CIRA

FELLOWS

SEPTEMBER 2011

Colorado State University

What it means To be a FELLOW

The Fellows of CIRA are a distinguished group of scientists whose expertise and experience represent a key underpinning to the success of our research organization.

The Fellows advise CIRA leadership in all scientific matters including concept development, program strategy, annual research plans, peer review, resource allocation, research and technology coordination, and achieving the overarching goal of regional and disciplinary integration.

Although not all are employees of CIRA, Fellows are offered this honorary post by the Director in recognition of their prominence in the field and in acknowledgment of their collaborative work with the Institute.

Cover photo: National Oceanic and Atmospheric Administration (NOAA)

FELLOWS OF CIRA

Mahmood R. Azimi-Sadjadi

Ph.D., Imperial College of Science and Technology, University of London, UK, 1982
Professor, Department of Electrical & Computer Engineering, Colorado State University

Research Interests:

Digital Signal/Image Processing; Detection; Estimation and Adaptive Systems; Acoustic, Sonar and Satellite Signal and Image Processing; Neural Networks and System Identification.

Current Research Projects:

Acoustic Inversion Problem for Temperature and Wind Velocity Estimation; Acoustic Noise Monitoring in National Parks; Buried Underwater Target Detection and Classification from Sonar Imagery; Detection, Localization and Classification of Wideband Acoustic Sources in Battlefield; Distributed Acoustic Sensor Networks.

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Daniel Birkenheuer

Ph.D., University of Denver, 1982
Meteorologist and Section Leader for Analysis, NOAA/ESRL/GSD Forecast Analysis Branch, Boulder, Colorado

Research Interests:

Meteorological analysis, variational methods, application of satellite data in innovative ways to mesh with forecaster needs; Data error reduction; Humidity analysis; Adaptation of local techniques to global problems; Post processing ensemble models.

Current Research Projects:

GOES moisture assimilation and calibration/validation; Satellite radiance gradient assimilation; Application of satellite forward radiance models in the analysis framework; Space Time Multiscale Assimilation System (STMAS) the follow on to LAPS; Assist in managing foreign and domestic projects including THORPEX, CWB Taiwan, U.S. National Weather Service interactions.

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V. Chandrasekar

Ph.D., Electrical Engineering, Colorado State University, 1986
Professor, Department of Electrical & Computer Engineering, Colorado State University

Research Interests:

Polarimetric Radar Observations; Radar System Design; Radar Network Development; Image Processing; Neural Network Applications; Large Scale System Simulation.

Dr. Chandrasekar (Chandra) has made pioneering contributions in the area of "Polarimetric Radar Observations of the Atmosphere." Dr. Chandra has extensive experience in Radar System Design, Radar Network Development, DSP Design as well as RF Communication Systems. He has contributed significantly to the areas of weather radar and applications to Atmospheric Sciences. He also conducts research on related topics including Image Processing, Neural Network Applications and Large Scale System Simulation. He has organized and participated in six large multi-agency, national level experiments involving many radars, aircraft and ground instrumentation. He is an avid

experimentalist conducting special experiments to collect in-situ observations to verify the new techniques and technologies. Dr. Chandra is co-author of two textbooks, *Polarimetric and Doppler Weather Radar* (by Cambridge University Press) and *Probability and Random Processes* (by McGraw Hill).

Current Research Projects:

Co-PI of the CSU-CHILL radar facility where he plays an important role in maintaining it as one of the most advanced meteorological radar systems in the world available for research. Dr. Chandra works actively with the CSU-CHILL radar supporting its research and education mission. He is also Co-PI and the associate director of the NSF Engineering Research Center, CASA (Center for Collaborative Adaptive Sensing of the Atmosphere), where he provides leadership for the sensing research in the center.

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Jeffrey L. Collett, Jr.

Ph.D., California Institute of Technology, 1989
Professor and Department Head, Department of Atmospheric Science, Colorado State University

Research Interests:

Atmospheric Chemistry and Air Quality.

Current Research Projects:

Examining sources, atmospheric transformation, and deposition of reactive nitrogen in the Rocky Mountain region; Characterizing impacts of wild and prescribed fires on local and regional air quality; Studies of interactions of cloud and fogs with particle and gas phase pollutants; Characterizing aging of atmospheric organic matter; Development of new approaches for real-time aerosol composition measurement. Recent funding for this research has come from a variety of federal and state agencies including NSF, USEPA, NPS, NIH, USDA, and Shell Exploration and Development Company.

Dr. Collett collaborates closely with federal and CIRA scientists on air quality topics including studies of pollution impacts on visibility and nitrogen deposition. He is also a member of the CIRA Executive Board.

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William R. Cotton

Ph.D., The Pennsylvania State University, 1970
Professor Emeritus, Department of Atmospheric Science, Colorado State University
Fellow AMS, AGU, CIRA.

Research Interests:

Clouds and storms; mesoscale meteorology; aerosol impacts on clouds, hurricanes, and precipitation; mesoscale numerical weather prediction.

Current Research Projects:

NOAA project in which urban land use and aerosol pollution impacts on clouds and precipitation in the Houston, TX area is investigated. CG/AR project examining impacts of aerosols on tropical cyclones.

