MARSHALL STAR

Serving the Marshall Space Flight Center Community June 26, 2003

New evidence suggests powerful 'conveyer belts' drive Sun's 11-year cycle

from the National Space Science and Technology Center

NASA and university astronomers have found evidence that the 11-year sunspot cycle is driven in part by a giant conveyor belt-like, circulating current within the Sun.

The astronomers, Dr. David Hathaway, Robert Wilson and Ed Reichmann of the Marshall Center, and Dr. Dibyendu Nandy of Montana State University in Bozeman, reported their findings the week of June 16 at the annual meeting of the Solar Physics Division of the American Astronomical Society in Laurel, Md. The results were also published in the May 20 issue of the Astrophysical Journal.

The astronomers made their discovery by reviewing the positions and sizes of all sunspots seen on the Sun since 1874. "The sunspots appear in two bands on either side of the Sun's equator," Hathaway said. "Although the individual sunspots come and go from week-to-week, the central positions of the bands in which they appear drift slowly toward the solar equator over the course of each 11-year sunspot cycle."

Previously, scientists believed this equator-ward drift was a wave-like process involving magnetic forces. However, this new evidence suggests this drift is produced by a giant circulation system in which the compressed gases, 125,000 miles below the Sun's surface, move from the Sun's poles to its equator at about 3 mph — a leisurely walking pace. The gases then rise near the equator and turn back toward the poles, traveling in the surface layers where the gas is less compressed — moving at a faster rate

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Step aboard the Space Station in Birmingham

McWane Center features Marshall exhibts

by Tracy McMahan

Visitors can blast off on the summer vacation of a lifetime with "International Space Station: The Earth Tour," a 5,000-square-foot, interactive exhibit appearing at McWane Center in Birmingham until Sept. 1.

McWane — a science center specializing in hands-on exhibits — is collaborating with the Marshall Center on the Space Station exhibition. Visitors can step aboard high-fidelity replicas of Space Station modules and laboratories, experiencing life in orbit from lift-off to landing.

Photo by Emmett Given, NASA/Marshall Center

Dr. Jan Davis, director of the Marshall Center's Flight Projects Directorate and a former Shuttle astronaut, shows Rashad Muhammad, 7, what the International Space Station will look like when completed. Muhammad, a student at C.J. Going Elementary School in Center Point, met Davis during a recent visit to the McWane Center in Birmingham.

The real International Space Station orbits more than 250 miles above Earth and is the third brightest object in the night sky. It is evolving from a construction project

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Evidence

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of approximately 20 to 40 mph. Recent progress in theoretical modeling of the sunspot cycle has emphasized the important role of this circulation.

The speed of this circulation system, called a meridional circulation, changes slightly from one sunspot cycle to the next. The circulation is faster in cycles shorter than the average 11-year period and slower in cycles longer than the average period. This is a strong indication that this circulation acts like an internal clock that sets the period of the sunspot cycle.

The circulation also appears to influence the strength of future cycles, as seen in the number and sizes of the sunspots produced, not in the cycle immediately following, but rather in a two-cycle or 22-year time lag. When the flow is fast, it concentrates the magnetic field at the Sun's poles. These stronger fields are then transported downward into the solar interior where they are further compressed and amplified to become the intense magnetic fields that form sunspots years later.

The Sun is now in the declining phase of the current sunspot cycle that peaked in 2000 and 2001. Because the circulation flow was fast during the previous cycle, the astronomers believe the next cycle will be a strong one, peaking in the years 2010 and 2011.

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to a world-class laboratory — the only lab without an Earth address. The Destiny laboratory, where most science experiments are conducted, was built at the Marshall Center. Alabamians work seven days a week, 24 hours a day in the Payload Operations Center — NASA's Space Station science command post located at the Marshall Center.

To highlight Alabama's contributions to the Space Station program, the Marshall Center is sending exhibits about Station hardware, and NASA has scheduled experts to talk at the museum during selected weekends this summer.

On July 19, Todd May, an engineer who led the team that built a "doorway to the stars" — the new Quest airlock, will speak. The airlock helps crews exit the Space Station for Extravehicular Activities, also known as EVAs and space walks.

