**Semi-Annual Performance Report for**
**Cooperative Agreement #: NA16SEC4810006**
**Reporting Period: March 1, 2019 to August 31, 2019**

# NOAA COOPERATIVE SCIENCE CENTER in ATMOSPHERIC SCIENCES and METEOROLOGY (NCAS-M)

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# I. Executive Summary

Howard University is pleased to report on the activities conducted during the performance period March 1, 2019 - August 31, 2019 by the NOAA Cooperative Science Center in Atmospheric Sciences and Meteorology (NCAS-M).

The NCAS-M is a thirteen-member consortium with Howard University as the lead institution. The partnership has nine partners as sub-awardees and four affiliate partners (related through a non-funded articulation agreements). NCAS-M nine partners include, Howard University (lead), Jackson State University, University of Puerto Rico - Mayagüez, University of Texas - El Paso, San Jose State University, Pennsylvania State University, University of Maryland - Baltimore County, University of Maryland - College Park, State University of New York - Albany, and the four affiliates are: Fort Valley State University, San Diego State University, Tuskegee University, and Universidad Metropolitana. All 13 of these academic institutions have been engaged in NOAA mission-relevant activities during this reporting period through faculty, student, or combined faculty-student engagement activities.

The NCAS-M continues to promote expanded participation in education, training, capacity building, and collaborative research with specific focus on groups that are traditionally underrepresented in NOAA mission-relevant STEM fields. Concerted efforts are made to include students from these groups who study the social, behavioral, and economic sciences disciplines (including communication sciences) for support of NOAA's mission. The NCAS-M research and training activities support its primary goal of producing a diverse and highly skilled cadre of technical and environmentally literate professionals who will help build a more resilient nation in the face of increasing vulnerability to weather extremes and other environmental threats.

This reporting period was marked by significant engagement with NOAA Office of Education and NOAA Grants Management Division (GMD) with specific focus on improving grants administration of the award and fostering a deeper institutional commitment to its success. NCAS-M leadership also engaged its technical monitors and technical advisors in various other activities including face-to-face meetings, technical briefings, the NCAS-M annual meeting in May 2019, and participation in the Center Champions Working Group (CCWG). NCAS-M leadership continued to foster the development and strengthening of collaborations and partnerships with NOAA personnel at GFDL, NCWCP, the Sterling Test Center, AOML, ESRL, ATDD, NSSL, and several Weather Forecast Offices (Albany, Jackson, Santa Teresa). NCAS-M is making significant progress with respect to the program level outcomes and outputs. NCAS-M filled all required positions in the Center and engaged OED staff in further enhancing and updating the Center's operational plans (e.g. evaluation plan, implementation plan, communication strategy). The specific activities and interactions are provided in the following sections in accordance with OED reporting guidance.

The NCAS-M began recruiting its fourth cohort of students with an emphasis on URM students from a variety of disciplines supporting NOAA mission-relevant research. NCAS-M has continued to connect existing Cohort and leveraged students to relevant opportunities across NOAA. Examples of the student engagements and achievements during the reporting period included:

- Engagement of NOAA mentors with NCAS-M post-doctoral Fellows at the NOAA ESRL (Dr. Keren Rosado) and NOAA NWS (Dr. Leticia Williams)
- NOAA personnel serving as co-advisors of graduate students – Dr. Nick Nalli (NESDIS) for Keren Rosado (HU) and Jessie Cremean (ESRL) or Julio Ceniceros (UTEP)
- NOAA personnel serving as mentors for graduate students – Dr. Daryl Kleist (NCEP) for Emmanuel Dibia (UMD), Jessie Creamean (ESRL) for Julio Ceniceros (UTEP), Dr. Renellys Perez (AOML), Vankita Brown (NWS) for Cassandra Jean (HU), and Nick Nalli (NESDIS) for Kafayat Olayinka and Daniel Yeager, (both HU)
- Collaborative engagement of NCAS-M faculty and NOAA personnel – Nick Nalli (NESDIS) and Vernon Morris (HU) on improving satellite retrievals in dusty environments, Jeff McQueen (NCEP) and William Stockwell (HU, UTEP) on improving operational air quality forecasts, Pius Lee (NWS) on PBL modeling

with Belay Demoz (UMBC) , and Howard Diamond (OAR), Tony Reale (NESDIS), Mitch Goldberg (NESDIS), Alan Gerard (NSSL) and Terri Adams (HU) on the Hazardous Weather Testbed testing weather products,, and Megan Lataille (NWS) on GRUAN analysis at Beltsville with Ricardo Sakai (HU) and Belay Demoz (UMBC)

- Training of undergraduate students at NWS Weather Forecast Office (WFO) in Jackson, MS
- NOAA personnel were involved in NCAS-M professional development through participation in the Experiential Training Summer Program and Center-Wide webinars (e.g. Genene Fisher, Audrey Trotman)
- NOAA personnel contributing to undergraduate courses and training at JSU (e.g. Latrice Maxie and Anna Wolverton of the Jackson WFO)

The NCAS-M also engaged NOAA leadership and personnel in program planning and implementation through participation in the Center Champions Working Group Meetings, the NOAA "Emerging Technologies for Observations" Workshop, briefings to leadership at NCEP, and briefings to the NOAA Chief Economist.

The following sections of this semi-annual performance report details the activities and accomplishments for March 1, 2019 – August 31, 2019.

## II. Accomplishments

The major goals of NCAS-M are listed below in sections a - f and are drawn directly from the original specific objectives of the award as articulated in the Federal Funding Opportunity for the EPP/MSI Program. The summary accomplishments with the relevant numerical statistic for each specific objective are presented in brief narrative form. The Center met or exceeded all annual performance goals based on the activities reported during this performance period.

### a. Increased number of CSC post-secondary students trained annually

NCAS-M Increased quantitative and analytical skills in students

NCAS-M sought to provide specific education and training opportunities to increase quantitative and analytical skills for at least 25 students per year. **During this reporting period 59 students were engaged in specific CSC activities to increase quantitative and analytical skills through courses taught by NCAS-M faculty with cohort students enrolled (11), workshops sponsored by NCAS-M (25), the ETSP (9), workshops/certifications that NCAS-M students attended as part of specialized training (6), and field training such as AEROSE (5) and FIREX-AQ (3).**

NCAS-M increased competence in applying STEM to decision making, policy and management

**The NCAS-M goal for this specific objective is to increase competencies for a minimum of 25 students per year. The annual goal was met during this performance period alone. The Center-wide specialized training provided 21 students with an intensive, interdisciplinary decision-making exercise that was moderated by NOAA scientists. Additionally, five (5) students participated in NERTOs that were focused on decision-making, policy, and management (Jennifer Kennedy, Michael Garvey, Chantal Smith, Cassandra Jean, and Yanna Chen).**

NCAS-M increased skills to use large data sets, geographical information systems (GIS), statistical analysis, computer modeling, and algorithm development.

The NCAS-M annual goal is to increase skills in these areas for a minimum of 25 students per year. As stated above, **59 students were provided specific education and training opportunities to increase quantitative and analytical skills and those skill sets were in big data analysis, statistical analysis, and computer programming/modeling.** In addition, collaborative research for NCAS-M Cohort students at UMD (Dibia and Kholodovsky), PSU (Moon), and HU (Yeager and Wilkinson) also involved the application of statistical analysis, computer modeling, and algorithm development. The total number of students with increased skills in this category is 63.

### b. Increased number of CSC post-secondary students educated and graduated annually

**During this reporting period, the number of degrees earned in NOAA mission-related disciplines was nine (9); 2 PhDs, 3 MS, 4 BS degrees. Eight of the nine degrees were awarded to URM students.** The list of the specific students along with their degree, cohort designation, disciplines and institution is provided below.

**Listing of graduates during the reporting period**

| Name | Institution | Degree | Discipline | Cohort | URM Type |
|---|---|---|---|---|---|
| Wambugu Kironji | UMBC | BS | Computer Science | 2 | AA |
| Daniel Yeager | HU | PhD | Atmospheric Sciences | 1 | AA |
| Mi'Chael Wright | HU | MA | Sociology | 2 | AA |
| Catherine Liu | SJSU | MS | Meteorology | 1 | A |
| Julio Ceniceros | UTEP | MS | Environmental Sciences | 2 | H |
| Brianna Ross | JSU | BS | Meteorology | 2 | AA |
| MiaNwi Obioha | JSU | BS | Meteorology | 2 | AA |
| Cassandra Shivers-Williams | HU | PhD | Social Psychology | 1 | AA |
| Krystal Sanchez-Castenada | SJSU | BS | Meteorology | 2 | H |

The number of students (total and URM) who participated in professional development opportunities.

The NCAS-M annual goal is 25 students per year. Our approach is to a) provide at least one Center-wide professional development activity each summer, b) sponsor NOAA lab faculty visits, c) support conference travel with an emphasis on students who present an oral or poster presentation to experts, peers, and/or other stakeholders, d) NCAS-M sponsored webinars, and e) supporting student travel to attend externally-sponsored workshops and professional training.

During this reporting period, 30 students were provided professional development opportunities through NCAS-M activities other than webinars. Twenty-one (21) students participated in the Center-wide PD workshop, eight (8) students participated in the AMS Policy Forum, and one (1) student was supported to attend an Ocean Carbon Biogeochemistry workshop in Woods Hole.

## c. Increased CSC capacity to train and graduate students

Number of seminars, new courses, new programs, and new degrees offered to develop working skills and functional competencies to support the NOAA mission and workforce.

The NCAS-M goal under this specific objective is to conduct 4 seminars/webinars per year and 3 training sessions per year. These are usually conducted during the academic term which is largely outside of the current performance period. **While new courses were developed during previous reporting periods, no new courses, seminars, degrees, or new programs were developed during the current performance period. NCAS-M hosted two webinars with an estimated attendance of 25 participants each time.** NCAS-M students developed working skills and functional capacities through a variety of existing courses and programs including the NERTOs. Twelve (12) NCAS-M students conducted NERTOs during the performance period, which increased our capacity to train and graduate students.

The NCAS-M goal for the total numbers of students supported that reflect the changing demographics of the nation is twenty (20) students per year.

**Thirty-two (32) cohort students were supported during this reporting period. An additional nine (9) ETSP students were supported during the summer program. Thus, a total of 41 students were supported, exceeding the projected goal. Thirty-five (35) of these students or ~85% were URM.**

The NCAS-M goal for increasing the number of URM students who select to pursue higher education in NOAA mission fields is to recruit at least five (5) students per year.

During this performance period, five URM students were recruited to Cohort 4. **Four African American students were recruited to the Atmospheric Sciences graduate program at Howard University**. This is the flagship atmospheric sciences program for the Center for its ability to attract, retain, and graduate URM students in atmospheric sciences. The three students, who are now in NCAS-M Cohort 4, are: Alia Wofford, Briah Davis, and Malachi Berry. A fourth African American student, Mr. Maurice Roots, who has also been recruited for Cohort 4 will be enrolled in Atmospheric Physics at UMBC.

### d. Reduce the attainment gap for URMs in NOAA mission-relevant fields

Increased number of URM students in student development activities that will lead them to the attainment of degrees and/or employment in NOAA mission fields.

The two efforts aimed at reducing the attainment gap of URMs during this performance period were the Center-wide professional development workshop and the placement of Cohort students in NERTOs across NOAA. **During this performance period, 12 NCAS-M students participated NERTOs at 10 different locations (NOAA facilities).** Cohort students conducted research on the NOAA Class-1 Research Ship *Ronald H. Brown*, and in various offices within the NCWCP, AOML, ATDD, ESRL, NSSL, three of the SSMC buildings in Silver Spring, and at a WFO (Albany).

Increased number of URM students who select to pursue higher education in NOAA mission fields.

**Five (5) URM students were recruited to pursue graduate studies at NCAS-M schools during the performance period.**

### e. Increased NOAA mission-relevant research capacity at MSIs

NCAS-M seeks to increase NOAA mission-relevant capacity at MSIs through four specific methods.

We aim to establish five (5) new research collaborations with NOAA and CSC faculty, staff and students each year. During this performance period, this occurred largely through NERTO interactions during which **three (3) students engaged in research projects that aligned with their thesis and their research projects continued at their home institutions.** These students include Arianna Jordan (Cohort 2) with Adam Clark of NSSL, Steven Solimine (Cohort 1) with Dave Turner of ESRL, Alrick Green (Cohort 2) with Drs. Xuejin Zhang and Ghassan Alaka, of HRD at AOML. Another new relationship was developed between leveraged student Zhifeng Yang of UMBC and Pius Lee of NWS through NCAS-M participation in the OWLETS-2 campaign. **NCAS-M met its goal for increasing the number of collaborations during this performance period.**

A second aim under this objective is to increase the number of NOAA scientists serving as mentors and advisors for

student research with a goal of five (5) new mentors per year.

As listed above, five new advisors have been identified from the summer activities. **Additionally, NCAS-M began ramping up preparations for an activity to be conducted in September 2019 called Project Fest**. This effort is a collaboration between NWS (Daniel Melendez and Genene Fisher) and NCAS-M to increase the number of collaborative opportunities within NOAA with an emphasis on NWS and to raise the visibility of the NERTO program.

Increase the number of inter-institutional collaborative partnerships established and maintained in support of NOAA's mission.

During this performance period, NCAS-M scientists at HU and UMBC collaboratively engaged NOAA personnel from NESDIS (Nalli, Goldberg, Reale), OAR (Diamond), and NWS (McQueen) on PBL and climate research at Howard University Beltsville Campus (HUBV or HUBC). Joint proposals were prepared and submitted with partnerships between UMBC, HU, and Penn State as well as between UMD and HU. Finally, new UTEP and HU collaborations were developed focusing on improving PBL observational capacity at UTEP. In summary, robust **inter- and intra-institutional collaborative partnerships continue to flourish within NCAS-M**.

Increase number of uses of NOAA data in research and tool development.

**NCAS-M scientists and students established a collaboration with NOAA NESDIS STAR to test and evaluate decision support materials from the NUCAPS suite for scientific field campaigns**. In particular, these satellite data were used to strategically inform rawinsonde and ozonesonde deployments during the AEROSE 2019 campaign and are in use at HUBV for the summer 2019 intensive observations.

### f. CSC-supported faculty, staff and students' research directly aligned with NOAA's mission and strategic priorities.

NCAS-M has set a mid-range goal for peer reviewed publications, presentations, and tools developed by faculty, staff and students to be five (5) publications, five (5) submitted manuscripts, five (5) conference presentations, and two (2) invited talks per reporting period. During the current reporting period, NCAS-M faculty and students achieved the following:

- 3 student conference papers
- 7 invited talks by faculty and students
- 5 journal articles published or accepted for publication (3 of these have student authors, 3 with NOAA co-authors)
- 2 tools or products in development
- 5 manuscripts submitted for publication (3 of these have student authors)
- 7 theses based on NOAA mission-relevant research

**On the basis of this performance period, NCAS-M met or exceeded its annual goals in this arena.**

Use of CSC research results and tools by NOAA and other stakeholders.

**NCAS-M produced four research results during the performance period that are in use by NOAA and other stakeholders.** These results and products are:

- Atmospheric soundings from the AEROSE cruises (NESDIS STAR archives these data immediately after each cruise)
- Analysis and feedback on NUCAPS products for field research guidance (NESDIS STAR collaborators obtain this feedback from the AEROSE and HUBV operations)

- GRUAN data obtained at HUBV is used by NCDC through Howard Diamond (ARL)
- Steven Solimine developed an image processing code during his NERTO that is in use at ESRL
- Light stress algorithm developed at UPRM is in use at NOS

In the following section, the specific activities conducted during this reporting period have been tabulated and displayed along with an indication of the progress against the goals set forth in the NCAS-M implementation plan. The first column lists the FFO specific objectives and indicates the numerical targets that we have set. The second column lists the major activities executed as Center-sponsored initiatives. The final two columns provide more detail on the results and outcomes of the activities including participants and collaborator names and affiliations.

### g. Increased number of CSC post-secondary students trained annually

| Specific Objectives | Major Activities | Significant Results | Key Outcomes/Other Achievements |
|---|---|---|---|
| Increased quantitative and analytical skills.<br><br>Goal: provide specific opportunities in this arena to 25 students per year. During this reporting period 58 students were engaged in specific CSC activities. | 1. Conducted mini-tutorial for Python programming at HUBV (5 students trained)<br>2. Student drone training (UAS technology for NWS) measurements (1 UPRM obtained pilot license)<br>3. Eleven (11) Students trained in ATMS courses specific to quantitative and analytical skills<br>4. Ten (10) students trained during UPRM, AEROSE and FIREX-AQ field campaigns<br>5. Nine (9) students trained in ETSP<br>6. Twenty-one students trained in Center-wide skill development exercise | Python and R programming skills training for 16 Cohort students<br><br>Nine rising sophomores from three institutions (UMBC, HU, and JSU) were exposed to research experience of NOAA relevance<br><br>One student received remote pilot license for drones after certification<br><br>Ten students received experiential training in field observations<br><br>Twenty-one students participated in interdisciplinary problem-solving exercise of NOAA relevance | Students gain proficiency in Python, R, and SPSS applications<br><br>Continuing to enhance student preparation in quantitative skills<br><br>Eleven (11) leveraged students trained in various tutorials and field experiments<br><br>Nine (9) individual projects completed and presented at summer colloquium in the ETSP.<br><br>1. Aolani Aviles (HU)<br>2. Henry Budris (UMBC)<br>3. Camryn Billett (HU)<br>4. Chinedu Chukwu (HU)<br>5. Tisha Copeland (HU)<br>6. Alexandra Grayson (HU)<br>7. Jordan Hundley (JSU)<br>8. Alycia Triplett (JSU)<br>9. Onyekachi Udoye (JSU) |

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| | Provided training opportunities to faculty, staff, postdocs, and students on NOAA mission-relevant research on aerosols through AEROSE and FIREX-AQ<br><br>(5 students trained in AEROSE, 3 students trained in FIREX-AQ) | Eight (8) students were trained in NOAA-sponsored field campaigns to analyze environmental data sets for model input and verification and for satellite data analysis | A manuscript was submitted on the AEROSE data<br><br>Eight (8) abstracts were submitted to the AMS and AGU conferences in Dec 2019 and January 2020. At the time of this report, decisions on acceptance had not been rendered. |
| Increased competence in applying STEM to decision making, policy and management<br><br>Goal: To increase competencies for a minimum of 25 students per year. During this reporting period, 25 students were reached through CSC activities. | 1. Center-wide PD exercise provided training for twenty-one (21) students.<br><br>2. (5) NERTO experiences focused on applying STEM to decision making, policy and management | NERTO students are preparing abstracts for submission to professional meetings | Positive feedback from NERTO mentors |
| Increased skills to use large data sets, geographical information systems (GIS) and statistical analysis, computer modeling, and algorithm development.<br><br>Goal - Increase skills for a minimum of 25 students per year.<br><br>During this reporting period, 14 students were reached through CSC activities. | 1.Twelve (12) graduate students participated in NERTOs during this performance period.<br><br>2. Center-wide PD reached 21 students<br><br>3. Nine (9) ETSP students increased skills to use large data sets, statistical analysis, computer modeling, and algorithm development. | Introduction to R-studio, NCL, spatial analysis<br><br>Analyzing large data sets from ceilometer data, FIREX-AQ observations, AEROSE data, and data from HUBV. | SJSU grad student (Catherine Liu) learned to use regional climate results for thesis research<br><br>Students gained strong skills in GIS, and statistical analyses, and developed empirical models for extreme episode identification<br><br>Students became more marketable and qualified for the job market |

