



IVView

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**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
INDEPENDENT VERIFICATION AND VALIDATION FACILITY**

2 The view from here...



Bill Jackson, Acting Director

As we go to press, we are preparing to host and participate in the sixth annual OSMA Software Assurance Symposium (SAS 06). We look forward to welcoming many of you, along with our SMA Directors, to an impressive showcase of research presentations, and we hope you will spend

time with us thinking big thoughts and planning more exciting research. See the SAS announcement and some samples of the fine work our researchers are doing on page 4.

We were excited to see the launch of Calipso and CloudSat this spring (see page 3). And we were also very excited about the work of some Preston County middle school students who aimed to go faster, higher and farther in the Freida J. Riley competition (page 5). Is the sky the limit, indeed, for these young engineers?

Speaking of young engineers—IV&V and NOAA benefited from some fine engineering work conducted by our own Jimmy Grippin and Joe Irons. You will read about the manner in which they lived up to our values of safety, innovation and teamwork on page 6.

Balance is, surprisingly, one of the values most difficult to achieve, but you will meet two of our contractors who are setting a great example for us on page 7.

Finally, we close this quarter's newsletter with two stories about team members who have exemplified the value of excellence. We couldn't be more proud of them.

Come and celebrate our sense of NASA family with us at our Facility picnic on July 22. In the meantime, enjoy all the pleasures that are summer—be safe, and rejuvenate.



Inspiring the Next Generation Day at NASA IV&V included flight demonstrations, research methods lessons, time in the simulator landing the Shuttle and docking it to the Space Station and launching pop rockets. We also asked our kids to tell us what their parents do at NASA IV&V. The responses ranged from being in charge of all things NASA, to playing on the computer and talking on the phone all day. Clearly we need to bring our kids to work more often. But take a good look at them...pretty darn cute aren't they? We had a great time together, and we ended the exciting day feeling as proud of the very bright and competent children of our civil service and contractor employees as we do of their parents.

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32 seconds in flight — the Preston County Middle School's amazing rocket!

Could it be a NASA-wide bottle rocket competition record? We'd love to hear from you if your team(s) have kept a bottle rocket in flight for longer than 32 seconds. Give Kat Millson a call (304-367-8445) to claim your bragging rights.



Managing Editor: Donna Ozburn

Editor: Kathleen Millson

Please submit news items and/or photos to Kathleen.Millson@nasa.gov; 304-367-8445. Ideas for stories and article submissions are welcome; all submissions are subject to editing. Next Submission Deadline: September 15, 2006

Two NASA satellites were launched Friday from Vandenberg Air Force Base, Calif., on missions to reveal the inner secrets of clouds and aerosols, tiny particles suspended in the air.

CloudSat and Calipso - Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations - thundered skyward at 3:02 a.m. PDT atop a Boeing Delta II rocket. The two satellites will eventually circle approximately 705 kilometers (438 miles) above Earth in a sun-synchronous polar orbit, which means they will always cross the equator at the same local time. Their technologies will enable scientists to study how clouds and aerosols form, evolve and interact.

"Clouds are a critical but poorly understood element of our climate," said Dr. Graeme Stephens, CloudSat principal investigator and a professor at Colorado State University, Fort Collins, Colo. "They shape the energy distribution of our climate system and our planet's massive water cycle, which delivers the freshwater we drink that sustains all life."

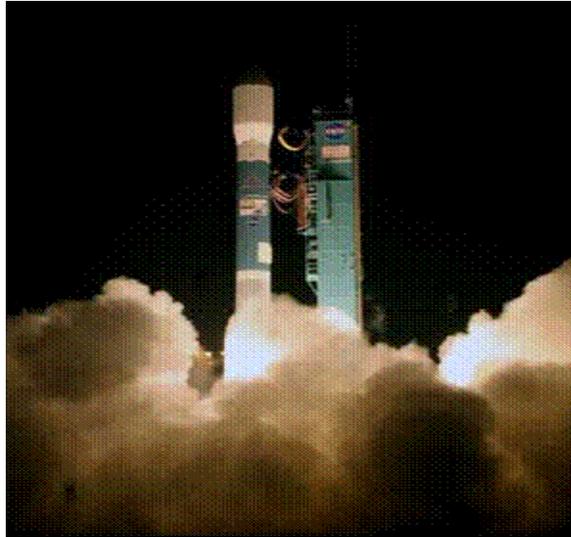
"With the successful launch of CloudSat and Calipso we take a giant step forward in our ability to study the global atmosphere," said Calipso Principal Investigator Dr. David Winker of NASA's Langley Research Center, Hampton, Va. "In the years to come, we expect these missions to spark many new insights into the workings of Earth's climate and improve our abilities to forecast weather and predict climate change."

