



## **CSU-led satellite mission INCUS was built on giants**

About four years from now, a set of three small satellites – each not much larger than a microwave oven – will launch into low-Earth orbit and begin a two-year mission in space, providing scientists a top-down view of rain, hail and lightning-laden storms in the tropics and the vertical air motions within them.

Called INCUS, or Investigation of Convective Updrafts, this new NASA Earth-observing mission will be broadly aimed at increasing scientists' understanding of storm physics and related climate processes. Its principal investigator is Colorado State University's Susan van den Heever, University Distinguished Professor in the Department of Atmospheric Science, who is also the first woman to lead a NASA Earth Science competed mission.

For van den Heever, a veteran storm observer and respected authority on cloud physics and mesoscale meteorology, launch day 2026 will be an auspicious milestone in a high-stakes technological achievement, as the nimble INCUS satellites begin collecting never-before-seen data that could change the game for storm forecasting and climate modeling. But launch day certainly won't be the start of the INCUS story.

Image by Susan van den Heever, based on NASA International Space Station and Jet Propulsion Laboratory imagery.

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**PRECIP campaign  
studies extreme  
rainfall in Taiwan**

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## Excited to lead department for next 5 years

I hope that 2022 has been fulfilling and productive for you. We are embarking on a new era this year. I'm excited and humbled to be the new head of our world-leading department. Professor Jeff Collett's steady and innovative leadership the last 11 years has helped grow the strength and reputation of the department, in addition to continuing its tradition of collegiality (see [Page 14](#)). I have big shoes to fill. Thank you, again, Jeff.

We have much to celebrate this year. I'm excited to welcome two new faculty members to our department. Assistant Professor Melissa Burt joined our faculty in the spring. Melissa conducts atmospheric science-based research and teaching related to science identity, mentorship, social justice in STEM education, and science communication. She also continues in her role as the assistant dean for diversity and inclusion in the college. Assistant Professor Patrick Keys joined our department in August. Pat conducts research and teaching on the human impacts of climate change, sustainable development, and anthropocene futures. Welcome, Melissa and Pat! I'm also excited that Associate Professor Emily Fischer began a three-year term as associate department head in August. This position has primary oversight for the recruitment and learning environment of graduate students. Emily brings exciting ideas on student mentoring, core courses, and equity to the role.

Our research programs continue to excel in diverse areas spanning climate, weather, atmospheric chemistry, and atmospheric science education due to the team efforts of our outstanding faculty, research scientists and associates, graduate students, postdocs, and staff. Exciting new field campaigns have helped support this research excellence. The NSF-funded PRECIP campaign led by Professors Michael Bell and Kristen



Department Head  
Eric Maloney

Rasmussen took place in Taiwan this past summer to study extreme rainfall ([Page 13](#)). We are particularly excited about the kick-off of the \$177 million NASA INCUS Earth Venture Mission led by University Distinguished Professor Sue van den Heever, which will enable exciting new capabilities to sense the evolution of clouds in the tropics ([Page 1](#)).

Our scientists and educators continue to be honored with prestigious awards from our professional societies, as well as with University, college, and department honors. Congratulations also to our distinguished alumni who have been honored, including Walter Petersen, who was named the 2022 ATS Outstanding Alum ([Page 9](#)).

Exciting initiatives are helping to support student success in our department. Launched by our students, the CIRA/ATS mentoring program for new graduate students is in its second year. This program addresses new students' diverse needs by providing a broad support network and connection to the department/CIRA community. A new award in 2023 will recognize student success. The Maria Silva Dias award, named in honor of the first woman to graduate with a doctorate from our department, will be awarded to a senior Ph.D. student for outstanding research ([Page 7](#)). Our students also continue to be honored with prestigious awards and fellowships from professional societies and funding agencies.

I'm looking forward to leading this department the next five years. We hope you have a happy and healthy 2023 and look forward to seeing you here in Fort Collins, at the 2023 AMS Annual Meeting in Denver, or elsewhere.

Best wishes,  
Eric D. Maloney  
[eric.maloney@colostate.edu](mailto:eric.maloney@colostate.edu)

# FACULTY NEWS

## Melissa Burt, Patrick Keys appointed as faculty members

Melissa Burt and Patrick Keys have been named the newest members of the atmospheric science faculty. Both joined the department as assistant professors.

Alumna and longtime director of CSU's REU Site in Earth System Science, Burt continues to serve in her role as assistant dean for diversity and inclusion in the Walter Scott, Jr. College of Engineering.

Burt conducts research and teaches classes related to social responsibility, science identity, mentorship, and social justice in STEM, with a particular focus in atmospheric science. She also continues to support department efforts to build a more inclusive environment and recruit and train a more diverse graduate student body.

Burt has been developing diversity and inclusion initiatives in the department for more than a decade. In 2018, she was named assistant dean for diversity and inclusion. She leads strategic planning and implementation of diversity, inclusion, and equity goals, and contributes to Universitywide diversity and inclusion initiatives.



Melissa Burt, left, and Patrick Keys

CSU recognized Burt in 2021 with the President's Council on Culture Award for her efforts to create an inclusive and equitable culture. Also in 2021, the American Meteorological Society honored Burt with the Charles E. Anderson Award for her outstanding contributions to the promotion of diversity in atmospheric science and broader communities through education and community service.

Keys, formerly the lead scientist with CSU's School of Global Environmental Sustainability, focuses on climate change impacts and human adaptation, creative scenarios developed through machine learning and science fiction storytelling, and societal interaction with the atmospheric water cycle.

Prior to joining SoGES, Keys founded an environmental consultancy that worked with local and international partners. His fieldwork has taken him all over the world, from exploring climate impacts in Vietnam to documenting Indigenous perspectives on conservation in American Samoa. He studied agricultural water policy in Morocco, the link between drought and conflict in sub-Saharan Africa, and municipal responses to extreme heat and wildfire smoke in Fort Collins.

