

# Trends

North Carolina Institute for Climate Studies

#### Inspire. Advance. Engage.

### Spring 2017

### Who We Are

Hosted by North Carolina State University, NCICS is a unique center of excellence showcasing a partnership between universities, the private sector, non-profit organizations, community groups, and the federal government.

NCICS' primary activity is the operation of the Cooperative Institute for Climate and Satellites– North Carolina. CICS-NC is a multidisciplinary team of experts who collaborate in climate and satellite research to support NOAA NCEI's "research to operations" strategy.

#### **Our Vision**

- NCICS *inspires* cutting-edge research and collaboration.
- NCICS *advances* understanding of the current and future state of the climate.
- NCICS *engages* with business, academia, government, and the public to enhance decision making.

more info

#### **Main Research Activities**

Access and Services Development

**Climate Assessments** 

Climate Data Records and Scientific Data Stewardship

Climate Literacy, Outreach, Engagement, and Communications

Surface Observing Networks

Workforce Development

**Consortium Projects** 

### NOTE FROM THE DIRECTOR

Welcome to the Spring 2017 issue of *Trends*! A lot has happened since our last issue, which has necessitated a hiatus in publication of the newsletter—please accept our belated apologies!

In the last year, a landmark climate and health publication was released, The Collider and the Asheville Museum of Science opened in downtown Asheville, the offices of the Executive Director of the American Association of State Climatologists (AASC) moved to Asheville, cloud-based access



for NEXRAD observations was made available from Amazon and the Open Commons Consortium, State Climate Summaries for individual states in the United States were completed and published, the next generation GOES satellite (GOES-16) was launched and is coming online, and we are preparing for re-competition of the NOAA Cooperative Agreement for operation of the Cooperative Institute for Climate and Satellites–North Carolina.

Details on many of these activities are available elsewhere in this issue and on our website, but I would like to highlight a few developments here:

The Institute's Technical Support Unit finalized and published a U.S. Global Change Research Program/Environmental Protection Agency-led National Climate and Health Assessment, which was released in April 2016. This assessment documents connections between climate change and human health in the United States: we encourage you to give it a read.

We worked with our partners in Western North Carolina to develop a proposal to host the American Association of State Climatologists (AASC) Executive Director's office in Asheville. I am pleased to report the AASC accepted our proposal and moved their Executive Director's office to Asheville. We provided interim space to house the Executive Director, Glenn Kerr, until he could move into permanent space at The Collider.

A copy of the NOAA/NCEI NEXRAD data archive was moved to a number of cloud partners involved with the NOAA Big Data Project as a prototype to test new ways to facilitate access to NOAA's information holdings. Institute staff moved more than 1 Petabyte of information to populate their stores. Amazon Web Services (AWS) went live with their version in 2016. Already, it is clear this pilot has more than doubled access to the NEXRAD archive of high-resolution radar data.

We await public release of NOAA's new GOES satellite data (GOES-16) as I write this note. The Institute has been asked to provide NOAA's Big Data Project partners with near-real time access to the GOES-16 products. We have designed and implemented an end-to-end system which provides low-latency access for available GOES-16 as well as the legacy GOES-13 and GOES-15 products.

It was clear after the release of the 3rd National Climate Assessment in 2014 there was a need for more localized assessments at the state level. The Institute's Technical Support Unit managed, developed, and generated summaries for the 50 states in a 20-month project. These summaries and supplementary material contain more than 1500 graphics providing users with relevant information at the state level. They were peer-reviewed and published in January 2017. See page 4 for more on this project.

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### NOTE FROM THE DIRECTOR (continued)

The Institute leverages NOAA support by requesting support from other federal agencies to do related work.

- Kenneth Kunkel is principal investigator on a project, "Incorporation of the Effects of Future Anthropogenically-Forced Climate Change in Intensity-Duration-Frequency Design Values" (\$1.55M, 5 years, DOD SERDP), to provide improved engineering design baselines for military facilities.
- Also, Kunkel is a co-principal investigator on a multi-institutional effort led by Arizona State University to build an Urban Resilience to Extremes Sustainability Research Network (UREx SRN) (\$400K, 5 years, NSF).
- Carl Schreck is project PI for "Multiscale Interactions Between the MJO, Equatorial Waves, and the Diurnal Cycle Over the Maritime Continent," a collaborative project with NCSU and NCAT to study tropical weather over the Maritime Continent (\$300K, 3 years, NASA).
- Ge Peng is a co-Pl on a multi-institutional effort led by NASA Goddard, "Climate Indicators to Track Seasonal Evolution of the Arctic Sea Ice Cover" to develop better indicators of high-latitude sea ice extent (\$150K, 3 years, NASA).
- Olivier Prat is a co-PI on a multi-institutional project led by Columbia University, "Synthesis of Observed and Simulated Rain Microphysics for Microphysical Parameterization in Climate Models" (\$69K, 3 years, DOE).
- Jesse Bell has Intergovernmental Personal Act (IPA) support from the Centers for Disease Control and Prevention to facilitate their use of environmental data (\$163K, 3 years, CDC).

