

Institute Highlights

The North Carolina Institute for Climate Studies (NCICS) is now 5.5 years old and has entered its second 5-year support agreement with NOAA as the Cooperative Institute for Climate and Satellites – NC (CICS-NC). Our current staff consists of 35 employees and number of part-time student interns.

NCICS principally supports NOAA's National Centers for Environmental Information (NCEI), which was formerly the National Climatic Data Center (NCDC). Main collaborative activities are organized in 7 streams:

- Climate Data Records and Scientific Data Stewardship
- Climate Literacy, Outreach and Engagement
- Surface Observing Networks
- Assessments
- Workforce Development
- Access and Services
- Administrative Support
- Consortium Projects

The different centers in NCEI, NOAA Line Offices such as the National Environmental Satellite, Data and Information Service (NESDIS), Oceanic and Atmospheric Research (OAR), and the National Weather Service (NWS), the US Global Change Research Program (USGCRP), and North Carolina State University support these streams. These streams structure NCICS thematically.

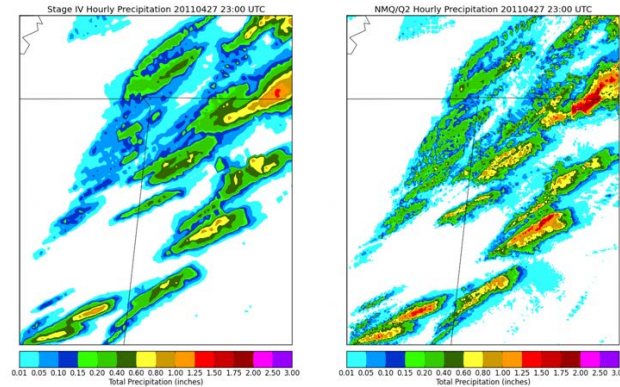


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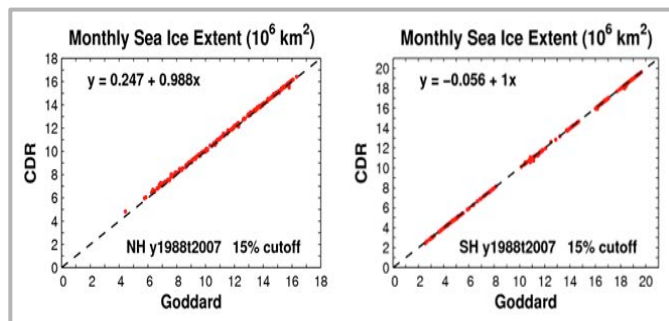
Sample Highlights By Stream

Climate Data Records and Scientific Data Stewardship

- Completed the first homogeneous reanalysis of the NEXRAD archive, for 2001-2011, providing precip data at high space and time resolutions [S. Stevens]



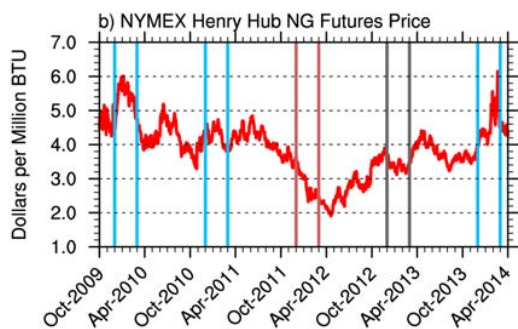
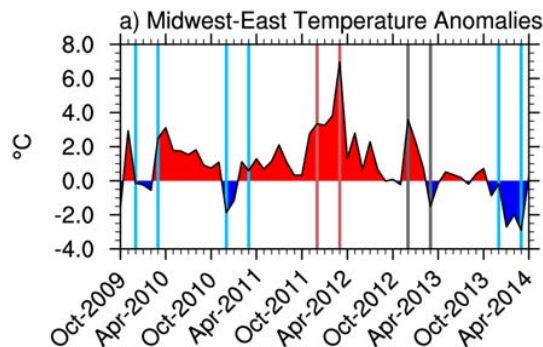
- Scientific leadership and expertise for various Climate Data Record (CDR) projects. For example, leading a collaboration with NCSU Statistics Dept. on a spatial-temporal data fusion of land surface albedo products [Matthews]
- Preparing to do a first production run to generate obs4MIPs files for the entire period of record for three different CDRs: the HIRS Outgoing Long-wave Radiation CDR, the Optimum Interpolation Sea Surface Temperature (OISST) CDR, and the Sea Ice Concentration CDR. [Biard]
- Verification of the NOAA/NSIDC Sea Ice Concentration Climate Data Record, including a co-authored a paper published by a peer-reviewed journal



- Collaborating on transition of the ISCCP (International Cloud Climatology Project) from NY GISS center to Asheville. The project relies on CICS computing resources, and will make use of the reprocessed, re-calibrated data to produce the next generation of higher-resolution cloud products. [Inamdar]
- Built a metadata collection process and infrastructure to document full transparent and reproducible ISO 19115 metadata for the Third National Climate Assessment. This process is now being used for other assessment activities. [Champion]
- Converted several NCA3 netCDF files with CF-compliant versions, in response to request from NOAA CPO. [L. Stevens]

Climate Literacy, Outreach and Engagement

- Graphics support for very high-profile, NCDC-led communications efforts including the annual NOAA *State of the Climate* and *Explaining Extreme Events* reports [Griffin]
- Planning and development of the National Partnership for Resilience (NPfR), a collaborative organization designed to link businesses, researchers, and governments for effective decisions on a changing planet. The goal is that, by 2025, the public, business, non-profit, and academic communities will have useful science, data, tools, and resources to consider climate as they make routine decisions at all levels. [Hennon, Dissen, others]
- Uncertainty quantification for NOAA's billion dollar disaster events reports [Matthews]
- Comparative analysis of the MODIS and VIIRS Satellite Land Surface Temperature (LST) products revealed issues with VIIRS LST algorithm. Results published in Remote Sensing of Environment [Biard]
- Lead author of manuscript accepted to BAMS describing climate forcing on natural gas prices in recent winters [Schreck]

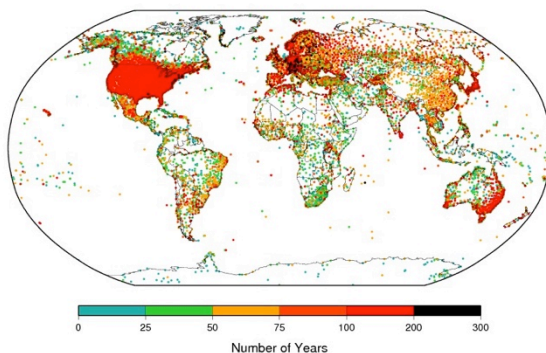


- Development work in support of USGCRP's Global Change Information System (GCIS). Built client software to access the structured data server RESTful API, pull survey results, and perform the actual translation and transfer. Also built an automated test suite (test_suite.py) to ensure the integrity of the software. The software is now publicly available. [Buddenberg]

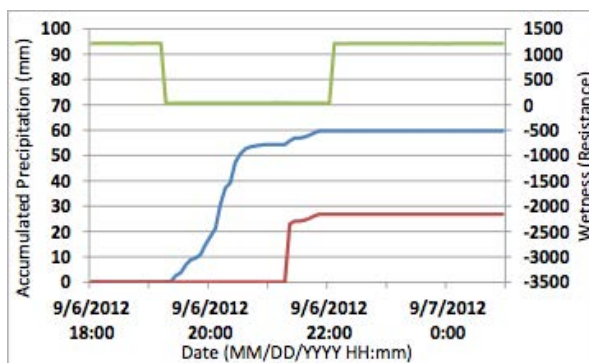
Surface Observing Networks

- Adapted reprocessing of data from the High-resolution Infrared Radiation Sounder (HIRS) satellite to run in a parallel environment, allowing for the entire task to be completed in weeks, rather than multiple years. [S. Stevens]
- Estimation of topographic information at various scales for precipitation network (radar and surface) research. Identified interesting associations between bias, slope, and protruding/undersurface station location. Some results presented in a poster at AGU. [Prat, Nickl]
- Released an innovative data holding that brings together new and existing sources of surface air temperature. This databank will provide the basis for future climate data sets, including the Global Historical Climatology Network's (GHCN's) daily and monthly product. [Rennie]

