Minimising Uncertainty In Vapour Cloud Explosion Modelling

We live on a dynamic Earth shaped by both natural processes and the impacts of humans on their environment. It is in our collective interest to observe and understand our planet, and to predict future behavior to the extent possible, in order to effectively manage resources, successfully respond to threats from natural and human-induced environmental change, and capitalize on the opportunities â€" social, economic, security, and more â€" that such knowledge can bring. By continuously monitoring and exploring Earth, developing a deep understanding of its evolving behavior, and characterizing the processes that shape
not only advance knowledge and basic discovery about our planet, but we further develop the foundation upon which benefits to society are built. Thriving on Our Changing Planet presents prioritized science, applications, and observations, along with related strategic and programmatic guidance, to support the U.S. civil space Earth observation program over the coming decade.
In contrast to nuclear plants and aerospace systems, human error is largely ignored in quantitative risk assessment for petroleum and chemical plants. Because of this, current risk analysis methods are able to calculate and predict only about one-third of the accidents happening in practice. Human Error in Process Plant Design and Operations: A Practitioner's Guide shows you how to develop a comprehensive risk assessment that includes human error. Based on the well-known SRK model of human error, this book represents a practical collection of examples and statistics from more than 30 years of study, with many exa
book provides a complete overview of the various types of human error, including operator error, hindrances and inability to function, errors in observation, errors in performing standard procedures, errors in decision making and planning, infractions and violations, design errors, and errors in procedures. It then goes on to identify human error potential and probabilities, and discusses techniques and methodologies that can be implemented to minimize human errors and prevent accidents. The result of the author's observations of human error over a lifetime of work as an operator, as a commiss
manager, the book demonstrates how to analyse, manage, and mitigate many types of error. By taking advantage of the author's experience and expert knowledge, and by applying the techniques and methodologies illustrated in this book, you will be able to make changes which will make work easier, error free, clearly understood, and more congenial.
An up-to-date, detailed set of notes covering all aspects of NOAA AVHRR data collection, pre-processing, analysis and application. Includes many FTP sites, e-mail addresses and URL locations. Some chapters address particular aspects of the NOAA AVHRR system, such as radiometric calibration and geometric correction, while others provide general information of interest to any remote sensing study, such as radiative transfer modelling and atmospheric correction. The publication of a book that covers all important aspects of the treatment and understanding of the data in one volume makes the work a convenient, infor
favourite for all users of NOAA AVHRR data.
South Asia and Climate Change

Geophysics and space physics. C
International Conference, ICICIS 2011, Chongqing, China, January 8-9, 2011. Proceedings
1997 Submission of the United States of America Under the United Nations Framework Convention on Climate Change
EOS Science Plan
Atmospheric aerosols are known to exert a significant influence on the Earth's climate system; however, the magnitude of this influence is highly uncertain because of the complex interaction between aerosols and water vapor to form clouds. Toward reducing this uncertainty, this dissertation outlines a series of laboratory and in-situ field measurements, instrument technique development, and model simulations designed to characterize the ability of aerosols to act as cloud condensation nuclei (CCN) and form cloud droplets. Specifically, we empirically quantify the mixing state and thermodynamic properties of organic aerosols (e.g., hygroscopicity and droplet condensational uptake coefficient) measured in polluted and non-polluted environments including Alaska, California, and Georgia. It is shown that organic aerosols comprise a substantial portion of the aerosol mass and are often water soluble. CCN measurements are compared to predictions from theory in order to determine the error associated with simplified composition and mixing state assumptions employed by current large-scale models, and these errors are used to constrain the uncertainty of global and regional cloud droplet number and albedo using a recently-developed cloud droplet parameterization adjoint coupled with the GMI chemical transport model. These sensitivities are important because they describe the main determinants of climate forcing. We also present two novel techniques for fast measurements of CCN concentrations with high size, supersaturation, and temporal resolution that substantially improve the state of the art by several orders of magnitude. Ultimately, this work represents a step toward better understanding how atmospheric aerosols influence cloud properties and Earth's climate.
