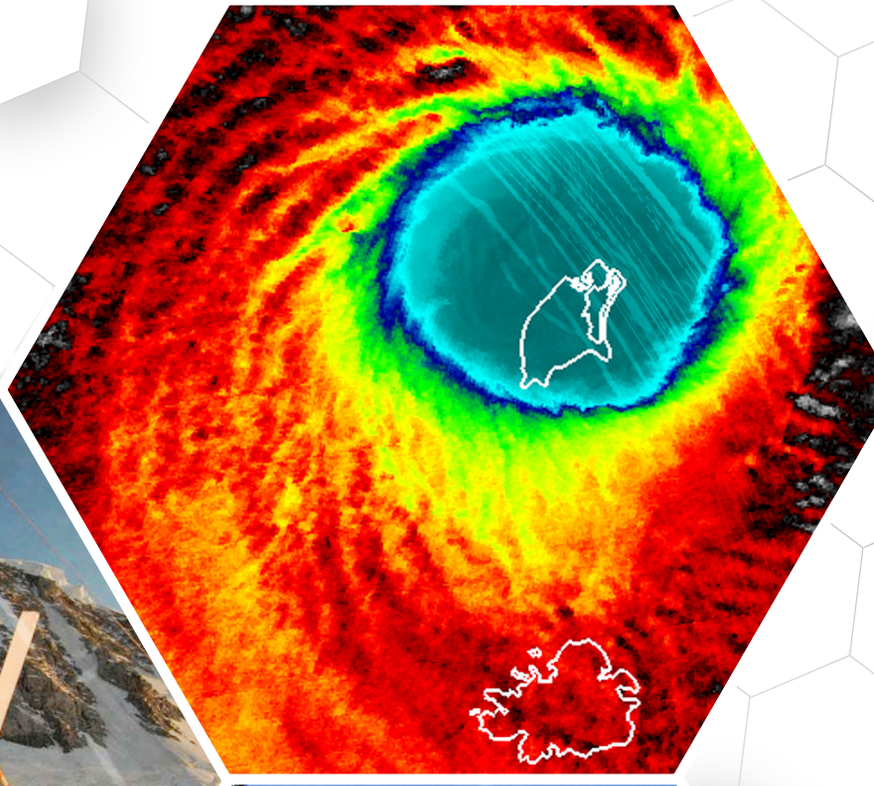
SSEC

Space Science and Engineering Center
University of Wisconsin–Madison

Biennial Report
2018-2019



The Space Science and Engineering Center conducts basic and applied research using Earth and planetary observations to increase understanding of our environment for the benefit of society.

From the director

Our commitment

It is my pleasure to share the inaugural University of Wisconsin–Madison Space Science and Engineering Center (SSEC) Biennial Report. Cover to cover, the 2018-2019 report offers a glimpse into the range of collaborations at SSEC and the Cooperative Institute for Meteorological Satellite Studies (CIMSS) with our federal and UW–Madison partners.

If there is one word that describes our approach to science in society, it is commitment.

Commitment to research. We continue to discover and develop novel ways to observe the atmosphere using ground-based, airborne and satellite measurements in field campaigns around the world.

Commitment to innovation. We are investing in research and infrastructure through the SSEC2022 initiative that provides financial support for collaborative research and applications, new partnerships and capacity-building to encourage new ways forward.

Commitment to education. Undergraduate and graduate students pursuing the earth and atmospheric sciences can avail themselves of two new scholarships, both of which reflect our dedication to preparing the scientists and leaders of the future.

Our planet is changing. The scientists and engineers of SSEC and CIMSS are not only monitoring these changes, but they are committed to finding solutions to the environmental challenges of today and into the future.

R. Bradley Pierce
SSEC Director

ATS-I, ATS-III, GOES-16

Field campaigns enhance data collection, research, and student experiences

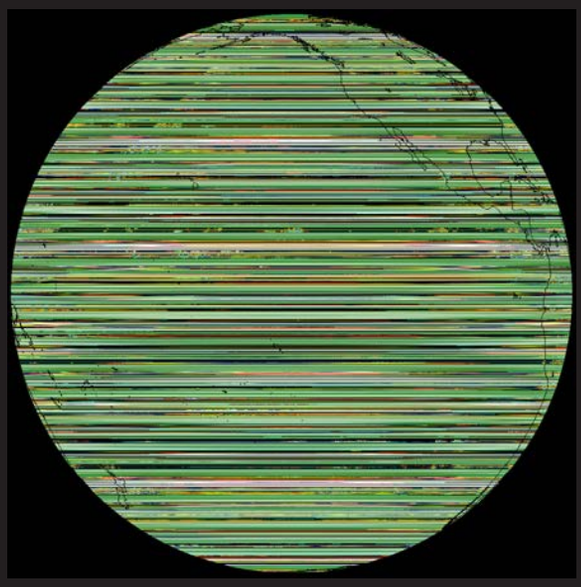
Smoke from wildfires and agricultural fires reduce air quality, poses risks to human health and affects weather and climate across the continental US.

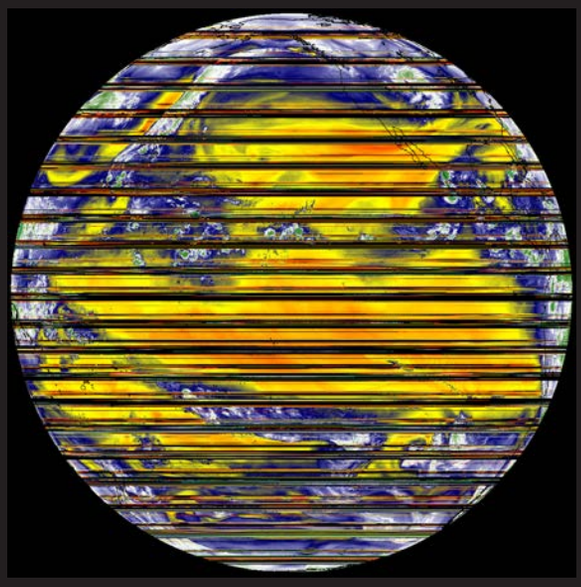
A large-scale field experiment funded by NASA and the National Oceanic and Atmospheric Administration (NOAA), FIREX-AQ (Fire Influence on Regional to Global Environments and Air Quality) brought together researchers from government agencies and universities, including SSEC, to study those impacts.