Location of Temperature Stations (Around 32,000)



- Improved US Climate Reference Network (USCRN) observations of precipitation, including a network comparison that identified issues with USCRN's current approach to determining depth change and evaluation and field testing of a newly proposed algorithm designed to mitigate these concerns. [Leeper]



- Developed code to ingest, format and grid 5 different meteorological station variables including minimum and maximum temperature, precipitation, snowfall and snow depth for the CONUS based on landscape factors. Mapped and animated the resulting daily grids [Burnet]

Assessments

- Third National Climate Assessment
 - Science, editorial, graphics and layout, production, website design and programming, metadata, software engineering [many]
 - Contributions to the climate science content were extensive and critical. Included lead authorship on 2 chapters and 2 appendices, the production of the major climate science technical input for the report (issued as a 700 page NOAA Technical Report), and service as the NOAA lead climate scientist for the report. In this latter role, major conflicts on climate science issues were mediated and report text constructed. Climate science material was composed for all of the 8 regional chapters and several of the sectoral chapters. [Kunkel, L. Sun, L. Stevens, A. Buddenberg, P. Hennon, others]
 - Highlights summary document: This was largely the work of CICS staff and subcontractors (with significant support from NCDC graphics). [Stewart, Griffin, Maycock]
 - NCA3 Website: Major contributions to the highly praised NCA3 website, including design, development, content deployment and editing, and responsive aspects. [Li, Sides, others]
 - Post-release: Presentations, data posted on website [Kunkel, L. Stevens, A. Li, A. Buddenberg]
 - Responding to requests from government agencies, universities, and others for detailed information on NCA figures and data sources, and for new content based on NCA work [L. Stevens]
- CMIP3 Downscaled dataset cluster computing: Continuing code improvements reduced complete time of all analyses from several hours to approximately five minutes, and included development of an automated unit-testing framework. Data made available to the Centers for Disease Control for use in their research. [Buddenberg]
- USGCRP Climate and Health Assessment [many]
 - Due March 2016. Providing same range of support as for NCA3, plus additional project management leadership and consultation on development of entire report process. Delivered first review draft January 2015.

Workforce Development

- Postdocs are producing significant research results. For example:
 - Research on an extreme surface temperature index using observations and CMIP5 hind cast model data, developed over the U.S. aggregated into six regions. Results show good agreement between CMIP5 models and observational trends for all regions except the NW, where results are mixed. [Stegall]
 - Research comparing HIRS surface temperatures from several satellites and collocation to USCRN surface temperature observations. Similar analysis is being done for diurnal (day vs. night) surface temperatures. Currently drafting a paper for journal submission in the near future. [Stegall]
 - Using model CM3-GFDL to analyze the impacts of surface temperature gaps on trends estimation; the result is that gaps produce a decrease in surface temperature trends. [Nickl]
 - Work on the influence of topography on precipitation data (see Surface Observing Networks above). [Nickl]
 - Several of these topics were presented in posters at AGU and/or AMS.
- Two temporary Research Associates are contributing to the USGCRP Climate and Health Assessment and a project to provide state-by-state summaries based on NCA3. [Rebekah Frankson, Jennifer Runkle]
- Hosted several UNCA interns. UNC-Asheville intern Kelly Gassert, mentored by Scott Stevens, gave a presentation at AGU 2014. [K. Gassert, S. Stevens] Intern Bobby Taylor made several contributions to NCA3 and gave several NCA-related presentations, including a session on K-12 educational uses of the NCA at AGU 2014 (with Laura Stevens).
- Mentored two Asheville-area high school students, completing a full research project. [Leeper, Rennie, Schreck, L. Stevens]

Access and Services

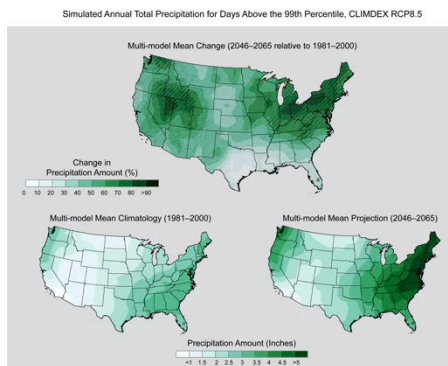
- Operational support activities to NCDC customer service division. [Dissen]
- Providing support to NOAA/NCDC in enhancing/overhauling their engagement activities to actively connect with current and new users of climate data. [Dissen]
- Formal programs include Executive Forum on Business and Climate and Climate Data and Applications Workshops [Dissen]

Administrative Support

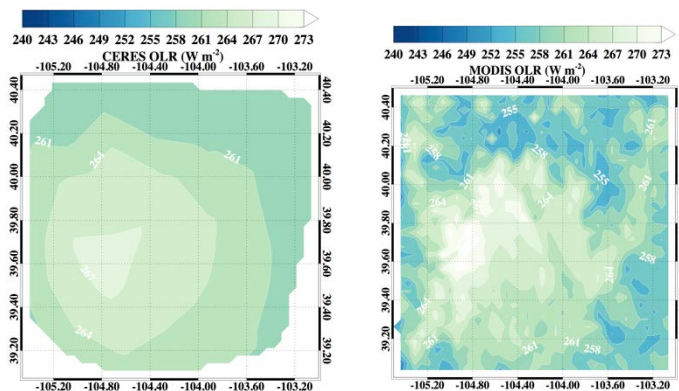
- Organizational leadership, HR functions, assistance with grant writing, etc. Submitted 28 grant proposals in 2014. The most significant award was the \$1.3M SERDP grant [Administration]
- Successful proposal and award of the \$40 million, five-year NOAA cooperative institute agreement. [Administration]
- Facilitating and improving communication between CICS and NOAA personnel in role as CICS middle manager [Matthews]
- Significant IT upgrades, including more processing capacity, more data storage, and infrastructure design improvements to increase performance. [Brannock, Wilkins, Vasquez, software engineers]
- Efforts by several researches to improve performance of computational software. For example, the code for reprocessing of HIRS data was converted to run in a parallel environment, allowing for the entire task to be completed in weeks, rather than multiple years. [Brannock, Wilkins, Vasquez, others]

Other NCICS and Consortium Projects

- Secured SERDP contract, \$1.3M over 5 years to examine impacts of extreme precipitation on DOD sites [Kunkel]
- Built a proof-of-concept application that demonstrates the use of a graph database as the underlying technology for metadata search across multiple disparate datasets.
- Produced CMIP5 data with resolution of 5 km over the United States for analyses of climate change in each of the 50 states in the United States. Four scenarios, temperature and precipitation data. Already being used by external groups.



- Collaborative work on the radiative effects of the smoke plumes of the Fourmile Canyon fire event in NW Colorado during Sep 6-10, 2010 is underway, including development of an empirical model to estimate broadband outgoing long wave radiation (OLR) from MODIS satellite imager through. The instrument is able to resolve the radiative effect of the fire plumes. Results presented at the recent AMS meeting. [Inamdar]

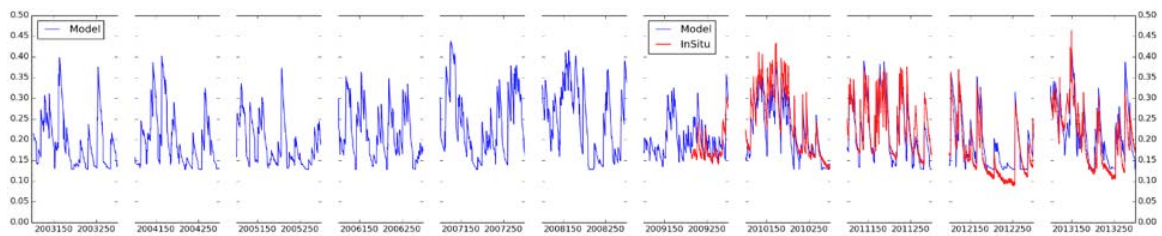


- Expanding support for US Global Change Research Project (USGCRP) activities, including taking over development and management of the www.globalchange.gov website and continuing development work on author collaboration and report development tools. [Li, Sides, Buddenberg]

Individual Highlights

Jesse Bell

- Working with a variety of groups at the Centers for Disease Control and Prevention on projects related to climate and health (e.g. valley fever, *Vibrio vulnificus*, heat wave indices, and mental health).
- Several projects with U.S. Department of Agriculture (USDA) to extend the historical soil moisture record for the United States. Using a soil moisture model that can learn the response of soil moisture to precipitation events, when both measurements are available, and then extend the record to historical periods that have only precipitation measurements.



