

# Unidata Community Equipment Awards Proposal Cover Sheet

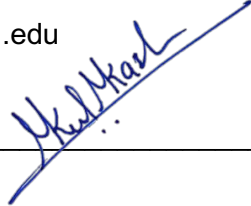
Proposal Title: Enhancing Computing Accessibility in the Atmospheric Science Program at Howard University

Date: March 15, 2023

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03/14/2023

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# Enhancing Computing Accessibility in the Atmospheric Science Program at Howard University

## I. Project Summary

The project aims to rebuild a computer lab on campus for students at Howard University to access computing resources (e.g., various datasets via Unidata and high-performance computing at NCAR). The Howard University graduate program in Atmospheric Science (HUPAS) has been established in 1997. Since its inception, hundreds of African American and Latinx graduate and undergraduate students have graduated from HUPAS. The current existing PC desktops are much outdated and have become a barrier for students to use or try to perform any meaningful tasks.

In order to enhance the accessibility of data and computing resources for students in HUPAS, it is vital that we provide our undergrad and graduate students with what they deserve and what they need to achieve the full reach of their potential at Howard University. The new computer lab will also improve the learning and research environment for our students on a daily basis. The intended applications of the new equipment include the traditional atmospheric science curriculum, such as weather and climate (IDSD 183), synoptic meteorology (ATMS 523), remote sensing (ATMS 570), numerical weather prediction (ATMS 572), special topics on data analysis (ATMS 590). This proposal is about rebuilding the computer lab to improve access to technology for our students and ensure that they have the resources they need to succeed. Overall, the proposed new computer lab will be a reflection of our investment in those students at Howard University.

## II. Project Description

### A. Goals of the Project

The primary objective of rebuilding the computer lab is to improve the Howard University graduate program in Atmospheric Science (HUPAS) students' access to modern and cutting-edge computing technology. HUPAS is an advanced degree-granting interdisciplinary program offering the Master of Science (MS) and Doctor of Philosophy (Ph.D.) degrees in atmospheric sciences. The Howard University Board of Trustees established HUPAS in 1997. Hundreds of African American and Latinx graduate and undergraduate students have graduated from HUPAS. HUPAS emerged as an exemplar in realizing Howard's mission by providing students with exceptional experiences and attracting a cadre of strong, socially responsible scholars and educators.

In last few years, computation has become an essential part of meteorology and atmospheric sciences within HUPAS courses that blend advanced atmospheric theories, meteorological instruments, and have gained immense popularity among students at Howard. Existing courses offered by HUPAS involve computation that uses some of the popular Unidata products (MetPy, IDV and NETCDF). However, the existing PC desktops at HUPAS are more than 10 years outdated and have become a barrier for students to use or perform meaningful tasks. They significantly impact the productivity and performance of students and faculties. The

computers have slower processing speeds and take longer to perform tasks such as loading programs, opening metadata files, or accessing the web interface. These computers are also not compatible with new software and applications. Oftentimes they crash when users attempt to run multiple programs. The existing computers also have limited storage capacity, which leads to a need for more space for users to store and access instrument datasets, simulation output files, and other databases. This results in reduced performance and difficulty in accessing files when needed. These issues make it difficult for students to complete assignments, conduct research, and specially gain access to valuable online Unidata resources and utilize it to the fullest. It is also difficult for professors to incorporate digital tools and resources into their teaching methods. As technology continues to play an important role in atmospheric science courses, it is critical that HUPAS provides students with access to up-to-date and reliable upgraded computing resources. HUPAS needs a dedicated modern computer laboratory for teaching and students to access Unidata software and perform training and research-related work.

The proposed new computer laboratory will benefit all classes offered by HUPAS that will utilize Unidata products for instructional purposes including Weather and Climate (IDSD 183), Global Climate Change (IDSD 180), Synoptic meteorology (ATMS 523), Remote Sensing (ATMS 570), Numerical Weather Prediction (ATMS 572), Special topics on data analysis (ATMS 590). Moreover, this computer lab will be an alternative platform for students to access NCAR computing resources. In the past, students were not always able to access Unidata software (IDV, AWIPS, and McIDAS) for their research or coursework or not be introduced with the data and computing resources at NCAR. It certainly poses serious disadvantages for students and instructors in the program.

