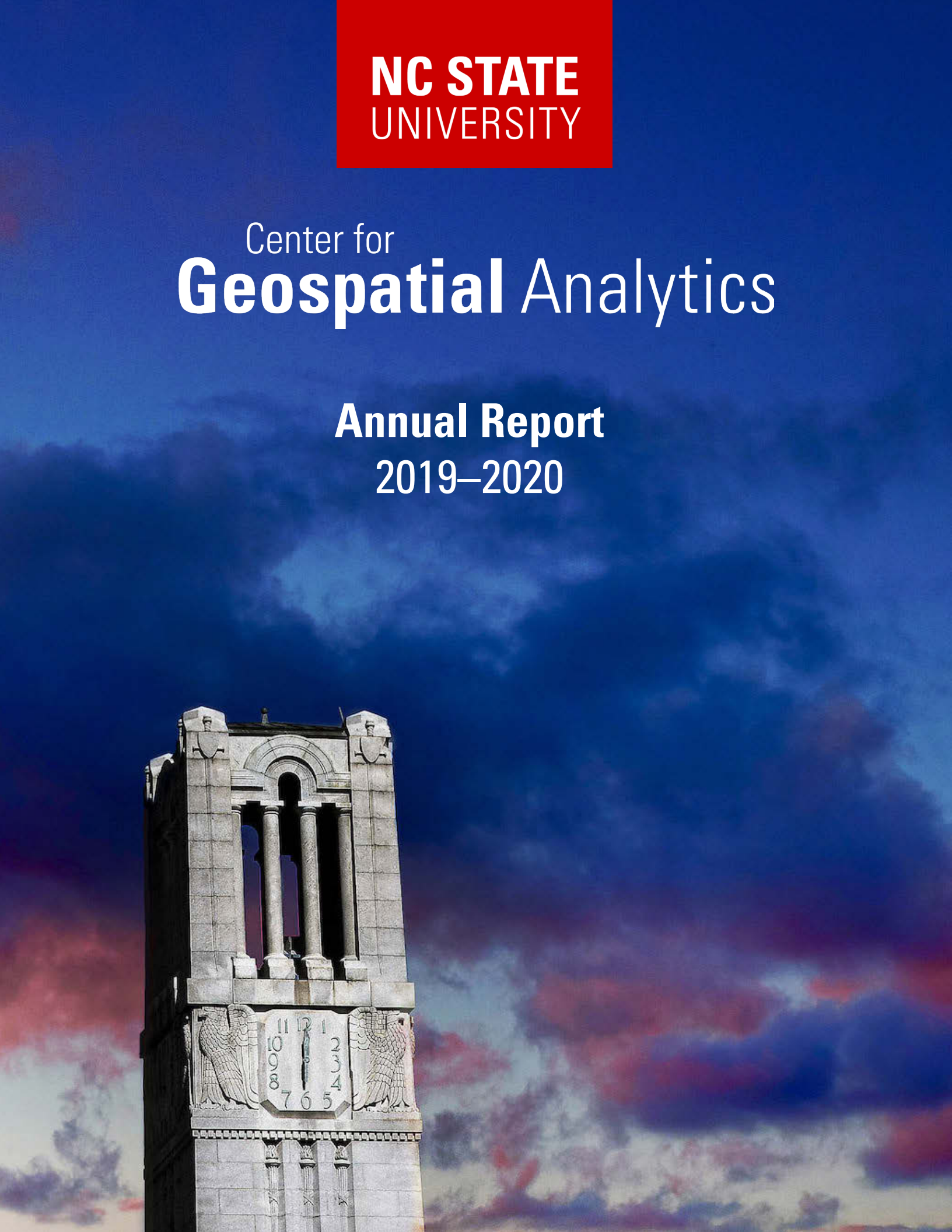
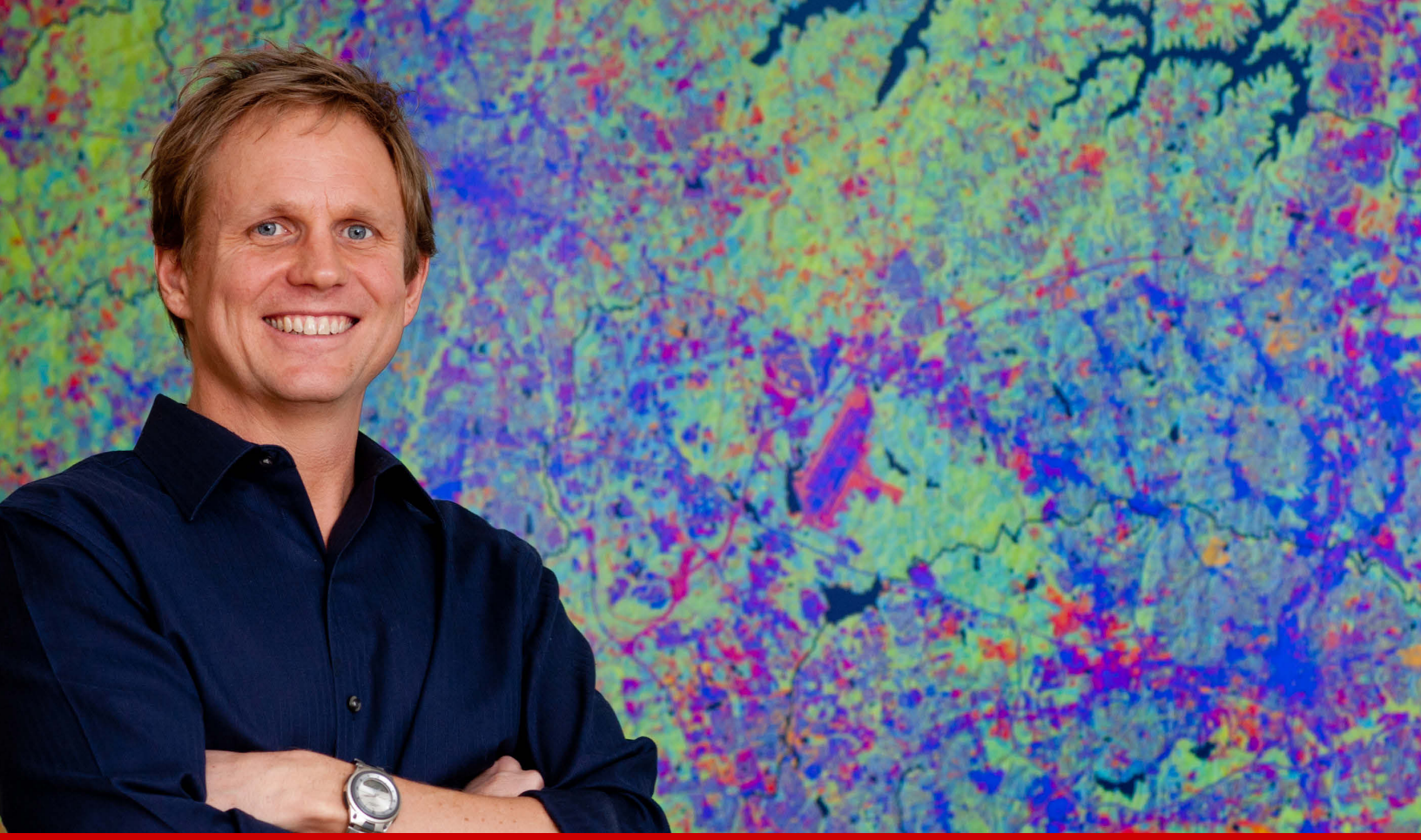
NC STATE UNIVERSITY

Center for Geospatial Analytics

Annual Report
2019–2020





MESSAGE FROM THE CENTER DIRECTOR

Welcome to the Center for Geospatial Analytics' 2019–2020 annual report. Our Center saw unprecedented growth and achievement this year, and I am pleased to share with you a recap of some of our academic, research and service highlights, as well as introduce you to some of our Center's newest members and alumni.

Our community grew by thirteen new staff and faculty hires, expanding our capacity for data-driven problem-solving in even more and varied ways. We also welcomed six new Faculty Fellows, enrolled our second cohort of talented Geospatial Analytics doctoral students and accepted our third cohort to start in Fall 2020. Our online Geospatial Information Science and Technology program also graduated a record number of professional master's students, and we are proud of all that they and the rest of our community have achieved in these unusual times.

I am also excited to share with you the Center's progress on several key initiatives. In Fall 2019, we unveiled five new strategic research frontiers, defining our unique contributions to the field of geospatial analytics. These research areas will focus our expanding efforts as we continue to push the boundaries of geospatial data science. A new undergraduate minor is also in the works, to serve the needs of even more NC State students and meet the demand for skilled graduates with GIS experience from a variety of disciplines.

Thank you to our entire community of faculty, researchers, students, administrative staff, donors, clients and partners for their dedication, enthusiasm and support of our Center.

As we like to say, location matters.

Dr. Ross Meentemeyer
Director of the Center for Geospatial Analytics
Goodnight Distinguished Professor of Geospatial Analytics

Center for
Geospatial Analytics

Annual Report 2019–2020

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14 ..... And Beyond

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About the Center

At the Center for Geospatial Analytics, we push the boundaries of spatial data science to advance discovery and inform real-world decision-making.

Our world-renowned researchers collaborate across disciplines to answer pressing questions about the world and address challenges.

Our signature academic programs train new generations of geospatial data scientists and GIS professionals to tackle emerging issues and leverage new technologies.

Through research, teaching and consulting, our community of experts work closely with industry, government, nonprofit and other community partners to produce data-driven solutions to real problems.

Connect with Us

Website: geospatial.ncsu.edu

Phone: 919-515-4000

Social:

NC State Center for Geospatial Analytics

@NCSUgeospatial

ACADEMICS

A Year of Growth

The next generation of interdisciplinary data scientists and GIS professionals find their start here, in the Center for Geospatial Analytics' academic programs. And our offerings only continue to grow.

This past academic year, we hired a talented new instructor to join our professional master's program, enrolled the second cohort of our groundbreaking doctoral program and admitted the third cohort, celebrated numerous honors and achievements by our exceptional graduate students, developed two new graduate courses and began developing a proposal for an undergraduate minor in GIS and Spatial Data Science.

