



AOS & CIMES Newsletter

Program in Atmospheric and Oceanic Sciences (AOS) &
The Cooperative Institute for Modeling the Earth System (CIMES)



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'Curiosity is the Thing': Suki Manabe Wins Nobel Prize in Physics



Suki Manabe
Photo: Denise Applewhite,
Office of Communications

AOS Senior Meteorologist Syukuro Manabe could never have envisioned when he joined NOAA's predecessor, the National Weather Service, in 1958, to use physics to model weather systems, where that quest would lead.

On Tuesday, October 5, AOS Senior Meteorologist Syukuro Manabe was awarded the 2021 Nobel Prize in Physics "for the physical modeling of Earth's climate, quantifying variability and reliably predicting global warming."

"Syukuro Manabe demonstrated how increased levels of carbon dioxide in the atmosphere lead to increased temperatures at the surface of the Earth," the Royal Swedish Academy said in its citation. "In the 1960s, he led the development of physical models of the Earth's climate and was the first person to explore the interaction between radiation balance and the vertical transport of air masses. His work laid the foundation for the development of current climate models."

L to R: University President Christopher L. Eisgruber, AOS Director Stephan Fueglistaler, AOS Senior Meteorologist Suki Manabe, Dean for Research Pablo Debenedetti, NOAA Administrator Rick Spinrad, GFDL Director V. Ramaswamy, NOAA Acting Chief Scientist Craig McLean

Photo: Frank Wojciechowski



"He was the first scientist to do a thorough calculation that was reliable," said Gunnar Ingelman, the secretary of the Nobel physics committee. Today, nearly every climate model relies on the groundbreaking research done by Manabe, he added.

Yet, the senior scientist remains remarkably humble. Upon hearing of the award, Manabe said, "When I got the phone call this morning, I was so surprised."



Manabe and AOS Senior Oceanographer Kirk Bryan, Emeritus

Photo: Frank Wojciechowski

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Welcome!

This fall we returned to campus with the hope that the challenges and disruption we endured over the past year and a half would soon be in the rearview mirror. That said, we realize that we are in a marathon, not a sprint, and we thank you for your resilience and dedication.

We do, however, have much to celebrate, beginning with the news of Suki Manabe's Nobel Prize in Physics, a truly astounding achievement! In this issue, we also introduce you to our new graduate students who are on campus for in-person instruction, as we return to some semblance of normal campus life. We share news of well-deserved recognition for a few of our esteemed colleagues, namely V. Ramaswamy, Alistair Adcroft, and Tom Delworth, as well as for AOS Alums Yi Zhang and Sukyoung Lee. We highlight QUEST 2021, a return to the in-person AOS Program Retreat, and PDC 2022. We extend a warm welcome to all those who are new to our AOS/CIMES community and wish you all a happy and healthy holiday season!

Stephan Fueglistaler, Director AOS, CIMES
Gabe Vecchi, Deputy Director, CIMES

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"Usually, the Nobel Prize in physics is awarded to physicists making a fundamental contribution in physics," said Manabe. "Yes, my work is based on physics, but it's applied physics. Geophysics. This is the first time the Nobel Prize has been awarded for the kind of work I have done: the study of climate change."

Manabe shares the honor for the physical modeling of the climate with Klaus Hasselmann of the Max Planck Institute for Meteorology, Hamburg, Germany. The other half of this year's physics prize was awarded to Giorgio Parisi of the Sapienza University of Rome, Italy, "for the discovery of the interplay of disorder and fluctuations in physical systems from atomic to planetary scales."

On the day of the announcement, a mid-day press conference was held in Princeton's Richardson Auditorium, which was filled with colleagues, students, staff, and reporters who roared with applause and cheers as Manabe was introduced.



L to R: CICES Director Stephan Fueglistaler, professor of geosciences and director of Atmospheric and Oceanic Sciences (AOS); University Provost Deborah Prentice, the Alexander Stewart 1886 Professor of Psychology and Public Affairs; and Ben Chang, deputy vice president for communications and University spokesperson. Photo: Denise Applewhite, Office of Communications

"Like everybody in the auditorium, I was thrilled when I read the news this morning," said Stephan Fueglistaler, director of both AOS and CICES. "We usually associate the Nobel Prize in physics with stellar music and faraway galaxies. This year, this prize is devoted to someone who devoted his life to the study of our very home."

Fueglistaler further elaborated, "Dr. Manabe's work is also a wonderful example how "blue sky" research provides the foundations for understanding - and hopefully - solving existential problems."

"When Suki started his career . . . , the topic of global warming was quite obscure, but his inspired vision led him to make the fundamental discoveries upon which all of modern climate science rests," said AOS Faculty Member Tom Delworth, a GFDL senior scientist.

"It's really hard to overstate Suki's impact," said Gabriel

Vecchi, director of the High Meadows Environmental Institute, and deputy director of the CICES. "It couldn't have happened to a better human being."