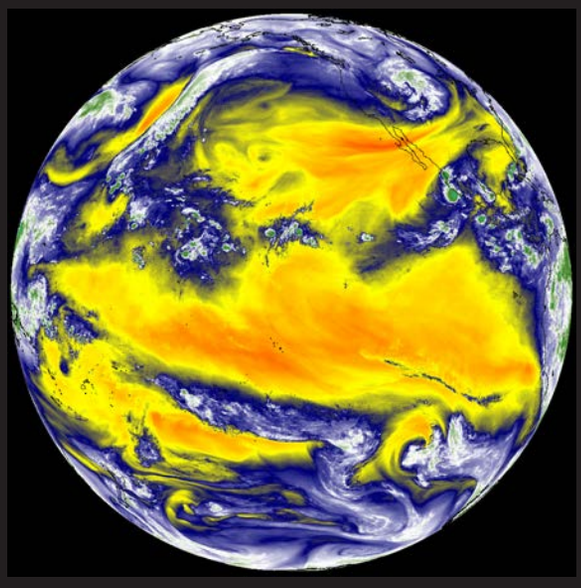
For several weeks during summer 2019, SSEC scientists deployed one of their instruments aboard an aircraft to remotely measure temperature, water vapor and carbon monoxide over western wildfires, using specialized smoke forecasts and satellite data as aids to flight planning. Learning more about the chemistry and transport of smoke will help improve weather, air quality and climate forecasts.

In addition to solving real environmental problems, field campaigns like FIREX-AQ provide rich opportunities for students to get firsthand experience developing research methodologies, preparing instruments, and collecting and analyzing data, while working side-by-side with their mentors and scientists from across the country.

Experts support GOES-R satellite program







When it was launched on the latest US Geostationary Operational Environmental Satellite, GOES-17, the Advanced Baseline Imager (ABI) did not always match the quality of data and imagery from the previous ABI on GOES-16. In fact, sometimes there were no data at all.

To improve the quality and quantity of available data, the National Oceanic and Atmospheric Administration (NOAA) brought together teams of experts to investigate and assess options.

Researchers at CIMSS assisted the instrument vendor in evaluating proposed changes to the calibration algorithm – providing feedback on how well the new calibration performed. In addition, they studied how data are flagged when detector temperatures are abnormally high and suggested modifications to maximize the amount of high-quality data and to prevent wholesale rejection of bands of data.

From pre-launch testing to post-launch checkout and beyond, scientists at CIMSS provide the critical expertise to ensure the continued success of the GOES-R program.

Precision and atmospheric measurements

To unravel the complexities of Earth's atmosphere, scientists rely on precise and frequent measurements of temperature, water vapor and aerosols.

The ground-based, Atmospheric Emitted Radiance Interferometer (AERI) has been a key instrument in capturing these data for more than 20 years. Originally designed and built at SSEC for the Department of Energy Atmospheric Radiation Measurement (ARM) program, AERIs have been installed in remote locations around the world.

The AERI's continuous measurements of atmospheric conditions are used to augment other data sources like the twice-daily weather balloons, especially in locations where these data are difficult to obtain. These precision measurements have numerous applications such as tracking small-scale changes in the atmosphere to improve local forecasts, validating the accuracy of satellite data and improving climate science applications.

From Antarctica, to the Azores, SSEC has deployed more than 25 units and maintains these sites while providing support and expertise to other international laboratories that rely on long-term atmospheric data.

Reconstructing past climate

To accurately predict future climate, the scientific community needs a method of reconstructing past climate to make sense of previous patterns and cycles.

SSEC's Ice Drilling Design and Operations (IDDO) was established in 2001 to design and maintain a suite of advanced ice coring and drilling systems for the National Science Foundation (NSF). Since then, they have met the current and emerging needs of scientists in fields from archaeology to glaciology and climate science.

In 2018, NSF merged the units comprising its drilling program to form the US Ice Drilling Program (IDP) for which SSEC directs operations.

Through adaptive designs and engineering, IDP engineers have built a suite of drills capable of operating in harsh conditions around the world, while also preserving crucial data within ice cores and rock samples.

At a time when our changing climate is in the forefront, IDP enables climate studies related to glacier melt and sea level rise by helping researchers unlock information stored in ice cores, such as the concentration of greenhouse gases and precipitation rates over the last 68,000 years.

These deep ice cores from polar and other regions are helping scientists and policy makers make informed decisions.

By land, sea, and air

The annual Southeast Asian Monsoon cycle is a vital freshwater source for billions living in the region. But little is understood about the conditions that fuel each cycle.

To understand this cycle, SSEC has provided crucial support to an international field campaign designed to capture atmospheric data over the region, known as the Cloud, Aerosol and Monsoon Processes Philippines Experiment ($CAMP^2Ex$).

SSEC researchers collaborated with scientists from NASA, the Naval Research Laboratory and the Philippines to collect these data from several platforms:

By land: SSEC scientists installed and operated their instrument, the High Spectral Resolution Lidar (HSRL), used to collect an entire year of daily temperature and aerosol data over the capital city of Manila.

By sea: SSEC scientists traveled thousands of kilometers aboard the Research Vessel Sally Ride and operated an HSRL to better understand air and sea interactions.

By air: SSEC scientists integrated near real-time geostationary weather satellite data from the Himawari-8 Advanced Himawari Imager for use in NASA's WorldView visualization program. These data supported daily flight planning for NASA's P-3 aircraft which carried a suite of instruments, including an HSRL.

Leveraging AI for improved forecasting

The fields of satellite meteorology and atmospheric science are well-suited to the rapidly developing world of artificial intelligence (AI). Stockpiles of high-resolution satellite imagery provide AI with vital training data used to identify elusive patterns and better predict severe weather.

Recent research by SSEC and CIMSS scientists has shown remarkable results in the field of tropical cyclone analysis and prediction. By using more than 50,000 images of hurricanes, researchers were able to train an AI system to accurately predict a hurricane's maximum wind speeds, matching closely to contemporary estimates using state-of-the-art methods.

These foundational research studies represent the tip of a much larger iceberg and demonstrate the powerful potential of AI systems.