Each spacecraft will transmit pulses of energy and measure the portion of the pulses scattered back to the satellite. CloudSat's Cloud-Profiling Radar is more than 1,000 times more sensitive than typical weather radar. It can detect clouds and distinguish between cloud particles and precipitation. Calipso's polarization lidar can detect aerosol particles and distinguish between aerosol and cloud particles. Lidar, similar in principle to radar, uses reflected light to determine the characteristics of the target area.

Sixty-two minutes after liftoff, Calipso separated from the rocket's second stage. CloudSat followed 35 minutes later. Ground controllers successfully acquired signals from both spacecraft, and initial telemetry re-

ports show both to be in excellent health. Over the next six weeks, system and instrument checks will be performed, and the satellites will be inserted into their final orbits.

The satellites will fly in formation as members of NASA's "A-Train" constellation, which also includes NASA's Aqua and Aura satellites and a French satellite known as Parasol, for Polarization and Anisotropy of Reflectances for Atmospheric Sciences coupled with Observations from a Lidar. The satellite data will be more useful when combined, providing insights into the global distribution and evolution of clouds to improve weather forecasting and climate prediction.



CloudSat is managed by NASA's Jet Propulsion Laboratory, Pasadena, Calif. JPL also developed the radar instrument with hardware contributions from the Canadian Space Agency. Colorado State University provides scientific leadership and science data processing and distribution. Ball Aerospace and Technologies Corp., Boulder, Colo., designed and built the spacecraft. The U.S. Air Force and U.S. Department of Energy contributed resources. U.S. and international universities and research centers support the mission science team.

Calipso is a collaboration between NASA and France's Centre National d'Etudes Spatiales (CNES). Langley is leading the Calipso mission and providing overall project management, systems engineering, and payload mission operations. NASA's Goddard Space Flight Center, Greenbelt, Md., provides support for system engineering, project and program management. The French Space Agency is providing a Proteus spacecraft developed by Alcatel Space, a radiometer instrument, and spacecraft mission operations. Hampton University, Hampton, Va., is providing scientific contributions and managing the outreach program. Ball Aerospace developed the lidar and on-board visible camera.

NASA's Launch Services Program at Kennedy Space Center, Fla., procured the mission's launch and provided the management for the mission's launch service.

For more information about CloudSat and Calipso, visit:

<http://www.nasa.gov/cloudsat>

<http://www.nasa.gov/calipso>

IV&V to Host Office of Safety and Mission Assurance Sixth Annual Software Assurance Symposium (OSMA SAS 06)

O SMA SAS '06 is the culmination of a year's worth of important research in the field of Software and Safety Assurance. NASA's OSMA sponsors the symposium as part of its Software Assurance Research Program (SARP). Forty researchers will present executive briefings and in-depth technical proposals this year. SAS 06 will also host the OSMA Directors Meeting again this year. The Symposium will be conducted July 18-20 at the Lakeview Conference Center in Morgantown, West Virginia. SAS is managed by IV&V. <http://www.ivv.nasa.gov/forresearchers/index.php>