Read more about our academic programs during the 2019–2020 academic year:

- > Ph.D. in Geospatial Analytics
- > Master of Geospatial Information Science & Technology
- > Graduate Certificate in GIS
- > Undergraduate Instruction
- > Graduate Minor in GIS
- > New Graduate Courses

21
unique courses taught by Center faculty

3,174
credit hours taught

305
graduate students in Center programs

300+
undergraduate students enrolled in Center GIS courses

93
2019–2020 graduates

30+
MGIST capstone partners

Ph.D. in Geospatial Analytics

Our interdisciplinary doctoral degree is the first of its kind, offering a unique training experience tailored to each student to help them develop novel understanding of spatial phenomena and apply new knowledge to grand challenges.

The program launched in Fall 2018 with its first cohort of 14 students, and a second cohort of 10 students joined the Center in Fall 2019 (see spotlight box below). An additional 11 students were admitted to the program to begin Fall 2020. Each student is supported by a fully funded four-year graduate assistantship with benefits and tuition support.

STUDENT HIGHLIGHT

As an Esri Development Center, the Center for Geospatial Analytics can select one student each year to be NC State's **EDC Student of the Year**. The honoree receives a cash prize, a certificate of award and a free Esri Press book. Their name is engraved on a plaque at the Center and entered in the worldwide EDC Student of the Year competition.

NC State's 2020 EDC Student of the Year is **Nikki Inglis**, a second-year doctoral student in Geospatial Analytics who develops spatial decision-support tools for fire management teams in National Parks.

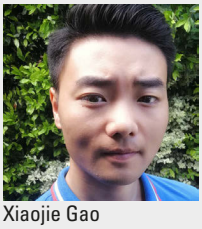
MEET OUR NEW PH.D. STUDENTS – FALL 2019

Elyssa Collins

Katie McQuillan

Mollie Gaines

Vinicius Perin


Xiaojie Gao

Laura Tomkins

Kate Jones

Thom Worm

Ian McGregor

Alexander Yoshizumi

STUDENT HIGHLIGHT

At the 2020 College of Natural Resources Graduate Research Symposium, Geospatial Analytics doctoral students took three of the four top awards:

Rohith Matli
1st place poster: Land, Wildlife & Forest Systems Management

Vini Perin
1st place poster: Human Dimensions & Community Health

Nick Kruskamp
1st place presentation: Three-Minute Thesis Competition

2019–2020 students:

46% female

73% domestic

79% have a master's degree

Geospatial Analytics Ph.D. students enjoying an escape room event in Fall 2019

Master of Geospatial Information Science & Technology

Our pioneering professional master's degree can be earned completely online and equips students with the knowledge and tools they need to succeed in the geospatial workforce and advance their GIS careers. The program debuted in 2010 and boasts over 200 alumni; 138 students were enrolled in 2019–2020.

Before graduation, each MGIST student completes a service learning capstone project, applying their skills and knowledge to solve a problem in collaboration with a community partner. This academic year, our 39 graduating students collaborated with 30 partners in government, nonprofits, industry and academia, addressing varied challenges with geospatial techniques and technology.

Read more: geospatial.ncsu.edu/news/tag/service-learning

Thank You

to Our 2019-2020 Capstone Partners:

City of Raleigh Parks, Recreation & Cultural Resources
Clean Jordan Lake
Cumberland County, NC
National Park Service
NC Department of Transportation
NC Division of Coastal Management
NC Division of Parks and Recreation
NC Office of State Budget and Management
NC Wildlife Resources Commission
North Carolina Alliance for Health
North Carolina/US Modernist
NC State University
- Center for Geospatial Analytics
- Dept. of Forestry and Environmental Resources
- Dept. of History
- Dept. of Parks, Recreation, and Tourism Management
- Dept. of Entomology & Plant Pathology
- Environmental Health & Public Safety
- Office of Information Technology

Recovery Alliance Initiative
Recreation Resources Service
SpatialGIS
The Nature Conservancy NC Chapter
Town of Apex
Town of Knightdale Fire Department
Triangle Bird Count
US Army Corps of Engineers
US Fish and Wildlife Service
US Geological Survey
VHB
Wake County Public School System
Winston-Salem Forsyth County Utilities

NEW FACULTY HIRE

In Fall 2019, we welcomed **Vaishnavi Thakar** as our new Assistant Teaching Professor of Geospatial Information Science & Technology. Thakar received her Ph.D. in Geospatial Information Sciences from the University of Texas at Dallas and performs research applying spatial statistics, analysis and modeling to disaster mitigation and resource management. She teaches in the MGIST program and will help shape the Center's growing undergraduate offerings as a member of the Education Committee.

2019–2020 students:

25% military-affiliated

92% exclusively online

34% female

14% underrepresented minority

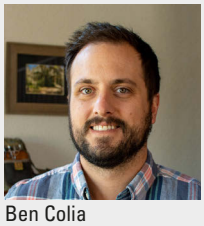
MEET OUR 2019-2020 MGIST GRADUATES

Fall 2019

Blake Baines

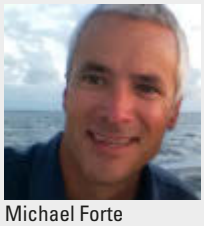
Tamika Brown

Michael Caslin

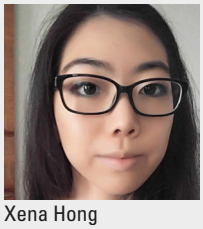

Ben Colia

Joel Conrad

John Cummings


Michael Forte

Eli Heetderks


Xena Hong

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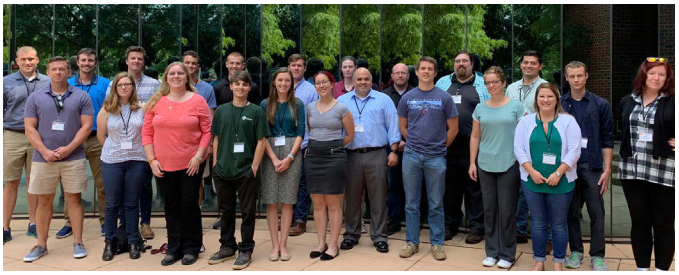


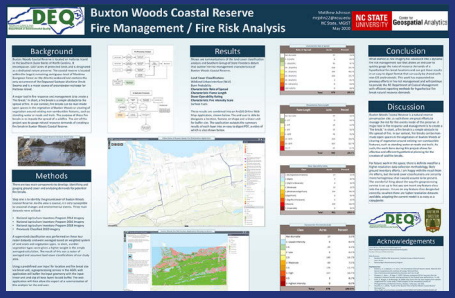
Fall 2019 MGIST orientation

Spring 2020 MGIST orientation

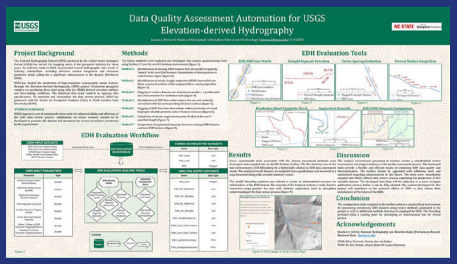
STUDENT HIGHLIGHT

In Spring 2020, graduating MGIST students competed in a capstone poster competition to showcase their service-learning projects:

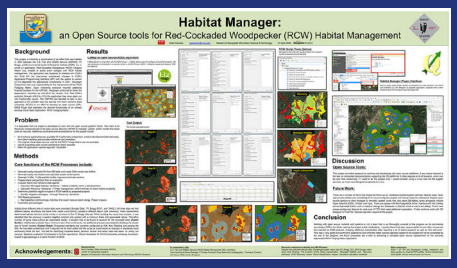
1st place: **Matthew Johnson**



2nd place: **Lucian Stewart**



3rd place: **Victor Dawson**



Tom Koch

Colleen Lippert

Daniel Oberrender

Madeline Pope

Elizabeth Robinson

Guillermo Valenciano

Shannon Veraldi

Sandi Watkins

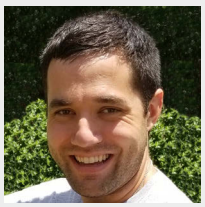
Calaen Wilson

Spring 2020

Jim Albert

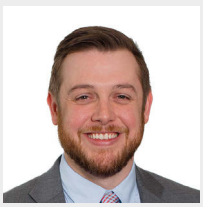
Sadie Barker

Adam Blythe



Justin Castrati

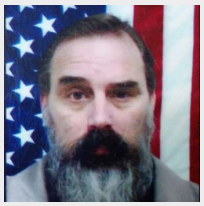
Charlie Charping



Matthew Cobb*

Anja Collette

Brett Cox



Victor Dawson

Samuel Franklin*

Matthew Johnson

Alli Jones

* Finishing the program in Summer 2020

Continued...

Symposium Adjustments due to COVID-19

Each semester, graduating MGIST students present their capstone projects at a Digital Symposium & Professional Showcase on NC State's campus. The Spring 2020 event was cancelled due to COVID-19, and so the Center held a digital poster competition (see spotlight box above) and virtual celebration on Zoom.

At the online celebration, Spring 2020 graduate Sadie Barker gave an uplifting address to her fellow students and friends, family and other members of the Center community.

Martine Kamabu

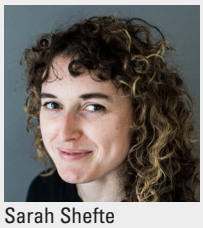
Todd Kesselring

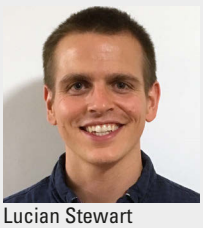
Kelsey Little

Xingli Ma

Jennifer Parra-MacDougal

Christine Pilato


Sarah Shefte


Lucian Stewart

James Wheaton

Graduate Certificate in GIS

Our graduate certificate program launched in 2002 and boasts over 400 alumni; 143 students were enrolled in 2019–2020, with 39% simultaneously pursuing another degree at NC State. Female students comprise 49% of all enrolled; 9% of students are from underrepresented minorities. The program helps students develop core skills to establish themselves in GIS practice or enhance existing skill sets to advance their careers. Students may also use the certificate as a stepping-stone towards full graduate study in the MGIST program. Like the MGIST, the certificate can be completed entirely online.

Undergraduate Instruction

The Center for Geospatial Analytics currently offers two undergraduate courses, which regularly enroll 300 students each year from over a dozen majors and every college at NC State University:

> GIS 205: Spatial Thinking with GIS
> GIS 280: Introduction to GIS

Now, the Center is developing a proposal to establish an undergraduate minor, one with a comprehensive and rigorous curriculum that can be paired with practically any major.

