

NOAA Center for Earth System Sciences and Remote Sensing Technologies

Education & Outreach

15 years in Retrospect and Future Ahead

Shakila Merchant
The City College of New York, NY
CICS Annual Science Meeting
College Park, MD
November 6, 2017

The 15 years of NOAA CREST accomplishments 2001-2016

UNIQUE DIMENSIONS: 15 YEARS OF EDUCATION AND OUTREACH

- **More than 700 students supported and trained in NOAA mission science**
- **77% Students** educated in NOAA-relevant remote sensing sciences are from **Underrepresented Minority Group**
- The City College of CUNY established a multidisciplinary Engineering and Science curriculum, with a focus on remote sensing, leading to a **Bachelor's degree in engineering or science; it was ABET accredited in 2010.**
- A **new Master's Degree in Earth System Science and Environmental Engineering** established with the **first class in 2012.**
- At HU, **a minor in Space, Earth and Atmospheric Sciences** was introduced, which subsequently resulted in the formation of an Atmospheric and Planetary Sciences department.
- **Extensive K-12 recruitment pipeline – High School Initiative in Remote Sensing of Earth System Sciences (HIRES) and Weather Camp** (partner with AmNH and NWS/Eastern Regional Office, NY);



UNIQUE DIMENSIONS: 15 YEARS OF EDUCATION AND OUTREACH

- More than 20 UG students successfully applied and received NOAA UG Scholarships and Hollings Scholarships from CCNY, HU and UPRM
- Increased NOAA collaborations (NWS/OHD, NOAA/OAR/ARL, NOAA/OAR/ESRL, NOAA/NESDIS/STAR & NCWCP)
- Increased publication by the student authors
- More than 5 students went on NOAA Cruise for Ocean Color mission studies
- Decreased withdrawal rates of 16 students (FY 2011) as compared to the past funding cycle 47 (FY 2001) and 39 (FY 2006) - evidence of the best practices (IERP, NOAA-SSIO/NERTO and STSS)
- Successfully trained two postdoctoral scientists – Dr. Daniel Comarazamy - NESDIS/STAR federal contractor now consultant in DC, and Dr. Soe Hlaing is a Patent Officer with Dept. of Commerce, US Patent Office (USPTO), Boulder, CO.
- Successfully created K12 initiatives such as HIRES (www.crest.cuny.edu/hires) and STEM ELL afterschool program serve as a good HS to college recruitment and pipeline imitative
- Initiated CREST Undergraduate Research Experience (CURE) - a center wide summer research opportunities for UG students



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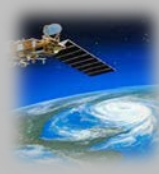
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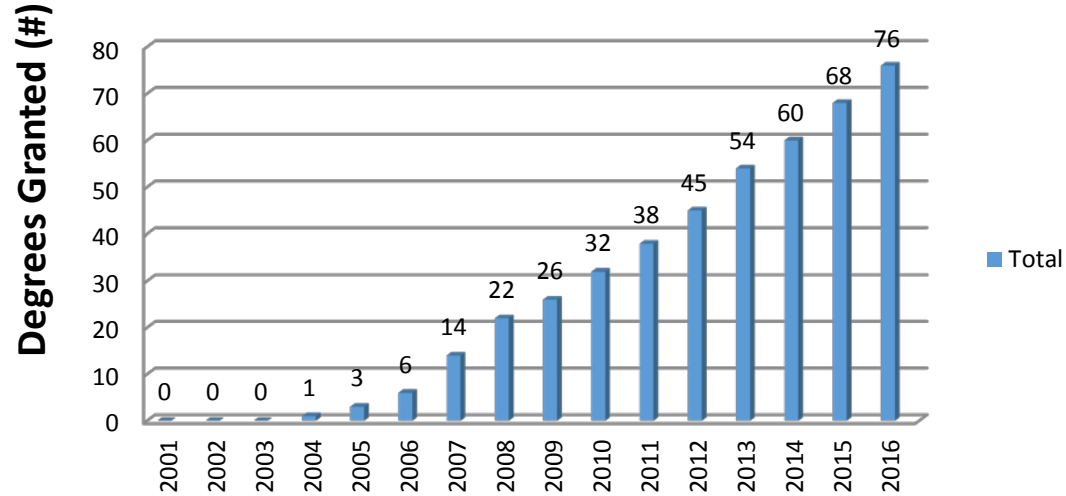
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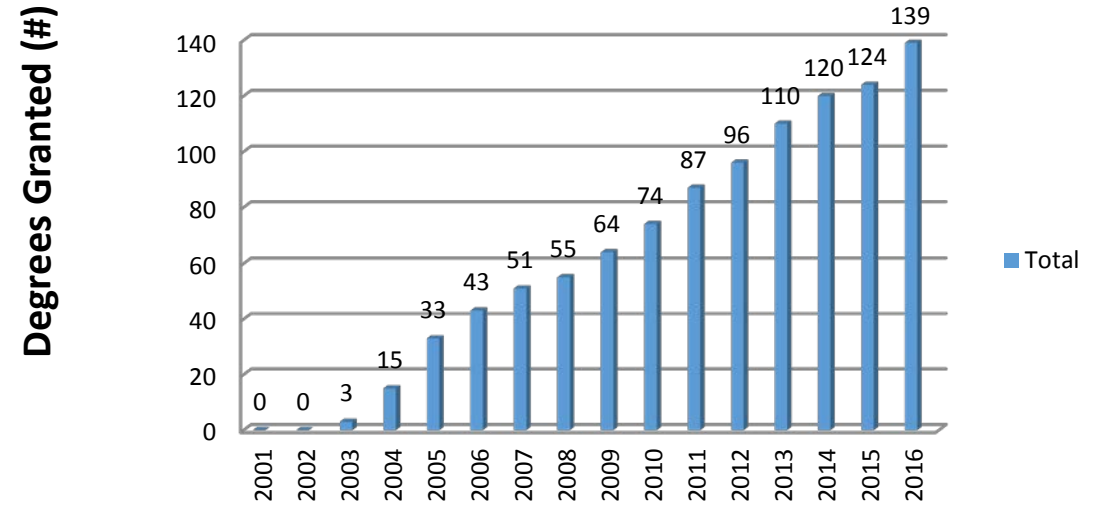
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Educational Performance