Autonomy and Failure Mitigation

Lisa Montgomery

Due to distance or planet position the human members of a team can't always be in contact with a spacecraft. If a craft has no human pilot we need one that can operate, to some degree, on its own. The trick is to help the vehicle be smart enough to survive an unexpected situation long enough to learn from it. A standard option when a vehicle encounters an unexpected situation involves switching to a safe mode. Think of a safe mode as some limited subset of behaviors that should lessen the chances that a bad situation will become worse. Suppose we have a little rover on a distant planet, and suppose that rover makes decisions about where to go based on information from image sensors by looking at pictures. Imagine those pictures can help our rover decide whether the terrain ahead is too steep, too rocky or in some other way too challenging to safely traverse. Now suppose something happens and the rover loses the ability to see. It's not difficult to understand that moving forward when our rover doesn't know what's ahead of it could cost us the vehicle. In this instance, a safe mode might tell the rover to stay put until a way to compensate for the loss of vision can be found. As the complexity of our missions increases, thereby increasing the need for our vehicles to be able to act without human assistance for longer periods of time, so too does the complexity of the necessary failure-mitigation strategies.



The Mars rovers make use of contingency software.

Contingency Software in Autonomous Systems

The need for autonomous agents, such as the Mars rovers, will increase as NASA fulfills new exploration objectives. These new autonomous vehicles such as rotorcraft and spacecraft operate in harsh environments with limited capacity to mitigate failures. Currently, when a failure occurs, vehicles may switch to a safe mode while ground crews devise a solution.

Solutions are difficult because failures are hard to pinpoint and contingencies may be too complex, novel or high-risk for current autonomous software. This work

will enhance diagnostic techniques to identify failures, provide software contingency planning to mitigate failures, perform tool-based verification of contingency software and investigate contingencies in safely relinquishing control to autonomous controllers.

Results, applied to current NASA programs, will pave the way to more resilient, adaptive unmanned systems.

PI: Robyn Lutz and Ann Patterson-Hine – AMES Government POC: Allen Nikora

<http://sarpreults.ivv.nasa.gov/ViewResearch/55.jsp>

Is the Sky the Limit?

Jess White

On a beautiful early May morning at Hite Field in Clarksburg, West Virginia, Middle School students from 12 West Virginia counties gathered to put their imagination, talent and inspiration to the test. The students were challenged to design and build a bottle rocket using a 2-liter bottle. The object of the effort—a successful launch and enduring flight.

NASA civil servants from the IV&V Facility were tasked to conduct and judge the competition. Outreach and Public Affairs Manager, Donna Ozburn and Student Outreach Manager, Jess White led the IV&V participation.

The competition was a part of the Freida J. Riley National Teacher Award. It was hosted by the Greater Clarksburg Convention and Visitors Bureau and featured the Rocket Boys, local and national leaders in education and Hall of Fame Astronaut **Captain Bruce McCandless, II**.



The Judges

Lft-Rt: Lisa Montgomery, Judi Connelly, Stephanie Ferguson, Phil Merritt, Meagan Carrier, Kaci Reynolds, Donna Ozburn, Jess White, Brian Kessecker, Melissa Bodeau



The Launch

Seeing the faces of the students as their rockets were launched into the sky was the highlight of the day. The students' rockets varied in colors, shapes and sizes—some engineering designs were very complicated, some were not. None the less, each rocket bore the unique signature that revealed the ingenuity of the teams that worked together for weeks to prepare for the competition.

After all the rockets were launched, South Preston Middle School was declared the undisputed winner. The team not only won by mere seconds, they won by **32 seconds!** Past competitions boasted an average 9 seconds in flight time, making this year's first place finish seem all the more impressive. It will be interesting to see what the students come up with next year to top the results of this year's competition.

The event is one of the efforts of NASA and educators in the area to inspire the next generation of math and science students to consider careers in engineering. Thanks to all the judges and launch specialists for their commitment to the success of this event.



The Rocket

Captain McCandless was chosen to be an Apollo astronaut in 1966, but he never flew on Apollo because the program was shortened. He then spent many years developing the MMU (manned maneuvering unit), which allowed a person to fly freely, untethered to the spacecraft. He was the first to fly the MMU on STS-41B, the Challenger space shuttle, in 1984 and he was on the crew of STS-31, which launched the Hubble space telescope. You can imagine how excited and encouraged the students were to hear the story of his life and his advice about staying in school and even about their rocket building efforts.