Dr. Cotton just completed the supervision of Geoffrey Krall for his M.S. degree.

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Mark DeMaria

Ph.D., Colorado State University, 1983
RAMM Branch Chief, NOAA/NESDIS/RAMM

Research Interests:

Tropical and Satellite Meteorology.

Current Research Projects:

Managing the NESDIS Regional and Mesoscale Meteorology Branch (RAMMB), co-located with CIRA. RAMMB applies satellite data to problems in mesoscale meteorology, including severe storms, tropical cyclones and mesoscale aspects of mid-latitude cyclones. RAMMB is also involved in satellite training. Dr. DeMaria's own research involves satellite applications to tropical cyclone analysis and forecasting, including currently available satellites and instruments planned for the future. The emphasis is on improvement of forecast methods for tropical storm formation and intensity changes, both of which remain challenging operational problems.

Dr. DeMaria collaborates extensively with CIRA and the Department of Atmospheric Science and is a member of several graduate student committees. He also coordinates with other agencies, including the NESDIS Center for Satellite Applications and Research in Camp Springs, the National Hurricane Center in Miami, FL, the OAR Hurricane Research Division in Miami, FL, and other NOAA cooperative institutes.

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Scott Denning

Ph.D., Colorado State University, 1994
Associate Professor, Department of Atmospheric Science, Colorado State University

Research Interests:

Global Carbon Cycle; Land-Atmosphere Interactions.

Current Research Projects:

Forward and inverse modeling of atmospheric CO_2 at local, regional, and global scales; Use of satellite imagery and numerical models to diagnose sources and sinks of CO_2 from measurements of atmospheric constituents; Development of carbon data assimilation system for analysis of column CO_2 mixing ratio from the Orbiting Carbon Observatory; Collaboration and modeling support for field projects as part of the North American Carbon Program; Development of algorithms for simulation of phenology and physiology of crops, grasslands, and forests; Coordination of scientific guidance for federal agencies regarding carbon cycle research in North America.

Dr. Denning collaborates closely with federal and CIRA scientists on land-atmosphere interaction, carbon data assimilation, and inverse modeling. He supervises several students and scientists supported on projects administered through CIRA.

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Graham Feingold

Ph.D., Tel Aviv University, 1989
NOAA Earth System Research Laboratory, Chemical Sciences Division, Boulder, Colorado

Research Interests:

Aerosol-cloud interactions; Numerical modeling of aerosol effects on cloud radiative properties and precipitation; In situ observations and remote measurement of aerosol, clouds, and aerosol-cloud interactions; Cloud processing of aerosol; Self-organization in aerosol-cloud precipitation systems; Stability of mixed-phase Arctic stratus.

Current Research Projects:

Modeling of aerosol-cloud interactions and their radiative properties (NOAA and NASA); Airborne measurements of aerosol-cloud interactions (NOAA); Remote sensing of aerosol-cloud interactions (Department of Energy); Scale dependence of aerosol-cloud interactions (NOAA and NSF).

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Douglas G. Fox

Ph.D., Princeton University, 1968
Senior Research Scientist Emeritus, CIRA, Colorado State University
Chief Meteorologist & Program Manager, Global Change, USDA, Forest Service (retired)

Research Interests:

Air pollution and its impacts on Parks and wilderness ecosystems; Wildland fire and smoke management.

Research Projects:

Studying relationships between anthropogenic pollution and impaired visibility in the National Parks; Forest fire impacts on regional air quality (Joint Fire Sciences Research Program); Fire meteorology and smoke management (consultant to USDA Forest Service, R & D); Coordinating smoke science research for the U.S. Joint Fire Science Program (consultant to US DOI, JFSP).

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Ingrid Guch

M.S., Colorado State University, 1996
Director, NESDIS Cooperative Research Program, NOAA

Research Interests:

Satellite techniques to improve climate and weather prediction and information; High performance computing; Doppler wind lidar; GPS radio occultation.

Current Research Projects:

GOES-R Risk Reduction; Satellite Algorithm Test Bed; Satellite Data Exploratorium; Collaborative Education; Advanced Satellite Applications, Research and Product Processing.

As director of the NESDIS Cooperative Research Program, Ms. Guch provides oversight, management, and direction to a coast-to-coast government and university-based research coalition for remote sensing in the environment. This includes the federal Regional Atmospheric Mesoscale Meteorology Branch, the Advanced Satellite Products Branch, the Satellite Climate Studies Branch and academic cooperative institutes, currently CIRA

and the CI for Meteorological Satellite Studies (CIMSS), the CI for Oceanographic Satellite Studies (CIOSS), the CI for Climate and Satellites (CICS) and the Center for Remote Sensing Science and Technology (CREST).

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Jay Ham

Ph.D., Texas A&M University, 1990
Professor, Department of Soil and Crop Sciences, Colorado State University

Research Interests:

Environmental physics and micrometeorology; Effects of animal feeding operations on air and water quality; Long-term CO_2 and H_2O flux monitoring by eddy covariance; Global climate change and field-scale carbon budgets; Instrumentation development; Remote sensing; Soil-plant-water relations; Irrigation management.