On Aug. 30, visitors can hear about Space Station science from Dr. Bill Carswell — a senior research scientist at the University of Alabama in Huntsville. Carswell has been involved with space experiments for 15 years and currently is working on a furnace that will process metals and alloys on the Space Station.

A Marshall Center exhibit will allow visitors to get their hands on science - the same way the Space Station crew conducts science inside the Microgravity Science Glovebox. Working inside the sealed glovebox by using gloves attached to the front, the crew can handle fluids, flames and other substances safely. The glovebox exhibit includes a mockup of mission control, so museum visitors can simulate the communications from the ground control to astronauts doing science on the Space Station.

Visitors will view Life Support System Racks and learn the way wastewater may someday be recycled for reuse by the Station crew. Five racks connected together include two water-recycling racks, one air recycling rack and the Station bathroom and shower.

A third display will feature NASA's Technology Transfer Program by showing numerous examples of commercial products used by Americans everyday. These products — smoke detectors, a bicycle racing helmet, cordless tools and golf clubs — were created or enhanced using technology from the space program.

As part of their Space Station tour, McWane guests will use simulators to train for their space mission and experience Shuttle lift off to the Station in a special theater. Once in orbit, guests step inside a mockup that resembles the real Space Station, which has been under assembly by the United States and 15 other nations since 1998. This international home in space has grown from the size of an apartment to a more spacious facility roomier than a three-bedroom house. Eventually, it will be as big as a five-bedroom house with almost an acre of solar panels.

Aboard the Station, McWane Center visitors learn how astronauts eat, sleep, shower, go to the bathroom and keep fit in space. Then they enter the Station's Destiny laboratory and go to work. Floor-to-ceiling racks containing equipment, experiments, stowage, crew systems and maintenance systems expose visitors to day-to-day science activities. After a full day of space-work, guests experience a virtual return to Earth in the Crew Return Vehicle Theater.

Built by U.S. Space Enterprises in Charlotte, N.C., "International Space Station: The Earth Tour" will travel to venues across the United States over the next six years and is expected to attract as many as 5 million visitors. The national exhibit sponsor is Goodrich, which developed space suits for NASA's Mercury astronauts and produces the wheels and brakes for the Space Shuttle. For more information on admission to the McWane Center, the exhibit and the Space Station, to to http://www.mcwane.org or http://www.scipoc.msfc.nasa.gov/.

The writer, employed by ASRI, supports the Media Relations Department.

One NASA brings benefits to Agency's astrobionics program

Editor's note: This is part of a series of articles highlighting the One NASA initiative at each center.

Ames Research Center release

Biological and medical technologies across NASA are stronger now, thanks to a NASA-wide teaming effort called 'astrobionics.' The program develops new technology and hardware for space- and ground-based research, as well as providing the latest information about its work across the Agency.

Ames Research Center/Marshall Imaging

Hines

Astrobionics supplies biological technology know-how to NASA scientists, engineers and managers. It functions as an integrated program/project team providing a NASA-wide technology capability in support of NASA's Office of Biological and Physical Research. The NASA team brings people together to collaborate not only within the Agency, but it also links NASA with peers in other government agencies, academia and industry. Astrobionics assists such key NASA programs as fundamental space biology, bioastronautics, astrobiology and biomolecular systems research.

"Particularly in biological technologies, there are a lot of commonalities that cross many disciplines at many NASA centers," said John Hines, manager of the astrobionics group at NASA Ames Research Center. "Because many groups and areas can use the same technologies, and there are not enough resources to conduct all these activities, this 'One NASA' effort facilitates teaming and leveraging while breaking down historical barriers that blocked collaboration among centers."

We've created project teams to identify common technology needs across multiple programs and across multiple NASA centers," Hines continued. "The scope of the program includes project management, technology and product definition, technology development and application."

The program presently includes participants at Ames, Johnson Space Center in Houston; the Jet Propulsion Laboratory in Pasadena, Calif.; and NASA Headquarters in Washington. In addition, discussions recently began about the future use of the astrobionics effort at the Marshall Center; Glenn Research Center in Cleveland, Ohio; and Kennedy Space Center in Florida.