## h. Increased number of CSC post-secondary students educated and graduated annually

| Specific Objectives | Major Activities | Significant Results | Key Outcomes/Other Achievements |
|---|---|---|---|
| Increased the number of degrees earned annually in NOAA mission-related disciplines. | Recruited five URM students in atmospheric sciences at UMBC and Howard University<br><br>Eight NCAS-M students received their degrees during this period. | 1)Julio Ceniceros, MS, Environmental Sciences (UTEP); 2) Wambugu Kironji, BS, Computer Sciences (UMBC); 3) Catherine Liu, MS, Meteorology (SJSU); 4) Brianna Ross, BS, Chemistry (JSU); 5) Krystal Sanchez-Castaneda, BS, Meteorology (SJSU); 6) Cassandra Shivers-Williams, PhD, Social Psychology (HU); 7) Mi'Chael Wright, MS, Sociology (HU); 8) Daniel Yeager, PhD, Atmospheric Sciences (HU) | Yeager is employed by NGA<br><br>Kironji received a full scholarship for graduate study at Duke University<br><br>Shivers-Williams is employed as a postdoc at NSSL<br><br>Wright received full support for graduate study (PhD) at the University of Minnesota |
| The number of students (total and URM) who participated in professional development opportunities, to include at least one on-site experiential research and training opportunity at a NOAA lab, office, or facility with tangible training and research: (a) for a minimum duration of 4 consecutive weeks, and (b) resulted in a publication or an oral or poster presentation to experts, peers, and/or other stakeholders.<br><br>Goal - 25 students per year. | 1. Twelve (12) NERTOs<br><br>2. NCAS-M professional development workshop (21 students)<br><br>3. UPRM students participated in Woods Hole workshop<br><br>4. WFO site Visits (2 JSU students)<br><br>5. AMS Washington Policy Forum. Eight (8) HU students participated in AMS Washington Policy Forum | 1**) NERTO**: 12 cohort students participated in or completed NERTOs during this reporting period which resulted in or will result in an oral or poster presentation to experts, peers and/or other stakeholders.<br><br>**Cohort 1:**<br>Kafayat Olayinka (C1) (completed 6/2019) – NOAA Ronald H Brown Ship & NCWCP<br>Daniel Yeager (C1) (completed 6/2019) – NOAA Ronald H Brown Ship & NCWCP<br>Yanna Chen (C1) (completed 8/2019) – | A SJSU grad student (Liu) was able to use data provided by NOAA for thesis research.<br><br>- NCAS-M annual meeting: 1 oral presentation, 1 poster presentation<br><br>Six (6) NCAS-M student abstracts submitted for presentation at the upcoming AMS annual meeting.<br><br>Students engaged private sector leaders and learned about the intersection of government and business in the weather industry |

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| | During this reporting period, 43 students were reached through CSC activities. | NOAA NWS Albany WFO<br>Stephen Solimine (C1) (completed 8/20/2019) – NOAA ESRL<br><br>**Cohort 2:**<br>Michael Garvey (C2) (completed 4/12/2019) – NOAA Silver Spring, MD<br>Cassandra Jean (C2) (completed 8/9/2019) - NOAA Silver Spring, MD<br>Chantal Smith (C2) (completed 4/12/2019) – NOAA Silver Spring, MD<br>Kelly Nunez Ocasio (C2) (completed 7/24/2019) – NOAA AOML<br>Jennifer Kennedy (C2) (completed 8/6/2019) – NOAA Silver Spring MD<br>Alrick Green (C2) (completed August 23, 2019 (Original); Extended thru December 2019) – NOAA AOML<br><br>**Cohort 3:**<br>Corbin Brooks (C3) (completed 9/6/2019) – NOAA ATDD<br>Arianna Jordan (C3) (completed 8/9/2019) – NOAA NSSL<br><br>Eight (8) students participated in AMS Washington Policy Forum<br><br>1) Julio Ceniceros (UTEP), 2) Miguel | |

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| | | Cortez (UTEP), 3) Emmanuel Dibia (UMD), 4) Ena Keys (JSU), 5) Wambugu Kironji (UMBC), 6) Catherine Liu (SJSU), 7) MiaNwi Obioha (JSU), 8) Shadya Sanders (HU) | |

## i. Increased CSC capacity to train and graduate students

| Specific Objectives | Major Activities | Significant Results | Key Outcomes/Other Achievements |
|---|---|---|---|
| Number of seminars, new courses, new programs, and new degrees offered to develop working skills and functional competencies to support the NOAA mission and workforce. | No new activities regarding new courses, programs, and webinars were conducted but the ongoing webinars continued.<br><br>A monthly seminar series was implemented for the Center-wide Research Focus Groups, in which Cohort students present their research via web conferencing to the full NCAS-M faculty and student body. This facilitates more interaction and cross-pollination of research ideas and approaches. | **NCAS-M wide:**<br>Mar 28, 2019 - "Weather Science Communication 101" (*Dr. Gina Eosco, Social Science Portfolio Coordinator, Cherokee Nation Company supporting: NOAA/OAR/OWAQ*)<br><br>April 25, 2019 - "A Likely Union: Climate Change and Landscape Architecture" (*Dr. Diane Jones Allen, Program Director for Landscape Architecture, in the College of Architecture Planning, and Public Affairs, at the University of Texas at Arlington*).<br><br>All Cohort 1 students presented their research to the full NCAS-M faculty and student body. | **NCAS-M wide:**<br>Mar 28, 2019 ~ 25-30 participants center-wide – The webinar provided information on the visual representation of weather risk and uncertainty, as well as outreach and dissemination.<br><br>April 25, 2019 ~ 25-30 participants center-wide - The webinar focused on research and practice pertaining to climate change and landscape architecture as well as career opportunities in the landscape architect profession.<br><br>Students gained increased competency at presenting their research and receiving constructive critique and input from peers and faculty alike across the center. Several of the students who presented their research subsequently defended their dissertations and theses with great success. |

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| Total numbers of students supported by the CSCs and degrees awarded that reflect the changing demographics of the nation.<br><br>Goal: Support twenty (20) students per year | Supported 43 students through NCAS-M research from cohorts 1 (11 students), cohort 2 (17 students), cohort 3 (six students), and ETSP (nine students). | One M.S. degree in the area of extreme weather events<br><br>One student (PSU) is working on the project<br><br>Four undergraduate African-American students supported (2 males and 2 females) | |
| To increased number of URM students who select to pursue higher education in NOAA mission fields.<br><br>Goal: Increase the number by five (5) students per year | Recruited five URM students in atmospheric sciences at HU and UMBC (4 students in Cohort 4 and 1 leveraged student) | Alia Wofford (HU), Briah Davis (HU), Malachi Berry (HU), Maurice Roots (UMBC), Reuben Vassar (HU, leverage) | Goal to increase the number by five (5) students per year achieved. |

## j. Reduce the attainment gap for URMs in NOAA mission-relevant fields

| Specific Objectives | Major Activities | Significant Results | Key Outcomes/Other Achievements |
|---|---|---|---|
| Increased number of URM students in student development activities that will lead them to the attainment of degrees and/or employment in NOAA mission fields. | 1. Completion of Individual Student Development Plans<br><br>2. Recruitment activities at SACNAS every year and the UTEP Career Expo | Students completed Individual SDPs throughout the year, including the summer<br><br>Increase number of minority students<br><br>Use UTEP's built-in infrastructure to recruit minorities and offer them opportunities to succeed in NOAA's mission related fields. | **NCAS-M wide:**<br>26 NCAS Cohort students completed Year-End SDPs and 23 NCAS-M Cohort students completed Summer SDPs that included the following areas: research, internships at NOAA, core competency attainment, integrative mechanisms of social sciences, publications, and presentations |

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| Increased number of URM students who select to pursue higher education in NOAA mission fields. | 1. ETSP<br><br>2. Recruitment activities | Dibia (UMD) will be encouraged for continuous study pursuing PhD in UMD with CSC funding secured<br><br>Recruiting two (2) JSU students for study in graduate school.<br><br>Twenty-one (21) students participated in professional development activities at Howard University during the Summer for 2-weeks. | Recruitment of 4 new NCAS-M students in Cohort 4 |

## k. Increased NOAA mission-relevant research capacity at MSIs

| Specific Objectives | Major Activities | Significant Results | Key Outcomes/Other Achievements |
|---|---|---|---|
| Undergraduate student training<br><br>Goal: Fifty (50) students per year. | 1. WFO volunteer program and Field measurement Coordination (both at JSU) trained four undergraduates<br><br>2. AEROSE trained five students in the field and another five as undergraduate researchers during the academic year<br><br>3. ETSP trained nine students | The five students who participated in ETSP at HUBV were trained in R and GIS.<br><br>JSU students have been exposed to NOAA – relevant training<br><br>UPRM students trained in R and GIS<br><br>HU and UTEP students trained in NWS sounding systems<br><br>SJSU students trained in climate modeling | 23 undergraduates trained during this performance period. |

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| Increase number of research collaborations with NOAA and CSC faculty, staff and students.<br><br>Goal: Five (5) new collaborations per year | 1. Field Visits, Webinars, and NERTOs<br><br>2. GRUAN, ASOS<br><br>3. UAS collaboration with NWS<br><br>4. FIREX-AQ<br><br>5. Thesis Advising by NOAA staff<br><br>6. Meetings with NOAA leadership for collaborations | Students engaged in activities that allowed them to visit NOAA and other field facilities, participate in NOAA webinars, and collaborate with NOAA and NCAS-M staff and other students on NERTOs<br><br>Joint NOAA-UMBC-HU group continues collaboration on GMAC/ GRUAN.<br><br>NCEP scientist (Henry Juang) served on the PhD thesis committee of Jia-Fong Fan (HU) | Student participation in visits to NOAA and other field facilities, NOAA webinars, and NERTO activities<br><br>Enhanced cross-institution interactions between HU, JSU, UTEP, and UMBC in the Ceilometer and Lidar group and Air Quality, with Jackson State University. We interact with NOAA scientists from nearby Weather Station in Santa Teresa.<br><br>See photo from the inaugural meeting attached. Air quality forecast data are routinely being generated at several sites by NOAA (J. McQueen) that has helped to bring together Howard, UMBC, and CUNY.<br><br>Share intellectual discussions and equipment resources<br><br>Director met with Ariel Stein of ARL to discuss increased collaboration between ARL and NCAS-M |
| Increase number of NOAA scientists serving as mentors and advisors for student research<br><br>Goal: Five (5) new mentors per year. | 1. NOAA Mentor recruitment<br><br>2. Engagement with NOAA facilities to enhance collaborations (ESRL, ATDD, NCEP, NWS-Sterling, WFOs in Jackson, Albany, Santa Teresa, San Juan)<br><br>3. NSSL mentor, Dr Bob Rabin, working with UTEP students<br><br>4. AEROSE mentors work with NCAS-M students<br><br>5. Collaborations with NOAA STC scientists at Beltsville | NOAA/ESRL scientists (Jessie Creamean) advised one grad student (Catherine Liu)<br><br>This led to the successful field training of Vitaly working with Thomas in GFDL<br><br>AOML and NESDIS staff work with HU students on data processing and field research in AEROSE<br><br>Nalli (NESDIS) serves on thesis committees<br><br>Sounding data from NWS STC (Megan Lataille, James Fitzgibbons) | See list of approved NOAA Mentors in *Appendix D*<br><br>JSU students will have more networks and experiences associated with NOAA-mission.<br><br>Increased knowledge and opportunities for the students. |

| | | | |
|---|---|---|---|
| Increase Number of intra-institutional collaborative partnerships established and maintained in support of NOAA's mission. | 1.GRUAN PBL - ASOS<br><br>2. Currently interacting with another CSC, the CREST Center (UTEP is also one of its partner institutions, through M.Velez Reyes).<br><br>3. Geohealth collaboration between ATMS program and Microbiology department at HU | Ad hoc PBL working group. GMAC collaboration with NOAA<br><br>This effort is funded by a separate NSF award but supports training of NCAS-M students | Trained students on use of new radiosonde system:<br><br>A strong collaboration with CUNY – CREST on PBL and air quality forecast has commenced |
| Increase number of uses of NOAA data in research and tool development. | 1. Acquired NOAA observational (Sterling) and modeling (GFS) data<br><br>2. Installation of SHARPpy and GR2 Analyst software<br><br>3. Students (Robert Garrett, Catherine Liu, Daniel Yeager are using GOES data and NESDIS products for SST and dust provided by NOAA<br><br>4. AWIPS data station installed in the Physics Department at UTEP<br><br>5. Use of NOAA Ronald H. Brown Data system and NESDIS products during cruise | These include NCDC station data analysis (Russell Vose), CMIP5 NCA data (Kenneth Kunkel), CCPA precipitation analysis (Yuejian Zhu), and NOAA CFSR analysis.<br><br>Analysis of NOAA radar data, with training by NWS JAN<br>Analysis of NOAA Radiosonde data<br><br>AWIPS is a NWS product that contains a comprehensive suite of decision support tools | We have increased the amount of NOAA data that students supported by CSC or other funding sources have been using in their research.<br><br>NCAS-M students at HU, UTEP, UPRM, routinely use HYSPLIT, and GFS operational runs<br><br>Planning for the use of GOES-16 satellite data<br><br>NOAA data is being increasingly used by students supported by CSC or other funding sources in their research, education, and training.<br><br>Underway data as well as GFS model runs were used extensively throughout the AEROSE cruise |

## l. CSC-supported faculty, staff and students' research directly aligned with NOAA's mission and strategic priorities.

| Specific Objectives | Major Activities | Significant Results | Key Outcomes/Other Achievements |
|---|---|---|---|
| Number of peer reviewed publications, presentations, and tools developed by faculty, staff and students.<br><br>Goals: Five (5) publications, five (5) presentations, one (1) tool, and two (2) invited talks per reporting period. | 1. Dr. Sen Chao attended one (1) conference (Meteorology and Climate – Modeling for Air Quality)<br><br>2. Five publications during this reporting period<br><br>3. Director gave three invited talks, one invited webinar, and and one invited panel<br><br>4. Five manuscripts submitted | Student authorship on three publications<br><br>NOAA collaborators on three of the publications<br><br>NOAA collaborators on four of the submitted manuscripts<br><br>. | Increased visibility of NCAS-M productivity<br><br>Publications shared with NOAA Library |
| Use of CSC research results and tools by NOAA and other stakeholders. | 1. NCAS-M ceilometer, NOAA's data, etc.<br>2. AEROSE Data | STAR is routinely retrieving the satellite coordinated radio sonde for NUCAPS calibration | |

## III. Products of the Award

Publications in Journals: HU, UMBC, UTEP

- Carroll et al (2019): An overview of low-level jet winds and corresponding mixed layer depths during PECAN. Conditionally Accepted. JGU-Atmospheres
- Creamean, J. M., Cross, J. N., Pickart, R., McRaven, L., Lin, P., Pacini, A., Hanlon, R., Schmale, D.G., Ceniceros, J., Aydell, T., Colombi, E., Bolger, E., and DeMott, P.J. (2019). Ice nucleating particles carried from below a phytoplankton bloom to the Arctic atmosphere. Geophysical Research Letters, 46, 8572–8581. https://doi.org/10.1029/2019GL083039
- Dreessen J., Orozco D., Boyle J., Szymborski J., Lee P., Flores A., and Sakai, R.K. (2019) Observed Ozone Over the Chesapeake Bay Land-Water Interface: The Hart-Miller Island Pilot Project, Journal of the Air & Waste Management Association, DOI: 10.1080/10962247.2019.166849
- Stockwell, W.R., E. Saunders, W.S. Goliff, and R.M. Fitzgerald, A Perspective on the Development of Gas-phase Chemical Mechanisms for Eulerian Air Quality Models, re-*submitted to the J. Air Waste Manage. Assoc.*, July 26 2019 to meet reviewers' requests.
- Huang, Y., Kok, J.F., Martin, R.L., Swet, N., Katra, I., Gill, T.E., ,Reynolds, R.L., and Friere. L.S., 2019. Fine dust emissions from active sands at coastal Oceano Dunes, California. Atmospheric Chemistry and Physics 19:2947-2964.
- Rivas, J.A., Schröder, T., Gill, T.E., Wallace, R.L. and Walsh, E.J. (2019). Anemochory of diapausing stages of microinvertebrates in North American drylands. Freshwater Biology 64:1303-1314

Manuscripts submitted for publication: HU, UPRM, UMD, UMBC

- Flores, A., R. Sakai, E. Joseph, N. Nalli, A. Smirnov, B. Demoz, V. Morris, D. Wolfe. On Saharan Air Layer Stability and Suppression of Convection over the Northern Atlantic: Case Study Analysis of a 2007 Dust Outflow Event. Submitted to the Journal of Applied Meteorology and Climatology.
- K. Rosado, V. Tallapragada, and V. Morris Spatial and Temporal Evolution of a Lightning Diagnostic in HWRF *Under Review for the Journal of Geoscientific Model Development 2019*
- A. L. Northcross, S. Hsieh, S. Wilson, E. Roper, R. Dickerson, and V. Morris Monitoring Neighborhood Concentrations of PM2.5 and Black Carbon: When Citywide Averages Average Out Hotspots *Resubmitted to Environmental Justice 2019*
- Shivers-Williams, and T. Adams. An Examination of the Impact of Cultural Worldviews on Risk Perceptions and Responses to Hurricanes and Severe Flooding . Under review with Weather, Climate and Society. 2019
- L. Williams and V. Brown. How women of color in weather manage and negotiate themselves. Under revision for Women's Studies and Communication. 2019
- Sanders, S., T. Adams, and E. Joseph. Severe Weather Forecasts and Public Perceptions: An Analysis of the 2011 Super Outbreak in Tuscaloosa, Alabama. Resubmitted to Weather, Climate, and Society. 2019

Conference Papers, Posters and Presentations: HU, UMBC

- Talapradaga, L., "Trends Between Particulate Matter and Ozone in the Air and Asthma" presented at the 2018-2019 Undergraduate Research Award Scholars (URCAD), UMBC – 24 April 2019.