This new computer lab will be housed in the Howard University Beltsville Campus (HUBC) and will be widely used by students and faculty members. We specifically intend to increase the number of available computers, upgrade outdated software and hardware, and ensure that the lab is equipped with cutting-edge technology. In addition, we hope to make the lab a more comfortable and conducive environment for studying and research work. One of the goals of HUPAS is to train underrepresented students for the next generation forecasters, researchers for different agencies, or the private sector. We anticipate that the new equipment will enhance our overall capabilities in teaching, training, and research as well as in Unidata community participation.

## **B. Project Activities**

A computer lab with advanced computing facilities will be setup in a multi-purpose room. At this moment, courses within HUPAS are using meeting rooms or conference rooms in several different locations on campus. Since Howard University has all campus activities in-person since Fall 2022, it is anticipated that with this new computer lab, all teaching activities can be done in this one class/computer lab room. On average we have 5 to 10 students in a typical class. The proposed 5 highly advanced PCs within linux installed will empower students and faculty to effectively and efficiently use range of Unidata products. These computers will contain many essential atmospheric science products such as AWIPS, MetPy, IDV, WRF, and HYSPLIT. Students may use specific software for tasks such as data analysis, programming, or graphic design, depending on their course of study. The proposed computers, equipped with one of the latest Intel i9 processors, 32 GB RAM, and large storage memory, can handle these tasks quickly

and efficiently, making it easier for students to complete their coursework and research assignments.

Because of the large amount of data available from various sources such as satellites (GOES-17, 18), radars, and National Centers for Environmental Information (NCEI) datasets across the country, the use of machine learning techniques with various data analysis is becoming increasingly essential in atmospheric sciences and meteorology. The proposed next-generation workstations will assist HUPAS faculty and researchers in developing new algorithms, particularly in machine learning. For example, regression analysis can be used to predict global temperature changes based on historical data, and neural networks can be used to predict weather patterns based on historical data. It will also provide HUPAS undergraduate and graduate students with valuable exposure to machine learning.

Additionally, students may access this computer lab to run a jupyter notebook and to access NCAR HPC if their own laptop cannot handle large volumes of data or run long lasting scripts or such. Students in HUPAS are conducting all different types of research projects related to data processing and numerical modeling. To keep up with these ever-increasing datasets, this improved computer lab will require ample storage for data and software. Hence the proposed Network Attached Storage (NAS) that will be connected to a network, allowing multiple users to access and share data. For instance, the HU Beltsville Campus and the Interdisciplinary Research Building (IRB) at the main campus have advanced laboratory space including atmospheric research laboratories, roof-top instrumentation (e.g., Halo Streamline XR Doppler LiDAR, Vaisala ceilometer (CL61), sun photometer, in situ WS and WD and aspirated Temp shield Pyranometer microwave radiometer, disdrometer, and NO<sub>2</sub> Gas Analyzer. This data server will be used to provide a centralized location for sharing and managing datasets, which will make it easier for students, researchers/faculties, and other Unidata community members to access and share information. This will improve student-faculty research collaboration and increase productivity. With a computer lab on campus, students will be able to access this facility whenever they need to.

The proposed large screen/monitor will make it easier for everyone in the computer lab to see the class presentations, no matter where they are sitting. It will not only help capture the attention of the students during the class, but also keep them engaged throughout the presentation. Large screens can display a variety of visualizations, such as satellite images, radar data, or graphics generated by AWIPS, Weather Research and Forecasting (WRF), and other models. This will enable students to see the data in a more tangible way, which can help them better understand complex atmospheric phenomena. Students can analyze data, interpret models, or create presentations, promoting group work and collaboration. This large screen will also be used to display real-time weather updates, such as the most recent radar images or satellite data. This can help students and faculty keep up with changing weather patterns and better understand how weather patterns evolve over time.

### **C. Resources Requested**

The proposed equipment consists of 5 desktops that are suitable for running software packages based on the Unidata recommendation.

HP Workstation Z2 G9 - Wolf Pro Security - tower - Core i9 12900 2.4 GHz - with following specifications:

- Win 10 Pro 64-bit
- Intel Core i9 12900K / 2.4 GHz
- RAM 32 GB and SSD 1 TB
- UHD Graphics 770

One LG 55 4K Conference Room Monitor

One Buffalo TeraStation NAS with following specifications:

- 16GB RAM
- 48TB (3 x 16TB) of Seagate Ironwolf PRO NAS Drives

## **D. Information Technology Support Available**

The Howard University Enterprise Technology Services (ETS) will be the main point of contact for handling hardware and software issues. The PI will be the main conduit for instructors and students for the computer lab. ETS will provide technical assistance and support for a wide range of technology-related issues. They will also provide advice and guidance on how to protect against cyber threats and data breaches.