Adding this minor to our portfolio of programs will position the Center as a world-class training hub for the full ladder of geospatial education, from undergraduate to doctorate.

Graduate Minor in GIS

Graduate students enrolled at NC State in a non-GIS major may earn a graduate minor through the Center. This year, 15 students pursued our GIS minor: seven master's students and eight Ph.D. students representing eight majors from natural resources to civil engineering.

New Graduate Courses

This year, the Center developed two new graduate courses. Led by the College of Design, the three-credit course GIS/LAR 517: GIS Applications in Landscape Architecture and Environmental Planning introduces students to the methods and applications of geographic spatial modeling technology in landscape architecture and environmental planning and is offered in fall semesters. The new three-credit course GIS/MEA 584: Mapping and Analysis Using UAS is offered in summer and provides an overview of unmanned aerial system (UAS) mapping technology, rules and regulations. The principles of UAS data collection are explained along with optional hands-on practice with flight planning and execution. The course mainly focuses on processing and visualizing imagery collected from UAS.

RESEARCH

New Directions

This year marked a new era for the Center for Geospatial Analytics, as we unveiled five new strategic research themes that underscore the innovations and novel approaches that set us apart in our field.

We also substantially grew our research capacity: Mirela Tulbure joined NC State as the newest member of the Chancellor's Faculty Excellence Program faculty cluster in geospatial analytics, and we hired four new postdoctoral scholars and seven new research staff, including the Center's first two full-time research software engineers.

The Faculty Fellows program also grew by six new members, representing a new total of six colleges at NC State.

Read more about our research activities during the 2019–2020 academic year:

> Research Frontiers
> New Faculty and Staff
> Grants and Contracts
> In the Press

46+
publications

24+
new affiliated grants

5+
publications with a student first author

$3.4+M
new affiliated funding

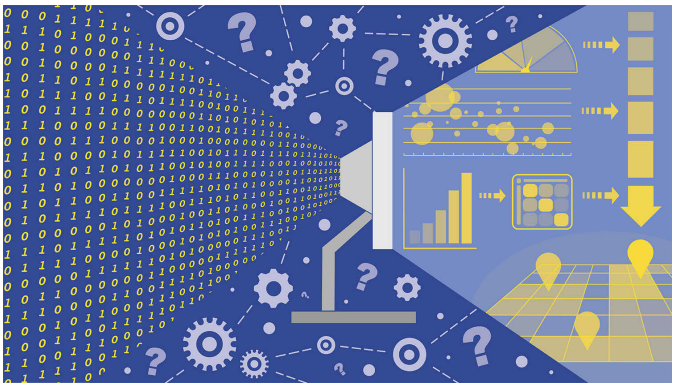
25+
conference presentations

New Research Frontiers

In Fall 2019, the Center launched five new strategic research frontiers to define and highlight our strengths and aspirations as we push the boundaries of geospatial data science. The frontiers emerged after consultation with Center faculty and research staff and will catalyze future collaboration.

To launch the frontiers, we redesigned our website and created new branded graphics and print materials.

Read more: geospatial.ncsu.edu/research



Creating Near Real-Time Decision Analytics

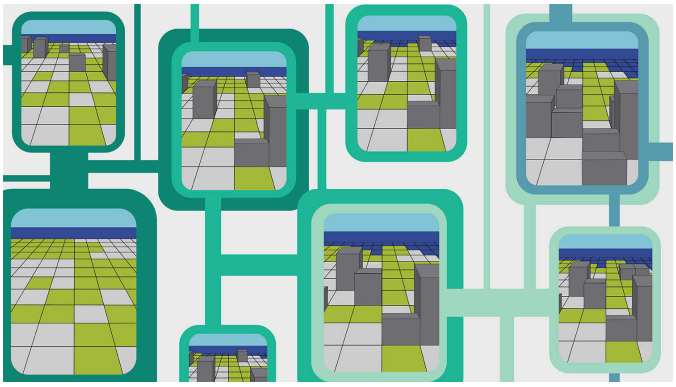
Data and models are useful only when they make sense to the people who need them. We remove technical barriers by creating user-friendly discovery tools — online dashboards and interactive maps — that present essential information clearly and quickly.

Mapping a Dynamic Planet

Devices that collect location-specific data are everywhere. We create new methods to collect and process massive datasets from these sensors, to map and monitor our changing planet from local to global scales.

Exploring Models through Tangible Interaction

Not everyone wants to use a computer mouse to explore data and models. We create tools that are literally hands-on, allowing anyone to shape, mold or otherwise change a physical surface to drive a computer simulation.



Forecasting Landscape and Environmental Change

Big data provide essential starting information for computer models, which can be used to make predictions. We develop models that simulate real-world conditions and forecast alternative futures, revealing the impacts of different decisions.

Engaging Communities with Participatory Modeling

To solve tough problems, people must work together — to define the problem, understand complexities and explore solutions. We work closely with communities to help them find the right geospatial data and models essential to their decision-making process.

New Faculty Fellows

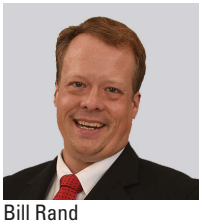
Our Faculty Fellows program is a touchstone of excellence for NC State faculty pushing the frontiers of geospatial data science. Fellows collaborate on research, teach advanced classes, advise doctoral students, host Geospatial Forum speakers and provide direction for our expanding geospatial activities on campus and beyond.

This academic year, we welcomed six new fellows, including our first from NC State's Poole College of Management.

Sankar Arumugam

Daniela Jones

Chris Osburn


Bill Rand

Jennifer Richmond-Bryant

Mirela Tulbure

FACULTY SPOTLIGHT

In Fall 2019, we welcomed **Mirela Tulbure** from the University of New South Wales in Sydney as the newest member of the Chancellor's Faculty Excellence Program's geospatial analytics faculty cluster. Tulbure joined NC State as a tenured associate professor in the Department of Forestry and Environmental Resources and as a Center for Geospatial Analytics faculty fellow. Her research uses big data to explore the dynamics of rivers, streams and other surface waters, to quantify and improve understanding of surface water extent, vegetation and landscape connectivity dynamics in water-stressed regions. Tulbure is a member of the Center's Steering Committee and teaches one of the Geospatial Analytics Ph.D. program's core courses, GIS 712: Environmental Earth Observation and Remote Sensing.

15
research assistants, associates and scholars

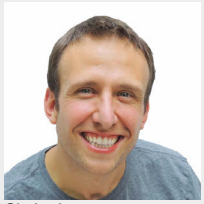
5
postdoctoral scholars

33
faculty fellows

FROM

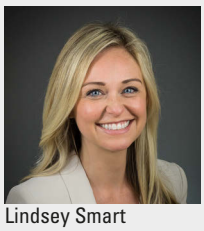
12
academic departments

NEW RESEARCH STAFF


Chris Jones

Margaret Lawrimore

Georgina Sanchez


Lindsey Smart

Vaclav Petras

Anna Petrasova

Chelsey Walden-Schreiner

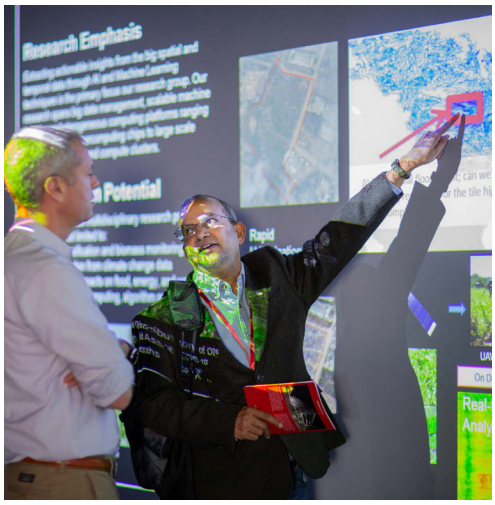
NEW POSTDOCTORAL SCHOLARS

Laura Belica

Wanwan Liang

Scott Ogletree

Ben Seliger



Grants & Contracts

This past year, our faculty fellows and researchers were involved in Center-affiliated externally funded research grants totalling nearly $2 million in expenditures. They also secured over two dozen new grants that began on or after 1 July 2019 and sum to over $3.4 million in funding. An additional 22 grant proposals are pending.

The Center is currently involved in over 40 active grants. These funded projects are supported by a variety of agencies and groups:

- Anza-Borrego Foundation
- Game-Changing Research Incentive Program for Plant Sciences (GRIP4PSI)
- Millenium Challenge Corporation
- National Academies
- National Aeronautics and Space Administration (NASA)
- National Oceanic and Atmospheric Administration (NOAA)
- National Science Foundation (NSF)
- NC Department of Agriculture
- NC Department of Transportation
- NC State University
  - Center for Human Health and the Environment
  - NC Space Grant Consortium
  - Sea Grant Program
  - Water Resources Research Institute
- Robert Wood Johnson Foundation
- RTI International
- Swine Health Information Center
- US Department of Agriculture
  - Animal and Plant Health Inspection Service (APHIS)
  - Forest Service
  - National Institute of Food and Agriculture
- US Fish and Wildlife Service
- US Geological Survey
- US National Park Service

FUNDING SPOTLIGHT

A new partnership between our Center and the US Department of Agriculture's Animal and Plant Health Inspection Service (USDA APHIS) is exploring how to use big data to stop the spread of pests and pathogens. Already, the research has sparked the innovation of analytical tools that combine sophisticated models with user friendly interfaces to forecast spread. This past year, USDA APHIS funded seven new grants affiliated with the Center, totalling over $1.6 million. The principal investigators on these funded projects include Center Director **Ross Meentemeyer**, Associate Director of Geovisualization **Helena Mitasova**, Research Scholar **Chris Jones**, and Senior Research Scholar **Yu Takeuchi**, a Center for Geospatial Analytics partner at the Center for Integrated Pest Management. The following grants are supported by USDA APHIS:

- Forecasting Plant Pest Spread Using Tangible Landscape Technology
- Eradication Analysis & Decision Support (eRADS)
- Evaluation of Pathways, Trends, and Risks to Improve Targeting
- Spatial Analytic Framework for Advanced Risk Information Systems (SAFARIS) – Technical Development
- Tangible Landscape Framework
- Plant Pest Pathway Characterization with Pandemic Approach
- Sensor Integrated Platform for Monitoring *Phytophthora*

Meetings with APHIS leadership have provided updates on research progress, demonstrated the potential for analytical tools to meet agency goals and fostered collaboration with APHIS personnel.