Current Research Projects:

1) Water, Carbon, and Global Climate Change – Starting in 1997, operated a network of long-term eddy covariance sites as part of DOE's Ameriflux program. These towers, which provided year-round hourly measurements of carbon flux and ET, have been deployed on prairies, a cedar forest, and at livestock operations. New research is aimed at characterizing spatial variations in ET and net carbon exchange so that research done at tower sites can be scaled up to make watershed- and regional-scale estimates of water and carbon cycles; 2) Research on Animal Feeding Operations – His research group developed instrumentation to measure ammonia/ammonium (NHx) fluxes from feedlots using a micrometeorological technique called relaxed eddy accumulation (REA). Ultimately, research could lead to improved practices for reducing NHx losses by allowing us to measure directly how a change in diet or waste management affects emissions. Anaerobic lagoons are widely used at AFOs to store and treat waste. His research team has been a leader in developing methods for measuring seepage losses and predicting the effects on groundwater quality; and 3) Instrumentation Development – looking to improve measurement capabilities such as new sensor technologies, including sap flow gauges, soil moisture probes, various chamber designs for measuring whole-canopy gas exchange, techniques for measuring seepage and gas fluxes from animal waste lagoons, new micrometeorological techniques for measuring fluxes of NH_3 and other trace gases from cattle feedlots, and more recently the development of low-cost unmanned aerial vehicles (UAVs) for remote sensing of vegetation.

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Richard H. Johnson

Ph.D., University of Washington, 1975
Professor, Department of Atmospheric Science, Colorado State University

Recent Research Activities:

Research activities – observational, theoretical, and modeling – have contributed to improved understanding of atmospheric moist convection, both on regional and global scales. Particular emphasis has been given in recent years to convection within the region of the Asian monsoon. In 2008, participated in the Terrain-influenced Monsoon Rainfall Experiment (TiMREX), conducted in Taiwan. Studies are underway to determine the mechanisms for extreme monsoon rainfall in a region where the monsoon flow interacts with steep topography. More recently, participating in the 2011-12 DYNamics of the MjO experiment (DYNAMO), which is directed at investigation of the initiation of the Madden-Julian Oscillation (MJO) over the Indian Ocean. Our research group is involved with the sounding measurements during DYNAMO, with the goal of characterizing the moistening effects of the cloud populations during the MJO initiation phase. A further area of research on tropical and monsoon convection involves the validation of Tropical Rainfall Measuring Mission (TRMM) estimates of latent heating profiles due to convection using observations from field campaigns.

Additional research is underway on the dynamics of midlatitude mesoscale convective systems (MCSs). The mechanisms by which strongly bowing convective lines (bow echoes) develop are being studied using observations and numerical simulations. It is found that prior to bowing, pressure pulses are observed moving rapidly ahead of the convective line. These features are related to gravity waves generated within the deep convection. In addition, the climatology of mesoscale convective vortices (MCVs) over the eastern two-thirds of the United States is being studied using operational analysis data.

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Andrew Jones

Ph.D., Colorado State University, 1996
Senior Research Scientist, CIRA, Colorado State University

Research Interests:

Coordinating, communicating, and implementing new technologies using innovative remote sensing and data assimilation methodologies, focusing on application areas of high impact to our sponsors. This includes cross-sensor remote sensing techniques, satellite/model data assimilation for analysis of hydrological processes, microwave emissivity analysis, land surface characterization, remote sensing of soil moisture, inversion theory, error propagation analysis, spatial filter analysis, and cross-sensor data fusion techniques. Aerosols, clouds, coupling of land/atmospheric processes, and atmospheric profile estimates are also broad scientific interests.

Current Research Projects:

NESDIS Blended Total Precipitable Water product development; NESDIS Blended Rainfall Rate product development; Air Force Weather Agency Coupled Assimilation and Prediction System (ACAPS) project; DoD Center for Geosciences/Atmospheric Research.

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Pierre Y. Julien

Ph.D., Civil Engineering (hydraulics), Laval University, Canada, 1983
Professor, Department of Civil Engineering, Colorado State University

Research Interests:

River morphology, sediment transport, sedimentation, rehabilitation and flood control; Computer modeling of fate and transport of metals from watersheds, soil erosion and sediment yield from rainfall and snowmelt on large watersheds; Upland erosion containing actinides and radionucleides; Erosion and sedimentation near nuclear and hydroelectric power plants; Two-dimensional modeling of flash floods from moving rainstorms using GIS data bases and radar precipitation data; Hydraulic geometry of stable alluvial channels and aquatic habitat; Hyperconcentrated sediment flows, mud flows and debris flows; Local scour downstream of grade-control structures and headcut migration.