- Kironji, W. "Ceilometer Comparisons and what their data says about Backscatter and PBL" presented at the 2018-2019 Undergraduate Research Award Scholars (URCAD), UMBC – 24 April 2019.
- *Newsome, E. "Symmetric Convergence Dynamics"* presented at the 2018-2019 Undergraduate Research Award Scholars (URCAD), UMBC – 24 April 2019.
- Wright, M. #KnowBetterDoBetter: An Examination of Twitter Impact on Disaster Literacy, Howard University Research Day, April 2019.
- Anas, A. Understanding the Public's Response to Uncertainty Through an Interdisciplinary Analysis, Howard University Research Day, April 2019.
- Olayinka, K. 12 years analysis of cirrus clouds and its radiative effect over the mid-latitude within the United States, Howard University Research Day, April 2019.
- Fong, J. The Characteristics of Radiosonde Data Under the Influence of the Saharan Air Layer during 2009 AEROSE Campaign, Howard University Research Day, April 2019.

Invited Talks

- Gill, Thomas E. Characteristics and Implications Of Windblown Dust and Sand in the El Paso- Las Cruces Area. New Mexico Dust Storm Conference (sponsored by New Mexico Dept. of Environment), Las Cruces, New Mexico, April 17, 2019.
- Fitzgerald, Rosa, Atmospheric Physics Studies, webinar presented to White Sands Researchers, June 2019.
- Merging Interdisciplinary and Multidisciplinary Geosciences Research in the Field Research Week at Howard University, April 9, 2019
- Obstacles for Underrepresented POC in STEM and Strategies for Diversifying Geoscience Fields.(Panel Presentation and Discussion) Narraganset Bay, RI May 23-24, 2019
- Geosciences Connections Across the Disciplines: Highlights from 15 Years of Inter- and Cross-Disciplinary Connections Howard University Research Retreat, Washington, DC April 9, 2019.
- Can We Talk: Difficult Conversations on Race in STEM (Panel Discussant) NOAA 3rd Annual Diversity and Inclusion Summit Silver Spring, MD April 2, 2019

Other Products:

- Carla Mejias (Cohort 1) is developing a satellite remote sensing particulate organic carbon (POC) product
- Databases corresponding to the GRUAN, AEROSE, and Beltsville data sets continue in their development. These data sets are in use by NOAA ARL and NESDIS STAR

## IV. Participants in Award Performance

NCAS-M has engaged a variety of participants during the reporting period in question.

a. The following participants worked on the project during the reporting period:

| Name | Most Senior Project Role | Project Hours Worked per Month |
|---|---|---|
| Dr. Vernon R. Morris | Director | 80 |
| Dr. Terri Adams | Deputy Director | 30 |
| Dr. Jo-Anne Manswell Butty | Education Expert | 160 |
| Kimberly Smith | Assistant Director | 160+ |
| Dr. Ricardo Sakai | Senior Research Scientist | 160 |
| Dr. Charles Ichoku | Distinguished Scientist | 32 |
| Dr. Sen Chiao | Lead PI | 12 |
| Dr. Neosho Ponder | Data and Communication Manager | 80 |
| Dr. Haydar Kurban | co-PI | 12 |
| Dr. Carolyn Stroman | co-PI | 12 |
| Dr. Xin-Zhong Liang | Lead PI | 32 |
| Dr. Jose D Fuentes | Adviser of graduate student | 20 |
| Dr. Tia Tyree | co-PI | 12 |
| Dr. Qilong Min | Lead PI | 20 |
| Dr. Roy Armstrong | Lead PI | 20 |
| Dr. Mehri Fadavi | Lead PI | 12 |
| Dr. Belay Demoz | Lead PI | 20 |
| Dr. Duanjun Lu | Undergrad Advisor | 12 |
| Dr. Susheela Reddy | Undergrad Advisor | 12 |
| Dr. Loren White | Undergrad Advisor | 12 |
| Dr. Everette Joseph | Graduate Advisor | 12 |

b. Partner Organizations that worked on the project during the reporting period:

| Type of Organization | Name | Location | Contribution to Project |
|---|---|---|---|
| Educational | UMBC | Baltimore, MD | Lead |
| Educational | Howard University | Beltsville, MD | Partner |
| Government - NOAA/ESRL | Jessie Creamean (supervisor: Allen White) | Boulder, CO | NERTO mentor |
| Advisory Firm | P.E.R.K Consulting | Powder Mill Rd, Silver Spring MD | Center-wide Professional Development |
| Government - NOAA/AOML: | Renellys Perez (Chief Scientist PNE) | Miami, FL | Research Collaborator |

c. Other collaborators or contacts involved on the project during the reporting period:

- Andrena Sawyer, P.E.R.K Consulting (Center-wide Professional Development)
- Sadija Smiley, Mental Health Expert (Center-wide Professional Development)
- Nadia Trowers, Branding Expert (Center-wide Professional Development)
- Shawne Turrentine, Headshots (Center-wide Professional Development)
- Dr. Yolonda Wilson, Howard University (Center-wide Professional Development)
- Dr. Leticia Williams, Dr. Thomas Searles, Dr. Talitha Washington, Dr. John Harkless, Howard University (ETSP Professional Development)

d. NOAA collaborators or contacts involved on the project during this reporting period:

- ETSP mentors and presenters**:** Jacqueline Rousseau (OED), Audrey Trotman (OED)

- NCAS-M Center-wide Professional Development**:** July 25, 2019 – NOAA 101: DaNa Carlis (OAR), Jamese Sims (NWS), Segayle Thompson (OAR) and Martin Yapur (NESDIS). July 26, 2019 – Communicating Science: Michael Brennan (NWS), Ari Gertsman (UCAR), Joel Cline (NWS), Aaron Pratt(NWS)

- NCEP Personnel who assisted in course development for ATMS program at Howard University: Drs Jordan Alpert and Miodrag Rancic (both EMC)

- Drs. Allen White and Jessie Creamean (ESRL) served as NERTO mentors for UTEP MS student, Mr. Julio Ceniceros, who collaboratively performed thesis research at NOAA ESRL and on a NOAA research vessel. Dr. Creamean also served on Julio's thesis committee.

- JAN WFO: Latrice Maxie; Bill Parker; John Moore, III, and Anna Wolverton provided undergraduate training for JSU students.

- NWS Sterling Test Center: Megan Lataille, James Fitzgibbons collaborated on GRUAN and PBL research with Beltsville scientists and students

- ARL: Howard Diamond, Ariel Stein, LaToya Myles, Bruce Baker, Rick Saylor collaborated on NERTOs, GRUAN activities, and Beltsville research.

- Vankita Brown, Cindy Woods, Gina Eosco of NWS collaborated on IDSS projects with NCAS-M postdoc, Leticia Williams

- NESDIS STAR: Antonia Gambacorta, Nick Nalli, Mitch Goldberg, Lihang Zhou collaborated on GRUAN activities at Beltsville and on NUCAPS collaborations at both Beltsville and AEROSE

- AOML: Sim Aberson served as a NOAA mentor

- AOML: Renellys Perez, Greg Foltz, Erik Valdez collaborated with NCAS-M on AEROSE cruise

- AOML: Lidia Cucurull collaborated with NCAS-M postdoc, Dr. Keren Rosado

- ESRL: Georg Grell collaborated with NCAS-M postdoc Dr. Keren Rosado

- NOS: Robert Warner collaborated with Roy Armstrong on coastal management research

- NESDIS STAR: Mark Eakin and Mike Ondrusek collaborated on research at UPRM on validation of VIIRS data products.

- NSSL: Alan Gerard collaborated with NCAS-M faculty and students, as well as leveraged students.

### e. NCAS-M External Advisory Board Meeting

The new External Advisory Board (EAB) of NCAS-M was inaugurated during the current reporting period, and its first meeting was held at Howard University, HURB1 Building, Room 120, on May 29, 2019, at 9am–5pm.

**Purpose of NCAS-M External Advisory Board**
To critically review NCAS-M's structure, partnerships, activities, and progress, as well as to provide recommendations to its executive management team (EMT) and the Vice President for Research at Howard University. Every year, the board meets once in-person, and meets once or twice again via phone/web conferencing, as needed to perform its role effectively and efficiently.

**Membership of NCAS-M External Advisory Board**
The EAB membership was drawn from a broad array of NCAS-M-relevant expertise, including: Atmospheric Science, Meteorology, Air-quality, and Climate (observations/modeling), Institutional Administration, Private Industry, and STEM Education, as well as the Social, Economic, Behavioral, and Communications (SBEC) disciplines. The current members are:

1. ***Genene Fisher*** *(Institutional Administration) NOAA/NCEP*
2. ***Tsann-Wang Yu*** *(Meteorologist) Retired/Howard University/NCAS*
3. ***Michelle Hawkins-Aguilar*** *(Atmospheric Scientist/Weather Forecast) NOAA/NWS*
4. ***Olga Mayol*** *(Atmospheric Scientist/In situ Observations) University of Puerto Rico*
5. ***Vankita Brown*** *(SBEC/Communications) NOAA/NWS*
6. ***Catherine Quinlan*** *(STEM Education) Howard University*
7. ***Danielle Wood*** *(Innovation/Aerospace) Massachusetts Institute of Technology*
8. ***Benjie Spencer*** *(Chief Engineer) NOAA/NWS*
9. ***Bob Swap*** *(Atmospheric Scientist) NASA Goddard Space Flight Center*

**Goals of the NCAS-M EAB Meeting of May 29, 2019**

1. Gain a full understanding of the initiative, purpose, and composition of NCAS-M
2. Get a detailed briefing of NCAS-M activities and Accomplishments in the areas of:
    i. Student Recruitment, Education, and Training
    ii. NOAA Engagement for Professional Development
    iii. Research Collaborations with NOAA
3. Provide an assessment of NCAS-M Programs, Activities, and Performance, and deliver a brief report with recommendations to NCAS-M and Howard University
4. Appoint a designated Chair/Co-Chair and Plan future engagements of the External Advisory Board and define tentative goals of such future engagements.

**Summary of the NCAS-M EAB Meeting of May 29, 2019**

The meeting was attended by five of the nine EAB members, one other member called in via web conferencing, and three members were not available to attend or participate in real time. Dr. Bob Swap was elected as the Board Chair by the attending EAB members. NCAS-M's Executive Management Team (EMT) presented the various aspects of the Center structure, objectives, partnerships, activities, and operations to the EAB, and was on hand to answer all of their questions. The deliberations went very smoothly, and the EAB conducted closed-door deliberations during appropriate segments of the meeting. It was a very productive meeting, and by the end of the day, the EAB generated an initial report with a number of helpful recommendations. Within the two weeks following the meeting, the EAB members worked offline to finalize the report, which they delivered to the NCAS-M EMT prior to the NCAS-M Annual Meeting that took place on June 13-14, 2019, at which some members of the EAB were also in attendance. The EAB report was organized under four main sections, namely: Strengths, Weaknesses, Opportunities, and Threats. Under each section, they outlined several findings and made some recommendations. The report is available for consultation when needed. NCAS-M is taking the findings and recommendations of the report into serious consideration in our partnerships, activities, and operations.

# IV. Impacts of Award

## a. Impact on the development of future workforce candidates for the Atmospheric Sciences, Meteorology, and NOAA mission-aligned support in weather and climate.

NCAS-M engaged in several activities related to the training and development/professional development of Cohort 1 and other students to impact the development of future workforce candidates for Atmospheric Sciences and Meteorology during this reporting period: Activities included the participation and completion of the Experiential Training Summer Program, Individual Student Development Plan, NERTO experience, student attendance at professional meetings, advanced research trainings, field visits, and center-wide professional development.

- NERTOs: Twelve cohort students participated in NERTOs during the performance period.

- NCAS-M alumni applying for NOAA jobs: Three cohort students applied for NWS jobs during the performance period - Keren Rosado (HU), Catherine Liu (SJSU), Ayesha Wilkinson (HU).

- Keren Rosado hired by CIMAS under the supervision of Dr. Lidia Cucurull (AOML)

- Cassandra Shivers-Williams hired at NSSL as a Peter Lamb Postdoc working with Kimberly Klockow

- JSU Advanced training at Jackson WFO: Personnel at the Jackson WFO led by Bill Parker, trained students from JSU meteorology in upper air measurements and provided internship hours on the weather desks to professionalize students and increase their competitiveness for NWS jobs.

- Center-wide PD involving NHC - Michael Brennan and Joel Cline participated in the Center-wide group exercise. During the exercise, Dr. Brennan presented a briefing on Hurricane Michael to a group of students from various NOAA mission-relevant disciplines via remote connection from NHC. Joel Cline and Aaron Pratt then assisted with a group exercise in which interdisciplinary groups clustered individually to discuss the impacts, response, and communications aspects of Hurricane Barry. The group was given specific IDSS themes to think about and then created a video summary to present to a panel of NCAS-M and NOAA experts (Vernon Morris, Aaron Pratt, and Joel Cline) (for discussion and feedback.

- ETSP students receive NOAA 101 briefing from Dr. Jacqueline Rousseau of the NOAA Office of Education

- NCAS-M Director delivered an invited webinar to the Bill Anderson Fund (BAF) Fellows on career opportunities and future workforce needs at the nexus of environmental sustainability and environmental hazards.

## b. Impact on other disciplines and Program Level Outputs and Outcomes aligned with the 2016 FFO.

- Jackson State University: JSU faculty in both the Sociology and Emergency Management programs-initiated conversations with NWS regarding collaboration and engagement through NCAS-M. These discussions focused on developing and extending capacity within SBEC at the nexus of sociology, meteorology, and emergency management in support of developing greater community resilience are in play at JSU. Dr. Adams has been assigned to as the point of contact for this engagement.
- NCAS-M has begun initial conversations regarding the development of a partnership with faculty in the departments of Sociology and Emergency Management at JSU. Dr. Terri Adams has been appointed the point of contact.

- NCAS-M Director, Vernon Morris delivered an invited talk at the University of Rhode Island, Narragansett Bay for a workshop on Overcoming Barriers to Equitable Access and STEM Diversity in Geosciences May 23-24, 2019

- Howard University: The Department of Geosciences proposal has been approved conceptually at the College level within the largest College in the University; the College of Arts and Sciences). A steering committee to merge the Environmental Studies program into the proposal was formed in August 2019. The proposal received unanimous support at the Division Level and is being presented to the College for a vote in academic year 2019-2020. This program links faculty from across the college in both STEM and non-STEM disciplines. It will also offer general education courses that would be offered to students from all non-STEM disciplines in the College. If approved, these courses will significantly enhance the offerings of NOAA mission-relevant curriculum at the university over the next generation. Our estimates of enrollments in the next five years would exceed 500 students where there are no Geosciences general education courses at this point.

- Seventeen leveraged students were directly engaged in this award through research, quantitative skills training, and engagement with NOAA personnel

| | Name | Home Institution | Type(s) of Engagement | Funding |
|---|---|---|---|---|
| 1 | Lekealem Hilary Taku | HU | Research at HUBV | HU |
| 2 | Jia-Fong Fan | HU | AEROSE Research | HU |
| 3 | Shadya Sanders | HU | Research at NSSL | E.E. Just Fellowship |
| 4 | Javoniel Trowers | HU | Statistical Analysis and Python programming for NCAS-M data | HU |
| 5 | Ena Keys | JSU | OWLETS | NCAS |
| 6 | Justin Bonds | JSU | Advanced training at Jackson WFO | NCAS |
| 7 | Craig Battle | HU | Numerical Modeling | HU |
| 8 | Maurice Roots | Hampton Univ. | Advanced instrumentation | NSF |
| 9 | Aquanette Sanders | NCCU | AEROSE Research | NCCU |
| 10 | Christopher Thompson | VUU | AEROSE Research | VUU |
| 11 | Audrey Rappaport | HU | Research at HUBV | volunteer |
| 12 | Mariam Almedwah | HU | AEROSE Research | UAE |
| 13 | Brian Carroll | UMBC | AEROSE Research | JCET |
| 14 | Zhifeng Yang | UMBC | AQ modeling | UMBC |
| 15 | Tisha Cambell | HU | SBEC Research | NSF |
| 16 | Suhail Mahmud | UTEP | Ceilometer Research | UTEP |
| 17 | Nakul Karle | UTEP | Ceilometer Research | UTEP |

## c. Impact of the Center activities to build institutional capacity in support of the NOAA FY16 CSC award

- Howard University: The Department of Geosciences being developed collaboratively with a cross-College team will build institutional capacity in Geoscience education at Howard University. The Distinguished Scientist is leading the effort to finalize the proposal for a vote in the College of Arts and Sciences and subsequently submission to the Board of Trustees.

- Additional observational capacity (e.g. ceilometers, actinometer, AWIPS) was developed at HU, UPRM, and UTEP through the installation of new instrumentation and student training. NCAS-M is negotiating with NWS to acquire ceilometers that have been decommissioned so that they can be installed at NCAS-M partner campuses. This will provide a training and research capacity at the MSIs that does not exist presently. It will also provide a cross-CSC link as some of the other CSCs are involved in remote sensing applications of lidars. At the date of this report submission, we are unable to assess the extent of the damage. These additions to observational capacity enhances the MSIs with respect to training and NOAA mission-relevant research.

## d. Impact of the NOAA award on the Centers data and information resources. Communication of Center accomplishments.

- The NCAS-M engages the School of Communications for issuing a combination of press releases, website stories, and social media communications on Twitter, Instagram, and Facebook. A static webpage has been developed and is being expanded to accommodate the information and resources that is reflective of NCAS-M activities and programs. The faculty, staff, and students of NCAS-M engaged in a variety of invited talks, seminars, workshops, interviews, and conference presentations. These interactions broaden the familiarity of NOAA mission science and service to non-STEM disciplines and exposes these students to career opportunities in NOAA.

## e. How has the Center successfully conducted transfer of research results and new technologies in support of NOAA mission –aligned R2X?

- NCAS-M Director held discussion on appropriate recording and submission of NCAS-M results into the NRDD with Dr. Meka Laster. A sub-team for NRDD was formed to review NCAS-M data products and tools for submission. The members are Belay Demoz, Charles Ichoku, and Vernon Morris.

- AEROSE - scheduled for February 14, 2019 to March 26, 2019, the AEROSE team was led by Vernon Morris and consisted of a NOAA Collaborator, NIck Nalli of NESDIS STAR, and five students. Two students participated as part of their NERTO (Daniel Yeager amd Kafayat Olayinka of Cohort-1) and three students were leveraged from other sources of support. Due to delays related to the government shutdown and mechanical issues stemming from work done during shipyard repairs by Caterpillar, the days at sea (DAS) for the RB-19-02 cruise was whittled down from 41 to 31 DAS. This reduction in days at sea, combined with long steams to/from Charleston, South Carolina meant that both PNE and AEROSE could not meet all of their science objectives before the Ronald H. Brown even sailed. In addition, a crew member became ill. After servicing the 11.5°N, 23°W mooring the ship returned to Praia to medivac the crew member. Unfortunately, the decision was made by leadership to cut the cruise short after the crew member was sent to shore. This decision meant that the 4°N, 23°W mooring was not recovered and redeployed, despite only being 2 days away from reaching that mooring. We also abruptly ended AEROSE operations along 23°W and missed the opportunity to fully sample a big Saharan air layer event. The AEROSE team successfully transferred evaluation of the NUCAPS suite for field campaign guidance and all radiosonde data at the close of the cruise. These data have been archived at NESDIS STAR.