Keys presented the keynote address to the United Nations General Assembly Second Committee in 2019, speaking on the challenges of achieving global sustainability. He is a member of the advisory council for CSU's Center for Environmental Justice and the African Futures Advisory Board based at the University of Witwatersrand, South Africa.

Keys has a Ph.D. in sustainability science from Stockholm University, an M.S. in civil and environmental engineering from the University of Washington, and a B.A. in biology from Willamette University.

## Students name Elizabeth Barnes Professor of the Year

Professor Elizabeth Barnes was presented with the Professor of the Year award for the 2021-22 academic year during the New Student Welcome Picnic on Aug. 31.



Atmospheric science graduate representatives determine the recipient based on which professor received the most feedback for teaching excellence on course evaluations by students.

Graduate representative Emily Gordon presented Barnes with the award, noting that she was the professor most likely to be recommended to other grad students for both her fall and spring courses. She had one of the highest survey response rates. Gordon

shared an excerpt from the surveys:

"She explains things so thoroughly and I felt like I learned so much in her

class. The subject she taught I hated in undergrad, but being in her class actually made me appreciate and love dynamics."

Students commented on her passion and dedication for teaching and the clarity of her explanations.

Barnes said this award is especially meaningful to her. This is the second time she has been named Professor of the Year; the first time she received the honor was in 2016.

# FACULTY NEWS

## AMS honors Eric Maloney, others with ties to department

Department Head Eric Maloney has been named an American Meteorological Society Fellow, and several other scientists with department connections also were honored by AMS this year.



will be honored with a named symposium that will celebrate his distinguished career over half a century as a researcher, educator, and leader in atmospheric science. Pielke is an authority on the understanding and modeling of land surface

impact on weather and climate, co-developer of the Regional Atmospheric Modeling System (RAMS), author of the most popular textbook on mesoscale meteorological modeling, and a pioneer in interdisciplinary science.

Alumnus Bruce Albrecht (M.S., '74; Ph.D., '77) was awarded the Carl-Gustaf Rossby Research Medal, the highest award the

society can bestow upon an atmospheric scientist. Alumna Julie Demuth (M.S., '01; Ph.D., '15) was named the Walter Orr Roberts Lecturer and was conferred fellowship. Alumni Jennifer Mahoney (M.S., '92) and David Changnon (Ph.D., '91) also were named fellows.

V. Chandrasekar, CIRA Fellow, University Distinguished Professor of electrical and computer engineering, and a close collaborator of the department, was selected for the Verner E. Suomi Technology Medal for leadership in developing techniques to observe precipitation processes using dual-polarization and spaceborne radar.

All will be recognized in January at the 103rd AMS Annual Meeting in Denver.

Alumnus Mark DeMaria (M.S., '79; Ph.D., '83), a CIRA Fellow and senior research scientist, also was named an AMS Fellow. Fellows are elected based on their extensive record of contributions to atmospheric or related sciences. No more than two-tenths of one percent of all AMS members are considered for the honor any given year.

Professor Emeritus Roger Pielke, Sr.

## Susan van den Heever named University Distinguished Professor



Professor Susan van den Heever's brilliant scientific mind, her tremendous stature in the field of atmospheric science, and her record of leadership guiding national and international planning of large-scale efforts to advance knowledge of the aerosol-cloud-climate system led to her nomination as University Distinguished Professor, the highest academic recognition awarded by Colorado State University.

Van den Heever is a global leader in the study of storm structure and development, including the development of convective cold pools associated with storm propagation and hazards.

The title is bestowed upon a very small number of full professors at any one time on the basis of outstanding scholarship and achievement. Professors with this title hold the distinction for the duration of their association with CSU. There are approximately 25 UDPs across CSU. Van den Heever joins current ATS Professors David Randall, Sonia Kreidenweis, and A.R. Ravishankara as UDPs. Thomas Vonder Haar and Graeme Stephens are University Distinguished Professors Emeriti.

## Sonia Kreidenweis serving as Graduate School interim dean



University Distinguished Professor Sonia Kreidenweis was selected to serve as interim dean of the Graduate School and vice provost for graduate affairs until the appointment of a new dean to replace Mary Stromberger. Kreidenweis began in the interim role July 1.

Kreidenweis serves as executive associate dean in the Walter Scott, Jr. College of Engineering, where she also previously served as research associate dean. She joined Colorado State University in 1991 to initiate the atmospheric chemistry program in the Department of Atmospheric Science.

# FACULTY NEWS

## Wayne Schubert, Scott Denning receive AGU recognition

Two Colorado State University atmospheric scientists have been recognized by the American Geophysical Union, a professional organization of more than 60,000 Earth and space scientists. Professor Emeritus Wayne Schubert has been elected a fellow, and Professor Scott Denning will receive the Climate Communication Prize. AGU will honor Schubert and Denning during a ceremony in December at its Fall Meeting in Chicago.

Fellowship recognizes outstanding contributions to the Earth and space sciences. Fellows demonstrate remarkable innovation and/or sustained scientific impact. Less than one-tenth of 1% of AGU members are selected for this honor each year.

“AGU Fellows serve as global leaders and experts who propel our understanding of geosciences,” AGU President Susan Lozier said in her announcement of this year’s class of fellows.

This honor joins many others Schubert has collected during 48 years with the department. In 2021, AGU chose Schubert to deliver the Jule Gregory Charney Lecture. The Charney Lecture is presented to a prominent scientist who has made exceptional contributions to the understanding of weather and climate. Schubert, now retired from



Wayne Schubert, left, and Scott Denning

teaching but not research, has made pioneering discoveries in his studies of tropical cyclones, moist convection, and the dynamics of mesoscale and synoptic-scale phenomena.