"A primary example of the 'One NASA' concept within astrobionics is the Biomolecular Systems Research Program (BSRP)," said Hines, who also is BSRP program manager. "BSRP is the Agency's lead for research into molecular and nano-scale biological technologies and represents the NASA element of a collaboration between NASA and the National Cancer Institute. The program manager is at Ames. The deputy, Darrell Jan, is at the Jet Propulsion Laboratory, and the enterprise scientist is at NASA Headquarters. BSRP hopes to expand to support research at Johnson, Marshall and Glenn, in addition to Ames and JPL. Products resulting from the BSRP can be used in a variety of biological and medical applications."

To develop a particular technology, astrobionics works either entirely within NASA or with external partners. After researchers have decided that a potential technology has merit, astrobionics may develop working prototypes for testing. Successful technologies then can be transitioned to flight and other applications hardware developers for final implementation. By its very nature, the astrobionics sequence of steps creates liaisons between programs and projects and supports the 'One NASA' concept. The collaborations that result can be helpful to all parties by providing cost sharing and other benefits.

Recently, astrobionics began a new project, the Technology Integration Agent (TIA). TIA includes a team of scientists and technologists who find new technologies and know-how and decide if these could be useful in ongoing or future space efforts. TIA people reside at Ames, JPL, Johnson and NASA Headquarters.

Astrobionics may build new hardware that scientists can use to conduct research during space flight.

For example, the astrobionics team is developing advanced technologies to monitor astronaut health during space flight and ground tests. The monitoring program is called the Smart Healthcare Management System. One of its systems, Lifeguard, measures human vital signs. It was recently delivered to Johnson Space Center for use during human tests in an underwater laboratory off the Florida coast.

The astrobionics group also is developing advanced, shoebox-sized biological payloads for use in small autonomous satellites that are part of the Fundamental Space Biology Program. Scientists intend to use these payloads for genetics studies of the effects of microgravity and space radiation on biological specimens such as yeast, various cells and nematodes.

"The interesting thing about these biological payloads is that you have to do all your analysis in space, and transmit data back to Earth because no samples will be returned," Hines said.

Job Announcements

MS03C0108, Supervisory, AST, Aerospace Flight Systems. GS-0861-15, Flight Projects Directorate, Flight Systems Department, Multi-Use Payload Group. Closes June 27. Contact: Carolyn Lundy at 544-4049.

MS03C0113, AST, Engineering Project Management, Systems Management Office. GS-0801-14. Closes June 30. Contact: Carolyn Lundy at 544-4049.

MS03C0114, Safety & Occupational Health Specialist. GS-0018-12, Safety & Mission Assurance, Industrial Safety Department. Closes June 30. Contact: Rita Evans-McCoy at 544-7507.

MS03C0115, Quality Assurance Specialist. GS-1910-12, Safety & Mission Assurance Department, Advanced Projects Assurance Office. Closes June 30. Contact: Rita Evans-McCoy at 544-7507.

MS03N0116, AST, Experimental Facilities Development. GS-0801-13, Center Operations Directorate, Facilities and Engineering Department, Operations Maintenance Group. Closes July 3. Contact: Dana Blaine at 544-7514.

MS03N0117, AST, Aerospace Flight Systems. GS-0861-13, Science Directorate, Microgravity Science & Applications Department, Microgravity Projects Group. Closes July 3. Contact: Debbie Longeddy at 544-2308.

MS03N0118, AST, Aerospace Flight Systems. GS-0861-14, Science Directorate, Microgravity Science & Applications Department, Microgravity Projects Group. Closes July 3. Contact: Debbie Longeddy at 544-2308.

MS03C0119, Supervisory, AST, Technical Management. GS-0801-15, Flight Projects Directorate, Business Management Office. Closes July 3. Contact: Carolyn Lundy at 544-4049.

MS03D0120, Information Technology Specialist (DATAMGT). GS-2210-14, Center Operations Directorate, IFM Integration Project Office. Closes July 7. Contact: Dana Blaine at 544-7514.

MS03D0121, Information Technology Specialist (APPSW). GS-2210-14, Center Operations Directorate, IFM Integration Project Office. Closes July 7. Contact: Dana Blaine at 544-7514.

