

Inside Wallops



National Aeronautics and Space Administration
Goddard Space Flight Center
Wallops Flight Facility, Wallops Island, Va.

Volume XX-08

Number 29

August 18, 2008

HSA Set to Launch from Wallops on Thursday

Two NASA aeronautics experiments will hitch a ride on a developmental Alliant Techsystems, or ATK, suborbital rocket scheduled to launch from the Eastern Shore of Virginia this summer.

One experiment, designed at NASA's Langley Research Center in Hampton, Va., will gather data on air flow conditions and heating on vehicles flying at hypersonic speeds at least eight times the speed of sound, or 5,280 miles per hour. The other experiment will evaluate a possible shape for a space capsule that could travel to Mars and gather data on atmospheric conditions encountered by the reentering probes. Both experiments are funded by NASA's Aeronautics Research Mission Directorate in Washington.

The Hypersonic Boundary Layer Transition, or HYBOLT, experiment, will sit atop ATK's ALV X-1 launch vehicle when it launches from the Mid-Atlantic Regional Spaceport at NASA's Wallops Flight Facility at Wallops Island, Va., in August.

HYBOLT resembles the blade of a flat-head screwdriver and is designed to pierce the atmosphere to assess the boundary layer, a very thin layer of air that flows over the surface of a vehicle in flight.

"We should be able to conquer some of the challenges of hypersonic flight if we can get a better handle on air flow," said chief engineer Mark Croom. "At hypersonic speeds the temperature of the flow around the aircraft or spacecraft is so great that it affects just about everything. That includes the shape of the vehicle, the material it's made of and even the chemistry of the molecules in the air."

Instruments embedded in HYBOLT will send temperature and pressure information back to the ground as the rocket accelerates to Mach 8 and faster. The information will be used to improve de-

sign tools for future aircraft and spacecraft.

After gathering its data the experiment payload will separate from the rocket and fall into the Atlantic Ocean, exposing the second payload package, the Sub-Orbital Aerodynamic Re-entry Experiments, or SOAREX. SOAREX will capture data and send it electronically back to researchers before it, too, falls into the Atlantic Ocean along with the rocket.

SOAREX consists of three separate probes. Two comprise NASA's experiment and the third belongs to the U.S. Naval Research Laboratory in Washington. The NASA experiments, designed at NASA's Ames Research Center at Moffett Field, Calif., will characterize a new self-orienting reentry vehicle shape. The largest of the probes, called the Slotted Compression Ramp, or SCRAMP, resembles a blunt-nosed cylinder mounted on a ring.

"The SCRAMP design offers a super-stable re-entry system -- sort of like a big hypersonic badminton birdie that rights itself nose-forward after tumbling," said principal investigator Marc Murbach. "The slot between the cylinder and the circular heat shield also enhances drag and stability."

SCRAMP represents a significant change in atmospheric entry probe design from the traditional blunt body space capsule shape that has been used since the 1960s. By using the blunt-nosed shape NASA may be able to embark on new planetary missions with probes that can carry more instruments and fly with more stability and less drag. SCRAMP is accompanied by an instrument that will measure atmospheric conditions at the point of release.

The third small probe in the SOAREX package will test an automatic identification system, or AIS, receiver and trans-



HSA rocket on Pad 0B. Jacob Owen Photo

mitter designed for ocean recovery. It is nicknamed "Melonsat" because of its shape. The foam-filled sphere will float and its beacon is designed to transmit its Global Positioning System satellite coordinates for about seven days until it is recovered.

The ALV X-1 rocket stands more than 53 feet tall. The two-stage suborbital launch vehicle uses solid-fuel motors for propulsion. During its voyage the rocket is expected to reach an altitude of more than 200 nautical miles and stay aloft about 10 minutes.

The mission is a partnership between ATK of Salt Lake City and the Fundamental Aeronautics Program in NASA's Aeronautics Research Mission Directorate. ATK provides the launch vehicle and launch services and NASA provides the range services.

