NASA UNVEILS NEW SATELLITE RESCUE SYSTEM

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GREENBELT - NASA unveiled a new satellite- based system on Monday that space agency officials say should reduce the time needed to locate lost boaters and hikers to just seconds.

"Our mission is to take the "search" out of search-and- rescue technology," said Dave Affens, the search and rescue mission manager at NASA, an agency sometimes criticized for not focusing enough on Earth- bound problems.

"Our ultimate goal here is to save lives," Affens said.

Designed and developed at the NASA Goddard Space Flight Center in Greenbelt, DASS - the Distress Alerting Satellite System - will be able to locate emergency beacons carried by aircraft, boats and hikers almost instantaneously, officials said.

Help could be on the way in minutes. The current Search and Rescue Satellite system might take an hour or more.

The new technology won't be operational until the hardware can be fully deployed aboard a constellation of 24 new U.S. Air Force Global Positioning System satellites. Nine are already in orbit, but the rest may not get there until 2017 or later, officials said.

In the meantime, the existing satellite rescue system continues to save lives - more than 27,000 worldwide to date. Air Force and Coast Guard authorities Monday urged anyone setting off in boats, planes or on foot into the wilderness, to consider carrying a satellite beacon - costs range from $200 to $700 for the handheld models, $800 to $1,500 for those used on boats - and to make sure it is registered.

One life the current system did save belongs to Dennis Clements. The Missouri man set out last Dec. 26 from Norfolk, Va., bound for Culebra, an island off the eastern tip of Puerto Rico.

He soon found himself alone, 250 miles off the Carolina coast, where he and his craft, the Gloria Adios, were pounded for four days by gale-force winds and tall waves.

"At one point, I saw the mast pointed straight down to the bottom of the sea," he said in a video interview with University of Maryland Baltimore County researcher Silvia

Stoyanova. "I was shaken loose somewhere under water, and when I reached the surface, I could see my boat about 30 feet away."

As he tried desperately to swim to the craft, it righted itself, caught a breeze and sailed out of reach. "As I floated there, I knew this was the end," he said.

It wasn't. The Gloria Adios carried an Emergency Position Indicating Radio Beacon (EPIRB), which activated automatically when the boat began taking on water.

Capt. David McBride, chief of the Coast Guard's Office of Search and Rescue, said too few boaters carry the devices. "Many people think they're going to use cell phones or radio," he said. But one big wave can quickly put those devices out of commission.

"The only means you'll have to notify anybody is the EPIRBs or ELTs [Emergency Locator Transmitters used on airplanes]," he said. "They're the only ones designed to work in that emergency for a specific length of time."
Hand-held Personal Locator Beacons (PLBs) must be activated manually.

Clements' beacon was picked up by orbiting weather satellites, where NASA-developed repeaters relayed the call to a ground station in Suitland, Md. There, computers did the math to calculate his location.

From Suitland, Clements' identity and position were sent to the Air Force Rescue Coordination Center, at Tyndall Air Force Base, in Florida, which receives
15 to 25 similar alerts every day. The center alerted the Coast Guard, and Clements was eventually rescued by a Navy diver.

Even before the Gloria Adios capsized, Coast Guard search and rescue controllers had gotten the alert, and were using Clements' EPIRB registration to contact his relatives. They confirmed his whereabouts. The Coast Guard knew in advance that rescuers on this call would not be risking their lives for nothing. Officials said 25 percent of the satellite beacons now in use have never been registered, putting first responders at risk needlessly in the event of false alarms.

A Coast Guard helicopter crew found Clements and dropped a life raft. And a Navy diver from the aircraft carrier U.S.S. Dwight D. Eisenhower - the only ship within 100 miles - finally put a harness on him and helped pull him from the roiling seas.

"It was the bravest thing I've ever seen," Clements said.

The current satellite beacon system saved Clements'
life. But it has limits.

Operational since 1982, the Search and Rescue Satellite-Aided Tracking (SARSAT) system relies on two kinds of weather satellites operated by the National Oceanic and Atmospheric Administration.

GOES satellites, which track weather systems from geosynchronous orbits that keep them "hovering"
22,500 miles above the Earth, also listen for emergency beacons. Each one can "see" 40 percent of the Earth's surface.

"GOES tells you the signal went off," said SARSAT's systems engineer, Mickey Fitzmaurice. But "it can't tell you where it is."

Some more expensive beacon devices carry global positioning electronics that encode their position into their signals, enabling rescuers to pinpoint their locations immediately to within a few feet, even as they drift with currents. But most do not.

Finding those beacons requires another satellite fleet, called Polar Orbiting Weather Satellites (POWS).
They circle the globe on "low" Earth orbits - about 450 miles up. By listening for subtle "Doppler effect"
changes in the beacon's radio frequency caused by the motion of the satellite, the SARSAT computers can locate the source to within a radius of 1.5 miles.

The technique works well. Lt. Col. Charles Tomko, commander of the Air Force Rescue Coordination Center, said his unit launched 1,100 rescue missions in 2009 in the contiguous 48 states. More than 700 of them were initiated by satellite beacon alerts. He figures those responses saved 214 lives.

But faster and better information on the locations of the alarms would save even more lives. So, in 2002, NASA engineers at Goddard began working on a promising new idea.

What the system needed was a larger fleet of satellites flying at middle altitudes. with only six POWS satellites in orbit, it can take more than an hour for one to pass over a given location. And, because of their relatively low orbits, they can miss beacon signals blocked by mountains or other surface terrain.

What the Goddard engineers needed was a larger fleet of satellites flying at an altitude somewhere between those of POWS and GOES.

The Air Force's GPS satellite fleet - a couple of dozen satellites in polar orbits about 12,000 miles up - fit the bill nicely. Once all 24 DASS repeaters are launched aboard new GPS spacecraft, every spot on the globe will always be within "view" of at least four of them, "more than is needed to solve the [positioning] equations,"
NASA's Affens said.

"DASS will provide near instant signal-burst detection anywhere on the surface of the Earth," he said. It will minimize terrain interference, time delays and improve accuracy to within a square kilometer.

If the sailors, pilots or hikers are using high-end beacons equipped to transmit GPS positioning data, Fitzmaurice said, and "the sky's the limit. We can pretty much fly right to the spot."

While the Air Force continues to launch DASS-equipped GPS satellites, NASA is beginning to build the satellite ground stations. Four satellite-tracking antennas are already working at Goddard. More are being planned for Hawaii, Florida, Australia and northeastern Canada.

In addition, search-and-rescue authorities in Europe, Russia and China are building their own DASS- compatible search-and-rescue satellite systems, which will work in concert with the United States' network.
In all, some 40 countries are participating in the current system.

Tomko also noted that signals from any beacon registered in the U.S., no matter where they go off, are routed to the Air Force Rescue Coordination Center in Florida.

"We call rescue centers globally to . make sure they're working that mission," he said. "We still protect our citizens."

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http://www.baltimoresun.com/news/maryland/bs-md-satellite-rescue-beacon-20100525,0,2765269.story