## **III. Benefits for Education, Research and Potential Community Benefit**

Upgrading our existing computer facility is essential to keep up with the rapid pace of technological advancements. The upgraded computing resources will allow both in-house (Howard University) and visiting researchers to conduct their research more efficiently and effectively. Researchers can analyze observational and model data faster, resulting in more accurate and dependable research results. In addition to regular courses, HUPAS also provides students with in-depth knowledge and prepare them for meteorological careers by offering summer weather camps and hands-on instruments and ozonesondes/radiosondes training. The upgraded computer facility will enable students and interns to access cutting-edge technology, enhancing their learning outcomes. The enhancement will also improve student and faculty collaboration.

Several meteorological and remote sensing instruments at the HUBC and IRB sites generate massive amounts of data, and managing this data is critical to the success of the research projects. Our research team also works on weather modeling and data assimilation. A data server is a powerful tool that can assist us in managing, storing, and securely sharing this data with the larger scientific community. The Unidata Equipment Grant will enable us to purchase a new data server. This data server can serve as a secure storage location for HU researchers and collaborators' observed and model datasets. Data can be regularly backed up to avoid loss

due to technical failures, or other unforeseen events. It will also provide a platform for HU researchers to share their data with the community, increasing the impact of their research and facilitating collaborations with researchers from other institutions, resulting in faster scientific discovery and better research outcomes. Investing in a data server will pay off in the long run by improving research outcomes, attracting new community researchers, and positioning HU as one of the leaders in atmospheric sciences research.

## 2. Budget

The budget request covers equipment cost only as per the Unidata guidelines. The total requested fund for this proposal is \$ 12,906.87. The total indirect costs: \$7034.

Items	Quantity	Unit Cost (\$)	Total Cost (\$)
HP Workstation Z2 G9	5	1882.25	9411.25
LG55 LED Conference Monitor	1	807.84	807.84
Buffalo TeraStation 6000	1	2687.78	2687.78

## Project Milestones

The proposed equipment will be ordered as soon as possible prior to the Summer 2023 semester. All necessary software will be installed in the new computers so that they are ready for use by students in the fall of 2023. The conference room monitor will be installed on the wall before the start of the semester, and the Synology NAS rack station will be installed and configured in early summer 2023, ready to serve the Unidata community in Fall 2023.

# Equipment Quotes



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7 Items




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Enter CDW# or MFG#

ITEM	AVAILABILITY	PRICE	QUANTITY	ITEM TOTAL
 <b>Buffalo TeraStation 6000 Series 48TB Network Attached Storage Server</b> MFG Part: TS6400RN4804 CDW Part: 7260787 UNSPSC: 43201835	<b>4-6+ Weeks</b> Expected in-stock date for this item is between 4-6 weeks. Item will ship once it is in stock.	<del>\$2,905.71</del> <b>\$2,687.78</b> E&I CNR01439 Catalog	1 <input type="text"/>	<b>\$2,687.78</b>
 <b>LG 55UR340C9UD UR340C Series - 55" LED-backlit LCD TV - 4K - for digital si</b> MFG Part: 55UR340C9UD CDW Part: 66803590 UNSPSC: 52161505	<b>In Stock</b> Orders placed today ship tomorrow by a CDW partner	<del>\$864.00</del> <b>\$807.84</b> E&I CNR01439 Catalog	1 <input type="text"/>	<b>\$807.84</b>
 <b>HP Workstation Z2 G9 - Wolf Pro Security - tower - Core i9 12900 2.4 GHz -</b> MFG Part: 6H912UT#ABA CDW Part: 6941178 UNSPSC: 43211515	<b>Item Backordered</b> This item will ship once it is in stock.	<del>\$9,923.92</del> <b>\$1,882.25</b> E&I CNR01439 Catalog	5 <input type="text"/>	<b>\$9,411.25</b>

### Order Summary

**Subtotal: \$12,906.87**

Tax and Shipping calculated at checkout.

**Lease Option Pricing**   
\$362.55 / Month

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## Howard University Budget Narrative

### Personnel

#### *Salaried Personnel*

**Dr. Haydar Kurban** serves as Principal Investigator and spends 13% of his time each summer for 3 summers to ensure the successful execution of all aspects of the research project. He will be the lead data analyst.