This two-volume set (CCIS 134 and CCIS 135) constitutes the refereed proceedings of the International Conference on Intelligent Computing and Information Science, ICICIS2011, held in Chongqing, China, in January 2011. The 226 revised full papers presented in both volumes, CCIS 134 and CCIS 135, were carefully reviewed and selected from over 600 initial submissions. The papers provide the reader with a broad overview of the latest advances in the field of intelligent computing and information science.
Gas Explosion Handbook provides an overview of the latest research on gas explosion hazards within the oil and gas industry, and is the only book which focuses specifically on gas explosions. The book is informed by the author's long experience in safety consulting, supporting his findings with examples and case studies. This useful resource reviews all relevant scientific and technical work performed in the field, and presents important lessons on release phenomena, dispersion processes, ignition sources and their properties, explosion processes and phenomena, blast waves, modeling of release, dispersion and explosion, hazardous area classification, and probabilities of release and ignition. The current regulatory frameworks, both onshore and offshore, from several countries are also reviewed, together with national and international standards supporting these regulations. The book is suitable for those new to the area as well as experienced professionals. Provides an overview of the latest research on gas explosion hazards within the oil and gas industry Designed to prevent accidents, injury, loss of life, and capital damage Includes onshore and offshore International regulatory standards Features the different type of models for gas explosions, and provides guidance as to which model is appropriate to a situation Covers tactics for conducting gas explosion safety studies, considering ventilation, gas dispersion and gas explosions for traditional platform constructions, FPSO's, and FLNG's
A Decadal Strategy for Earth Observation from Space
Report of the ... Session of the Joint Scientific Committee
Characterizing Water-soluble Organic Aerosol and Their Effects on Cloud Droplet Formation: Interactions of Carbonaceous Matter with Water Vapor
Analysis and Calibration of CRF Raman Lidar Cloud Liquid Water Measurements
24-31 May, 2006, Orlando, Florida, USA
Including Bottom Sediments and Sludges. (1923)

Intelligent Computing and Information ScienceInternational Conference, ICICIS 2011, Chongqing, China, January 8-9, 2011. ProceedingsSpringer Science & Business Media
Proceedings of SPIE present the original research papers presented at SPIE conferences and other high-quality conferences in the broad-ranging fields of optics and photonics. These books provide prompt access to the latest innovations in research and technology in their respective fields. Proceedings of SPIE are among the most cited references in patent literature.
CD-ROM contains conference manuscripts.
Human Perspectives
Science, Governance and Uncertainty
7th World Congress of Chemical Engineering, Incorporating the 5th European Congress of Chemical Engineering, 10-14 July 2005, SECC, Glasgow, Scotland
Intelligent Computing and Information Science
Ground-based and Airborne Telescopes
Using Measurements of CCN Activity to Characterize the Mixing State, Chemical Composition, and Droplet Growth Kinetics of Atmospheric Aerosols to Constrain the Aerosol Indirect Effect

Aerosols have significant impacts on earth's climate and hydrological cycle. They can directly reflect the amount of incoming solar radiation into space; by acting as cloud condensation nuclei (CCN), they can indirectly impact climate by affecting cloud albedo. Our current assessment of the interactions of aerosols and clouds is uncertain and parameters used to estimate cloud droplet formation in global climate models are not well constrained.Organic aerosols attribute much of the uncertainty in these estimates and are known to affect the ability of aerosol to form cloud droplets (CCN Activity) by i) providing solute, thus reducing the equilibrium water vapor pressure of the droplet and ii) acting as surfactants capable of depressing surface tension, and potentially, growth kinetics. My thesis dissertation investigates various organic aerosol species (e.g., marine, urban, biomass burning, Humic-like Substances). An emphasis is placed on the water soluble components and secondary organic aerosols (SOA). In addition the sampled organic aerosols are acquired via different media: directly from in-situ ambient studies (TEXAQS 2006) environmental chamber experiments, regenerated from filters, and cloud water samples. Novel experimental methods and analyses to determine surface tension, molar volumes, and droplet growth rates are presented from nominal volumes of sample. These key parameters for cloud droplet formation incorporated into climate models will constrain aerosol-cloud interactions and provide a more accurate assessment for climate prediction.