By investing in next-generation computer hardware, and by leveraging the strengths among its scientists in the fields of Numerical Weather Prediction, severe weather, computer science, and radiative transfer, SSEC and CIMSS will play a critical role in harnessing AI.

A commitment to student scholars

With a commitment to education that dates to its founder, Verner Suomi, CIMSS continues to recruit the next generation of scientists. To attract and engage new students in remote sensing and atmospheric science, CIMSS established two scholarship opportunities.

The Verner E. Suomi Scholarship Award for Outstanding Achievement in the Physical Sciences is awarded to high school seniors who will attend a University of Wisconsin System undergraduate program in the physical sciences. The scholarship provides $2,000 toward the first year of studies.

The William L. Smith Sr. Graduate Scholarship is available to graduate students who are accepted into the Ph.D. program in the Department of Atmospheric and Oceanic Sciences (AOS) at UW–Madison. The award is offered in partnership with the National Oceanic and Atmospheric Administration (NOAA). Recipients will receive up to three years of financial support and work with a CIMSS investigator on research relevant to NOAA.

Named after SSEC's founder and a former CIMSS director – both advocates for students and sharing their experience and knowledge – these scholarships reflect CIMSS' dedication to preparing the scientists and leaders of the future.

Diversity initiatives through SSEC Tech Camp

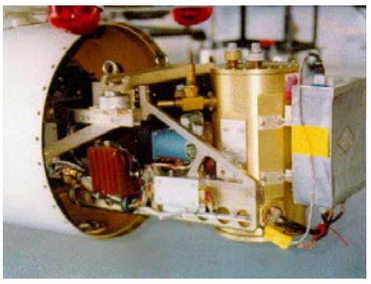
From learning how to code in Python, to flying around the Earth in a virtual reality simulation, SSEC's inaugural Tech Camp brought together students and teachers from the Madison Metropolitan School District. Participants learned about atmospheric science and the tools used by SSEC scientists to study the Earth, its atmosphere and the weather.

The five-day course provides underrepresented students an opportunity to sample a wide range of skills and technologies in science, technology, engineering and mathematics fields. Engaging hands-on activities introduce students to disciplines like computer programming, engineering and weather modeling – inspiring them toward one of the many fruitful career paths in the fields of atmospheric science and satellite meteorology.

In 2020 the camp will be among the course offerings in UW–Madison's Badger Summer Scholars Program.

SSEC2022

New pathways to innovation



The goal of SSEC2022 is to stimulate promising, transformative and innovative research and applications at SSEC that are consistent with the center's mission and the Wisconsin Idea to promote knowledge beyond the university.

Over the next three years, this internal initiative will provide financial support for cross-campus and other collaborative research and applications, new and strategic partnerships, mission critical but underfunded capabilities, equipment or infrastructure improvements and capacity-building.

This seed funding, provided by SSEC, opens new pathways to research and partnerships. Projects selected for funding in 2019-2020 are listed below.

Project	PI
Construction of a rubidium based HSRL prototype	Ed Eloranta
Upgrade of SSEC's high accuracy temperature calibration facility	Jon Gero
Ensemble damage and loss modeling of landfalling hurricanes in the US	Shane Hubbard
SAT-AnEn: A satellite-based analog ensemble for tropical cyclone structure estimation and Nowcasting	Will Lewis
Improving the low level of operational NUCAPS soundings with multi-source data using machine learning technique	Jinlong Li
Improving multilayer cloud detection, cloud heights and cloud cover layer with machine learning techniques	Yue Li
CSPP Geo enhancements and capabilities demonstration	Graeme Martin

SSEC Tech Camp	Margaret Mooney
A tape library for research data backup and archive	Scott Nolin
Precipitation Imaging Package instrument development: Expanding SSEC snowfall measurement capabilities to support satellite ground validation and algorithm research	Claire Pettersen
Schwerdtfeger Library: A collaborative environment for teaching, learning, and research	Jean Phillips
Promote flight of the GEO Hyperspectral Imaging IR Sounder	Hank Revercomb
Satellite Data Services satellite geostationary data archive expansion	Jerry Robaidek
Deriving 3D winds using retrieved moisture fields from microwave sounders	Dave Santek
Modernizing McIDAS ADDE server development	Becky Schaffer
A mobile application to improve access of satellite fire detections	Chris Schmidt
S-HIS upgrade path study	Joe Taylor
Data Center cooling loop upgrade	Don Thielman
Assimilating ABI hydrometeors and its impacts on moisture initialization for hurricane prediction	Pei Wang
Assimilating sea ice products from satellites into energy exascale Earth system model	Xuanji Wang
Antarctic Meteorological Research Center Internship Program	Lee Welhouse
Developing a critical mass of AI programming resources at SSEC	Tony Wimmers

Publications

2019

Albrecht, B., and Coauthors, 2019: Cloud system evolution in the trades (CSET) following the evolution of boundary layer cloud systems with the NSF-NCAR GV, Bull. Amer. Meteor. Soc., 100, 1, 93-121.

Anthes, R. A., and Coauthors, 2019: Developing priority observational requirements from space using multi-attribute utility theory, Bull. Amer. Meteor. Soc., 100, 9, 1753-1773.

Baines, K. H., L. A. Sromovsky, R. W. Carlson, T. W. Momary, and P. M. Fry, 2019: The visual spectrum of Jupiter's Great Red Spot accurately modeled with aerosols produced by photolyzed ammonia reacting with acetylene, Icarus, 330, 217-229.

Basara, J. B., J. I. Christian, R. A. Wakefield, J. A. Otkin, E. H. Hunt, and D. P. Brown, 2019: The evolution, propagation, and spread of flash drought in the Central United States during 2012, Environ. Res. Lett., 14, 8.

Bechtold, M., and Coauthors, 2019: PEAT-CLSM: a specific treatment of peatland hydrology in the NASA Catchment Land Surface Model, J. of Adv. Model. Earth Syst., 11, 7, 2130-2162.

Bennartz, R., F. Fell, C. Pettersen, M. D. Shupe, and D. Schuettemeyer, 2019: Spatial and temporal variability of snowfall over Greenland from CloudSat observations, Atmos. Chem. Phys., 19, 12, 8101-8121.