**Dr. Omari Swinton** serves as Co-Principal Investigator contribute his services and expertise to the project during each of 3 summers in support of all aspects of the project.

#### *Wage Personnel*

A program assistant (TBD) will provide a range of support for the PIs and subcontractor personnel during intensive surveying periods at a rate of \$20/hour for 200 hours/year (600 hrs \* \$20 = \$12,000).

### Benefits

**The fringe benefit rates** stated in the budget are federally negotiated rates, US HHS is cognate agency.

### Supplies

Office supplies and related items are estimated at \$100/month throughout the project.

6 tablets, SAMSUNG Galaxy Tab A8 10.5" 32GB Android Tablet @\$175=\$1,050, for the use of surveyors conducting interviews/surveys

32 sets of monitoring devices (particulate, CO<sub>2</sub>, CO, humidity, and other hazards as determined in partnership with DOEE) @ approximately \$550/set = \$17,600 (in addition to those provided by GW subcontractor).

### Local Travel

Reimbursement for surveyors for local travel by surveyors' private vehicles to various buildings throughout the life of the project @\$0.655 per mile (2023 federal rate). This sum will support a total of 763 miles of local travel.

### Consultants

An expert (Dr. David Jacobs) in IAQ monitoring devices and related engineering questions will be brought in throughout during the first 2 years of the project to provide expert advice on air quality monitoring and electrification @\$150/hour x 100 hours = \$15,000.

### Participant Costs

**Stipends** An advanced graduate student will be used especially in the summer and one semester for each of three years to help lead and carry out surveys, survey analysis, focus group support, focus group analysis, and statistical analysis in an apprenticeship training relationship with the Principal Investigator and other key personnel. The standard annual stipend rate for advanced graduate students is \$28,000/year, reduced to \$19,000/year for this project (\$57,000). Other advanced students will conduct interviews and receive training as part of their curricular activities during the 1<sup>st</sup> and 3<sup>rd</sup> years of the



project and will receive stipends @ \$5,000 per year for 6 students for years 1 and 3 = 2 x 6 x \$5000 = \$60,000. Total student stipends are \$117,000

**Subcontracts (2)**

**1. George Washington University**

**Dr. Janet Phoenix** (key personnel) will serve as Principal Investigator of the subcontract to George Washington University and is a leader of the research team. She will provide 15% of her time over the course of the 3-year project. She will supervise surveyors and the community navigator. The community navigator will be paid \$25/hour to assist with accessing, recruiting, and interviewing/surveying households for the survey work throughout the 3 years of the project.

George Washington University 3 Year Budget								
Personnel		Institutional Base Salary or Wage Rate	Years	Share of time on project or hours per year	Salaries and wages	Benefits rate	Benefits	Total costs
Janet Phoenix	PI/lead researcher	\$141,117	3	0.15	\$63,503	0.2314	\$14,694.51	\$78,197.16
Derrick L. Faison	Community Navigator	\$25	3	100	\$7,500	0.0795	\$596.25	\$8,096.25
Supplies	#units	Unit cost						
Purple AQI Monitoring Device (\$269 ea.) and CO, CO2, RH devices (\$231 ea. set)	20	\$500						\$10,000
<b>Total Direct</b>								<b>\$96,293.41</b>
<b>Indirect/F&amp;A</b>		<b>0.26</b>						<b>\$25,036.29</b>
<b>Total Cost</b>								<b>\$121,329.70</b>

**2. Green Consulting Company (GCC)** Dr. Rodney Green (key personnel), President of GCC, will support the rest of the research team in providing expert analytical analysis of the data generated in this project. His company will provide logistical support for the research activity including the acquisition, provision, and tracking of research incentives for participants in surveys and focus groups.

**GCC Budget estimate:** \$25 gift card x 400 cards = \$10,000 for residents in the sample (100 residents x 2 full surveys + 1 training + 1 test each). \$50 gift card x 30 focus group participants (2 focus groups with owners/manager and 1 with resident/occupants with 10 participants each) = \$1,500. Additional costs of supplies and mailing = \$2,000. Direct costs = \$13,500 Indirect costs (10%, de minimus) = \$1,350. **Total cost of GCC contract = \$14,850**

**Total Direct Costs** Sum of all direct costs

**Modified Total Direct Costs** Total direct costs minus stipends and all but the first \$25,000 of contracts with George Washington University.

