



MARSHALL STAR

Serving the Marshall Space Flight Center Community

March 15, 2007

An interview with Dr. John Horack, manager of the Science & Mission Systems Office

Defining the intersection of science and exploration

As manager of Marshall's Science & Mission Systems Office, you oversee some 65 separate science and engineering projects across the NASA science spectrum. What are the core missions of the organization?

The Science & Mission Systems Office works for three of the four NASA mission directorates: Exploration Systems, Space Operations, and Science.

We provide the Science Mission Directorate with three different core products. The first is new knowledge obtained through research — scientific papers, journals and conference proceedings, which are really the ultimate output of scientific investigation.

We also lead extensive hardware development and testing activities for SMD, such as the GLAST Burst Monitor instrumentation, designed and built at Marshall and now being readied for a fall 2007 launch. We're conducting significant hardware testing for backplane elements of the James Webb Space Telescope, NASA's next flagship cosmic observatory, slated to launch to space in 2013. We provide program and project management of critical scientific research spacecraft and missions, such as the Chandra X-ray Observatory, the Discovery and New Frontiers programs and the Hinode mission to study the sun.

We're also doing a great deal of work for the Exploration Systems Mission Directorate, particularly in support of the Service Module and the Launch Abort System — two key elements of the next-generation vehicle to return explorers to, and beyond, low Earth orbit. We're responsible for delivering the roll-control thrusters package for the first test flight of the Ares launch vehicle, and we're doing groundbreaking work for the Exploration Technology



Dr. John Horack, manager of the Science and Mission Systems Office, discusses his philosophy for success within his organization and across the Marshall Center.

Development Program — things like the Radiation Hardened Electronics for Space Exploration, also known as the RHESE project, and advanced propulsion system and hardware development and testing.

We manage the Lunar Precursor Robotics Program for the agency. And with the Johnson Center, we're beginning development of the Lunar Surface Access Module, the lander that will take human explorers to the lunar surface and return them to space again.

Our third primary customer is the Space Operations Mission Directorate. Our work for them involves hardware construction for the International Space Station, delivery of science payloads and logistics support. This year, we will launch Node 2, the second of three station module connectors, which was built at Alenia Spazio in Italy, with program/project management at Marshall. In 2006, we delivered the Oxygen Generation System to the space station, and we're now integrating the Water Recovery System

rack to help ensure the station crew has an adequate, healthy water supply. We also delivered the Lab-on-a-Chip Application Development Portable Test System, designed for rapid detection of biological and chemical substances on station, which is a tool for scientific investigation and will help with station housekeeping.

We have well-defined, critical roles in each of these areas, and I'm very proud of the work we're doing here.

How do you get your arms around such a breadth of work?

My main objective is to provide an environment in which people

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Orbital Express launches successfully March 8

On March 8, an Atlas V rocket carrying the Orbital Express satellite servicing demonstrator thundered away from Cape Canaveral Air Force Station in Florida, soaring to low Earth orbit to begin an intensive, three-month demonstration of automated rendezvous and docking capabilities.

Engineers at the Marshall Center say those capabilities could become a critical element of America's future space endeavors, providing a viable alternative to some human-piloted missions in the next decade.

Orbital Express is a joint mission by the Defense Advanced Research Projects Agency, known as DARPA, the Boeing Company of Huntington Beach, Calif., and NASA. NASA's key contribution is the Orbital Express Advanced Video Guidance Sensor, or AVGS, the compact, state-of-the-art automated guidance system developed at the Marshall Center.

"It was a picture-perfect launch, and we're excited and proud to see Orbital Express reach orbit and begin unmated operations tests of

the video guidance system," said James Lee, AVGS project manager at Marshall.

"AVGS represents a significant teaming effort at Marshall," he added, "including key members of the Science and Mission Systems Office and our partners in the Flight Robotics Laboratory and the Engineering Directorate, working together with Boeing and DARPA."

Orbital Express consists of two test satellites: the Autonomous Space Transport Robotic Operations, also known as the ASTRO service vehicle, and the Next-generation serviceable Satellite, or NextSat. Using AVGS in tandem with two optical sensors, a laser rangefinder and an infrared camera, the satellites will conduct unassisted rendezvous and docking operations, on-orbit refueling and satellite repair. They'll also trade and install a functional battery and computer — the first unassisted component exchange in space history.