“It is indeed a great honor to be elected an AGU Fellow, and I thank all those involved in nominating me,” Schubert said. “One of my fond memories in attending the annual AGU meetings is setting aside time to drop in on some of the talks being given on a wide variety of topics. Just when you think you know something about geophysics, that can be quite humbling.”

The Climate Communication Prize is given annually to a scientist who has had significant impact communicating climate science to the public. Over the past 15 years, Denning has shifted his focus from climate and biogeochemical research to climate communication and outreach, delivering hundreds of talks to audiences of all ages and levels of openness to the subject matter.

Denning developed undergraduate and graduate courses on climate change that have been posted online to reach more students. He also regularly addresses climate topics on news segments and broadcasts such as PBS NOVA’s “Can We Cool the Planet?” Denning has led workshops and developed content to teach meteorologists, teachers, and journalists how to communicate about climate change.

“I have been a broadcast meteorologist for over 40 years, and Dr. Scott Denning has had a major impact on my knowledge and understanding of climate change,” Mike Nelson, KMGH-TV chief meteorologist, wrote in his nomination letter. “Whenever I have a question from a viewer that I cannot understand, Scott is always patiently willing to take the time to teach me more about the science of our warming world.”

Denning earned his M.S. and Ph.D. in atmospheric science from CSU in 1993 and 1994, and joined the faculty in 1998. Denning said he’s grateful AGU has chosen to recognize climate communication because it is so important.

“The people who have gotten [the prize] in the past are giants in the field of explaining this problem to the public, and I am just touched to be honored in this way,” he said.

## Five department members recognized with college awards

Five faculty members and researchers from the department were honored during the Walter Scott, Jr. College of Engineering All-College Meeting on April 26. Nominations were submitted by college colleagues and staff.

- **Outstanding Researcher Award:** Charlotte DeMott
- **Outstanding Researcher Award – Rising Star:** Russell Perkins
- **George T. Abell Award for Teaching and Mentoring:** Emily Fischer

- **George T. Abell Award for Outstanding Mid-Career Faculty:** Russ Schumacher
- **George T. Abell Award for Outstanding Research Faculty:** Susan van den Heever

# STUDENT AND STAFF NEWS

## Congratulations, graduates!



Spring and Summer 2022 graduates from left to right, top to bottom row: Chloe Boehm, Lee Brent, Ellie Casas, Ali Cole, Jacob Escobedo, Megan Franke, Eric Goldenstern, Justin Hudson, Nicole June, Emily Lachenmayer, Lilly Naimie, Mike Natoli, Sam O'Donnell, Sagar Rathod, and Rick Schulte.

## 2022 Graduates

### Student – degree – research group

Chloe Boehm – M.S. – Thompson  
Lee Brent – M.S. – Hurrell  
Ellie Casas – Ph.D. – Bell  
Michael Cheeseman – Ph.D. – Pierce  
Kyle Chudler – Ph.D. – Rutledge  
Ali Cole – M.S. – Bell  
Michael DeCaria – M.S. – van Leeuwen  
Jacob Escobedo – M.S. – Schumacher  
Nick Falk – M.S. – van den Heever  
Megan Franke – M.S. – Hurrell  
Sean Freeman – Ph.D. – van den Heever  
Eric Goldenstern – M.S. – Kummerow  
Justin Hudson – M.S. – Maloney

### Student – degree – research group

Daniel Hueholt – M.S. – Hurrell  
Nicole June – M.S. – Pierce  
Emily Lachenmayer – M.S. – Collett  
Gabrielle Leung – M.S. – van den Heever  
Kirsten Mayer – Ph.D. – Barnes  
Lilly Naimie – M.S. – Collett  
Mike Natoli – Ph.D. – Maloney  
Sam O'Donnell – M.S. – Pierce  
Sagar Rathod – Ph.D. – Pierce/Bond  
Naufal Razin – Ph.D. – Bell  
Rick Schulte – Ph.D. – Kummerow  
Alex Sokolowsky – Ph.D. – van den Heever  
Kristen Van Valkenburg – M.S. – Rutledge/van den Heever

# STUDENT AND STAFF NEWS

## Welcome, new students!



2022 incoming class, from left to right: Charles Davis, Mitchell Gregg, Andrew Feder, Leif Fredericks, Angelie Nieves Jiménez, Camille Mavis, Michelle Kanipe, Joshua Quinnett, and Ying-Ju Chen. Not pictured: Matthew King, Katurah McCants, and Jesse Turner. (Nova, front and center, is not an incoming student but a welcome addition to the group nonetheless.)

## Alumni Award renamed to honor alumna Maria Silva Dias

The department has renamed its Alumni Award to honor Maria Silva Dias, the first woman to graduate with a Ph.D. from the department, in 1979. The award is given annually to a senior Ph.D. student for outstanding research.



Silva Dias founded the atmospheric science department at the University of São Paulo, Brazil, where she has been a professor for most of her career. She

also served as director of the Center for Weather Forecasting and Climate Studies of the Brazilian National Institute for Space Research.

Silva Dias has done seminal research in tropical convection, South American precipitation and climate, and biosphere-atmosphere interactions. She has led numerous South American field campaigns and employed novel numerical modeling approaches.

Silva Dias won the Outstanding Alum award in 2017 and has been recognized nationally and internationally with numerous accolades, including as president of the Brazilian Meteorological Society, member of the Brazilian Academy of Sciences, and fellow of the American Meteorological Society.

Students initiated the renaming of the award, and a committee of students, research scientists, and faculty identified a distinguished Ph.D. graduate to be its namesake.