USCRN #1010, Arizona. In Situ (2010-2013), Historical Extension (2002-2009)

- Working to understand the spatial representativeness of a point-based measurement to the surrounding area for improved validation/calibration with satellite measurements. Installed temporary dense soil monitoring networks at two locations to improve the understanding of soil moisture variability away from a single point. This work will directly benefit the NASA's Soil Moisture Active Passive (SMAP) satellite mission.



The dense temporary network placement around the USCRN station in Tennessee. The numbers indicate the placement of the temporary stations and the red dot indicates the location of the USCRN station. The 3km grid is to replicate the smallest possible measurement of the NASA SMAP mission.

Jim Biard

- Performed a comparative analysis of the MODIS and VIIRS Land Surface Temperature (LST) products, and discovered that the VIIRS LST algorithm produces anomalously high temperature values when there are high atmospheric water vapor levels. This finding was included in a paper published in the journal *Remote Sensing of Environment*.
- Obtained six months of VIIRS Sensor Data Record (SDR) granule metadata from CLASS and loaded it into the graph database that is at the core of the Federated Archive Search Tool (FAST) proof of concept application. Developed an application to calculate ground footprint polygons for each granule based on granule acquisition time using Suomi-NPP satellite orbit parameters obtained from Two-Line Element (TLE) files. This geographic information was also loaded into the graph database, and makes it possible to perform a number of geographic queries for VIIRS granules.
- Developed a python application that reads in Climate & Forecast (CF) Conventions - compliant netCDF data files and writes out files that comply with the requirements of the Observations for Model Inter-comparison Projects (obs4MIPs) effort. The application can produce outputs at the same time-scale as the inputs, or can average the inputs to produce outputs at longer time scales accompanied by statistical measures.
- Preparing to do a first production run to generate obs4MIPs files for the entire period of record for three different Climate Data Records (CDRs): the HIRS Outgoing Long-wave Radiation CDR, the Optimum Interpolation Sea Surface Temperature (OISST) CDR, and the Sea Ice Concentration CDR.
- Generated compositable thumbnail images for 10 different bands of VIIRS SDR data for most all of 2013.. Each thumbnail image is accompanied by a Keyhole Markup Language (KML) file that contains geographic, state, and quality information about that granule. The KML files can be used with Google Earth to display the thumbnails on the surface of the Earth.

Tom Burnet

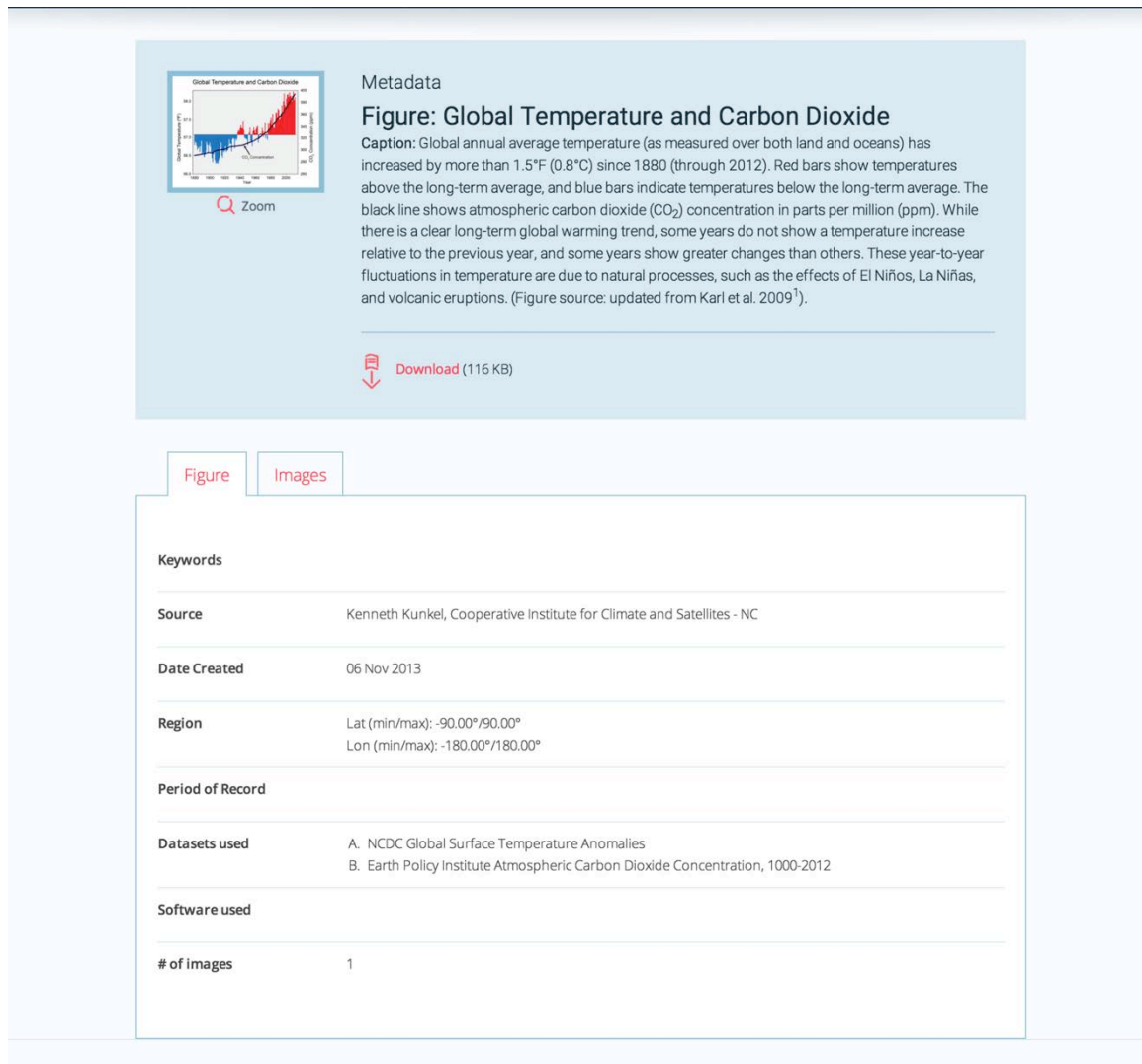
- Developed code to ingest, format and map snowfall station observations for the Continental US (CONUS) for user defined snow events.
- Developed code to ingest, format and grid 5 different meteorological station variables including minimum and maximum temperature, precipitation, snowfall and snow depth for the CONUS based on landscape factors. Mapped and animated the resulting daily grids.
- Developed code to query, resample, ingest, format and map high quality datasets used to validate and evaluate daily gridded CONUS products for precipitation and temperature.