"We look forward to demonstrating the critical role that automated rendezvous and

docking capabilities are sure to play in America's next-generation space infrastructure," Lee said.

DARPA, the central research and development organization for the U.S. Department of Defense, manages the Orbital Express Program. The Boeing Company of Huntington Beach, Calif., is DARPA's prime contractor for Orbital Express. The Marshall Center developed the AVGS technology, and delivered the flight software and conducted performance tests for Orbital Express. The AVGS hardware was built by Orbital Sciences Corp. of Dulles, Va.

Photo courtesy of United Launch Alliance



The Lockheed Martin Atlas V rocket lifts off.

Joint Aeronautical Logistics Commanders conference held Feb. 7-8



Emmett Given/MSFC

Marshall Deputy Director Charles Chitwood, left, presents an overview of the center at the Joint Aeronautical Logistics Commanders conference at Marshall last month. The conference identifies and exploits joint aeronautical logistics opportunities to improve productivity and reduce cost through commonality. Attendees toured the National Center for Advanced Manufacturing, Structural Test Facility, Environmental Test Facility, Flight Robotics Laboratory, Payload Operations Integration Center, Materials Environmental Test Complex and various test stands.

Dr. Michael Brown to discuss his discovery of dwarf planet Eris

Renowned astronomer to speak at U.S. Space & Rocket Center March 15 and at NSSTC March 16

By Sherrie Super

Astronomer Dr. Michael Brown, who discovered the dwarf planet Eris in 2005, will speak in Huntsville March 15 and 16.

Eris, the largest object found in the solar system in 150 years, is the celestial object that sparked the debate leading to Pluto's demotion from a "real" planet to a dwarf planet in 2006.

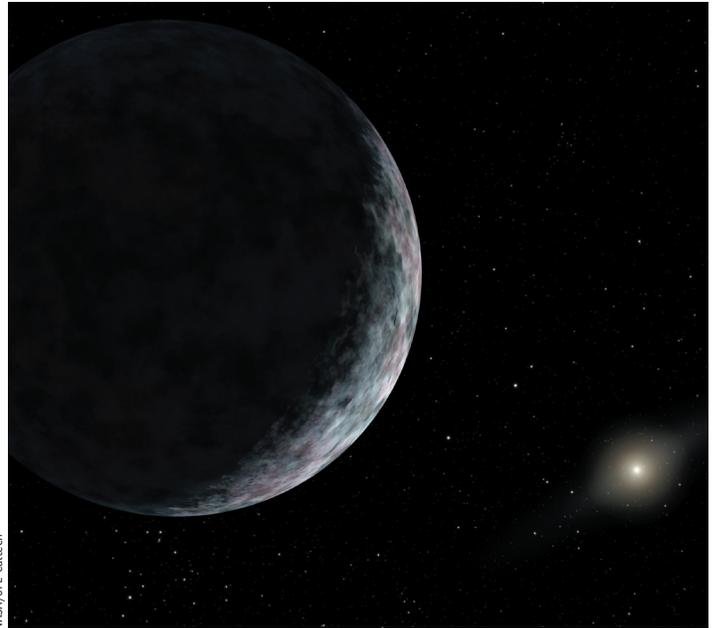


Dr. Michael Brown

Brown, professor of planetary astronomy at the California Institute of Technology in Pasadena, will discuss Eris, Pluto and other dwarf planets at the U.S. Space & Rocket Center at 3 p.m. Thursday, March 15, and at the National Space Science and Technology Center at 11 a.m. Friday, March 16.

Both lectures are free and open to employees and contractors at the NSSTC and the Marshall Center, commercial partners, and university students and instructors. The lecture at the Space & Rocket Center is open to the public.

Named one of Time magazine's "100 Most Influential People" in 2006, Brown is author of nearly 100 scientific papers. He specializes in the discovery and study of bodies at the edge of the solar system. These discoveries have been featured on front pages of countless newspapers worldwide. Brown is a Huntsville native and graduate of Grissom High School.