Bhatia, K. T., G. A. Vecchi, T. R. Knutson, H. Murakami, J. Kossin, K. W. Dixon, and C. E. Whitlock, 2019: Recent increases in tropical cyclone intensification rates, Nat. Commun., 10, 1.

Bloch, C., R. O. Knuteson, A. Gambacorta, N. R. Nalli, J. Gartzke, and L. Zhou, 2019: Near-real-time surface-based CAPE from merged hyperspectral IR satellite sounder and surface meteorological station data, J. Appl. Meteor. Climatol., 58, 8, 1613-1632.

Bocanegra-Bahamon, T.M., and Coauthors, 2019: Venus Express radio occultation observed by PRIDE, Astron. Astrophys., 624, A59.

Breeden, M., and J. E.Martin, 2019: Evidence for nonlinear processes in fostering a North Pacific jet retraction, Quart. J. Roy. Meteor. Soc., 145, 721, 1559-1570.

Cesana, G., D. E. Waliser, D. Henderson, T. S. L'Ecuyer, X. Jiang, and J. L. F. Li, 2019: The vertical structure of radiative heating rates: a multimodel evaluation using A-train satellite observations, J. Climate, 32, 5, 1573-1590.

Chang, K., and T. S. L'Ecuyer, 2019: Role of latent heating vertical distribution in the formation of the tropical cold trap, J. Geophys. Res.-Atmos., 124, 14, 7836-7851.

Choi, T. I., S. Kim, J. H. Kim, H. Kwon, and M. A. Lazzara, 2019: Characteristics of Surface Meteorology at Lindsey Islands, Amundsen Sea, West Antarctica, J. Geophys. Res.-Atmos., 124, 12, 6294-6306.

Christian, J. I., J. B. Basara, J. A. Otkin, E. D. Hunt, R. A. Wakefield, P. X. Flanagan, and X. Xiao, 2019: A methodology for flash drought identification: application of flash drought frequency across the United States, J. Hydrometeor., 20, 5, 833-846.

Cloud, K. A., B. J. Reich, C. M. Rozoff, S. Alessandrini, W. E. Lewis, and L. Delle Monache, 2019: A feed forward neural network based on model output statistics for short-term hurricane intensity prediction, Wea. Forecasting, 34, 4, 985-997.

Dhingra, R. D., and Coauthors, 2019: Observational evidence for summer rainfall at Titan's north pole, Geophys. Res. Lett., 46, 3, 1205-1212.

Di, D., M. Min, J. Li, and M. M. Gunshor, 2019: The radiance differences between wavelength and wavenumber spaces in convolving hyperspectral infrared sounder spectrum to broadband for intercomparison, Remote Sens., 11, 10.

Dzambo, A. M., T. L'Ecuyer, O. O. Sy, and S. Tanelli, 2019: The observed structure and precipitation characteristics of southeast Atlantic stratocumulus from airborne radar during ORACLES 2016-17, J. Appl. Meteor. Climatol., 58, 10, 2197-2215.

Ferre, I. M., S. Negron, H. Pantin, S. J. Schwartz, J. P. Kossin, and J. M. Shultz, 2019: Hurricane Maria's landfall near Punta Santiago, Puerto Rico: Community needs and mental health assessment 6 months post-impact, Disaster Med. Public Health Preparedness, 13, 1 (Serial Hurricanes), 18-23.

Ferre, I. M., S. Negron, J. M. Shultz, S. J. Schwartz, J. P. Kossin, and H. Pantin, 2019: Hurricane Maria's impact on Punta Santiago, Puerto Rico: community needs and mental health assessment six months postimpact, Disaster Med. Public Health Preparedness, 13, 1, 18-23.

Foster, M. J., and Coauthors, 2019: State of the climate in 2018: Cloudiness, Bull. Amer. Meteor. Soc., 100, 9 Supp., S34-S35.

Gao, L., L. Chen, J. Li, A. K. Heidinger, X. Xu, and S. Qin, 2019: A long-term historical aerosol optical depth data record (1982-2011) over China from AVHRR, IEEE Trans. Geosci. Remote Sens., 57, 5, 2467-2480.

Gerth, J. J., 2019: It's not hot air: using GOES-16 infrared window bands to diagnose adjacent summertime air masses, Meteor. Appl., 26, 3, 362-368.

Ghate, V. P., D. B. Mechem, M. P. Cadeddu, E. W. Eloranta, M. P. Jensen, M. L. Nordeen, and W. L. Smith, 2019: Estimates of entrainment in closed cellular marine stratocumulus clouds from the MAGIC field campaign, Quart. J. Roy. Meteor. Soc., 145, 1589-1602.

Gong, X., Z. Li, J. Li, C. C. Moeller, and W. Wang, 2019: Monitoring the VIIRS sensor data records reflective solar band calibrations using DCC with collocated CrIS measurements, J. Geophys. Res.-Atmos., 124, 15, 8688-8706.

Griffin, S. M., and C. S. Velden, 2019: Hazard avoidance products for convectively-induced turbulence in support of high-altitude Global Hawk aircraft missions, Pure Appl. Geophys., 176, 5, 2045-2055.

Gultepe, I., and W. F. Feltz, 2019: Aviation meteorology: observations and models. Introduction., Pure Appl. Geophys., 176, 5, 1863-1867.

Gultepe, I., and Coauthors, 2019: A review of high impact weather for aviation meteorology, Pure Appl.

Geophys., 176, 5 Supp., 1869-1921.

Hall, T. M., and J. P. Kossin, 2019: Hurricane stalling along the North American coast and implications for rainfall, Clim. Atmos. Sci., 2, 17.

Hang, Y., T. S. L'Ecuyer, D. S. Henderson, A. V. Matus, and Z. Wang, 2019: Reassessing the effect of cloud type on Earth's energy balance in the age of active spaceborne observations. Part I: Top of atmosphere and surface, J. Climate, 32, 19, 6197-6217.

Hang, Y., T. S. L'Ecuyer, D. S. Henderson, A. V. Matus, and Z. Wang, 2019: Reassessing the effect of cloud type on Earth's energy balance in the age of active spaceborne observations. Part II: Atmospheric heating, J. Climate, 32, 19, 6219-6236.