Andrew Buddenberg

- **CMIP3 Downscaled dataset cluster computing:** A comprehensive suite of analyses was developed to process the U.S. Geological Survey's new statistically-downscaled CMIP3 dataset. Successive upgrades of the suite to better take advantage of cluster computing resources reduced the complete runtime of all analyses from several hours to approximately five minutes. The inclusion of an automated unit-testing framework greatly increased the detection rate and control of configuration errors (see below). Beyond their use in the NCA, these results were made available to the Centers for Disease Control for use in their research.
- **Maurer gridded observational dataset cluster computing:** These cluster computing techniques were further employed in a separate but similar set of analyses of a 1/8 degree gridded observational dataset by Ed Maurer out of Santa Clara University. Incorporating lessons learned from the statistically-downscaled CMIP3 analyses, this package was written in a more modular fashion; enabling the use of the unit-testing framework to detect data processing errors. Computations were similarly performant: ~100,000 grid points * 60 years processed in a matter of minutes.
- **A significant number of figures in the Assessment:** [this list](#) isn't exhaustive but nevertheless exists because of...
- **GCIS development:** Client software to access the SDS RESTful API, pull survey results, and perform the actual translation and transfer (`gcis_client.py`, `webform_client.py`, and `sync.py`, respectively) as well as an automated test suite (`test_suite.py`) to ensure the integrity of the software. The software is now publicly available [here](#).
- **Packaging and releasing NCA datasets to the public.** In-house datasets documented and repackaged as both NetCDF and ASCII files.
- **Next-generation metadata collection prototype.** Using Meteor, MongoDB, and Google Drive API to more rapidly collect, manage, and disseminate assessment metadata. This is ongoing.

Sarah Champion

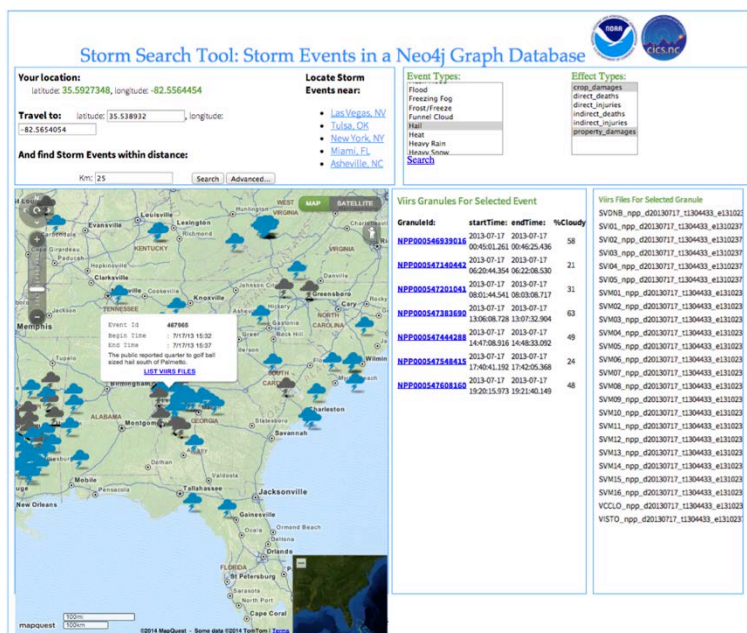
- Built a metadata collection process and infrastructure to document full transparent and reproducible ISO 19115 metadata for the Third National Climate Assessment. This process is now being used for two Assessments currently in production: "Impacts on Human Health in the United States: A Scientific Assessment", and the "Regional Surface Climate Conditions in CMIP3 and CMIP5 for the United States: Differences, Similarities, and Implications for the U.S. National Climate Assessment".



- This process has been presented at various scientific conferences and workshops, and is being investigated for replication for the IPCC, and being included in an upcoming special issue of *Climatic Change*.

- Built a proof-of-concept application that demonstrates the use of a graph database as the underlying technology for metadata search across multiple disparate datasets.

Queries support finding VIIRS filenames for data at the same time and location as Storm Events. All data can be queried by State, County, Zip Code. Many Storm Events do not supply latitude and longitude data, but can be correlated to VIIRS data by County or Zone location.



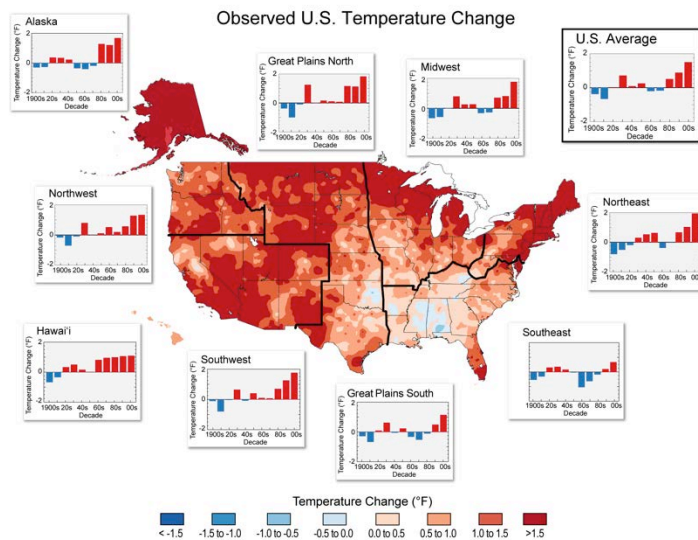
Jenny Disson

- **Interdisciplinary engagement** with Facebook, Isothermal Community College, NOAA/NCDC and CICS-NC. This was instrumental in expanding climate data network coverage for North Carolina, expanding access to climate observations and training to students at ICC, engaging a private sector partner (Facebook) and NOAA/NCDC at the regional level
- **In the process of developing a Partnership for Resilience**
- **Continued engagement with business and industry**
 - Formal programs include Executive Forum on Business and Climate and Climate Data and Applications Workshops
 - Informal engagement (some include MoU's) with Bloomberg Energy, Climate Corporation, Acclimatise, Facebook and Google continues.
 - Expanding climate literacy discussions with management consulting firms such as Booz Allen Hamilton and others
- **Advancing climate literacy in partnerships with other stakeholders**
 - Connecting with Air and Waste Management Association (and SAMSI, CDC and others as part of a broader effort by the CICS team)
 - Leading students through the NASA DEVELOP program
 - Participating and leading discussions with AMS and AGU
 - Partnering with organizations with C2ES for business leadership on climate
- **Operational support activities to NCDC customer service division**
 - Providing support to NOAA/NCDC in enhancing/overhauling their engagement activities to actively connect with current and new users of climate data



Jessica Griffin

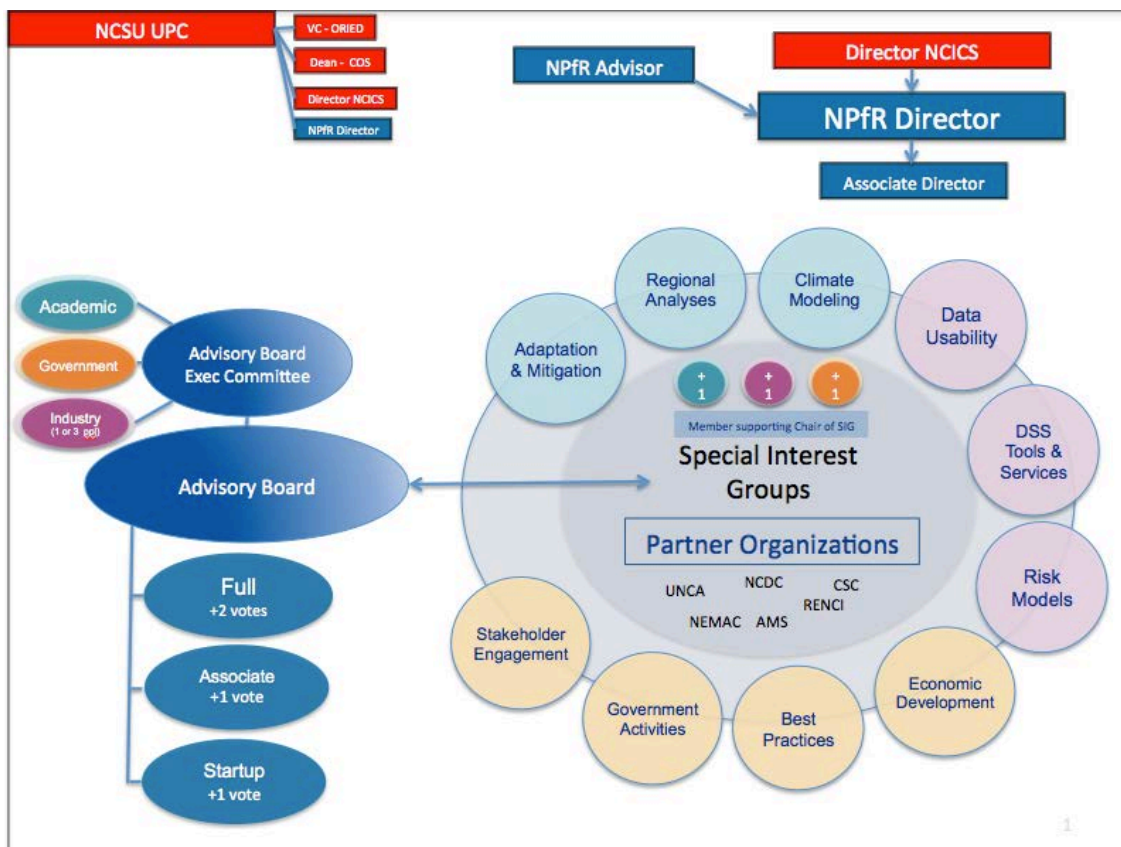
- Third National Climate Assessment
 - Production Team member providing graphics support