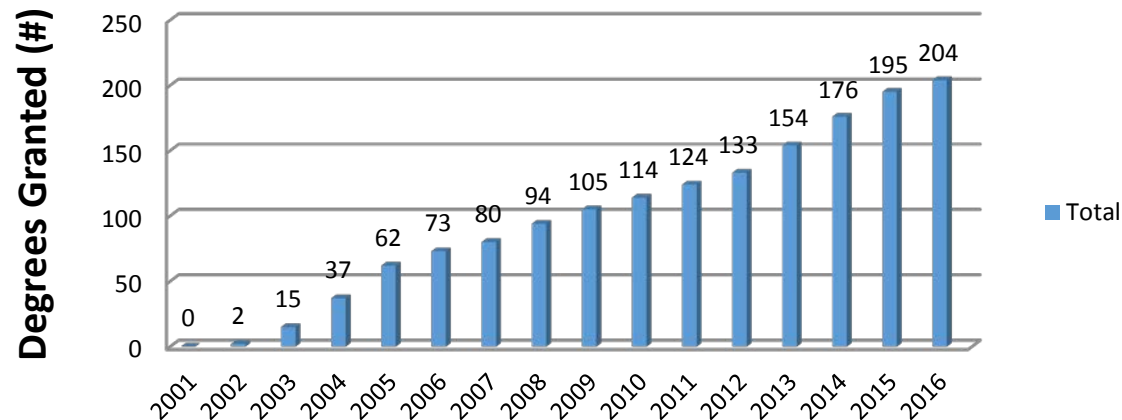
Doctoral Degrees Granted 2001-2016



Master's Degrees Granted 2001-2016

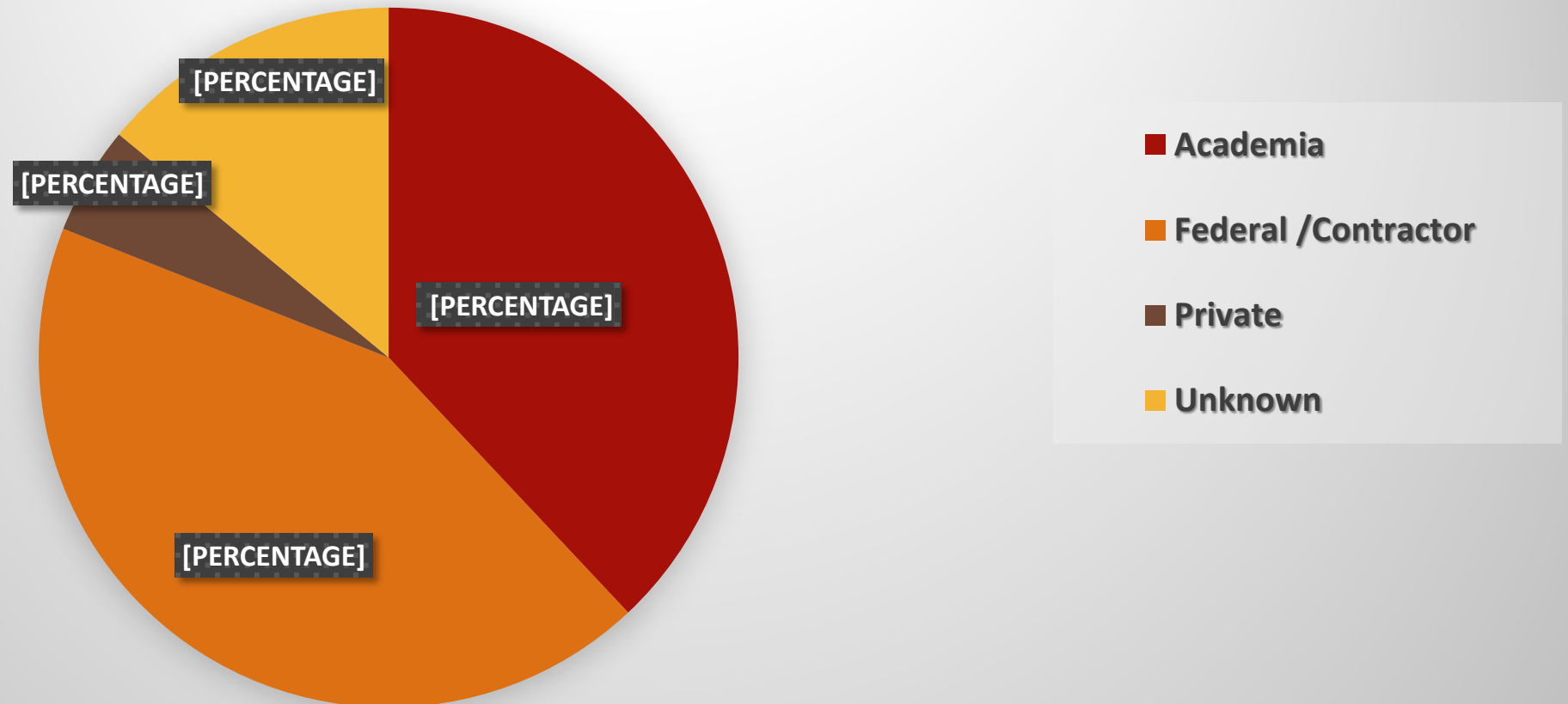


Undergraduate Degrees Granted 2001-2016



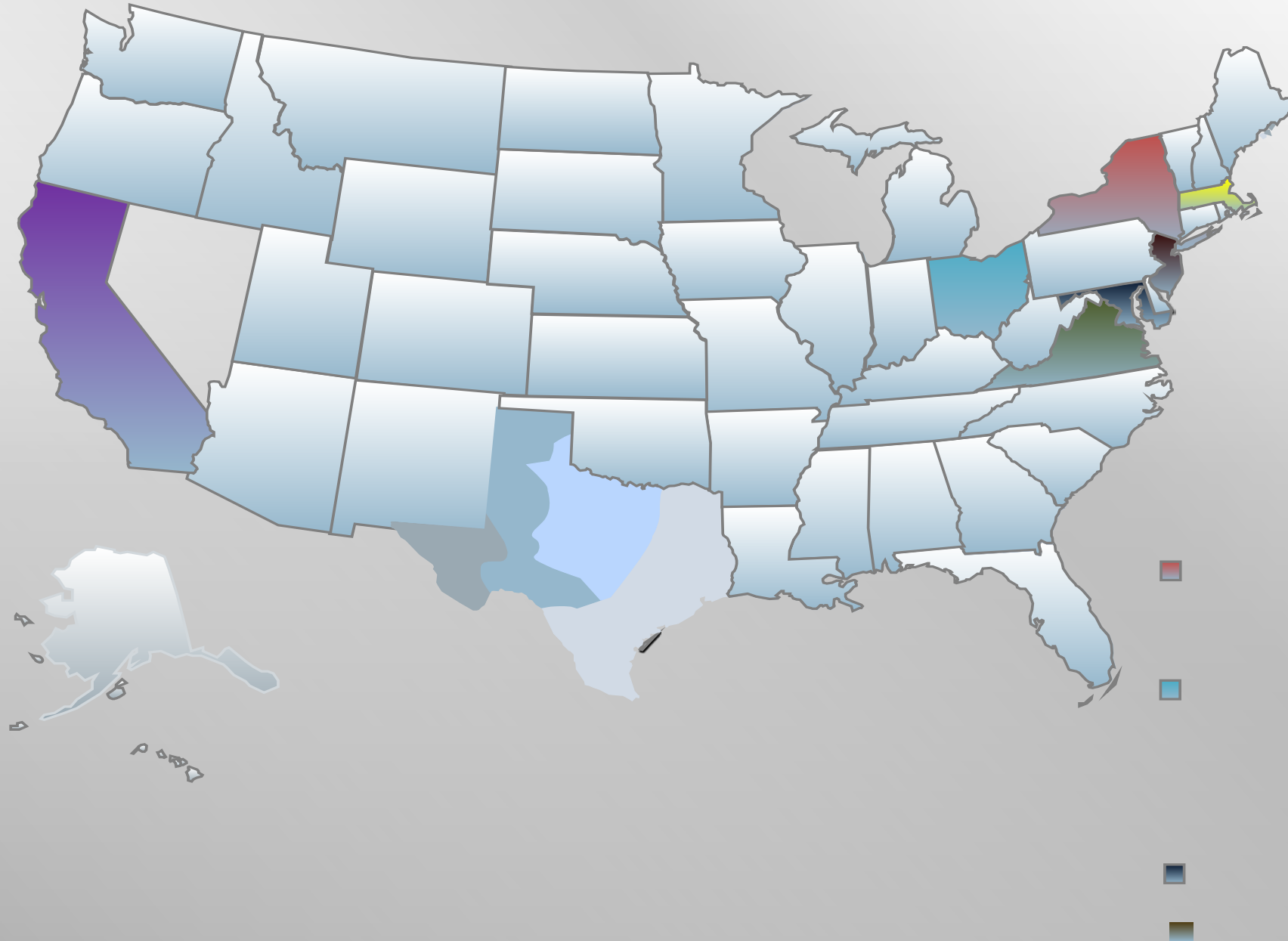