The Arctic is warming at twice the global rate over recent decades. To slow down this warming trend, there is growing interest in reducing the impact from short-lived climate forcers, such as black carbon (BC), because the benefits of mitigation are seen more quickly relative to CO2 reduction. To propose efficient mitigation policies, it is imperative to improve our understanding of BC distribution in the Arctic and to identify the sources. In this dissertation, we investigate the sensitivity of BC in the Arctic, including BC concentrations in snow (BCsnow) and BC concentrations in air (BCair), to emissions, dry deposition and wet scavenging using a global 3-D chemical transport model (CTM) GEOS-Chem. By including flaring emissions, estimating dry deposition velocity using resistance-in-series method, and including Wegener-Bergeron-Findeisen (WBF) in wet scavenging, simulated BCsnow in the eight Arctic sub-regions agree with the observations within a factor of two, and simulated BCair fall within the uncertainty range of observations. Specifically, we find that natural gas flaring emissions in Western Extreme North of Russia (WENR) strongly enhance BCsnow (by up to 50%) and BCair (by 20-32%) during snow season in the so-called 'Arctic front', but has negligible impact on BC in the free troposphere. The updated dry deposition velocity over snow and ice is much larger than those used in most of global CTMs and agrees better with observation. The resulting BCsnow changes marginally because of the offsetting of higher dry and lower wet deposition fluxes. In contrast, surface BCair decreases strongly due to the faster dry deposition (by 27-68%). WBF occurs when the environmental vapor pressure is in between the saturation vapor pressure of ice crystals and water drops in mixed-phase clouds. As a result, water drops evaporate and releases BC particles in them back into the interstitial air. In most CTMs, WBF is either missing or represented by a uniform and ice mass fraction based on long-term observations in mixed-phase clouds. We find that WBF reduces BC scavenging efficiency globally, with larger decrease at higher latitude and altitude (from 8% in the Arctic). WBF slows down and reduces wet deposition of BC and leave more BC in the atmosphere. Higher BCair results in larger dry deposition. The resulting total deposition is lower in mid-latitudes (by 12-34%) and higher in the Arctic (2-29%). Globally, including WBF significantly reduces the discrepancy of BCsnow (by 50%), BCair (by 50%), and washout ratios (by a factor of two to four). The remaining discrepancies in these variables suggest that in-cloud removal is likely still excessive over land. In the last part, we identify sources of surface atmospheric BC in the Arctic in springtime, when radiative forcing is the largest due to the high insolation and surface albedo. We find a large contribution from Asian anthropogenic sources (40-43%) and open biomass burning emissions from forest fires in South Siberia (29-41%). Outside the Arctic front, BC is strongly enhanced by episodic, direct transport events from Asia and Siberia after 12 days of transport. In contrast, in the Arctic front, a large fraction of the Asian contribution is in the form of 'chronic' pollution on 1-2 month timescale. As such, it is likely that previous studies using 5- or 10-day trajectory analyses strongly underestimated the contribution from Asia to surface BC in the Arctic. Our results point toward an urgent need for better characterization of flaring emissions of BC (e.g. the emission factors, temporal and spatial distribution), extensive measurements of both the dry deposition of BC over snow and ice, and the scavenging efficiency of BC in mixed-phase clouds, particularly over Ocean. More measurements of 14C are needed to better understand sources of BC (fossil fuel combustion versus biomass burning) and to provide additional constrain on BC simulations.
