrus was very small over the oceans. The diurnal cycle over land followed the diurnal cycle of convective clouds. (2) A large increase in cirrus and high cloud frequency was found in 1991. This cloud cover increase appeared with ...

Microphysical Studies of Noctilucent Clouds

Microphysical studies of noctilucent clouds have revealed that ice crystals of cubic habit, as suggested, or whether they are hexagonal, as in tropospheric clouds. It has not been established whether the crystal habit and the crystal growth rates are influenced ... size and shape of the individual crystals determine their optical properties and therefore determine how noctilucent clouds interact with transmissions of electromagnetic waves. Our experiments were aimed at revealing the habit of noctilucent...

Bubble Clouds and their Transport within the Surf Zone as Measured with a Distributed Array of Upward-Looking Sonars

Clouds of order 10 cm/s, and the length scales of these bubble clouds in the seaward direction are inferred to be in the range 50 to 100 m. The influence of the incoming surface wave field is also discussed.

Cloud researchers have documented a variety of processes at work in the formation and dissipation of clouds in the marine boundary layer (MBL). Cloud riffs occasionally mark a distinct exception to the continuity and broad coverage more commonly observed with these clouds. A possible explanation for the presence of large features of broken cloudiness embedded in stratocumulus is the ... rift were only 1/6 that observed below the background stratocumulus. Cloud droplets in rift clouds were 3-5 microns larger than droplets in stratocumulus and exhibited a broader size ...

The significant findings reported in this paper are: (1) Cirrus clouds were 3-5 microns larger than droplets in stratocumulus and exhibited

Clouds Due to Reduced Cloud Condensation Nuclei

Clouds of order 10 cm/s, and the length scales of these bubble clouds in the seaward direction are inferred to be in the range 50 to 100 m. The influence of the incoming surface wave field is also discussed.

Clouds of order 10 cm/s, and the length scales of these bubble clouds in the seaward direction are inferred to be in the range 50 to 100 m. The influence of the incoming surface wave field is also discussed.
Detection of Daytime Arctic Clouds using MISR and MODIS Data

Mar 2006 25 pages
Authors: Tao Shi; Eugene E. Clothiaux; Bin Yu; Amy J. Braverman; David N. Groff; OHIO STATE UNIV COLUMBUS DEPT OF STATISTICS

Amongst the spectral radiances available on the Moderate Resolution Imaging Spectroradiometer (MODIS) 7 are used operationally for detection of clouds in daytime polar regions. While the information content of clouds inherent in spectral radiances is familiar, the information content of clouds contained in angular radiances (i.e., radiances emanating to space from the same object but in different directions) is not. The Multi-angle Imaging Spectroradiometer (MISR) measures angular ...

Aircraft Ionizing Doses and Dose Rates from Radioactive Clouds and Fallout

Apr 1976 46 pages
Authors: Rayford P. Patrick; George D. Ansell; AIR FORCE WEAPONS LAB KIRTLAND AFB NM

Aircraft flying over surface areas contaminated by fallout from radioactive clouds from surface nuclear detonations accumulate ionizing doses. An investigation of this situation was accomplished, and the dose and dose rate resulting from such fly-overs are presented. The dose rates were also determined for aircraft approaching radioactive clouds and fallout contaminated surface areas. The results are presented in general terms, and examples are presented to illustrate the manner of applying the general results to specific situations. (Author)

The Adjacency Effect of Clouds in LANDSAT MSS Data

Jul 1, 1993 5 pages
Authors: Robert P. D’Entremont; PHILLIPS LAB HANSCOM AFB MA

The objective of this study is to determine the effect of clouds on clear Landsat pixels that are adjacent to cloudy pixels. A partly cloudy scene over a well-defined ocean background was analyzed and the effect of clouds on the clear pixels as a function of cloud amount was determined. The amount of scattering that occurs is proportional to the amount of cloud edges in the vicinity, which is proportional to cloud amount. For each non-cloudy pixel, the ...

Low-Frequency Resonance Scattering from Acoustically Compact Bubble Clouds

Jan 22, 1996 349 pages
Authors: Ronald A. Roy; William M. Carey; UNIV OF WASHINGTON SEATTLE APPLIED PHYSICS LAB

... characteristic than predicted by Bragg scattering from gravity waves, i.e. there exists a large zero-Doppler component. We hypothesized that if microbubble clouds and plumes with void fractions greater than .001 act...
Comparisons of Satellite-Derived Cloud Heights with Radar Measurements of Mid-Level, Mixed-Phase Clouds

Authors: James C. Jones; COLORADO STATE UNIV FORT COLLINS DEPT OF ATMOSPHERIC SCIENCE

... from the 10.7 micrometers channel of Geostationary Operational Environmental Satellite-8 are converted to cloud top height (CTH) for comparison to 95 GHz radar measurements of mid-level, mixed-phase clouds. CTH is objectively determined by airborne cloud radar and used as ground truth. Three methods of satellite-derived CTH are compared to the radar. The black body (BB) ... from a sounding. The solution is determined iteratively using a perturbation method. Errors range from +200 m to +700 m with only a slight dependence on the opaqueness of the cloud until the clouds become very optically thin.

Laser Transmission Through Cirrus Clouds

Authors: Kuo-Nam Lou; CALIFORNIA UNIV LOS ANGELES

... models based on the successful-order-of-scattering approach for the computation of airborne high-energy laser transmission and backscattering through homogeneous and inhomogeneous thin cirrus clouds in both plane-parallel and spherical geometries. These models took into account the relative positions of aircraft, target, and cirrus clouds in the atmospheres. We investigated the sensitivity of laser transmission and backscattering on variation of the cloud optical depth, particle size, and cloud-base height, ...

Structure in Small Molecular Clouds: Pedestals and Clumping

Authors: Lois Magnani; John M. Carpenter; Leo Blitz; Namir E. Kassim; Biman B. Nath; NAVAL RESEARCH LAB WASHINGTON DC

Observations of wings or pedestals from three regions in high-latitude molecular clouds are presented in order to determine the morphology and physical conditions of the gas responsible for this phenomenon. High-sensitivity spectra along 10-25 lines of sight in each ... of the bipolar outflows, the energy required to drive the outflow comes from a young stellar object; in contrast, it is virtually certain that the small molecular clouds studied in this paper do not contain any low-mass star formation sites. The data indicate that the pedestal emission is optically thick. Large velocity gradient ...