- GRUAN - GRUAN analysis at Beltsville continue. A strong collaborations with Howard Diamond, Tony Reale, Mitch Goldberg, Megan Letaille and others continued. Upper air data: traditional radiosonde, ozonesonde, cryogenic frost-point hygrometer data is sent through the internet using the GRUAN launch software. Point of contact: Michael Sommer. Dr. Diamond (ARL) ensures that the data transfers are successful and consistent with NOAA mission R2X.

- UPRM - as part of a calibration/validation database of field bio-optical measurements, Carla Mejias (Cohort 1) is developing a satellite remote sensing particulate organic carbon (POC) product

- NCAS-M initiated the transmission of all relevant publications produced by the award to the NOAA Library through NOAA OED.

- The NCAS-M participated in NOAA's "Emerging Technologies for Observations" Workshop and presented two papers at this meeting of NOAA and NOAA stakeholders. The two ideas proposed for innovations to operational observations centered on collaborative work with NWS STC on lidar applications to weather and novel use of aerosol optical thickness measurements with surface aerosol measurements to improve weather forecasts.

### f. Societal impacts of the Center research activities. Communications to the general public.

- Tia Tyree is a professor in the School of Communications within Howard University. Each spring she teaches a Capstone course with public relations and advertising majors, and NCAS-M or NOAA is a client. In January 2019, she, her students and NCAS-M administrators worked to create a full-scale communications plan. The plan was not only created but implemented and evaluated throughout the semester. More specifically, the students worked to rebrand the center, increase social media engagement and activities and develop a lobbying toolkit for NCAS-M staff to use in government relations meetings to help share the center's accomplishments with those on the House Committee on Energy and Commerce and others.

- NCAS-M Director led a Twitter Chat session on April 16, 2019.

- NCAS-M Director was featured in a three-part video series on barriers to equitable inclusion in STEM by filmmaker Kendall Moore. The first Film was shown at the NOAA D&I Summit and Dr. Morris participated as a panelist for the post-video discussion. It continues to be shown throughout the country, including upcoming conferences such as the AGU meeting in San Francisco (Dec 2019) and the AMS in Boston (Jan 2020).

## VI. Changes/Challenges

### a. Changes in performance of the award objectives – approach and reasons(s) for change:

The NCAS-M will continue to work with Program to cooperatively identify solutions and best modes of satisfying all FFO requirements and achieving the goals of the program.

The Technical Monitor of NCAS-M changed due to the retirement of Ming Ji. Dr. Ji was replaced, and NCAS-M is in the process of setting up a briefing with the new Technical Monitor, Russ Schieder.

### b. Actual or anticipated problems of delays and actions or plans to resolve them:

NCAS-M continues to evolve in response to a dynamic social, political, economic, and environmental landscape. Challenges arise from both internal and external factors and NCAS works with institutional leadership, NOAA Program leadership, stakeholders, and partners to develop solutions that will enable greater efficiency in achieving our goals, enhancing student success, and optimizing award administration. The NCAS-M Director has implemented monthly briefing tag-ups with EPP/MSI leadership to review challenges, performance, and updates to ensure smooth progress and continual improvement of Center operations.

The following narrative and the table below summarizes the challenges encountered during this performance period.

During this performance period, NCAS-M engaged with NOAA EPP/MSI Program and NOAA GMD leadership to develop a comprehensive corrective action plan (CAP) and a Performance Improvement Plan (PIP) to address financial reporting, compliance, and award administration challenges associated with financial administration and compliance of the FY11 and FY 16 awards. Several meetings (site visits, individual briefings, and teleconferences) occurred during April 2019 - August 2019 and involved three site visits and extensive reorganization of the institutional commitment to smooth operations and functioning of NCAS-M. Several mechanisms were implemented beginning in July 2019 to verify and report validated information aligned with the program level data, outputs, outcomes, and metrics in the solicitation and the funded award objectives. Special emphasis was made to ensure that all elements tied the activities and performance at the partnering institutions to the same criteria, metrics, and reporting measures as the primary recipient of the award, i.e. Howard University. Four key elements of the CAP and PIP were:

1. Provost, Office of the Vice President for Research (OVPR), the Chief Financial Officer (CFO), and the Chief Operating Officer (COO) will mandate required attendance from all reporting departments; Procurement and Accounts Payable (P&AP), Grants and Contracts (G&C), Research Administrative Services (RAS), OVPR, and NCAS-M to attend a *NOAA* GMD workshop on July 16-17, 2019 in Silver Spring, MD. The purpose of this action is to ensure that all units supporting the award informed on award requirements, issues of compliance associated with the financial management and reporting.
2. A Tiger Team has been formed comprised of the NCAS-M Director, the Assistant Director, the Program Manager, OVPR, and the Financial Management Lead from the CFO that has been meeting weekly to review and develop responses to the NOAA requests. This team will remain in place and meet monthly for the duration of the project period. The Tiger Team will address issues of compliance, timely responses to NOAA requests, verification of data, and other requirements of effective award management and reporting.

3. The Provost, OVPR, COO, Deans (GS and COAS), and CFO mandated attendance of all reporting departments (Program, P&AP, G&C, RAS, VPR) to attend a NOAA/NCAS-M 101 workshop where NOAA GMD, EPP, and NCAS-M covered the award requirements, guidelines, and implementation.
4. All future sub awards will be modified to require structural changes in the invoices that will include a student breakout that is fully consistent with the award financial reporting requirements (the NOAA student tracker) and contains all supporting documentation. Financial reporting at HU will follow the same rubric. Further, the sub awards will require that the SPOs of those institutions will be required to certify the direct student support requirements and adherence to the special award conditions and solicitation requirements.

Attracting new faculty to a program that cannot offer start-up nor summer salary is extremely challenging as it offers little, if any, incentive to junior tenure-track faculty. Both JSU and HU are still actively seeking replacements for positions vacated in the past three to five years. In particular, HU has two tenure track positions (one in Atmospheric Physics and one in Chemistry) being advertised but budget shortfalls at the university and the challenges of locating a suitable department have been barriers to success in this matter.

Dr. Terri Adams has assumed the Interim Chair position in the Department of Sociology and Criminology. This additional responsibility will place some stress on her time management. We are considering sharing some of her charges with faculty at UMBC (Dr. Belay Demoz) or JSU (Dr. Dereka Carroll, who is affiliated with the Meteorology Program). Dr. Demoz will assist with representing the Center and Lead Institution in cases for which the Director, Deputy Director, and the Distinguished Scientist cannot attend. Dr. Carroll would be a liaison for SBEC at JSU and potentially fill the role of student ombudsperson. These changes have not been finalized but are under consideration.

| **Challenge** | **Description** | **Resolution** | **Timeline** |
|---|---|---|---|
| Start date of award on September 1 is after the start of the academic year | Cohort students recruited for each academic year experience a delay in receiving funds because the academic year and award year have different start dates. | Working with individual institutions and with OED to develop a resolution | Ongoing |
| USA JOBS do not sufficiently account for CSC experience in NOAA applications | The NERTO and Cohort engagement with NOAA are two highly significant aspects of workforce preparation for CSC students. However, there are no means for these experiences to be formally incorporated as a competitive advantage for students applying through USAJOBS. | Work with NOAA OED to explore ways of translating these experiences into a competitive advantage | Ongoing |
| Student support time limits | Two students were identified as having exceeded funding time limits in the student tracker. In Cardona's case the the student took a medical leave and was not in school and supported the entire time. In the case of Battle, the | The student tracker will be annotated in the case of Cardona. HU will cover the costs of the overpayment to Battle. | Oct 31, 2019 |

| | | | |
|---|---|---|---|
| | student also had special circumstances both in transferring between degrees and unexpected personal leave. | | |
| HCM Status at HU | Howard University is currently in heightened cash management (HCM) status, which limits the ability to provide advances on awards and adds time to the financial processing of external awards. HCM2 status also requires greater documentation in support of invoicing. | NCAS-M has met with NOAA Program and NOAA GMD leadership to develop a CAP and PIP to address issues associated with financial administration and compliance of the award. | Ongoing |
| PI Workload | The Director's teaching workload exceeds the 40% release time requirement in the FFO | This was addressed in the CAP and PIP. Adjustments to the Spring 2020 teaching assignments will be made in order to reach compliance. | January 2020 |
| URM Student recruitment | UAlbany has been non-compliant regarding i) URM recruitment and for Cohorts 2 and 3, ii) direct student support for Cohort 1. These concerns delayed the issuance of sub-awards in Year 3. Ultimately, a sub-award was issued in August 2019. | Enhanced monitoring of the existing and Year 4 sub-awards will be conducted and the determination of a change in scope to remove this partner will be determined on the basis of compliance | January 2020 |
| Additional staffing needs | The Data and Communications Manager is a 1/2-time position but the requirements for student tracker updates and website upgrades exceed the capacity of the position.<br><br>To enhance financial reporting for NCAS-M additional staffing is required. | HU has committed to provided funds to convert a 1/2-time position into a full time position and adding a second staff position associated with budget | January 2020 |
| Timely issuance of sub-awards to partners | Several sub-awards were issued months late. | This was addressed in the CAP and PIP | Ongoing |
| Timely payments to vendors | Vendors for several key service providers were not being paid on a timely schedule. This affected future purchases | This was addressed in the CAP and PIP | Ongoing |

| | | | |
|---|---|---|---|
| Timely reporting by partners | Several partners have failed to provide timely, comprehensive progress reports and responses to data calls. The existing reporting templates did not sufficiently map onto the implementation plan | New reporting templates were developed and presented at the annual meeting. An online system for reporting performance data will be implemented. | January 2020 |
| Deferred maintenance at HUBV | The main building at HUBV has been in a state of deferred maintenance and needs several key upgrades to improve efficiency and provide a representative space for the services provided there | NCAS-M has opened communications with the COO but is awaiting final decision on program prioritization | Ongoing |
| Delays in building replacement at HUBV | A key building that was destroyed at HUBV has yet to be replaced. This causes challenges to implementing observations and hosting field campaigns | The insurance claim has been settled by the university. Requests and inquiries regarding construction have been sent to OGC but no timeline for construction has been provided. | TBD |
| Deferred maintenance of NOAA research vessels and logistical uncertainties | During AEROSE, unanticipated changes in departure time, ship track, and duration occurred during the cruise that led to increased shipping costs and compromised the scientific return. | Impacts were communicated in the cruise debrief and in the final cruise report. | complete |

### c. Changes that have a significant impact on expenditures:

The performance period start date of September 1 continues to be a challenge to recruitment and retention. This start date is nearly a month after the official academic term begins and two of the MSI partners (HU and JSU) are not in a financial position to advance funds prior the award start date. This means that students are forced to take loans or find alternate means of financial support for the first two months of their appointment while funds are being set up at the university. HU has coordinated with the Office of Financial Aid for short-term emergency loans to be awarded to students upon request but this is not a sustainable resolution. As this is an issue across all CSCs, we will work through the CCWG to address this matter collectively.

### d. Other

The NCAS-M continues responding to the budget threats and uncertainty as effectively as possible under the current federal and institutional (university) administration. We acknowledge that these are issues common to all academic entities, but the plight of minority-serving institutions remains more dire and tenuous than large, historically white public and well-endowed private institutions. The NCAS-M seeks alternate and complementary revenue streams to support efforts in education and training. We have been able to successfully acquire physical resources and in-kind contributions of instrumentation. We have also secured commitments from the University to support a limited number of additional students associated with the atmospheric sciences program.

## VII. Special Award Conditions

This section details the progress made during this reporting period (March 1, 2019 – August 31, 2019) for the specified special award conditions written below.

### a. Multi-Year Special Award Condition

NCAS-M is in receipt of $3,190,000.00 for year 2 of this 5-year period. This year two funding was received in two separate award files (award file 1 and 2). Award file one (1) was received in May 2017 in the amount of $1,600,709.00 and award file two (2) was received August 31, 2017 in the amount of $1,589,291.00. Award file two (2) combines two revenues of funding - $1,399,291.00 for ASM Center activities and $190,000.00 to host the NOAA Office of Education, Educational Partnership Program Education and Science Forum. This funding represents a shortfall of $100,000.00 from the proposed amount. The funding period for year two is 03/01/2017 to 08/31/2017.

### b. New Award Special Award Condition

NCAS-M acknowledges the terms and conditions of Award #NA16SEC4810006 and are following them accordingly.

### c. NOAA Environmental Data and Information

During this performance period NCAS-M has shared data with the following collaborators:

1. GRUAN lead center (Lindenberg, GER) - Upper air data: traditional radiosonde, ozonesonde, cryogenic frost-point hygrometer data. Data is sent through the internet using the GRUAN launch software. Point of contact: Michael Sommer.
2. NOAA STAR (College Park, MD) - Upper air data: radiosonde data, cryogenic frost point hygrometer, and ozonesonde data from both AEROSE and HUBV. Data is collected through dropbox or the NESDIS STAR data archive. Point of contact: Tony Reale/Nick Nalli.
3. Maryland Department of Environment - MDE (Baltimore, MD) - Upper air: radiosonde, and ozonesonde data. Data is collected through dropbox. Point of contact: Joel Dreessen.
4. MDE air quality monitor site at HUBC. Trace gases, aerosols, surface meteorological data, and wind and temperature profiles. Point of contact: Ryan Auvil.
5. DC lightning network detection. Lightning counter. Maintained by NASA-Huntsville and UMD, College Park. Point of contact: Scott Rudlovsky (UMD, NOAA).
6. NASA Pandora. Profiles of trace gases using passive instrument. Point of contact: Robert Swap.
7. UMD small sensors - SENSE project. Meteorological and $CO_2$ data. Point of contact: Ning Zeng,
8. FIREX-AQ Data was shared with collaborating NOAA scientists

Data requested by scientists:

1. Israel Coto Lopez (NIST) - micrometeorological data. Data was sent by email.
2. Karin Ardon-Dryer (Texas Tech) - AEROSE dust samples from PNE buoys - samples being prepared for shipping by surface mail.
3. Ken L. Pryor (NOAA Star) - meteorological data. Data was sent by email and retrieved personally.

## d. Center External Evaluator Support on Award Funds Special Award Condition

No payments were made during this performance reporting period

## e. EPP/MSI CSC Evaluation Plan for Center

Submitted and approved to date.

## f. Direct Student Support, Post-Doctoral Program and Pre-Publication Manuscript Submission

NCAS-M financially supported 53 full-time students across the Center in cohort 1, 2 and 3 who are US citizens with a minimum GPA of 3.0 during this performance period. The level of support provided for the students met the minimum amounts outlined in the original FFO during this performance period. Full details of support can be found in the NCAS-M student tracker. At present, Cohort 3 students are still being onboarded due to the late issuance of sub awards. NCAS-M executive staff is diligently working with our partners to ensure that all students are being paid the minimum direct funding as outlined in the FFO for this award. A current list of the students supported during this performance period can be found in appendix A.

### Post-Doctoral Program

The goal of the ASM postdoctoral fellowship (PF) program is to support advanced training in NOAA-related sciences. ASM will support PFs in the thematic areas of atmospheric sciences and meteorology.

The NCAS-M supported two postdoctoral fellows during this reporting period; Dr. Leticia Williams who works at NWS COO in Silver Spring, MD, and Dr. Keren Rosado, who worked at NOAA /ESRL. Dr. Rosado left the NCAS-M postdoc for a postdoctoral position at CIMAS working with Dr. Lidia Cuccurull. She is still a collaborator with NCAS-M. Dr. Keren Rosado completed the postdoc program on 5/31/19) and Dr. Leticia Williams.

**Dr. Keren Rosado** was stationed at NOAA Earth System Research Laboratory – Global Systems Division in Boulder, CO until May 31, 2019. Her activities during the reporting period (March 1, 2019 – May 31, 2019) are as follows:

Conferences: None

Research: Evaluating GSD suite with FV3GFS for tropical cyclones
NOAA Site-Based Research: NOAA ESRL Boulder, CO - Start date September 1, 2018; NOAA mentor: Dr. Georg Grell. Project Title: Evaluating GSD suite with FV3GFS for tropical cyclones

Publications: None published to date

Publication under preparation:

- "Evaluating the Impact of Grell-Freitas Convective Parameterization into 2017 Atlantic Hurricane Season Simulations using FV3GFS" Authors: Keren Rosado, Georg Grell, Ligia Bernardet, and Evan Kalina (all OAR).
- "Evaluating the Grell-Freitas and the GSD suite using FV3GFS for tropical cyclones". Journal name and proposed day of publication is still being determined.

Technical Skill Development: Programming, statistical analysis and analysis of big data sets as part of postdoctoral research.

Collaborative Activities: Evaluating GSD suite with FV3GFS for tropical cyclones

**Dr. Leticia Williams** is stationed at NOAA headquarters in Downtown Silver Spring. Her activities during this performance period are as follows:

Conferences: None
Research and Training Activities:
Project 1. Hurricane Florence and Michael Service Assessment: Cindy Woods, Jeff Garmon, Vankita Brown, Michael ScottenIDSS external measures: Michael Scotten, Vankita Brown
Project 2. IDSS external measures: NWS, Silver Spring, April 2017-present, Vankita Brown
Project 3. Hurricane Florence and Michael Service Assessment: NWS, Silver Spring, April 2017-present, Vankita Brown
Project 4. Experimental products 10-102 survey: NWS, Silver Spring, July 2018-present, Vankita Brown
Project 5. Customer Satisfaction Survey: NWS, Silver Spring, August 2018-present, Vankita Brown

Publications: None published to date

Publications under preparation:

- Warning Coordination Meteorologist (WCM) IDSS communication: Vankita Brown (NWS)
- How women of color in weather manage and negotiate themselves (Women's Studies and Communication, proposed re-submit date September 2019), journal; Vankita Brown (co-author)
- STEM mentor's communication with underrepresented STEM graduate students (Communication Research, proposed submit date September 2019), journal
- Climate change knowledge and perceptions: Exploring the influence of race and ethnicity on environmental prediction information: Carolyn Stroman, Shadya Sanders
- Evaluating danger: African Americans' perceptions of hurricane risks (Weather, Climate, Society, proposed submit date December 2019), journal; Carloyn Stroman, Shadya Sanders, Bryan Jenkins, Britney Gulledge (co-authors)
- History of the Colour of Weather (BAMS, proposed submit date October 2019) Leticia Williams, Belay Demoz, Jose FUentes, Marshall Shepard,Vernon Morris (for submission to BAMS)
- Science communication at NOAA (Science Communication, proposed submit date December 2019), journal TBD

Technical Skill Development: Qualtrics: Survey platform procurement; Survey set-up, dissemination, and initial analysis

Collaborative Activities: 1) NCAS-M Professional Development activities, 2) Planning/coordinating a NWS service assessment panel for AMS 2020, 3) Member, NOAA Social Science Committee

## g. EPP MSI CSC Substantial Involvement and Collaborative Engagement

NCAS-M acknowledges the terms and conditions of this special award condition and will continue to work openly and collaboratively with NOAA. During this reporting period, Dr. Morris met with the technical monitor (Dr. Ming Ji) in March 2019. All other communications during this reporting period have taken place via email.