The Royal Society has published the findings of a major study into geoengineering the climate. The study, chaired by Professor John Shepherd FRS, was researched and written over a period of twelve months by twelve leading academics representing science, economics, law and social science. Man-made climate change is happening and its impacts and costs will be large, serious and unevenly spread. The impacts may be reduced by adaptation and moderated by mitigation, especially by reducing emissions of greenhouse gases. However, global efforts to reduce emissions have not yet been sufficiently successful to provide confidence that the reductions needed to avoid dangerous climate change will be achieved. This has led to growing interest in geoengineering, defined here as the deliberate large-scale manipulation of the planetary environment to counteract anthropogenic climate change. However, despite this interest, there has been a lack of accessible, high quality information on the proposed geoengineering techniques which remain unproven and potentially dangerous. This study provides a detailed assessment of the various methods and considers the potential efficiency and unintended consequences they may pose. It divides geoengineering methods into two basic categories: 1. Carbon Dioxide Removal (CDR) techniques, which remove CO2 from the atmosphere. As they address the root cause of climate change, rising CO2 concentrations, they have relatively low uncertainties and risks. However, these techniques work slowly to reduce global temperatures. 2. Solar Radiation Management (SRM) techniques, which reflect a small percentage of the sun's light and heat back into space. These methods act quickly, and so may represent the only way to lower global temperatures quickly in the event of a climate crisis. However, they only reduce some, but not all, effects of climate change, while possibly creating other problems . They also do not affect CO2 levels and therefore fail to address the wider effects of rising CO2, including ocean acidification. The report recommends: Parties to the UNFCCC should make increased efforts towards mitigating and adapting to climate change and in particular to agreeing to global emissions reductions of at least 50% on 1990 levels by 2050 and more thereafter; CDR and SRM geoengineering methods should only be considered as part of a wider package of options for addressing climate change. CDR methods should be regarded as preferable to SRM methods. Relevant UK government departments, in association with the UK Research Councils, should together fund a 10 year geoengineering research programme at a level of the order of £10M per annum. The Royal Society, in collaboration with international science partners, should develop a code of practice for geoengineering research and provide recommendations to the international scientific community for a voluntary research governance framework. The Royal Society issued a call for submissions and convened a small ethics workshop as part of the evidence gathering process. More information is available in the main report.
The State of Science in the EOS Program
Standard Methods for the Examination of Water and Wastewater
Metrology and Physical Constants
Purple Book
Il Nuovo Cimento Della Società Italiana Di Fisica
ILO-CIS Bulletin

Pinnles, or soundings, of atmospheric temperature and water vapor from remotely sensed platforms provide critical observations within the temporal and spatial gaps of the radiosonde network. The 2017 National Academies of Science Decadal Survey highlighted that observations of the planetary boundary layer (PBL) from the current space-based observing system are not of the necessary accuracy or resolution for monitoring and predicting high impact weather phenomena. The National Research Council (NRC, 2009) suggested the development of a network of ground-based profilers to supplement the existing space-based observing system in order to improve observations of the PBL. One instrument that fits the requirements outlined by the NRC (2009) for the ground-based network for profilers is the Atmospheric Emitted Radiance Interferometer (AERI). This dissertation advances the understanding of the benefits of a synergy between the ground-based AERI and space-based hyperspectral infrared (IR) sounders as a method for improving thermodynamic sounding using three studies: 1) A synthetic information content analysis in clear sky conditions to quantify improvements offered by the synergy of profilers in terms of degrees of freedom, vertical resolution, and uncertainties. 2) A synthetic information content study in three cloudy sky scenes to assess the potential of the ground-based and space-based synergy as a possible solution to IR sounding in cloudy environments. 3) Develop an optimal estimation retrieval that combines AERI with the space-based Cross-track Infrared Sounder (CrIS) on S-NPP and NOAA-20 to assess the performance of the synergy in practice, outside of synthetic studies. The clear sky information content study shows that a combination of AERI with any of the three polar-orbiting IR sounders: The Atmospheric Infrared Sounder (AIRS), the Cross-track Infrared Sounder (CrIS), or the Infrared Atmospheric Sounding Interferometer (IASI), results in a 30-40% increase in degrees of freedom (DOF) in the surface to 700 hPa layer compared to the space-based instrument alone. Introducing AERI measurements to the observing system also results in significant improvements to vertical resolution and uncertainties in the bottom 1000 m of the atmosphere compared to CrIS measurements alone. The cloudy sky information content analysis show that the synergy of CrIS+AERI has greater temperature information in cloudy sky conditions than in clear sky because the cloud provides an opaque layer that sharpens the Jacobians enabling a temperature retrieval at that layer. AERI and CrIS both lose water vapor information as the cloud becomes optically thick, though a synergy of CrIS+AERI would minimize those losses. In partly cloudy scenes, the information content of the synergy is most sensitive to cloud cover at greater than 50% aerial cloud fraction. The combined CrIS+AERI retrieval is assessed for a single case study. CrIS+AERI did not produce the best comparison to the radiosonde profile when compared to the individual instrument retrievals and was found to have greater uncertainty as well. It is shown that this is likely due to the small uncertainties used for each instrument. The synergy of CrIS+AERI was found to replicate the improvements in vertical resolution identified in the information content analysis. The vertical resolution of the combined retrieval in this case study is found to exceed the 1 km resolution goal stated by the 2017 Decadal Survey.