Special thank yous

To my Marshall family, I say "thank you" and express my appreciation for the prayers and donated leave during my recent surgery and rehabilitation. I also extend a special thank-you to my immediate Marshall family: AD42T, AD42, AD40, AD01, and Cortez Transportation for the many acts of kindness — the visits, wonderful cards, phone calls and especially your much coveted prayers. You demonstrated wonderful encouragement. During such a time, your co-workers are truly your brothers and sisters. Thank you so very much and may God richly bless each of you.

— Linda Wilson
AD42T/Traffic Management

Our family would like to thank the Marshall Center family for the continuous support given to our mother, Linda Amesbury, and to us during her two-year battle with cancer. We will never forget your thoughtfulness in giving and lifting us all up in your prayers and the phone calls just to say, "Hi, I'm thinking of you." The beautiful flowers never stopped coming and always brightened her day. Thank you for the donated leave so that she was able to take care of her medical needs without worry. Your cards, sometimes with humor and always encouraging words, were all opened, read and treasured. The generosity in your giving was overwhelming and greatly appreciated. Thank you again for all that you have done to touch our mother's life and ours.

— The family of Linda B. Amesbury

Photo by David Higginbotham, NASA/Marshall Center

Having lunch with Art

Dallas Dai spent his 12th birthday having lunch with former Center Director Art Stephenson on June 11. Dai, a seventh-grader at Hartselle Junior High School, won the lunch plus a tour of the Marshall Center through a Combined Federal Campaign silent auction. Dai's stepfather, Bruce Wiegmann, a Marshall employee, placed the high bid in the auction for "A Day at NASA." Auction proceeds went to the CFC.

Center Announcements

Center Director's Update will be July 1

Marshall Director David King will host a "Center Director's Update" at 10 a.m. July 1 in Morris Auditorium.

Dial-in and VPN require security registration

Marshall team members who use the Virtual Private Network software to connect to the Marshall Private Network, or who dial directly into the network from home or TDY, must apply for a MSFC RSA SecurID Token in June. For more information, including frequently asked questions and an updated schedule to apply, go to http://www1.msfc.nasa.gov/INSIDE/announcements/dial_in_token.html.

Thrift Savings Plan closes June 30

The Thrift Savings Plan open season closes June 30 for employees who want to begin, increase or decrease, contributions to their account. For more information, see "Inside Marshall" or call 544-5654 or 544-7536.

Chandra X-ray Observatory Symposium set for September

The Chandra X-ray Observatory Program will host a three-day symposium Sept. 16-18 at the Huntsville Marriott. A banquet will be Sept. 17 at the U.S. Space & Rocket Center. The Marshall Center's Chandra Program is sponsoring the event. For more information, go to http://mi.msfc.nasa.gov/chandra/index.html or call 544-5468 or 544-0570.

Joint Propulsion Conference July 20-23

The American Institute of Aeronautics and Astronautics has provided a special registration discount for Marshall civil service employees attending the Joint Propulsion Conference July 20-23. To register, visit http://www.aiaa.org/events/jpc-nasa-marshall. Employees will need to submit a MSFC form 1265 to EODD/CD20. Deadline for registration is July 1. For more information, call Chris Robinson at 544-1422.

Marshall Association scholarship applications due July 31

The Marshall Association will award two college scholarships to dependents of Marshall employees or retirees in August. A technical and a non-technical scholarship will be awarded to incoming September freshmen. The association will accept applications until July 31. To receive or submit a completed application form, call Cliff Bailey at 544-5482.

Auto shop closes June 30-July 7

The Marshall Center auto shop will be closed June 30-July 7. For more information, call Bill Mayo at 544-7564.

Disabilities awareness training mandatory for Center employees

Disabilities Awareness Online Training is a mandatory course for all Marshall civil service employees. The course is designed to heighten awareness and knowledge of regulatory requirements under the Rehabilitation Act and to help employees understand special needs of disabled co-workers. The training must be completed by July 31 and is available at https://solar.msfc.nasa.gov.

Full Cost Initiative Web site available

The Full Cost Initiative Web site has answers to questions on "all things Full Cost." For the latest information, go to https://fullcost.hq.nasa.gov.