Artist's concept of Eris, the largest object found in orbit around the sun since the discovery of Neptune and its moon Triton in 1846.

His presentation is part of the NSSTC's Distinguished Lecturer Series. Hosted monthly by the NSSTC and its participating organizations, the series brings speakers to Huntsville from industry, academia, private research facilities and government agencies around the nation. For more information, call the NSSTC at 961-7000.

Brown's presentation will be available in the coming weeks on the NSSTC Web at <http://www.nsstc.org/lectures/>.

The writer, an ASRI employee, supports the Office of Strategic Analysis and Communications.

Dr. Michael Brown lectures at a glance

At the U.S. Space & Rocket Center

- Thursday, March 15, at 3 p.m.
- Educator Training Facility auditorium, located behind the Huntsville Marriott.
- Open to the public.

At the NSSTC

- Friday, March 16, at 11 a.m.
- The National Space Science and Technology Center, room 4078.
- Open to employees and contractors at the NSSTC and the Marshall Center, commercial partners, and university students and instructors.

Continued from page 1

can be successful. We have very smart, very talented people, who know what they're doing. In partnership with good engineering practices, the only thing they need to be successful is an environment in which they can be.

One of the key characteristics of such an environment is integration. Though we serve three very different customers, there are benefits we can derive from integrating across the organization. We try to bring scientific viewpoints to bear on human spaceflight projects when appropriate, and to bring the knowledge from human spaceflight and exploration into our science endeavors. Each adds value to the others, and everyone benefits.



David Higginbotham/MSFC

Under Horack's leadership, the Science and Mission Systems Office operates "at the intersection of science and exploration," improving life on Earth while pursuing NASA's mission to expand human presence in space.

What are the major challenges facing Marshall and S&MS today? What strengths does the organization possess to face those challenges?

Marshall is a development center. Our primary strength has always been — and, I think, always will be — the development of large or complex space systems for human and scientific spaceflight.

To serve that mission, S&MS must be a garden of sorts, in which we cultivate many different kinds of crops, assess their potential value to the agency, and then proceed to work on those things that are related to our primary agency missions in the national interest. We need to continually enhance our understanding of how to provide the most valuable return on the country's investment in space exploration.

We're always going to face a very dynamic and changing work environment, so we have to make sure we surface and assess as many good ideas as we possibly can. And we need to establish and maintain very good relationships. Our success will come through collaboration — with engineering, with the private sector, with universities, with other NASA centers and with the National Space Science and Technology Center.

It's important that we maintain open, clear, transparent communications with all these organizations, and consider all good ideas as we go forward. These traits create flexibility within our organization when conditions change, or when NASA's requirements change, enabling us to rapidly and successfully respond to those changes.

What constitutes success for the Science & Mission Systems Office?

Success means serving our mission directorate customers in four primary ways:

We must help Marshall continue to serve NASA as a developer of scientific and human spaceflight systems.

We need to create new opportunities for the agency to add value to the national agenda, in ways that are consistent with NASA's mission.

We must effectively communicate the positive social, economic, educational and quality-of-life results we bring to the country.

And we must help NASA serve its purpose as the mechanism by which people will leave low Earth orbit.

I would add that businesses are successful when people work hard — and work smart. And we're doing that — staying focused, keeping our eye on the ball, and working to make our partners in the Engineering Directorate and across Marshall successful as well.

What role does the NSSTC play in accomplishing the Marshall and NASA mission?

There are no more pure chemistry problems, pure biology or physics problems. From here on out, the kinds of problems NASA must solve are all interdisciplinary. The NSSTC is an excellent environment in which we can bring together a lot of different people from a lot of different backgrounds, and create the kind of teams we need to solve very complicated problems with a strong scientific component.

SERVIR is a great example. The SERVIR environmental visualization and monitoring system is helping Central American and southern Mexican authorities identify and react to changes in environmental conditions. It integrates remote sensing, weather forecasting, oceanography, even archaeology, to provide regional governments, scientists and stakeholders with real-time, high-resolution imagery and sophisticated information to respond to forest fires, tropical storms, flooding and other environmental concerns.