"Suki's work that started in the 1960s allowed us to quantitatively and predictively simulate the behavior of the climate system," said Vecchi. "We could try to understand how ice ages came to be and also what the response of the climate system to increases in greenhouse gases would be. His prescient work was very accurate in predicting the course of global warming up to now."

"The whole field of climate modeling originates with Suki," said Vecchi.

"I never imagined that this thing I was beginning to study [would have] such huge consequences," Manabe said. "I was doing it just because of my curiosity. I really enjoyed studying climate change. Curiosity is the thing, which drives all my research activity. It is great fun to use a model to study how climate change over the last 400 million years has evolved."

Manabe created the first global climate model after his groundbreaking studies of atmospheric dynamics in the 1960s. In this model, he connected the processes that take place in the atmosphere and at ground level with the oceans' movements and their thermal balance. Together with Richard Wetherald of GFDL, he published several seminal global warming papers, starting with their 1967 paper, which offered the first quantitative estimate of the change in surface air temperature due to increasing CO₂ in the atmosphere. It continues to be one of the most-cited papers in climate science and, in 1975, led to the first three-dimensional model of global warming. Manabe identified profound connections between the sea, land and atmosphere. Using numerical modeling to predict how the Earth's surface temperatures are influenced by atmospheric conditions – Manabe's revolutionary idea – was a major breakthrough, giving researchers a powerful new tool to investigate the Earth's complex climate systems.



L to R: AOS Alum Alex Hall, Manabe, AOS Senior Meteorologist Isaac Held, both former students of Manabe's Photo: Frank Wojciechowski

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2021 Nobel Laureate Suki Manabe continued from continued from Page 2

Reflecting back on the 1967 seminal paper, AOS Senior Meteorologist Isaac Held, who was a graduate student under Manabe, said that it provided the first “robust, physically-based estimate” of how much the Earth will warm given the increase of CO₂ in the atmosphere.

“I think it’s clear to everyone that the IPCC [Intergovernmental Panel on Climate Change] wouldn’t have the solid scientific foundation for its projections of future climate change and the need for mitigation that it has now in the absence of Suki’s work,” said Held.

“Suki has not just done pioneering work in terms of research, but he’s set the tone for the entire field,” said GFDL Director Venkatachalam (Ram) Ramaswamy. “The Nobel Prize is the pinnacle of all awards and honors. Climate science is now sitting in a place where it is duly recognized.”

Manabe’s work on climate change modeling was the basis for a yearlong installation that was erected in the Paris subway for the 2015 United Nations Climate Change Conference. “I was so honored to see this display,” he said at the time, when he learned about the installation from colleagues attending the conference. “I did these experiments out of pure scientific curiosity. I never realized that it would become a problem of such wide-ranging concern for all of human society.”

He is the co-author with Anthony J. Broccoli of “Beyond Global Warming” (Princeton University Press, 2020), a first-hand account of how scientists have come to understand the fundamental processes behind climate change using numerical models.



*L to R: Manabe and Fueglistaler (background)
Photo: Frank Wojciechowski*

Manabe, whose work is the foundation for all modern climate research, has been widely recognized for his contributions, including his election to the U.S. National Academy of Sciences, the Academia Europaea, the Royal Society of Canada and the Japan Academy. His numerous awards and honors include the Bowie Medal (2010), the highest honor of the American Geophysical Union, the Benjamin Franklin Medal of the Franklin Institute (2015), the BBVA Foundation Frontiers of Knowledge Award (2017), and the Crafoord Prize (2018). Notably, Manabe

was the first recipient of the Blue Planet Prize (1992), an award established by the Asahi Glass Foundation and presented to individuals or organizations worldwide in recognition of major contributions to solving global environmental problems.

In a congratulatory message to Manabe read by Fueglistaler at a reception thrown by the Program in Suki’s honor on October 8, Ramaswamy said, “What is equally amazing is how your insight and work has inspired countless students, postdocs, visiting scientists, colleagues at GFDL and Princeton and the whole wide world. You have been a principal figure leading AOS and GFDL through the frontiers of climate science.”

The GFDL director summed up Suki and his six decades of research best, “You are a rock star in climate science!” We in AOS/CIMES and GFDL have long known that to be true, but now the rest of the world gets to share in just how cool he really is.

After a whirlwind of media events and on-campus receptions, Manabe was honored on November 17, 2021 at a festive celebration, hosted by the AOS Program. Held at the Nassau Inn, the celebration was attended by Princeton University President Christopher Eisgruber, NOAA Administrator Rick Spinrad, NOAA Acting Chief Scientist Craig McLean, colleagues, faculty, alumni, students, and distinguished guests and administrators of the University and NOAA.



L to R: University President Christopher L. Eisgruber and Manabe. Photo: Frank Wojciechowski

“Suki Manabe’s work exemplifies how curiosity-driven research can simultaneously deepen our understanding of nature and improve the world,” said Eisgruber. “Dr. Manabe, thank you for coming to America and thank you for coming to Princeton. Thank you for the contributions you have made to science and to the betterment of our society,” he said in addressing Manabe.