- Contributed to the design and development of the Third NCA Full report in the form of a PDF
- Contributed to the design and development of the “Highlights” version of the Third NCA in both PDF and printed book forms, as well as other supplemental products including the *Overview*, Climate Trends and Regional Impacts, 8 Regional Factsheets, Agriculture Factsheet, business card, and bookmark.
- Contributed to the online content and interactive products
- Member of the NCDC Communications Team
 - Work closely with the NCDC Graphics department on publications including BAMS State of the Climate, Explaining Extreme Events, and posters and presentations for AGU and AMS annual meetings and other events.
- USGCRP Climate Health Report (eta Spring 2016)
 - Graphics development
 - Beginning stages of layout development

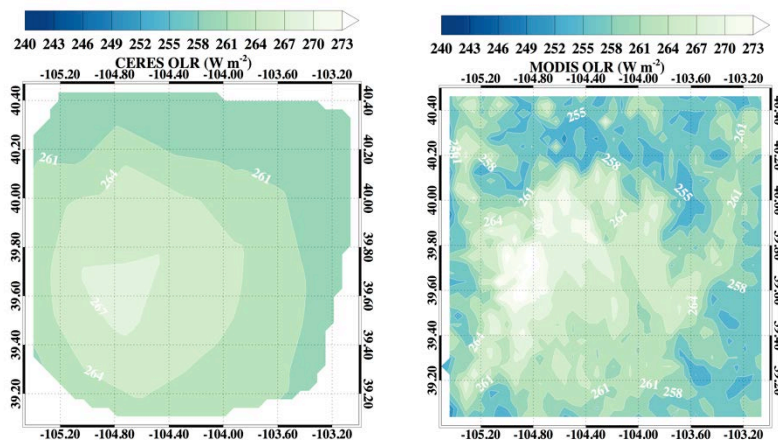
Paula Hennon

- Project lead for development of NCA3 website.
- Exploring and developing opportunities for collaboration with NC State University and other elements of the UNC system including NEMAC at UNC-Asheville. Particular focus on connections and opportunities related to “big data” and the intersection of climate, computing, and statistics, and on developing educational opportunities for NC State Students and CICS staff.
- Focus on planning and developing the National Partnership for Resilience (NPfR), a collaborative organization designed to link businesses, researchers, and governments for effective decisions on a changing planet. The goal is that, by 2025, the public, business, non-profit, and academic communities will have useful science, data, tools, and resources to consider climate as they make routine decisions at all levels. Efforts involve developing a viable business plan and structure, and bringing together several key foundational partners, including NOAA and the Asheville-Buncombe Sustainable Community Initiatives (ABSCI) organization.



Anand Inamdar

- Paper titled “Inter-comparison of the independent calibration techniques applied to the visible channel of the ISCCP B1 data” has been accepted for publication at the J. Atmospheric Oceanic Tech.
- Collaborating with the SCOPE-CM (Sustained and Coordinated Processing of Environmental Satellite Data for Climate Monitoring) project on Inter-calibration of imager observations from time-series of geostationary satellites (IOGEO) as a member of the NOAA team. Efforts to compare our calibration results with the Deep Convective Cloud (DCC)–derived method is under progress.
- I am part of the NOAA/NCDC team in the implementation of the transition of the ISCCP (International Cloud Climatology Project) from NY GISS center to Asheville. The ISCCP project will make use of the reprocessed, re-calibrated B1 data to produce the next generation of higher resolution cloud products. The computing resources at CICS are being used for the project.
- Collaborating with a former CICS colleague, Dr. Pierre Guillevic, on the retrieval of net solar radiation at 1 km scale from geostationary satellites. Results have been validated through comparison with NOAA SURFRAD sites and a manuscript submitted to IEEE TGRS is undergoing revision. We are planning to follow up with a proposal based on the strength of the results achieved.
- Another collaboration with Dr. John Augustine on the radiative effects of the smoke plumes of the Fourmile Canyon fire event in NW Colorado during Sep 6-10, 2010 is underway. I developed and delivered an empirical model to estimate broadband outgoing long wave radiation (OLR) from MODIS imager through using match-up with the broadband Clouds and Earth’s Radiant Energy System (CERES) instrument. The accompanying figure shows how the OLR derived from MODIS (Sep 7, 2010 at 900 hrs UTC) is able to resolve the radiative effect of the fire plumes. The study has been extended to produce downward LW radiation and validated with SURFRAD measurements, and presented at the recent AMS meeting.



Ken Kunkel

- Completion of NCA3. Our contributions to the climate science content were extensive and critical. This included lead authorship on 2 chapter and 2 appendices, the production of the major climate science technical input for the report (issued as a 700 page NOAA Technical Report), and service as the NOAA lead climate scientist for the report. In this latter role, major conflicts on climate science issues were mediated and report text constructed, and climate science material was composed for all of the 8 regional chapters and several of the sectoral chapters.

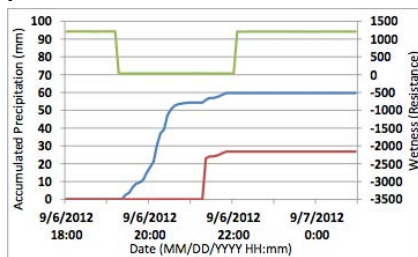


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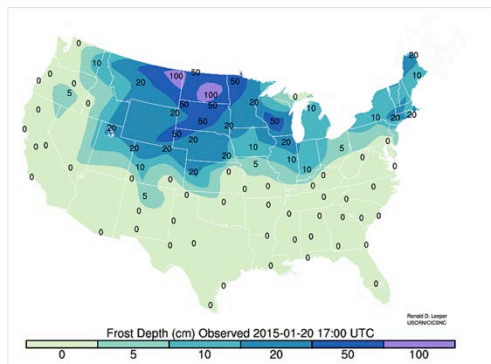
- Post NCA3 release: numerous talks, interviews, and dissemination of NCA3 datasets (outreach)
- Successful SERDP proposal. \$1.3M over 5 years to examine impacts of extreme precipitation on DOD sites
- Assessment of long-term changes in U.S. temperature climate (has it become more extreme?)

Ronnie Leeper

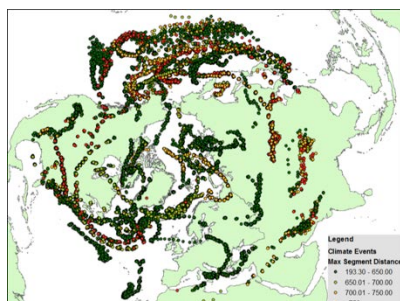
- Completed a great deal of work on improving USCRN observations of precipitation, including a network comparison that identified issues with USCRN's current approach to determining depth change in addition to an evaluation and field testing of a newly proposed algorithm designed to mitigate these concerns. Figure below shows plots of accumulated precipitation for old method (red), newly proposed method (blue) and the presence of precipitation (green); zeroing meaning precipitation if falling. For this precipitation event, the old method misses the initiation of precipitation, which is better captured by the new precipitation algorithm



- Deployed an exploratory tool to monitor observed frost depth in near-real time based on USCRN observations of soil temperature.