DIRECTOR SPOTLIGHT

In 2019, **Ross Meentemeyer** was appointed the Goodnight Distinguished Professor of Geospatial Analytics in recognition of his contributions to advancing the field. Meentemeyer is a foundational member of the Chancellor's Faculty Excellence Program's geospatial analytics faculty cluster and took over strategic direction of the Center for Geospatial Analytics in 2013. He established the Center's Geospatial Forum series, Faculty Fellows program and Geospatial Analytics Ph.D. The professorship was made possible by a gift from longtime NC State supporters Jim and Ann Goodnight.

In the Press: UAVs and Christmas Trees

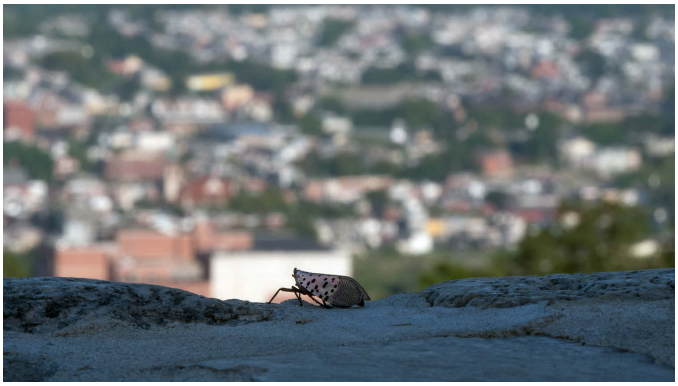
In December 2019, the Center for Geospatial Analytics announced a new partnership between NC State's Christmas Tree Extension Team and our Center to test how unmanned aerial vehicles (UAVS, or drones) can help NC Christmas tree growers more efficiently monitor tree size and health. Several online magazines picked up the story, including Futurity.org and Futurism.com. The College of Agricultural and Life Sciences invited research associate Justyna Jeziorska to speak at a donor event about UAV technology and how it helps farmers.

Read more: go.ncsu.edu/uavs-christmas-trees

In the Press: A New Way to Stop Insect Pests

In July 2019, we unveiled a powerful new ecological forecasting and decision-support tool called PoPS, the Pest or Pathogen Spread Forecasting Platform, which is helping resource managers across the US curb the spread of spotted lanternfly and other invasive insect pests. The announcement was reprinted by *Pest Control Technology* magazine, *Mirage News* in Australia, Phys.org and the Education News blog.

Read more: go.ncsu.edu/stopping-insect-pests

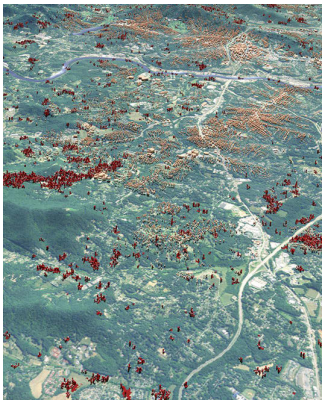


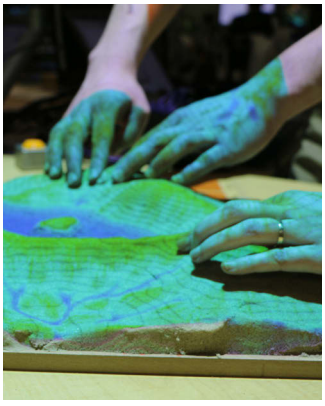
Software Releases

In October 2019, our developers announced the first stable release of Tangible Landscape, the Center's signature open source system for hands-on geospatial modeling: Tangible Landscape 1.0.0.

In January 2020, our developers released the newest official version of the Center's open source software for modeling urban growth: FUTURES 2.0.0.

Read more: geospatial.ncsu.edu/news/tag/software-release





DIRECTOR SPOTLIGHT

In March, the University Consortium for Geographic Information Science awarded its 2020 Research Award to **Helena Mitasova**, our Associate Director of Geovisualization. The honor recognizes Mitasova's "groundbreaking work in the methodological and theoretical developments of open source geospatial software." As UCGIS explains, Mitasova "played a critical role in establishing the first Open Source Geospatial Research and Education Lab in the United States, which subsequently became a primary node of the OSGeo global network of GeoForAll Labs."

AND BEYOND

New Opportunities

Each year brings more, and more varied, opportunities for our students, research staff and faculty to make impactful contributions beyond the classroom and lab. Public talks, special events, workshops and celebrations strengthen our connections with the larger geospatial community and help us to better serve the needs of geospatial professionals, learning partners and our Service Center clients.

We deeply appreciate the members of our Center who make these activities possible, and the members of our community who engage with us.

Read on to learn more about:

> Geospatial Forum
> GIS Day Celebrations
> Research Demonstrations
> Service Center
> GAPS
> Geospatial Graduate Student Organization
> Awards Banquet and Other Celebrations

9
Geospatial Forum speakers

5
off-campus research demonstrations

100+
students reached over the lifetime of GAPS high school program

16
visiting groups to the Geovisualization Lab

70+
GISocial attendees

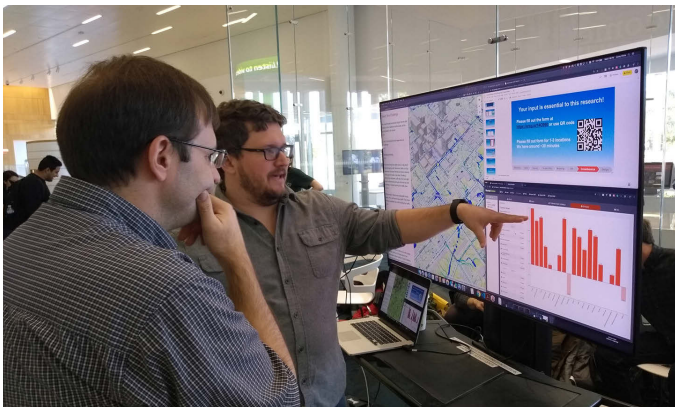
Engaging with Our Community

This academic year, our Center hosted nine distinguished speakers for the Geospatial Forum and added a livestream option by popular demand. The final forum of Spring 2020 was held on Zoom due to COVID-19, and over sixty people attended online.

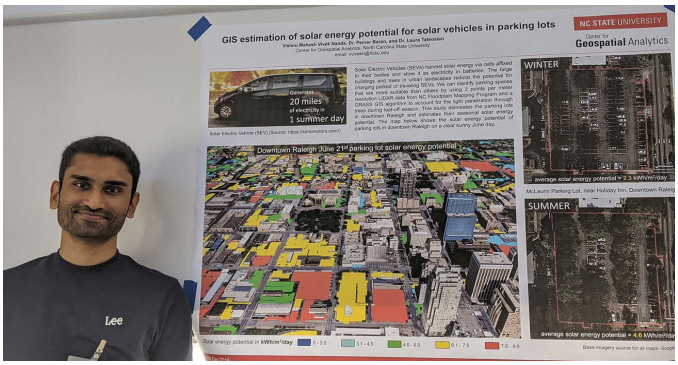
We also offered the Unmanned Aerial Systems (UAS) Operations & Analytics workshop, hosted visitors to our Geovisualization Lab and demonstrated our research and technologies at public events.

November marked the first GIS Day celebration organized by our Center, uniting students and professionals from around the Triangle to enjoy shared interests and experience.

Our Center hosted its first Triangle GISocial, a GIS Day celebration and networking opportunity, at the City of Raleigh Museum in November. This special event was sponsored by Geo Owl and attended by over seventy students, alumni and geospatial professionals from the Triangle region of North Carolina.



Center students and staff presented research at the GIS Day Open House hosted by NC State University Libraries.



Geospatial Analytics Ph.D. student Vishnu M. Vivek Nanda won 1st place in the Raleigh GIS Day 2019 Poster Contest.

GEOSPATIAL FORUM SERIES 2019-2020

Dr. Mirela Tulbure – NC State
Remote Sensing and Spatiotemporal Analysis of Surface Water, Vegetation, and Landscape Connectivity Dynamics in a Water-Stressed Region

Dr. Julian Agyeman – Tufts University
Just Sustainabilities in Policy, Planning and Practice

Dr. Karl Wegmann – NC State
Adventures in (Digital) Vegetation Removal for Geologic Hazards Research and a Bit of a Fish Story, Too

Mr. Matthew Dusch &
Mr. Harrison Webb – Esri Charlotte
ArcGIS Enterprise in the Cloud

Dr. Sankar Arumugam – NC State
Climate-Informed Uncertainty Analyses for Water and Energy Management: Opportunities and Challenges

Dr. Michael Dietze – Boston University
Forecasting Ecology in a Changing World

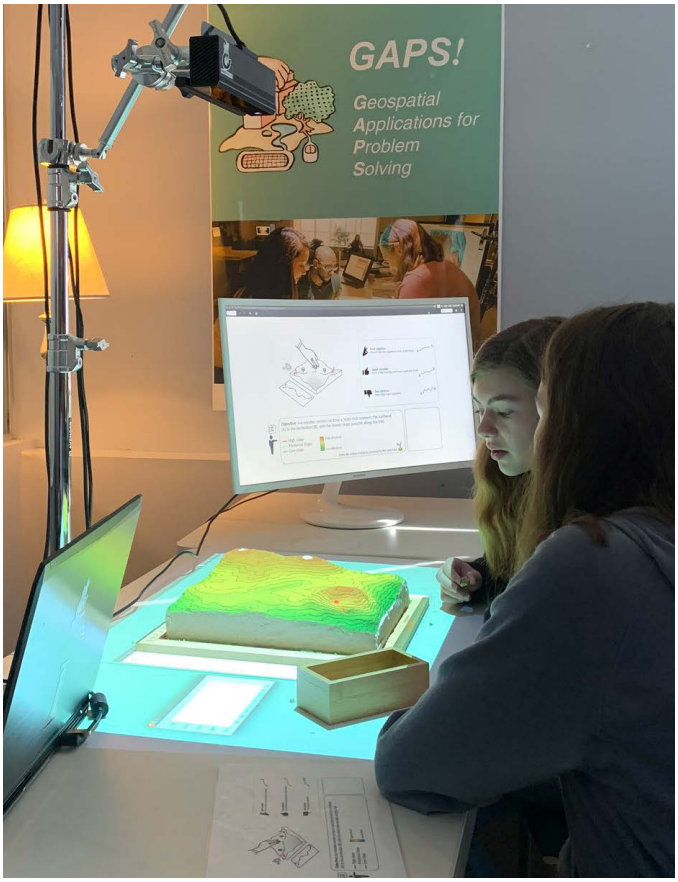
Dr. Matthew Hansen – University of Maryland
Advancing Global Land Monitoring

Dr. Bill Rand – NC State
Space, Time and Hurricanes: How Location Affects Social Media

DISCOVERY MEETINGS, RESEARCH DEMOS AND YOUTH EDUCATION

Between July 2019 and February 2020, our state-of-the-art Geovisualization Lab welcomed sixteen visiting groups for live demonstrations. These groups included over 30 local STEM educators, staff of Congressman David Price's office, Strata Solar, Draganfly, GEOI Solutions, the NC Climate Office, NC Emergency Management, NC Department of Transportation, state wildlife and conservation agencies and the environmental branch of the US Department of Defense.

