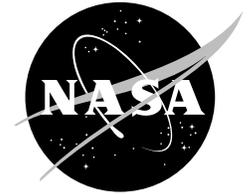


# FactSheet

National Aeronautics and  
Space Administration

Langley Research Center  
Hampton, Virginia 23681-2199



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## Synthetic Vision Displays give pilots clear skies all the time

A revolutionary cockpit display system being developed with seed money from NASA would help prevent the world's deadliest aviation accidents.

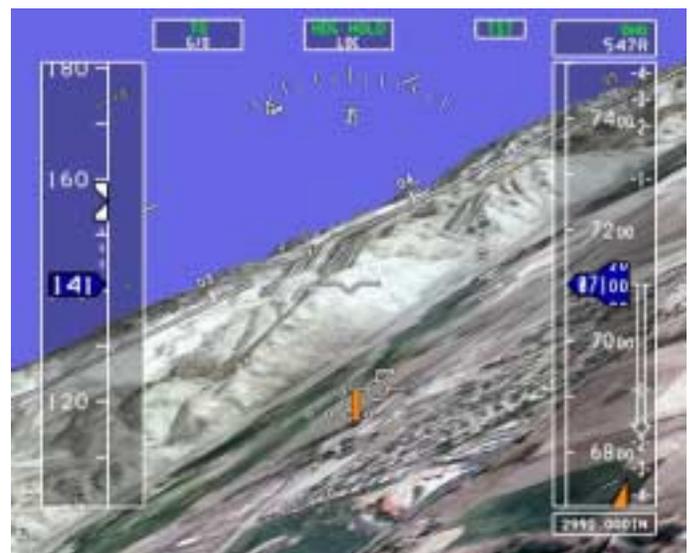
Limited visibility is one of the greatest contributing factors in fatal airline and general aviation crashes, according to Michael Lewis, director of the NASA Aviation Safety Program (AvSP). How to make flying safer by giving flight crews clear, sunny conditions all the time is a challenge facing the AvSP, based at the Langley Research Center in Hampton, Va.

NASA is working with industry to help create Synthetic Vision, a kind of virtual reality display system for cockpits. The new technologies being developed offer pilots a clear, electronic picture of what's ahead outside their windows, no matter what the weather or time of day.

### GPS signals are key

"With Global Positioning System signals, pilots now know exactly where they are," said Lewis. "Add super-accurate terrain databases and graphical displays and we can draw three-dimensional moving scenes that will show pilots exactly what's outside. The type of accidents that happen in poor visibility just don't happen when pilots can see the terrain hazards outside."

The Aviation Safety Program envisions a system that would use technologies, such as Global Positioning System signals, terrain databases and advanced sensors to project data onto displays in aircraft cockpits. The displays would show terrain, ground obstacles, air traffic, approach and landing patterns, runway and taxiway surfaces, and other information to the flight crew.



**A Synthetic Vision display would provide pilots with a clear electronic picture of what's outside, no matter what the conditions. This picture is from a terrain database used to test displays near Vail, Colo.**

NASA has already tested pieces of a Synthetic Vision system on two different aircraft.

NASA researchers tested a prototype of Synthetic Vision in flights over Asheville, N.C., in 1999. Engineers loaded a three-dimensional terrain database that had been augmented by sophisticated computer rendering techniques onto a research aircraft owned by the U.S. Air Force.

Research pilots flew more than a dozen flights in and out of the Asheville Regional Airport.

One pilot commented during a flight, "The terrain picture, the synthetic vision display, is just terrific. I find myself forgetting that that's not the real world I'm looking at."

Another series of flight tests examined Synthetic Vision display concepts at Dallas/Fort Worth International Airport in October, 2000.

Engineers installed software and hardware in the NASA Airborne Research Integrated Experiments System (ARIES) 757 aircraft.

A number of pilots evaluated display sizes and computer graphics to help determine which Synthetic Vision system configurations will be most effective in preventing accidents.

The ARIES 757 will be used in future test flights to assess and further refine this revolutionary cockpit technology.

The NASA aircraft will fly over the Eagle County Regional Airport near Vail, Colo. The purpose is to assess display concepts in a real-life, terrain-challenged environment.

## Shuttle will provide maps

NASA plans to use images collected by the Shuttle Radar Topography Mission (SRTM) in Feb., 2000 to supply aircraft with an extensive world terrain map.

Using imaging technology that flew on the space shuttle twice before, combined with additional



**NASA used its Airborne Research Integrated Experiments System (ARIES) 757 aircraft to test Synthetic Vision System concepts at Dallas/Fort Worth International Airport.**

innovations, SRTM gathered information to make 3-D measurements of 80 percent of the Earth's land surface.

## AvSP is a partnership

AvSP is a partnership with the Federal Aviation Administration, the Department of Defense, aircraft manufacturers, airlines and universities. This partnership supports a national goal to reduce the fatal aircraft accident rate by 80 percent in 10 years. NASA has designated about \$500 million over five years for aviation safety research, with more funding expected to follow.

Researchers at four NASA field installations are working with the FAA and industry to develop advanced, affordable technologies to make flying safer: Langley; Ames Research Center at Moffett Field, Calif.; Dryden Flight Research Center in Edwards, Calif.; and Glenn Research Center in Cleveland, Ohio.



**During a flight test in North Carolina, a NASA research pilot compared a terrain database (bottom) to the real world.**

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*For more information on the NASA Aviation Safety Program, please check the Internet at:*

**<http://avsp.larc.nasa.gov>**

*or call the NASA Langley Public Affairs Office at:*

**(757) 864-6124**