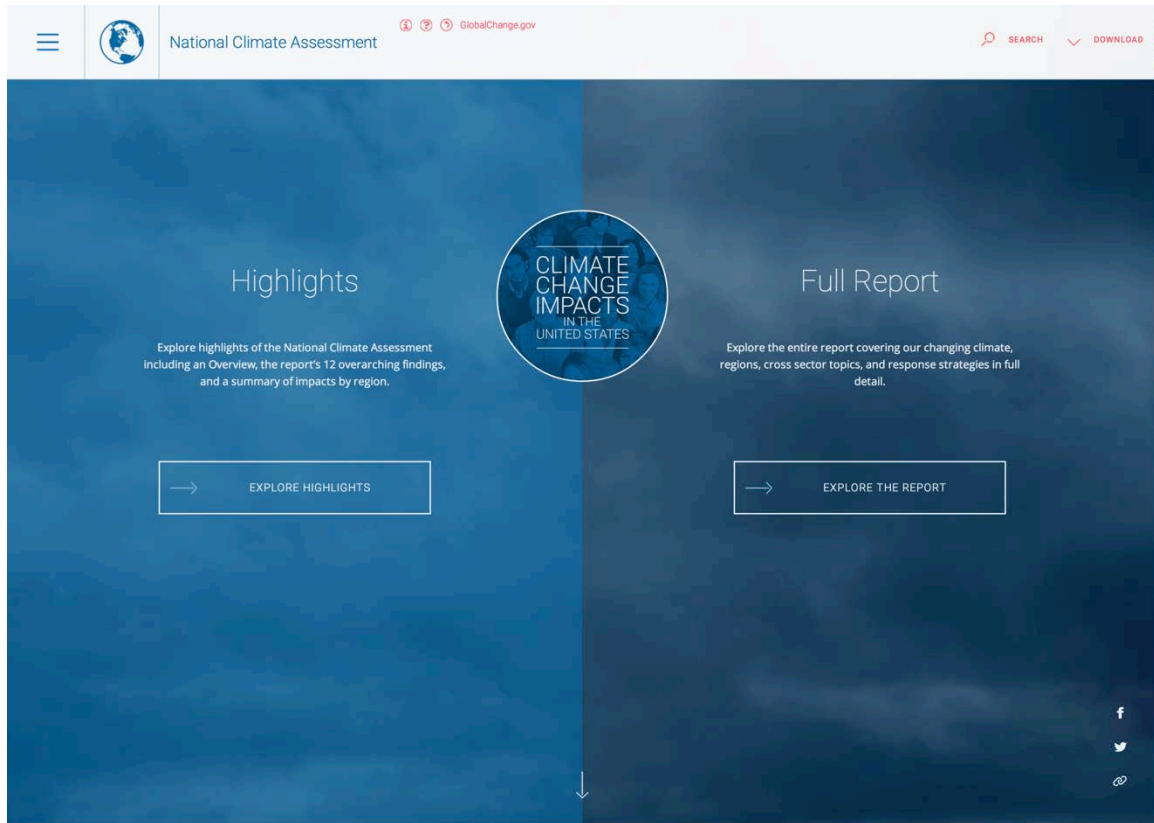


- Created a script using Geographic Information Systems (GIS) technology that associates the same extra-tropical cyclone (ETC) track from different ensemble realizations based on timing and track location. This script was used to associate common ETC tracks from a 56 member ensemble set modeled from 1871 to 2012 (20th Century Reanalysis). Figure below illustrates all track ETC tracks for March 1993 colored coded by greatest member segment distance (distance between low pressure centers over a six-hour window).



Angel Li

- **NCA3 Website:** Was intimately involved with the styling and input of the content for the 2014 National Climate Assessment. The site has been nominated for various Drupal and web awards.



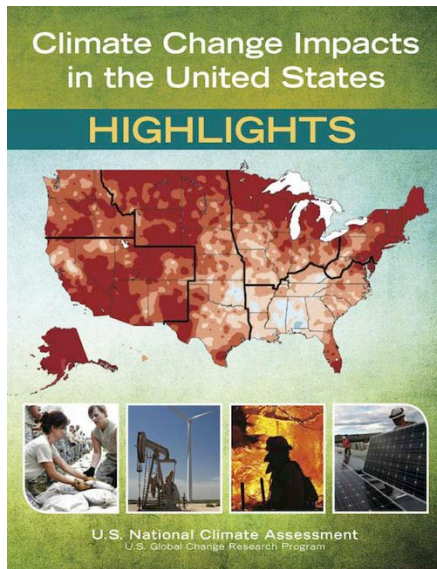
- **Metadata Viewer for the NCA 2014:** For the NCA 2014 report, every figure has a link that displays the metadata for that figure. The metadata itself is stored in the Global Change Information System or GCIS. The viewer dynamically queries the GCIS server and displays the content on the web page.
- **Metadata Collection:** Wrote a simplified web app for the collection of metadata for post NCA 2014 reports and assessments, including the ongoing Climate and Health report and the CMIP5/CMIP3 comparison report. This new app steps the user through the collection process and has been very well received.

Jessica Matthews

- Spatial-temporal data fusion of land surface albedo products (collaboration with NCSU Statistics Dept)
- HIRS atmospheric temperature and humidity profile climate data record development
- Uncertainty quantification for billion dollar disaster events
- Subject matter expert for land surface (i.e. vegetation) climate data record transition
- Facilitating and improving communication between CICS and NOAA personnel in role as CICS middle manager

Tom Maycock

- **Development of “Highlights” version of the Third National Climate Assessment.** Content selection and editorial contributions to the 150-page summary version of NCA3. The Highlights report was in fact largely the work of CICS personnel (two full-time editors, two contracted writer/editors, and the lead graphic designer), along with significant support from the NCDC graphics team.



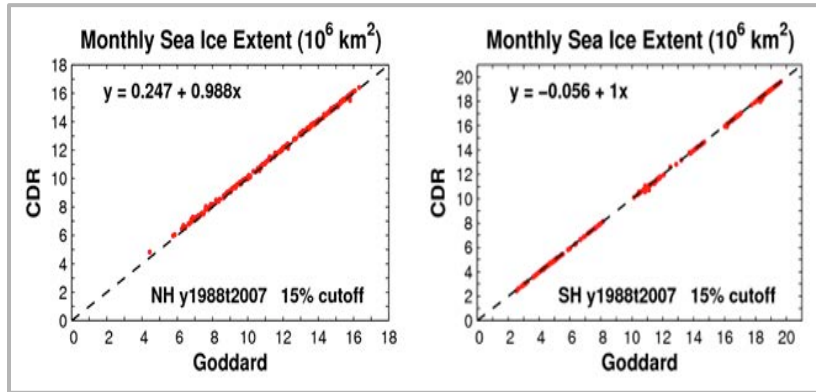
- **Delivery of the Third National Climate Assessment.** Editorial, production, reference management, and process management work on NCA3, culminating in the delivery of PDF and online versions of the full report, the Highlights summary report, and other derivative products.
- **The USGCRP Climate and Health Assessment.** Serving as the project manager and technical editor for the NOAA Technical Support Unit's work on the forthcoming Climate and Health Assessment, due to be released in early 2016. Translating lessons learned from the NCA3 experience into effective processes for both TSU support of the report, and the overall report development process. Draft for review by the Subcommittee on Global Change Research was released (on schedule) on January 16, 2015.
- **Serving as a Liaison with USGCRP.** Working to maintain and grow the working relationships with staff at USGCRP, particularly with respect to ongoing climate assessment activities and the TSU's new role as the graphics development team for the www.globalchange.gov website.
- **CICS-NC Communications.** Serving as the lead for internal and external CICS-NC communications since mid-September, 2014. Early contributions include providing editorial suggestions for two papers being submitted for peer review (one paper accepted so far) and highlighting CICS-NC research and outreach activities, including our extensive AGU and AMS contributions, via the website and social media.