Classification of Polar Stratospheric Clouds Using LIDAR Measurements From the SAGE III Ozone Loss and Validation Experiment

Authors: Jr. Felton Melvin A.; Thomas A. Kovacs; Ali H. Omar; Chris A. Hosteller; ARMY RESEARCH LAB ADELPHI MD

... measurements from the stratospheric aerosol and gas experiment (SAGE) III ozone loss and validation experiment (SOLVE) have been used to identify classes of polar stratospheric clouds (PSCs) and their corresponding characteristics. Volume backscatter at 532 nm (Beta532) and 1064 nm (Beta1064), scattering ratio at 532 nm (R532) ... > 2 and delta(a) < 0.025); and II (532 > 7 and delta(a) > 0.1). In addition, a cluster predominantly found on the outside edges of clouds, which does not fit the definition of these PSCs, which has low R532 and delta(a) values, was found. The clustering analysis of PSC ...

Extensible 3D (X3D) Graphics Clouds for Geographic Information Systems

Authors: Darren W. Murphy; NAVAL POSTGRADUATE SCHOOL MONTEREY CA

This research evaluates the production of three dimensional (3D) clouds for geospatial viewing programs such as Google Earth, NASA World Wind, and X3D Earth. This thesis took advantage of iso-standard X3D graphics and X3D Edit in conjunction with manually produced image textures to represent 3D clouds. While a 3D geospatial viewing might never completely characterize the current state of the atmosphere, a sufficiently realistic virtual 3D rendering can be created to present current sky coverage given adequate satellite and ...

Solid Fuel-Gaseous Oxygen Reaction Techniques for Producing High Altitude Barium Vapor Clouds

Authors: Jr. Allen Edward F.; Philip E. Beaudoin; SPACE DATA CORP TEMPE AZ

The program was conducted to develop superior techniques for producing barium vapor clouds at high altitudes using sounding rockets. Several possible vapor production reactions are considered and thermochemical computations are performed comparing achievable efficiencies of yielding free barium at high temperatures. Several prime candidate reactions are evaluated for safety in use and practicality in reactor design. A reactor has been designed for future implementation. Thermochemical computations, ground test results and preliminary flight test observations indicate a large increase in ...

The Collapse of Interstellar and Intergalactic Gas Clouds

Authors: D. McNally; DEFENSE NUCLEAR AGENCY KIRTLAND AFB NM TECHNOLOGY AND ANALYSIS DIRECTORATE

The problem covered by this contract was that of star formation through the collapse of interstellar gas clouds under their own self-gravitation. This is not a new idea in the field of star formation as the idea can be traced back at least as far as Laplace. However, the problem had only been considered for simplified conditions which were unrealistic, and which probably in no small measure contributed to two of the major difficulties (fragmentation and angular momentum) encountered by the theory. The aim of the present work was to apply numerical methods to the problem to find out if the ...

Modern Methods for the Artificial Dissipation of Fog and Low Clouds and Experience In...
Using These Methods for Aviation Purposes

May 28, 1972 15 pages
Authors: L. I. Gavroronskaya, L. I. Krasnovskaya, A. D. Soloyev

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OH

The report contains reviews methods for the artificial dissipation of low-level clouds and fogs. A classification of dissipation methods is given. The classification was made on the basis of the physical processes capable of leading to an improvement of visibility in a fog. The classification makes it possible to analyze any modification methods by comparing them with the most characteristic methods listed in the table. It is proposed that the specific expenditures on energy (reagent) during a definite period be regarded as the principal criterion of method efficiency.

Statistics of Electromagnetic Scattering from Chaff Clouds

Apr 1975 58 pages
Authors: Vital P. Pyatil

AIR FORCE AVIONICS LAB WRIGHT-PATTERSON AFB OH

Starting from first principles, the first and second order probability densities of the scattered field from chaff clouds are derived. Auto-correlation functions and power spectra of the received voltage, radar cross section and phase are obtained. All the mathematical derivations are explained in detail. For the simple case of a spherically uniform distribution of relative speed of the dipoles, it is shown that an integral relation exists between the speed distribution function and the intensity auto-correlation function. The utility of second order statistics in studying the effects of...

Spectral Radiance of Snow and Clouds in the Near Infrared Spectral Region

Nov 17, 1978 46 pages
Authors: Francis R. Valovcin

AIR FORCE GEOPHYSICS LAB HANSCOM AFB MA

The near infrared spectral radiation measurements of snow and cirrus and cumulus cloud backgrounds taken by the Air Force Geophysics Laboratory's flying laboratory are evaluated. From the analysis of the 124 spectra obtained, the spectral radiances or reflectance characteristics of snow and cirrus and cumulus clouds between 5500 and 7000/cm (1.82-1.43 micrometers were determined. Snow/cloud discrimination can be made by utilizing a sensor in the 5500 to 7000/cm spectral region. Based on the analysis of these data, certain snow/cloud design parameters were identified; that is, slope of...

Optical Extinction Coefficients Beneath Marine Stratus Clouds. Comparison of Coefficients Calculated from Observed Aerosol Spectra with Coefficients Specified by the Navy Aerosol Model

May 2, 1983 32 pages
Authors: V. R. Noonkester

NAVAL OCEAN SYSTEMS CENTER SAN DIEGO CA

... of wind speed, relative humidity (less than saturate), and air mass type. The capability of the model to duplicate the observed profiles below cloud base was determined. The surface model was applied to the above-surface conditions by assuming various vertical profiles of relative humidity below cloud base. Comparison of the observed and model profiles were made for humidity, profile, and air mass type. These comparisons indicated that the model could not reproduce the observed profiles of optical extinction by aerosols below marine stratus clouds.

Electro-Optical Transmission and Liquid Water Content of Fogs and Clouds

May 1984 13 pages
Authors: S. G. Jennings

UNIVERSITY COLL GALWAY (IRELAND) DEPT OF PHYSICS

... two direct filtration methods, one of which employed a top loading balance. The use of a reference impaction assembly is imperative when making absolute measurements of liquid water content. The experimental assembly designed to measure simultaneously extinction coefficient and liquid water content has been completed and used. Simultaneous measurements of extinction coefficient, wavelength, and liquid water content have been successfully made, and do not closely match theoretical predictions. A new device for measuring the homogeneity of clouds in a cloud chamber has been developed. (Author)

Numerical Simulation of Cirrus Clouds: - Fire Case Study and Sensitivity Analysis

Aug 12, 1991 142 pages
Authors: Scott T. Heckman

COLORADO STATE UNIV FORT COLLINS DEPT OF ATMOSPHERIC SCIENCE

... mechanisms. Sensitivity simulations were run to determine long and short wave radiative forcing. Also, a simulation was run with no condensate to examine cloud feedbacks on the environment. Cloud top generation zones, fallstreaks, and layering were simulated. Longwave radiation appeared to be instrumental in developing weak convective activity in the lower layer thereby increasing it's optical depth. Cloud top cooling and cloud base heating affected the flow around the cloud. Secondarily, the effects of three upper boundary conditions on cirrus clouds were studied in a synoptic setting.