Throughout the remainder of the evening, Manabe’s colleagues, past and present, praised his life, work, and influence – a befitting tribute to a Nobel Laureate whose boundless energy, visionary thinking, and curiosity inspires us all.

Indeed, the world is a better place because of Suki.

Meet Our New Graduate Students



Jacinta Clay

Jacinta Clay

Jacinta Clay completed her bachelor's degree in Geology-Physics/Mathematics at Brown University. Her research interests include ice-ocean interactions, fjord oceanography, and geoscience education. Jacinta is planning on investigating the impact of melting ice sheets on the North Atlantic Ocean, and hopes to walk away from Princeton with a better understanding of the Earth's natural systems. She also hopes to use this time to improve her ability to communicate complicated scientific topics to her peers (scientist and non-scientist alike) as well as global and local policymakers. Jacinta's adviser is Bob Hallberg.



Niall Coffey

Niall Coffey

Niall Coffey earned his bachelor's degrees from the University of Chicago in 2021, with majors in Physics, with a specialization in Astrophysics, and Economics with a specialization in Data Science. His research interests include glaciology, climate, and machine learning. At Princeton, he hopes to further our knowledge of elements of the cryosphere through theoretical physics techniques and novel approaches to machine learning. Additionally, Niall looks forward to engaging in the abundant opportunities and resources that Princeton has to offer. He is excited to be working under the advisement of Yao Lai.



Marta Faulkner

Marta Faulkner

Marta Faulkner earned her bachelor's degree in Mathematics and Music at Cornell University in 2020. From fall 2020 to summer 2021, she worked as a lab assistant in a high latitude oceans and climate group at Scripps Institute of Oceanography. Her research interests include Arctic physical oceanography, particularly fjord meltwater dynamics and freshwater circulation in the Arctic. At Princeton, in addition to learning from and collaborating with many fabulous scientists, she hopes to learn how to teach in a way that not only effectively communicates topics, but also promotes an inclusive and supportive community and inspires students to love math and climate science. In her free time, Marta hopes to continue to make lots of music. She is advised by Stephen Griffies.

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Meet Our New Graduate Students continued from Page 4*Rajat Joshi***Rajat Joshi**

Rajat Joshi earned his master's degree in Climate Science from the Indian Institute of Science, Bangalore, and completed his bachelor's degree in Mechanical Engineering at Pantnagar University. His research interests include the ocean's role in climate, the impact of ocean circulations like AMOC in regional phenomena, such as ITCZ, South Asian Monsoon, tropical-extratropical interactions, and extreme events. As a graduate student at Princeton, Rajat hopes to contribute in solving some of the challenging, present climate change problems and explore the policy aspect of his research. Rajat's adviser is Rong Zhang.

*Sofia Menemenlis***Sofia Menemenlis**

Sofia Menemenlis studied Earth Science and Global Affairs at Yale University. While at Yale, her research used paleoclimate models and geologic proxies to consider the hydroclimate of the mid-Pliocene warm period. Sofia is interested in Earth's past and future hydrological cycle, and in connections between extreme weather events and the mean climate. She maintains an interest in the interface between science and public policy, and hopes to produce knowledge that will help communities respond to the impacts of anthropogenic global warming. Sofia's adviser is Gabe Vecchi.

*Mathieu Poupon***Mathieu Poupon**

Mathieu Poupon obtained a master's degree in Earth and Planetary Sciences at the Ecole Normale Supérieure (ENS, Paris). His main interest is oceanography, both physical and biogeochemical. He is especially curious about the complex interactions that govern the chemical element dynamics in the ocean, involving physics, biology and chemistry. Mathieu's research goal is to understand the links between these three components. He has been working on the relationship between multidecadal ocean variability and oxygen dynamics in the Indian Ocean (Princeton University - 2020) and in the Pacific (Laboratoire de Météorologie Dynamique, Paris - 2021). At Princeton, he will continue to work on ocean oxygen in Laure Resplandy's group. Mathieu hopes to improve his scientific expertise in order to produce research useful to the scientific community, but especially to policy makers and citizens.

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Meet Our New Graduate Students continued from Page 5



Josh Rines

Josh Rines completed his bachelor's degree at Bates College, where he studied Mathematics and Physics. Before coming to Princeton, he studied Geophysics at Boston College for his master's degree. There, he fell in love with ice sheets. His research at BC focused on the impacts of grain size on ice sheet viscosity and flow. Josh is excited to be at Princeton working under the advisement of Yao Lai. He is hoping to tackle research questions regarding the impacts of liquid water on the large-scale frozen water sheets he so adores. Josh is also excited to gain expertise in the broad field of geophysical fluid dynamics.

V. Ramaswamy Wins 2022 AMS Carl-Gustaf Rossby Research Medal

Contributed by Maria Setzer, GFDL Communications Director

Honoring a distinguished career in atmospheric sciences, the American Meteorological Society (AMS) will present V. "Ram" Ramaswamy with the 2022 Carl-Gustaf Rossby Research Medal.