CREST Education Highlights

Post graduate tracking of CREST supported PhD Students (2011-2016)



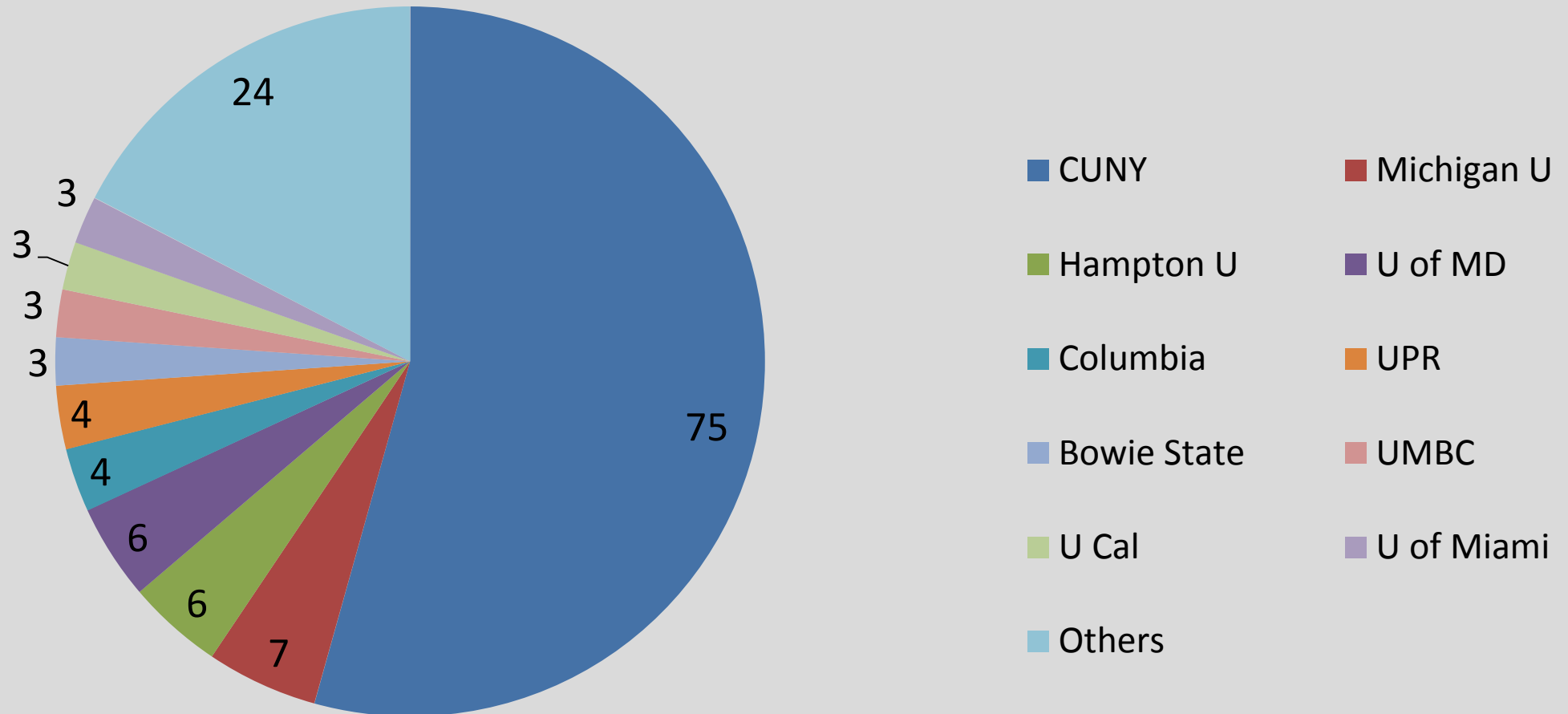
167 Students graduated (91 direct support and 76 Leveraged)
35 NOAA-Collaborators || 69 CREST Faculty