Heidinger, A. K., and Coauthors, 2019: Using sounder data to improve cirrus cloud height estimation from satellite imagers, J. Atmos. Oceanic Technol., 36, 1331-1342.

Hoffman, J. P., S. A. Ackerman, Y. Liu, and J. R. Key, 2019: The detection and characterization of Arctic sea ice leads with satellite imagers, Remote Sens., 11, 5, 521.

Kataoka, F., R. O. Knuteson, A. Kuze, K. Shiomi, H. Suto, J. Yoshida, S. Kondo, and N. Saitoh, 2019: Calibration, level 1 processing, and radiometric validation for TANSO-FTS TIR on GOSAT, IEEE Trans. Geosci. Remote Sens., 57, 6, 3490-3500.

Kossin, J. P., 2019: Reply to: Moon, I-J. et al.; Lanzante, J.R., Nature, 570, E16–E22.

Lee, J., J. Li, Z. Li, P. Wang, and J. Li, 2019: ABI water vapor radiance assimilation in a regional NWP model by accounting for the surface impact, Earth Space Sci., 6.

Lee, Y., and Coauthors, 2019: Long-term variations of Venus's 365 nm albedo observed by Venus Express, Akatsuki, MESSENGER, and the Hubble Space Telescope, Astron. J., 158, 3.

Lemonnier, F., and Coauthors, 2019: Evaluation of CloudSat snowfall rate profiles by a comparison with in situ micro-rain radar observations in East Antarctica, Cryosphere, 13, 3, 943-954.

Li, J., and Coauthors, 2019: Potential faster Arctic sea ice retreat triggered by snowflakes' greenhouse effect, Cryosphere, 13, 3, 969-980.

Li, S., S. Jaroszynski, S. Pearse, L. Orf, and J. Clyne, 2019: VAPOR: a visualization package tailored to analyze simulation data in Earth system science, Atmosphere, 10, 9.

Li, Z., J. Li, M. Gunshor, S. Moeller, T. J. Schmit, F. Yu, and W. McCarty, 2019: Homogenized water vapor absorption band radiances from international geosta-

20+
weather satellites tracked and archived every day

tionary satellites, Geophys. Res. Lett., 46.

Li, Z., and Coauthors, 2019: The alternative of CubeSat-based advanced infrared and microwave sounders for high impact weather forecasting, Atmos. Oceanic Sci. Lett., 12, 2, 80-90.

Lim, A. H. N., J. A. Jung, S. E. Nebuda, J. M. Daniels, W. Bresky, M. Tong, and V. Tallapragada, 2019: Tropical cyclone forecasts impact assessment from the assimilation of hourly visible, shortwave, and clear-air water vapor atmospheric motion vectors in HWRF, Wea. Forecasting, 34, 1, 177-198.

Liu, Y., Z. Li, and M. Huang, 2019: Towards a data-derived observation error covariance matrix for satellite measurements, Remote Sens., 11, 5.

Liu, Z., and Coauthors, 2019: Local severe storm tracking and warning in pre-convection stage from the new generation geostationary weather satellite measurements, Remote Sens., 11, 4.

Loveless, D. M., T. J. Wagner, D. D. Turner, S. A. Ackerman, and W. F. Feltz, 2019: A composite perspective on bore passages during the PECAN campaign, Mon. Wea. Rev., 147, 4, 1395-1413.

Lu, J., T. Feng, J. Li, Z. Cai, X. Xu, L. Li, and J. Li, 2019: Impact of assimilating Himawari-8-derived layered precipitable water with varying cumulus and microphysics parameterization schemes on the simulation of Typhoon Hato, J. Geophys. Res.-Atmos., 124, 6, 3050-3071.

Matus, A., T. S. L'Ecuyer, and D. S. Henderson, 2019: New estimates of aerosol direct radiative effects and forcing from A-Train satellite observations, Geophys. Res. Lett., 46, 14, 8338-8346.

Merrelli, A., M. C. Turnbull, and T. S. L'Ecuyer, 2019: Terran World Spectral Simulator, Publ. Astron. Soc. Pac., 131, 999.

Merrick, T., S. Pau, M. S. S. P. Jorge, T. S. F. Silva, and R. Bennartz, 2019: Spatio-temporal patterns and phenology of tropical vegetation solar-induced chlorophyll fluorescence across Brazillian biomes using satellite observations, Remote Sens., 11, 5.

Meyssignac, B., and Coauthors, 2019: Measuring global ocean heat content to estimate the Earth Energy Imbalance, Frontiers Marine Sci., 6.

Min, M., and Coauthors, 2019: Estimating summertime precipitation from Himawari-8 and global forecast system based on machine learning, IEEE Trans. Geosci. Remote Sens., 57, 5, 2557-2570.

Molter, E., and Coauthors, 2019: Analysis of Neptune's 2017 bright equatorial storm, Icarus, 321, 324-345.

Olander, T. L., and C. S. Velden, 2019: The Advanced Dvorak Technique (ADT) for estimating tropical cyclone intensity: update and new capabilities, Wea. Forecasting, 34, 4, 905-922.

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peer-reviewed
publications
2018–2019

Otkin, J. A., Y. Zhong, E. D. Hunt, J. Basara, M. Svoboda, M. C. Anderson, and C. Hain, 2019: Assessing the evolution of soil moisture and vegetation conditions during a flash drought-flash recovery sequence over the south-central United States, J. Hydrometeor., 20, 3, 549-562.

Palerme, C., C. Claud, N. B. Wood, T. L'Ecuyer, and C. Genthon, 2019: How Does Ground Clutter Affect CloudSat Snowfall Retrievals Over Ice Sheets?, IEEE Geosci. Remote Sens. Lett., 16, 3, 342-346.

Peralta, J., and Coauthors, 2019: New cloud morphologies discovered on the Venus's night during Akatsuki, Icarus, 333, 177-182.

Pinker, R. T., and Coauthors, 2019: Towards a unified and coherent Land Surface Temperature Earth System data record from geostationary satellites, Remote Sens., 11, 12.

Reid, J. S., and Coauthors, 2019: Observations and hypotheses related to low to middle free tropospheric aerosol, water vapor and altocumulus cloud layers within convective weather regimes: a SEAC(4)RS case study, Atmos. Chem. Phys., 19, 17, 11413-11442.