Center researchers also took demos on the road! Tangible Landscape, our signature technology for hands-on modeling, was demonstrated at multiple outside venues including the "Innovations and Libations" Homecoming Reunion for the Black Alumni Society at Raleigh's Google Fiber Space. Tailored demos were also presented for The Nature Conservancy, Czech University of Life Sciences and AERANN Instruments and Engineering Services.



Our highly successful extracurricular program for high school students—Geospatial Applications for Problem Solving, or GAPS—expanded in Summer 2019 to offer its first workshop for teachers. The two-and-a-half year program also came to a close in Spring 2020.

Over its lifetime, GAPS provided free mentoring and hands-on mapping experience for more than 100 students in Wake County. Twelve middle and high school teachers from Durham County attended the summer workshop.

The goal of GAPS was to provide unique opportunities for high school students from all backgrounds, particularly groups historically underrepresented in STEM, to experience mapping, spatial analysis and visualization, and gain fundamental skills for a variety of careers in the geospatial sciences.

Program partners included the College of Education at NC State, Wade Edwards Foundation and Learning Lab, and RTI International. GAPS was supported by generous grants from the Burroughs Wellcome Fund and NC Space Grant.

SERVICE CENTER

Through our Service Center, government agencies, private companies and other clients gain payment-based access to resources and expertise at the Center for Geospatial Analytics. With a focus on finding the right approach for each client, we leverage the skill sets and knowledge base of personnel at the Center for Geospatial Analytics to perform geospatial services on a contract basis. For example, clients purchase the time of our resident experts to develop GIS web maps or purchase space on our file servers to archive and display data. Clients also request skills training to build their own capacities, for example, in data analysis or unmanned aerial systems (UAS).

This academic year, we served clients both internal and external to NC State, generating maps, creating geodatabases and visualizations and providing a UAS operations workshop.

Find out more: geospatial.ncsu.edu/engage/service-center

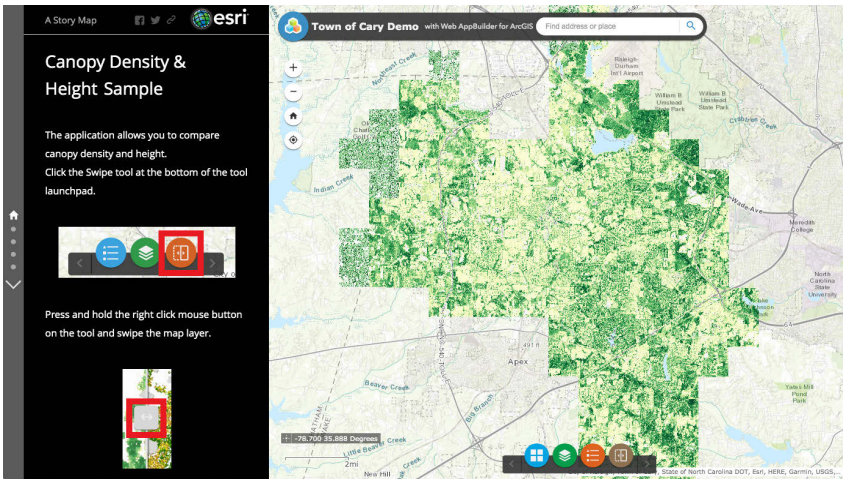
Through hands-on training, our UAS experts provide experience in drone flight planning and teach researchers, students and practitioners how to process the imagery collected.

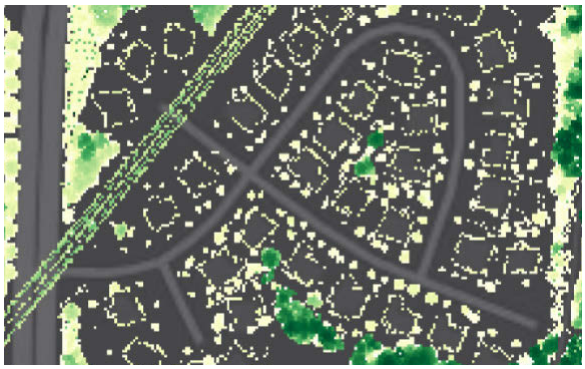
Thank You

to Our 2019-2020 Service Center Clients:

Town of Cary
Northern Arizona University
NC State University Dept. of Entomology

Data begin to tell their story only after they have been properly processed, mapped and visualized. Our researchers help clients to clean their data, removing noise and extraneous features, and visualize the data in meaningful ways, such as through interactive web mapping applications.





Celebrating Our Community

Our Center had a lot to celebrate this academic year! Despite challenges, our community of students, researchers, staff and faculty continue to impress with their dedication, spirit of service and commitment to excellence.

During the Fall 2019 semester, we celebrated promotions, achievements and graduations as well as organized opportunities to simply gather as a community to enjoy each other's company. We look forward to once again gathering in person to celebrate ongoing accomplishments!

In October, the Center hosted its first Awards Banquet, celebrating achievements by the Center community and recognizing members with five new Center awards.

In October, the Center hosted a celebration for Director Ross Meentemeyer, at which College of Natural Resources Dean Myron Floyd announced Meentemeyer's appointment as the Goodnight Distinguished Professor of Geospatial Analytics.

This year, the Geospatial Graduate Student Organization organized a range of team-building events, game nights, professional development activities and service projects. Members participated in the Girl Scout TechnoQuest speed-mentoring event and partnered with Wake County's Holiday Cheer program to support a family in need.

Fall Commencement saw the graduation of 18 MGIST students, 25 Graduate Certificate in GIS students, and one Geospatial Analytics doctoral student. Spring Commencement exercises were postponed, but the Center celebrated online its 21 MGIST and 28 Graduate Certificate graduating students.

Publications (Not an exhaustive list)

Bhattachan, A., Jurjonas, M.D., Morris, P.R., Taillie, P.J., **Smart, L.S., Emanuel, R.E.**, & Seekamp, E.L. (2019). Linking residential saltwater intrusion risk perceptions to physical exposure of climate change impacts in rural coastal communities of North Carolina. Natural Hazards, 97, 1277-1295. https://doi.10.1007/s11069-019-03706-0

Bolton, D.K., **Gray, J.M.**, Melaas, E.K., et al. (2020). Continental-scale land surface phenology from harmonized Landsat 8 and Sentinel-2 imagery. Remote Sensing of Environment, 240, 111685. https://doi. 10.1016/j.rse.2020.111685

Bunds, K.S., Casper, J.M., **Hipp, J.A.**, Koenigstorfer, J. (2019). Recreational walking decisions in urban away-from-home environments: the relevance of air quality, noise, traffic, and the natural environment. Transportation Research Part F: Traffic Psychology and Behavior, 65, 363-375. https://doi. 10.1016/j.trf.2019.08.006

Chen, R., **Hipp, J.A.**, Morrison, L., et al. (2019). Association of number of indoor tanning salons with neighborhoods with higher concentrations of male-male partnered households. JAMA Network Open, 2(10), Article e1912443. https://doi.10.1001/jamanetworkopen.2019.12443

Cobb, R.C., Haas, S.E., **Kruskamp, N.**, Dillon, W.W., Swiecki, T.J., Rizzo, D.M., Frankel, S.J., **Meentemeyer, R.K.** 2020. The magnitude of regional-scale tree mortality caused by the invasive pathogen Phytophthora ramorum. Earth's Future. [in press] https://doi.org/10.1029/2020EF001500

Coetzaa, S., Ivanova, I., **Mitasova H.**, Brovelli, M.A. 2020. Open geospatial software and data: A review of the current state and a perspective in the future. ISPRS International Journal of Geo-Information, 9(2), 90. https://doi: 10.3390/ijgi9020090

Coffer, M.M. (2020). Balancing privacy rights and the production of high-quality satellite imagery. Environmental Science & Technology. Advance online publication. https://doi.org/10.1021/acs.est.0c02365

Coffer, M.M., Schaeffer, B.A., Darling, J.A., et al. (2020). Quantifying national and regional cyanobacterial occurrence in US lakes using satellite remote sensing. Ecological Indicators, 111, Article 105976. https://doi.org/10.1016/j.ecolind.2019.105976

Cutts, B.B., Greenlee, A.J., Hornik, K., Nigrelli, C.A. (2020). Hyperlocal sustainabilities: theorizing action research for sustainability in the digital age. Sustainability Science, 15(1), 315-331. https://doi.org/10.1007/s11625-019-00694-9

Del Giudice, D., **Matli, V.R.R., Obenour, D.R.** (2019). Bayesian mechanistic modeling characterizes Gulf of Mexico hypoxia: 1968-2016 and future scenarios. Ecological Applications, Article e02032. https://doi.org/10.1002/eap.2032

Fang, S., Del Guidice, D., Scavia, D., Binding, C.E., Bridgeman, T.B., Chaffin, J.D., Evans, M.A., Guinness, J., Johengen, T.H., **Obenour, D.R.** (2019). A space-time geostatistical model for probabilistic estimation of harmful algal bloom biomass and areal extent. Science of The Total Environment, 695, Article 133776. https://doi.org/10.1016/j.scitotenv.2019.133776

Harmon, B.A., **Mitasova, H., Petrasova, A., Petras, V.** (2019). R.sim.terrain 1.0: a landscape evolution model with dynamic hydrology. Geoscientific Model Development, 12, 2837-2854. https://doi.org/10.5194/gmd-12-2837-2019

Hasala, D., **Supak, S.**, Rivers, L. (2020). Green infrastructure site selection in the Walnut Creek wetland community: A case study from southeast Raleigh, North Carolina. Landscape and Urban Planning, 196: Article 103743. https://doi.org/10.1016/j.landurbplan.2020.103743