Current Research Projects:

Modeling fate and transport of Zn, Cu and Cd at the USEPA Superfund Site California Gulch since 2002; Recent soil erosion studies using the dynamic model CASC2D-SED with GIS applications to watersheds including Nelson Farm and Goodwin Creek, Mississippi since 1995; Development of the model CASC2D for the simulation of two-dimensional surface runoff from spatially-distributed rainfall on complex watersheds. The hydrologic model is coupled with GIS tools and rain gauges or S-Band polarized dual-Doppler rainfall rates for the simulation of surface runoff on arid areas since 1990; The model CASC2D has been calibrated on Macks Creek in Idaho, Goodwin Creek in Mississippi and has been used for simulations on Taylor Arroyo, Colorado, Hickahala-Senatobia, Mississippi, and Salzbach in Switzerland. The model CASC2D has been integrated in

the Watershed Modeling System WMS of the U.S. Army Corps of Engineers at the Waterways Experiment Station since 1989; The analysis of large concentrations of sands in suspension using the diffusion-dispersion models since 1985.

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Stanley Q. Kidder

Ph.D., Atmospheric Science, Colorado State University, 1979
Senior Research Scientist, CIRA, Colorado State University

Research Interest:

Application of satellite data to meteorological problems

Current Research Projects:

The use of constellations of satellites for meteorological observations; Blending precipitable water products from different satellites to make a unified product; Cloud products from Meteosat Second Generation data; Retrieval of water vapor profiles over land from AMSU-B data; Studies of mid-level, mixed-phase clouds using CloudSat, CALIPSO, and aircraft data; Writing a second edition of Kidder and Vonder Haar, *Satellite Meteorology: An Introduction*, Academic Press, 1995.

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Sonia M. Kreidenweis

Ph.D., Chemical Engineering, California Institute of Technology, 1989
Professor, Department of Atmospheric Science, Colorado State University

Research Interests:

Atmospheric Chemistry and Air Quality, Aerosol Optical Properties.

Current Research Projects:

Studying long-range dust transport to the United States and characterizing its effects on air quality and climate; Characterization of physical and optical properties of biomass and diesel combustion emissions and estimating their effects on visibility, cloud formation and climate; Modeling of secondary organic aerosol formation and its role in the global aerosol and carbon cycles. Recent funding for this research has come from a variety of federal and state agencies including the National Science Foundation, DOE, the National Park Service, the Joint Fire Science Program, NASA, NOAA, and CG/AR.

Dr. Kreidenweis' research contributes to CIRA's mission to furthering understanding of weather and climate. Her group's work on atmospheric particulate matter has been applied to studies as diverse as elucidation of the conditions conducive to mixed-phase cloud formation and the apportionment of visibility reduction in remote areas to natural and man-made causes, including forest fires.

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Christian Kummerow

Ph.D., University of Minnesota, 1987
Director, CIRA and Professor, Department of Atmospheric Science, Colorado State University

Research Interests:

Radiative Transfer; Satellite Remote Sensing; Precipitating Cloud Characteristics; Climate Trends in the Hydrologic Cycle.

Current Research Projects:

Using satellite data to understand the relationship between environmental variables and precipitation at global as well as regional scales. Merging multiple satellite data streams to infer precipitation properties such as rainfall efficiency, the interaction of aerosols with clouds and precipitation and the relationship between water vapor and the morphology of clouds. Developing a physical framework to compare remotely sensed precipitation from surface and space-based observations with cloud resolving model output – and using these tools to develop better rainfall products for applications such as agriculture and extreme precipitation forecasts.

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Glen Liston

Ph.D., Montana State University, 1991
Senior Research Scientist, CIRA, Colorado State University

Research Interests:

Dr. Liston focuses on research and parameterization of land-surface hydrology and boundary layer processes for local- regional- and global-scale land-atmosphere interaction models operating at climate, and shorter, time scales. His particular emphasis is process studies and modeling of snow and ice found in high-latitude and high-elevation environments. He is the author of the MicroMet, SnowModel, SnowTran-3D, and SnowAssim snow evolution modeling system.

Dr. Liston has considerable experience in cold-regions field research, leading and participating in snow and glaciological research expeditions around the world. These projects involve multi-day, multi-week, and multi-month field programs; over the last 29 years he has spent over 5 years in the field. In 1982-83 he wintered over at the United States Amundsen-Scott South Pole Research Station, Antarctica, where he received a United States Congressional Service Medal. He participated in a 4200-km International Polar Year (IPY) expedition across Arctic Canada (2007), and an IPY overland expedition to the South Pole (2007-2008). In recognition of his field research and related publications, in 1999 he was elected a Fellow of the Explorers Club of New York.

Current Research Projects:

NSF: Collaborative Research-AON: A Snow Observing Network to Detect Climate Change – SnowNet II; NSF: IPY: Collaborative Research: Linking Inuit Knowledge and Local-Scale Environmental Modeling to Evaluate the Impacts of Changing Weather on Human Activities at Clyde River, Nunavut; NSF: IPY: Norwegian-United States IPY Scientific Traverse: Climate Variability and Glaciology in East Antarctica; NSF: IPY: Collaborative Research: A Prototype Network for Measuring Arctic Winter Precipitation and Snow Cover (Snow-Net); NASA: Defining Subgrid Snow Distributions within NASA Remote-Sensing Products and Models; NASA: Improving the Representation of Global Snow Cover, Snow Water Equivalent, and Snow Albedo in Climate Models by Applying EOS Terra and Aqua Observations.