The NCAS-M leadership engages with OED and EPP MSI Program leadership on a regular (near weekly) basis via telephone and email. The NCAS-M engages with the CCWG during the quarterly meetings and teleconferences as well as presenting to the NOAA Chief Economist, Dr. Monica Grasso (July 13), participation in the OAR Stakeholders Forum (June 15-16), Tag-Ups with Cindy Woods and Dr. Vankita Brown (May 2), and Craig McLean (August 16).

During this performance period, NCAS-M engaged with NOAA EPP/MSI Program and NOAA GMD leadership to develop a comprehensive corrective action plan (CAP) and a Performance Improvement Plan (PIP) to address financial reporting, compliance, and award administration challenges associated with financial administration and compliance of the FY11 and FY 16 awards. Several meetings (site visits, individual briefings, and teleconferences) occurred during April 2019 - August 2019 and involved three site visits and extensive reorganization of the institutional commitment to smooth operations and functioning of NCAS-M.

NCAS-M also engaged EPP MSI significantly on the coordination of the twelve NERTOs conducted during this performance period. Based on these engagements, the center is in the process of developing a corrective action plan for the NERTOs and a Project Fest to raise the visibility of the opportunity within NOAA and to inform NOAA personnel about the process.

## h. Center Implementation Plan is Required

NCAS-M implementation plan was updated during this performance period and has been submitted to NOAA program office and currently under review.

## i. EPP CSC Programmatic Special Awards Condition

The NCAS-M continues to work toward full staffing, interacting with Program officials to finalize operational plans (e.g. evaluation plan, implementation plan, communication strategy), setting up an advisory board, engaging with other CSC leadership and Program to further program sustainability and success through the Center Champions Committee, and building coalitions within NOAA. Many of our interactions have been spelled out in previous sections.

Provide FY16 Center award information for:

- **Number of EPP-funded post-secondary students from underrepresented minority communities** who are trained **35** and graduate **9** in NOAA-mission sciences.
- **Total number of EPP-funded post-secondary students** who are trained **41** and graduate **11** in NOAA-mission fields relevant to this announcement
- **Number of EPP-funded graduates who enter the NOAA mission workforce as hires** by NOAA **1**, NOAA contractors **1**, NOAA partners **2**, resource management agencies **0**, NGO community **0**, academia **5** or as entrepreneurs **0**.
- **Number of EPP-funded graduates who participate in and complete NOAA agency mission-related postdoctoral level programs 2 (Drs. Leticia Williams and Keren Rosado)**.
- **Total new funds leveraged with NOAA EPP award~$553K from four awards.**

Provide FY16 Center award information to demonstrate contribution to supporting CSC Desired Program level Outcomes and Outputs defined in FFO p. 7 - 10, for this reporting period.

**Experiential Training Summer Program (ETSP)**
Nine students participated in ETSP. Summer experiential training; professional development, and poster presentations. Applications to be submitted to NOAA scholarships in fall 2019 (see *Appendix J)*

### j. Performance Progress Reports

This current report represents the performance progress report for the performance period beginning March 1, 2019 to August 31, 2019.

## VIII. Financial Information

### Total NOAA Funding Breakout*

| Budget Category | Funds Budgeted | Funds Used | Funds Encumbered | Funds Remaining |
|---|---|---|---|---|
| Salary | $1,312,338.00 | $697,678.34 | $0.00 | $614,659.66 |
| Fringe Benefits | $333,797.00 | $192,705.18 | $0.00 | $141,091.82 |
| Supplies | $595,553.00 | $346,895.26 | $6,180.00 | $242,477.74 |
| Travel | $113,959.00 | $75,773.68 | $0.00 | $38,185.32 |
| Participant (HU student) cost | $3,026,436.00 | $1,843,169.82 | $1,416.12 | $1,181,850.06 |
| Sub-Awards | $3,371,505.00 | $1,472,794.38 | $1,080,966.18 | $817,744.44 |
| Equipment | $0.00 | $0.00 | $0.00 | $0.00 |
| F&A | $638,412.00 | $366,760.23 | $0.00 | $271,651.67 |

*Please note that the numbers/amounts given above are estimates and are in the rear by 30 days.

### Total Leveraged Funding Breakout:

| Funding Source | Funding Type | Funding Amount | PI | Project Title | Contribution to ASM Center |
|---|---|---|---|---|---|
| University of Houston | sub-award | $12,500 | Fitzgerald | Ozonesonde launches for AQ | research capacity, student support |

| | | | | | |
|---|---|---|---|---|---|
| DOD | Grant | $107,825, | Gill | Acquisition of laser diffraction particle sizing system, | Instrumentation |
| NSF | sub-award | $45K | Morris | Radiative Effects of Biomass Burning Aerosols Laboratory and Field Measurements and Modeling of Climate and Health Impacts | Research support and student support |
| NSF | Grant | $298K | Morris | Investigating Vertical Profiles of Aerosols and Their Radiative Impacts | Research and postdoc support |
| NSF | Grant | $90K | Whiteman<br>Sakai<br>Fuentes<br>Ichoku<br>Morris | Workshop in Measurements, Modeling and Data Analysis of the Planetary Boundary Layer | Training |

# IX. APPENDICES

## Appendix A -- List of Current NCAS-M Fellows – Cohorts 1-3 (2016-2019)

**List of Current NCAS-M Cohort Fellows (Cohorts 1-3, 2016-2019)**

| No | Name | Degree | Gender | Race/ Ethnicity | Cohort | Institution | Degree |
|---|---|---|---|---|---|---|---|
| 1 | Brady, Francisco | BS | M | H | 1 | HU | Economics |
| 2 | Ellis, Tierra | PhD | F | AA | 1 | HU | School Psychology |
| 3 | Kebede, Mussie | MS | M | AA | 1 | HU | Atmospheric Sciences |
| 4 | Olayinka, Kafayat | PhD | F | AA | 1 | HU | Atmospheric Sciences |
| 5 | Sanders, Shadya | PhD | F | AA | 1 | HU | Atmospheric Sciences |
| 6 | Shivers-Williams, Cassandra | PhD | F | AA | 1 | HU | Social Psychology |
| 7 | Yeager, Daniel | PhD | F | AA | 1 | HU | Atmospheric Sciences |
| 8 | Elkins, Janae | BS | F | AA | 1 | JSU | Meteorology |
| 9 | Gibson, Keon | BS | M | AA | 1 | JSU | Meteorology |
| 10 | Harvey, Jaylond | BS | F | AA | 1 | JSU | Meteorology |
| 11 | Hurt, Tony | BS | M | AA | 1 | JSU | Meteorology |
| 12 | Moon, Zachary | PhD | M | W | 1 | PSU | Atmospheric Sciences |
| 13 | Jordan, Arianna | BS | F | AA | 1 | SJSU | Meteorology |
| 14 | Liu, Catherine | MS | F | A | 1 | SJSU | Meteorology |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **15** | **Chen, Yanna** | **PhD** | **F** | **A** | **1** | **SUNYA** | **Atmospheric Sciences** |
| **16** | **Solimine, Stephen** | **PhD** | **M** | **W** | **1** | **SUNYA** | **Atmospheric Sciences** |
| **17** | **Dawkins, Kendall** | **BS** | **M** | **AA** | **1** | **UMBC** | **Physics** |
| **18** | **Emerson, Damian** | **BS** | **M** | **AA** | **1** | **UMBC** | **Chemical Engineering** |
| **19** | **Newsome, Emmanuel** | **BS** | **M** | **AA** | **1** | **UMBC** | **Physics** |
| **20** | **Shah, Nirav** | **BS** | **M** | **A** | **1** | **UMBC** | **Computer Science** |
| **21** | **Kholodovsky, Vitaly** | **PhD** | **M** | **W** | **1** | **UMD** | **Atmospheric and Oceanic Sciences** |
| **22** | **Mejias, Carla** | **PhD** | **F** | **H** | **1** | **UPRM** | **Marine Sciences** |
| **23** | **Cortez, Miguel** | **MS** | **M** | **H** | **1** | **UTEP** | **Physics** |
| **24** | **McAfee, Robert** | **MS** | **M** | **H** | **1** | **UTEP** | **Physics** |
| **25** | **Fisher, Kalen** | **MS** | **M** | **AA** | **2** | **HU** | **Atmospheric Sciences** |
| **26** | **Garvey, Michael** | **PhD** | **M** | **AA** | **2** | **HU** | **Economics** |
| **27** | **Jean, Cassandra** | **PhD** | **F** | **AA** | **2** | **HU** | **Sociology** |
| **28** | **Smith, Chantal** | **PhD** | **F** | **AA** | **2** | **HU** | **Economics** |
| **29** | **Wilkinson, Ayesha** | **MS** | **F** | **AA** | **2** | **HU** | **Atmospheric Sciences** |
| **30** | **Wright, Mi'Chael Noel** | **MA** | **M** | **AA** | **2** | **HU** | **Sociology** |
| **32** | **Abraha, Aman** | **BS** | **M** | **AA** | **2** | **JSU** | **Physics** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **33** | **Obioha, MiaNwi** | **BS** | **F** | **AA** | **2** | **JSU** | **Physics** |
| **34** | **Ross, Brianna** | **BS** | **F** | **AA** | **2** | **JSU** | **Chemistry** |
| **35** | **Woods, Jamiyah** | **BS** | **F** | **AA** | **2** | **JSU** | **Chemistry** |
| **36** | **Nuñez Ocasio, Kelly** | **PhD** | **F** | **H** | **2** | **PSU** | **Atmospheric Sciences** |
| **37** | **Green, Alrick** | **MS** | **M** | **AA** | **2** | **SJSU** | **Meteorology and Climate Science** |
| **38** | **Sanchez-Castaneda, Krystal** | **BS** | **F** | **H** | **2** | **SJSU** | **Meteorology and Climate Science** |
| **39** | **Kironji, Wambugu** | **BS** | **M** | **AA** | **2** | **UMBC** | **Computer Science** |
| **40** | **Tallapragada, Lasya** | **BS** | **F** | **A** | **2** | **UMBC** | **Biochemistry and Molecular Biology** |
| **31** | **Dibia, Emmanuel** | **MS** | **M** | **AA** | **2** | **UMD** | **Atmospheric & Oceanic Sciences** |
| **41** | **Kennedy, Jennifer Anne** | **PhD** | **F** | **W** | **2** | **UMD** | **Geographical Sciences** |
| **42** | **Cardona-Maldonado, Maria** | **PhD** | **F** | **H** | **2** | **UPRM** | **Marine Sciences** |
| **43** | **Ceniceros, Julio E.** | **MS** | **M** | **H** | **2** | **UTEP** | **Environmental Science** |
| **44** | **McAfee, Ashley** | **UG** | **F** | **H** | **2** | **UTEP** | **Environmental Science** |
| **45** | **Villalobos, Claudia** | **UG** | **F** | **H** | **2** | **UTEP** | **Environmental Science** |
| **46** | **Askar, Anas** | **PhD** | **M** | **AA** | **3** | **HU** | **Sociology** |
| **47** | **Brooks, Corbin** | **MS** | **M** | **AA** | **3** | **HU** | **Atmospheric Sciences** |
| **48** | **Jordan, Arianna** | **MS** | **F** | **AA** | **3** | **HU** | **Atmospheric Sciences** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **49** | **Lewis, Brandon** | **MS** | **M** | **AA** | **3** | **HU** | **Atmospheric Sciences** |
| **50** | **Reliford, Anaiya** | **MS** | **F** | **AA** | **3** | **HU** | **Chemical Engineering** |
| **51** | **Smith, Thomas** | **PhD** | **M** | **AA** | **3** | **HU** | **Atmospheric Sciences** |
| **52** | **Feaster, Mariama** | **BS** | **F** | **AA** | **3** | **JSU** | **Meteorology** |
| **54** | **Smith, Michael** | **BS** | **M** | **AA** | **3** | **JSU** | **Meteorology** |
| **53** | **Thornton, Anthony** | **BS** | **F** | **AA** | **3** | **JSU** | **Meteorology** |

**Key: Race/Ethnicity: A=Asian. AA=African American, H=Hispanic, W=White**

## Appendix B – List of Approved NERTO Mentors and Assignments

### List of Approved NOAA Mentors and Assignments

| No | Institution | Student | Degree | Cohort | Academic Advisor | Project Title | NOAA Mentor | Start & End Date | NERTO Location |
|---|---|---|---|---|---|---|---|---|---|
| 1 | HU | Olayinka, Kafayat | PhD | 1 | Vernon Morris | AEROSE Data Collection and Analysis in Support of Satellite Validation and Product Evaluation Support | Lihang Zhou /Nick Nalli | Feb 21, 2019 - May 16, 2019 | NOAA Ronald H. Brown Ship & NCWCP, College Park, MD |
| 2 | HU | Yeager, Daniel | PhD | 1 | Vernon Morris | AEROSE Data Collection and Analysis in Support of Satellite Validation and Product Evaluation Support | Lihang Zhou /Nick Nalli | Feb 21, 2019 - May 16, 2019 | NOAA Ronald H. Brown Ship & NCWCP, College Park, MD |
| 3 | SUNYA | Chen, Yanna | PhD | 1 | Everette Joseph | Investigate and Understand the Uncertainties of Forecasting NE Cold Season Precipitation in the Numerical Weather Prediction Models Using WRF | Michael Evans | Mar 11, 2019 - May 2019 | NOAA NWS Albany Weather Forecast Office |
| 4 | SUNYA | Solomine, Stephen | PhD | 1 | Qilong Min | Autonomous cloud identification using imager observations | David Turner | May 28, 2019 - Aug 20, 2019 | Boulder, CO - NOAA/ESRL |
| 5 | HU | Garvey, Michael | PhD | 2 | Haydar Kurban | The Rising Cost of Urban Heat Islands | Nancy Beller-Simms & Claudia Nierenberg | Jan 14, 2019 - Apr 12, 2019 | Silver Spring, MD - NOAA |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **6** | **HU** | **Jean, Cassandra** | **PhD** | **2** | **Terri Adams** | **A Social Science Approach to Understanding Gaps in the Dissemination of Information and Behavioral Responses to Severe Weather** | **Vankita Brown** | **Apr 13, 2019 - Aug 9, 2019** | **Silver Spring, MD - NOAA** |
| **7** | **HU** | **Smith, Chantal** | **PhD** | **2** | **Haydar Kurban** | **Extreme Weather Events: Measuring the Economic Impact of Improving Small Business Resilience** | **Nancy Beller-Simms & Claudia Nierenberg** | **Jan 14, 2019 - Apr 12, 2019** | **Silver Spring, MD - NOAA** |
| **8** | **PU** | **Ocasio, Kelly Nunez** | **PhD** | **2** | **Jose Fuentes** | **Sensitivity of African Easterly Wave to Convection prior to Tropical Cyclogenesis** | **Sim Aberson** | **May 1, 2019 - Jul 24, 2019** | **Miami, FL - AOML** |
| **9** | **UMD** | **Kennedy, Jennifer** | **PhD** | **2** | **Xin-Zhong Liang** | **Developing Drought Decision Support Materials and Improving Usability of the Local Climate Analysis Tool (LCAT)** | **Michelle Hawkins** | **May 6, 2019 - Aug 6, 2019** | **Silver Spring, MD** |
| **10** | **SJSU** | **Green, Alrick** | **MS** | **2** | **Sen Chiao** | **Understanding the Role of Eddy Vorticity Fluxes on Rapid Intensification of Hurricanes Irma and Michael** | **Sundararaman Gopalakrishnan Co Mentors: Xuejin Zhang, Ghassan J. Alaka, Jr.** | **May 28, 2019 - Aug 23,2019 (Original). Extended thru Dec 2019** | **Miami, FL - AOML** |
| **11** | **HU** | **Brooks, Corbin** | **MS** | **3** | **Sonya Smith** | **Small Unmanned Aircraft System (sUAS) Studies of Boundary Layer Meteorology** | **LaToya Myles** | **Jun 17, 2019 - Sep 6, 2019** | **Oakridge, TN - ATDD** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **12** | **HU** | **Jordan, Arianna** | **MS** | **3** | **Vernon Morris** | **Application of Surrogate Severe Forecast Verification for Warn-on-Forecast** | **Adam Clark** | **May 20, 2019 - Aug 4, 2019** | **Norman, OK - NSSL** |

## Appendix C – NCAS-M List of NOAA Mentors

**NOAA Center for Atmospheric Sciences and Meteorology (NCAS-M)**
**List of NOAA Mentors (March 2019 - August 2019)**

| | NOAA MENTOR | EMAIL | NOAA OFFICE | LINE OFFICE |
|---|---|---|---|---|
| **1** | Brown, Tyra | tyra.brown@noaa.gov | NOAA - National Weather Service (**NWS**) | NWS |
| **2** | Brown, Vankita | vankita.brown@noaa.gov | NOAA - National Weather Service (**NWS**) | NWS |
| **3** | Carlis, DaNa | dana.carlis@noaa.gov | Office of Atmospheric Research (**OAR**) | OAR |
| **4** | Cortinas, John | john.cortinas@noaa.gov | NOAA - Oceanic and Atmospheric Research (**OAR**) / Office of Weather and Air Quality (**OWAQ**) | OAR |
| **5** | Hawkins, Michelle | michelle.hawkins@noaa.gov | NOAA - National Weather Service (**NWS**) | NWS |
| **6** | Hawkins, Michelle | michelle.hawkins@noaa.gov | NWS OWAQ | NWS |
| **7** | Knuteson, Thomas | tom.Knuteson@noaa.gov | NOAA GFDL | OAR |
| **8** | Marquis, Melinda | melinda.marquis@noaa.gov | NOAA-Earth System Research Laboratory (**ESRL**) / Physical Sciences Division/Renewable Energies | OAR |
| **9** | Moore III, John | john.moore@noaa.gov | NOAA - National Weather Service (**NWS**) / Weather Forecasting Office (**WFO**), Memphis, TN | NWS |
| **10** | Parker, William 'Bill' | bill.parker@noaa.gov | NOAA - National Weather Service (**NWS**) / Weather Forecasting Office (**WFO**), Jackson, MS | NWS |
| **11** | Salem II, Thomas | thomas.salem@noaa.gov | NOAA - National Weather Service (**NWS**) / Weather Forecasting Office (**WFO**), Memphis, TN | NWS |
| **12** | Sims, Jamese | jamese.sims@noaa.gov | NOAA Satellite and Information Service (**NESDIS**) | NESDIS |
| **13** | Spencer, Albert 'Benjie' | benjie.spencer@noaa.gov | NOAA - National Weather Service (**NWS**), Chief Engineer | NWS |
| **14** | Maxie, Latrice | latrice.maxie@noaa.gov | NOAA - National Weather Service (**NWS**) / Weather Forecasting Office (**WFO**), Jackson, MS | NWS |
| **15** | Taylor, Jason | jason.taylor@noaa.gov | NOAA - National Environmental Satellite, Data, and Information Service (**NESDIS**) | NESDIS |
| **16** | Yapur, Martin | martin.yapur@noaa.gov | NOAA - National Environmental Satellite, Data, and Information Service (**NESDIS**) | NESDIS |
| **17** | Turner, David | dave.turner@noaa.gov | NOAA ESRL | |

| | | | | |
|---|---|---|---|---|
| **18** | Aberson, Sim | ssim.aberson@noaa.gov | NOAA AOML | OAR |
| **19** | Melendez, Daniel | daniel.melendez@noaa.gov | NOAA STI | NWS |
| **20** | Baker, Bruce | bruce.baer@noaa.gov | NOAA ATDD | OAR |
| **21** | Myles, LaToya | latoya.myles@noaa.gov | NOAA ATDD | OAR |
| **22** | Saylor, Rick | rick.saylor@noaa.gov | NOAA ATDD | OAR |
| **23** | Jewett, Libby | libby.jewitt@noaa.gov | NOAA CPO | OAR |
| **24** | Woods, Cindy | cindy.woods@noaa.gov | NOAA COO | NWS |
| **25** | Clark, Adam | Adam.clark@noaa.gov | NOAA NSSL | OAR |
| **26** | Kleist, Daryl | daryl.kleist@noaa.gov | NOAA NCEP | NWS |
| **27** | Rhome, Jamie | jamie.rhome@noaa.gov | NOAA NHC | NWS |
| **28** | Eosco, Gina | gina.eosco@noaa.gov | NOAA OWAQ | OAR |
| **29** | Tong, Daniel | daniel.tong@noaa.gov | NOAA ARL | OAR |
| **30** | Evans, Michael | michael.evans@noaa.gov | Albany WFO | NWS |
| **31** | Gopalakrishnan, Sundaraman | gopal.sundaraman@noaa.gov | NOAA AOML | OAR |
| **32** | Beller-Sims, Nancy | namcy.beller-sims@noaa.gov | NOAA CPO | OPAR |
| **33** | Nierenberg, Claudia | claudia.nierenberh@noaa.gov | NOAA CPO | OAR |
| **34** | Stein, Ariel | ariel.stein@noaa.gov | NOAA ARL | OAR |