The students also met with the Rocket Boys, the subjects of the movie "October Sky", who also offered many suggestions for succeeding in this and future bottle rocket competitions.



The Television Interview

For more information feel free to contact Jess White 304.367.8433, jess.white@ivv.nasa.gov.

Beyond the Call of Duty

Dave Sheldon

The NASA Independent Verification and Validation Facility recognized and commended the innovation and rapid response time that Crothall technicians, Jim Grippin and Joe Irons exhibited during our recent loss of cooling tower number two water pump.

With outside air temperature reaching the high 90's we lost a water pump on cooling tower number two. When faced with the loss of this water pump the remaining facilities cooling towers could be unable to provide adequate cooling for our own equipment as well as the National Oceanic and Atmospheric Administration supercomputer.

Knowing that the existing pump repair could take some time, Jim and Joe used a teamwork approach to solve the problem. An urgent operations team meeting was quickly called and the decision was made to purchase two temporary submersible water pumps to compensate for the lost pump and alleviate some of our cooling challenges until the rebuilt pump arrived back on site.

Due to their adaptive approach and can-do-attitude, we were able to maintain valuable cooling to facility equipment without having to shut down. This work exemplifies our goal of ensuring a safe, comfortable, and well-equipped workplace that is conducive to high performance and productivity. Jim and Joe, in this instance and in so manner others, personify the NASA IV&V values of safety, innovation and teamwork.



IV&V Deputy O&M Manager, Dave Sheldon (left), presents much-deserved letters of commendation to Joe Irons (center) and Jimmy Grippin (right) .

Foundation of Excellence

Back-to-School Supply Give-Away



Through the generous donations from churches, groups and individuals, Scott's Run Settlement House is able to assist low income families in receiving school supplies and backpacks for their school-age children. In 2005 alone, 651 students were served by this program. The NASA IV&V Facility has generously supported this effort since 2003. This August, the tradition of giving will continue. Stay Tuned for more information!



7 The Cube

...where you'll find our colleagues



Going the Distance...Belize 2006

Mark Cerullo

It comes once a year and goes by so fast—my annual trip to Belize, Central America. Dangriga is where we practice, which is a little community south of Belize City and Belmopan, the country's capital. The population is about 900 people in town and maybe 2000 in the whole district. Over \$32,000 was raised in the past year to fund our travel, lodging and other expenses. The local cable access channel announced our plans from April until May 6 when we landed in Belize City. We were blessed upon arrival that Saturday evening with many volunteers from the Southern Regional Hospital who helped us unload our crates, 48 of them as a matter of fact. Many people were asking for treatment and surgeries right then and there. Most of them had seen us before or had family members treated in the past and knew our procedures, so they waited until Sunday to come back for triage and clinic day. As Vice President of Hands and Heart Missions, it was my responsibility to assist with admissions and record keeping this year. My wife Rhonda joined me for the second time this year on this mission. She was support staff in the O.R. We normally have someone to handle my task but they were unable to include the trip in their schedule the trip for 2006.



The author with patient—skinned knees are also part of the care plan. Mark looks very different out of his usual security guard uniform!

I enjoyed every bit of sweat, heat and dehydration of my 5th year there and the gratitude of the Belizean citizens for our work was obvious. Every year we see more and more people with different ailments and health issues. They age from less than a year to over 90. We see mostly poor citrus farmers and workers, to medium income citizens. The families range from 5 to 10 members in one family. The average income is \$1,800 - \$2,500 per year and the cost of a major surgery is more than they can afford. They showed their thanks to us in many ways, usually with homemade food or baked items. Rice, beans and chicken are normal staples for the families so at least two times a day your menu will consist of something from that pantry. The evening supper could be fresh fish, shrimp, crab or even pork. I longed for the "Jonny Cakes" on the breakfast menu in the morning; they are like flat, no-raise biscuits and the fresh fruit butter that accompanied them were a real treat.