Multiparameter Radar and Aircraft Based Studies of the Micro-Physical, Kinematic and Electrical Structure of Convective Clouds

Feb 14, 1993 15 pages
Authors: V. N. Bringi, L. J. Caylor

COLORADO STATE UNIV FORT COLLINS DEPT OF ELECTRICAL ENGINEERING

Ongoing studies of the microphysical kinematic and electrical evolution of two convective clouds observed by radar and aircraft during the Convective and Precipitation Electrification Project (CaPE) are reported. A complete life-cycle of cloud evolution from radar first echo to mature phase is documented using reflectivity (ZH) and differential reflectivity (ZDP). Aircraft data from T-28, NOAA-P3, NCAR King Air and Wyoming King Air are in the process of being analyzed for particle type, electric field from field mills and up/down draft. Surface field mills and LLP data give an indication of...

Uplink Laser Propagation Measurements Through the Sea Surface, Haze and Clouds

Mar 1993 14 pages
Authors: G. T. Kaye, Roger Nies

NAVAL COMMAND CONTROL AND OCEAN SURVEILLANCE CENTER RDT AND E DIV SAN DIEGO CA

... FLIP at depths of 15 to 45 m. During six nights of operations, the AOR received the laser light at various test geometries and through clear and cloudy conditions. This represents the first optical uplink cloud experiment at...
visible wavelengths. Results show that optical pulses in clouds are significantly more forward-scattered than modeled. The results can be explained by Mie scattering theory. Measured cloud attenuation and pulse stretching agreed with an existing optical propagation model. Significant attenuation and signal spreading due to haze and fog was measured and compared with theory.

Clouds: Their Prediction and Simulation
Jun 30, 1993 12 pages
Authors: W. R. Cotton; G. L. Stephens; COLORADO STATE UNIV FORT COLLINS DEPT OF ATMOSPHERIC SCIENCE

... events has been repeated using newly developed microphysics schemes. Boundary layer cloud fractional coverage schemes has been tested for one of the FIRE I stratuscumulus cases in which there was a transition from solid stratocumulus to broken cumuli. RAMS ability to simulate ordinary deep convective clouds has been evaluated for one of the CaPE case over the Kennedy Space Flight Center. New modules for cloud microphysics and radiation transfer have been written and the impacts of those schemes on cloud forecasting will be evaluated in the future. Cloud prediction, Cirrus, Stratocumulus, ...

The Appearance of the Sun and Moon Seen Through Clouds
Dec 1993 66 pages
Authors: Jeffrey R. Linsken; AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH

The sun occasionally appears fuzzy through altostratus because altostratus is composed of larger particles than other clouds, and is of the necessary optical thickness. Experimental results indicate that the range of optical thicknesses of a cloud at which a fuzzy sun is seen increases with the size of the particles. This relationship is caused by an increase in the attenuation of contrast at high spatial frequencies relative to that at low spatial frequencies when the size of cloud particles increases. The increase in, the size of cloud particles is caused by the presence of raindrops and ...

Time Delay and Pulse Stretching Calculations for Laser Radiation Propagation in Clouds
Apr 1, 1979 54 pages
Authors: Dave G. Collins; RADIATION RESEARCH ASSOCIATES INC FORT WORTH TX

A computer study was conducted to determine the effects of multiple scattering on the time delay and stretching of a laser pulse propagating within a cloudy atmosphere. An effort was made to model the experimental setup and cloud conditions that existed during Project CLIPS conducted by Sandia Laboratories on Hawaii Island in the Fall of 1978. The scattering and extinction coefficients and the angular scattering distributions were calculated for several cloud conditions using measured cloud aerosol size distributions furnished by Light scattering, Pulse stretching, Clouds, Mie scattering

Temporal Effects of Shiptracks on Clouds
Mar 1995 133 pages
Authors: Andrew Brown III; NAVAL POSTGRADUATE SCHOOL MONTEREY CA

... and optical characteristics of 27 shiptracks are analyzed using AVHRR satellite data. Channel 1 (0.63um), and channel 3 (3.7um), are utilized to determine the temporal variations in shiptrack albedo and track width. In most cases, shiptracks mirror the trend of albedo changes exhibited by the ambient clouds in which they are formed. Under special circumstances, shiptrack albedo increases when ambient cloud albedo decreases due to cloud thinning. Shiptrack widths show uniformity of growth, with rapid growth rates of 4-6 km/hr in the near-source region, decreasing to 1-2 km/hr in the far field. ...

Acoustic Scattering from Compact Bubble Clouds
Jun 1996 282 pages
Authors: Ronald A. Roy; Jeffrey A. Schindall; UNIV OF WASHINGTON SEATTLE APPLIED PHYSICS LAB

In this study, a simple model describing the low frequency scattering properties of high void fraction bubble clouds in both the free field and near the ocean surface is developed. This model, which is based on an effective medium approximation and acoustically compact scatterers, successfully predicts the results of the bubble cloud scattering experiment carried out at Lake Seneca NY for frequencies consistent with the model assumptions (Roy et al., 1992). The introduction of the surface is facilitated by the method of images is subject to the same constraint of low acoustic frequency imposed ...

Acoustical Emission from Bubbles and Dynamics of Bubbles and Bubble Clouds
Jan 1997 17 pages
Authors: Michael S. Lonquet-Higgins; CALIFORNIA UNIV SAN DIEGO LA JOLLA OFFICE OF CONTRACT AND GRANT ADMINISTRATIO N

The aim of the research was to further our understanding of the natural sources of sound near the ocean surface, which are known to be due mainly to oscillating bubbles and bubble clouds. A theory has been given for the damping of bubble oscillations by nonlinear coupling between different modes of oscillation of a spherical bubble. Some experimental confirmation was found by later workers. A simple statistical model has been proposed for the initial bubble sizes from breaking waves, which also has received experimental support. A direct method of calculating wave-generated ripples has been ...