## Appendix D – NCAS-M ESTP and Center-wide Professional Development (July 22 - 26, 2019) at Howard University (Ju1y 22 - 26, 2019)

**Experiential Training Summer Program for Rising Sophomores (ETSP)**
**2019 Professional Development Workshop 2019**
Howard University Interdisciplinary Research Building (IRB), 2nd Floor Conference Room
2201 Georgia Ave NW, Washington, DC 20059

### NCAS-M ETSP
### Mon, July 22, 2019

| Time | Session |
|---|---|
| 10:00am – 10:10pm<br>10:10am – 10:45am<br>10:45am – 11:15 am<br><br>11:15am – 11:30am<br><br>11:30am – 12:30am | • Welcome and Introductions – ***Terri Adams/Jo-Anne Manswell Butty***<br>• NOAA 101 – ***Jacqueline Rousseau***<br>• NOAA UG Scholarship Winners – ***Ja'Nia Dunbar, Nohemi Perales***<br><br>**Break**<br><br>• Poster Presentations: PowerPoint and other ways to Construct and Format a Research Poster – ***Leticia Williams*** |
| 12:30pm – 1:30pm | **Lunch** |
| 1:30pm – 4:00pm | • Poster Preparation |

## NCAS-M ETSP
## Tue, July 23, 2019

| Time | Session |
|---|---|
| 10:00am – 10:30am<br>10:30am – 11:00am<br><br>11:00am – 11:15am<br><br>11:15am – 11:45am<br><br>11:45am – 12:15pm | ● Prezi vs PowerPoint – Selecting Your Medium; Speaking on Camera – ***John Harkless***<br>● Elevator Speech/Perfecting the Elevator Speech/Extemporaneous Speaking – ***Michaela Amoo***<br><br>**BREAK**<br><br>● NOAA Mission Relevant Communication – ***Tia Tyree***<br>● Stage Presence and the Basics of Oral Technical Presentations – ***Talitha Washington*** |
| 12:15pm – 1:15pm | **LUNCH** |
| 1:15pm – 2:00pm | ● The Role of Human Dimensions in NOAA Mission-Relevant Research – ***Terri Adams, Carolyn Stroman*** |
| 2:00pm – 4:00pm | ● Poster Preparation and Printing |

## NCAS-M ETSP
## Wed, July 24, 2019

| Time | Session |
|---|---|
| 10:00am – 12:00pm | ● NCAS-M ETSP Research Colloquium |
| 12:00pm – 1:00pm | ● Lunch |
| 1:00pm – 5:00pm | ● National Museum of African American History and Culture Tour |

**NOAA Cooperative Science Center in Atmospheric Sciences & Meteorology**
**2019 NCAS-M ETSP Research Colloquium**
**Howard University Interdisciplinary Research Building**
**Multipurpose Room (106)**
**July 25, 2019 – 10:00 am**

**AGENDA**

**10:00 AM** **Welcome** - Dr. Terri Adams, Deputy Director, NCAS-M
**10:05 AM** **Overview of NCAS-M ETSP and Introduction of Interns** – Dr. Jo-Anne Manswell Butty, Education Expert, NCAS-M
**10:12 AM** **Remarks** – Dr. Bruce Jones, Vice President for Research, Howard University
**10:20 AM** **Remarks** – Dr. Audrey Trotman, NOAA Office of Education

**Poster Presentations**
**10:30 AM** Viewing of poster presentations
**12:00 PM** Closing

| Name | Institution | Poster Presentation Title |
|---|---|---|
| Aolani Aviles | HU | Pesticides Activism Then and Now: The UFW and the California Teachers Association in Historical Context |
| Camryn Billett | HU | Aerosol Signatures Based on the Wavelength, Aerosol Optical Thickness, and the Angstrom Exponent |
| Henry Budris | UMBC | Comparison of Radiosonde and Wind Profiler Wind Components |
| Chinedu Chukwu | HU | Exploring the Functionality of Ozonesondes and the Impact of Different Variables on Data Readings |
| Tisha Copeland | HU | Hurricane Maria Economic & Societal Impact |
| Alexandra Grayson | HU | Observation of MASTER and MODIS Fire Radiative Power data from California Fires Using R-Programming Language for FIREX-AQ |
| Jordan Hundley | JSU | Aviation and Weather at Jackson International Airport |
| Alycia Triplett | JSU | Air-Sea Interactions and High Winds Associated with Hurricane Harvey Using Satellite Data and Storm Surge Modeling |
| Onyekachi Udoye | UMBC | A Study on Peak Levels of Particulate Matter 2.5($PM_{2.5}$) in the Baltimore-Washington Area |

**Center-Wide Professional Development Workshop 2019**

Howard University Interdisciplinary Research Building (IRB) Multipurpose Room

2201 Georgia Ave NW, Washington, DC 20059

July 25-26, 2019

| Center-wide Professional Development | | |
|---|---|---|
| **Thursday, July 25, 2019** | | |
| **Time** | **Topic** | **Facilitators** |
| 9am – 9:45am | • Welcome & Introductions / NCAS-M 101 Team Building Activity | Terri Adams, Jo-Anne Manswell Butty, Andrena Sawyer, & Shadya Sanders |
| 9:45am – 10:45am | • NOAA 101 | DaNa Carlis, Jamese, Sims, Segayle Thompson, Martin Yapur |
| 10:45am – 11am | **Break** | |
| 11am – 12pm | • Professional Development Basics | Andrena Sawyer |
| 12:00pm - 1pm | **Lunch** | |
| 1pm - 2pm | • Responsible Conduct of Research | Yolanda Wilson |
| 2pm -2:15pm | **Break** | |
| 2:15pm – 3:00pm | • Coping with Stress and Minimizing Burnout | Sadija Smiley |
| 3:00pm – 3:450 pm | • It's All About Branding | Nadia Trowers |
| 4:00 pm – 4:50pm | • Headshots | Shawne Turrentine |
| 4:50 - 5:00pm | • Wrap Up and Evaluations | Jo-Anne Manswell Butty & Andrena Sawyer |
| | | |
| **Friday, July 26, 2019** | | |
| 9am – 9:30am | • NCAS-M Team Building Activity | Andrena Sawyer |

| | | |
|---|---|---|
| 9:30am – 11:00am | • Communicating Science: Skills Training Workshop | Vernon Morris, Michael Brennan, & Shadya Sanders |
| 11:00am – 11:15am | **Break** | |
| 11:15am – 12:15pm | • Communicating Science - Panel | Ari Gertsman (Policy), Sushma Subramanian (The Public), Marcus Walter (Media), Jose Fuentes (Moderator) |
| 12:15pm – 1:15pm | **Lunch** | |
| 1:15pm – 2:15pm | **Poster Presentations** | NCAS-M Fellows, ETSP Interns, Other Students |
| 2:15pm -3:15pm | • Communicating Science - Group Activity Pt 1 | NCAS-M & NOAA Partners |
| 3:15pm – 3:30pm | **Break** | |
| 3:30 to 4:30pm | • Communicating Science – Group Activity Pt 2 | NCAS-M & NOAA Partners |
| 4:30pm – 5:00pm | • Wrap Up and Evaluations | Jo-Anne Manswell Butty, Andrena Sawyer |

## Appendix E – Report of External Evaluation

**Evaluation of the NOAA Cooperative Science Center for Atmospheric Sciences and Meteorology (NCAS-M) Year 3 (2018-19) annual progress report**

# Background

The NCAS-M is comprised of thirteen partner institutions with Howard University as the lead institution. The goal of NCAS-M is to produce high quality professionals, primarily from underrepresented populations, who will directly contribute to the workforce at NOAA and in NOAA mission-related fields. NCAS-M supports fellows through organizing educational and professional development activities, providing guidance from NOAA mentors and program advisors, and providing research opportunities. NCAS-M also seeks to share best practices and progress made in developing science in NOAA mission-related fields with the broader academic community and the general public.

# Evaluation approach and methods

This evaluation report presents results from an annual fellow survey, former fellow follow up survey, and PI/faculty interviews conducted from February to May 2019. These data sources and their response rates are presented in the following table. In addition to surveys and interviews, tracking data for program years 1-3 on 43 fellows and 17 research projects were collected by the EMT and shared with the evaluators. These data were used to assess the extent to which education, research, and collaboration targets were met. Findings from this report should be used by the EMT to identify progress made towards meeting program goals and to improve implementation.

| Data sources | Evaluation participants | Number in program | Response frequency | |
|---|---|---|---|---|
| | | | # | % |
| Annual fellow survey | Undergraduate fellows | 9 | 7 | 78% |
| | Graduate fellows (PhD and Masters) | 20 | 15 | 75% |
| | Postdoctoral fellows | 3 | 3 | 100% |
| Former fellow follow up survey (Hereafter referred to as "Follow up survey") | Fellows who completed fellowship experience | 18 | 8 | 44% |
| PI interviews | Partner institution PIs | 13 | 11 | 85% |
| Faculty interviews | JSU faculty | 3 | 3 | 100% |

The surveys consisted of quantitative and qualitative (i.e., open-ended) items. Items on the annual fellow survey related to skill development were measured on a five-point Likert scale. Quantitative data were analyzed using frequencies and descriptives. Open-ended survey responses were coded for themes. It should be noted that some respondents provided comments that were coded as more than one theme. Therefore, the total number of responses reported in this report may exceed the total number of respondents.

Tracking data were analyzed to identify if program targets were exceeded (above the target), met (exactly at the target), or not met (below the target) by the end of year 3. The data provided in this report represent the cumulative data as of the end of program year 3 (i.e., program years 1, 2, and 3 combined), unless otherwise noted. For metrics

where only an end of program target is identified (i.e., end of year 5), the data as of year 3 is provided (when possible) and achievement of the target is indicated as to be determined, "TBD." For metrics where no data were provided to assess achievement of the metric, the data are listed as "Not available" and achievement of the target is indicated as "TBD." These metrics will be fully evaluated at the end of the program. For metrics where it is unclear whether the metric was a yearly target or an end of program target, the data were provided as of the end of program year 3 and the achievement of the metric is listed as "TBD."

**Limitations**

Tracking data were only available up to June 2019, which does not represent the full program year 3 term. Therefore, caution should be used when interpreting the findings as the actual numbers may be higher than reported. Research project tracking data included numbers on publications that tied to specific research projects, number of fellows involved in projects, number of presentations, and number of tools developed or used. However, no additional publication details were provided, which limited the evaluators from conducting a complete assessment of publication-related metrics in this report.

## Progress made in education targets

Education targets were evaluated using tracking data on 43 fellows. Despite not meeting the overall target of training 80 fellows by the end of year 3, the program has been successful in other areas of recruitment including recruiting fellows from diverse backgrounds, recruiting fellows for the ETSP program, and funding two postdocs each year. The program has also met the goal of ensuring that fellows enter careers in NOAA mission-related fields. All funded partner PIs/faculty noted that delays in funding hindered their ability to recruit and retain fellows, which may explain why the project did not meet its recruitment targets. Additionally, both affiliate partner PIs noted that while they would like to involve fellows in NCAS-M activities, they currently have no funds from the Center to do so.

| Metric | Data as of end of Year 3 | Exceeded/Met/Not met |
|---|---|---|
| Train 148 fellows by the end of the program<br>• End of year 3 target = 80 fellows | 43 | Not met |
| 75% of fellows from underrepresented communities by the end of the program | URM: 81%<br>URG: 93% | Exceeded |
| Ensure 84 fellows graduate by the end of the program (all fellows & underrepresented fellows) | 11 | TBD |
| Ensure 75% of fellows from underrepresented communities graduate by the end of the program | URM: 31%<br>URG: 28% | TBD |
| Ensure 2 postdocs are funded each year to participate in and complete NOAA mission-related work. | 2[a] | Met |
| Maintain 75% retention rate for fellows in degree programs | Not available | TBD |
| Maintain a 5-year graduation rate for 75% of undergraduate fellows | Not available | TBD |

| | | |
|---|---|---|
| Ensure 12 fellows enter careers in NOAA mission-related fields, and/or are hired by NOAA, NOAA contractors, NOAA partners, or resource management agencies, or in academia, or as entrepreneurs by the end of the program (all fellows & underrepresented fellows)<br>• End of year 3 target = 8 fellows<br>• Note: Achievement of this goal is influenced by factors not directly related to program leaders' efforts. As such, potential employment opportunities will vary by fellow. | 8 | Met |
| Recruit 44 fellows to attend ETSP by the end of the program<br>• End of year 3 target = 24 fellows | 24 | Met |
| Develop and host seminars, workshops (10 total), new courses (10 total), webinars (25 total), Center-wide Professional Development sponsored field training (7 total), new programs, and new degrees offered to develop working skills and functional competencies to support the NOAA mission and workforce the end of the program | Not available | TBD |

a. This data represents the number of postdocs funded during program year 3 only. The program has also met the target of funding two postdocs each program year.

## Impact of education activities

Responses from the 2018-19 annual fellow survey were used to assess the impact of the program on fellows' skill development and pursuit of advanced education and careers.

### Skill development

Twenty-four annual fellow survey respondents rated their presentation, communication, and professional skills when they first became a fellow and at the end of program year 3 (2018-19 academic year). The majority (84%-87%) were already fairly skilled (working, competent, and expert) in all areas when they first became a fellow. However, results suggest that the program helped fellows enhance or refine their abilities, as a greater proportion rated themselves as competent or expert at the end of program year 3 compared to when they became fellows. It should be noted that the EMT are currently reviewing the core competencies (knowledge and skill areas) that they anticipate all fellows learning through this program. Future evaluations of skill development will be aligned to those new core competencies, which may yield more notable results regarding skill improvement due to the program.

| Skill level | Poor | | Basic | | Working | | Competent | | Expert | |
|---|---|---|---|---|---|---|---|---|---|---|
| | # | % | # | % | # | % | # | % | # | % |
| Before the program (n=24) | | | | | | | | | | |
| Presentation skills (e.g. delivering an oral presentation or poster) | 2 | 8% | 2 | 8% | 10 | 42% | 9 | 38% | 1 | 4% |
| Communication skills (e.g. communicating with scientists and lay audiences) | 1 | 4% | 2 | 8% | 8 | 33% | 11 | 46% | 2 | 8% |
| Professional skills (e.g. interviewing, networking) | 1 | 4% | 2 | 8% | 13 | 54% | 7 | 29% | 1 | 4% |
| At the end of the 2018-19 academic year (n=24) | | | | | | | | | | |
| Presentation skills (e.g. delivering an oral presentation or poster) | 0 | 0% | 1 | 4% | 3 | 13% | 14 | 58% | 6 | 25% |
| Communication skills (e.g. communicating with scientists and lay audiences) | 0 | 0% | 1 | 4% | 4 | 17% | 11 | 46% | 8 | 33% |
| Professional skills (e.g. interviewing, networking) | 0 | 0% | 1 | 4% | 4 | 17% | 12 | 50% | 7 | 29% |

Note. Row percentage totals may not add up to 100% due to rounding.

Twenty-one annual fellow survey respondents shared how their experience as an NCAS-M fellow influenced their skill development. Overall, the NCAS-M experience provided fellows with opportunities to develop and practice presentation, communication, networking, professional, and leadership skills.

- Ten respondents mentioned enhancing their presentation skills through NCAS-M opportunities to present at professional meetings, learn new presentation strategies, and present to audiences from diverse backgrounds.
- Seven respondents generally highlighted improved communication skills. Only one respondent elaborated, commenting that he/she has gained experience communicating with professionals from diverse backgrounds (e.g., research, academic, and policy) due to the program.
- Seven respondents generally mentioned improved networking skills. Two respondents appreciated the opportunity to work with many people. Another respondent mentioned that being an NCAS-M fellow led him/her to "more experienced people that could serve as a guide." Respondents did not elaborate further.
- Five respondents commented that, in general, being able to continuously practice their newly developed skills at NCAS-M events has been helpful for improving their skill set. They did not specify further.
- Two respondents stated that they had improved professional skills, including being more prepared and confident in their ability to advance to the next step in their future professional development. They did not elaborate further.
- One respondent mentioned improved leadership skills but did not clarify further.

| Select quotes highlighting a general positive experience in the program |
|---|
| • "Becoming an NCAS-M fellow has been one of the best experiences of my life." |
| • "I was given opportunities that I would not have been exposed to if I wasn't a fellow." |
| • "By being an NCAS-M fellow, it opened the doors to a whole new world." |

**Impact on pursuing advanced education**

Eight follow up survey respondents shared their education and employment status at the end of program year 3 to identify what education and career paths fellows pursue after their program participation. The majority of

respondents were enrolled in an advanced degree program in a NOAA-related field and one was employed in a NOAA mission-related field.

| Employment/Education Status (n=8) | | # | % |
|---|---|---|---|
| Advanced degree in NOAA mission-related field | Currently enrolled | 6 | 75% |
| | Applying | 0 | 0% |
| Employment in NOAA mission-related field | Currently employed | 1 | 13% |
| | Searching for employment | 0 | 0% |
| Other employment/education status (write in) | "Currently employed in a job outside of a NOAA mission-related field" | 1 | 13% |
| | "Nanoengineering PhD (could possibly be a NOAA mission-related field)" | 1 | 13% |

Note. The employment and education status question was presented as a select all that apply. One respondent indicated both enrollment in an advanced degree program and having other employment/education status. Therefore, there are, in total, nine responses from eight participants.