# STUDENT AND STAFF NEWS

## Student and Postdoc Awards, Fellowships, and Scholarships

American Association for Aerosol Research Student Poster Award	Sam O'Donnell
AGU Outstanding Student Presentation Award	Kimberley Corwin, Rick Schulte
Alumni Award (renamed Maria Silva Dias Award in September)	Ting-Yu Cha
AMS Outstanding Oral Presentation Award	Alex DesRosiers
AMS first-place Outstanding Student Presentation Award	Kevin Yang
AMS first-place Oral Presentation Award	Emily Gordon
AMS second-place Outstanding Student Presentation Award	Charlotte Connolly, Madison Shogrin
AMS second-place Oral Presentation Award	Gabrielle "Bee" Leung, Chandra Pasillas
AMS third-place Oral Presentation Award	Jamin Rader
AMS honorable-mention Outstanding Student Presentation Award	Kevin Yang
ASCENT (Assisting Students, Cultivating Excellence, Nurturing Talent) award	Chih-Chi Hu, Allie Mazurek, Marqi Rocque
David L. Dietrich Award	Gabrielle "Bee" Leung
German Academic Exchange Service scholarship (DAAD)	Marc Alessi
Herbert Riehl Memorial Award	Kevin Yang
NASA FINESST (Future Investigators in NASA Earth and Space Science and Technology)	Kimberley Corwin, Gabrielle "Bee" Leung, Kevin Yang
NCAR Advanced Study Program Postdoctoral Fellowship	Ting-Yu Cha
NOAA CORP Symposium second-place Student Poster Presentation	Jack Cahill
NSF Graduate Research Fellowship Program (GRFP)	Daniel Hueholt
NSF Graduate Research Fellowship Program (GRFP) Honorable Mention	Amanda Bowden, Spencer Jones
Rocky Mountain States Section of the Air and Waste Management Association Scholarship	Andrey Marsavin
Shrake-Culler Scholarship	Wei-Ting Hsiao
SoGES 2022-2023 Sustainability Leadership Fellows	Marybeth Arcodia, Julieta Juncosa Calahorrano, Kathryn Moore
Taiwan Ministry of Education Government Scholarship to Study Abroad	Wei-Ting Hsiao
University Distinguished Professors Scholarship	Emily Gordon
Walter Scott, Jr. College of Engineering Excellence in Research Award	Kevin Barry

## Walter Petersen selected as 2022 Outstanding Alum

Walter Petersen, chief of the Science Research and Projects Division at NASA Marshall Space Flight Center, has been selected as the department's 2022 Outstanding Alum. Petersen received his M.S. (1992) and Ph.D. (1997) from the department, studying with Professor Steven Rutledge. His dissertation was "Multi-Scale Process Studies in the Tropics: Results from Lightning Observations."

Petersen continued as a research associate in the department until 2002, when he accepted a position as senior research scientist in the National Space Science and Technology Center at the University of Alabama-Huntsville. Petersen served as science director for the UAH ARMOR dual-polarimetric Doppler radar facility.

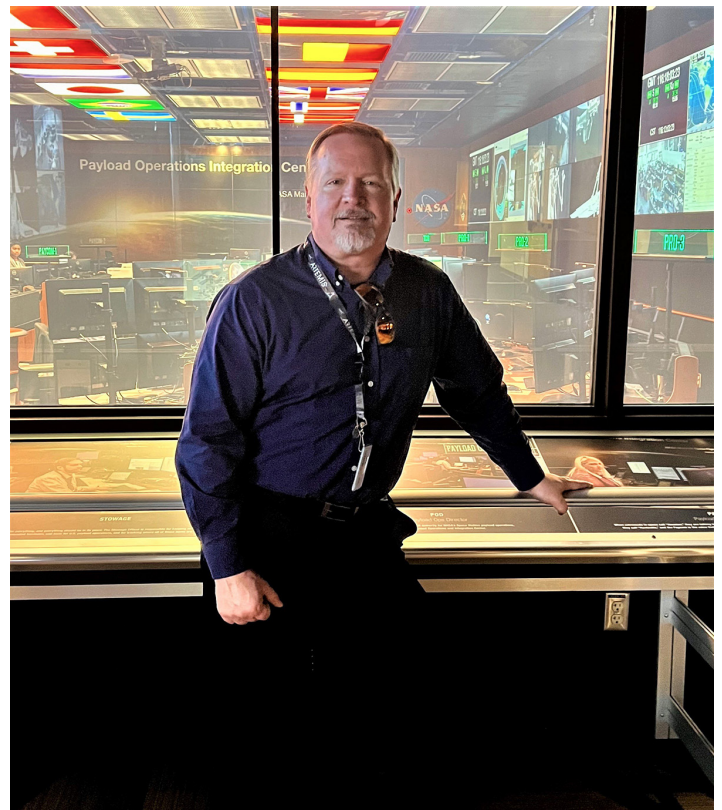
In 2008, he became a physical scientist at NASA Marshall Space Flight Center, and in 2011, he became a supervisory research physical scientist and the branch chief of the Earth Science Field Support Office at NASA Goddard Space Flight Center's Wallops Flight Facility. Petersen returned to NASA Marshall Space Flight Center in Huntsville as division chief in 2015, where he leads 200 scientists, engineers, and technical specialists.

Petersen's research spans many topics in cloud physics, mesoscale meteorology, and radar meteorology, and he has made seminal contributions in remote sensing of tropical convection, the relationship between lightning and updraft strength, and how cloud-to-ground lightning relates to convective rainfall.

Among his many leadership roles, Petersen has been a principal leader of the calibration and validation of the NASA Global Precipitation Mission, providing an essential and sustained contribution to a major program of NASA's Earth Science Directorate. He led the NASA-JAXA GPM ground validation program from 2011-2019 and helped organize eight associated field programs.