Experimental and Modeling Studies of Interactions of Marine Aerosols and Clouds
May 31, 1997 8 pages
Authors: Sonia M. Kreidenweis; COLORADO STATE UNIV FORT COLLINS

The primary goals of this research were to address the following key questions regarding marine aerosol/ cloud interactions: (1) What factors control the abundance and vertical distribution of aerosol in the marine boundary layer? (2) How do these factors affect the formation and lifetime of marine clouds? These questions have been addressed through a combination of modeling and experimental approaches, as described below. The goal of the modeling component was to produce a model description of aerosol evolution and aerosol/ cloud interaction that can be applied to a variety of marine ...

Accounting for Clouds in Sea Ice Models
Dec 1998 38 pages
Authors: Aleksandr P. Makhtisov; Edgar L. Andreas; Pavel N. Svyashchennikov; Valery F. Timachev; COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER NH

http://www.stormingmedia.us/search.html?q=clouds&search.x=9&search.y=6 12/22/2008
Over sea ice in winter, the clouds, the surface layer air temperature, and the longwave radiation are closely coupled. This report uses archived data from the Russian North Pole (NP) drifting stations and recent data from Ice Station Widdell (ISW) to investigate this coupling. Both Arctic and Antarctic distributions of total cloud amount are U shaped: that is, observed cloud amounts are typically either 0-2 tenths or 8-10 tenths in the polar regions. These data obey beta distributions; roughly 70 station years of observations from the NP stations yielded fitting parameters for each winter ...

**A Characterization of the Impact of Clouds on Remotely Sensed Water Quality**

Authors: Ronald R. Fairbanks; AIR FORCE INST OF TECH-WRIGHT-PATTERSONAFB OH

... seem to fail when used on data taken over the Laurentian Great Lakes. Two primary reasons for the failure have been identified as higher suspended minerals in the Great Lakes than in the oceans and normally higher cloud cover over the Great Lakes. A characterization of the impact of clouds on the radiance reaching remote sensing platforms has been performed. From this characterization, the impact on the calculated chlorophyll content determined by current algorithms is derived. The work presented here describes the creation of an end-to-end radiative transfer model for the complete ...

**Meteoric Metals and Noctilucent Clouds: An Experimental Study of the Uptake of Sodium and Potassium Atoms on Low-Temperature Ice Films**

Authors: John M. Plane; UNIVERSITY OF EAST ANGLIA NORWICH (UNITED KINGDOM)

... follows: The Grantee will investigate the kinetics of atomic Na and K uptake on both amorphous and cubic crystalline ice films, over the temperature range 100 to 150 K. The data obtained will be used in a predictive, high resolution 1-dimensional model of the upper mesosphere. Model predictions will be validated by comparison with lidar observations of the depletion of Na and K layers during the formation of noctilucent clouds. The results of the kinetic studies and model validation will then be published and will be provided to AFRL personnel for inclusion in mesospheric background codes.

**Overlapping Open Clusters NGC 1750 and NGC 1758 Behind the Taurus Dark Clouds, II.**

CCD Photometry in the Vilnius System

Authors: V. Straižys; A. Kazlauskas; A. Cerniauskas; R. P. Boyle; F. J. Vrba; NAVAL OBSERVATORY FLAGSTAFF AZ

... are given for 287 stars. The classification of stars is based on their reddening-free O-parameters. Eighteen stars observed photoelectrically were used as standards. The extinction versus distance diagram exhibits the presence of one dust cloud at a distance of 175 pc, which almost coincides with the distance of other dust clouds in the Taurus complex. The clusters NGC 1750 and NGC 1758 are found to be at the same distance of approximately 760 pc and may penetrate each other. Their interstellar extinction A(V) is 1.06 mag, which corresponds to E(B-V) = 0.34 mag. (3 tables, 5 figures, 10 refs ...

**Whole Sky Imaging of Clouds in the Visible and IR for Starfire Optical Range**

Authors: Janet E. Shields; Monette Karr; Art R. Burden; Richard W. Johnson; William S. Hodkiss; SCRIPPS INSTITUTION OF OCEANOGRAPHY LA JOLLA CA MARINE PHYSICAL LAB

... Kirtland Air Force Base under Contract N00014-01-D-043 DO #11, between 02 September 2004 and 30 April 2006. This work relates to the Air Force's need to characterize the cloud distribution during day and night, for a variety of applications, including support of research into impact of clouds on laser communication and support of satellite tracking. This contract followed Contract N00014-01-D-0043 DO #4, which will be discussed in Section 2, and is documented in Shields et al 2007, Technical Note 271. Under this contract, we began preparing Whole Sky Imager systems for field experiments in ...

**Thermodynamic Feedback Between Clouds and the Ocean Surface Mixed Layer**

Authors: P. C. Chu; Jr Garwood Roland Wy; NAVAL POSTGRADUATE SCHOOL MONTEREY CA DEPT OF OCEANOGRAPHY

A cloud-ocean planetary boundary layer (OPBL) feedback mechanism is presented and tested in this paper. Water vapor, evaporated from the ocean surface or transported by the large-scale air flow, often forms convective clouds under a conditionally unstable lapse rate. The variable cloud cover and rainfall may base positive and negative feedback with the ocean mixed layer temperature and salinity structure. The coupling of the simplified Kuo's (1965) cumulus cloud model to the Kraus-Turner's (1967) ocean mixed layer model shows the existence of this feedback mechanism. The theory also predicts ...

**Particle Size Distributions in Atmospheric Clouds**

Authors: Roberto Paoli; Karin Shariff; NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MOFFETT FIELD CA AMES RESEARCHCENTER

In this note, we derive a transport equation for a spatially integrated distribution function of particles size that is suitable for sparse particle systems, such as in atmospheric clouds. This is done by integrating a Boltzmann equation for a (local) distribution function over an arbitrary but finite volume. A methodology for evolving the moments of the integrated distribution is presented. These moments can be either tracked for a finite number of discrete populations ("clusters") or treated as continuum variables.