Hefner, W.L., Nooner, S.L., Chadwick, W.W., **Bohnenstiehl, D.R.** (2020). Revised magmatic source models for the 2015 eruption at Axial Seamount including estimates of fault-induced deformation. Journal of Geophysical Research: Solid Earth, 125 Article e2020JB019356. https://doi.org/10.1029/2020JB019356

Holcomb, J.A., Runnels, C., **Wegmann, K.W.** (2020). Deposit-centered archaeological survey and the search for the Aegean Palaeolithic: A geoarchaeological perspective. Quaternary International. [in press] https://doi.org/10.1016/j.quaint.2020.04.043

House, J.S., Hall, J., Park, S.S., Planchart, A., **Money, E.**, et al. (2019). Cadmium exposure and MEG3 methylation differences between Whites and African Americans in the NEST Cohort. Environmental Epigenetics, 5(3), Article dvz014. https://doi.org/10.1093/eep/dvz014

Inglis, N.C. & **Vukomanovic, J.** 2020. Visualizing when, where, and how fires happen in U.S. parks and protected areas. ISPRS International Journal of Geo-Information, 9(5), 333. https://doi:10.3390/ijgi9050333

Jeziorska, J. (2019). UAS for wetland mapping and hydrological modeling. Remote Sensing, 11(17), 1997. https://doi.org/10.3390/rs11171997

Jurjonas, M., Seekamp, E., Rivers, L. **Cutts, B.** (2020). Uncovering climate (in)justice with an adaptive capacity assessment: A multiple case study in rural coastal North Carolina. Land Use Policy, 94, Article 104547. https://doi.org/10.1016/j.landusepol.2020.104547

Kozik, P., **Tateosian, L.G.**, et al. (2019). Impressionism-inspired data visualizations are both functional and liked. Psychology of Aesthetics, Creativity, and the Arts, 13(3), 266-276. https://doi.org/ 10.1037/aca0000175

Leithold, E.L., **Wegmann, K.W., Bohnenstiehl, D.R.**, et al. (2019). Repeated megaturbidite deposition in Lake Crescent, Washington, USA, triggered by Holocene ruptures of the Lake Creek-Boundary Creek fault system. GSA Bulletin, 131(11-12), 2039-2055. https://doi.org/10.1130/B35076.1

Li, C., **Sanchez, G.M.**, Wu, Z., Cheng, J., Zhang, S., Wang, Q., Li, F., Sun, G., **Meentemeyer, R.K.** (2020). Spatiotemporal patterns and drivers of soil contamination with heavy metals during an intensive urbanization period (1989-2018) in southern China. Environmental Pollution, 260, Article 114075. https://doi.org/10.1016/j.envpol.2020.114075

Li, C., Sun, G., Cohen, E., **Zhang, Y.**, Xiao, J., McNulty, S.G., and **Meentemeyer, R.K.** (2020). Modeling the impacts of urbanization on watershed-scale gross primary productivity and tradeoffs with water yield across the conterminous United States. Journal of Hydrology, 583, Article e124581. https://doi.org/10.1016/j.jhydrol.2020.124581

Li, C., Sun, G., Caldwell, P.V., Cohen, E., Fang, Y., **Zhang, Y.**, Oudin, L., **Sanchez, G.M., Meentemeyer, R.K.** (2020). Impacts of urbanization on watershed water balances across the conterminous United States. Water Resources Research 56(7): e2019WR026574. https://doi.org/10.1029/2019WR026574

Liang, W., Abidi, M., Carrasco, L., et al. (2020). Mapping vegetation at species level with high-resolution multispectral and lidar data over a large spatial area: a case study with kudzu. Remote Sensing, 12(4),609. https://doi.org/10.3390/rs12040609

Marquet, O., Hipp, J.A., Alberico, C., Huang, J., Fry, D., **Mazak, E.**, et al. (2019). How does park use and physical activity differ between childhood and adolescence? A focus on gender and race-ethnicity. Journal of Urban Health, 96(5), 692-702. https://doi.org/10.1007/s11524-019-00388-8

Marquet, O., Hipp, J.A., Alberico, C., Huang, J., Fry, D., **Mazak, E.**, et al. (2019). Short-term associations between objective crime, park-use, and park-based physical activity in low-income neighborhoods. Preventive Medicine, 126, Article 105735. https://doi.org/10.1016/j.ypmed.2019.05.023

McGregor, D., **Supak, S.**, Rivers, L. 2020. Green infrastructure site selection in the Walnut Creek wetland community: A case study from southeast Raleigh, North Carolina. Landscape and Urban Planning, 196, Article 103743. https://doi.org/10.1016/j.landurbplan.2020.103743

Miller, J.W., Paul, M.J., **Obenour, D.R.** (2019). Assessing potential anthropogenic drivers of ecological health in Piedmont streams through hierarchical modeling. Freshwater Science, 38(4), 771-789. https://doi.org/10.1086/705963

Morris, S.A., **Reich, B.J.**, Thibaud, E. (2019). Exploration and inference in spatial extremes using empirical base functions. Journal of Agricultural, Biological and Environmental Statistics, 24(4), 555-572. https://doi.org/10.1007/s13253-019-00359-1

Nelson, N.G., Montefiore, L., Anthony, C., et al. (2019). Undergraduate perceptions of climate education exposure in natural resources management. Transactions of the ASABE, 62(3), 831-839. https://doi.org/10.13031/trans.13361

Petrasova, A., Hipp, J.A., Mitasova, H. (2019). Visualization of pedestrian density dynamics using data extracted from public webcams. ISPRS International Journal of Geo-Information, 8, Article 559. https://doi.org/10.3390/ijgi8120559

Phlips, E.J., Badylak, S., **Nelson, N.G.**, Havens, K.E. (2020). Hurricanes, El Nino and harmful algal blooms in two sub-tropical Florida estuaries: direct and indirect impacts. Scientific Reports, 10, Article 1910. https://doi.org/10.1038/s41598-020-58771-4

Pickard, B.R., **Meentemeyer, R.K.** (2019). Validating land change models based on configuration disagreement. Computers, Environment and Urban Systems, 77, Article 101366. https://doi.org/10.1016/j.compenvurbsys.2019.101366

Rice, J.S., **Emanuel, R.E.** (2019). Ecohydrology of interannual changes in watershed storage. Water Resources Research, 55(10), 8238-8251. https://doi.org/10.1029/2019WR025164

Richmond-Bryant, J., Mikati, I., Benson, A.F., et al. (2020). Disparities in distribution of particulate matter emissions from US coal-fired power plants by race and poverty status after accounting for reductions in operations between 2015 and 2017. American Journal of Public Health, 110, 655-661, https://doi.org/10.2105/AJPH.2019.305558

Rudolph, J.C., Arendt, C.A., Houndhell, A.G., Paerl, H.W., **Osburn, C.L.** (2020). Use of geospatial, hydrologic, and geochemical modeling to determine the influence of wetland-derived organic matter in coastal waters in response to extreme weather events. Frontiers in Marine Science, 7, Article 18. https://doi.org/10.3389/fmars.2020.00018

Sanchez, G.M., Terando, A., Smith, J.W., Garcia, A.M., Wagner, C.R., **Meentemeyer, R.K.** (2020). Forecasting water demand across a rapidly urbanizing region. Science of the Total Environment, 730, Article 139050. https://doi.org/10.1016/j.scitotenv.2020.139050

Simler-Williamson, A.B., Metz, M.R., Frangioso, K.M, **Meentemeyer, R.K.**, et al. (2019). Compound disease and wildfire disturbances alter opportunities for seedling regeneration in resprouter-dominated forests. Ecosphere, 10(12), Article e02991. https://doi.org/10.1002/ecs2.2991

Stanimirova, R., Cai, Z., Melaas, E.K., **Gray, J.M.**, et al. (2019). An empirical assessment of the MODIS land cover dynamics and TIMESAT land surface phenology algorithms. Remote Sensing, 11(19), Article 2201. https://doi.org/10.3390/rs11192201

Tabrizian, P., **Baran, P.K., Van Berkel, D., Mitasova, H., Meentemeyer, H.** (2020). Modeling restorative potential of urban environments by coupling viewscape analysis of lidar data with experiments in immersive virtual environments. Landscape and Urban Planning, 195, Article 103704. https://doi.org/10.1016/j.landurbplan.2019.103704

Van Berkel, D., Shashidharan, A., Moredcai, R.S., **Vatsavai, R., Petrasova, A., Petras, V., Mitasova, H., Vogler, J.B., Meentemeyer, R.K.** (2019). Projecting urbanization and landscape change at large scale using the FUTURES model. Land, 8(10), Article 144. https://doi.org/10.3390/land8100144

Vivek Nanda, V.M., Tateosian, L., & Baran, P. 2020. GIS-based estimation of seasonal solar energy potential for parking lots and roads. In press. IEEE Green Technologies Conference Proceedings 2020.