Ramaswamy, an AOS faculty member, has served as director of the National Oceanic and Atmospheric Administration's Geophysical Fluid Dynamics Laboratory in Princeton, New Jersey since 2008.

Regarded as the highest award AMS offers, the medallion spotlights outstanding scientific contributions to the understanding of atmospheric behavior and structure, spanning back to the first recipient in 1951. Winners are nominated by their fellow AMS colleagues and peers.

According to AMS, Ramaswamy is being honored for his "outstanding contributions leading to fundamental insights into radiative-climate interactions among greenhouse gases, aerosols and clouds."



GFDL Director V. Ramaswamy, an AOS faculty member

The 2022 AMS award recipients will receive their honor at the 102nd AMS Annual Meeting in Houston, Texas.

Ramaswamy is a central figure in climate science. From 1992 to 2021, he was Lead Author, Coordinating Lead Author, or Review Editor for each of the major assessment reports of the Intergovernmental Panel for Climate Change. He was also a Coordinating Lead Author on the World Meteorological Organization assessments on stratospheric ozone and climate, and the first U.S. Climate Change Science Program (Global Change Research Program) assessment.

He is a Fellow of the American Geophysical Union, as well as AMS, and the American Association for the Advancement of Science. He remains involved in the leadership of the U.S. Global Change Research Program's Interagency Group on Integrative Modeling and the Joint Scientific Committee of the World Climate Research Program.

The AMS medal is named for Carl-Gustaf Rossby, a pioneering scientist of meteorology and oceanography, who first explained the large-scale motions of the atmosphere in terms of fluid mechanics. Rossby served as AMS president from 1944 to 1945, and throughout his career he advanced the understanding of polar fronts on American weather. He developed mathematical descriptions of atmospheric dynamics and established methods and models for numerical weather forecasting as large-scale computing came into use.

AMS is a community of weather, water, and climate scientists disseminating information about atmospheric, oceanic, and hydrologic research to ultimately advance society as a whole.

Alistair Adcroft Awarded 2021 AGU Ocean Sciences Award



*AOS Research Oceanographer
Alistair Adcroft*

AOS Research Oceanographer Alistair Adcroft, a CIMES researcher, is among 108 distinguished scientists to receive accolades from the American Geophysical Union (AGU), the world's largest Earth and space science society. Selected by AGU as a 2021 Ocean Sciences section honoree on the basis of meritorious work or service toward the advancement and promotion of discovery and solution science, Adcroft was honored with the Ocean Sciences Award. Presented biennially, the award recognizes outstanding leadership or service to the ocean sciences by a senior scientist.

Adcroft's work primarily centers around numerical models of ocean circulation -- both global scale and small -- although he has also developed an iceberg model for use in climate models and assisted in the development of sea-ice models. As the GFDL ocean working group lead, Adcroft is tasked with developing the ocean and sea ice components of the coupled climate and earth system models.

"I develop numerical models because, to a great extent, they encapsulate all we know about the world around us, and are a powerful tool for studying that world and for predicting the future," he said. "It takes a team to build a comprehensive model and I've been lucky enough to be part of great teams, here at NOAA-GFDL, Princeton and before at MIT. But the most rewarding part is seeing a community develop around a model. That means others think the model is useful and we're enabling them to do new science."

As a proponent of open-source science and software, Adcroft's team follows an open development paradigm for building GFDL's new ocean model, [MOM6](#), available on GitHub.

Established in 1982, the Ocean Sciences Award is presented at the Ocean Sciences section luncheon during the AGU Fall Meeting.

Tom Delworth Receives 2021 AGU Bert Bolin Global Environmental Change Award

AOS Faculty Member Tom Delworth, a GFDL senior scientist, has been selected as the 2021 Bert Bolin awardee and lecturer of the AGU Global Environmental Change section. He will receive the award and present this lecture at AGU's Fall Meeting 2021, to be held December 13-17 in New Orleans.

Delworth was cited for "major contributions in atmosphere ocean interactions through pioneering climate modeling that has advanced the understanding of climate variations, change, and extremes."

Delworth's research focuses on such topics as the role of the ocean in the climate system, with emphasis on climate variability, change and predictability on seasonal to decadal to centennial time scales; interactions between forced climate change and internal variability; the Atlantic Meridional Overturning Circulation and climate; climate extremes, including drought and storms; and use of hierarchies of models to study climate variability and change.



AOS Faculty Member Tom Delworth

The award is named after Bert Rickard Johannes Bolin (1925-2007), a Swedish biogeochemist/meteorologist who served as the first Chairman of the Intergovernmental Panel on Climate Change. It is given annually to an Earth scientist (or a team of scientists) for ground breaking research and/or leadership in global environmental change through cross-disciplinary, interdisciplinary, and trans-disciplinary research in the past 10 years.

