



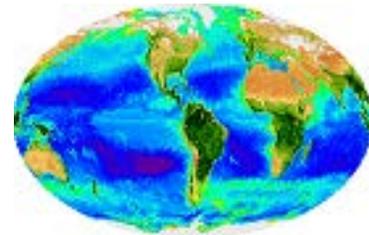
## UNCW TEAM OF SCIENTIST RECEIVES \$1.67M GRANT TO CONSTRUCT NANOSATELLITES

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**Wilmington, NC**—As a team of scientists from University of North Carolina Wilmington, *Cloudland Instruments* of Santa Barbara, CA, *Clyde Space* of Glasgow, UK, *NASA Goddard Space Flight Center*, Greenbelt, MD, and *Hawk Institute for Space Sciences*, Pocomoke City, MD, led by UNCW Professor John M. Morrison, recently received a 2-year grant for \$1,675,000 from the Gordon and Betty Moore Foundation as a “proof of concept to demonstrate the capability to construct low-cost autonomous nanosatellites to provide sustained, high spatial resolution and temporal resolution information about the surface ocean processes.”

The “science dream team” is composed of investigators that have been involved in the forefront of Ocean Color Remote Sensing since its inception 30+ years ago including Alan Holmes (SeaWiFS Sensor Designer and CEO/CTO Cloudland Instruments), Craig Clark, (CEO/CTO for Clyde Space, one of the leading designers of CubeSats, worldwide), Dennis McCartney (ex-NASA Associate Administrators for Earth Science and CTO for Hawk Institute for Space Sciences), and Mary Cleave (Retired), NASA Astronaut, NASA Goddard Project Manager for SeaWiFS; and Associate Administrator, NASA Science Mission Directorate.



In a recent report the National Academy of Science (NAS2011) discussed the need for sustaining and advancing ocean color research and operations. This report shows that Ocean color satellites provide a unique vantage point for observing the changing biology in the surface ocean. Space observations have transformed biological oceanography and are critical to advance our knowledge of how such changes affect important elemental cycles, such as the carbon and nitrogen cycles, and how the ocean’s biological processes influence the climate system. In addition, ocean color remote sensing allows scientists to assess changes in primary production, which forms the base of the marine food chain. Thus, continuous satellite observation of ocean color is essential to monitoring the health of the marine ecosystem and its ability to sustain important fisheries, especially in a time of global change and acidification. Any interruption in the ocean color record would severely hamper the work of climate scientists, fisheries and coastal resource managers, and an expanding array of other users, from the



military to oil spill responders.

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NANOSATELLITES GRANT

PAGE 2/2

The goal of this project is to enhance the ability of the earth sciences to observe ocean color in high temporal and spatial resolution modes through the use of a low-cost, next generation, miniature ocean color sensor flown aboard a CubeSat. A CubeSat is a type of nanosatellite with volumes in multiples of 3.0 liter (30cm<sup>3</sup>), and typically uses commercial off-the-shelf (COTS) components for its electronics. Stanford University's Space Systems Development Laboratory (SSDL) and California Polytechnic State University developed the CubeSat concept to provide standardized, low-cost access to space (<http://www.CubeSat.org/>). The advantages of CubeSats in terms of development cost and time, and low volume and mass, with respect to larger satellites opens the door for radically new earth observing missions (EO). EO missions traditionally involve large, complex spacecraft with multiple payloads leading to spacecraft having a large price tag. A constellations of EO nanosatellites, by contrast, could provide daily or higher temporal resolution and increased spatial resolution while still being economically viable.

The SeaWiFS sensor development took more than 10 years at a construction cost of \$14.1 M. Here, we have proposed to develop and construct two SeaHawk CubeSats with HawkEye Ocean Color Sensors in 2-years at a cost of \$1.675 M. The final product will be 130 times smaller (10-m × 10-cm × 30-cm), 45 times lighter (approximately 1 kg), with a ground resolution 7 - 15 times better (150 - 75 meters per pixel), while still having a Signal/Noise Ratio approximately 50% that of SeaWiFs. The resulting imagery should be remarkable, with a development time and construction cost of both approximately 10 percent that of SeaWiFS.

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*About the Gordon and Betty Moore Foundation: "The Gordon and Betty Moore Foundation believes in bold ideas that create enduring impact in the areas of science, environmental conservation and patient care. Intel co-founder Gordon and his wife Betty established the foundation to create positive change around the world and at home in the San Francisco Bay Area. Science looks for opportunities to transform—or even create—entire fields by investing in early-stage research, emerging fields and top research scientists. Environmental conservation efforts promote sustainability, protect critical ecological systems and align conservation needs with human development. Patient care focuses on eliminating preventable harms and unnecessary healthcare costs through meaningful engagement of patients and their families in a supportive, redesigned healthcare system. Visit [Moore.org](http://Moore.org) or follow @MooreScientific."*

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