These extramurally funded activities provide postdoctoral and graduate student and analysis support, which is otherwise not available from NOAA.

We continue to aggressively push workforce development, including undergraduate, graduate, and post-doctoral training. Dr. Andrew Ballinger, a recent Ph.D. from Princeton University, joined us and is working on the Urban Resilience to Extremes Sustainability Research Network (UREx SRN). In this collaborative role, he seeks to draw upon his background in weather observation and climate modeling to help urban communities build resilience to high-impact weather events. Two Institute staff, Brooke Stewart and Sarah Champion, are working on their Ph.D. programs at NC State.

I would be remiss if I didn't note the scholarly productivity of the Institute's staff, who have published 29 peer-reviewed papers in the past year (see page 4) and did a number of presentations at the Fall 2016 AGU Meeting and the 2017 AMS Annual Meeting (see below). It is a joy to be associated with such a productive group.

Thank you for your interest in the Institute. We look forward to helping you and your stakeholders address the impacts of environmental change on their communities, businesses, and lives.

 Otis Brown, CICS-NC Director info@cicsnc.org

### AGU and AMS Annual Meetings

Institute staff were involved in almost three dozen presentations, posters, and discussions at the 2016 Fall meeting of the American Geophysical Union and the 2017 Annual meeting of the American Meteorological Society. Topics ranged from the State Climate Summaries, analytics and use case data for NCEI's climate data products, research on climate extremes, and advancements in precipitation and soil moisture observations.

The institute co-sponsored an "Asheville" booth at the AMS meeting again this year, along with the Asheville Area Chamber of Commerce, the National Environmental Modeling and Analysis Center, and The Collider. The booth provided a focal point for CICS-NC staff and our partners to engage with AMS attendees about the growing climate services capacity and industry here in Asheville, North Carolina.

See our website for details on research presented at AGU 2016 and AMS 2017.



**NC STATE** UNIVERSITY

### New Institute Website



In October of 2016, we rolled out a completely redesigned website at ncics.org. Our new site is intended to better meet the needs of everyone visiting the site and to better reflect our identity as an NC State University research institute.

The site is based on design guidelines developed by NC State, with significant aesthetic and user-interface enhancements and customization by our graphic designer Jessicca Griffin and web developer Angel Li. We hope that the organizational structure of the site is largely self-evident, but here is a quick overview to help new users get oriented:

- The home page presents key information about the Institute, highlighted projects, and a feed of our latest news and Facebook posts.
- About provides details about the structure of the Institute and links to annual reports detailing past activities.
- News includes stories on Institute activities, research highlights describing the latest peer-reviewed research, links to back issues of *Trends*, information on current and past events, and more.
- Expertise provides an overview of the skills and subject matter expertise available at NCICS, and should be of interest to those looking for opportunities for collaboration or seeking subject matter expertise.
- Portfolio offers examples of major products, research outcomes, and other Institute accomplishments.
- People lists all of our staff, including contact information, brief biographies, and lists of publications and conference presentations.
- Data provides access to figures and data sets produced by NCICS.
- Programs provides more information about the Institute's primary activities and partners.

#### NCICS or CICS-NC?

Those of you are who familiar with the the Cooperative Institute for Climate and Satellites–North Carolina or the acronym CICS-NC might be a bit confused by the appearance of our new site, but rest assured that CICS-NC is still alive and well, and continues to be the primary activity of NC State's North Carolina Institute for Climate Studies.

Previously, we maintained separate website presences for both CICS-NC (at www.cicsnc.org) and NCICS. Now, in order to provide a more unified view of the Institute's activities, we have consolidated our web presence into a single site at ncics.org. The old www. cicsnc.org URL now automatically redirects to this address. See the CICS-NC page under Programs on the website for more about the mission and activities of CICS-NC.