**Snow and Ice Particle Sizes and Mass Concentrations at Altitudes Up to 9 km (30,000 ft)**

Authors: Richard K. Jack; FEDERAL AVIATION ADMINISTRATION ATLANTIC CITY NJ AIRPORT AND AIRCRAFT SAFETY RESEARCH AND DEVELOPMENT

... cloud intervals or other convenient distances in wintertime clouds, snowstorms, cirrus, and other high-altitude clouds. The findings are that, generally, the largest particles and the greatest concentrations of total ice particle ... upper reaches of deep winter storm clouds that are found at these levels. Exceptions are thunderstorm ... .000 ft (9 km). Anvil clouds and stratiform clouds associated with warm season ... confined to
short distances of 3 nm or less in convective clouds, the largest average TIPM's in glaciated clouds have been found in layer clouds over distances up to 30 nm. ...

**Cirrus Particle Distribution Study, Part 6.**

Authors: Ian D. Cohen; Arnold A. Barnes Jr; AIR FORCE GEOPHYSICS LAB HANSCOM AFB MA

Cirriform clouds associated with a frontal system which passed through New Mexico on 4 and 5 April 1978 ... which has been equipped with cloud physics instrumentation by AFGL. The clouds sampled were thin cirrus and cirrostratus layers in ... 6 April were approximately 700 microns. On 4 April, few clouds could be found, but one patch yielded particles as ... time periods from each of the flights. In addition to the visible cirrus clouds, particles were also found in clear air between the ... Some of the sub-visible cirrus particles seemed to come from clouds above the aircraft, but other instances of sub-visible ...

**Satellite Observations of Marine Stratus/Stratocumulus**

Authors: James A. Coakley Jr; OREGON STATE UNIV CORVALLIS COLL OF OCEANIC AND ATMOSPHERIC SCIENCES

... were performed in order to obtain the properties of low level clouds and the cloud free ocean background. The work led to the findings that: (1) reflectivities of broken clouds at both 0.63 and 3.7 pm are smaller than those of nearby uniform clouds indicating that the broken clouds have substantially less liquid water than ... and that photons are escaping through the sides of the broken clouds and being absorbed by the ocean surface. (2) The ... models were unable to adequately predict low level clouds. The deficiency was thought to be due to the inability of the model to adequately ...

**Comparison of the Naval Operational Global Atmospheric Prediction SystemCloud Analyses and Forecasts With the Air Force Real Time Nephanalyses Cloud Model**

Authors: Gary E. Manstatter; NAVAL POSTGRADUATE SCHOOL MONTEREY CA DEPT OF METEOROLOGY

... NOGAPS analyses for high, middle, and low clouds during January 1998 and October 1997. ... accurate except for in the polar regions and the low clouds. NOGAPS forecasts at 12, 24, 36, ... analyses compare well for high and middle clouds. However the RTNEPH and NOGAPS analyses are ... more occurrences for the cloudiest category (80-100%). For low clouds the RTNEPH and the NOGAPS are quite different, since the RTNEPH has difficulty analyzing clouds at night The NOGAPS and the RTNEPH (except for low clouds) generally agree on the clear areas. However, it appears that NOGAPS underestimates the number of...

**Optimization of MAS and MODIS Polar Ocean Cloud Mask**

Authors: Sean P. Memmen; NAVAL POSTGRADUATE SCHOOL MONTEREY CA

... ice, but with the exception of SSM/I and RADARSAT, clouds are a major obstacle to viewing the surface. With NASA's ... of using multi-spectral techniques to detect the presence of clouds. A group at the Space Science and Engineering Center ... from all tests, it is possible to detect the presence of clouds at different altitudes in the atmosphere. Based on the Ackerman et ... subjective analysis, the modifications greatly improved the detection of clouds over cold polar oceans where sub-pixel ice ... or water temperatures might falsely indicate clouds. The number of Cloudy pixels (<0.66 clear confidence ...

**Prediction of Global Cloud Cover with a Very High Resolution Global Spectral Model**

Authors: T. N. Krishnamurti; FLORIDA STATE UNIV TALLAHASSEE DEPT OF METEOROLOGY

... a function of prevailing relative humidity. The new method explicitly predicts clouds as a variable of the model. Our research effort covers both avenues. The ... occur in the first 24 hours, an initialization problem. Observed clouds appear to exhibit more of a resilience than is demonstrated by the ... to the strong selection rules imposed by the model for the existence of clouds; (2) The explicit treatment of clouds where the cloud water mixing ratio is used as ... dependent variable of the model, appears to handle long lasting clouds in a more realistic manner. It does not show the rapid spin-down ...

**Survey of Ship Tracks Observed by NOAA AVHRR**

Authors: James A. Coakley Jr; OREGON STATE UNIV CORVALLIS COLL OF OCEANIC AND ATMOSPHERIC SCIENCES

... the altitudes, visible optical depths, and cloud droplet effective radii for low-level clouds. Comparisons were made between the properties of clouds within 50 km of the tracks left by underlying ships in the clouds and those farther than 200 km from the tracks in order to ... The results indicated that: 1) ship tracks rarely appeared in low-level clouds having altitudes greater than 1 km; 2) small cloud droplet sizes and ... was suggested by theory; and 3) ship tracks were more frequent when clouds at altitudes below 1 km were extensive and completely covered large areas, as ...

**Two Years of Global Cirrus Cloud Statistics Using HIRS**

Authors: Donald Wylie; W. P. Menzel; H. M. Woolf; WISCONSIN UNIV-MADISON SPACE SCIENCE AND ENGINEERING CENTER

A climatology of upper tropospheric semi-transparent cirrus clouds has been compiled using HIRS multispectral infrared data. ... of data analyzed (June 1989 - May 1991). Semi-transparent clouds were found in 36% of the observations. Large seasonal changes were found in these clouds in many geographical areas; large changes occur in areas ... high pressure systems, and the mid-latitude storm belts. Semi-transparent clouds associated with these features move latitudinally with the seasons. These clouds also are more frequent in the summer hemisphere than the winter hemisphere. They appear to be ...

**Retrieval of Cirrus Radiative and Spatial Properties Using Independent Satellite Data**

Authors: Robert P. d'Entremont; Donald W. Wylie; J. W. Snow; Michael K. Griffin; James T. Bunting; PHILLIPS LAB
HANSCOM AFB MA

Cirrus is one of the most poorly quantified clouds. As a part of International Satellite Cloud Climatology Project (ISCCP), intensive observations of cirrus clouds were taken in the autumn of 1986 over Wisconsin. During this first ... from satellite, aircraft, and ground-based platforms were made of cirrus clouds. This paper deals with the verification of cirrus cloud information, both spatial and ... to the wide variability in properties common for other types of clouds, cirrus clouds have the added complexity of transmissivity t values that span ...

