

## Virginia Community College Students Collect Data for NASA Using Unmanned Aircraft Systems (UAS)

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Thirteen students from five Virginia Community Colleges can now add unmanned aircraft systems (UAS) and NASA to their resumes thanks to their work on a sea level rise study for NASA Wallops Flight Facility on Virginia's Eastern Shore. The students recently completed four-days of fieldwork at NASA Wallops in which they planned and conducted UAS missions, analyzed data, and prepared a report for NASA. The fieldwork was completed as part of a new pilot online course, Topics in Service Learning in Geographic Information Systems (GIS), offered by Thomas Nelson Community College in partnership with the Virginia Space Grant Consortium (VSGC) as part of the VSGC's NASA-funded STEM Takes Flight at Virginia's Community Colleges project.

In preparation for the fieldwork, students worked under the guidance of faculty mentors Cherie Aukland and David Webb to develop knowledge and skills in GIS, remote sensing, UAS, and sea level rise. The goal of the fieldwork was to demonstrate the capability of small UAS to collect imagery and other data about phragmites, an invasive species, and shoreline data to help Wallops assess the impact of sea level rise on the facility. The student-gathered data and technical report will support NASA Wallops' Coastal Resilience Initiative and goals for future similar use of UAS.

"The partnerships were tremendous. Thomas Nelson, VSGC, NASA Wallops, and Sentinel Robotics Solutions (SRS) worked great together to make these ground-breaking missions happen. All of us were thrilled to be part of the first autonomous flight of a UAS in the airspace at NASA Wallops," said Chris Carter, VSGC Deputy Director and project coordinator. "Students demonstrated real strength and ability to complete the goals of the class despite having just met each other and a mission schedule that was adjusted at the last minute due to the weather," commented Webb.

Matthew Cox, a student participant, stated that this "was a great experience getting to work with actual NASA employees. It was interesting to see the steps and procedures the team had to complete before being able to fly the missions. From the data we collected, we were able to identify the shoreline and phragmites, which was rewarding because that was the ultimate goal."

A DJI Phantom 3 quad-copter flew an autonomous flight over 52 acres on the north end of the island. This mission collected two hundred and eleven high definition true color images to create a high resolution map of the area. A manual flight using a DJI Phantom 2 quad-copter equipped with a payload of a Raspberry Pi-controlled near-infrared camera was flown over a smaller area on the south end of the island. Students used GIS to analyze the imagery and data about the shoreline and presence of phragmites. "We were able to prove that these relatively low-cost vehicles and sensors can be used to identify phragmites and the shoreline. Now NASA can fly and collect data-on-demand with small UAS. What a great real-world service learning project for these students," stated Aukland.

Michael Bonsteel, Environmental Scientist at Wallops stated, "These missions allow us to gather data for the exact regions where we have questions about erosion, accretion, and subsidence. Using small UASs for data collection will enhance our ability to gauge the health of our ecosystems and evaluate the success of invasive species management strategies. The use of small UASs results in low-cost, high-value projects, in line with the overall Wallops business model."

Peter Bale of SRS served as the pilot in command for the UAS missions, and Chase Riley of SRS provided technical and payload support. The project was also supported in part through the VSGC's National Science Foundation-funded Geospatial Technician Education (GeoTEd) project in partnership with Thomas Nelson, Virginia Tech, and the Virginia Community College System. Student participants were from the following community colleges: Northern Virginia Community College, Rappahannock Community College, Thomas Nelson Community College, Tidewater Community College, and Virginia Western Community College.

Please see attached photos.



**Photo Caption (Credit: Linda Sherman / NASA Wallops): Group picture of the student and faculty participants.**

(Left to Right) (Seated Front Row)

Chris Carter, VSGC Deputy Director

Nicole Knudson, Tidewater Community College

Carmen Ferraro, Tidewater Community College

Sarah Lubkin, Northern Virginia Community College

Cherie Aukland, Thomas Nelson Community College (Co-Faculty Lead)

(Standing Back Row)

Gabriel Fearing, Rappahannock Community College

Heidi Phillips, Virginia Western Community College

Shari Davies, Thomas Nelson Community College

Matthew Cox, Virginia Western Community College

Tim Minich, Thomas Nelson Community College

Josh Darnall, Thomas Nelson Community College

Jason Sanchez, Northern Virginia Community College

Brian Stemm, Tidewater Community College

David Nicks, Thomas Nelson Community College

Laura Nusz, Thomas Nelson Community College

David Webb, VSGC Consultant (Co-Faculty Lead)



***Photo Caption (Credit: NASA / Patrick Black): Community college faculty and students along with the pilots observing the DJI Phantom 3 just before take-off.***