Ringerund, S., M. S. Kulie, D. L. Randel, G. M. Skofronick-Jackson, and C. D. Kummerow, 2019: Effects of ice particle representation on passive microwave precipitation retrieval in a Bayesian scheme, IEEE Trans. Geosci. Remote Sens., 57, 6, 3619-3632.

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social media followers

Schirle, C. E., S. J. Cooper, M. A. Wolff, C. Pettersen, N. B. Wood, T. S. L'Ecuyer, T. Ilmo, and K. Nygard, 2019: Estimation of snowfall properties at a mountainous site in Norway using combined radar and in situ microphysical observations, J. Appl. Meteor. Climatol., 58, 6, 1337-1352.

Schmit, T. J., and Coauthors, 2019: Legacy atmospheric profiles and derived products from GOES-16: validation and applications, Earth Space Sci., 6, 9, 1730-1748.

Schroeder, M., and Coauthors, 2019: The GEWEX water vapor assessment: overview and introduction to results and recommendations, Remote Sens., 11, 3.

Schwartz, M. C., and Coauthors, 2019: Merged cloud and precipitation dataset from the HIAPER GV for the Cloud System Evolution in the Trades (CSET) Campaign, J. Atmos. Oceanic Technol., 36, 6, 921-940.

Shao, M., and W. L. Smith, 2019: Impact of atmospheric retrievals on Hurricane Florence/Michael forecasts in a regional NWP model, J. Geophys. Res.-Atmos., 124, 15, 8544-8562.

Shultz, J. M., J. P. Kossin, J. M. Shepherd, J. M. Ransdell, R. Walshe, I. Kelman, and S. Galea, 2019: Risks, health consequences, and response challenges for small-island-based populations: Observations from the 2017 Atlantic hurricane season, Disaster Med. Public Health Preparedness, 13, 1 (Serial Hurricanes), 5-17.

Silber, I., J. Verlinde, M. Cadeddu, C. J. Flynn, A. M. Vogelmann, and E. W.

Eloranta, 2019: Antarctic cloud macrophysical, thermodynamic phase, and atmospheric inversion coupling properties at McMurdo Station part II: radiative impact during different synoptic regimes, J. Geophys. Res.-Atmos., 124, 3, 1697-1719.

Skofronick-Jackson, G., M. Kulie, L. Milani, S. J. Munchak, N. B. Wood, and V. Levizzani, 2019: Satellite estimation of falling snow: A Global Precipitation Measurement (GPM) Core Observatory Perspective, J. Appl. Meteor. Climatol., 58, 7, 1429-1448.

Stallard, T. S., and Coauthors, 2019: Local-time averaged maps of H-3(+) emission, temperature and ion winds Philos. Trans. R. Soc., A, 377.

Stettner, D., C. Velden, R. Rabin, S. Wanzong, J. Daniels, and W. Bresky, 2019: Development of enhanced vortex-scale atmospheric motion vectors for hurricane applications, Remote Sens., 11, 17, 1981.

Thomas, M. A., A. Devasthale, T. L'Ecuyer, S. Wang, T. Koenigk, and K. Wyser, 2019: Snowfall distribution and its response to the Arctic Oscillation: an evaluation of HighResMIP models in the Arctic using CPR/CloudSat observations, Geosci. Model Dev., 12, 8, 3759-3772.

Ting, M., J. P. Kossin, S. J. Camargo, and C. Li, 2019: Past and future hurricane intensity change along the U.S. East Coast, Sci. Rep., 9.

Wagner, T. J., P. M. Klein, D. D. Turner, 2019: A new generation of ground-based mobile platforms for active and passive profiling of the boundary layer, Bull. Amer. Meteor. Soc., 100, 1, 137-153.

Wang, W., C. Cao, A. Ignatov, X. Liang, Z. Li, L. Wang, B. Zhang, S. Blonski, and J. Li, 2019: Improving the calibration of Suomi NPP VIIRS thermal emissive bands during blackbody warm-up/cool-down, IEEE Trans. Geosci. Remote Sens., 57, 4, 1977-1994.

Weisz, E., and W. P. Menzel, 2019: Imager and sounder data fusion to generate sounder retrieval products at an improved spatial and temporal resolution, J. Appl. Remote Sens., 13, 3.

Wimmers, A., C. Velden, and J. H. Cossuth, 2019: Using deep learning to estimate tropical cyclone intensity from satellite passive microwave imagery, Mon. Wea. Rev., 147, 6, 2261-2282.

Xu, S., and Coauthors, 2019: Dynamical coupling between Hurricane Matthew and the middle to upper atmosphere via gravity waves, Journal of Geophysical Research-Space Physics, 124, 5, 3589-3608.

Xue, Y., J. Li, W. P. Menzel, E. Borbas, S. Ho, Z. Li, and J. Li, 2019: Characteristics of satellite sampling errors in total precipitable water from SSMIS, HIRS, and COSMIC observations, J. Geophys. Res.-Atmos., 124, 13, 6966-6981.

Zhong, Y., M. Notaro, and S. J. Vavrus, 2019: Spatially variable warming of the Laurentian Great Lakes: an interaction of bathymetry and climate, Climate Dynamics, 52, 5833-5848.

25
field
deployments

Partners and Collaborators

SSEC has built key research and education partnerships with federal agencies as well as departments and centers across the University of Wisconsin–Madison campus and beyond. With our partners we are working towards understanding Earth-atmosphere processes to improve society's resilience to hazardous weather and climate events.