Vukomanovic, J., **Singh, K.K.**, **Vogler, J.B., Meentemeyer, R.K.** (2020). Protection status and proximity to public-private boundaries influence land use intensification near U.S. parks and protected areas. Conservation Science and Practice, 2, Article e190. https://doi.org/10.1111/csp2.190

Vukomanovic, J., Vogler, J.B., Petrasova, A. 2019. Modeling the connection between viewscapes and home locations in a rapidly exurbanizing region. Computers, Environment and Urban Systems, 78, Article 101388. https://doi.org/10.1016/j.compenvurbsys.2019.101388

White, C.T., Petrasova, A., Reckling, W., **Mitasova, H.** 2020. Automated land cover change detection through rapid UAS updates of digital surface models. The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, XLII-3/W11, 155-159. https://doi.org/10.5194/isprs-archives-XLII-3-W11-155-2020

Zhang, Y., Chen, G., **Vukomanovic, J.**, **Singh, K.K.**, Liu, Y., Holden, S., **Meentemeyer, R.K.** 2020. Recurrent Shadow Attention Model (RSAM) for shadow removal in high-resolution urban land-cover mapping. Remote Sensing of Environment, 247: Article 111945. https://doi.org/10.1016/j.rse.2020.111945

Student Presentations

(Not an exhaustive list)

Coffer, M. Processing commercial satellite imagery for water quality applications. [oral, invited speaker] Seagrasses & Neural Networks Workshop; NASA Ames - Mountain View, CA; September 2019

Gupta, U. Real-time automatic identification system (AIS) data analytics. [oral, invited speaker] OmniSci Converge; Mountain View, CA; October 2019

Coffer, M. Monitoring cyanobacterial blooms using high-spatial resolution imagery. [poster] Coastal and Estuary Research Foundation (CERF) 2019; Mobile, AL; November 2019

Matli, V.R.R. Fusion-based hypoxia estimates: linking geostatistical and mechanistic models of dissolved oxygen variability. [oral] Coastal and Estuary Research Foundation (CERF) 2019; Mobile, AL; November 2019

Belica, L.. Influence of topography on stream insolation and thermal regimes in a mid-latitude, montane, forested headwater. [poster] American Geophysical Union (AGU) Annual Meeting; San Francisco, CA; December 2019

Kruskamp, N. Web-based decision analytics for mapping host species distributions and forecasting the spread of forest pests and pathogens. [oral] American Geophysical Union (AGU) Annual Meeting; San Francisco, CA; December 2019
Outstanding Student Presentation Award

Coffer, M. Mapping seagrass with WorldView-2 and RapidEye. [oral, invited speaker] Exploring Satellite Image Integration for the Chesapeake Bay Submerged Aquatic Vegetation Monitoring Program; Gloucester Point, VA; December 2019

Alberico, C.. Hot spot analysis to characterize children's park-based physical activity in low-income communities of color. [poster] Active Living Conference; Orlando, FL; February 2020

Huang, J-H. Perceived neighborhood social and built environment effects on park use and physical activity among log-income diverse families with young children. [poster] Active Living Conference; Orlando, FL; February 2020

Van Bakergem, M. Tracking the emergence of active living topics within real estate development literature: A keyword co-occurrence network approach. [poster] Active Living Conference; Orlando, FL; February 2020

Ifediora, B. Muck, debris, or tree: A spatial, temporal approach to predicting who asks for volunteer assistance after disaster and how quickly their needs are met. [poster] HurriCon; Greenville, NC; February 2020

Ricci, S.W. Development of a call catalog to support automated acoustic data processing techniques for coral reef soundscapes. [poster] Ocean Sciences Meeting; San Diego, CA; February 2020

College of Natural Resources Graduate Research Symposium, February 2020

Gao, X. Modeling forest productivity by management practices and phenology. [poster]

Ifediora, B. Muck, debris, or tree: A spatial, temporal approach to predicting who asks for volunteer assistance after disaster. [poster]

Inglis, N. Future declines in quaking aspen disproportionately affect Rocky Mountain viewscapes along scenic roadways. [poster]

Karimi, K. Assessing long term variability in phosphorus stream loadings using a hybrid Bayesian watershed model. [poster]

Kruskamp, N. Trees and disease: Monitoring dynamic forest change from space. [oral]
1st Place: Three Minute Thesis Competition

Lin, Z. How land cover grain sizes affects land change modeling uncertainty. [poster]

Matli, V.R.R. Fusion based hypoxia estimates: linking geostatistical mechanistic models of dissolved oxygen variability. [poster]
1st Place: Land, Wildlife & Forest System Mgt.

McGregor, I. Satellite vegetation phenology reliably explains timing of carbon fluxes [poster]

Montgomery, K. Canopy structure measured by low-cost UAS for predicting nutrient content in field grown tobacco. [poster]

Perin, V. Large-scale-on-farm reservoir monitoring using remote sensing techniques. [poster]
1st Place: Human Dimensions & Community Health

Randall, J. Characterizing the multi-scalar interactions of energy poverty. [oral]

Ricci, S.W. Development of a call catalog to support automated acoustic data processing techniques for coral reef soundscapes. [poster]

Vivek Nanda, V.M. GIS-based estimation of seasonal solar energy potential for parking lots and roads. [poster]

Accepted presentations affected by COVID-19 cancellations

Coffer, M. Automated seagrass mapping from commercial satellite imagery. [oral] World Seagrass Conference.

Coffer, M. Rethinking the southeastern bloom season: an investigation into cold-season cyanobacterial blooms. [oral] Ecological Society of America.

Collins, E.L.. Dynamic spatiotemporal modeling of population changes in vulnerable communities. [poster] International Association for Landscape Ecology – North America.

Inglis, N. Spatially-explicit exurban growth modeling requires novel amenity parameters. [poster] International Association for Landscape Ecology – North America.

Karimi, K. Assessing long term variability in nutrient loading to Jordan and Falls Lake using hierarchical Bayesian modeling. [poster] Water Resources Research Institute.

Karimi, K. Using a hybrid Bayesian watershed model to assess differences in phosphorus and nitrogen stream loadings. [poster] Watershed Management Conference.

McGregor, I. The correspondence of MODIS land surface phenology and GPP. [oral] International Association for Landscape Ecology – North America.

Vivek Nanda, V.M. Incorporating the structure of trees in estimates of clear day solar energy potential over parking lots and roads. [poster] IEEE Green Technologies Conference.

Awards and Honors

(Not an exhaustive list)

Students

Megan Coffer received the EPA Mason Hewitt Award for GIS Technical Excellence. She received a Student Travel Award to present at the CERF 2019 Conference.

Elyssa Collins received a Graduate Student Workshop/Short Course Support Grant through the Graduate School. She was also accepted to the Near-term Ecological Forecasting workshop.

Victor Dawson won 3rd place in the Center's MGIST capstone poster competition.

Mollie Gaines was selected for the William M. Lapenta NWS Student Internship Program for Summer 2020.

Devon Gaydos won the Center's Beacon Award and was on the research team that won the Collaboration & Innovation Award.

Umesh Gupta was student runner up in NC State's Envisioning Research contest, Graphics & Data Visualization category. He received an Advanced Short-Term Research Opportunity (ASTRO) fellowship through the Oak Ridge National Laboratory for Fall 2019 and a Student Travel Award to present at the ACM SIGSPATIAL 2019 Conference.

Nikki Inglis was named NC State's 2020 Esri Development Center Student of the Year.

Matthew Johnson won 1st place in the Center's MGIST capstone poster competition.

Kate Jones received a Global Change Graduate Fellowship from the Southeast Climate Adaptation Science Center for 2019-2020.

Nick Kruskamp won an Outstanding Student Presentation Award at the AGU 2019 Fall Meeting. He also won 1st place in the College of Natural Resources Graduate Research Symposium's Three Minute Thesis competition. He won the Center's Advocate Award and was on the research team that won the Collaboration & Innovation Award.

Rohith Matli won 1st place in the Land, Wildlife & Forest System Management category of the College of Natural Resources Graduate Research Symposium's poster competition.

Ian McGregor received the NC Space Grant Graduate Research Fellowship for 2020-2021 ($10,000).

Katie McQuillan received a Global Change Graduate Fellowship from the Southeast Climate Adaptation Science Center for 2019-2020.

Garrett Millar was on the research team that won the Center's Collaboration & Innovation Award.

Kellyn Montgomery was accepted to the Near-term Ecological Forecasting workshop.

Vini Perin won 1st place in the Human Dimensions & Community Health category of the College of Natural Resources Graduate Research Symposium's poster competition.

Shannon Ricci received the NC Sea Grant-NC Space Grant Graduate Research Fellowship for 2020-2021 ($20,000). She also won the Center's Gladys West Award.

Elizabeth Robinson won the Center's Creativity in Teaching Award.

Lucian Stewart won 2nd place in the Center's MGIST capstone poster competition.

Laura Tomkins received a Graduate Student Workshop/Short Course Support Grant through the Graduate School.

Vishnu M. Vivek Nanda won 1st place in the Raleigh GIS Day 2019 Poster Contest.

Faculty and Staff

Teaching Professor **Perver Baran** was accepted into the Fall 2019 I-Corps Cohort at NC State. She was also promoted from Associate Teaching Professor.

Faculty Fellow **Bethany Cutts** was a finalist for NC State's Outstanding Graduate Faculty Mentor Award.

Faculty Fellow **Ryan Emanuel** was honored with the Steve Wing International Environmental Justice Award by the North Carolina Environmental Justice Network. He was also chosen to serve on the National Science Foundation's Committee on Equal Opportunity in Science and Engineering and won a National Humanities Center fellowship.

Faculty Fellow **Aaron Hipp** was accepted into the newest cohort of Interdisciplinary Research Leaders.

Research Scholar **Chris Jones** and Research Associate **Shannon Jones** were on the research team that won the Center's Collaboration & Innovation Award.

University Program Associate **Rachel Kasten** was the 2020 SHRA winner of the College of Natural Resources (CNR) Award for Excellence in recognition for her dedication to making the Center an inclusive place to work and learn. She also won the CNR Pride of the Wolfpack Award for 2020 and the Center's Advocate Award.

Faculty Fellow **Katie Martin** won the Editor's Choice Award for a paper she co-authored in *Water Resources Research*.

Center Director **Ross Meentemeyer** was named the Goodnight Distinguished Professor of Geospatial Analytics. He was also on the research team that won the Center's Collaboration & Innovation Award.

Center Associate Director of Geovisualization **Helena Mitasova** received the University Consortium for Geographic Information Science (UCGIS) 2020 Research Award.

Faculty Fellow **Stacy Nelson** won the Center's Creativity in Teaching Award.

Faculty Fellow **Chris Osburn** was named a University Faculty Scholar.

Research Software Engineers **Vaclav Petras** and **Anna Petrasova** won CGA's Beacon Award. They were also on the research team that won the Center's Collaboration & Innovation Award.

Faculty Fellow **Robert Scheller** was named a University Faculty Scholar.

Research Technologist **Makiko Shukunobe** won the Center's Gladys West Award.

Science Communicator **Megan Skrip** was accepted into the National Association of Science Writers.

Associate Teaching Professor **Stacy Supak** was promoted from Assistant Teaching Professor.

Faculty Fellow **Jelena Vukomanovic** was named a 2020 TRELIS Fellow (Training and Retaining Emerging Leaders In STEM) by the University Consortium for Geographic Information Science (UCGIS).