GROMET 2. Rainfall Augmentation in the Philippine Islands

Authors:  C. St.-Amand; D. W. Reed; T. L. Wright; S. D. Elliott NAVAL WEAPONS CENTER CHINA LAKE CA

... through mid-June 1969. Pyrotechnically generated silver iodide was released in updrafts in growing clouds, and through judicial placement and timing of seeding events individual clouds were organized into larger cloud systems. Rainfall estimated as at least ... to the 10th power cubic meters of water fell from seeded clouds. The precise extent of rainfall augmentation resulting from seeding cannot be calculated; nonetheless, rainfall augmentation from tropical cumulus clouds was accomplished in a simple operational manner. Benefits derived, at least in part ...

Icing Simulation in the Aeropulsion Systems Test Facility Propulsion Development

Authors:  C. S. Bartlett; ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AFS TN

... has been modified to provide simulated altitude icing conditions. Spray droplet clouds with droplet mass median diameters simulating natural icing clouds are produced with calibrated water atomizing spray nozzles. The proper amount of liquid water ingested by an engine in flight through icing clouds is simulated by injection of the proper water content into the airstream that enters a ... of system activation testing have been summarized.

Monte Carlo Simulation of Detection of Cirrus Cloud Properties By Micro Pulse Lidar

Authors:  James A. Cotterone Jr; AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH

... study. Cloud base height and the radiative properties of cirrus clouds are important for determining the radiation budget of the planet. Inferred cirrus cloud radiative properties vary with the type of crystals assumed to compose the model clouds. To properly model optically thin clouds, it is important to include a standard background atmosphere composed of Rayleigh... and above-cloud layer. Information that is unavailable when sampling optically thick clouds. This capability plays a pivotal role in an inversion algorithm that is developed ...

An Investigation of Plume Rise from Titan IV Rocket Launches

Authors:  Joseph D. Brands; AIR FORCE INST OF TECH WRIGHT-PATTERSONAFB OH

... Vandenberg Air Force Base (vAFB) produce exhaust ground clouds from the solid rocket boosters and liquid hypergolic fuels containing ... drawback to the REEDM is its underprediction of the initial ground clouds stabilization height. This underprediction causes an overprediction of the ground level toxic substance concentrations. This thesis focused on increasing the accuracy of the clouds stabilization height. Therefore, a model was developed incorporating conservation ... conditions. This rate of entrainment is a critical factor in accurately predicting the rise behavior of ground exhaust clouds.

Global Statistics on Cloud Optical Depths From Satellite and Lidar Observations

Authors:  Donald Wylie; WISCONSIN UNIV-MADISON SPACE SCIENCE AND ENGINEERING CENTER

... satellite series. The High Resolution Infrared Radiometer Spectrometer (HIRS) data were used to detect clouds and estimate their optical depths in the 11 micron infrared window. The cloud... uses the 13-15 micron infrared channels where partial CO2 absorption occurs, to detect partially transparent clouds and correctly determine their altitude. This algorithm is designed to be sensitive to upper tropospheric cirrus clouds which are difficult to detect. The frequency of these clouds along with their global distribution and seasonal changes have been reported at past CIDOS conferences.

Operation Greenhouse, Scientific Director's Report, Annex 4.1, Cloud Studies, Parts I, II, and III, Nuclear Explosions, 1951

Authors:  Charles E. Anderson; Philip E. Gustafson; AIR FORCE CAMBRIDGE RESEARCH CENTER BEDFORD MA ATMOSPHERIC PHYSICS LAB

... a requirement for detailed information on the meteorological microstructure of atomic clouds. This requirement arose from the speculation that radioactive material could be deposited ... cloud. More factual information was required on the properties of atomic clouds before definite answers could be given to these questions. ... revealed the following conclusions concerning the meteorological properties of atomic clouds. (1) The cloud properties depended greatly on the conditions in the environment ... content. The stems of both Dog and Easy clouds were found to be dry. George cloud, which was ...

Investigation of Emissive Smoke

Authors:  Robert E. Turner; SCIENCE APPLICATIONS INTERNATIONAL CORP ABINGDON MD

... procedure for creating a model for the description of radiation in and released from emissive smoke clouds, that is, clouds in which sources of radiation consist of the internal thermal radiation from an ambient medium ... used in realistic scenes using external atmospheric conditions and the optical and geometric properties of clouds, flares, targets, and a background. The model is designed to allow a wide range of parameter values to be used to quantify the physical, optical, and geometric properties of clouds, flares and targets, and backgrounds. The model contains simple input and output files ...
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<th>Title</th>
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<tbody>
<tr>
<td>TRANSPORT OF RADIOACTIVE DEBRIS FROM OPERATIONS BUSTER AND JANGLE</td>
<td>Mar 15, 1952</td>
<td>188</td>
</tr>
<tr>
<td>Authors: Philip W. Allen; Lester Machta; Kenneth M. Nagler; Harry L. Hamilton Jr.; Lester F. Hubert; WEATHER BUREAU SILVER SPRING MD</td>
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The main portions of the Baker and Charlie clouds moved south-westward to the Pacific Ocean and recurred to spread over a large portion of the United States. The Dog and Easy clouds spread south-eastward over the Southern states. Both JANGLE clouds moved north-eastward and were detected chiefly in the northern part of the country. The combination of vertical diffusion and fallout with variable low-altitude winds produced broad bands of deposition at the surface. Heaviest ...

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<tr>
<td>The ROSCOE MANUAL, Volume 27. Natural Background Radiation</td>
<td>Jul 1, 1980</td>
<td>346</td>
</tr>
<tr>
<td>Authors: Daniel A. Hamlin; Melvin R. Schoonover; SCIENCE APPLICATIONS INC LA JOLLA CA</td>
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... cone with vertex at each selected altitude. The processes contributing to the radiance are emission from air, Earth's surface, and clouds and reflection of solar radiation from Earth's surface and clouds; attenuation is by molecules and aerosols. The Module integrates ROSCOE-IR models for atmosphere, atmospheric thermal emission, molecular transmittance, aerosols, clouds, Earth's surface characterization and radiance, solar radiation, and upwelling natural radiation. The last 3 models are documented fully; ...