DOE-GTRC-05596 11/24/2104 Collaborative Research: Process-Resolving Decomposition of the Global Temperature Response to Modes of Low Frequency Variability in a Changing Climate PI: Dr. Yi Deng (PI) School of Earth and Atmospheric Sciences Georgia Institute of Technology 404-385-1821, yi.deng@eas.gatech.edu El Niño-Southern Oscillation (ENSO) and Annular Modes (AMs) represent respectively the most important modes of low frequency variability in the tropical and extratropical circulations. The projection of future changes in the ENSO and AM variability, however, remains highly uncertain with the state-of-the-science climate models. This project conducted a process-resolving, quantitative evaluations of the ENSO and AM variability in the modern reanalysis observations and in climate model simulations. The goal is to identify and understand the sources of uncertainty and biases in models' representation of ENSO and AM variability. Using a feedback analysis method originally formulated by one of the collaborative PIs, we partitioned the 3D atmospheric temperature anomalies and surface temperature anomalies associated with ENSO and AM variability into components linked to 1) radiation-related thermodynamic processes such as cloud and water vapor feedbacks, 2) local dynamical processes including convection and turbulent/diffusive energy transfer and 3) non-local dynamical processes such as the horizontal energy transport in the oceans and atmosphere. In the past 4 years, the research conducted at Georgia Tech under the support of this project has led to 15 peer-reviewed publications and 9 conference/workshop presentations. Two graduate students and one postdoctoral fellow also received research training through participating the project activities. This final technical report summarizes key scientific discoveries we made and provides also a list of all publications and conference presentations resulted from research activities at Georgia Tech. The main findings include: 1) the distinctly different roles played by atmospheric dynamical processes in establishing surface temperature response to ENSO at tropics and extratropics (i.e., atmospheric dynamics disperses energy out of tropics during ENSO warm events and modulate surface temperature at mid-, high-latitudes through controlling downward longwave radiation); 2) the representations of ENSO-related temperature response in climate models fail to converge at the process-level particularly over extratropics (i.e., models produce the right temperature responses to ENSO but with wrong reasons); 3) water vapor feedback contributes substantially to the temperature anomalies found over U.S. during different phases of the Northern Annular Mode (NAM), which adds new insight to the traditional picture that cold/warm advective processes are the main drivers of local temperature responses to the NAM; 4) the overall land surface temperature biases in the latest NCAR model (CESM1) are caused by biases in surface albedo while the surface temperature biases over ocean are related to multiple factors including biases in model albedo, cloud and oceanic dynamics, and the temperature biases over different ocean basins are also induced by different process biases. These results provide a detailed guidance for process-level model turning and improvement, and thus contribute directly to the overall goal of reducing model uncertainty in projecting future changes in the ENSO and AM variability.
The feedbacks among aerosols, clouds, and radiation are important components for understanding Earth's climate system and quantifying human-induced climate change, yet the magnitude of these feedbacks remain highly uncertain. Since every cloud droplet in the atmosphere begins with water condensing on a pre-existing aerosol particle, characterizing the ability of aerosols to uptake water vapor and form cloud condensation nuclei (CCN) are key to understanding the microphysics behind cloud formation, as well as assess the impact aerosols have on the Earth system. Through a combination of controlled laboratory experiments and field measurements, this thesis characterizes the ability of atmospheric aerosols to uptake water vapor and become CCN at controlled levels of water vapor supersaturation. The origin of the particle water uptake, termed hygroscopicity, is also explored, being from either the presence of deliquescent soluble material and/or adsorption onto insoluble surfaces. The data collected and presented is comprehensive and includes (1) ground samples of volcanic ash, collected from six recent eruptions re-suspended in the laboratory for analysis, (2) laboratory chamber and flow-tube studies on the oxidation and uptake of surface active organic compounds, and (3) in-situ aircraft measurements of aerosols from the Arctic background, Canadian boreal forests, fresh and aged biomass burning, anthropogenic industrial pollution, and from within tropical cyclones in the Atlantic basin. Having a more thorough understanding of aerosol water uptake will enable more accurate representation of cloud droplet number concentrations in global models, which can have important implications on reducing the uncertainty of aerosol-cloud-climate interactions, as well as additional uncertainties in aerosol transport, atmospheric lifetime, and impact on storm dynamics.
