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Project Gulf Q a Study of Maritime Cumulus Modification, Dec 1970 30 pages
Authors: W. C. White; R. S. Clark; J. R. Ennis; H. E. Cronin; NAVAL WEAPONS CENTER CHINA LAKE CA
... through 28 May 1969 at Brownsville, Tex. The objective was to study the modification of warm tropical cumulus clouds by seeding them with hygroscopic solutions that had exhibited considerable warm cloud modification potential. These solutions were sprayed from aircraft on all of the 16 tests completed during the project ... attributable to this treatment were observed in all tests. When cloud growth occurred after seeding, there were frequently ... content and turbulence, especially in the upper half of the target cloud. On five tests the seeded clouds completely dissipated within 5 ...

Full Text

Development of 2-Dimensional Cloud Rise Model to Analyze Initial Nuclear Cloud Rise, Mar 2005 109 pages
Authors: Karson A. Sandman; AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH SCHOOL OF ENGINEERING AND MANAGEMENT
... rise model that could be used instead of the current 1-D cloud rise model in the Defense Land Fallout Integrative Code ( ... more detailed definition of the physical properties within the mushroom cloud than the 1-D DELFIC option. This is particularly useful in ... and particle location within the rising/risen cloud. The analysis model created for this study is the result of modifications to a convective cloud simulation. The primary modification to the convective cloud model is the incorporation of initial conditions for a nuclear cloud similar to those used in DELFIC’s initial conditions module.

Full Text

Authors: B. S. Katz; F. C. DeBold; J. J. Perez-Esandi; NAVAL SURFACE WEAPONS CENTER SILVER SPRING MD
... (PCFLOS) were calculated for a set of nine angles using a modification of Lund and Shanklin’s universal method from lower cloud weather data taken at fifteen marine locations. The data ... (1964-1971) and provides statistics for seasonal variations of lower cloud base heights and cover and low cloud type ... degrees above the horizonal and for the heights for which lower cloud base data were available. The main assumption of the ... method can be applied successfully to the statistics for individual low cloud base height recording cells. Intermediate computational results corresponding ...

Full Text

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
... following key questions regarding marine aerosol/ cloud interactions: (1) What factors control the abundance and ... model description of aerosol evolution and aerosol/ cloud interaction that can be applied to a variety of marine ... model for prediction of the effects of aerosol characteristics on cloud formation and evolution, and, in turn, ... effects of cloud processes on the marine aerosol. The models built in this project can be used to study the role of aerosol in cloud modification, including ship tracks and ... aimed at elucidating some important aerosol/ cloud interactions, and to adapt and use ...

Full Text

The Behavior of Cloud Droplets in an Acoustic Field: A Numerical Investigation, Aug 1985 107 pages
Authors: Michael P. Foster; ARMY ELECTRONICS RESEARCH AND DEVELOPMENT COMMAND WSMR NM ATMOSPHERIC SCIENCES LAB
... the study of atmospheric phenomena may provide insight to the effect of thunder on cloud and precipitation processes as well as providing the basis for a new technology in weather modification. In this thesis the theory of acoustic agglomeration is described and a one-dropel model is developed to study the effects of acoustic waves on cloud droplets. A stochastic model used to predict changes in cloud droplet ... sedimentation is modified to simulate the application of acoustic energy to various cloud volumes. The results are discussed and suggestions are made for further ...

Full Text

Authors: Richard D. H. Low; ARMY ELECTRONICS COMMAND WHITE SANDS MISSILE RANGE NM ATMOSPHERIC SCIENCES LAB
... single parameter to denote the hygroscopicity of the nucleus and which includes an additional term to reflect
the inefficiency of the condensation process. This volume and its predecessor serve as a valuable reference for the experimental cloud physicist in his study of the growth behaviors of condensation nuclei and for the field cloud physicist in his selection of the proper artificial nuclei for warm fog or cloud modification.

Project Foggy Cloud 1
Aug 1970 85 pages
Authors: E. Alex Blomerth; R. S. Clark; H. E. Cronin; J. R. Ennis; R. L. Lininger; NAVAL WEAPONS CENTER CHINA LAKE CA

Foggy Cloud I was a series of experiments in observation, modification, and treatment of fog and stratus clouds conducted at or near the Arcata-Eureka airport, Humboldt County, Calif., from late March through mid-November 1963. A ... enough identifiable effects to indicate promise were investigated in detail and improved upon.