Petersen has authored or coauthored at least 105 peer-reviewed journal publications, which have been cited more than 11,000 times. He is well known for his dedicated service to the atmospheric science community, including as chair of the AMS Committee on Atmospheric Electricity.

Petersen was elected an AMS Fellow in 2020 and has received numerous other awards, including the NASA Exceptional



Scientific Achievement Medal in 2018. He was nominated for the Outstanding Alum award by Rutledge and University Distinguished Professor Emeritus Graeme Stephens.

Petersen will be honored in a ceremony next year, when he will have the opportunity to present his work.

### Note from Petersen:

I offer my sincere thanks to the Department of Atmospheric Science for this award. This honor is certainly not something I would have envisioned when joining the department as a graduate student back in 1990. There is no question that it is the result of the excellent education, coaching, mentoring, dedication, and more than occasional personal counseling and guidance offered by faculty, colleagues, fellow classmates, and most especially, my research adviser, Professor Steve Rutledge.

Within the broader supporting infrastructure of the department,

*Continued on Page 11*

## Alumni Updates

**Bruce Albrecht** (M.S., '74; Ph.D., '77) was awarded the American Meteorological Society Carl-Gustaf Rossby Research Medal, the highest award AMS bestows upon an atmospheric scientist. Albrecht was honored for outstanding contributions to the understanding of the structure or behavior of the atmosphere.

**Melissa Burt** (M.S., '08; Ph.D., '16) joined the department faculty as an assistant professor in February. Melissa continues in her role as assistant dean for diversity and inclusion in the Walter Scott, Jr. College of Engineering, while conducting research and teaching classes related to social responsibility, science identity, mentorship, and social justice in STEM.

**Stacey Hitchcock** (Ph.D., '18) is a postdoctoral research fellow in the School of Geography, Earth and Atmospheric Sciences at the University of Melbourne in Australia. She will start as an assistant professor at the University of Oklahoma in August 2023, where her research group will focus on relationships between thunderstorm environments, dynamics, and hazards.

**Anna Hodshire** (M.S., '16; Ph.D., '19) recently started as solutions lead at QuantAQ where she will be working with clients and customers to make sure QuantAQ's air quality data helps meet their needs. She also started an MBA at the University of Northern Colorado.

**John Knaff** (M.S., '92; Ph.D., '97) was NOAA/NESDIS Center for Satellite Applications and Research's acting regional and mesoscale meteorology branch chief from March to June 2022. John and **Kate Musgrave** (M.S., '06; Ph.D., '11) received AMS's 2022 Banner I. Miller Award for groundbreaking work in developing a new application to significantly improve the prediction of rapid intensification of tropical cyclones in the Western North Pacific.

**Jakob Lindaas** (M.S., '18; Ph.D., '20) is now a legislative assistant for U.S. Sen. Martin Heinrich, with the directive to "make every bill a climate bill." Jakob previously worked for a year on the professional policy staff of the House Select Committee on the Climate Crisis, following a yearlong AAAS Congressional Science Fellowship in Sen. Heinrich's office.

**Nick Powell** (M.S., '92) has worked for Raytheon (formerly Hughes) in Colorado Springs for 26 years, where he provides engineering, development, operations, and scientific support to a number of programs as a principal systems engineer. His work has taken him to the far corners of the world, from the tropics to both poles, including nine trips to the South Pole. He recently coauthored a paper in *Nature*: "Surface-to-space atmospheric waves from Hunga Tonga–Hunga Ha'apai eruption." Currently, he is assessing environmental effects on GPS radio wave transmissions. Nick joined Raytheon after a 23-year Air Force career that began as an enlisted weather observer and ended as an advanced-degree weather officer.

**Louis Rivoire** (Ph.D., '20) is a postdoctoral fellow at Harvard University. He studies the recovery of the ozone layer, overturning circulation of the stratosphere, and future of tropical cyclone risk under solar engineering scenarios. His work also informs satellite requirements for a new flight mission developed at Caltech's Jet Propulsion Laboratory.

## Alumni Updates

**Ahmad Samman** (M.S., '14) earned his Ph.D. in meteorology from Iowa State University in 2019. He currently serves as an assistant professor at King Abdulaziz University, Saudi Arabia, where he teaches several courses and conducts research focused on using numerical modeling to investigate common weather phenomena in the Middle East. He is also involved in interdisciplinary research projects related to renewable energy, sustainability, and social sciences.

**Kathy Straub** (M.S., '99; Ph.D., '02) was named dean of the School of Natural and Social Sciences at Susquehanna University in Pennsylvania, where she and husband, **Derek Straub** (M.S., '99; Ph.D., '02), have been on the faculty since 2002.

**Zitely Tzompa Sosa** (M.S., '14; Ph.D., '18) now works at Clean Air Task Force as the technical advocate for the Methane Pollution Prevention team. She performs direct decision-making advocacy for European legislation aimed at reducing methane emissions from the oil and gas industry.

**George Young** (Ph.D., '86) retired from Pennsylvania State University and became a professor emeritus during the summer. George has been on the faculty at Penn State since his CSU graduation in 1986. He is still active in mentoring and research.

**Xubin Zeng** (Ph.D., '92) was appointed by NASA/Caltech Jet Propulsion Laboratory as a Distinguished Visiting Scientist from August 2022 to July 2024. Xubin also was appointed by the World Climate Research Programme to chair the Tiger Team in preparing the white paper on Global Precipitation EXperiment, a new WCRP initiative.

## Note from Outstanding Alum, continued from Page 9

Steve did not just provide the opportunity to learn, he also provided me the examples and tools required to succeed in the role of a Ph.D.-level scientist; i.e., how to learn, do research, manage a field project, communicate, and lead. Those lessons were routinely reinforced by the faculty, students, and researchers that I was fortunate enough to interact with while at the department.