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Alexander E. “Sandy” MacDonald

Ph.D., University of Utah, 1975
National Oceanic and Atmospheric Administration, Oceanic and Atmospheric Research, Deputy Assistant Administrator for Laboratories and Cooperative Institutes, Earth System Research Laboratory, Director

Research Interests:

Atmospheric modeling; Atmospheric Observing Systems; Advanced Geophysical Computing; Interface of Science and Public Policy.

Current Research Projects:

Development of a global finite-volume icosahedral atmospheric model; The Unmanned Aircraft Systems program of NOAA; The Global Unified Profiling System (a program to use UAS and buoys for obtaining high resolution profiles of the atmosphere and ocean). He is also a member of the CIRA Executive Board.

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William Malm

Ph.D., University of Missouri, 1972
Senior Research Scientist, CIRA, Colorado State University

Dr. William C Malm is a research scientist/scholar at CIRA and a recently retired research physicist in the National Park Service Air Resources Division where he was program coordinator for the visibility/particulate research and monitoring program. He has previously worked as an Environmental Protection Agency (EPA) research scientist and as a professor of environmental science at Northern Arizona University in Flagstaff. He is a member of the Air & Waste Management Association (AWMA), the American Geophysical Union (AGU), and the American Association for Aerosol Research (AAAR). He has served as an organizing chair for special sessions in each of these associations and as a guest editor for the Journal of Geophysical Research (JGR) and the Journal of the Air & Waste Management Association (JAWMA). He is also a topic editor for environmental monitoring for the Encyclopedia of Earth. He has received a number of awards for outstanding lectures and various research activities. In 2009 he received the George Wright Society 2008 Director’s Award for Natural Resources, the EPA Thomas W. Zosel 2008 Outstanding Individual Achievement Award, and the Air & Waste Management Association’s Frank A. Chambers Excellence in Air Pollution Control Award for his research contributions in the areas of visibility and air quality. He serves as a science advisor to the EPA as a member of the Clean Air Scientific Advisory Committee.

Dr. Malm’s expertise is in the general area of visibility and related topics. He made some of the first visibility and air quality measurements in the National Park Service system at the Grand Canyon in 1972. Since then he has designed and built instrumentation to measure the effects of atmospheric aerosols on the scenic qualities of landscape features, as well as their optical and chemical properties. He has formulated radiation transfer algorithms that allow pictorial visualization of aerosol scattering and absorption effects on scenic landscape features. He pioneered studies of visibility perception that elicit human responses, in terms of both psychophysical and value assessment, to changes in scenic quality as a function of aerosol optical properties. He has initiated and carried out large field campaigns to better characterize aerosol physical and optical properties, especially as they relate to aerosol hygroscopic properties, and to assess the relative contributions of various source types to visibility impacts in a number of national parks and wilderness areas. He has also pioneered a number of back-trajectory receptor modeling methodologies that allow estimates of the relative contributions of source areas to aerosol concentrations or visibility effects at selected receptor sites. Many of the results from this work have been incorporated into the Interagency Monitoring of Protected Visual Environments (IMPROVE) program and the EPA Regional Haze Rule (RHR).

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Denis O'Brien

Ph.D., Mathematical Physics, University of Adelaide, Adelaide, Australia, 1975
Senior Research Scientist, CIRA, Colorado State University

After holding postdoctoral positions in Scotland and Australia, Denis M. O'Brien worked with the Commonwealth Scientific and Industrial Research Organization (CSIRO) of Australia where his focus was radiation, remote sensing, and instrumentation. In 2004, he moved to Colorado State University as a Senior Research Scientist with the Department of Atmospheric Science and then to CIRA in 2010. He is a member of the science team for the Orbiting Carbon Observatory and the Atmospheric Carbon Observations from Space missions.

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Roger A. Pielke Sr.

Ph.D., Meteorology, The Pennsylvania State University, 1973
Professor Emeritus, Department of Atmospheric Science, Colorado State University
Senior Research Scientist, CIRES, University of Colorado
Research Associate, Program in Atmospheric and Oceanic Sciences (PAOS), University of Colorado-Boulder

Research Interests:

Climate; Weather; Mesoscale and Regional Modeling; Atmospheric Dynamics.

Current Research Projects:

Regional climate effects of direct and indirect aerosol forcing with a focus on the SE United States; Modeling assessment of LULC change influences on land surface hydrology, regional weather, and climate variability of mesoscale climate models to assess air quality; Short Grass Steppe Long Term Ecological Research; Numerical modeling investigation of infrasound generated by tornadic storms; Integrated regional climate study with a focus on the land-use land-cover change and associated changes in hydrological cycles in the southeastern United States; Investigation of the North American monsoon sensitivity to boundary and regional forcing with a focus on land-atmosphere interaction; Assessment of Mesoscale Model Dynamics and Methods to Improve Computational Accuracy and Efficiency.

Recent research is funded through the National Science Foundation, United States Geological Survey, NASA, NOAA, and the Department of Defense.

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James F.W. Purdom

Ph.D., Colorado State University, 1986
Senior Research Scientist Emeritus, CIRA, Colorado State University, NOAA (Retired)

Research Interests:

Satellite Meteorology; Global Observing Systems; Integrated Satellite Products; Severe Weather.