Observations were made of fog characteristics, visual effects, changes in cloud physics parameters, and of the fallout from the fog. Hygrometric smokes were found useful for intensifying, stabilizing, and forming fog and stratus. Hygroscopic powders, ...

Analysis of Shiptrack Persistence With In situ Cloud Measurements and Satellite Retrieved Reflectance
Mar 1996 96 pages
Authors: Scott A. Tessmer; NAVAL POSTGRADUATE SCHOOL MONTEREY CA

... than expected. A simple model of physical processes is developed to correlate the ship injected aerosols to the subsequent affects on cloud condensation nuclei, droplet distribution, effective radius, and albedo. The theoretical dispersion model is tested using measured values ... in the observed down-track fractional change of droplet concentration disputes the decreasing fractional changes of droplets predicted by dispersion associated with track widening. The results indicate downtrack modification of cloud and droplet concentrations able to maintain track brightness and track-detection life.

Step Potential Modification by the Lightning Electromagnetic Environment
Sep 1996 13 pages
Authors: John M. Tobias; ARMY COMMUNICATIONS-ELECTRONICS COMMAND FORT MONMOUTH NJ

... This step potential examination considers the space charge region developed in the earth as a consequence of the charge present in a thunderstorm cloud. It is theorized that, under certain conditions, the step potential may be significantly higher than previous theoretical estimates, or empirical results obtained under fine weather electric field conditions. The objective of this report is to present the theory of the influence of the cloud charge on current distribution and, hence, step potential by citing recent qualitative observations of rocket-triggered lightning studies.

Experimental and Modeling Studies of Interactions of Marine Aerosols and Clouds
May 31, 1995 13 pages
Authors: Sonia M. Kreidenweis; COLORADO STATE UNIV FORT COLLINS

... objectives of the modeling component are to develop models of the marine boundary layer, including models that predict cloud formation and evolution and the effects of such processes on the marine aerosol (and vice versa). It is anticipated that the modeling techniques built in this project can be used to study the role of aerosol in cloud modification, including ship tracks. The objectives of the experimental component are to evaluate new techniques for aerosol characterization and adapt these for field (shipboard and ground) deployment, particularly ...

Delivery and Development of a Day/Night Whole Sky Imager with Enhanced Angular Alignment for Full 24 Hour Distribution Assessment
Mar 1997 19 pages
Authors: Janet E. Shields; Richard W. Johnson; Monette E. Kari; Richard A. Weymouth; David S. Sauer; SCRIPPS INSTITUTE OF OCEANOGRAPHY LA JOLLA CA MARINE PHYSICAL LAB

The Whole Sky Imager is a ground-based digital imaging system for assessment of cloud cover over the full upper hemisphere. Using a fisheye lens and a slow scan CCD sensor, it acquires imagery under daylight, moonlight and starlight conditions. This contract funding enabled Marine Physical Lab ... Sky Imager to the Air Force, with several enhancements. The primary enhancements funded under this contract included more accurate alignment with respect to the sky field, detailed documentation, and enhancement of the software to allow interactive modification of the data acquisition from remote sites.

STUDIES OF EFFECTS OF BOUNDARY MODIFICATION IN PROBLEMS OF SMALL AREA METEOROLOGY
Apr 1969 187 pages
Authors: Heinz H. Leitau; Charles R. Stearns; WISCONSIN UNIV-MADISON DEPT OF METEOROLOGY

Contents: Evapotranspiration climatonomy; Estimates of vorticity, divergence, and vertical velocity in a surface layer; Thermal response of a plant canopy to drifting cloud shadows; Thermal response of a concrete slab to controlled daytime and nighttime cycles of radiation; Topographic influence on tornado tracks and frequencies in Wisconsin and Arkansas; The theory of variangular wind spirals; The determination of the surface roughness from wind speed and air temperature profiles in the surface layer; Thermo-tidal winds in an equivalent barotropic boundary layer; Note on aerodynamic ...