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Technicians work on Atlantis' damaged tank



On an upper level of high bay 1 of the Vehicle Assembly Building at Kennedy Space Center, Fla., technicians move protective material toward the nose cone of Atlantis' external tank. Space Shuttle Atlantis was rolled back to the Vehicle Assembly Building from Launch Pad 39A because of hail damage to the tank during a severe thunderstorm Feb. 26. The hail caused approximately 1,000 to 2,000 divots in the giant tank's foam insulation and minor surface damage to about 26 heat shield tiles on the orbiter's left wing. A new target launch date has not been determined, but teams will focus on preparing Atlantis for liftoff in late April.

Horack

Continued from page 4

Just as importantly, SERVIR helps local and regional environmental agencies continuously monitor the health of the region's critical water supply — the network of rivers and waterways that irrigate the land, support local agriculture, generate power and sustain the population, many of them in locations so remote they're utterly dependent on natural water resources.

So we're integrating disciplines and assets to explore these problems on a variety of levels, helping to maintain a healthy and sustainable environment on Earth even as we pursue NASA's critical exploration mission in space. The NSSTC is an essential component of that equation.

What are your near-term and long-term goals for Science & Mission Systems?

My near-term goal is to deliver on what we're accountable for today. We have a great deal of responsibility, and we have to be successful across a breadth of portfolio that is, I think, unmatched in the agency. We have to serve our customers extremely well.

Next, we have to provide an environment in which we can turn NASA's and the nation's challenges over, look at them from

many different angles and offer viable, competitive solutions that serve the national interest.

And then, in the long term, we need to help the center find a way forward for life after Ares. We are a development center, and developing the next generation of launch vehicles is exciting and important work. But what comes after that? The nation will always have new challenges to address. And I think it's likely the things Marshall will be working on after Ares will be activities that began, in a very nascent way, within the Science & Mission Systems Office.

So we have to deliver on our assignments today, help maintain the center's viability as a national asset, and develop systems for human and scientific spaceflight that the country will need 30 or 40 years from now. That's our task.

What are some of the most unique facilities and capabilities of the Science & Mission Systems Office that support the Marshall Center and NASA as a whole?

Offices and buildings are not critical. What's critical is the people, what they do, their commitment to where we're going, and the expertise they bring to the table.

We have scientists at Marshall who are equally adept at tackling the complex scientific and mathematical principles of X-ray astrophysics and addressing the technical issues associated with foam on the space shuttle external tank. We have managers who have literally worked across the NASA spectrum, from the International Space Station airlock to development of a mission to Pluto.

That breadth of experience and integration across the agency is the No. 1 reason our organization is successful. Our people have learned to think creatively to solve major challenges.

And that's vital. We may ask project managers to deliver hardware and systems on a five-year time scale, but then we can't tell them what their budgets will be next year ... and we may be forced to cut that budget in the middle of the year. In spite of all that, our people do a great job balancing available resources, managing to find ways to make the mission a success — and thriving.

Rick Smith, an ASRI employee who supports the Office of Strategic Analysis and Communications, conducted this interview for the "Marshall Star."

How long does it take to rebuild bone lost during spaceflight?

NASA Headquarters news release

Are bigger bones stronger bones? Not necessarily, according to a recent NASA study that seeks to ensure healthy bones in astronauts.

A four-year study of the long-term effects of microgravity on the bones of International Space Station crew members showed that the astronauts, on average, lost roughly 11 percent of their total hip bone mass over the course of their mission.

