

## Global Experts: It's Time to Address Space Debris

There's an urgent need to remove orbiting space debris and to fly satellites in the future without creating new fragments, according to experts at Europe's largest-ever space-debris conference.

According to findings from the Sixth European Conference on Space Debris, which were released April 25, 2013, future space missions must be sustainable, including safe disposal when they're completed. The current levels mean that we must soon begin removing debris from orbit, with research and development urgently needed for pilot "cleaning" missions.

The findings also suggested the removal of space debris is an environmental problem of global dimensions that must be assessed in an international context, including the United Nations. The results were presented to more than 350 worldwide participants, representing almost all the major national space agencies, industry, governments, academia and research institutes.



An artist's concept shows how a defunct satellite could be grappled for a controlled re-entry into Earth's atmosphere, where it would burn up and be destroyed harmlessly. This is one of several concepts for clearing dead satellites from orbit being studied by space agencies and industry experts.

European Space Agency/Mixed-Reality Communication GmbH

## Nordic Nations Focus on Nano-UAS Technology

The heightening Nordic focus on soldier protection has spurred the region's unmanned aircraft system (UAS) manufacturers to prioritize development of sophisticated micro-technologies. Nordic nano-UAS producers Prox Dynamics and CybAero are taking a somewhat different route to that of larger global competitors, which are developing more offensive UASs. The two companies are designing and producing smaller, unarmed nano-UASs that are virtually invisible, silent and difficult to neutralize.

Prox Dynamics' nano-sized Black Hornet, which has been developed in cooperation with the state-funded Norwegian Defense Research Establishment (NDRE), already has been sold to the British and Norwegian armies. CybAero also has been investing heavily to produce more sophisticated macro-sized UASs with more nano-technology content. The Swedish company formed a strategic helo-UAS partnership with U.S.-based AeroVironment in November 2012. Under the agreement, AeroVironment will use CybAero's current product APID 60 in the UAS systems it sells to the U.S. military.



Prox Dynamics' camouflage-gray Black Hornet weighs just 16 grams, is 10 centimeters long and has a 4-inch rotor span. Designed for infantry units, the aircraft is equipped with a nano-camera capable of sending back high-definition motion video or still images to its operator via a tablet-size LCD screen.

Prox Dynamics

## ESA Preps Users for Sentinel-1 Data

Users with a wide range of satellite data needs, from mapping sea ice and tracking maritime traffic to monitoring geohazards, anticipate the European Space Agency's coming Sentinel-1 launch. The agency is helping users get ahead of the game by offering test data and simulated images.

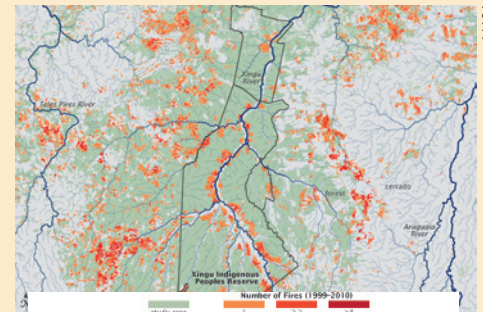
To be launched later this year, Sentinel-1 is the first of five satellite missions dedicated to supplying a stream of data for Europe's Global Monitoring for Environment and Security (GMES) "Copernicus" program. This particular satellite will provide timely high-quality radar images of Earth's surface to support European operational services that use Earth observation data in areas such as emergency response, marine and land monitoring, civil security and climate studies.

The new data format and information structure, the increased data volume, the expected data quality and sensor characteristics all mean that users have to develop or update processing facilities before the launch. The European Space Agency is addressing this in two ways. First, the agency just released a sample of Sentinel-1 simulated user products and associated format and product definition documents to GMES users. In addition, the agency is planning a further distribution to all potential users in the coming weeks. To complement this initial release of test data, the agency is, in parallel, simulating Sentinel-1 acquisitions from space using Canada's RADARSAT-2 satellite.

## New Technique Detects Fire Below Amazon Canopy

NASA scientist Doug Morton has developed a new technique based on data from the Moderate Resolution Imaging Spectroradiometer (MODIS) Earth observation satellite sensor that makes it easier to distinguish understory fires from similar-looking forest disturbances.

Understory fires are low-intensity blazes that creep along the leaf litter on a forest floor but never get hot enough to burn up through the canopy. Because the fires remain beneath the canopy, NASA satellites designed to monitor fire activity rarely detect understory fires. The technique has made it possible for Morton and his colleagues to map the distribution of understory fires across the entire southern Amazon basin for the first time.



NASA scientist Doug Morton found that Amazon understory forest fires burned more than 85,500 square kilometers (33,000 square miles), or 2.8 percent of the forest, between 1999 and 2010.