Current Research Projects:

Dr. Purdom is currently a special advisor to the WMO's Observations Department. In that capacity he advises WMO on: 1) Integrated observing systems addressing both current and future surface and space based observing systems as part of WMO's Integrated Global Observing System (WIGOS); 2) A space-based architecture for climate monitoring; 3) Observations as a part of the WMO's Global Framework for Climate Services; and 4) Capacity building. He currently is Chair of the International Conference Steering Committee for the Second Asia/Oceania Meteorological Satellite Data

Users' Conference, Tokyo, December 2011, and served as its Chair for the first such conference that was held in Beijing in 2010. Since Dr. Purdom's retirement in 2008 he has continued to be active as a CIRA Fellow.

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Robert M. Rabin

Ph.D., University Pierre et Marie Curie in Paris, France, 1987
Research Meteorologist, NOAA/National Severe Storms Laboratory (NSSL)

Research Interests:

Applications of satellite observations in thunderstorm research and in weather forecasting; Use of Doppler radar for measurement of winds and stability changes in the clear air prior to thunderstorm development; The effects of surface wetness and vegetation patterns on cumulus cloud formation; Medium- and long-range weather forecasting of extreme weather.

Current Research Projects:

Dr. Rabin is a research meteorologist with NOAA's National Severe Storms Laboratory (NSSL) in Norman, OK. He is working collaboratively with the NOAA/NESDIS Applications Development Lab in Madison WI, and the Regional and Mesoscale Meteorology Branch (RAMMB) at CIRA. The collaboration has led to several innovative research projects involving satellite measurements of mesoscale winds, surface wetness, and the monitoring convective storm clouds and trends in moisture and stability. Dr. Rabin also collaborates with the NOAA-Cooperative Remote Sensing Science and Technology Center (CREST) at the City College of New York on GOES-R related research.

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Marty Ralph

Ph.D., University of California at Los Angeles, 1991
Chief, Water Cycle Branch of the NOAA/Earth System Research Lab./Physical Sciences Division and Research Associate, Scripps Inst. of Oceanography, Climate, Atmos. Sci., and Phys. Ocean. Group

Research Interests:

A key area of interest is exploring how to best observe the atmosphere, with an emphasis on advancing the physical understanding of extreme precipitation processes as well as related hydrometeorological predictions and climate projections.

A major goal is to better understand, monitor, and predict key elements of the global water cycle including water vapor transport, precipitation and runoff. Scientific understanding of atmospheric rivers, which are critical to both the global water cycle and to the distribution of precipitation and flooding in key parts of the world, is a major thrust. Using these results to evaluate and improve short-term precipitation forecasting and to provide reliable regional climate projections of flooding and water supplies in several areas of the world, are desired outcomes.

Dr. Ralph has published over 60 peer-reviewed scientific articles, 23 as the lead author. He has helped lead the establishment of testbeds as a method to accelerate the development and infusion of new science and technology into weather and climate forecasting operations. He has developed new projects, experiments and teams on several subjects, most having to do with observations, physical understanding, and precipitation.

Current Research Projects:

Analysis of dropsonde data from manned and unmanned aircraft in several atmospheric rivers over the Pacific (WISPAR experiment); exploration of the role of aerosols in clouds and precipitation in the Sierra Nevada (CalWater experiment); development of observing system networks for extreme precipitation event monitoring and prediction; evaluation of potential impacts of changing climate conditions on atmospheric rivers.

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Steven A. Rutlege

Ph.D., University of Washington, 1983
Professor, Department of Atmospheric Science, Colorado State University

Research Interests:

Cloud Physics; Radar Meteorology; Cloud Electricity and Lightning; Tropical Meteorology.

Current Research Projects:

The CSU-CHILL Radar Facility; Analysis of TRMM precipitation radar and microwave imager data to study the characteristics of tropical rainfall; Study of the dynamical, microphysical and electrical characteristics of mid-latitude convection and Mesoscale Convective Systems; Shipboard radar PI for DYNAMO; DOE ASR support to analyze radar data for Improving numerical models; Developing ground validation plans for the Global Precipitation Measurement mission; Developing multi-Doppler, hydrometeor identification and rainfall algorithms for the CASA-ERC X-band radar system.

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John Schneider

B.S. Mechanical Engineering, University of Wisconsin, 1985
Acting Director, NOAA's Earth System Research Laboratory, Global System Division, Boulder, Colorado

Mr. Schneider began with NOAA as the Deputy Director for the Global Systems Division (then Forecast System Laboratory) in 2004. Since 2008 Mr. Schneider has been the Deputy Director of the Earth System Research Laboratory. In that role, Mr. Schneider led efforts to expand NOAA's role in renewable energy weather forecasting, added a group to lead NOAA's efforts within the Earth System Modeling Framework (ESMF) and associated projects, negotiated a regulatory settlement with the Nuclear Regulatory Commission, and led efforts regarding numerous leadership and management challenges.