The six follow up survey respondents enrolled in an advanced degree program shared how the program influenced their decision to pursue an advanced degree. Two highlighted that the program was a positive influence, with one respondent stating that he/she would not have applied for an advanced degree without NCAS-M and the other attributed the positive influence to the NOAA workforce opportunities through the NERTO program. Two respondents explained that the program did not influence them to pursue an advanced degree because they were either already in a graduate program or already had these goals. Two respondents indicated "N/A" and did not clarify further.

Four follow up survey respondents enrolled in an advanced degree program shared that the program prepared them for success through applied experiences (e.g., networking at conferences), attending professional development workshops to build networking skills, writing abstracts, and engaging with their NERTO mentor to receive feedback on their thesis.

**Impact on pursuing careers**

One respondent was employed at the time of the follow up survey. The respondent was employed at a Cooperative Institute and shared that his/her participation in NCAS-M helped prepare him/her for employment through learning of the NOAA mission, providing opportunities for networking with NOAA professionals, and helping to focus research on a NOAA mission-related field.

**Feedback on education activities**

Four follow up survey respondents had suggestions for how the program could better develop their professional and technical skills. Two suggested having increased opportunities to attend personalized trainings/workshops that are relevant to one's discipline. Funding to attend conferences or trainings in specific topic areas would have been appreciated, rather than only being supported to attend larger, less relevant conferences. Two suggested having more involvement from NOAA professionals, with one respondent requesting more involvement in general from NOAA professionals in the technical trainings/workshops and one interested in learning the day-to-day lives of NOAA professionals. One respondent indicated that a larger emphasis on publications would have been helpful but did not clarify further. A fifth follow up survey respondent did not share suggestions for improvement but shared an appreciation for the inclusion of relevant software programs like RStudio into the workshops.

### Education recommendations

- Invite NOAA professionals to present more often at technical trainings, webinars, and workshops. Send email invitations to fellows informing them that these are opportunities to learn from NOAA professionals.
- Identify specific skills and knowledge areas within each of the core competencies and provide a range of trainings so that fellows have the opportunity to develop these skills. Distribute e-newsletters describing online resources so that fellows attend trainings relevant to their interests.
- Continue introducing software programs into workshops that are relevant to NOAA mission-related fields (e.g., RStudio, R, ArcGIS, QGIS).
- Provide tracking data on numbers of seminars, workshops, new courses, webinars, Center-wide Professional Development sponsored field trainings, new programs, and new degrees offered to the evaluators so that metrics can be fully assessed.
- Program leads have made changes to budgeting and contracting in an effort to improve fellow recruitment. This includes meeting with NOAA officials regarding timelier contracting. In addition to working to resolve these administrative issues, program leads should revisit the target number of fellows to determine whether this target is still feasible for program years 4 and 5.
    - Program leads and funders may also consider modifying the contract year dates to allow more time for contract approval, if feasible. For example, starting the program year earlier in the summer instead of at the beginning of fall.
- Implement other education related recommendations suggested in the August 2019 Midterm Evaluation Report.

## Progress made in research and collaborations targets

Research and collaboration targets were evaluated using tracking data collected for 17 NOAA projects.

### Research targets

As of the third program year, all 17 research projects involved participation from both fellows and NOAA partners. In total, 19 fellows and 47 NOAA partners participated in projects. The program has succeeded in developing research projects across NOAA areas, conducting invited talks about research, and developing and using research tools. Ten papers were published in journals; however due to incomplete publication details in tracking data (e.g., citations for publications, percent of graduate fellows who published, percent of NOAA scientists as co-authors, percent of papers with fellows as co-authors, number of proposals submitted to other programs including number of which were funded, and the amount of funds leveraged from non-NCAS-M budget to support the program), further evaluation was limited. During PI/faculty interviews, three out of 14 interviewees mentioned that funding issues inhibited their ability to recruit fellows to meet research needs. As such, it may be difficult to meet fellow-related research targets (e.g., publications by graduate fellows and fellows as co-authors or first authors) when the program has not yet recruited the targeted number of fellows. Further details on research metrics are in the following table.

| Metric | Data as of end of Year 3 | Exceeded/Met/ Not met |
|---|---|---|
| Provide 5 research projects in NOAA areas to engage 10 fellows in all levels participating in the program each program year | 17[a] projects total<br>19 fellows total<br>Number of projects by area:<br>• Integrated SBEC (5)<br>• Process-Level Understanding and Enhanced Modeling Capacities (7)<br>• Advancing the Development of High Resolution Coupled Models and Assimilation and Integration of Observations (5) | Exceeded |
| Publish a total of 45 peer reviewed publications in NOAA mission related areas by the end of the program (total is across all groups - faculty, staff, and fellows)<br>• End of year 3 target = 15 publications | 10 | Not met |
| Ensure 100% of graduate fellows publish at least one paper by the end of the program | 0 grad fellows<br>1 postdoc | TBD |
| Ensure 50% of papers have NOAA scientists as co-authors by the end of the program | Not available | TBD |
| Ensure 30% of papers have fellow co-authors by the end of the program | Not available | TBD |
| Ensure 19 fellows are first authors on publications by the end of the program<br>• End of year 3 target = 7 fellows<br>• Note: Author status may depend on the fellow's contribution to the project which is not directly influenced by program leaders. | 0 | Not met |
| Give 100 professional presentations on project research (faculty, staff, and fellows) by the end of the program<br>• End of year 3 target = 60 presentations | 51 | Not met |
| Ensure 75% of presentations have fellows as co-authors or presenters by the end of the program | 65% | TBD |
| Give 29 invited presentations by the end of the program (faculty, staff, and fellows)<br>• End of year 3 target = 11 presentations | 12 | Exceeded |
| Submit 35 proposals to other programs by the end of the program<br>• End of year 3 target = 15 proposals | Not available | TBD |
| Of which, 11 proposals will be funded by the end of the program<br>• End of year 3 target = 6 proposals | Not available | TBD |
| Develop and use tools each program year (faculty, staff, and fellows) – total of 8 tools developed by end of program<br>• End of year 3 target = 3 tools | 4 | Exceeded |
| Leverage $7 million from non-NCAS-M budget in order to support the program, including post-secondary fellow support by the end of the program<br>• End of year 3 target = $3 million | Not available | TBD |

a. One project, the CapComm Lab, involved 23 fellows who were not included in the total fellow count as it was unknown to what extent the fellows overlapped with other research projects.

**Research recommendations**

- Encourage PIs and faculty to submit journal articles and identify other potential article topics during with PI/faculty meetings with the Distinguished Scientist.
- Continue encouraging fellows to become involved in research projects and publish by explaining the publication process, expectations of authorship, and how to become involved with research across the five research focus areas. This can be done through webinars and discussions with the Distinguished Scientist and faculty advisors.
- Provide complete publication and presentation data to the evaluators so that research metrics can be fully assessed. This includes details on percent of graduate fellows published, percent of NOAA scientists as co-authors, percent of papers with fellows as co-authors, and the number of proposals submitted to other programs including number of which were funded. Determine if end of program targets for publication production and fellows' involvement in publication are still feasible based on delays in funding and other administration issues.
- Provide complete data on leveraged funds to the evaluators so that they can assess program administration metrics.
- Implement other research related recommendations suggested in the August 2019 Midterm Evaluation Report.

**Collaboration targets**

The program exceeded its goal of developing 44 collaborative projects/research interactions by the end of year 3, which indicates that the program is on track to meet its end of program goal of 99 collaborative projects/research interactions. Of the 17 research projects, 13 involved more than one PI (i.e., "collaborations"). Notably, these collaborations have occurred most often among PIs/faculty from across institutions (11 projects involved inter-institutional collaborations) as compared to within the same institution (2 projects involved intra-institutional collaborations). Results suggest that while the inter- and intra-institutional collaboration metrics were not met, the program is working towards these targets by developing collaborative partnerships. Six of the 14 PI/faculty interviewees indicated that they desired more collaborations across different sites. However, new collaborations have been difficult to establish due to lack of monthly PI calls, lack of budget, and lack of initiative or motivation.

| Metric | Data as of end of Year 3 | Exceeded/Met/Not met |
|---|---|---|
| Develop 200 engagements with NOAA and NCAS-M faculty, staff, and fellows including research, professional development, outreach, and education by the end of the program<br>• End of year 3 target = 100 engagements | Not available | TBD |
| Develop 99 collaborative projects/research interactions with NOAA by the end of the program<br>• End of year 3 target = 44 collaborative projects/research interactions | 46 (17 research projects & 29 NERTO projects) | Exceeded |
| Develop and maintain 30 inter- and intra-institutional partnerships including research, outreach, and education by the end of the program<br>• End of year 3 target = 17 partnerships | Inter-institutional: 11<br>Intra-institutional: 2 | Not met |

**Collaboration recommendations**

- As recommended in the August 2019 Midterm Evaluation Report, discuss potential collaboration opportunities during regular teleconferences led by the Distinguished Scientist.

- Increase opportunities for partner PIs to develop collaborations, including at annual meetings and EPP forums. Devote time during these activities for facilitating research collaborations and providing a space for PIs to meet each other and learn about each other's research interests.
- Provide detailed information on engagements to the evaluators so that the collaboration metrics can be fully assessed.
- Implement other collaboration related recommendations suggested in the August 2019 Midterm Evaluation Report.

**Suggestions to improve fellow experience**

Four follow up survey respondents suggested ways to improve the fellow experience in NCAS-M. Two respondents suggested having greater administrative support, including additional staff to help address financial and logistical issues as well as more timely notifications about events fellows are meant to attend. One respondent would have liked to learn more on how to be successful in graduate school (e.g., avoiding burnout, methods for time management, protecting well-being). He/she did not specify from whom this information should come or in what form. Finally, one respondent suggested having greater time management between coursework and research but did not specify further.

**Recommendations to improve fellow experience**

- Develop and share resources (e.g., Q&A guide) that can help fellows navigate common problems related to financial and logistical issues.
- Devote a portion of time to speaking with fellows about how to be successful in graduate school. This can be done during meetings with faculty advisors or as part of a webinar. Former fellows can also return to talk about their own experiences and tips for success in graduate school.
- Use an email listserv (previously recommended in the August 2019 Midterm Evaluation Report) to send timely communications informing fellows of upcoming education activities and events. PIs and faculty should also be aware of events so that they can remind fellows and encourage participation.
- Implement other administration/logistics related recommendations suggested in the August 2019 Midterm Evaluation Report.

**Other program benefits**

Eight follow up survey respondents shared how participation in the NCAS-M program allowed them to do things that they would not have had the opportunity to do otherwise. Three respondents highlighted academic goals they were able to achieve, such as finishing a master's degree, becoming a doctoral candidate, and being able to focus more on school. Three respondents shared how the program generally improved skills related to research, networking, and working independently. Two respondents appreciated the opportunities for travel, including to Washington, D.C. and conferences. One respondent mentioned how participation in NCAS-M led her/him to their current position via access to individuals at NOAA and volunteer opportunities.

## Appendix F – NCAS-M Annual Meeting Agenda (June 13-14, 2019)

**Theme: Center Administration and Operations**

**Day 1: Location: ESSIC Large Conference Room, 4th Floor,**
**Address**: 5825 University Research Ct, Suite 4001, College Park, MD 20740

9:00 – 9:15 AM Welcome, Introductions, Review of Agenda - Dr. Charles Ichoku

Overview and Objectives

"The NCAS-M Annual Meeting scheduled on June 13-14 will focus on administrative and operational issues. Specifically, at the midway point, we aim to:

1. Provide an assessment of where we are with respect to the Implementation plan performance metrics and goals
2. Assess the various programmatic elements of the implementation plan (Day 1) and seek collective solutions and strategies on how to improve and optimize results.
3. Assess the various student training elements of the implementation plan (Day 2) and seek collective solutions and strategies on how to improve and optimize results.
4. Present and collectively discuss external evaluator reports, interviews and feedback
5. Develop recommendations for updates to the implementation plan based on the collectively developed solutions, evaluator feedback, and meeting discussions

Anticipated Outcomes:

1. Updated Implementation Plan
2. Updated calendar for site visits and joint endeavors
3. Confirm alignment of Center activities with implementation plan and WRN Strategic Plan

Please note that we will have a separate technical meeting in late September 2019 at NCWCP. The planning for this is ongoing and an update will be presented during the Annual Meeting."

9:15 – 9:45 AM Leadership discussion on award implementation and performance - Dr. Vernon Morris

(A brief overview of the Year 3 activities and accomplishments will be presented)

Summary of Advisory Board Meeting - Dr. Charles Ichoku

9:45 – 11:00 AM Sub-Awards and Budget Formulation - Dr. Vernon Morris, Ms. Kimberly Smith, Dana Hector

11:00 – 11:15 AM Break

11:15 – 12:30 PM Communications and Upcoming Events - Dr. Neosho Ponder

- Project Fest, Color of Weather, Lab Visits (Morris)
- Center-wide Activity Calendar
- EPP Forum 2020 (Morris, OED)
- Communications Template - should be sent to faculty as well as students
- Gathering/Sharing/Promoting Information and Data

12:30 – 1:30 PM Lunch — Collaborator Roundtable

At this time, we invite interested parties, current collaborators, and NOAA stakeholders to engage the NCAS-M team informally to discuss joint activities. These can include proposals, projects, new opportunities, NERTOs, and other types of engagements.

1:30 – 2:30 PM Reporting Content, Schedules, and Templates - Kimberly Smith

- Reporting Elements
- Reporting Template
- Quarterly Reporting Requirement

3:30 — 4:30 PM PI Interviews (Singh, Arratia)

3:30 – 4:45 PM Compliance and Special Award Conditions and new WRN Strategic Plan

- Updates to Implementation Plan

4:45 — 5:00 PM Summary and Action Items

**Theme: Student Engagement**

**Day 2** **Location: NCWCP 4552 and 4553 Address: 5830 University Research Ct, College Park, MD 20740**

9:00 – 9:15 AM Recap, Agenda, Updates from Day 1

9:15 – 10:45 AM Student Recruitment - Dr. Jo-Anne Manswell-Butty

- Workforce Goal 4
- Recruitment Strategy for a URM Focus
- NERTOs
- Student selection
- Updates on Postdoctoral Program

Student Participation - Dr. Jo-Anne Manswell-Butty

- SDPs
- Integrated Student Activities
- Student Input and Representation in Center Operations
- Strengthening the Utility of the Focus Groups

10:45 AM - 11:00 AM Break

11:00 — 11:45 AM External Evaluators Report and Discussion - Carly Raasch and Kartik Jha

11:45 AM – 12:30 PM Discussion Institutional Student Impact Goals - Dr. Terri Adams

- SBEC Integration
- Center-wide Core Competencies - Strategies and Goals
- Student Leadership, Alumni Association

12:30 – 1:30 PM Lunch — Open Discussion

At this time, we invite interested parties, current collaborators, and NOAA stakeholders to engage the NCAS-M team informally to discuss joint activities. These can include proposals, projects, new opportunities, NERTOs, and other types of engagements

1:30 – 3:00 PM Faculty Responsibilities - Dr. Vernon Morris

- Communication with URMs
- Effective Mentoring Strategies
- Identifying/Addressing URM Student Needs

3:00 - 3:15 PM Break

3:00 – 4:00 PM PI Interviews (Min)

3:15 – 4:45 PM Open Discussion

4:45 – 5:30 PM End of visit post-mortem

## Appendix G - NCAS-M Calendar of Events

**NCAS-M Calendar of Events**

**March 2019**

| | |
|---|---|
| 1 — 29 | 13th AEROSE Campaign |
| 25 — 28 | AMS Policy Forum |
| 28 | NCAS-M Webinar Series -- "Weather Science Communication 101" (Dr. Gina Eosco, Social Science Portfolio Coordinator, Cherokee Nation Company supporting: NOAA/OAR/OWAQ) |

**April 2019**

| | |
|---|---|
| 3 | NOAA D & I Summit -Screening and panel for "Can We Talk?"(Silver Spring, MD) |
| 8 — 12 | HU Research Week (invited Talk:Daniel Yeager) |
| 9 | HU Research Retreat Presentation (Vernon Morris) 9:00AM |
| 4 | UMBC/JCET faculty visit to HUBC |
| 12 | HU Research Week Environmental Studies Session |
| 16 | NCAS-M Twitter Chat with NCAS-M Director, Vernon Morris (8:00PM) |
| 25 | NCAS-M Webinar Series -- "A Likely Union: Climate Change and Landscape Architecture" (Dr. Diane Jones Allen, Program Director for Landscape Architecture, in the College of Architecture Planning, and Public Affairs, at the University of Texas at Arlington) |
| 30 | Daniel Yeager (Cohort 1) PhD Defense 1400 (IRB 3rd Floor Faculty Lounge) |

**May 2019**

| | |
|---|---|
| 3 | NCAS-M Director Visit San Jose State University (San Jose, CA) |
| 3 | Tyler Prize Award Ceremony & Reception (San Francisco, CA) |
| 4 | NOAA Open House (College Park, MD) |
| 6 — 7 | OWLETS Science Team Meeting (College Park, MD) |
| 8 | Princeton Poster Expo (Princeton, NJ) _ Charles Ichoku and Vernon Morris |
| 11 | HU Commencement |
| 23-25 | University of Rhode Island STEM Access, Inclusion Workshop, Narraganset Bay, RI |
| 29 | NCAS-M Advisory Board Meeting |

**June 2019**

| | |
|---|---|
| 2 | ETSP Program Begins |
| 13 - 14 | NCAS-M Annual Meeting |
| 17 | NWS-NCAS-M Project Fest Planning Meeting |
| 26 | NOAA CAP Meeting with Provost |

**July 2019**

| | |
|---|---|
| 17 | NASA JPSS internship students visit to HUBC |
| 22 | EMT Meeting |
| 22 — 26 | Center-wide Professional Development Workshop, Washington, DC |
| 29 | EMT Meeting |
| 30 | External Evaluator Meeting on implementation plan |
| 30 | Nohemi Perales presentation at SSMC |
| 30 | PI Monthly Teleconference 1600 - 1700 |
| 31 | AGU Abstracts due |
| 31 | NRDD Meeting 1300-1400 |

**August 2019**

| | |
|---|---|
| 1 | Tiger Team Meeting 1300 |
| 1 | AMS Abstracts due |
| 5 | EMT Meeting 1500 |
| 12 | EMT Meeting 1500 |
| 12 — 16 | Freshman Week/New Grad Student Advising |
| 14 | CoWx Article Writing 1000 |
| 14 | New Student Orientation HUPAS 1400 - 1500 |
| 16 | OED Tag-Up 1100 |
| 19 | EMT Meeting 1500 |
| 19 | Formal Classes Begin at Howard University |
| 21 | EPP Planning Teleconference 1400-1600 |
| 22 | Kick-Off for 2020 Summer Workshop (HUBC) 1100-1200 |
| 22 | Vernon Morris - Briefing on NCAS-M at NCWCP 1300 - 1400 |
| 26 | EMT Meeting 1500 |