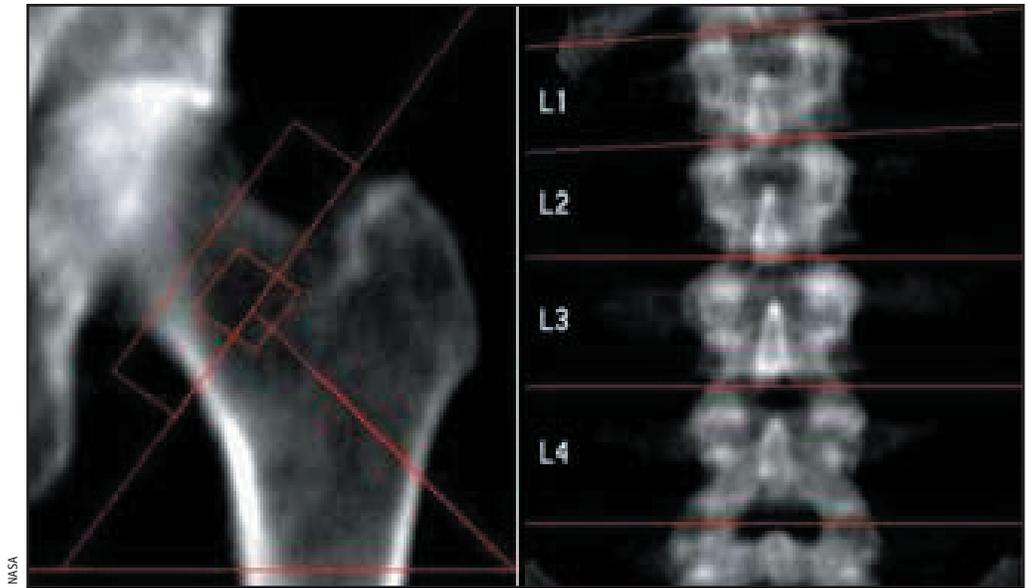
The study also found that a year after each crew member had returned to Earth, much of their lost bone mass was replaced. However, the bone structure and density had not returned to normal and signs of hip strength had not recovered at one year, although it had increased slightly compared to post-flight levels. Researchers say it could take much longer than a year to regain the lost strength.

The study's findings are important because bone loss during the course of a long transit to Mars and back could result in an increased risk of a bone fracture during activities on the Martian surface, or in the long term, back on Earth during the course of aging years after mission completion. Data from the study showed that, on average, crew members lost as much bone mass in one month on orbit as an elderly woman loses in an entire year.

Doctors treat millions of women and men for osteoporosis — a disease in which the bones atrophy causing loss of density, becoming more porous and breaking more easily. Although healthy astronauts did not develop osteoporosis during their four-to-six-month stays on the space station, the levels of bone loss documented were still enough to raise the concern for an increased risk for fracture when astronauts' skeletons are subjected to applied loads with working, lifting or falling.

"The success of human exploration missions depends on finding countermeasures to overcome such effects on crew members," said Julie Robinson, International Space Station program scientist at NASA's Johnson Space Center in Houston. "There are important synergies between osteoporosis research on Earth, and studies of bone loss and recovery in healthy astronauts in space. Each area of study complements the other."

The research, formally named the Subregional Bone Assessment, was one of the first Human Research Program investigations to be completed on board the space station. The program manages human health experiments to understand and reduce health and performance risks to astronauts in space.



A Dual Energy X-ray Absorptiometry scan of a human hip bone, left, and a human spine, right.

Beginning with Expedition 2, from March to August 2001, and continuing through Expedition 8, from October 2003 to April 2004, 16 crew members participated in the study. The research focused on their weight-bearing bones, including the hip bones because studies had shown that the hip experiences the highest amount of bone loss during a space mission, and the hip is the site of the most devastating osteoporotic fractures in the elderly.

The astronauts' bones were measured before and after their mission and one year after their return to Earth. The principal investigator for the experiment, Dr. Thomas Lang of the University of California in San Francisco, used X-ray Quantitative Computed Tomography to characterize the recovery of parts of the hip bone and changes in size and strength of the bones. The technique produces a series of cross-sectional images of the hip bone, allowing it to be quantified three-dimensionally without interference from overlying tissues. Lang used the X-ray technology to examine separately the bone's dense outer, or cortical, layer and its spongy inner, or trabecular, layer to determine bone loss in the hip and spine. The three-dimensional tomography measurements allowed researchers to determine whether loss is more prominent in one of those bone subregions.

"There's evidence from studies of aging that bone size increases as a compensation for loss of bone mass. We hypothesized that something similar would occur when crew members were re-introduced to gravity after long-duration spaceflight," said Lang. "Our one-year measurements were consistent with such an increase in bone size; however, this increase in the bone may not have been enough to result in full recovery of the hip bone strength. We will continue to measure bone density to determine how much longer it takes to rebuild bone and bone strength, and whether these structural changes are permanent."