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<tr>
<td>Specification of Cloud Amount over Local Areas from GOES Visual Imagery</td>
<td>May 28, 1981</td>
<td>60</td>
</tr>
<tr>
<td>Authors: Thomas J. Keegan; Michael Niezbiedzki; AIR FORCE GEOPHYSICS LAB HANSCOM AFB MA</td>
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... , as well as the two years separately. The seasonal data were further divided into those cases that contained predominantly ice crystal clouds or water clouds. The characteristics of the satellite data were computed for a 9 by 9 one-mile pixel box and were the average, maximum and minimum albedos, ... attention was given to the relationship between average albedo and cloud amounts. Equations were generated for each station for each year for the water droplet clouds during the spring/summer season. There were not sufficient cases to do the same for the autumn of the ice crystal cloud cases. There ...

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<tr>
<td>Fuel-Air Explosive Simulation of Far-Field Nuclear Explosions</td>
<td>Dec 31, 1979</td>
<td>244</td>
</tr>
<tr>
<td>Authors: T. H. Pierce; R. T. Sedgwick; S-CUBED LA JOLLA CA</td>
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... at the one kiloton level. Two issues have been researched in parallel efforts. These are the mechanisms by which largescale FAE clouds of controlled shape can be reliably and repeatedly formed and detonated, and the quality of nuclear airblast simulation that is achieved when such FAE clouds are detonated. The formation of hemispherical clouds by simultaneous, impulsive liquid fuel injection through a large number of radially directed, centrally clustered nozzles is discussed in detail. Specific fuel dispenser designs are ...

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<tr>
<td>The Whole Sky Sensor</td>
<td>Feb 26, 1986</td>
<td>64</td>
</tr>
<tr>
<td>Authors: James K. Rocks; MICRO SCIENCE INC LEESBURG VA</td>
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The height and velocity of visible clouds and percent cover at several altitudes over a portion (28 degree cone) of the sky can be determined ... A simple algorithm for the corresponding of points in 3-space has been found. There is some indication that types of clouds can be identified from an examination of the population statistics of the images. The system should include shelters for the instruments and an auto-iris attachment. More experience with different kinds of clouds and extensive field testing are required. Algorithms for slant range viewing, non-horizontal cloud forms and time ...

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<td>Comparison of Areal Extent of Snow as Determined by AVHRR and SSM/I satellite Imagery</td>
<td>Sep 1992</td>
<td>106</td>
</tr>
<tr>
<td>Authors: Robert W. Maxson; NAVAL POSTGRADUATE SCHOOL MONTEREY CA</td>
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... 4 (11.Oum), creates a synthetic image that classified land, snow, water and clouds. The classified images created by this algorithm serve as a baseline for a second algorithm that examines ... data provides high resolution, daytime images of the snow pack but is completely dependent on the absence of clouds to view this ground based feature. The SSM/I data gives lower resolution imagery of the snow during daylight or night time satellite passes and is not affected by the presence of nonprecipitating clouds. A total of 12 sub scenes are analyzed using both data sets and general agreement of the ...

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<tr>
<td>Annual Technical Report for Contract N00014-91-J-4017 (South Dakota School of Mines and Technology)</td>
<td>Sep 30, 1992</td>
<td>8</td>
</tr>
<tr>
<td>Authors: SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY RAPID CITY INST OF ATMOSPHERIC &amp; SCIENCES</td>
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The primary objectives of the research are to numerically simulate stratus, stratocumulus, and cumulus clouds in the marine boundary layer. This will include the formation, evolution, and dissolution of the clouds and the area covered by the cloud fields. If a large enough domain can be covered, then the change from ... in space and time? What causes the changing depth of the boundary layer? What are its interaction with the clouds in and out of the boundary layer? A third objective is to compare various numerical models among themselves ...

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<tr>
<td>Authors: Q. Fu; K. N. Liou; S. K. Krueger; UTAH UNIV SALT LAKE CITY CENTER FOR ATMOSPHERIC AND REMOTE SOUNING STUDIES</td>
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Satellite imagery suggests that large portions of the tropics are covered by extensive cirrus cloud systems. Tropical cirrus clouds evolve during the life cycle of the mesoscale convective systems and are modulated by large-scale disturbances. Outflow cirrus clouds from tropical cumulonimbus appear to be maintained in a convectively active state by radiative flux gradients within the clouds, as suggested by Danielson (1982). Extensive anvils are likely to become radiatively destabilized by cooling at tops and warming at bases ...

http://www.stormingmedia.us/search.html?q=clouds&search.x=9&search.y=6 12/22/2008
research for cloud effects on weapon, communications and surveillance systems. The theme of CIDOS-91 was

Clouds - The First Order Impact for Defense and Climate Change'. Two Keynote addresses were presented: ...

Clouds, Cloud models, Cloud simulation, Cloud data bases, Cloud observing, Cloud sensors, ...

The Influence of Forest Fire Induced Albedo Differences on the Generation of Mesoscale Circulations

Authors: John B. Knowles, AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH

... by the Regional Atmospheric Modeling System (RAMS) in order to show the circulation's ability to generate clouds and precipitation. The simulations used two fires that occurred during the summer of 1988. The ... developed mesoscale circulation with a vertical updraft speed of over 3.5 m s-1. The simulation also developed clouds and precipitation directly above the circulation center. Simulation of the second fire burn area generated ... a vertical updraft speed of over 2.5 m s-1. Although the second simulation did develop clouds and some very light precipitation, it could not be directly tied to the ...

Debris Cloud Material Characterization for Hypervelocity Impacts of Single- and Multi-

Material Projectiles on Thin Target Plates

Authors: William P. Schonberg, ALABAMA UNIV IN HUNTSVILLE DEPT OF CIVIL AND ENVIRONMENTAL ENGINEERING

... of time, under less intense loads, and over a much larger area of the target. In KEW impacts, one or more debris clouds are created during the initial impact on the outer wall of a target. These debris clouds can contain solid, melted, and vaporized projectile and target materials. The levels of melt and vaporization within the debris clouds determine the loads transmitted to various internal target components. To accurately determine total target damage, a lethality assessment scheme must include the ...