"Just being mentioned in the same breath as Burt Bolin is an honor," Delworth said. "He is a legend in the field."

QUEST 2021: When Teachers Become Learners

During QUEST 2021, educators from communities in New Jersey exchanged their roles as teachers and became learners, coming together with expert teachers and university-level researchers, to increase their confidence and competence in teaching science and mathematics. The virtual 4-day QUEST Summer Institute, “Climate & the Ocean,” was held July 6-9, 2021 and was sponsored by the Cooperative Institute for Modeling the Earth System (CIMES), in partnership with Princeton University’s Program in Teacher Preparation.

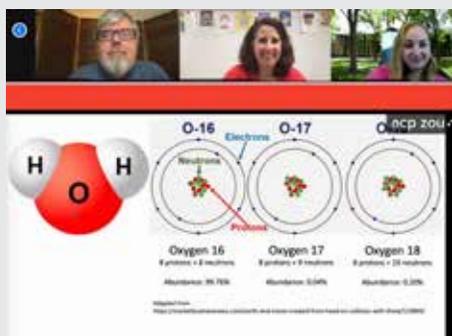


Photo: QUEST

The professional development program, initiated more than 30 years ago and whose formal name is Questioning Underlies Effective Science Teaching, fosters science literacy in educators through self-directed investigation and hands-on laboratory experiments. The program is intended to help participants become more effective teachers by becoming more inquisitive scientists.

Sixteen teachers -- representing 13 public and private schools in New Jersey -- participated in the Program under the guidance of content experts Steve Carson, a Princeton Township middle school teacher and former GFDL researcher, Danielle Schmitt, manager of the Geosciences undergraduate lab, and Princeton Public School lead teacher Martha Friend, who helped the teachers make applicable connections to their practice.

In addition to gaining a better understanding of the content in relation to their pedagogical practices, the teachers learned to articulate questions and pursue answers to those questions, learning from instructors and colleagues alike, and to learn science through investigation and inquiry -- a model teachers were encouraged to instill in their own classrooms when school resumed in the fall.

Thanks to CIMES support and the flexibility and ingenuity of the instructors and participating teachers during the ongoing pandemic, the participants engaged in hands-

on experiments at home, using materials supplied by QUEST and online learning resources modified for a virtual format. The institute provided not only the resources, but also the content knowledge teachers need to generate new and exciting standards-based science lessons to approximately 3,500 students throughout New Jersey, among them historically underserved student populations.

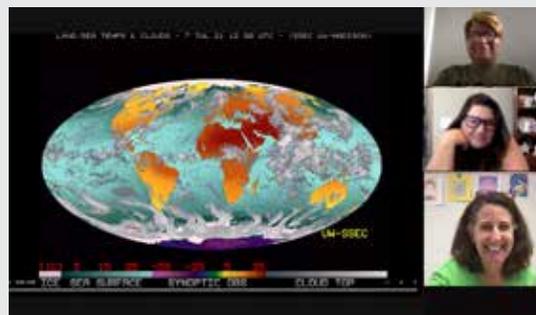


Photo: QUEST

Jessica Monaghan, assistant director of STEM in the Program in Teacher Preparation, described the Institute as collaborative and interactive. “The participants really took a deep dive into the topics, asking questions and staying actively involved throughout QUEST,” she said. “They were able to create a sense of community as they built connections to the topics and to each other in the whole group and in break out rooms.”

These discussions were followed by wider collegial conversations about pedagogy and instructing inquiry-based science, which adopts an investigative approach to teaching and learning.

After a challenging year and a half, QUEST participants hoped to return to their classrooms this fall with confidence in their enhanced content knowledge and renewed enthusiasm for science instruction. Feedback from a post-institute survey indicated that confidence levels of participants increased substantially after attending, according to Monaghan.

“This was a very rewarding professional development [experience] over the summer that allowed me to increase my knowledge on climate change,” said one of the participating teachers. “We learned topics such as the thermohaline circulation as well as solar radiation, interactions between air, land, and water, and ways of teaching climate change to young students.” “A perfect way to end a challenging year,” commented another.

We couldn’t agree more.

The QUEST program hopes to continue next year with sponsorship from the Cooperative Institute for Modeling the Earth System (CIMES).

Reunited: AOS Program Retreat Returns to In-Person

This fall the AOS Program Retreat was back in person with a new venue, new people, and a new approach. Forty people converged on the scenic grounds of Princeton Lavender, an interactive family-run farm with lavender fields and animals in the heart of Princeton, on August 21 for a day of social and scientific interaction.

This was a welcomed departure from the previous year's retreat, which took place virtually due to the COVID-19 pandemic. For students, postdocs, and faculty members, many of whom had not seen one another in-person in over a year and a half, it was a joyous occasion. Even the animals wanted in on the action, according to AOS Student Ben Johnson, a retreat organizer.

"When it was time to gather for introductions, some of the animals wanted to join in on the fun and tried to follow us through the gate of their fenced area," said Johnson, much to the amusement of their human counterparts.