**Indirect Costs/F&A** The federally negotiated rate for research. U.S. Department of Health and Human Services is the cognate agency for Howard University.

**Total Costs** Sum of Total Direct Costs and Indirect Costs/F&A.

PROJECT TITLE: Enhancing Computing Accessibility in the Atmospheric Science Program at Howard University

PRINCIPAL INVESTIGATOR: Nakul Karle

BUDGET PERIOD: 9/1/23 to 8/31/24

# YEAR 1

	% effort devoted to Project			Person-months			Institutional Base Salary	Salary	Funds Requested	Cost Sharing	
	CAL	ACAD	SUM	CAL	ACAD	SUM					
<b>(A) KEY PERSONNEL (Howard University Only)</b>											
Name	Role on Project										
Nakul Karle	PI		0.00%	0.00%	0.00%	0.00	0.00	0.00	\$ -	\$ -	
			0.00%	0.00%	0.00%	0.00	0.00	0.00	\$ -	\$ -	
			0.00%	0.00%	0.00%	0.00	0.00	0.00	\$ -	\$ -	
			0.00%	0.00%	0.00%	0.00	0.00	0.00	\$ -	\$ -	
			0.00%	0.00%	0.00%	0.00	0.00	0.00	\$ -	\$ -	
			0.00%	0.00%	0.00%	0.00	0.00	0.00	\$ -	\$ -	
			0.00%	0.00%	0.00%	0.00	0.00	0.00	\$ -	\$ -	
<b>SUBTOTAL PERSONNEL</b>									\$ -	\$ -	
<b>(B) WAGED PERSONNEL</b>											
									\$ -	\$ -	
									\$ -	\$ -	
<b>SUBTOTAL WAGES</b>									\$ -	\$ -	
<b>TOTAL PERSONNEL</b>									\$ -	\$ -	
<b>(C) BENEFITS</b>											
Salaried Faculty & Staff	@	31.2%	Enter the applicable rate in the yellow box.							\$ -	\$ -
Waged Employees	@	8.2%	Enter the applicable rate in the yellow box.							\$ -	\$ -
<b>TOTAL BENEFITS</b>									\$ -	\$ -	
<b>TOTAL PERSONNEL AND FRINGE BENEFITS</b>									\$ -	\$ -	
<b>(D) SUPPLIES &amp; MATERIALS</b>											
General Supplies									\$	12,907	
Misc. Supplies									\$	-	
<b>TOTAL SUPPLIES &amp; MATERIALS</b>									\$	12,907	
<b>(E) TRAVEL</b>											
Local									\$	-	
Foreign									\$	-	
<b>TOTAL TRAVEL</b>									\$	-	
<b>(F) FOOD</b>											
<b>TOTAL FOOD</b>									\$	-	
<b>(G) CONSULTANTS FEES</b>											
<b>TOTAL CONSULTANTS FEES</b>									\$	-	
<b>(H) PARTICIPANT SUPPORT COSTS</b>											
(1) Stipends									\$	-	
(2) Travel									\$	-	
(3) Subsistence									\$	-	
(4) Tuition									\$	-	
(5) Other									\$	-	
<b>TOTAL PARTICIPANT SUPPORT COSTS</b>									\$	-	
<b>(I) EQUIPMENT</b>											
(1) 5 desktops from HP, one monitor, and one storage									\$	-	
(2)									\$	-	
<b>TOTAL EQUIPMENT</b>									\$	-	
<b>(J) SUBCONTRACTS</b>											
(1)									\$	-	
(2)									\$	-	
(3)									\$	-	
(4)									\$	-	
(5)									\$	-	
<b>TOTAL SUBCONTRACTS</b>									\$	-	
<b>(K) OTHER DIRECT COSTS</b>											
(1)									\$	-	
(2)									\$	-	
(3)									\$	-	
(4)									\$	-	
<b>TOTAL OTHER</b>									\$	-	
<b>(L) TOTAL DIRECT COST (TDC)</b>									\$	12,907	
<b>(M) MODIFIED TOTAL DIRECT COST (MTDC)</b>									\$	12,907	
<b>(N) Total Facilities &amp; Administrative Cost @ 54.5% of Modified Total Direct Cost (Enter the applicable rate in the yellow box.)</b>									\$	7,034	
Choose one:			Organized Research	Instruction	Other Sponsored Activities						
<b>(O) GRAND TOTAL</b>									\$	19,941	