CREST Graduate (2011-2015) Workforce by Region



CREST Education Highlights

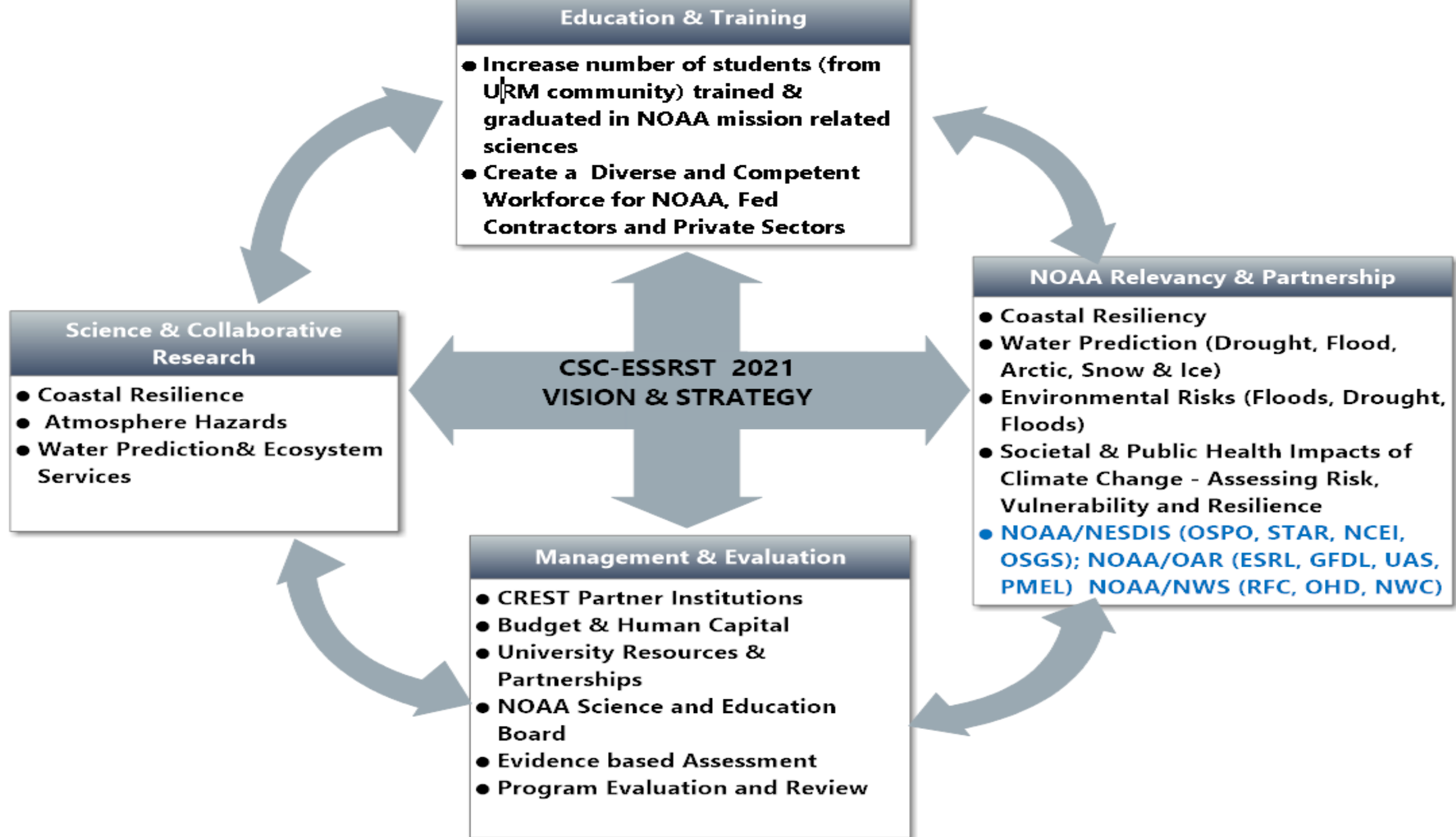
**CREST Graduates who are pursuing higher degrees
(State-wise breakdown)**