Prior to his time with NOAA, Mr. Schneider was a lead Federal executive for a $4B contract to close the DOE's Rocky Flats nuclear weapons production facility south of Boulder. In that role he led efforts to successfully dispose of tons of weapons grade plutonium, the disposal of 250,000 cubic meters of radioactive waste, and the cleanup and demolition of over 800 facilities, while developing a wide array of oversight, reporting and tracking methods to evaluate and document project performance and progress. The $10B, 10-year closure plan that he helped develop for this project in the mid-'90s completely rethought and compressed the former plans timeline which called for a 65 year $37B closure. This new plan was formally given a 1% chance of success by the General Accounting Office. Despite this GAO prediction of failure the closure project was complete in 7 years for $6.5B dollars with the unusual feature of being large scale government contract finished ahead of schedule and under budget. Prior to his time with DOE Mr. Schneider developed innovative defensive systems, smoke and obscurants for the U.S. Military as a civilian equipment designer for the U.S. Army and was a contract auditor for the Department of Defense.

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George Smith

Ph.D., Civil and Environmental Engineering, University of Florida
Senior Program Manager, Riverside Technology Inc.

Dr. Smith spent 33 years with NOAA supporting and leading the Hydrology and Water Resources Program, NWS river forecast system development, and NOAA strategic planning and programming for weather and water initiatives, before joining Riverside Technology, Inc. as a Senior Program Manager. Dr. Smith currently serves on the National Academy of Sciences Committee on Hydrologic Sciences, the American Meteorological Society Board on Enterprise Planning, and the National Hydrologic Warning Council Executive Program Committee.

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Graeme L. Stephens

Ph.D., Meteorology, University of Melbourne, Australia, 1977
Professor Emeritus, Department of Atmospheric Science, Colorado State University
Director, Center for Climate Sciences, Jet Propulsion Lab, California Institute of Technology

Research Interests:

Current research is divided into three broad, overlapping areas funded by various agencies. Over the years, the accumulated understanding of the interactions between solar and infrared radiation and the terrestrial atmosphere has led to research addressing: energetics issues that relate radiative transfer to dynamical systems such as climate and numerical weather prediction, the remote sensing of the atmosphere by spaceborne platforms (e.g., the *CloudSat Program*), and measurement programs that are aimed at testing theoretical developments by using observational data gathered from instruments designed and constructed within the Stephens Group.

Current Research Projects:

Dr. Stephens is currently the Director of the Center for Climate Sciences of the Jet Propulsion Laboratory in California. He is on numerous committees such as the Co-Investigator of the CALIPSO mission, Member – NOAA's National Climatic Data Center Climate Panel, Member – National Academy of Sciences Climate Change Feedbacks Working Group, Member – NOAA's Climate and Global Change Advisory Panel, Member of the U.S. National Academy of Science – Committee on Earth Sciences (CES), and has remained as a member on several other advisory panels for over a decade through his dedication to the atmospheric science community.

This includes a publication of a classroom project that exposes students to research data collected during the CIRRUS II First ISCCP Regional Experiment from Parsons, Kansas, entitled *FIRE in the Classroom* (Stephens, G.L., S.K. Cox, P.W. Stackhouse, Jr., J. Davis and the AT622 Class, 1993: Bull. Amer. Meteor. Soc., 74, 2375-2383; a graduate-level textbook entitled *Remote Sensing of the Lower Atmosphere: An Introduction* (Oxford University Press, New York, NY, 1994); development of a Doppler radar used for hands-on teaching the laboratory; and recently the CloudSat Education Network (CEN) Outreach Program to incorporate scientific hands-on real data in the curriculum of elementary and secondary schools.

Professor Stephens collaborates closely with CIRA through research projects and the CloudSat Data Processing Center (DPC). The DPC is currently examining and validating the data retrieved from the CloudSat Satellite which was launched April 28, 2006.

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Pieter Tans

Ph.D. University of Groningen (the Netherlands), 1978
Senior Scientist, NOAA's Climate Monitoring and Diagnostics Laboratory

Research Interests:

Biogeochemical Cycles; Atmospheric Chemistry; Climate and Global Change; Stable Isotopes; Paleoclimate.

Current Research Projects:

Global atmospheric measurements of CO_2, CH_4, CO, H_2, N_2O, SF_6, and isotopic ratios in several of those species; Numerical models of atmospheric transport; Field measurements of air-sea gas exchange.

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Thomas H. Vonder Haar

Ph.D., Meteorology, University of Wisconsin, 1968; Minor: Astrophysics
University Distinguished Professor, Department of Atmospheric Science, Colorado State University
Founding Director Emeritus, Cooperative Institute for Research in the Atmosphere, Colorado State University
Member, National Academy of Engineering

Research Interests:

Satellite Meteorology; Atmospheric Radiation; Climate Studies.

Current Research Projects:

Professor Vonder Haar is the Principal Investigator on a multi-million dollar contract in support of the Department of Defense Geosciences research as well as other grants from organizations such as the National Aeronautics and Space Administration, the United States Air Force, and the National Oceanic and Atmospheric Administration.