Classified Ads

To submit a classified ad to the Marshall Star, go to Inside Marshall, to "Employee Resources," and click on "Employee Ads — Submit Ad." Ads are limited to 15 words, including contact numbers. No sales pitches. Deadline for the next issue is 4:30 p.m. Thursday.

Miscellaneous

Stearns & Foster sleeper sofa, blue, \$400; Ethan Allen cherry coffee table, \$150. 837-2267

40GB iPod with iSnug case set and Altec-Lansing inMotion speakers, plus extras, \$150. 256-498-3864

New Belsoie designer gown, Latte, size 12, spring '07 line, prom or evening appropriate, \$125. 682-6826

Golden Retriever pups, AKC registered, 4 males/2 females, ready March 16, parents on premises, \$250. 256-325-2430

American Eskimo puppy, 11 weeks, male, UKC, \$250. 880-7378

Washer and dryer, white, Frigidaire, \$375, 256-852-5595 after 4 p.m.

Two yellow AKC Lab pups, 13 weeks old, 2nd shots, \$100. 256-498-0923

Pool table, 8', Kasson-Auburn, fruitwood, Queen Anne feet, leather pockets, all accessories, \$2,250. 880-6563

Cradle, cherry, 4-sheets, bumper pads, mattress, \$25. 882-3326

Golf clubs, Callaway X-18 irons, 3-PW, \$135. 738-2889/Greg

Siemens C61 cell phone w/manual charger, \$10. 256-655-6348

2004 Husqvarna riding mower, 42" cut, \$950. 526-777-2652

Corner computer armoire, poplar wood, light oak finish, must pick up, \$150. 829-0285

Four 18" Moda R3 alloy wheels w/4 BF Goodrich g-Force tires, \$600 for all. 783-4216

Sharp 32" stereo color television with PIP and remote, \$50; DVD player, \$20. 429-8534

1950 MARX Royal Artillery truck w/canvas top and all-tin litho "firing" cannon, \$125. 303-3702/Decatur

Electric wheelchair, brand new, everything included, \$2,000. 651-9738

Go-cart, 30 yrs. old, \$15; Gameboy Advance games, \$5. 885-2293

Brindle boxers, two left, female and male, docked tails, dewclaws, shots, wormed. 256-883-6065

Golf clubs, men's left handed, woods, 1/3/5, irons 3-9, PW, SW, putter, no bag, \$90. 882-3983

GE drop-in range, 30", black, self-cleaning oven, 7 yrs. old, \$200. 658-1203

Executive wood desk and credenza, locking drawers, glass protective tops, \$450. 880-9025

Laptop 2GB RAM, Nanya PC2-5300 2x512MB, 4 months old, supports dual mode, \$80 both. 256-652-5274

AKC Lab puppies, all colors, parents DNA certified, \$200. 256-729-1871

Two adjacent 5th Row Broadway Theatre League tickets to Wonderful Town, March 30, 8 p.m., \$108. 325-0085

Entertainment center, solid oak, corner w/doors, 6' tall, \$300. 881-2131

Sauder lateral file #2702, cherry, in box, \$150; end table, marble/cherry, 12"x27", \$20. 721-9071

RC airplane and RC glider w/transmitter, \$100. 828-4564

Ashley antique oak finish table, buffet/hutch, 6 chairs, \$600; large insulated doghouse, \$30. 679-9710

PowerMac 7500/100, extended keyboard, 17" monitor, Mac OS 9.1., loaded w/software, \$150. 489-4483

China cabinet, \$250; many years copper collection, \$300; sofa, \$195. 852-6952

Frigidaire washer and dryer, white, \$375. 655-2229 after 3:30 p.m.