My rounded “education” in the department involved a great deal of one-on-one counseling from any number of faculty in any number of situations – and it was all good advice, much of which I relate to students I advise to this day. I was also fortunate to have been

a member of a tight group of “well-seasoned” and personable graduate students in Radarmet. These people became the absolute best support group I could have ever hoped for while at CSU. To this day, I feel a special connection to those folks – they reflect the best of an integrated set, a standard really, of personal qualities blended with intellect that CSU atmospheric science attracts.

Finally, there is no question that my professional direction has benefited from myriad field campaign adventures focused on studies of convection, lightning, and precipitation using advanced radar technologies that are characteristic of a place like CSU. I got to

experience the “atmospheric laboratory” from the jungles of the Amazon, the beautiful isolation of both the tropical western and eastern Pacific Ocean, and, of course, closer to home in Colorado and on the Great Plains.

The field experiences, combined with the science knowledge, personal interactions, and all the science leadership skills taught explicitly or implicitly to me while being at CSU, brought me to where I am today. What a ride!

My sincere thanks again for this award and the integrated set of experiences and opportunity that laid the foundation for my receiving it.

## Climate Center guided by monitoring, research, service

Update from Colorado Climate Center  
Director Russ Schumacher

Colorado's complex and fascinating climate provides plenty for the staff of the Colorado Climate Center to keep track of, and the last year has been no exception. 2021 ended with one of the worst disasters in state history: the devastating Marshall Fire in Boulder County, which occurred during an intense downslope windstorm following a record warm and dry fall. The water year as a whole was warm, with water year 2022 (October 2021-September 2022) ranking as the sixth warmest on record.

Drought continued across the state, though the epicenter shifted somewhat. Western Colorado had a near-average year for precipitation, which brought at least some short-term relief, while northeast Colorado was much below normal. Statewide, it was the 35th driest water year on record. Other notable events during the water year were record windy conditions in April, a late snowstorm in May, and significant heat waves in July and September. Interested in learning more? Check out our [Water Year 2022 summary](#), or better yet, [sign up for our email list](#) to get our regular monthly climate summaries.

As in-person meetings slowly resumed over the last year, CCC staff were able to engage more broadly with groups around the state on topics ranging from drought to snow to high-impact weather. Assistant State Climatologist Becky Bolinger led a comprehensive study of the [February 2021 cold snap in the central U.S.](#)

We continue to add new resources to our website, including an [interface for exploring "climate normals"](#) at stations



Colorado Climate Center staff, from left to right: Julian Turner, Zach Schwalbe, Noah Newman, Dani Talmadge, Alistair Vierod, Kristie Davis, Becky Bolinger, Russ Schumacher, Peter Goble, and Henry Reges.

around the state, and a [Climate at a Glance](#) page that shows variability and trends. We are leading the effort to update the state-level "Climate Change in Colorado" report that was last published in 2014.

Our two observing networks, CoCoRaHS and CoAgMET, continue to thrive as well. The Community Collaborative Rain, Hail and Snow network has a big anniversary coming up in 2023: 25 years! The 25th anniversary of the Fort Collins flash flood that inspired Nolan Doesken to found the network took place last July, and CoCoRaHS followed soon after that flood. CoCoRaHS continues to grow its network of dedicated volunteer observers. Stay tuned for some 25th anniversary festivities, including a session in January at the American Meteorological Society Annual Meeting in Denver and an exciting new data

explorer that will be released in 2023.

We continue to enhance the Colorado Agricultural Meteorological network, also known as Colorado's Mesonet. Soil moisture sensors were installed at 10 additional stations in 2022, and we will be installing 10-meter towers and all-weather precipitation gauges to obtain additional observations in 2023. We continue to add new real-time maps and data access options to the [CoAgMET website](#), and the data are used widely by meteorologists, water utilities, farmers and ranchers, and weather enthusiasts, among others.

The CCC mission of "climate monitoring, climate research, and climate services for Colorado" continues to guide our work, and we look forward to serving the state in this threefold mission as we move into 2023.

## Summer field campaign in Taiwan studies extreme rainfall

In many parts of the world, heavy, frequent rainstorms are catastrophic events that cause mudslides, flooding, and loss of life.

An international team of experts led by Colorado State University atmospheric scientists spent last summer getting to the bottom of how and why the most violent rainstorms in the world occur. By identifying the key physical processes and environmental ingredients that cause high-intensity, long-duration rain events, their goal is to improve models for forecasters and eventually save lives.

The team was led by Michael Bell and Kristen Rasmussen, both faculty members in the department, and included collaborators from the National Center for Atmospheric Research in Boulder, seven other U.S. academic institutions, and several international partners in Taiwan, Japan, and Korea. The \$6 million-plus field campaign was supported by the National Science Foundation and was called PRECIP, or Prediction of Rainfall Extremes Campaign in the Pacific. Data collection began in late May and continued through August.

Their laboratory was one of the wettest regions in the world: western Taiwan and the southernmost island of Japan. Bringing new depth to the science behind rain, their work could be applied anywhere that experiences catastrophic rain and flooding, from the arid West to the monsoonal Indian subcontinent.

“Extreme rainfall in particular is one of the most difficult things to forecast,” said Bell, who has extensive research experience in tropical cyclone dynamics and other weather phenomena.



**ATS alumna Erin Dougherty of the National Center for Atmospheric Research tweeted this photo of the CSU SEA-POL radar being readied for PRECIP in Yonaguni, Japan.**

The famous, extreme rain-producing storms in the monsoonal regions of the world like West Africa and Southeast Asia are the result of a large combination of ingredients mixing together in a very specific way. Those ingredients include moisture, convection, and the continual redevelopment of storms over one area in a short period of time. The rainfall events can also be influenced by topography, ocean proximity, and other environmental factors.