Professor Vonder Haar has more than 40 years of research and teaching experience in the field of Satellite Meteorology. He has co-authored the first textbook in this area: *Satellite Meteorology – An Introduction*, Academic Press, 1995. In addition to the textbook, he has authored/coauthored more than 550 publications and presentations in his field. Currently, he is University Distinguished Professor of Atmospheric Science at Colorado State University, Fort Collins, Colorado, and Chairperson of the CSU UDP group comprising 1% of the faculty. He is a charter member of the CloudSat Mission Science Team and active on several National Academy Advisory Committees. In his years at Colorado State University, he has served as the M.S. advisor for 83 students and Ph.D. advisor for 29 students, most of whom are now professionals in Satellite Meteorology and related areas of Atmospheric Science. Among other national and international honors and awards, he was elected in 2003 to the National Academy of Engineering.

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Fuzhong Weng

Ph.D., Colorado State University, 1992
Acting Chief of Satellite Meteorology and Climatology of NOAA/NESDIS/Center for Satellite Applications and Research and also Senior Scientist of Joint Center for Satellite Data Assimilation (JCSDA), and JPSS Sensor Science Chair

Research Interests:

Dr. Weng is a leading expert in developing various NOAA operational satellite microwave products and algorithms such as the Special Sensor Microwave Imager (SSM/I) and the Advanced Microwave Sounding Unit (AMSU) cloud and precipitation algorithms, land surface temperature and emissivity algorithms. These products are increasingly being utilized by the international communities to validate the numerical weather prediction model outputs and provide real-time monitoring of various severe weather events.

Dr. Weng has contributed extraordinarily to the advances in satellite data assimilation. He developed a comprehensive technique for simulating microwave land, snow and sea ice emissivity. These emissivity models have significantly improved uses of satellite sounding data in models and have impacted the high latitude weather forecasts.

Dr. Weng is developing innovative techniques to advance uses of satellite measurements under cloudy and precipitating areas in models. As a doctoral advisor at the University of Maryland, he has supervised students on using satellite microwave measurements from NOAA operational satellites in mesoscale models. He developed a new initialization for hurricane simulation models, using satellite-derived profiles of temperature and water vapor. His method yields balanced fields of atmospheric mass and motion. The technique can now replace the bogus method in hurricane forecast models.

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Milija Zupanski

Ph.D., University of Oklahoma,1990
Senior Research Scientist, CIRA, Colorado State University

Research Interests:

Ensemble Data Assimilation; Nonlinear and Nondifferentiable Optimization and Preconditioning; Non-Gaussian Probability Assumptions; Predictability and Chaos Theory; Applied Mathematics Focusing on Weather and Climate. Dr. Milija Zupanski is a principal developer of the Maximum Likelihood Ensemble Filter (MLEF).

Current Research Projects:

1) Ensemble Data Assimilation for Nonlinear and Nondifferentiable Problems in Geosciences (NSF): Extend the applicability of ensemble data assimilation to nonlinear and nondifferentiable processes, such as cloud and precipitation, by developing/adopting nondifferentiable minimization algorithms. This research is done in collaboration with Prof. Michael Navon of Florida State University; 2) Ensemble-based assimilation and downscaling of the GPM-like satellite precipitation information (NASA): Develop a level-4 precipitation product for NASA GPM satellite, by downscaling precipitation observations via ensemble data assimilation; 3) Ensemble data assimilation for hurricane forecasting (NOAA-NCEP): Examine regional data assimilation of all-sky microwave satellite radiances for improvement of hurricane prediction. The NCEP's operational hurricane WRF (HWRF) model is used; 4) Utility of GOES-R instruments for hurricane data assimilation and forecasting (JCSDA): Evaluate the impact of the future GOES-R ABI and GLM observations on hurricane data assimilation, using the NCEP's operational HWRF system. This research is done in collaboration with Dr. Jun Li of CIMSS, University of Wisconsin-Madison; 5) Utility of GOES-R geostationary lightning mapper (GLM) using hybrid variational-ensemble data assimilation in regional applications (NOAA-NESDIS): Evaluate the impact of the future GOES-R GLM observations in severe weather on data assimilation, using the NCEP's operational WRF-NMM model; and 6) Ensemble data assimilation research for wind forecasting (Precision Wind, Inc.): Collaborates with private industry in developing a practical system for renewable energy applications.

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CIRA Mission

The mission of the Institute is to conduct research in the atmospheric sciences of mutual benefit to NOAA, the University, the State, and the Nation. The Institute strives to provide a center for cooperation in specified research program areas by scientists, staff, and students and to enhance the training of atmospheric scientists. Special effort is directed toward the transition of research results into practical applications in the weather and climate areas. In addition, multidisciplinary research programs are emphasized, and all university and NOAA organizational elements are invited to participate in CIRA's atmospheric research programs.

The Institute's research is concentrated in several theme areas that include global and regional climate, local and mesoscale weather forecasting and evaluation, applied cloud physics, applications of satellite observations, air quality and visibility, and societal and economic impacts, along with cross-cutting research areas of numerical modeling and education, training, and outreach. In addition to CIRA's relationship with NOAA, the National Park Service also has an ongoing cooperation in air quality and visibility research that involves scientists from numerous disciplines, and the Center for Geosciences/Atmospheric Research based at CIRA is a long-term program sponsored by the Department of Defense.

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