Following introductions in a socially-distant circle and a warm AOS welcome to the Program's newest graduate students, the new students were briefed and welcomed by AOS Faculty Member Bob Hallberg, a member of the Graduate Work Committee (GWC), just prior to the start of the day's festivities.



Photo: AOS Graduate Student Chenggong Wang

For the kick-off activity, students and faculty were split into three groups and challenged to create geoenvironmental proposals to benefit the planet, according to Johnson, noting that "outrageous proposals" and creative thinking were encouraged with the promise of extra points. The proposed ideas included digging the ocean deeper to prevent sea level rise, and pipelining salty water from the Mediterranean Sea and Great Salt Lake to the North Atlantic to speed up the Atlantic Meridional Overturning Circulation (AMOC).

Over lunch, members of the AOS community kicked back with friends, old and new, before gathering into new groups

for the science experiments, which were puzzle-inspired this year and designed to foster community and teamwork, according to AOS Graduate Student Juho Iipponen, a retreat organizer.

The first group was given a task to bend a laser around an obstacle. Participants had a tank full of water, a plastic bottle with a hole near the bottom, and a laser. (The stand that the bottle was standing on was cardboard and their task was to make the laser hit the ground, explained Iipponen, which was accomplished by making the laser reflect inside the flow of water).

The second group had the opportunity to return to their grade school years by having a pinewood derby. Teams were given a set of pinewood derby cars, bolts for weights, and some duct tape to build the "fastest" derby car in Princeton. Iipponen, whose talents extend beyond his graduate work, had made a timing system for the track from microcontrollers and ultrasonic radars.



Photo: AOS Graduate Student Chenggong Wang

The third group conducted two science experiments. In the first one, participants had to distinguish salt water from fresh water with ice cubes and food coloring. In the second one, team members had to crush a soda can with atmospheric pressure by boiling water inside the can and then sinking it upside down in cold water.

No matter the group or interactive activity, the retreat provided a neutral, off-campus space for students to get to know one another outside of their daily routines and a opportunity for much-needed personal interaction.



Photo: AOS Graduate Student Chenggong Wang

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Reunited: AOS Program Retreat continued from Page 9

"I think an in-person retreat was a great way to start the year, perhaps especially so for the second years and the new postdocs who finally got to see everyone face-to-face," said lipponen. "Both the students and the faculty said they had a great time and they loved the activities we had -- but there is no doubt what the crowd favorite was ... the fact that we were on a farm and got to meet all the animals!"

The credit for the success of the 2021 organizational committee comprised of graduate students and faculty who oversaw the planning and implementation of the retreat, including scientific and social activities. In addition to lipponen and Johnson, committee members included AOS Faculty Member Rong Zhang and AOS Graduate Administrator Anna Valerio.

"Without a doubt the best possible start to my final year," lipponen added. "It was great being an organizer for once and watching people scratch their heads with the onerous experiments we had come up with."

"Overall, I think there was a general sense of joy upon finally gathering after a long period of class, meetings, and events being held on Zoom," said Johnson. "With everyone tested beforehand and the event being outside, we were able to hold the retreat in a safe and responsible manner. Most importantly, I think the new students felt properly welcomed into the AOS community and left the event feeling more comfortable in their new home and excited for their first semester."

V. Ramaswamy Named 2021 APS Fellow

AOS Faculty Member V. "Ram" Ramaswamy, director of the Geophysical Fluid Dynamics Laboratory (GFDL), has been named a 2021 fellow of the American Physical Society (APS) "for pioneering research on radiative transfer in the climate system, especially regarding the impacts of anthropogenic changes in carbon dioxide and ozone on stratospheric dynamics, and the effects of aerosols on tropospheric temperatures and the hydrological cycle."

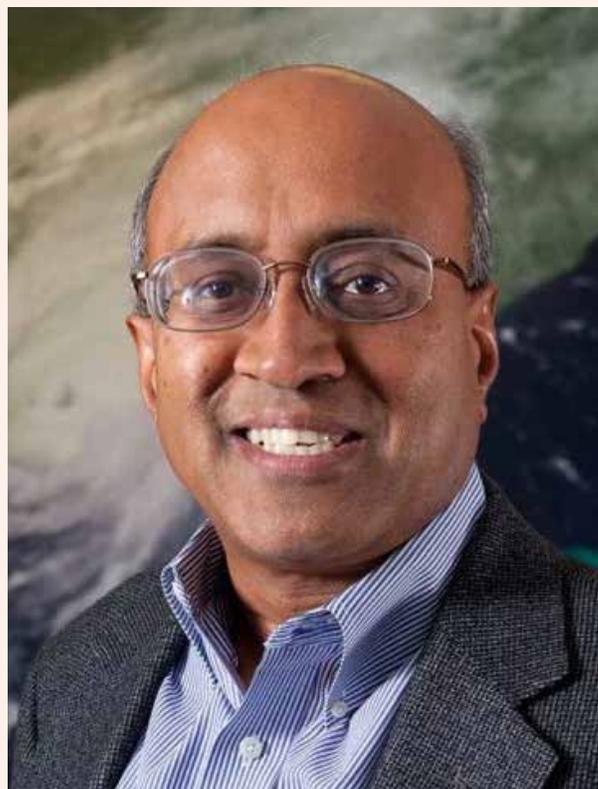
The APS Fellowship Program recognizes members who have made exceptional contributions in physics research, important applications of physics, leadership in or service to physics, or physics education. Each year, no more than one half of one percent of the Society's membership (excluding student members) is recognized by their peers for election to the status of Fellow of the American Physical Society.