## Appendix H - NCAS-M ACRONYMS

| | |
|---|---|
| 3DVAR | Three-Dimensional Variation |
| AAAR | American Association for Aerosol Research |
| ACARS | Aircraft Communications Addressing and Reporting System |
| ACS | American Chemical Society |
| ADP | Automated Data Processing |
| AERADNET | AErosols and RADiation Observing NETwork |
| AEROSE | AERosols and Oceanographic Science Expedition |
| AFWA | Air Force Weather Agency |
| AG | Access Grid |
| AGL | Above Ground Level |
| AGU | American Geophysical Union |
| AHPCRC | Army High Performance Computing Research Center |
| AIRS | Atmospheric Infrared Sounder |
| AL | Alabama |
| AMMA | African Monsoon Multidisciplinary Analysis |
| AMS | American Meteorological Society |
| AMSU | Advanced Microwave Sounding Unit |
| AOML | Atlantic Oceanographic and Meteorological Laboratory |
| AOT | Aerosol Optical Thickness |
| ARL | Air Resources Laboratory |
| ARM | Atmospheric Radiation Measurement |
| ARW | Advanced Research WRF |
| AQS | Air Quality System |
| ASL | Atmospheric Surface Layer |
| ASLO | American Society of Limnology and Oceanography |
| ASOS | Automated Surface Observing System |
| AUV | Autonomous Underwater Vehicle |
| AVHRR | Advanced Very High Resolution Radiometer |
| AWIPS | Advanced Weather Interactive Prediction System |
| AWOS | Automated Weather Observing System |
| BAMP | Howard University Beltsville Atmospheric Measurement Program |
| BBSS | Balloon Borne Sounding System |
| BLH | Boundary Layer Heights |
| BSRN | Baseline Surface Radiation Network |
| CAFAS | Careers in Fisheries, Aquatics, and Atmospheric Sciences |
| CAMx | Comprehensive Air Quality Model with Extensions |
| CAREERS | Channeling Atmospheric Research into Educational Experiences Reaching Students |
| CAPE | Convective Available Potential Energy |
| CASTNET | Clean Air Status and Trends Network |
| CB4 | Carbon Bond IV model |
| CBIV | Carbon Bond 4 mechanism |
| CB05 | Carbon Bond 2005 mechanism |
| CBL | Convective Boundary Layer |
| CCBay | Corpus Christi Bay |
| CCN | Cloud Condensation Nuclei |
| CE-CERT | Center for Environmental Research and Technology (University of California Riverside) |
| CFH | Cryogenic Frostpoint Hygrometer |
| CGD | Climate and Global Dynamics |
| CGU | Canadian Geophysical Union |

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|---|---|
| CICS | Cooperative Institute for Climate and Satellites |
| CISM | Center for Integrated Space Weather Modeling |
| CLM | Common Land Model |
| CM3 | Coordinated Mesoscale Measurements in Mississippi |
| CMAQ | Community Multi-scale Air Quality model |
| CMM5 | Climate MM5 Model |
| CMP | Conference Mentorship Program |
| COAMPS | Coupled Ocean-Atmosphere Mesoscale Prediction System |
| COASTB | Coastal Monitoring and Assessment Group B Reefs |
| CONFRRM | Cooperative Network for Renewable Resource Measurements |
| CoZOBs | Coastal Marine Zone Observations |
| CPAS | Cooperative Program in Atmospheric Sciences (UPRM) |
| CPC | Climate Prediction Center |
| CPS | Cumulous Parameterization Schemes |
| CPU | Central Processing Unit |
| CREST | Cooperative Remote Sensing Science and Technology Centers |
| CREWS | Coral Reef Early Warning System |
| CRTM | Community Radiative Transfer Model |
| CSC | Cooperative Science Center |
| CSWR | Center for Severe Weather Research |
| CTD | Conductivity/Temperature/Depth Instrument |
| CUNY | City University of New York |
| CV | Curriculum Vitae |
| CVS | Concurrent Version Systems |
| CRW | Coral Reef Watch |
| CWRF | Climate WRF |
| D | Democrat |
| DC | District of Columbia |
| DCPS | District of Columbia Public Schools |
| DDR | Direct to Diffuse Irradiance Ratio |
| DEQ | Department of Environmental Quality |
| DISORT | Discrete Ordinate Radiative Transfer |
| DCRM | Detailed Cloud Resolving Model |
| DIAR-BAR | Differential O2 Absorption Barometric Pressure Radar |
| DMR | Division of Marine Resources |
| DOD SMART | Department of Defense Science Mathematics & Research for Transformation Scholarship |
| DOE | Department of Energy |
| DOW | Doppler-on-Wheels |
| DRI | Desert Research Institute |
| ECSU | Elizabeth City State University |
| EF | Enhanced Fujita scale |
| EMC | Environmental Modeling Group |
| ENSO | El Nino/Southern Oscillation |
| EOC | Expanding Opportunities Conference |
| EOS | Earth Observing System |
| EPA | Environmental Protection Agency |
| EPIC | Equatorial Processes including the Coupling |
| EPP | Educational Partnership Program (NOAA) |
| EPPMSI | Educational Partnership Program (NOAA) with Minority Serving Institutions |
| EPIRM | Environmental Physics Inverse Reconstruction Model |
| EQB | Environmental Quality Board |

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|---|---|
| ERDC | Engineering Research and Development Center |
| ESA | European Space Agency |
| ESE | Environmental Sciences and Engineering |
| ESRL | Earth System Research Laboratory |
| EWX | Austin/San Antonio Region code for the Weather Forecast Office |
| FAMU | Florida A & M University |
| FGSEE | Future Geoscientists for a Sustainable Earth Environment |
| FL | Florida |
| FSOC | Field Systems Operations Center |
| FRRF | Fast Repetition Rate Fluorometry |
| FSIRP | Faculty and Student Internship Program |
| FTE | Full Time Employee |
| GCOS | Global Climate Observing System |
| GDAS | Global Data Assimilation |
| GFDL | Geographical Fluid Dynamics Laboratory |
| GIS | Geographic Information Systems |
| GLAS | Global Laser Altimeter S |
| GOCART | Georgia Tech/Goddard Global Ozone Chemistry Aerosol Radiation Transport Model |
| GOESPO | GOES Program Office |
| GOES | Geostationary Operational Environmental Satellites |
| GoHFAS | Goddard Howard University Fellowship in Atmospheric Sciences |
| GFS | Global Forecasting System |
| GLOW | Goddard Lidar Observatory for Winds |
| GMD | Ground-based Midcourse Defense |
| GPCP | Global Precipitation Climatology Project |
| GPA | Grade Point Average |
| GPI | Global Precipitation Index |
| GPS | Global Positioning System |
| GRUAN | GCOS Reference Upper-Air Network |
| GSFC | Goddard Space Flight Center (NASA) |
| GSM | Global Spectrum Model |
| GSPD | GOES Program Data |
| GUFMEX | GUlf of Mexico EXperiment |
| HBCU | Historically Black Colleges and Universities |
| HF | High Frequency |
| HU | Howard University |
| HUBRF | Howard University Beltsville Research Facility |
| HU IRB | Howard University Institutional Review Board |
| HURL | Howard University Roman Lidar |
| HUPAS | Howard University Program in Atmospheric Sciences |
| HYSPLIT | Hybrid Single-Particle Lagrangian Integrated |
| IAMA | International Aerosol Modeling Algorithms Conference |
| IAMAS | International Association of Meteorology and Atmospheric Sciences |
| ICCM | Canary Institute of Marine Sciences |
| ICE | Informal Science Education |
| IC-FAIM | Institutional Change through Faculty Advancement in Instruction and Mentoring |
| ICodEM | Icod Environmental Model |
| ICON | Integrated Coral Observing Network |
| IDAS-RAP | Diversity in Atmospheric Science through Research Application and Partnership |
| IPDDP | Individual Post-Doctoral Development Plan |
| IDV | Integrated Data Viewer |

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|---|---|
| IEEE | Institute of Electrical and Electronics Engineers, Inc. |
| IEO | Spanish Institute of Oceanography |
| IGARSS | International Geosciences & Remote Sensing Symposium IGRA Infrared Gas Analyzer |
| IHOP | International H2O Project |
| INTEX | Intercontinental Chemical Transport Experiment |
| IOAS-AOLS | Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface |
| IOPs | Intensive Observational Periods |
| IR | Infrared |
| ISCS | International Solar Cycle Studies |
| ISO | International Standards Organization |
| ISWS | Illinois State Water Survey |
| IUGG | International Union of Geodesy and Geophysics |
| JAN | Jackson, Mississippi - I Region code for the Weather Forecast Office |
| JCET | Joint Center for Earth Systems Technology |
| JCSDA | Joint Center for Satellite Data Assimilation |
| JISAO | Joint Institute for the Study of the Atmosphere and Ocean |
| JPL | NASA/Jet Propulsion Laboratory |
| JSU | Jackson State University |
| JSU-MET | Jackson State University Meteorology Program |
| JPSS | Joint Polar Satellite System |
| LA | Louisiana |
| LA-MS | Louisiana/Mississippi |
| LAPS | Local Analysis and Prediction System |
| LEAD | Linked Environment for Atmospheric Discovery Lidar |
| LIDAR | Light detection and ranging |
| LISA-QED | Laboratory for Interdisciplinary Statistical Analysis and Mathematics Learning through Quantitative Exploration of Data |
| LIX | New Orleans/Baton Rouge Region code for the Weather Forecast Office |
| LSD | Light Stress Damage (algorithm) |
| LSM | Land Surface Model |
| LST | Local Solar Time |
| LPASF | Laboratory of Atmospheric Physics Siméon Fongang |
| LW | Longwave |
| LWS | Living With a Star |
| MADIS | NOAA's Meteorological Assimilation Data Ingest System |
| MAS | Mississippi Academy of Sciences |
| MAST | Mississippi Academy for Science Teaching |
| MCC | Mesoscale Convective Complex |
| MECB | Marine Ecosystems and Climate Branch |
| MEMA | Mississippi Emergency Management Agency |
| Met | Meteorological |
| MD | Maryland |
| MDE | Maryland Department of the Environment |
| MDEQ | Mississippi Department of Environmental Quality |
| MEA | Malt Extract Agar |
| MFRSR | Multi-Filter Rotating Shadowband Radiometer |
| MHD | Magneto Hydro Dynamics |
| MISR | Multi-angle Imaging Spectro Radiometer |
| MMB | Office of Management and Budget |
| MMCR | Millimeter Cloud Radar |

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|---|---|
| MM5 | Mesoscale Model 5 |
| MODIS | Moderate Resolution Imaging Spectroradiometer |
| MODTRAN | Moderate resolution atmospheric Transmission |
| MP | Micro Physics |
| MPL | Micro-Pulse Lidar |
| MS | Mississippi |
| MS DMR | Mississippi Division of Marine Resources |
| MSI | Minority Serving Institution |
| MWR | Microwave Radiometer |
| NAAPS | Navy Automated Aerosol Prediction System |
| NAAQS | National Ambient Air Quality Standards |
| NAM | North American Model |
| NAME | North America Monsoon Experiment |
| NAQFS | National Air Quality Forecast System |
| NARR | North American Regional Reanalysis |
| NASA | National Aeronautics and Space Administration |
| NATO | North Atlantic Treaty Organization |
| NAVO | Naval Oceanographic Office |
| NCAR | National Center for Atmospheric Research |
| NCAS | NOAA Center for Atmospheric Sciences |
| NCAS-M | NOAA Cooperative Science Center in Atmospheric Science and Meteorology |
| NCCOS | National Centers for Coastal Ocean Science |
| NCDC | National Climatic Data Center |
| NCDDC | National Coastal Data Development Center |
| NCEP | National Center for Environmental Prediction |
| NCO | NOAA Computing Office |
| NCUR | National Center on Undergraduate Research |
| NCWCP | NOAA Centers for Weather & Climate Prediction |
| NDBC | National Data Buoy Center |
| NESDIS | National Environmental Satellite, Data & Information Service |
| NGIA | National Geospatial Intelligence Agency |
| NHC | National Hurricane Center |
| NIS | Network Infrastructure & Administrations |
| NMM | Non-hydrostatic Mesoscale Model |
| NOAA | National Oceanic and Atmospheric Administration |
| NOBCChE | National Organization of Black Chemists & Chemical Engineers |
| NoN | Nationwide Network of Networks |
| NOS | National Ocean Service |
| NRCS | National Resources Conservation Service |
| NREL | National Renewable Energy Lab |
| NRL | Naval Research Laboratory |
| NSF | National Science Foundation |
| NSSL | National Severe Storms Laboratory |
| NSTA | National Science Teachers Association |
| NWA | National Weather Association |
| NWS | National Weather Service |
| OAR | Office of Atmospheric Research |
| OCWWS | Office of Climate, Water, and Weather Services |
| OD | Optical Depth |
| OES | Oceanic Engineering Society |
| OGP | Office of Global Programs |
| OLR | Outgoing Longwave Radiation |

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|---|---|
| OMB | Office of Management and Budget |
| OOS | Office of Operational Service |
| OPDB | Operational Products Development Branch |
| ORA | Howard University Office of Research Administration |
| ORA | Office of Research & Applications (NESDIS) |
| ORAD | Office of Research Applications and Development |
| ORISE | Oak Ridge Institute for Science and Education Optical Depth |
| OSB | Ocean Surface Bundle |
| OS&T | Office of Science and Technology |
| PAR | Photosynthetically Active Radiation |
| PASCoR | Partnership for Spatial and Computational Research |
| PBL | Planetary Boundary Layer |
| PCR | Polymerase Chain Reaction |
| PDAS-RAP | Promoting Diversity in Atmospheric Sciences through Research Applications Partnership |
| PdN | Paseo del Norte Pegion |
| PI | Principal Investigator |
| PIERS | Progress in Electromagnetics Research Symposium |
| PM | Particulate Matter |
| PNE | PIRATA Northeast Extension |
| PPM | Piecewise Parabolic Method |
| PRWC | Puerto Rico Weather Camp |
| PSM | Ponce School of Medicine (Puerto Rico) |
| PSU | Pennsylvania State University |
| PPD | Planning and Programming Division |
| QBO | Quasi-Biennial Oscillation |
| QEM | Quality Education for Minorities |
| QPF | Quantitative Precipitation Forecasts |
| RAC | Research Advisory Council |
| RAD | Radar |
| RACM2 | Regional Atmospheric Chemistry Mechanism, Version 2 |
| RAS | Research Administration Services |
| RASS | Radio Acoustic Sounding System |
| RAAS | Reference Ambient Air Sampler |
| RAMS | Regional Atmospheric Modeling System |
| RCC | Riverside Community College |
| REBS | Radiation and Energy Balance Systems |
| Rep. | Representative |
| RFC | River Forecast Center |
| RHB | Ronald H. Brown |
| Rn | Net radiation |
| RMS | Root Mean Square |
| RS | Remote Sensing |
| RSM | Regional Spectrum Model |
| RSMS | University of Miami Rosenstiel School of Marine and Atmospheric Science |
| RSS | Rotating Shadowband Spectrometer |
| RTMA | Real-Time Mesoscale Analysis |
| SAR | Semi-Annual Report |
| SACS | Southern Association of Colleges and Schools |
| SACNAS | Society of Associated Chicanos, Native Americans in Science |
| SAHRA | Center for Sustainability of Semiarid Hydrology and Riparian Areas (University of Arizona) |

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| SAL | Saharan Aerosol Layer |
| SAQM | SARMAP Air Quality Model |
| SARMAP | SJVAQS/AUSPEX Regional Modeling Adaptation Project |
| SCDAB | Satellite Calibration and Data Assimilation Branch |
| SCEP | Student Career Experience Program |
| SDP | Student Development Plan |
| SeaWiFS | Sea-viewing Wide Field-of-View Sensor |
| SEC | Space Environment Center |
| SGP | Southern Great Plains |
| SJSU | San Jose State University |
| SLP | Sea Level Pressure |
| SMCD | Satellite Meteorology and Climatology Division |
| SMOKE | Sparse Matrix Operator Kernel Emissions model |
| SOARS | Significant Opportunities in Atmospheric Research & Science |
| SOSVRT | Successive Order of Scattering Vector Radiative Transfer model |
| SOW | Statement of Work |
| SPB | Science Plans Branch |
| SPC | Storm Prediction Center |
| SR | Southern Region |
| SRL | Scanning Raman Lidar |
| SSM/I | Special Sensor Microwave Imager |
| SSRB | Solar Surface Radiation Branch |
| SST | Sea Surface Temperature |
| STAR | Satellite Applications and Research |
| STC | Science and Technology Center |
| STEM | Science, Technology, Engineering and Mathematics |
| STP-M | Solar-Terrestrial Physics and Meteorology |
| SUW | Subtropical Underwater |
| SURFRAD | Surface Radiation Budget Network |
| SUNYA | State University of New York at Albany |
| SW | Shortwave |
| TCEQ | Texas Commission for Environmental Quality |
| TDL | Techniques Development Laboratory |
| TNRCC | Texas National Resource Conservation Commission |
| TOA | Top of the Atmosphere |
| TPIOP | Television and Infrared Observation Satellite |
| TRMM | Tropical Rainfall Measuring Mission |
| TRMM PR | Tropical Rainfall Measuring Mission Precipitation Radar |
| TUV | Tropospheric Ultraviolet and Visible model |
| TX | Texas |
| UCAR | University Corporation for Atmospheric Research |
| UIUC | University of Illinois Urbana-Champaign |
| UMBC | University of Maryland Baltimore County |
| UMCP | University of Maryland College Park |
| UMES | University of Maryland Eastern Shore |
| UMET | Universidad Metropolitana de San Juan |
| UND | University of North Dakota |
| UPRH | University of Puerto Rico Humacao |
| UPRM | University of Puerto Rico at Mayaguez |
| URC | University Research Center |
| US | United States |
| USA | United States of America |

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|---|---|
| USDA | United States Department of Agriculture |
| USDA SCAN | United States Department of Agriculture Soil Climate Analysis Network |
| UTC | Coordinated Universal Time |
| UTEP | University of Texas at El Paso |
| UV | Ultraviolet |
| UW/APL | University of Washington Applied Physics Laboratory |
| VAMD | Vice Admiral |
| VALIDAR | Validation LIDAR |
| Vis5d | Visualization of Large 5-d Grided Data Sheets |
| VIIRS | Visible Infrared Imaging Radiometer Suite |
| VOC | Volatile Organic Compounds |
| VRS | Visible Reflectance Spectroscopy |
| WBTP | Weather Broadcast Training Program |
| WFO | Weather Forecast Office |
| WMO | World Meteorological Organization |
| WRF | Weather Research and Forecast model |
| WSU | Washington State University |
| WTA | Western Tropical Atlantic |
| XBT | Expendable Bathythermographs |