Federal Partners

National Aeronautics and Space Administration (NASA)
- Earth Science
- Planetary Science

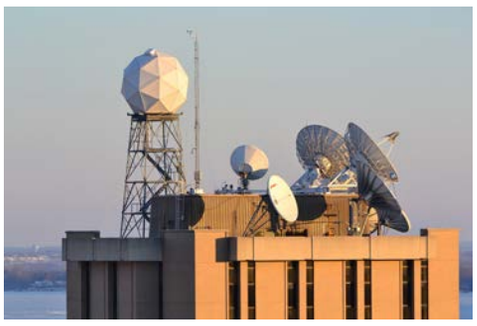
National Oceanic and Atmospheric Administration (NOAA)
- National Environmental Satellite, Data, and Information Service (NESDIS)
- Center for Satellite Applications and Research (STAR)
- Advanced Satellite Products Branch (ASPB)
- NOAA Cooperative Institutes

National Science Foundation (NSF)
- Office of Polar Programs

Department of Energy (DOE)
- Office of Science
- Atmospheric Radiation Measurement (ARM) user facility

University of Wisconsin-Madison Campus Partners

College of Letters and Science (L&S)
Department of Atmospheric and Oceanic Sciences
Department of Astronomy
Department of Geoscience
Center for Limnology
Nelson Institute for Environmental Studies
Center for Climatic Research (CCR)
Center for Sustainability and the Global Environment (SAGE)
Office of the Vice Chancellor for Research and Graduate Education (OVCRGE)
Physical Sciences Laboratory
College of Engineering (COE)
Department of Civil and Environmental Engineering



Leadership

R. Bradley Pierce
SSEC Director

Brad Pierce began serving as Director of SSEC at the University of Wisconsin–Madison in October 2018 following a nationwide search. His background includes over 25 years as a scientist with the National Oceanic and Atmospheric Administration and NASA. Pierce is also a professor in the Department of Atmospheric and Oceanic Sciences (AOS).

Tristan L'Ecuyer
CIMSS Director

The CIMSS Board of Directors met in December 2018 and appointed AOS Professor Tristan L'Ecuyer as the institute's next director. He began his role in January 2019. L'Ecuyer is well situated to lead CIMSS into the future, bringing 20 years of experience at the "intersection of satellite remote sensing and climate science" to the position.

SSEC's leadership also includes an executive director as well as associate directors for engineering, administration and science. Their combined experience is guiding SSEC and CIMSS into the future.

Mark Mulligan
Executive Director and Associate Director of Engineering

Jenny Hackel
Associate Director of Administration

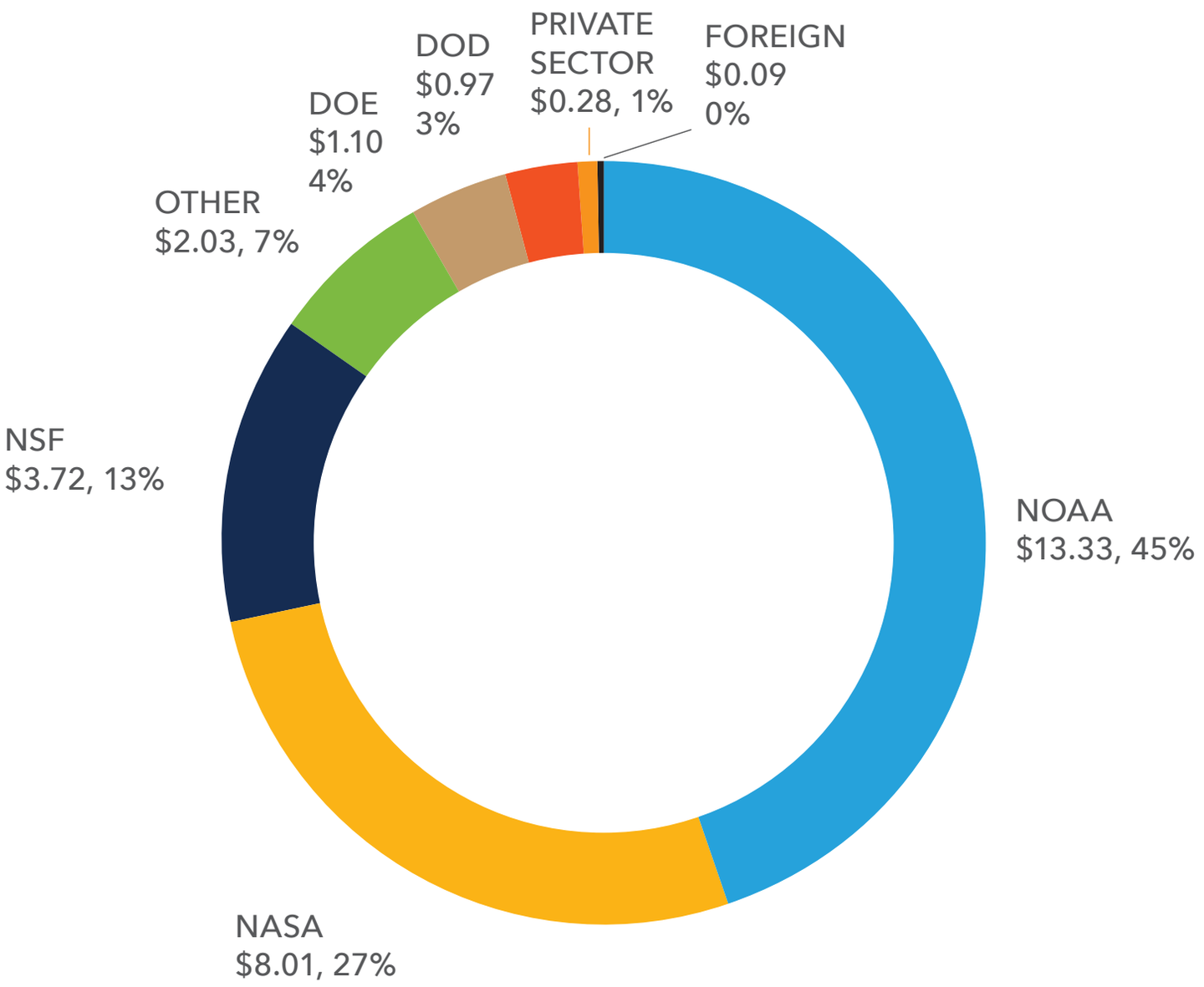
Wayne Feltz
Associate Director of Science