AOS Associated Faculty Member Michael Oppenheimer, the Albert G. Milbank Professor of Geosciences and International Affairs in Princeton University's School of Public and International Affairs and the High Meadows Environmental Institute, said Ramaswamy's contributions toward advancing climate science span decades.

"Only a tiny percentage of American Physical Society members are so honored each year, generally for specific, original contributions to the Earth sciences," Oppenheimer said. "In addition, having collaborated with Ram for over 25 years on international ozone and climate assessments, I can tell you that Ram's deep grasp of radiative processes enabled many of the key, policy relevant findings of those assessments."

The historical record for named APS Fellows goes back to 1921. This year, 155 Fellows were selected for their contributions to science.

To view the complete list of the 2021 APS fellows and their citations, or to search all APS fellows to date, visit the [APS fellow archive](#).



AOS Faculty Member V. Ramaswamy, director of GFDL

Alumni News

Yi Zhang Receives DRI's 23rd Annual Wagner Award for Women in Atmospheric Science



Photo: Recent AOS Alum Yi Zhang (left) and Vera Samburova, Ph.D., (right) of DRI stand outside on DRI's Reno campus following the Wagner Award Ceremony on Sept. 16, 2021. Photo: DRI.

Congratulations to recent AOS Alum Yi Zhang on being awarded the 23rd annual [Peter B. Wagner Memorial Award for Women in Atmospheric Sciences](#). Yi received this honor on September 16 at an award ceremony and public lecture on her winning paper, [Projections of tropical heat stress constrained by atmospheric dynamics](#), at the DRI campus in Reno.

Yi wrote the paper with co-authors AOS Senior Meteorologist Isaac Held and AOS Director Stephan Fueglistaler. Yi, who was advised by Fueglistaler, accepted a prestigious

Postdoctoral Fellowship from the Miller Institute at UC Berkeley. [Learn more](#)

Sukyong Lee Elected as Fellow of the AGU



AOS Alum Sukyoung Lee. Photo: Penn State

AOS Alum Sukyoung Lee, a professor of meteorology in Penn State's College of Earth and Mineral Sciences, was recently elected as a Fellow of the American Geophysical Union. While at Princeton, she was advised by AOS Senior Meteorologist Isaac Held. Lee was recognized for her "fundamental discoveries in atmospheric dynamics, including self-organization of midlatitude storms and tropical impacts on Arctic climate change." [Learn more](#)

Check out a Ted Talk by AOS Alum Ilissa Ocko on "[The Fastest Way to Slow Climate Change Now](#)". The October 2021 talk was given at the [Countdown Summit sponsored by TED](#).

PDC 2021 Rescheduled to June 2022

The Physics-Dynamics Coupling (PDC) Workshop has been rescheduled to June 1–3, 2022 in the Frick Chemistry Laboratory, Taylor Auditorium on Princeton's Main Campus. Originally planned for June of 2020 and rescheduled to June 2021 due to the pandemic, the event has been postponed for the second consecutive year with the hope that the postponement puts meeting organizers in the best position to safely host the meeting in-person on campus.

Co-sponsored by CIMES and GFDL, the workshop will be the fourth in a series of pre-pandemic biannual workshops aimed at bringing together the growing community of scientists who have an interest in discussing and improving process coupling in geophysical modeling.

Experts in the weather, climate, and Earth system modeling communities consider physics–dynamics coupling a

challenging, complex, and evolving modeling problem. Decisions in the development of new models and improvements to current ones necessitate guidance based on investigation and understanding of the physics–dynamics coupling issue from the modeling community as a whole.

In light of this, the PDC 2022 workshop will address challenges in the development of advanced algorithms to represent process interactions that determine fundamental characteristics of weather and climate systems both accurately and efficiently. It will provide a platform for a free exchange of ideas and experiences topics of importance to the physics-dynamics coupling problem, including: Conceptual issues in model or process formulation, including conservation and consistency; Discretization of individual processes and process interactions; Solution sensitivity to static or dynamic adaptation in spatial and temporal resolutions; Test strategies, results, and intercomparisons; and Optimization, algorithmic efficiency and high-performance computing.

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The scope of the workshop extends beyond these topics and may include new approaches to Earth system modeling, including emulators and machine-learning approaches, according to GFDL Physical Scientist Lucas Harris, a member of the 2022 organizing committee.

can really make a big impact on this field and to earth-system modeling as a whole.”