CENTER FOR EARTH SYSTEM SCIENCES
AND REMOTE SENSING TECHNOLOGIES

**The New (Institutional) Award
Center for Earth System Sciences and
Remote Sensing Technologies
2016-2021**



NOAA GOAL #2: Supporting and Strengthening Societal Decision-Making

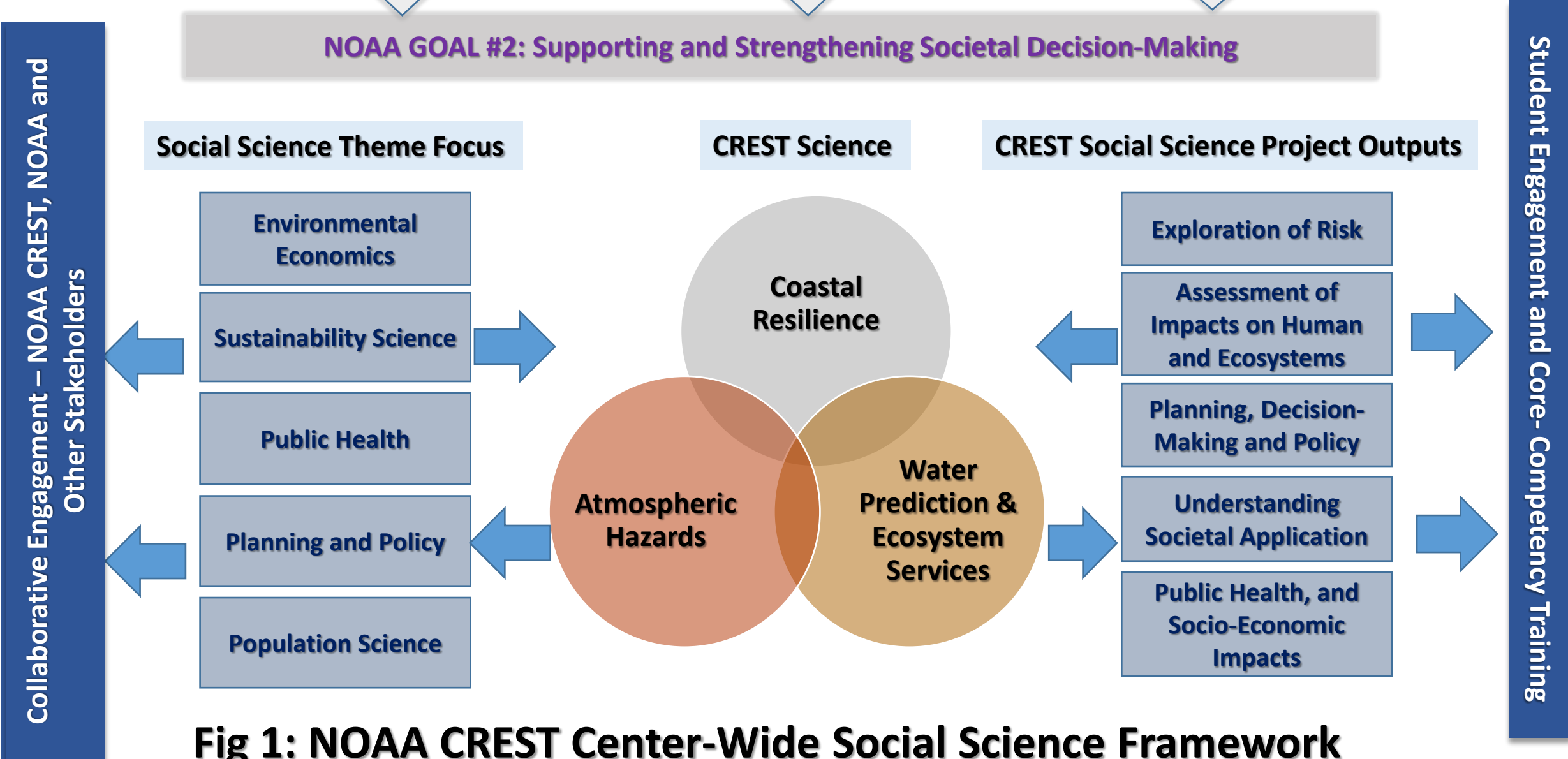
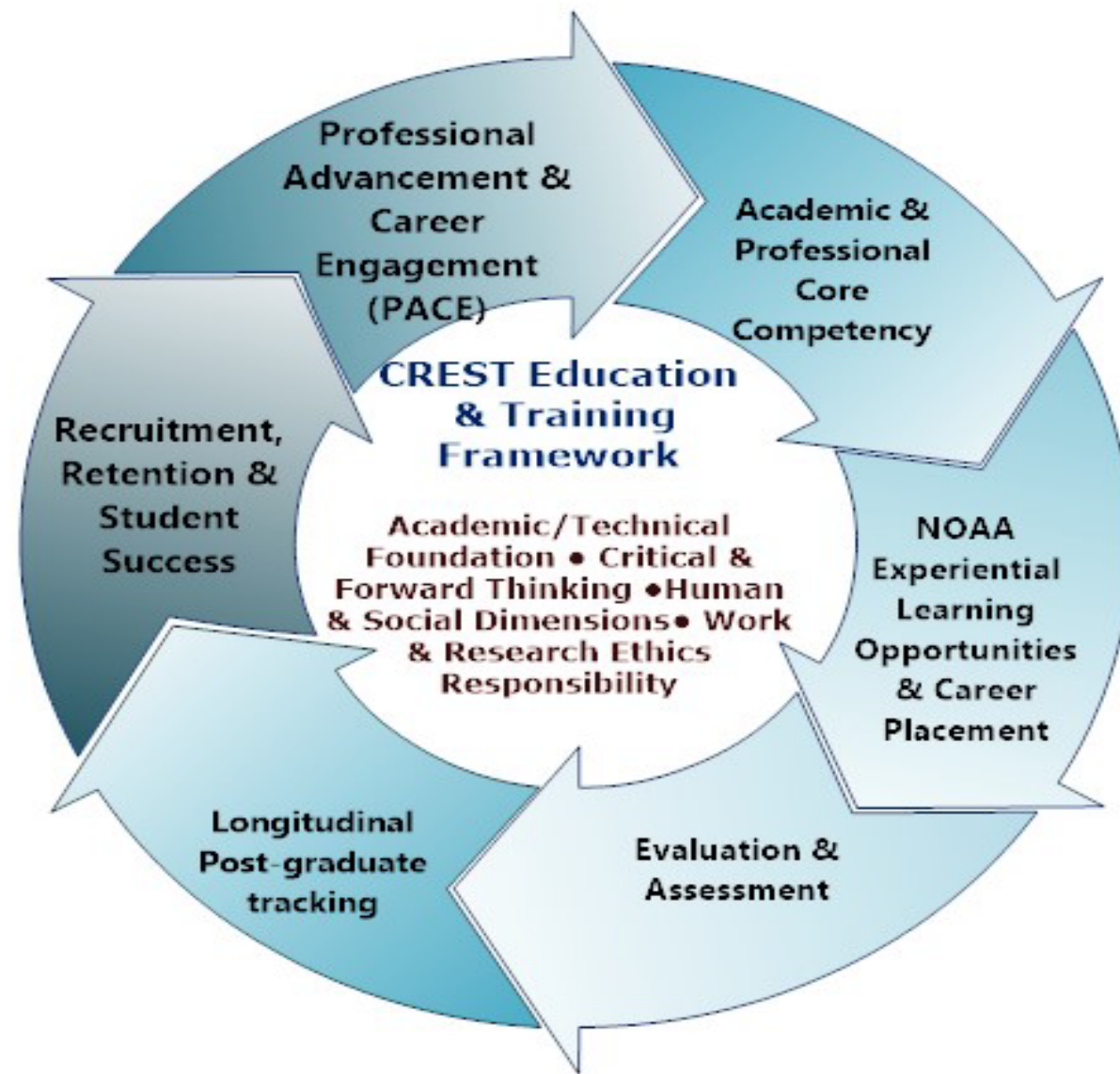
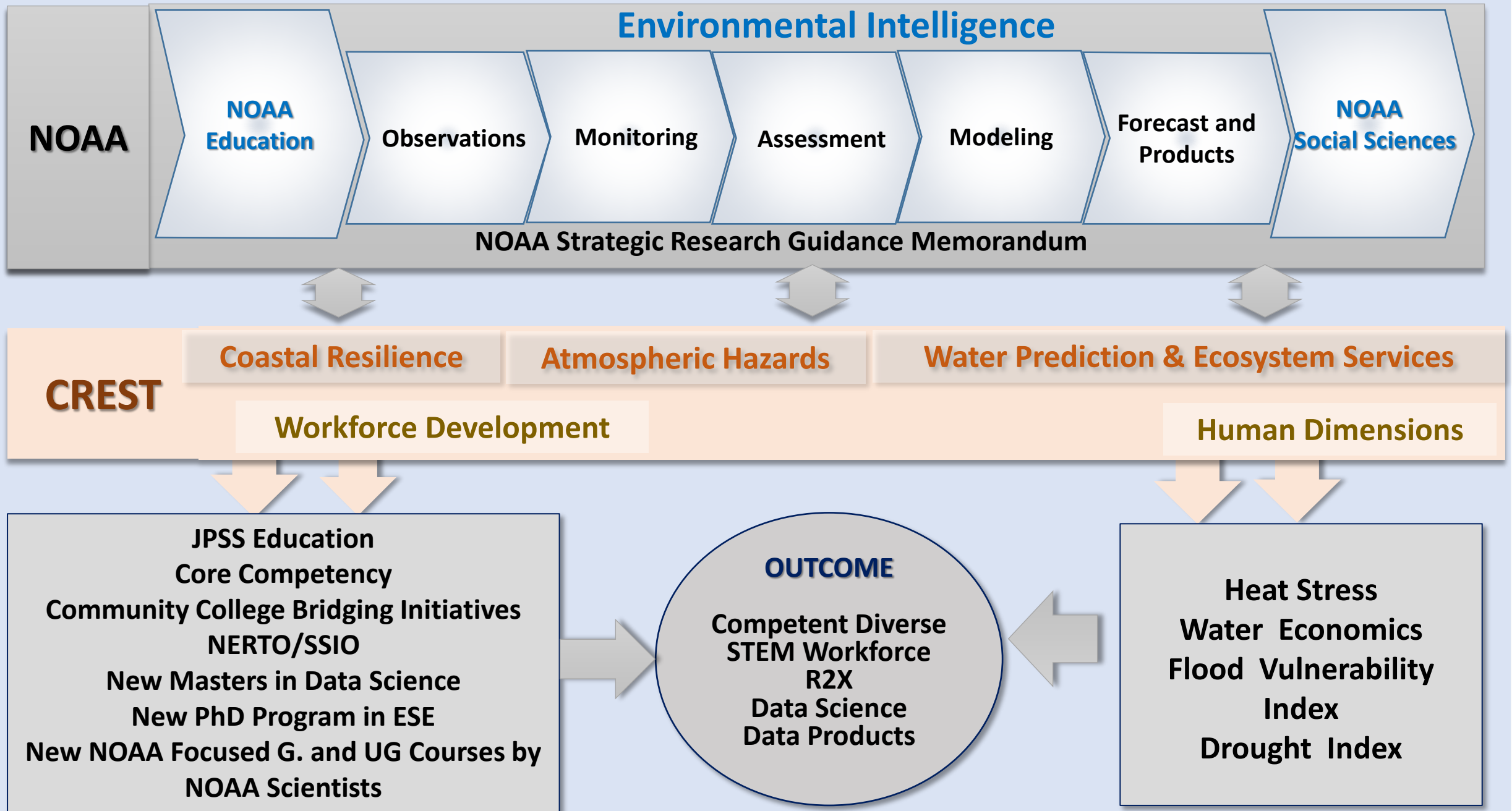