Elsa Nickl

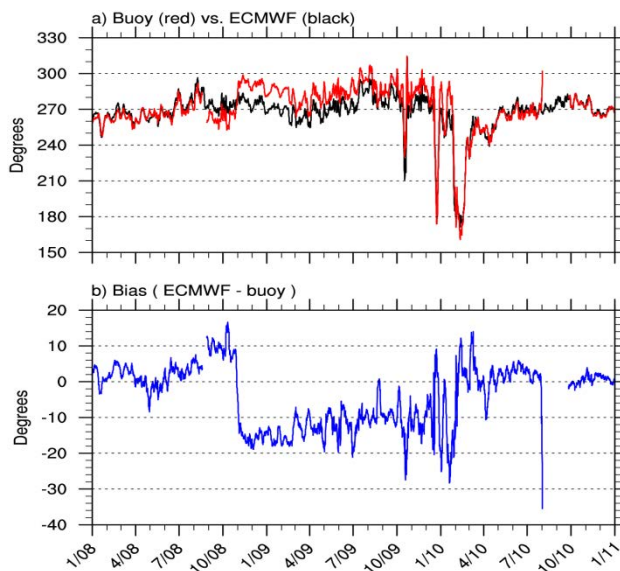
- Using model CM3-GFDL to analyze the impacts of surface temperature gaps on trends estimation; the result is that gaps produce a decrease in surface temperature trends.
- Application of a new spatial interpolation method that takes into account topography to estimate precipitation over U.S.; the method has an acceptable performance using NCDC network observations. We need to test it with fewer stations.
- Estimation of topographic information at various scales for Olivier Prat's precipitation network (radar and surface) research. They found interesting associations between bias and slope and protruding/undersurface station location (some of these results were presented in AGU poster)

Ge Peng

- Verification of the NOAA/NSIDC Sea Ice Concentration Climate Data Record, co-authored a paper published by a peer-reviewed journal (Meier, Peng, & et al., 2014)

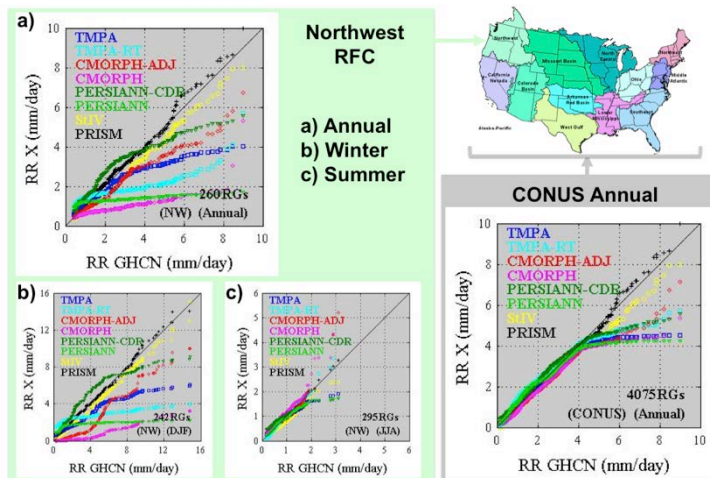


- Figure 1: The scatter-diagram of monthly sea ice extends from monthly NOAA/NSIDC Sea Ice Concentration CDR and Goddard fields (1988 – 2007). It demonstrates the close and linear agreement between the two. (From Meier, Peng, & et al., 2014.)
- Identification of a systematic directional bias of the TAO wind vectors in the central equatorial Pacific Ocean, led a paper published by a peer-reviewed journal (Peng, Bidlot, & et al., 2014)

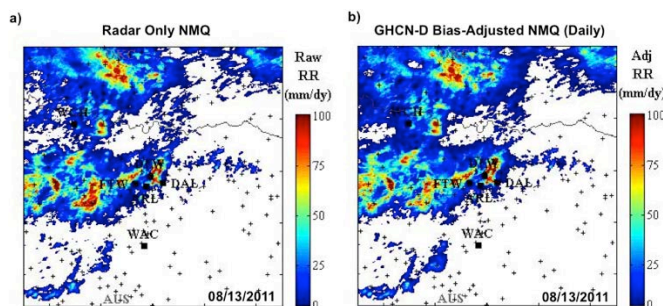


Olivier Prat

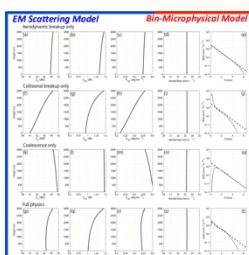
- Extensive comparison of Satellite Quantitative Precipitation Estimates (QPEs) and Climate Data Records (CDRs). This is the multiproduct (satellite, radar, in-situ) comparison focused on a long-term perspective (11 years)



- National Mosaic and Multi-Sensor QPE (NMQ): Bias-assessment and bias-adjustment of the radar-only NMQ reanalysis (CONUS wide) was performed using surface datasets at the daily, hourly, and 5-min scales for the period 2002-2012.



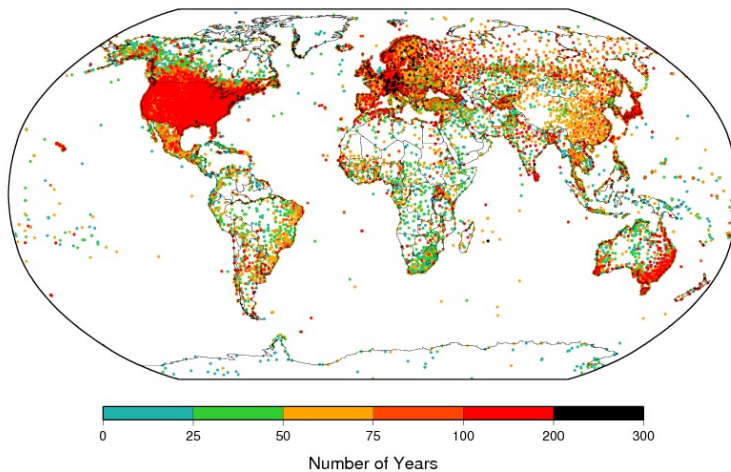
- Microphysics of precipitation: By combining an explicit bin microphysical model with an electromagnetic scattering model, we found an unequivocal dependency between microphysical processes and polarimetric radar variables. This suggests that real time radar rainfall field observations could help improve microphysical parameterization of drop-drop interactions, resulting in better radar measurements of rainfall as well as macro-scale models of storm behavior.



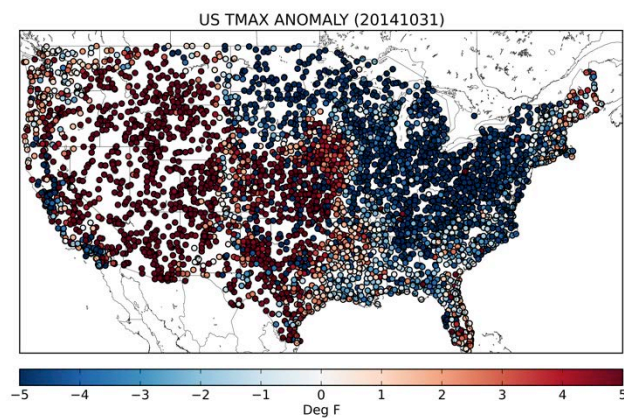
J. Jared Rennie

- Released an innovative data holding that brings together new and existing sources of surface air temperature. This databank will provide the basis for future climate data sets, including the Global Historical Climatology Network's (GHCN's) daily and monthly product.