The workshop will feature keynote lectures, oral presentations, and a poster session. In addition to more seasoned researchers, those new to the field – early-career scientists interested in model development, in particular – are encouraged to participate. The abstract submission website has been reopened and all previously submitted abstracts are still available. Abstracts can be submitted [here](#).

Additional information about the workshop, including registration details, can be found on the [PDC 2022 website](#).



“The committee and our sponsors at GFDL and CIMES are really hoping that we can finally hold the in-person workshop that we going to have last year,” said Harris. “There is a lot of interest in the physics-dynamics coupling problem and this is a place where new thinking from young scientists and engineers

Suki Manabe's Celebration in Pictures *Photos: Frank Wojciechowski*



L to R: V. Ramaswamy and Manabe



November 17, 2021 Reception



L to R: Bineke Oort, Manabe, Bram Oort



L to R: Manabe and Gabriel Lau



L to R: Manabe and his wife, Noku



Fueglistaler toasting Manabe - Cheers!

AOS & CIMES News

Congratulations to **Jane Smyth** who successfully defended her Ph.D. Thesis, "Investigating the Physical Controls of Monsoon Seasonality in a Hierarchy of Climate Models," on August 3. Jane accepted an NSF Postdoctoral Research Fellow position at MIT, working with Paul O'Gorman.

Congratulations to **Michelle Frazer** who successfully defended her Ph.D. Thesis, "Using an Idealized Climate Model to Elucidate Physical Mechanisms and Improve Model Representation of Extratropical Cloud Feedbacks," on August 10. Michelle accepted a postdoctoral research scholar position, in paleoclimate reconstruction, at Penn State.

Congratulations to **Shiv Priyam Raghuraman** who successfully defended his Ph.D. Thesis, "Changes in the Satellite-Observed Radiation Budget: Manifestations of Radiative Forcing, Feedbacks, and Internal Variability," on August 17. Priyam accepted an NCAR Advanced Study Program Fellowship.

Arrivals

Bor-Ting Jong arrived in early September, from NOAA Physical Science Lab, Boulder, to work with Tom Delworth as a postdoc.

Abigail Lute joined the Program in early September, from the University of Idaho, to work with Tom Delworth as a postdoc.

Jing Feng arrived in mid-September, from McGill University, to work with David Paynter as a postdoc.

Akshaya Nikumbh joined the Program in early October, from the Indian Institute of Science, to work with Yi Ming as a senior research assistant.

Tarun Verma arrived in early October, from Los Alamos National Lab, to work with Feiyu Lu and Alistair Adcroft as a postdoc.

Wenhao Chen joined the Program in early October, from Stanford University, to work with Bob Hallberg as a postdoc.

Elise Olson arrived in mid-October, from the University of British Columbia, to work with Jasmin John and John Dunne as an associate research scholar.

Spencer Hill joined the Program in early November, from Lamont-Doherty, to work with Yi Ming as an associate research scholar.

Jenny Chang arrived in early November, from the University of Chicago, to work with Alistair Adcroft as a postdoc.

Cheng Zheng joined the Program in mid-November, from the University of Delaware, to work with Alistair Adcroft as a postdoc.

Yushi Morioka arrived in mid-November, from JAMSTEC, to work as a visiting research scholar for 15 months.

Gabriel Lau, a former faculty member and GFDL scientist, arrived in early December to work with his AOS/GFDL colleagues as a senior scholar.

Yang Wang is scheduled to arrive in late December, from the Institute of Oceanology, Chinese Academy of Sciences, to work as a visiting postdoctoral research associate for 18 months.

Departures

AOS Associate Research Scholar **Fernando González Taboada** left the Program at the end of July.

AOS Postdoc **Elisa Mantelli** left the Program in mid-August. She accepted a position as a lecturer in Ice Sheet Dynamics at the Institute for Marine and Antarctic Studies, University of Tasmania.

AOS Postdoc **Yan Yu** left the Program in late August. She accepted a position as an assistant professor in the Department of Atmospheric and Oceanic Sciences, School of Physics at Peking University.

AOS Postdoc **Suqin Duan** left the Program in late August. She accepted a postdoctoral scholar position at UCLA.

AOS Postdoc **Hemant Khatri** left the Program in early September. He accepted a postdoctoral research position in the Department of Environmental Sciences at the University of Liverpool, UK.

AOS Postdoc **Yuanyu Xie** left the Program in mid-September. She accepted an associate research scholar position with Denise Mauzerall in the Center for Policy Research on Energy and the Environment (C-PREE), Princeton School of Public and International Affairs.

AOS Research Scholar **Meiyun Lin** left the Program in late September to become a federal employee with NOAA/GFDL.

AOS Associate Research Scholar **Andrew Ross** left the Program in early November to become a federal employee with NOAA/GFDL.

AOS Postdoc **Aaron Match** left the program in early December to begin his NSF Fellowship at New York University (NYU).