New Grants (Not an exhaustive list)

PI: **Okan Pala**
Location Aware Approach to Creating Effective Public Outreach
NC Department of Transportation
$229,360 (7-1-2019 to 6-30-2021)

PI: **Ross Meentemeyer**; Co-PI: **Chris Jones**, **Helena Mitasova**
Forecasting Plant Pest Spread Using Tangible Landscape Technology
USDA Animal and Plant Health Inspection Service (APHIS)
$125,396 (7-1-2019 to 6-30-2020)

PIs: **Gustavo Machado**, Glen Almond, Juliana Bonin Ferreira, **Ross Meentemeyer**, **Chris Jones**
High-resolution Dynamic Risk Mapping to Guide Timely Disease Interventions
Swine Health Information Center
$86,987 (8-1-2019 to 7-31-2020)

PI: **Ross Meentemeyer**; Co-PI: **Chris Jones**, **Helena Mitasova**
Eradication Analysis & Decision Support (eRADS)
USDA Animal and Plant Health Inspection Service (APHIS)
$131,230 (8-1-2019 to 7-31-2020)

PI: **Natalie Nelson**
FACT: Developing Data-to-Decision Pipelines for Agroecosystem Management through High-performance Computing and Big Data Analytics
USDA National Institute of Food and Agriculture
$500,000 (8-1-2019 to 7-31-2023)

PI: **Yu Takeuchi**
Evaluation of Pathways, Trends, and Risks to Improve Targeting
USDA Animal and Plant Health Inspection Service (APHIS)
$100,000 (8-1-2019 to 7-31-2020)

PIs: **Yu Takeuchi**, Kathi Dello
Spatial Analytic Framework for Advanced Risk Information Systems (SAFARIS) - Technical Development
USDA Animal and Plant Health Inspection Service (APHIS)
$466,671 (8-1-2019 to 7-31-2020)

PI: **Karl Wegmann**
Geomorphology and Geochronology of Artifact-bearing Late Quaternary Landforms Near Sweeney Pass, ABDSP (Anza-Borrego Desert State Park, California)
Anza-Borrego Foundation
$5,000 (8-1-2019 to 12-31-2019)

PIs: **Aaron Hipp**, Myron Floyd
Translating and Disseminating Findings from RWJF's Physical Activity Research
Baylor University (Prime–Robert Wood Johnson Foundation)
$36,000 (8-15-2019 to 12-31-2020)

PI: **Katherine Martin**
Predicting Wildland Fire Behavior and Water Supply in Fire-affected Landscapes
USDA National Institute of Food and Agriculture
$195,000 (9-4-2019 to 8-31-2022)

PIs: **Ross Meentemeyer**, **Chris Jones**, **Yu Takeuchi**
Tangible Landscape Framework
USDA Animal and Plant Health Inspection Service (APHIS)
$300,000 (9-30-2019 to 9-29-2020)

PIs: **Ross Meentemeyer**, **Yu Takeuchi**
Plant Pest Pathway Characterization with Pandemic Approach
USDA Animal and Plant Health Inspection Service (APHIS)
$230,817 (9-30-2019 to 9-29-2020)

PI: **Josh Gray**
MMC APS High Frequency Monitoring Data
RTI International (Prime–Millennium Challenge Corporation)
$15,000 (10-1-2019 to 1-29-2022)

PIs: Robert Bardon, Mary Addor, **Georgina Sanchez**, **Jelena Vukomanovic**
The North Carolina Strategic Plan for Sustaining Military Readiness Through Conservation Partnership
US Fish and Wildlife Service
$206,782 (10-15-2019 to 8-15-2023)

PI: **Okan Pala**
NCDOT Community Studies Geospatial Sandbox
NC Department of Transportation
$389,408 (11-1-2019 to 10-31-2021)

Investigators: Jeffery Owen, **Justyna Jeziorska**, **Zachary Arcaro**
Comprehensive Christmas Tree Management Using Drones
NC Department of Agriculture & Consumer Services (Prime–USDA)
$122,800 (1-1-2020 to 12-31-2021)

PI: **Stacy Nelson**
GIS Analysis of the Benefits of State and Private Forest Lands for Water Supply in the Southern United States
South Carolina Forestry Commission, USDA Forest Service
$8,080 (1-1-2020 to 3-30-2020)

PI: **Katherine Martin**; Co-I: **Ross Meentemeyer**
Can Strategic Riparian Buffers Improve Coastal Resilience to Changing Conditions in the Cape Fear River Watershed?
NCSU Sea Grant Program
$48,099 (2-1-2020 to 1-31-2021)

PI: **Natalie Nelson**
Development of a Tool to Forecast Closure of Shellfish Aquaculture Harvest Areas
NCSU Sea Grant Program
$59,988 (2-1-2020 to 1-31-2021)

PIs: Jean Ristaino, Qingshan Wei, Anna Whitfield, **Robert Scheller**, Dorith Rotenberg, David Rasmussen, **Chris Jones**, Yong Zhu, Inga Meadows, Kelly Zering
Plant-Aid: A Data Driven and Sensor Integrated Platform to Monitor Emerging Plant Diseases
Game-Changing Research Incentive Program for Plant Sciences (GRIP4PSI)
$50,000 (2-17-2020 to 6-30-2023)

PI: **Daniel Obenour**; Co-PIs: **Sankar Arumugam**, **Helena Mitasova**
Assessing Controls on Nutrient Loading at the Watershed Scale through Data-Driven Modeling
NC State University Water Resources Research Institute
$59,999 (3-1-2020 to 2-28-2021)

PI: **Helena Mitasova**
A Web Platform for Mapping Global, Publication-based, Spatial and Temporal Distributions of Per- and Polyfluoroalkyl Substances (PFASs)
NC State University Center for Human Health and the Environment
$23,633 (4-15-2020 to 4-15-2021)

PI: **DelWayne Bohnenstiehl**
Monitoring visitation at North Carolina artificial reef sites using very high-resolution satellite imagery (NC Space Grant Project; Shannon Ricci)
NC State University NC Space Grant Consortium
$10,001 (6-1-2020 to 5-30-2021)

PI: **DelWayne Bohnenstiehl**
Monitoring visitation at North Carolina artificial reef sites using very high-resolution satellite imagery (NC Space Grant Project; Shannon Ricci)
NC State University Sea Grant Program
$9,999 (6-1-2020 to 5-30-2021)

MGIST Capstones

Fall 2019

Blake Baines
PFAS Distribution in North Carolina Drinking Water
Center for Geospatial Analytics

Tamika Brown
Optimal Number of Ground Control Points to Georectify Drone Data
Center for Geospatial Analytics

Michael Caslin
Triangle Bird Count
Triangle Bird Count & NC State University Dept. of Forestry and Environmental Resources

Ben Colia
Assessing Public Mountain Trout Access with Public Field Data Collection
North Carolina Wildlife Resources Commission

Joel Conrad
Water Main Failure Prediction
Winston-Salem Forsyth County Utilities

John Cummings
Automation of Spatial Data Update and Management
VHB

Michael Forte
Coastal Morphology Application to Visualize Trends
US Army Corps of Engineers

Eli Heetderks
Identifying Demographics of NCDOT Project Stakeholders with Drive Time
NC Dept. of Transportation & Center for Geospatial Analytics

Tom Koch
Geospatial Data Management and Analysis to Locate Future Prescribed Burns
North Carolina Wildlife Resources Commission

Colleen Lippert
Accessible Website Design and Application Development
National Park Service & Center for Geospatial Analytics

Daniel Oberrender
NC State Campus Accessibility Wayfinding
NC State University Office of Information Technology

Madeline Pope
LiDAR Point Density for Predicting Urban Forest Biomass
Center for Geospatial Analytics

Elizabeth Robinson
Hazard Exposure Assessment of Post-Hurricane Conditions
NC State University Dept. of Parks, Recreation & Tourism Management

Guillermo Valenciano
NC Obesity, Diabetes & Physical Inactivity Prevalence Assessment
North Carolina Alliance for Health

Shannon Veraldi
Impacts of Agricultural Best Management Practices on Sediment and Nutrient Runoff
Center for Geospatial Analytics

Sandi Watkins
North Carolina Alliance for Health Information Portal
North Carolina Alliance for Health

Calaen Wilson
Resource Coverage by Provided Services Versus Demographics
Recovery Alliance Initiative

Spring 2020

Jim Albert
Opportunity Zones in North Carolina
SpatialGIS

Sadie Barker
Visual Representations of Capacity and Enrollment Data
Wake County Public School System

Adam Blythe
Geospatial Assessment of Fire Service Response
Town of Knightdale Fire Department

Justin Castrati
Overmountain National Historic Trail Proposal Analysis and Database Management
National Park Service

Charlie Charping
GIS for Land and Water Conservation Fund
Recreation Resources Service & NC Division of Parks and Recreation

Matthew Cobb
Prioritizing Storm Water Control Measures Inspections and Maintenance
NC State University Environmental Health & Public Safety

Anja Collette
Visualization of Patterns in Overnight Reservations on Federal Lands
Center for Geospatial Analytics

Brett Cox
Inundation Modeling Using Stream Gauges and Impact on Greenway Infrastructure
Raleigh Parks, Recreation & Cultural Resources

Victor Dawson
Habitat Manager: An Open-Source Tool for Red-Cockaded Woodpecker
US Fish and Wildlife Service

Samuel Franklin
Landscape Change with the Creation of the Federal District, Brasilia, Brazil
NC State University Dept. of History

Matthew Johnson
Buxton Woods Coastal Reserve Fire Risk Management
NC Division of Coastal Management

Alli Jones
Identifying Well and Septic Systems in Cumberland County, NC
Cumberland County

Martine Kamabu
Estimating Loss of Angler Access to Public Mountain Trout Waters
NC Wildlife Resources Commission

Todd Kesselring
Examining North Carolina State Agency Regions
NC Office of State Budget & Management

Kelsey Little
Lake Level Rise and Trash Accumulation on Lake Jordan's Shoreline
Clean Jordan Lake

Xingli Ma
Real-Time Visualization of Late Blight Outbreaks in the United States
NC State University Dept. of Entomology & Plant Pathology

Jennifer Parra-MacDougal
Site Suitability Analysis of Solar Development in Non-Protected Forested Areas
The Nature Conservancy in NC

Christine Pilato
Assessing Access to North Carolina Recreational Sites
NC State University Dept. of Parks, Recreation & Tourism Management

Sarah Shefte
Identifying Charcoal Storage Sites in Lusaka, Zambia
NC State University Dept. of Forestry and Environmental Resources

Lucian Stewart
Data Quality Assessment Automation for USGS Elevation Derived Hydrography
US Geological Survey

James Wheaton
Identifying and Communicating Town Maintenance Areas
Town of Apex

NC STATE
UNIVERSITY

Center for
Geospatial Analytics