Aviation
Weather, Climate and Climate Change
Atmospheric Remote Sensing
Hazardous Materials
Aerosol Indirect Effects on Clouds and Global Climate
Concrete

The reliability and accuracy of systems of measurement continue to advance. We are about to enter a period of the most stable measurement system we can imagine with the anticipated new definitions of the SI units of measurement; a direct link between fundamental physics and metrology which will eliminate the current definition of the kilogram, until now based upon an artifact. This book presents selected papers from Course 185 of the Enrico Fermi International School of Physics, held in Varenna, Italy, in July 2012 and jointly organized with the Bureau International des Poids et Mesures (BIPM). The papers delivered at the school covered some of the most advanced topics in the discipline of metrology, including nano-technologies; quantum information and quantum devices; biology and medicine; food; surface quality; ionising radiation for health, environment, art and archaeology; and climate. The continuous and striking advances in basic research concerning atomic frequency standards operating both in the visible range and at microwave levels and the applications to satellite systems are also considered, in the framework of a historical review of the international organization of metrology, as are the problems inherent in uncertainty statements and definitions. This book will be of interest to all those whose work involves scientific measurement at the highest levels of accuracy.
This book provides a comprehensive and interdisciplinary examination of the diverse aspects of climate change in South Asia. The region, home to almost 4% of the world's population, is under serious threat from climatic disasters. The volume underscores the urgency of addressing cataclysmic events related to climate change and their ramifications on the economy, agriculture and livelihoods of the region. The book discusses the reasons causing climate change as well as highlights normative and ethical considerations involved in the battle against climate change. With case studies from India, Sri Lanka and Bangladesh, it explores issues such as extreme climatic events; energy use, fossil fuels, non-renewable resources and carbon dioxide emission in South Asia; internal migration and climate refugees; the ethical dilemma of sustainable development; technological advancements for extreme weather forecast; and responses to climate change in South Asia. Highlighting the need for striking a balance between developmental imperatives and environmental sustainability, the chapters also show the North-South divide in the research agenda and policies on climate change and the global politics that underlie climate policies. The volume juxtaposes a scientific analysis of factors responsible for climate change with an analysis of the human cost of climate change from the perspective of social sciences. It discusses the challenges faced by developing countries while also offering recommendations and solutions. This book will be of interest to scholars and researchers of climate studies, geography, public policy and governance, sustainable development, development studies, environmental studies, political studies, international relations, political economy, economics and sociology. It will also be useful to practitioners, thinktanks, policymakers and civil society organisations working on environmental management.
The Atmospheric Radiation Measurement (ARM) Raman lidar (RL), located at the Southern Great Plains (SGP) Climate Research Facility (CRF), is a unique state-of-the-art active remote sensor that is able to measure profiles of water vapor, aerosol, and cloud properties at high temporal and vertical resolution throughout the diurnal cycle. In October 2005, the capability of the RL was extended by the addition of a new detection channel that is sensitive to the Raman scattering of liquid water. This new channel permits the system, in theory, to measure profiles of liquid water content (LWC) by the RL. To our knowledge, the ARM RL is the only operation lidar with this capability. The liquid water Raman backscattering cross-section is a relatively weak and spectrally broad feature, relative to the water vapor Raman backscatter signal. The wide bandpass required to achieve reasonable signal-to-noise in the liquid water channel essentially eliminates the ability to measure LWC profiles during the daytime in the presence of large solar background, and thus all LWC observations are nighttime only. Additionally, the wide bandpass increases the probability that other undesirable signals, such as fluorescence from aerosols, may contaminate the observation. The liquid water Raman cross-section has a small amount of overlap with the water vapor Raman cross-section, and thus there will be a small amount of 'cross-talk' between the two signals, with water vapor contributing a small amount of signal to the LWC observation. And finally, there is significant uncertainty in the actual strength of the liquid water Raman cross-section in the literature. The calibrated LWC profiles, together with the coincident cloud backscatter observations also made by the RL, can be used to derive profiles of cloud droplet effective radius. By combining these profiles of