Location of Temperature Stations (Around 32,000)

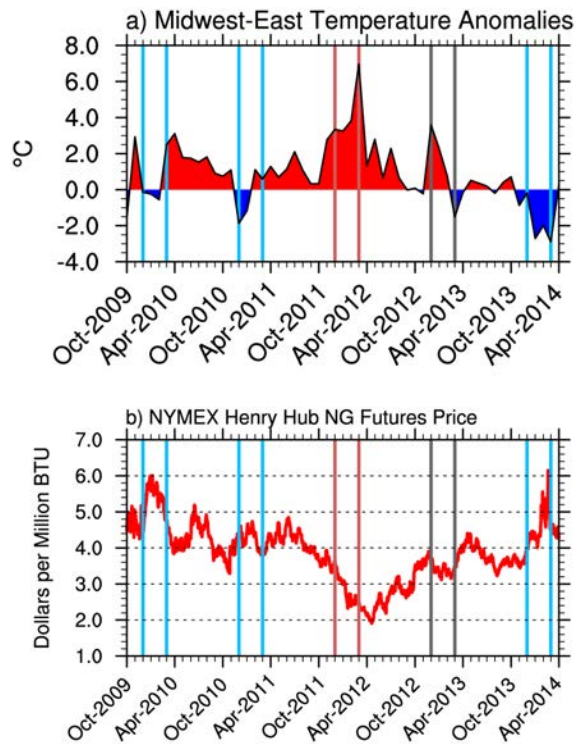


- Currently developing a daily surface temperature anomaly product for the United States, which will be used for current and future climate assessments.



Carl Schreck

- Lead author of manuscript accepted to BAMS describing climate forcing on natural gas prices in recent winters



- Lead author of article published in MWR describing uncertainties in the climatology of tropical cyclones
- Coauthor of manuscript accepted to BAMS showing initial results from Cyclone Center
- Science advisor for two terms of the NASA DEVELOP program looking at climate forcing for rainfall in the southwest US
- Manuscript in preparation describing the effect of Kelvin waves on hurricane activity around the globe.

April Sides

- **2014 National Climate Assessment website** - Contributed Drupal web development for the site, which has been submitted for a Webby award.
- **GlobalChange.gov web support** - Took over the web development support of the site, using the continuous integration workflow established by the hosting company.



- **Metadata Survey integration** - Integrated a newly developed metadata survey into existing author workspace sites to make metadata collection more user friendly.

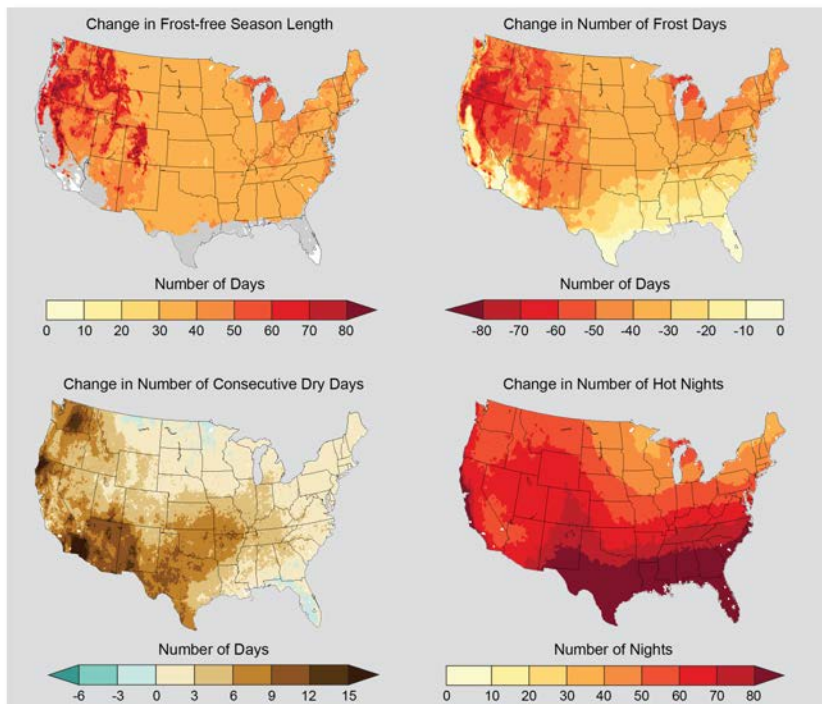
Steve Stegall

- Conducting research on an extreme surface temperature index using observations and 13 CMIP5 hind cast model data. The index is developed over the U.S. aggregated into 6 regions, NE, NW, GP, MW, SE, and SW. Results show good agreement between CMIP5 models and observational trends for all the regions, except the NW where results are mixed. Currently drafting a paper for journal submission in the near future.
- Conducting research using HIRS surface temperatures from several satellites and collocation to USCRN surface temperature observations. Results show that for 2007 to 2012 the N17 and M02 HIRS surface temperatures have similar BIAS and RMSE, with M02 showing a slightly lower RMSE and BIAS. Similar analysis is being done for diurnal (day vs. night) surface temperatures. Currently drafting a paper for journal submission in the near future.
- Attended both AGU and AMS to present posters of the results above.

Laura Stevens

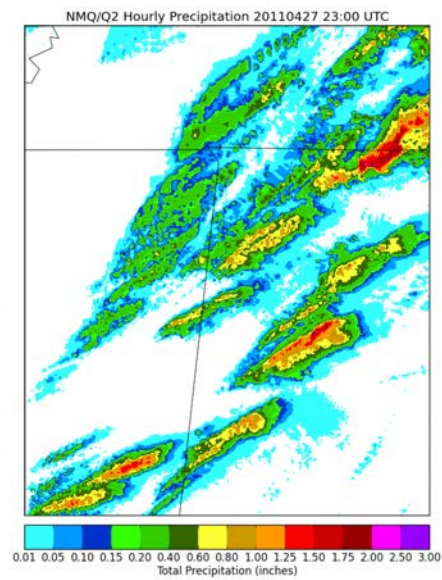
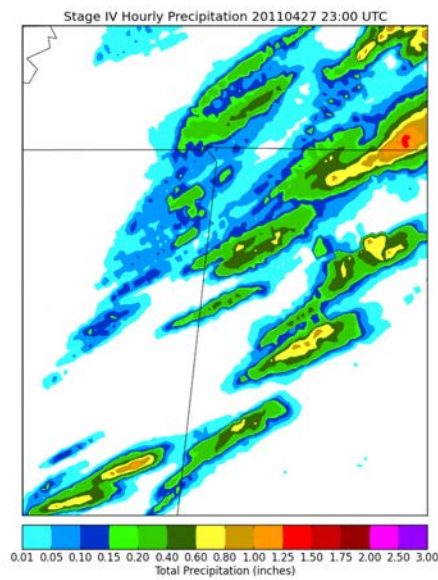
- Continuing support for NCA3, including fielding inquiries for the data and metadata for numerous figures and other results.
- Directed users of NCA and related content to appropriate NCDC resources.
- Delivered GIS files for NARCCAP and CMIP3 climate model data to the NOAA Climate Program Office (CPO).
- Converted several NCA3 netCDF files with CF-compliant versions, in response to request from NOAA CPO.
- Generated maps indicating the number of days over 100F for historical and future climates for the contiguous U.S., as requested by EPA.

Projected Changes in Key Climate Variables Affecting Agricultural Productivity



Scott Stevens

- Successfully completed the first homogeneous reanalysis of the NEXRAD archive, spanning 2001-2011, at high resolution
- Adapted HIRS reprocessing flow to run in a parallel environment, allowing for the entire task to be completed in weeks, rather than multiple years.
- Mentored an undergraduate student through an intensive research project culminating in an oral presentation at the AGU Fall Meeting (and hopefully a publication)



Liqiang Sun

- Scientific analyses of CMIP5 model data for scenarios of RCP8.5, RCP6.0, RCP4.5, RCP2.6, historical runs and historical runs with natural forcing only.
- Scientific analyses of CMIP3 data for scenarios of A2, A1B, B1, and historical runs.
- Analyses of climate extremes derived from both CMIP5 and CMIP3 model data
- Comparison between CMIP3 and CMIP5 simulations, to assess the ability of two sets of models to simulate the historical climate conditions over the United States, and document the simulated future conditions with uncertainty estimate for NCA regions.
- Produced CMIP5 data with resolution of 5 km over the United States for analyses of climate change in each of the 50 states in the United States. Four scenarios, temperature and precipitation data. Already being used by external groups.

Simulated Annual Total Precipitation for Days Above the 99th Percentile, CLIMDEX RCP8.5