Spending

SSEC 2019 SPENDING BY SOURCE

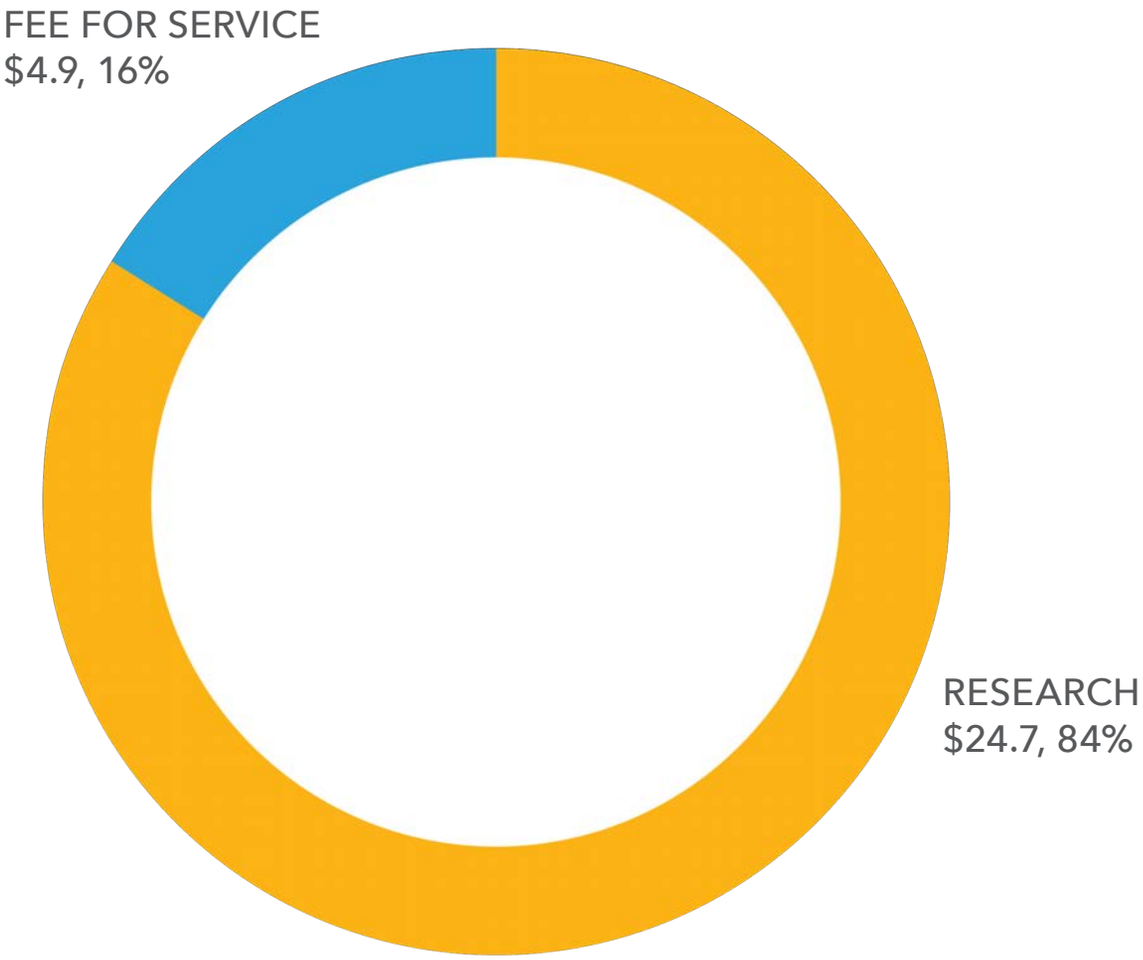
(in millions)

Total spending $29.5M



SSEC 2019 RESEARCH & FEE FOR SERVICE SPENDING
(in millions)

Total spending $29.5M



59
grad and undergrad degrees awarded since 2015

850+
student visitors

13
congressional staffers visited

463
professional training attendees

211,000
Weather Guys listeners

stats are from 2019 unless otherwise noted

Awards

2019

Steven Ackerman
Sigma Xi/American Meteorological Society Distinguished Lecturer

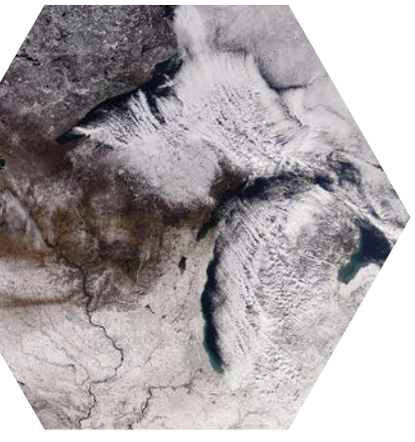
Ed Eloranta
Lifetime Achievement Award, International Committee for Laser Atmospheric Studies Distinguished Scientist

Jordan Gerth
National Weather Association's Larry R. Johnson Special Award

Jeff Key
NOAA Bronze Medal for Scientific/Engineering Achievement

Zhenglong Li
Bronze Award for oral presentation at the ITSC-22 meeting: "An alternative method to quantify NLTE radiances"

Scott Lindstrom
National Weather Association's Larry R. Johnson Special Award



Paul Menzel
Yuri Gagarin Medal for contributions to environmental satellite applications, research and training

Margaret Mooney
Earth Science Information Partners (ESIP) 2019 Catalyst Award

Timothy Schmit
American Meteorological Society Fellow

David Tobin
Distinguished Scientist, UW–Madison

2018

Kelton Halbert
Best Student Poster, AMS Conference on Severe Local Storms

Bob Holz
Permanent Principal Investigator, UW–Madison

Allen Huang
Chair, Asia-Oceania Meteorological Satellite Users Conference (AOMSUC)

Jun Li
Permanent Principal Investigator, UW–Madison

Margaret Mooney
UW–Madison Robert and Carroll Heideman Award for Excellence in Public Service and Outreach

Timothyt Schmit
Finalist, Samuel J. Heyman Service to America Award

David Tobin
Permanent Principal Investigator, UW–Madison

Christopher Velden
American Meteorological Society Banner I. Miller Award

Elisabeth Weisz
SPIE Best Paper in Interdisciplinary Applications

Charles White
Best Oral Presentation, NOAA/NESDIS Cooperative Research Program Annual Science Symposium

Tom Whittaker
STAC Distinguished Scientific/Technological Accomplishment and Outstanding Service Award

Editorial team
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Eric Verbeten
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There are many ways to support SSEC and CIMSS. Gifts benefit our areas of greatest need and strengthen our areas of greatest opportunity. Targeted giving through the University of Wisconsin Foundation allows you to direct your contribution to a specific program.

To give please visit: **ssec.wisc.edu/give**

For more information on making a gift to SSEC or CIMSS, please contact:

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