Overall this trip was a HUGE success; we performed over 76 cases in the Operating Theatre, and attended to over 500 in the clinic during the week. We were blessed with low occurrence of mosquito's and biting "no see ums." Although I came home with a "bug" of sorts that I didn't plan for but that's the Tropics. You never know. This time the classic phrase, "What happens in Belize, stays in Belize" didn't hold true for me, because it (the "bug" that is) should have stayed there.



I want to thank the NASA IV&V Facility family for its financial support and compassion throughout our fundraising year. I also want to thank Crothall, and their staff for their support and for allowing me to be a part of this mission. If you would like more information, please feel free to email me.

mark.j.cerullo@ivv.nasa.gov or ruger328@cebridge.net

Cycling in the Mountains of West Virginia is **Grrrrrr eat!**

Joe Sallman

Riding to work. For me it's not only a way of life, I actually get depressed driving a car unless the weather is downright awful. Passion comes on two wheels. On a good day, I have counted a total of 6 motorcycles in the parking lot, which I love to see. It's not important what you ride, but that you ride. Most of you have probably seen that big yellow gnarly motorcycle in the parking lot. It's my Triumph Tiger, a fuel injected beast that I not only love riding to work, but going to motorcycle rallies, races, or maybe just rides through the West Virginia countryside.



IV&V Outreach Program Receives NASA Exceptional Achievement Award

Marcus Fisher

We are proud to announce that the IV&V Outreach Team recently received the prestigious **NASA Exceptional Achievement Award**. The IV&V Facility's Outreach Program, led by Donna Ozburn, worked in partnership with GSFC's Public Affairs Office to develop an initiative to reach out to an under-served population of young people throughout southern West Virginia.



Donna Ozburn, pictured here (foreground) leading the judging for the Frieda J. Riley Bottle Rocket Competition, (see story, page 5) has been the recipient of three Goddard Honor Awards and one NASA Honor Award for her services and unyielding commitment to the IV&V Outreach Program.

Lisa Montgomery, member of the IV&V Research and Development Team and OSMA SAS Project Manager, Valerie Graves, former IV&V Student Outreach Manager, and Joe Kasimo, NASA Liaison at West Virginia State, worked with Donna to create a one-day event specifically for 200 students participating in a residential Upward Bound experience on the campus of West Virginia State University. Donna led the development of a unique day-long curriculum that included an engineering challenge led by John Leck of GSFC, a bottle rocket competition led by Valerie Graves of IV&V, and a Science Spectacular, led by Dr. Daryl Baynes, that included a historical perspective about the contributions to science and engineering by women and African Americans. To develop a one-day event that included so many experiences is, in itself, an outstanding achievement. But perhaps the greatest achievement of the day by the members of the IV&V Outreach Team was the inspiration offered to this population of students, most of whom will be the first of their family members to go to college.

Under the leadership of Donna Ozburn, the IV&V Outreach Program has an outstanding reputation for its solid commitment to inspire, inform and pursue collaborations throughout our local, state and regional community.

IV&V Team Receives CAU Memento

Ramona Gallardo

Members of the Cockpit Avionics Upgrade (CAU) IV&V team received a memento from project development contractor United Space Alliance (USA). USA's CAU Project Manager Anne V. Martt expressed thanks for the teamwork and dedication of the project community. In a card that accompanied the keepsake, Martt adds:

"Spanning multiple companies, organizations, locations and disciplines, the industry and government members of the CAU Team are exemplary in a business that is legendary for talent, creativity, innovation, accomplishment and teamwork".

The clear paperweight which reads, "**CAU, 1999 – 2004, Best Project In The Agency**", measures 4.125 x 2 x 3 inches and contains a flight-ready keycap from CAU's orbiter cockpit keyboard.



Recipients of the award are Steve Raque (NASA PM), Pat Callis (NASA PM), Melissa Schmidt-Northey (NASA), John Bradbury (L-3 Titan PM), David Soto (L-3 Titan Project Lead), Reid Brockway, Gary Carvell, Bruce Danielson, Ramona Gallardo, David Greeson, Nick Guerra, Heath Haga, Nick Hein, Bill McAllister, Julius Marcus, John Penn, Pat Wilhelmi and Chris Williams.