Prediction of Global Cloud Cover with a Very High Resolution Global Spectral Model

Authors: T. N. Krishnamurti, FLORIDA STATE UNIV TALLAHASSEE DEPT OF METEOROLOGY

The completed research is in the area of cloud prediction with a high resolution global model. We have extended our studies on the handling of implicit clouds (i.e. clouds specified as a function of prevailing humidity). We have also examined this problem in the context of rainfall initialization (called physical initialization). We demonstrate a strong positive ... the explicit over the implicit scheme. That work was performed using a low resolution global model. Further work on the improvement of the explicit scheme at higher resolution is required. Cloud prediction, Global modelling of clouds.

Study of Midlatitude and Arctic Aerosol-Cloud Radiation Feedbacks Based on LES Model with Explicit Ice and Liquid Phase Microphysics

Authors: Yefim L. Kogan, OKLAHOMA UNIV NORMAN

... at investigating the cloud radiation feedbacks in midlatitude, subtropical, and high latitude low level clouds. We will continue the study of marine stratocumulus clouds using LES simulations based on FIRE I and FIRE I IASTEX observational data. The data will be used to validate the CIMMS LES ... explicit formulation of aerosol and cloud drop size resolving microphysics and radiation. The study of mixed phase clouds will use the new version of the CIMMS model which includes also explicit formulation of the cloud phase microphysics. ...

Cloud Condensation Nuclei Measurements in Shiptrails

Authors: James G. Hudson, MACKAY SCHOOL OF MINES RENO NV

Enhancements of droplet concentrations in clouds affected by four ships were fairly accurately predicted from ship emission factors and plume and background cloud condensation ... the increased droplet concentrations in these ship tracks. Derived supersaturations were typical of marine stratus clouds, although there was evidence of some lowering of supersaturations in some ship tracks closer to the ships ... diesel ships burning low grade fuel were responsible for nearly all of the observed ship track clouds. There is some evidence that fuel type is a better predictor of ship track potential than ...

Development and Testing of Physical Algorithms for Cloud Forecasting on the Mesoscale

Authors: William R. Cotton, COLORADO STATE UNIV FORT COLLINS DEPT OF ATMOSPHERIC SCIENCE

... on the development of a comprehensive mesoscale numerical weather prediction (NWP) system for forecasting clouds anywhere in the world. The host model for performing this research, RAMS, has been extended to ... to telescopically nest anywhere on earth and provide high resolution 24 to 48 forecasts of clouds and precipitation. Some of the physical modules developed under support of this project include: a ... microphysics model. The new cloud forecasting scheme has been tested in applications to Arctic stratus clouds,
and mid-latitude and tropical cirrus. The model has been shown to perform...

**Worldwide Cloud Forecasts with Neural Networks**

Authors: Kenneth A. Poehl; David M. Crandall; Kevin O'Rourke; Kenneth E. Heikes.

Pacific-Sierra Research Corp.
Santa Monica CA

May 1, 1998

113 pages

**Understanding Satellite Cirrus Cloud Climatologies with Calibrated Lidar Optical Depths**

Authors: Donald Wylie; Palvi Pirinen; Walter Wolf; Edwin Eloranta.

Wisconsin Univ-Madison Space Science and Engineering Center.

1994

40 pages

**Prediction of Global Cloud Cover with an Explicit Formulation**

Authors: T. N. Krishnamurti.

Florida State Univ Tallahassee Dept of Meteorology.

Dec 31, 1998

14 pages

**Spatial-Spectral Sensor Techniques for Detection of Atmospheric Turbulence**

Authors: Robert D. Sears; Lyle Broadfoot.

Vanguard Research Inc Fairfax VA

Mar 3, 2000

71 pages

**Unified Retrieval of Cloud Properties, Atmospheric Profiles, and Surface Parameters from Combined DMSP Imager and Sounder Data**

Authors: Ronald G. Isaac; Sid Bokan; Jennifer Hegarty; Chris Lietzke; Richard Lynch.

Atmospheric and Environmental Research Inc Cambridge MA

May 1, 2000

60 pages

**Measurement and Prediction of Particulate Concentration Within External and Internal Flows**

Authors: Lisle H. Russell; Philip M. Bushong; Robert E. Richardson.

Naval Surface Warfare Center Dahlgren Div VA

Oct 1997

98 pages

**Cloud Optical Depth Retrieval from Cloud Radar and Microwave Radiometer Measurements**

Authors: Paul R. Desrochers.

Air Force Research Lab Hanscom AFB MA Space Vehicles Directorate

Nov 5, 2004

27 pages

**Low Noise Simultaneous Fluorescence Detection of Two Atomic States (PREPRINT)**

Authors: M. T. Cashen; J. B. Finley; G. W. Biedermann; M. A. Kasevich.

Stanford Univ CA Dept of Physics

Apr 5, 2006

5 pages
We have demonstrated a new technique for fluorescence detection of ultracold atoms. Fluorescence from two spatially separated clouds of ultracold atoms illuminated by a mutual probe laser was imaged onto opposite quadrants of a position-sensitive detector. The populations in the two separated atomic clouds were measured by integrating the quadrant detector photocurrents. Simultaneous detection of the populations of the two atomic clouds was used to reduce noise caused by fluctuations in detection laser amplitude and frequency. Using this technique we ...

**Large-Eddy Simulation of Stratocumulus-Topped Atmospheric Boundary Layers with Dynamic Subgrid-Scale Models**

Mar 24, 2004  12 pages

Authors: Inanc Senocak, CALIFORNIA INST OF TECH PASADENA

Earth's climate and its geographical variation is strongly influenced by cloud coverage. It is estimated that about 50% of the earth is covered by clouds at any given time, providing a shield from solar radiation. Radiative energy transfer and its interaction with clouds play an important role in the thermal structure and stratification of the atmosphere. For instance, clouds have high reflectivity in the visible wavelengths, thus providing relative cooling of the atmosphere. They also absorb strongly in the infrared wavelengths, resulting in heating of the atmosphere (Salby 1996).

**PRECURSOR SHOCKS PRODUCED BY A LARGE YIELD CHEMICAL EXPLOSION**

1965 1 pages

Authors: John M. Dewey, SUFFIELD EXPERIMENTAL STATION RALSTON (ALBERTA)

In July 1964, a 500 ton TNT hemispherical surface burst charge was detonated at Suffield Experimental Station. High-speed photographs of the explosion show that in some radial directions dust clouds moved out ahead of the main shock and had reached a height of 50 ft. before its arrival. The dust clouds were enveloped by a shock wave. At ground-level this precursor eventually became downward facing and produced a reflected shock and a Mach stem. Photography from an aeroplane at 19,000 ...