The launch window opens on Thursday morning and runs through August 25.

Olympic Swimmers Shattering Records in NASA-Tested Suit

Swimmers from around the world are setting world and Olympic records in Beijing this month and most are doing it wearing a swimsuit made of fabric tested at NASA.

Among the Olympic gold medalists wearing Speedo's LZR Racer are Americans Michael Phelps -- who has now won more Olympic gold medals than any athlete in the modern era -- and Natalie Coughlin.

Both had a hand in developing the skintight body suit.

So did aerospace engineer Steve Wilkinson from NASA's Langley Research Center in Hampton, Va.

Wilkinson, who says he's not much of a swimmer himself, is watching this summer's Olympics with enthusiasm.

"I'm paying very close attention to the swimmers' times," said Wilkinson. "I'm amazed that so many athletes are wearing a fabric I tested in a laboratory in Hampton, Virginia."

Researcher Wilkinson has tested dozens of swimsuit fabrics in NASA Langley's 7- by 11-Inch Low Speed Wind Tunnel.

The fabric that made it through Wilkinson's wind tunnel analysis has already caused a big splash since the LZR Racer swimsuit was introduced in February. Even before the Olympics swimmers wearing the skin-tight body suit set 48 world records.

But how did NASA get involved in what is probably the most talked-about swimsuit since the bikini? Warnaco Inc., the U.S. licensee of the Speedo swimwear brand, approached NASA Langley to test fabric samples, since NASA Langley has researched drag reduction for aircraft and even boats for decades.

"We evaluated the surface roughness effects of nearly 60 fabrics or patterns in one of our small low speed wind tunnels," said Wilkinson. "We were assessing which fabrics and weaves had the lowest drag. The tests have generally



NASA Langley researcher Steve Wilkinson with Olympic swimming medalists Katie Hoff (left) and Natalie Coughlin (right). Credit: NASA/Kathy Barnstorf

shown the smoother the fabric, the lower the drag."

Just like reducing drag helps planes fly more efficiently, reducing drag helps swimmers go faster. Studies indicate viscous drag or skin friction is almost one-third of the total restraining force on a swimmer. Wind tunnel tests measure the drag on the surface of the fabrics.

"The fabric comes in the form of fabric tubes, a small diameter fabric tube," Wilkinson added. "We pull that over our smooth flat model, which is an aluminum plate underneath. We prepare the edges so they're straight and square with no protruding corners or edges to interfere with the drag on the surface."

The plate goes into the small wind tunnel test section. With a flip of a switch, air flows over it. Wilkinson runs the tunnel through a number of wind speeds and, with the help of sensors, measures drag on the surface. He records the data and then sends it on to Speedo researchers.

Speedo's research and development team, Aqualab, takes the results and uses them to help create advanced "space-age" swimsuit designs.

Wilkinson says he never expected that he would test swimsuit fabric when he started at NASA 30 years ago. He adds he gets a lot of chuckles from his colleagues. As he's watching the Olympics, knowing that he played a small part in swimming history, Wilkinson may be having the last laugh.

Wallops Island to be Closed August 19-20

Wallops will be having a Navy Aerial Target Exercise on Tuesday, August 19 with a back-up day of Wednesday, August 20.

During this time, non-mission essential personnel will **not** be allowed on the island between 6 a.m. and 5 p.m. unless the project is completed or cancelled. Mission essential personnel have been identified and will be required to sign in at the Wallops Island Security gate.

For more information about this project, call Rob Hurley at x1881.

Training Opportunities

The Office of Human Capital Management, Professional Development Center, is offering a workshop open to both civil servants and contractors entitled, "How to Prevent Job Burnout," on Wednesday, August 20, from 11:30 a.m. to 12:30 p.m., in the E-2 Training Room at WFF.

To register, log onto SATERN, or call Sharon Ray at 66-5400. For questions, contact Goddard's Career Coaches at 301-286-5794.

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