SwRI building 8 NASA nanosatellites to help predict extreme weather events on Earth

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NASA has selected a team including Southwest Research Institute to develop the Cyclone Global Navigation Satellite System (CYGNSS), which will provide better prediction capabilities for extreme weather events, particularly the intensification of hurricanes.

Tropical cyclones develop over warm bodies of water and typically consist of an "eye" — a center of low pressure — and intense, rotating thunderstorms that produce strong winds and heavy rains. Heat drawn up from the water produces energy through a complex process that can feed and strengthen the storm, spawning tornadoes and causing significant damage as it moves over land.

CYGNSS will study the relationship between ocean surface properties, moist atmospheric thermodynamics, radiation and convective dynamics to determine how a tropical cyclone forms and if and by how much it will strengthen, thereby helping to advance forecasting and tracking methods.

"The system will allow us to probe the inner core of hurricanes in greater detail to understand their rapid intensification," says Dr. Chris Ruf, CYGNSS principal investigator and professor of atmospheric, oceanic and space sciences at the University of Michigan, Ann Arbor. "This will allow us to observe and understand the complete life cycle of storms and, thereby, understand the thermodynamics and radiation that drive their evolution. Our goal is a fundamental improvement in hurricane forecasting."

A single launch vehicle will carry CYGNSS' constellation of eight nanosatellite observatories into low-Earth orbit for deployment. Once in orbit, the observatories will receive Global Positioning System signals both directly from the GPS satellites and reflected from the Earth's surface. The direct signals pinpoint CYGNSS observatory positions, while the reflected signals respond to ocean surface roughness, which determines wind speeds.

Southwest Research Institute leads development and integration of the eight nanosatellites. Other partners include Surrey Satellite Technology, which will provide the Delay Doppler Mapping Instrument, and the NASA Ames Research Center, which will provide the Deployment Module.

"In leading the development of the CYGNSS observatories, we are building on our heritage of spacecraft avionics and subsystem design and developments," says Dr. Jim Burch, vice president of the SwRI Space Science and Engineering Division. "It is a natural next step in the evolution of our support to NASA."

The primary objective of the mission is to measure the ocean surface wind speed in almost all precipitating conditions and in the tropical cyclone core; however, CYGNSS measurements should also be helpful to the hurricane forecasting community.

Provided by Southwest Research Institute