effective radius in the lower portion of the cloud with the aerosol extinction measurements made below the cloud by the RL, the first aerosol indirect effect can be investigated using a single instrument, thereby reducing the uncertainty associated with aligning the different sampling periods and fields of view of multiple instruments. We have applied a "first principles" calibration to the LWC profiles. This approach requires that the relative differences in optical efficiency between the water vapor and liquid water channels be known; this relative difference is easily computed using the efficiency values of the beam splitters and interference filters in the lidar that were provided by the vendors of these components. The first principles approach then transfers the calibration from the water vapor mixing ratio to the LWC using the difference in the optical efficiency and an interpolated value of the liquid water Raman cross section from the literature, and the better established water vapor Raman cross section. After accounting for all known error sources, the vertical integral of LWC was compared against a similar value retrieved from a co-located ground-based infrared radiometer. The RL and infrared radiometer have significantly different fields of view; thus to compare the two sensors the data were averaged to 5 min intervals where only cloudy samples were included in the average of each. While there is fair scatter in the data (r=0.47), there is also a clear indication of a positive correlation between the infrared and the RL values. The value of the slope of the regression is 0.49, which indicates a tendency of the RL measurements to underestimate the total liquid amount with respect to the infrared retrieval. Research continues to investigate the source of the bias, but the most likely candidate is the large uncertainty in the liquid water Raman cross-section as there have been no direct measurements made of this parameter at the lidar's laser wavelength of 355 nm. The calibrated LWC profile was then used together with the cloud backscatter coefficient profile from the RL to derive profiles of cloud droplet effective radius and cloud droplet number density. These profiles of cloud droplet size together with the aerosol extinction observed by the same lidar are used to investigate the aerosol indirect effect in several case studies in August 2006. Russo F. "An investigation of Raman lidar measurements and their application to the study of the aerosol indirect effect", PhD Thesis (2007). Russo F., D.N. Whiteman, D.D. Turner, B.B. Demoz, R.M. Hoff, I. Veselovskii, "Measurements of the Aerosol Indirect Effect using a Raman lidar. Part 1: cloud liquid water measurements", manuscript in preparation. Russo F., D.N. Whiteman, D.D. Turner, B.B. Demoz, R.M. Hoff, I. Veselovskii, "Measurements of the Aerosol Indirect Effect using a Raman lidar. Part 2: the calculation of IE", manuscript in preparation.
Chemical Engineering Abstracts
Collaborative Research
Managing the Incident
Gas Explosion Handbook
Developing a Synergy Between Space-based Infrared Sounders and the Ground-based Atmospheric Emitted Radiance Interferometer (AERI) to Improve Thermodynamic Profiling of the Planetary Boundary Layer
Climate Action Report

Provides an introduction to space science.
A timely and accessible analysis of one of the most crucial and contentious issues facing the world today – the processes and consequences of natural and human induced changes in the structure and function of the climate system. Integrating the latest scientific developments throughout, the text centres on climate change control, addressing how weather and climate impact on environment and society.
The expert, all-inclusive guide on LNG risk based safety Liquefied Natural Gas (LNG) is the condensed form of natural gas achieved by cryogenic chilling. This process reduces gas to a liquid 600 times smaller in volume than it is in its original state, making it suitable for economical global transportation. LNG has been traded internationally and used with a good safety record since the 1960s. However, with some accidents occurring with the storage and liquefaction of LNG, a good understanding of its mechanisms, and its potential ramifications to facilities and to the nearby public, is becoming critically important. With an unbiased eye, this book leans on the expertise of its authors and LNG professionals worldwide to examine these serious safety issues, while addressing many false assumptions surrounding this volatile energy source. LNG Risk Based Safety: Summarizes the findings of the Governmental Accountability Office's (GAO) survey of nineteen LNG experts from across North America and Europe Reviews the history of LNG technology developments Systematically reviews the various consequences from LNG releases—discharge, evaporation, dispersion, fire, and other impacts, and identifies best current approaches to model possible consequence zones Includes discussion of case studies and LNG-related accidents over the past fifty years Covering every aspect of this controversial topic, LNG Risk Based Safety informs the reader with firm conclusions based on highly credible investigation, and offers practical recommendations that researchers and developers can apply to reduce hazards and extend LNG technology.
