SwRI-developed satellites enter second phase of operations

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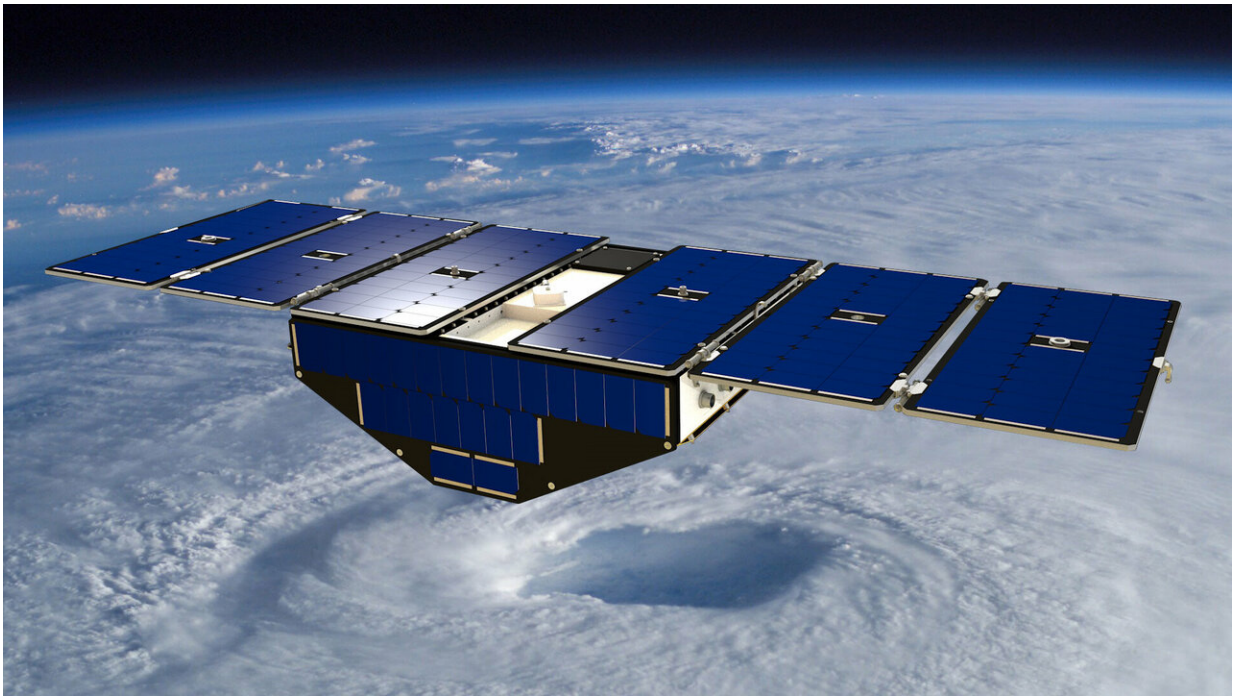


The SwRI-built constellation of microsatellites will continue their sojourn in the skies over the equator for at least another year and a half, collecting continuous data about hurricane wind speeds. These data are improving the intensity forecasting models, to help officials make better evacuation decisions. Credit: NASA

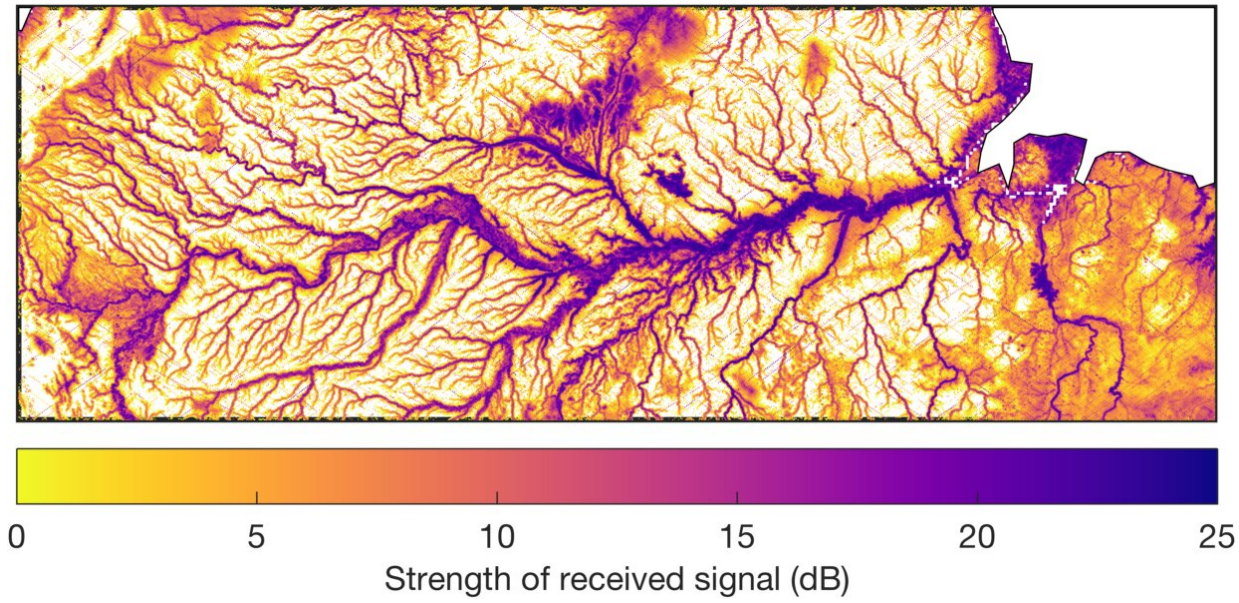
NASA has extended the Cyclone Global Navigation Satellite System (CYGNSS) mission for an additional year and a half. The constellation