“The combination of different factors across many different time and space scales is what’s really challenging,” Bell said. “If all of the factors don’t come together, then you don’t necessarily get an extreme event. But when they do, the result can be catastrophic.”

How one defines “extreme” can vary depending on the region of the world, the researchers say. One such event in recent history was Typhoon Morakot, which brought catastrophic damage to Taiwan in 2009 and caused the deaths of hundreds of people. More than 100

inches of rain over three days triggered mudslides and flooding throughout the southern portion of the island.

In the U.S., a recent extreme event was Hurricane Harvey in 2017, which set multiple rainfall records and dumped 60 inches of rain over Houston and surrounding areas. And in Colorado, a week of rain in September 2013 caused severe flooding along the Front Range, with up to 18 inches of rainfall in some areas, which is comparable to annual rainfall totals in the region.

“If you compare the Colorado flood to the 3 meters of rain they experienced during Typhoon Morakot, you get the scale of how different extreme rain can be in different places,” said Rasmussen, who is also no stranger to severe-weather fieldwork. Rasmussen has studied flooding in India and Pakistan and co-led a field campaign in Argentina in 2018 that studied vigorous, deep-convective storms.

*Story by Anne Manning*

# DEPARTMENT NEWS

## Department honors Jeff Collett's 11 years of leadership

The department celebrated Professor Jeff Collett's 11 years of service as department head June 24 and welcomed Professor Eric Maloney as the new chair July 1. Faculty, former department heads, students, and staff honored Collett's leadership and character in a ceremony at the atmospheric science campus.



Professor Emeritus Tom Vonder Haar said. "They've had some unique challenges, but Jeff, you've handled yours very, very well." Vonder Haar was one of three former department heads to speak during the ceremony.

"You were so dedicated in the position, to the students, staff, and faculty. You were always there for us," said Professor Steven Rutledge, another former department head. "You led our department through the challenges of COVID, and we weathered that storm, thanks to you being at the helm."

David McLean, dean of the Walter Scott, Jr. College of Engineering, remarked that the department is in a better place today than when Collett took the post. "You've been a great colleague and a great co-leader in the college," he said.

Colleagues praised Collett's fairness, integrity, wisdom, modesty, and remarkable calm in the face of adversity. Professor Jim Hurrell listed the qualities that make a good leader and reflected on how Collett has demonstrated them all.

"Good leadership is defined by the ability to listen, reflect, and then act," Hurrell said. "Thank you for making it feel as though all of our voices – faculty, staff, students – matter to you because we know they do."

Collett noted the accomplishments of atmospheric science students as a memorable highlight from his time as department head.

"ATS is so successful because we bring talented people – faculty, graduate students, research staff, and department staff – together to pursue important problems in a collaborative, supportive, and trusting environment," he said.

"Our department is widely considered a world leader in no small part due to what Jeff has helped build over the last decade," Maloney said. "He has provided creative, inspirational, and visionary leadership through both good and extremely challenging times over the last 11 years that will be hard to match."

Collett hired 13 faculty members, more than half of the department's total faculty. About half are women, increasing the number of women faculty from two to eight. He considers bringing so many outstanding faculty to the program a highlight of his career.

"This is probably the single most enduring legacy that a department head can have," University Distinguished Professor Sonia Kreidenweis said during the ceremony. "And I think we can all agree that the faculty who have joined the department over these 11 years are not only continuing our long tradition of excellence but are taking us in new and exciting directions."

Collett originally planned to step down as department head in 2021 but stayed on an extra year to continue guiding the department through the pandemic and related challenges to teaching and research.

"I've been around long enough to work with all eight of the department heads in our department, and they've all been challenged at one time," University Distinguished

### Faculty & Staff Milestones (Years of Service)

#### 5 years

Christine Chiu  
Jennifer DeHart  
Chelsea Nam  
Russell Perkins  
Alistair Vierod

#### 10 years

Elizabeth Barnes  
Paula Brown  
Emily Fischer  
Jeff Pierce

#### 15 years

Noel Bryan  
Steven Miller  
Heather Packard  
Ammon Redman

#### 20 years

Brenda Dolan  
Philip Klotzbach

#### 25 years

Charlotte DeMott

#### 35 years

Kelley Branson  
Mark Branson  
Ross Heikes

#### 45 years

Paul Ciesielski  
Nolan Doesken

# DEPARTMENT NEWS

## In 52 years, Tom Vonder Haar has taken CSU ATS to new heights

University Distinguished Professor Emeritus Thomas Vonder Haar's 52-year career at Colorado State University has had many high points – both figurative and literal. As chair of the department, he led the graduate program to its ranking as one of the top three in the U.S., and as the founding director of the Cooperative Institute for Research in the Atmosphere, he oversaw satellite research and a NASA mission.

Vonder Haar's interest in meteorology took off when he got his pilot's license at 19 and accelerated in graduate school at the University of Wisconsin under the guidance of Verner Suomi, who is considered the father of satellite meteorology. Since then, Vonder Haar has made CSU a recognized leader in satellite meteorology.

Participating in Northern Colorado's emergence as a nexus for science and technology has been most satisfying as he looks back on decades of remarkable accomplishments as a researcher, educator, and leader in the field. This has been his goal since joining CSU in 1970.

Early on, Vonder Haar forged partnerships with the National Center for Atmospheric Research and National Oceanic and Atmospheric Administration. He collaborated on satellite programs with NOAA, NASA, Ball Aerospace in Boulder, and Raytheon in Aurora. He co-founded "spinoff" companies METSAT and ASTER with University colleagues to apply research results to special environmental problems.