A Maritime and Continental Aerosol-Cloud Interaction Study From ASTEX '92
Dec 1992 114 pages
Authors: Karen M. Ruppe; NAVAL POSTGRADUATE SCHOOL MONTEREY CA

... by particle size index, optical depth, and low cloud analysis at visible and 3.7 micrometers wavelengths. Use of ... to resolve aerosol type and distribution prove useful in determining implications of cloud reflectance changes due to modification by aerosol particles. Air masses were clearly defined and showed distinctive signatures in aerosol characteristics and cloud reflectances at 3.7 micrometers wavelengths. Air mass characteristic sources consisted ... Europe and desert dust from the Sahara Desert. ... Satellite cloud analysis, Cloud distribution, Aerosol distribution, Aerosol classification,
A generic texture routine was developed for upgrading smooth obscuring cloud models by introduction of time and space dependent fluctuations in line ... for mean or average aerosol concentration contributions in the obscuring cloud. Atmospheric turbulence and eddy structures are the underlying algorithms that provide either two-dimensional propagation overlays for image modification or three-dimensional volume fluctuations. Path integrated concentration, LOS propagation fluctuations, and realistic cloud imaging are then simulated by multiplication of pseudorandom fluctuation outputs with ...

... of the airborne Chernobyl cesium was wet deposited, either via interception by falling raindrops or via absorption into cloud droplets destined to become raindrops. The Hybrid Single-Particle Lagrangian rated Transport (HYSPLIT) model, developed at Air Resources Laboratory, is used to simulate the transport and deposition of Chernobyl cesium-137. A cloud base parameterization modification is tested and appears to slightly improve the accuracy of one HYSPLIT simulation of daily Chernobyl cesium-137 deposition over the course of the accident ...

... transport and condensation processes of clouds. The models considered include two dimensional warm fog seeding, one dimensional cumulus cloud formation, and three dimensional warm fog modification by external heat sources. The finite difference techniques used and the stability criteria are discussed. A series of computer models. The meteorological data collected is reduced into a usable form such that computer studies relative to the growth, structure, and modification techniques of convective clouds can be made. (Author)

... anthropogenic, influences on convection as it relates to lightning production and precipitation structure. In general, inadvertent weather modification hypotheses offered to explain lightning and rainfall anomalies rely on either or both perturbations in the spatial distribution and intensity of convection (from whence warm-season rainfall and lightning emanate), or modification to convective cloud microphysics through aerosol loading over and downwind of polluted cities such as Houston. Using eight independent datasets, causative mechanisms to explain ...

The feasibility of performing laboratory experiments to aid in the modification and enhancement of existing numerical models for predicting the physical fate of dredged material discharged into open water is addressed. First, appropriate design requirements of the test facility. These requirements include the types of equipment and measurement techniques required to monitor rates of cloud entrainment, rates of spreading on the bottom, disposal material properties, suspended sediment concentrations, and other parameters of interest. Typical testing scenarios for various ...

The mean atmospheric temperature was empirically linked to ... speed. With the significant environmental variables parameterized, two algorithms for analysis of polar SSM/I data were developed. The first is a simple modification that adds the capability of determining ice temperature to an existing algorithm. The second is a weather correcting algorithm significantly more complex than ...

... examined with regard to the 19, 22, 37, and 85 GHz channels of the SSM/I system. The atmospheric vapor and cloud liquid water attenuation was empirically modeled with respect to frequency and atmospheric temperature. The mean atmospheric temperature was empirically linked to ... speed. With the significant environmental variables parameterized, two algorithms for analysis of polar SSM/I data were developed. The first is a simple modification that adds the capability of determining ice temperature to an existing algorithm. The second is a weather correcting algorithm significantly more complex than ...

... to the natural ionosphere and one into an ionosphere modified by HF heating.

Full Text
Extended periods of HF modification prior to the rocket launches also provided an opportunity to study heating effects, per se. This report reviews some preliminary results from three participating instruments: (1) ion-line mapping made by the Arecibo incoherent scatter radar, (2) HF backscatter characterization and tracking of the barium cloud, and (3) transionospheric propagation diagnosis of large and medium scale structure produced by heating and the barium releases. The data that are ...