NASA

## ESA Biomass Mission Proceeds Despite Operating Challenges

The European Space Agency (ESA) will finance a satellite to measure the global forest biomass and carbon, although such data collection over North America and Europe will be impossible.

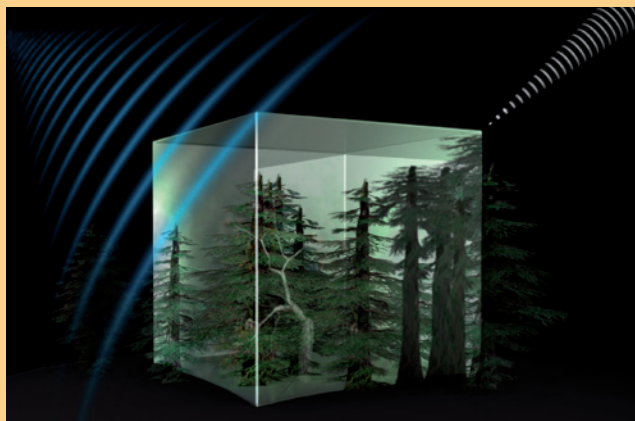
In unanimously agreeing to spend up to 420 million euros (\$550 million) to build, launch and operate the Biomass satellite and its P-band radar, ESA all but agreed to write off North America and Europe for Biomass use because of conflicting frequency transmissions by U.S. military radars.

ESA Earth Observation Director Volker Liebig said the decision was

made with full recognition that the U.S. missile warning and space tracking radars, which have frequency priority

over Biomass, may render the satellite unable to record data from these regions when it is launched in 2020.

Liebig said Biomass' promise is so great that the project was able to overcome this handicap and win selection over two other missions. But at a time when ESA's Earth observation program is facing a much-lower-than-expected budget in the coming years as a result of decisions by the agency's governments last November, ESA hasn't yet given a definitive green light to Biomass.



Europe's Biomass mission will require two technologies that aren't currently available in Europe—its feeder antennas and its deployable radar antenna. ESA is investing research money into feeder antennas as part of its program to ensure autonomy in critical space technologies.

## USGS Drones to Monitor Nevada Wildlife

The U.S. Geological Survey's first Nevada drone mission, planned for August or September, will count sheep and deer within the Desert National Wildlife Refuge north of Las Vegas. What once required a helicopter and thousands of dollars worth of fuel can now be done with some fresh batteries and what looks like an elaborate toy plane no bigger than a turkey vulture.

Mike Hutt, who heads the USGS National Unmanned Aircraft Systems Project Office in Denver, says there has been a "groundswell" of Department of Interior drone use in recent years, as cash-strapped field offices look for ways to overcome funding gaps (see "USGS UAS Program Does More with Less," page 12).

In coming months, USGS also plans to use unmanned aircraft to track eagles and trumpeter swans in Idaho and Washington state, spot invasive plants at Utah's Zion National Park and search the Oregon coast for debris from the 2011 tsunami that struck Japan.

## Drone Research Could Aid Atlanta Traffic Management

A Georgia Tech University researcher is exploring the potential for using Earth observation drones to supplement the Georgia Department of Transportation's network of traffic cameras.

By fitting a drone with cameras controlled with an iPad, Georgia Tech's Dr. Javier Irizarry is researching its potential for the Georgia Department of Transportation (DOT). According to Irizarry, a variation of the technology could be an airborne supplement to the DOT's existing network of traffic cameras for assessing traffic conditions in areas where there are no cameras or where cameras have a limited field of view or range.

Georgia Tech's drone research extends beyond the laboratory. At Ft. Benning, university researchers have tested military applications for a gasoline-powered unmanned aircraft. The civilian potential is equally extensive, according to the researchers, including using drone technology to provide real-time traffic counts supplemented by mobile airborne images.

## Leica, Aibotix Partner to Offer UAS Mapping Solution

Swiss airborne mapping company Leica Geosystems has teamed with German unmanned aircraft system (UAS) manufacturer Aibotix to create a one-stop shop for infrastructure inspection and mapping. Headquartered in Heerbrugg, Switzerland, Leica is part of Sweden's Hexagon Group and maintains U.S. headquarters in Norcross, Ga.

"For us this is really the next step in our UAS strategy," said Rüdiger Wagner, general manager of Leica's geospatial solutions division. "UAS-based mapping solutions are on the increase, and we have been carefully expanding our exposure to this market by focusing on select applications."



Lightweight multicopter UASs such as the Aibotix X6, shown here, are proving ideal for infrastructure inspections of powerlines, bridges, dams and power plants.