Indian Journal of Anaesthesia
Guidelines for Quantitative Risk Assessment
A Practitioner's Guide
Distribution and Sources of Black Carbon in the Arctic
Human Error in Process Plant Design and Operations
Advances in the Use of NOAA AVHRR Data for Land Applications
A Complete Training Solution for Hazardous Materials Technicians and Incident Commanders! In 1982, the authors Mike Hildebrand and Greg Noll, along with Jimmy Yvorra, first introduced the concept of the Eight-Step Process© for managing hazardous materials incidents when their highly regarded manual, Hazardous Materials: Managing the Incident was published. Now in its Fourth Edition, this text is widely used by fire fighters, hazmat teams, bomb squads, industrial emergency response teams, and other emergency responders who may manage unplanned hazardous materials incidents. As a result of changing government regulations and consensus standards, as well as the need for terrorism response training, Mr. Noll and Mr. Hildebrand have modified and refined their process of managing hazmat incidents and added enhanced content, tips, case studies, and detailed charts and tables. The Fourth Edition contains comprehensive content covering: * Hazard assessment and risk evaluation * Identifying the problem and implementing the response plan * Hazardous materials properties and effects * Identifying and coordinating resources * Decontamination procedures * The Eight-Step Process© * Personal protective equipment selection * Procedures for terminating the incident The Fourth Edition's dynamic features include: * Knowledge and Skills Objectives correlated to the 2013 Edition of NFPA 472, Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents* ProBoard Assessment Methodology Matrices for the Hazardous Materials Technician and Hazardous Materials Incident Commander levels * Correlation matrix to the National Fire Academy's Fire and Emergency Services Higher Education (FESHE) Bachelor's (Non- Core) Managerial Issues in Hazardous Materials Course Objectives * Realistic, detailed case studies * Practical, step-by-step skill drills * Important hazardous materials technician and safety tips
A Complete Training Solution for Hazardous Materials Technicians and Incident Commanders! In 1982, the authors Mike Hildebrand and Greg Noll, along with Jimmy Yvorra, first introduced the concept of the Eight-Step Process© for managing hazardous materials (hazmat) incidents when their highly regarded manual, Hazardous Materials: Managing the Incident was published. Now in its revised fourth edition, this text is widely used by fire fighters, hazmat teams, bomb squads, industrial emergency response teams, and other emergency responders who may manage unplanned hazardous materials incidents. As a result of changing government regulations and consensus standards, as well as the need for terrorism response training, Mr. Noll and Mr. Hildebrand have modified and refined their process of managing hazmat incidents and added enhanced content, tips, case studies, and detailed charts and tables. The Revised Fourth Edition contains comprehensive content covering: • Hazard assessment and risk evaluation • Identifying the problem and implementing the response plan • Hazardous materials properties and effects • Identifying and coordinating resources • Decontamination procedures • The Eight-Step Process© • Personal protective equipment selection • Procedures for terminating the incident The Revised Fourth Edition's dynamic features include: • NFPA 1072 and 472 Correlation Guide for the Hazardous Materials Technician and Hazardous Materials Incident Commander levels • Correlation matrix to the National Fire Academy's Fire and Emergency Services Higher Education (FESHE) Bachelor's (Non-Core) Managerial Issues in Hazardous Materials Course (C0274) • Realistic, detailed case studies • Practical, step-by-step skill drills • Important hazardous materials technician and safety tips Also available to support Hazardous Materials: Managing the Incident, Fourth Edition: • Hazardous Materials: Managing the Incident, Fourth Edition Field Operations Guide • Hazardous Materials: Managing the Incident, Fourth Edition Student Workbook • Navigate TestPrep: Hazardous Materials: Managing the Incident • Hazardous Materials: Awareness and Operations, Third Editio
Safety and Health at Work
Mausam
Managing the Incident with Navigate 2 Advantage Access
The Chemical Engineer
Geoengineering the Climate
Unravelling the Conundrum