Marshall Retirees Association offering university scholarship

Students who are direct descendants of a Marshall Center retiree can apply for the NASA-MSFC Retirees Association Scholarship at the University of Alabama in Huntsville. The $1,000 scholarship will be awarded for the academic year beginning in the fall. For more information, call UAH Financial Services at 824-2755.

Astrionics Retirees to meet first Monday of each month

Marshall Center Astrionics retirees meet at 8:30 a.m. on the first Monday of each month at Gibson's Bar-B-Q at 3319 Memorial Parkway Southwest in Huntsville. For more information, call Jim Lewis at (256) 353-1557.

Instrumentation Division of Astrionics Lab to meet Tuesday

Retirees and friends of the Instrumentation Division of the Astrionics Lab will meet at 11 a.m. Tuesday at the Redstone Golf Course coffee shop. For more information, call Tom Escue at (256) 232-1549.

Marshall barbershop closed July 3-4

Chatterbox Barber & Styling at the Marshall Center will be closed July 3-4 and reopen at 8 a.m. July 7. For an appointment, call 881-7932.

Marshall Child Development Center accepting applications

The Marshall Child Development Center is accepting applications for its waiting list. Eligible children include those of NASA employees, retired NASA employees, NASA contractors and grandchildren of NASA employees. A $15 fee is charged to be placed on the waiting list. The center accepts children aged 6 weeks-5 years or until entering kindergarten. Operating hours are 6:45 a.m.-5:45 p.m. weekdays. For more information, go to http://mcdc.msfc.nasa.gov or call Kelli Brott at 544-8609.

Marshall Mail Operations guidelines in effect

Only official mail and packages will be handled through Marshall Mail Operations and Central Receiving. Personal mail should be deposited in the U.S. Postal Service office in Bldg. 4200, Room G-39, or in designated post office drop boxes. Incoming personal mail or packages should be sent to a personal post office box or to a home address.

Employee Ads

Miscellaneous

★ Fusion Subwoofer system, two FPW-1200 speakers, 500-watt amplifier, Subwoofer crossover, all for $400. 256-586-7181/Scott
★ Large cream color sofa, $50. 316-2902
★ Steel bunk bed, lower bed rotates to make couch, including foam mattress. 881-6040
★ Clayton Marcus sleeper sofa, $400. 256-653-7792
★ Maternity clothes, summer and fall, casual and dressy, medium and large. 859-4367
★ Sears Craftsman industrial tool chest, 6 drawers w/ball bearing sides, hinged top, lock, $475. 539-2051
★ King-size waterbed,headboard, mattress, $100; dining room suite, $750; laminate wood flooring, $35 box. 837-2223
★ Tennis ball machine, new; lobster w/remote control, two cases of balls. 772-8744
★ Two wing-back chairs, gold floral pattern. 881-0457
★ Peavey Series 260-amp head, 130 Watts, 12" bass speaker. 536-4506
★ Pie-cut lazy-susan, 24", new, $55; white satin wedding basket set, 6-piece, $125. 682-9727
★ 2002 Harley-Davidson 883R, only year made, many upgrades, under 7K miles, $8,000. 509-9550
★ Twin-sized daybed, mattress, bedspread w/ matching cushion, $100. 533-4824
★ Seven Gameboy games, $3 each; magnifier, $2; light, $2; carrying case, $5. 430-6897
★ Kenwood car CD player, 10-disc, $75 obo. 520-2656
★ Two twin beds w/wood frames & mattresses, may be bunked, $100. 772-2375
★ Bundy II alto saxophone with case, reeds, $500. 881-0221
★ Kasson pool table, 8' w/1" slate, Victorian style, $1,950. 880-6563
★ UUC Motorworks transmission bushings/ Tranny mount enforcer kit for BMW E46 manual, unused, $70. 922-1424
★ Kenmore washer and dryer, 5 yrs. old, $300. 603-4399
★ Murray 14HP garden tractor, twin mulcher blades, regular maintenance, $275. 534-6166
★ Packard Bell PC, 233MHz, 32MB, 4.3GV, 15" monitor, Canon printer, $100. 772-4984
★ DP Gympac 2000 fitness system w/ accessories and instructions, $50. 852-8320
★ Two CKC Registered Szhitu puppies, male and female, 8-weeks old, $200 each. 256-778-7925
★ Digital SLR body only, Canon D30, 3.25MP, uses all EF auto-focus lenses, CF memory. 256-830-6655
★ SanDisk secure digital memory card, 64MB, unopened, $22.50; Nokia cell phone, Model 5160, $15. 683-7683
★ Swimming pool/dock slide, $400. 256-652-9739
★ Century Ultra camper shell, fits Nissan Frontier crew cab, $300. 536-4326
★ Rickenbacker 350V63 vintage series electric guitar. Long-scale version of John Lennon's. W/case, acces. 306-0700