Fig 1: NOAA CREST Center-Wide Social Science Framework

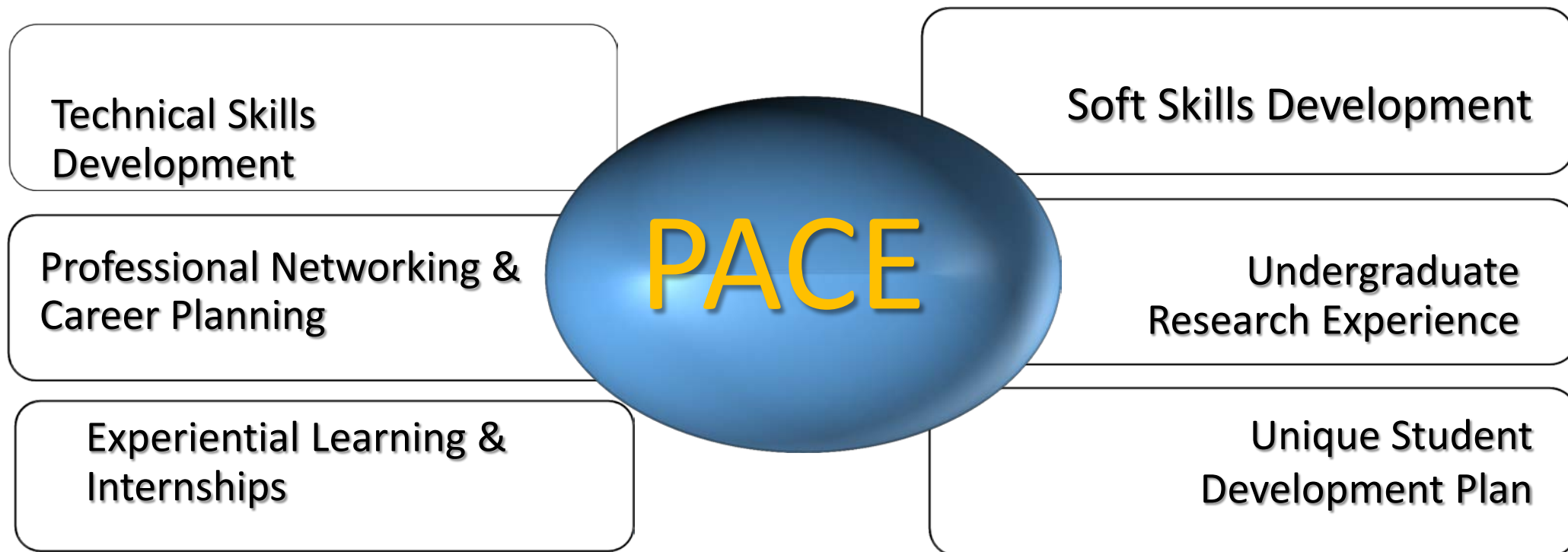


Center-Wide Education & Training Framework

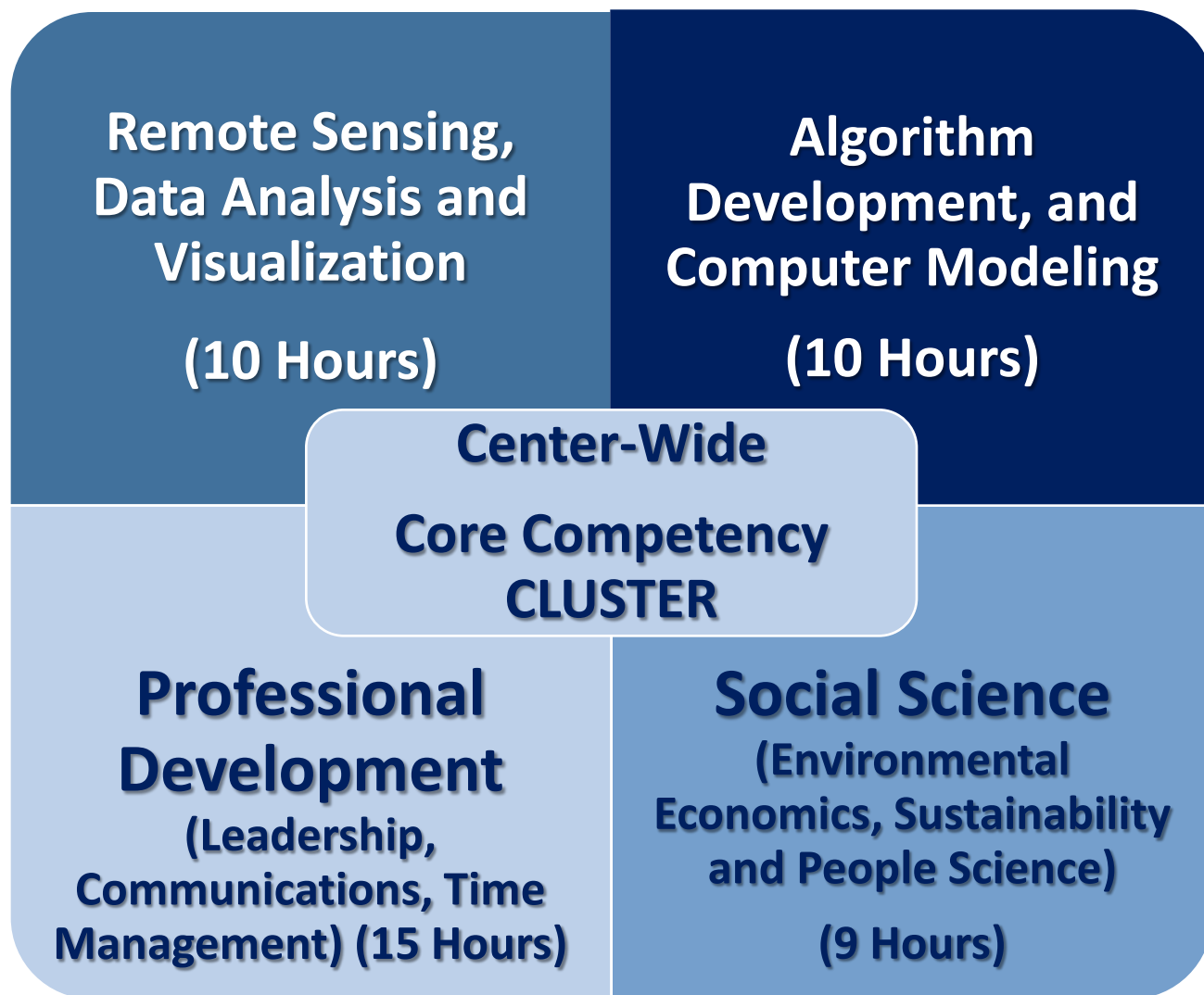
CREST Concept of Operation



CREST Education Holistic Model



Professional Advancement Career Engagement (PACE)



Center Wide Core Competency CLUSTER





NY City-Wide K12 Network

High School Initiative In NOAA Mission related Sciences

- HIGH SCHOOL INITIATIVE IN REMOTE SENSING OF THE EARTH SYSTEMS SCIENCE & ENGINEERING (HIRES)
- 3 college credit bearing summer program
- 7 weeks program with 70 hours of authentic research in CCNY/CREST research labs
- CUNY CREST works with more than 40 schools in NY metropolitan region
- One of the 14 consortium partner with AmNH
- **More than 250 students engaged so far since 2007**



CREST OUTREACH

High School Engagement:

Weather Camp, CCNY

- Partnership with NWS office in Long Island, presenters from NBC, NASA-GISS, NSSL, Lamont-Doherty Earth Observatory
- More than 100 campers served since 2009 50% from minorities underserved in STEM areas

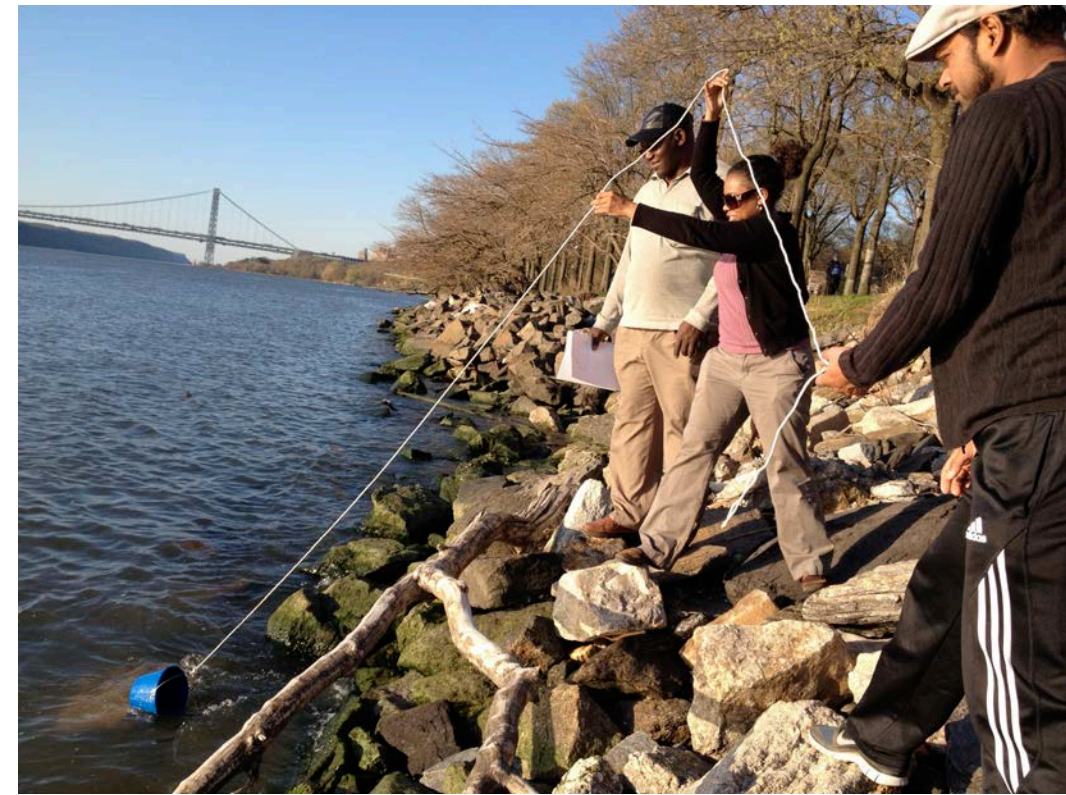


CREST OUTREACH

K-12 Teacher Knowledge and Pedagogies:

Teacher Training: Title II Math Grant, CCNY

- Cycle of 3-credit summer courses for teachers to **improve connections between Math and Science**
- Funded by NYC DOE
- Includes development of math tasks during academic year
 - 1 semester Meteorology (3 Credits)
 - 1I semester Remote Sensing(3 Credits)
 - 1II semester Environmental Assessment (3 Credits)
 - Erosion and water management*
 - Air and water quality measurement*
 - Precipitation monitoring*
 - Global climate change*



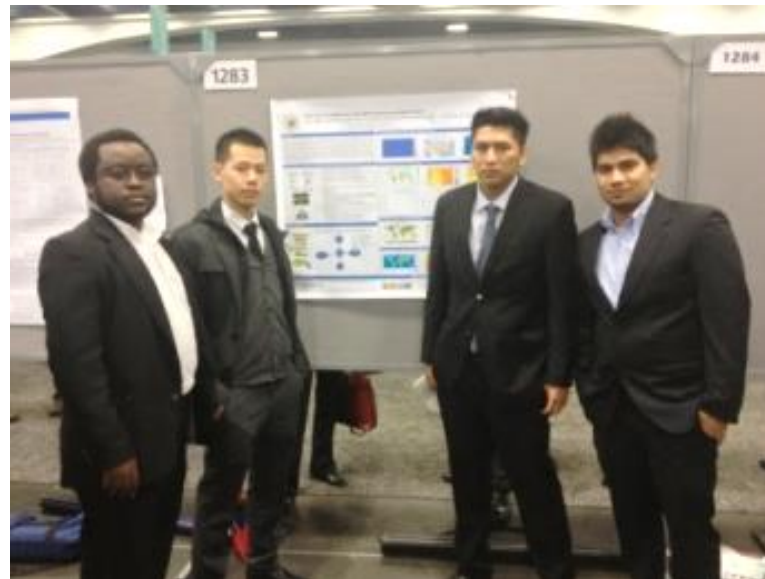
**More than 200 teachers
outreached through professional
development seminars and
workshops and training**

Annual Summer Research Symposium

- Students participate in a research symposium at the end of the summer along with other high school and undergraduate research interns from across CUNY and New York.
- Oral and Poster presentation
- A great experience to network and showcase summer research by more than 200 summer interns across New York City.



CREST Undergraduate Research Experience



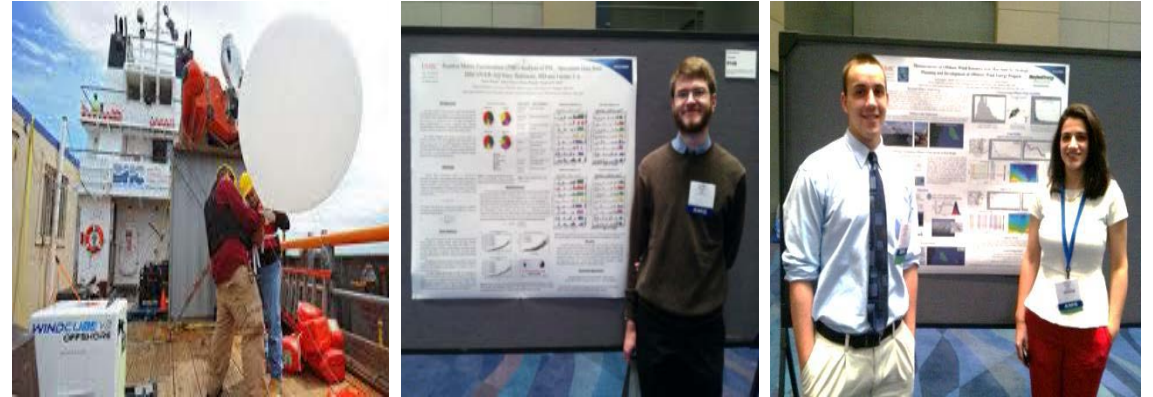
CREST OUTREACH

Undergraduate Engagement at other CREST partner institution)

CREST Undergraduate Research Experience (CURE)



At Hampton University



At University of Maryland, Baltimore County



At University of Puerto Rico, Mayaguez

VADM Lautenbacher Annual Public Service Scholarship



Stephen Escarzaga is a UTEP alumnus who earned his bachelor's degree in science.

As part of his graduate studies, he will research satellite and ground-based remote sensing techniques to measure coastline changes in the Arctic.

To fulfill part of the scholarship's service requirement, he will spend the summer conducting education and outreach in the predominantly Native American community of Utqiagvik (formerly Barrow), Alaska, where his students will be introduced to basic applications of remote sensing first hand.

NOAA Satellite Conference, July 17-20, 2017, The City College of New York, NY



JPSS – Students Professional & Academic Readiness with Knowledge in Satellites (JPSS-SPARKS)

NOAA JPSS Program, Greenbelt, MD

NOAA-Cooperative Remote Sensing Science & Technology (CREST)

IMSG, Inc. JPSS Program, University of Maryland, College Park, MD

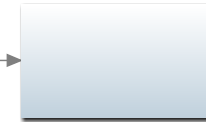
A unique Partnership between Federal, Academia and Private Sector in Diversity and Inclusion Initiative



David Melecio-Vazquez,
PhD Candidate, Mech.
Engineering



Cassandra Calderon,
Masters Student, Earth &
Atmospheric Sciences



Elius Etienne, PhD
Candidate, Civil
Engineering



Ivan Valerio, Masters
Student, Electrical
Engineering

Future Ahead....

- Strengthen partnership with Cooperative Institutes – CICS, CIRA, CIMSS
- Help increase students NOAA core competency training to advance NOAA workforce strategic plan
- NOAA Social Science Integration across the center
- Explore more collaborative opportunities across NOAA and other academic partners and private sector.