Unused postage stamps, 90, face value, plate blocks, mint sheets and singles. 551-0276

Four cemetery plots at Tri-Cities Memorial Gardens, \$4,000. 256-436-1106

Vintage Craftsman table saw with stand, very heavy, motor needs rewiring, \$150. 851-9418

Trombone King 3B with F-attachment, mutes, mouth pieces, hard case, \$800. 539-5439

Vehicles

1999 Toyota Avalon, V6, white, leather, cruise, ABS, PW, PB, PS, CD/cassette, \$5,800. 828-9494

2006 Accord EX, white/tan, moonroof, loaded, cloth interior, 6-disc CD, 5K miles, must sell, \$21,500. 883-6894

2003 Chevy Corvette convertible, 5K miles, 50th Anniversary Edition, \$41,500. 256-508-8538

2005 Dodge Ram Quad, loaded, 20K miles, \$22,000. 256-337-6298

2005 Mini Cooper S convertible, loaded, including navigation, premium sound, run flats, 24K miles, factory warranty, \$26,500. 882-2776

1964 Ford F100, \$475. 256-339-0970

1996 Cadillac Deville, green, loaded, \$3,200; 1995

Denville Concours, loaded, black, rims, \$2,400. 520-2802

1997 BMW 528i, white, 135K miles, automatic transmission, power sunroof, \$8,700. 722-0498

Bowrider boat, 16', w/65HP Mercury Outboard w/galvanized drive-on trailer, \$900. 353-8229

2002 Honda S2000, silver, black leather, low mileage, premium wheels, lots of extras, \$20,000. 256-828-5527

1998 Chevy S-10 pickup, new engine, radiator, battery, etc., good air & heat, \$3,000. 256-656-9466

2001 Suzuki SV650s motorcycle, blue, 6K miles, \$3,850. 256-503-7327

2005 Acura TL, black w/black leather interior, includes navigation, sunroof, all the extras, 49K miles, \$24,495. 256-784-5299

1999 BMW 528i, black, tan leather, new tires, garage kept, clean, 95K miles, \$12,500. 464-7894

1993 Honda Civic, 12,000 /- miles, sage green, \$13,500 firm. 256-882-2533

1992 Dynatrak fiberglass bass boat, 17', 85HP Yamaha, trailer, new tires, boat cover, 1 fish finder, \$3,200. 880-6271

Wanted

1974 British/Triumph/BSA single cylinder motorcycle or parts, any condition considered. 653-0800/Brace

Propane tank, 250 gallon. 881-5139

Infant car seat, good condition. 256-631-5861

Huntsville Senior slow-pitch softball league is seeking players 55 and over. Contact Garcia at 883-1135

Spare parts for Xerox Work Center M950 and/or Dell 19" flat screen LCD monitor. 883-2757

Rototiller in working condition. 776-1230

Bed frame, mattress and box springs, double size, in excellent condition. 468-4406

Free

Moving boxes, all sizes, including wardrobe boxes w/hanger bars, you pick up in Madison. 772-9387

Shuttle Buddies to meet March 26

The Shuttle Buddies will meet at 9 a.m. Monday, March 26, at Mullins Restaurant on Andrew Jackson Way. For more information, call Deemer Self at 881-7757.



Emmett Given/MSFC

**Marshall engineer
Thad Henry recognized
as 'Center Best'
by NASA Headquarters**

Thad Henry, right, a systems engineer in Marshall's Engineering Directorate, receives a One NASA Peer Award for "Center Best" from Dr. Scott Pace, associate administrator for program analysis and evaluation at NASA Headquarters. Henry led the Exploration Configuration and Data Management team at NASA Headquarters, which developed an easy-to-use change management system for change data in the Constellation Program used by multiple centers. Henry was selected by NASA Headquarters as an outstanding example of using agency teamwork to achieve NASA's goals and how inter-center collaboration leads to mission success. The One NASA initiative has completed its original objectives, and the One NASA approach has been successfully integrated across the agency. For more information about One NASA at the Marshall Center, contact Bruce Askins at 544-1096 or Dave Edwards at 544-4081.

NASA employees can submit questions to the NASA Administrator on InsideNASA

NASA employees are invited to visit the Administrator's Corner on the InsideNASA Web site at <http://www.insidenasa.nasa.gov> to submit questions to Administrator Michael Griffin regarding the agency, its programs and its policies.

complete the online form. To read the administrator's answers to employee questions posted on the site, click on the "Administrator's Answers" link.

To submit a question, click on the "Ask a Question" link and

The InsideNASA site will preserve the anonymity of all submitters unless they choose to provide their name.

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(256) 544-0030
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