of microsatellites designed and built at Southwest Research Institute has made history over the last two years, penetrating thick clouds and heavy rains to accurately assess wind speeds and better understand hurricane intensification. Assessments confirmed that all eight spacecraft and their subsystems are healthy and ready to support two more years of operations.

The microsatellites—each roughly the size of carry-on luggage—make frequent measurements of ocean surface winds to monitor the location, intensity, size and development of tropical cyclones. Flying in formation, the spacecraft cover an orbital swath that passes over most of the Earth's hurricane-producing zone, up to 35 degrees north and south of the Equator.

"Launched in late 2016, the spacecraft have provided round-the-clock surface wind speed measurements to help improve intensity forecasting of tropical cyclones," said SwRI's William Wells, CYGNSS operations phase systems engineer. "The extended mission opens the door for many new science opportunities, in addition to continuing the primary mission objectives. We are making some engineering and operational changes to enable new types of science while maximizing science returns in this second phase."

This science is critical because, over the last few decades, forecasters have improved hurricane path prediction significantly, but the ability to predict the intensity of storms has lagged behind. Collecting data in the midst of a storm is difficult and dangerous, but conventional space technology could not provide accurate measurements. GPS signals penetrate intense rainstorms, and CYGNSS uses these signals, reflected off the ocean surface, to calculate wind speeds.



In the second phase, the CYGNSS mission has expanded to include land-based studies. In the prime mission, a surprising capability emerged -- CYGNSS can characterize flooded landscapes and measure subsurface soil moisture, as seen in this CYGNSS map of the Amazon basin. Credit: University Corporation for Atmospheric Research/University of Michigan

"For the extended mission, we are ramping up for four new investigations related to tropical cyclones, six in other oceanography disciplines, six that use CYGNSS data in groundbreaking land science applications and many others," said SwRI's Jillian Redfern, CYGNSS project manager and mission operations manager. "We are adjusting payload operations to support the new science applications while maintaining production of the core data products already in use by the science community."

During the prime mission phase, CYGNSS science has led to 72 refereed journal publications and 158 conference proceedings publications in atmospheric, ocean and terrestrial science as well as

space systems engineering.

"We have made extensive observations of inner core winds and demonstrated that assimilating these data into numerical weather prediction models has a significant positive impact on their ability to forecast a storm's track, intensity and structure," said Dr. Chris Ruf, CYGNSS Principal Investigator from The University of Michigan in Ann Arbor, Michigan. "In addition, bonus observations over land have uncovered a wealth of new science applications related to imaging of flood inundation and measuring sub-surface soil moisture. I look forward personally to many more years supporting these efforts and helping to expand the community of our data users."

SwRI led the engineering development and manages the operation of the constellation. The University of Michigan Climate and Space Sciences and Engineering Department leads the science investigation, and the Earth Science Division of NASA's Science Mission Directorate oversees the mission. SwRI's office in Boulder, Colorado, hosts the mission operations center, which commands the spacecraft, collects the telemetry and transmits the data to the science operations center at the University of Michigan.

For more information, see https://www.swri.org/spacecraft-subsystem-assembly-integration-testing and http://www.cygnss-michigan.org.

Provided by Southwest Research Institute