In 1980, Vonder Haar founded CIRA to merge satellite observations, display technology, and computer modeling with the climate and weather forecasting research needs of NOAA,



Thomas Vonder Haar is pictured in 2005.

the U.S. Department of Defense, and the National Park Service. He directed the cooperative institute for 28 years. NOAA renewed its partnership with CIRA in 2019 with a \$128 million award.

CIRA has advanced technology to improve global climate observations and storm forecasting and detection, while supporting hundreds of CSU graduate students and postdoctoral fellows. It has been a model for successful university-government partnerships.

Vonder Haar served as atmospheric science department head from 1974-1984. During that time, the department became one of the top-rated graduate programs of its kind. He credits teamwork and hiring strong faculty for the department's success.

"The principal job of a department head is to help bring in new, well-qualified faculty," Vonder Haar said. "With the help of the whole team, we brought in some very good people."

That included high-quality graduate students and postdoctoral fellows. Vonder Haar advised and mentored about 150 grad students and postdocs.

"The students I advised and their wide spectrum of research interests were always highlights of my work," he said.

Vonder Haar has served on five NASA science teams and led NASA's Earth Radiation Budget Experiment that launched three satellites to begin continuously collecting data on Earth's radiation budget. His involvement in ERBE and other projects made him a pioneer in satellite meteorology, and his research in interpreting and analyzing data from satellites laid the groundwork for understanding and describing climate processes.

This expertise has led to invitations to lecture on six continents. He is a member of the National Academy of Engineering, a fellow of the American Geophysical Union, and a fellow and honorary member of the American Meteorological Society. He has served on numerous international science commissions and advisory groups of the World Meteorological Organization of the United Nations and the International Council of Scientific Unions.

Vonder Haar was named a University Distinguished Professor in 1995. Since semi-retiring in 2016, he has focused on leading small research projects in the department and CIRA, as well as activities with the National Academies of Science, Engineering, and Medicine.

Vonder Haar has watched the department nearly double in size, but its ability to remain at the forefront of the field has been a constant.

"The thread has been continued change to meet new scientific and societal needs of Colorado, the nation, and the world," he said.

# DEPARTMENT NEWS

## INCUS, from cover

NASA's awarding of the \$177 million INCUS mission to CSU, announced in late 2021, is a testament to the experience and vision of van den Heever and a team of close to 70 expert collaborators from CSU, NASA's Jet Propulsion Laboratory, and other institutions. The award also continues a rich history of CSU-led missions related to atmospheric science and Earth observations: the operational side of weather-monitoring, advancements in weather prediction, and data processing and distribution; as well as the research side of developing new capabilities that push the boundaries of Earth observation science.

Van den Heever is quick to acknowledge that the work of many others before her is allowing her team to now run with the INCUS ball.

"In terms of my history with this proposal, we've been developing INCUS for about five years," van den Heever said. "But the heritage of space research is very large at CSU. People know CSU because of what we've done in space."

INCUS will consist of three small spacecraft, each carrying about a human's weight in instrumentation: radars, antennas, and other hardware. The middle spacecraft will carry a millimeter-wave radiometer called TEMPEST-D, which just completed its own successful NASA mission led by Steven Reising, professor in the Department of Electrical Engineering at CSU. Reising is now serving on the INCUS team.

"It's plug and play, from the point of view that we are using TEMPEST-D as it was flown as a tech demo," explained van den Heever, who served on Reising's team when he first pitched the radiometer technology to NASA over a decade ago.

TEMPEST-D flew as a technology



**Susan van den Heever welcomed science team members at Canvas Stadium during the first all-hands meeting of the mission in October. Photo by John Eisele**

demonstration, proving to NASA and the satellite research community that a miniaturized instrument inside a breadbox-sized satellite could collect time-resolved information from hurricanes and storms – all with the accuracy and resolution of weather satellites or ground radars many times its size and cost.

INCUS will showcase how proven technologies can be combined in innovative ways. The mission instrumentation includes a copy of Reising's TEMPEST-D radiometer, along with three copies of a precipitation radar called RainCube. Funded by NASA and built by Jet Propulsion Laboratory, RainCube was a 2018 technology demonstration mission that featured a miniaturized Ka-band radar within a low-cost, quick-turnaround platform.

Unlike TEMPEST-D, which is a passive instrument, RainCube is an active instrument that works by sending downward radar signals to gather information about a storm's inner workings. INCUS, van den Heever explains, will build on that capability by scanning side to side across the satellite path, allowing it to examine much more than the single slice seen by RainCube.

The three INCUS satellites will obtain radar images of the same storm seconds to minutes apart, as opposed to just at a single point. That will let scientists learn much more about how storm structures and motions change over time.

The TEMPEST-D instrument will allow the INCUS team to locate *where* these time-resolved radar measurements are taken within the storm structure, as well as provide information about storm anvils. These are large, umbrella-type clouds at the top of storms and have important, but not well understood impacts on climate. (In fact, "INCUS" means "anvil" in Latin.) Combining the radars and the radiometer will allow scientists for the first time to see the evolution of the 3D structure of storms and the motions within them, enhancing our understanding of extreme weather in current and future climates.

The INCUS team includes Associate Professor Kristen Rasmussen and CIRA research scientist Phil Partain, who will oversee data processing.

CSU is no stranger to high-profile research satellite missions, in large part due to its close ties with CIRA. The groundbreaking CloudSat mission, which sent a cloud-observation satellite into orbit in 2006, was led by University Distinguished Professor Emeritus Graeme Stephens. The CIRA team streamlined and economized how satellite data are transformed into useful information for meteorologists, researchers, and others.

"In those days, CSU was recognized as an entity that was able to handle, distribute, and process large amounts of satellite data," explained Stephens, who now heads the JPL Center for Climate Science. "What CIRA did was show that you can deliver data processing for large satellite missions without an army. What CIRA did was break the mold."

*Story by Anne Manning*