#### NC STATE UNIVERSITY

### **NOAA State Climate Summaries**

On January 9, 2016, the Cooperative Institute for Climate and Satellites–North Carolina and NOAA's National Centers for Environmental Information released a set of 50 State Climate Summaries providing up-to-date information on observed and projected climate changes for each U.S. state. The summaries are available via an interactive website and as downloadable PDFs at: stateclimatesummaries.globalchange.gov

Additional supplemental figures, technical details on methodology, references, and metadata for all figures are also available via the website.

Focusing on characteristics of the physical climate and coastal issues in accordance with NOAA's mission, these summaries are designed to supply decision makers, other stakeholders, and the public with highly relevant climate information in an accessible and compact format.

Each state summary includes three "Key Messages" highlighting important trends and projections, 7 to 10 figures presenting data on key climate variables, and narrative text providing details and context on observed trends, projected changes, and selected climate impacts relevant to that state.

The summaries were produced by scientists, web developers, graphic designers, and science communication experts at NCEI and CICS-NC, with additional input from state and regional experts, including State Climatologists and staff from NOAA's Regional Climate Centers. Each summary underwent a comprehensive and anonymous peer review process prior to release. An additional summary for Puerto Rico is currently under development.

You can read more about CICS-NC's role in the development of the summaries on our website.

### Institute Research Highlights

As mentioned in the Director's note, Institute staff contributed to more than two dozen peer-reviewed papers and publications over the past year. Research topics included advancing data stewardship practices, exploring trends in extreme weather events, understanding how Kelvin Waves influence tropical storm formation and snowfall events in the Northeast, improving satellite and ground-based observing systems, and innovations in processes and tools for producing climate assessments.

You can read about most of these publications in the Research Highlights section of our website. We also encourage you to follow us on Facebook and Twitter where we announce new research outcomes, upcoming events, and outreach and engagement efforts. Our Twitter account is https://twitter.com/CICSNC. On Facebook, you can find us at https://www.facebook.com/cicsnc/.



Observed and Projected Annual Number of Tidal Floods for Charleston, SC





## **Educational Outreach**

NCICS engages with K-12 students, teachers and the general public to help advance climate science, literacy, and education, particularly focusing on STEM skillsets. In the past year, various members of the NCICS team gave presentations, led lectures, developed activities, and mentored high-school student interns.

In 2016, NCICS doubled its previous year's outreach activities reaching over 3000 students, parents, teachers, and the public through various activities.

Highlights from the last year included Jared Rennie's work with Western North Carolina students in collaboration with code.org, a website dedicated to "expanding access to computer science, and increasing participation by women and underrepresented students of color," and new engagement activities with the Asheville Museum of Science that led to NCICS' participation



in their Beer City Science Pub and Super Science Saturday events series with presentations on "State of the Climate in the US," "Climate and Health," and "Extreme Weather & Climate." NCICS continued its collaborations with the NC Science Festival events in Western NC, hosting educational booths at several local STEM events, including the Mountain Science Expo, Isothermal Community College's Science and Technology Expo, and Buncombe County Schools' Celebrate STEM event. NCICS also hosted its own NC Science Festival event in 2016 in partnership with NCEI. The "Weather and Climate at NCEI" event attracted more than 30 local homeschool 5th and 6th graders and chaperones, and included presentations on NCEI, climate change, the CycloneCenter. org project, and coding. In the fall of 2016, several outreach volunteers worked to coordinate a meteorology program for the entire 7th grade at Asheville Middle School. This involved 7 classroom sessions, one for each science class, taught serially over the course of 3 days.

NCICS is gearing up for another busy year filled with K-12 Outreach activities starting this spring with NC Science Festival events throughout Western NC!

# India Workshop: Downscaling Climate Projections

CICS-NC and NOAA NCEI recently partnered with the Indian Institute of Tropical Meteorology (IITM) and India's Centre for Climate Change Research to convene a workshop on applications of downscaled climate projections. The event, held March 7–9 at IITM in Pune, India, is part of the ongoing U.S.-India Partnership for Climate Resilience.

Jenny Dissen and Ken Kunkel of CICS-NC and David Easterling of NOAA NCEI led the U.S. delegation, which included scientists from Texas Tech University, the World Resources Institute, and the U.S. National Institutes of Health. The workshop was attended by more than 60 participants, including representatives from Indian universities; State Action Plan Development groups from various Indian states; private sector companies, including Acclimatise and



Skymet—India's largest meteorological company; and several organizations working on adaptation and resilience.

The workshop included sessions on the theory and methods of climate model downscaling and the use of downscaled datasets for a variety of sectoral applications and for India's State Action Plan on Climate Change.

Presentations and other content from the workshop are available via the Events section of our site. The Times of India also published a story on the conference.



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