Vehicles

★ 1990 Nissan Maxima SE, auto, white/cloth interior, sunroof, 168K miles, needs maintenance, $1,250. 651-1288
★ 2002 Chevy Cavalier, 30K miles, 2-door, a/c, 5-speed, CD, blue, 32-35 mpg, warranty, $6,500. 851-1854
★ 2002 Mazda B2300 truck, red, A/C, P/S, AM/FM, $8,600. 256-830-8934
★ 1999 Ford Ranger XLT Sport, supercab, 4-door, 6-cyl., CD, cruise, PW/PL, bed cap, $8,750. 859-0729
★ 1973 El Camino Custom Sport, big block, body good condition, interior needs restoration, $3,900. 651-3802
★ 1992 Ford Explorer Sport, 2-door, 4x4, 157K miles, $2,850. 880-8321 after 4 p.m.
★ 1997 Chevy Silverado, extended cab, 4WD, loaded, tow pkg., 110K miles, $9,800. 351-1754
★ 2002 Ford Escape XLT, leather, sunroof, towing pkg., 4WD, loaded, 13K miles, $20,500. 830-1844/655-2056
★ 1996 Corvette Collector's Edition, LT1, auto, 75K miles, loaded, new tires, silver/red interior, $17,000. 256-232-0246
★ 1995 Dodge Caravan SE, automatic, 162K miles, blue w/gray interior, V6, $2,500. 256-880-3337
★ 2002 Toyota 4-Runner, V6, TRD, Superchgd, 100K warranty, 2WD, new tires, $23,000. 256-227-4121/773-1405.
★ 1987 GMC 4x4 truck, stepside, 305/V8 w/ TH400, dual tanks, 4" lift, big tires, $3,800. 683-9364
★ 1998 Ford Escort ZX2, 5-speed, 96K miles, one-owner, $2,950. 325-0672/683-4976
★ 1991 Acura Legend, dark blue, V6, 4-door, 5-speed, a/x, PW/PL/PS, $4,750. 828-4823
★ 2001 Chevy Blazer, 4-door/4WD, white, loaded, one-owner, $15,900. 961-9739/653-4333
★ 1999 Toyota Avalon XL, moonroof, CD/ cassette, leather, power seats, side airbags, 72K miles, $13,900. 880-9025
★ 1990 Mustang LX, 4-cyl., 5-speed, a/c, cruise, PW/PM/PDL, garaged, maintenance records, $2,450 firm. 256-753-2278
★ 1997 Buick LaSabre Limited, maroon, 84K miles, $7,700. 655-3243/830-0757 after 5 p.m.
★ 1995 Mercury Villager minivan, one-owner, 114K miles, $3,750. 489-8029
★ 1996 Honda Accord EX sedan, silver, 105K miles, auto, CD, power moonroof, $7,400. 880-5182
★ 2003 Mitsubishi Eclipse, all-power, low mileage, sunroof; 1997 Buick LeSabre, all-power. 859-2022
★ 2000 Nissan Frontier crew cab, auto, PW/ PDL, tilt, cruise, 79K miles, silver, bedliner, $12,700. 880-9025

Wanted

★ Mini-bike or mini-bike frame, 60s or 70s vintage, running or not. 883-9875

Found

★ Pair of sunglasses; pair of prescription glasses in NASA Gift Shop. Call 544-3623 to claim.

Free

★ Two puppies, 7-wks.-old, female, one white, one white w/black spots, Husky/Malamute/ Spitz mix. 256-753-2459

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