

Space News Roundup

Vol. 34

January 6, 1995

No. 1

Hubble replacement camera selected

Telescope continues string of discoveries with new Saturn storm

As Hubble Space Telescope images continue to offer scientists invaluable data about the planets in our solar system and the universe, action has begun to prepare for a third servicing mission.

NASA Associate Administrator for Space Science Wesley Huntress announced the selection of a proposed scientific investigation that includes the development of a new \$30 million camera that will allow astronomers to make even more detailed observations.

NASA will work with Dr. Holland

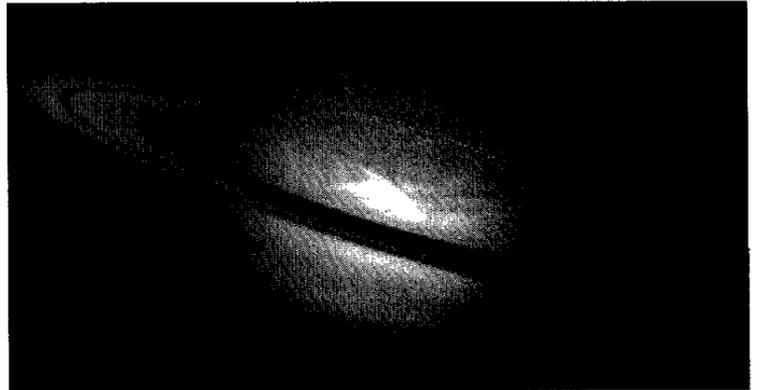
Ford of Johns Hopkins University to negotiate a contract for the new camera, called the Hubble Advanced Camera for Exploration. The new camera is planned for installation on HST by shuttle astronauts during the third servicing mission scheduled for November 1999.

The new camera's capabilities will be a major enhancement to Hubble's present camera, the Wide Field and Planetary Camera-2 according to Dr. Edward Weiler, HST program scientist. WFPC-2 was installed into the orbiting space

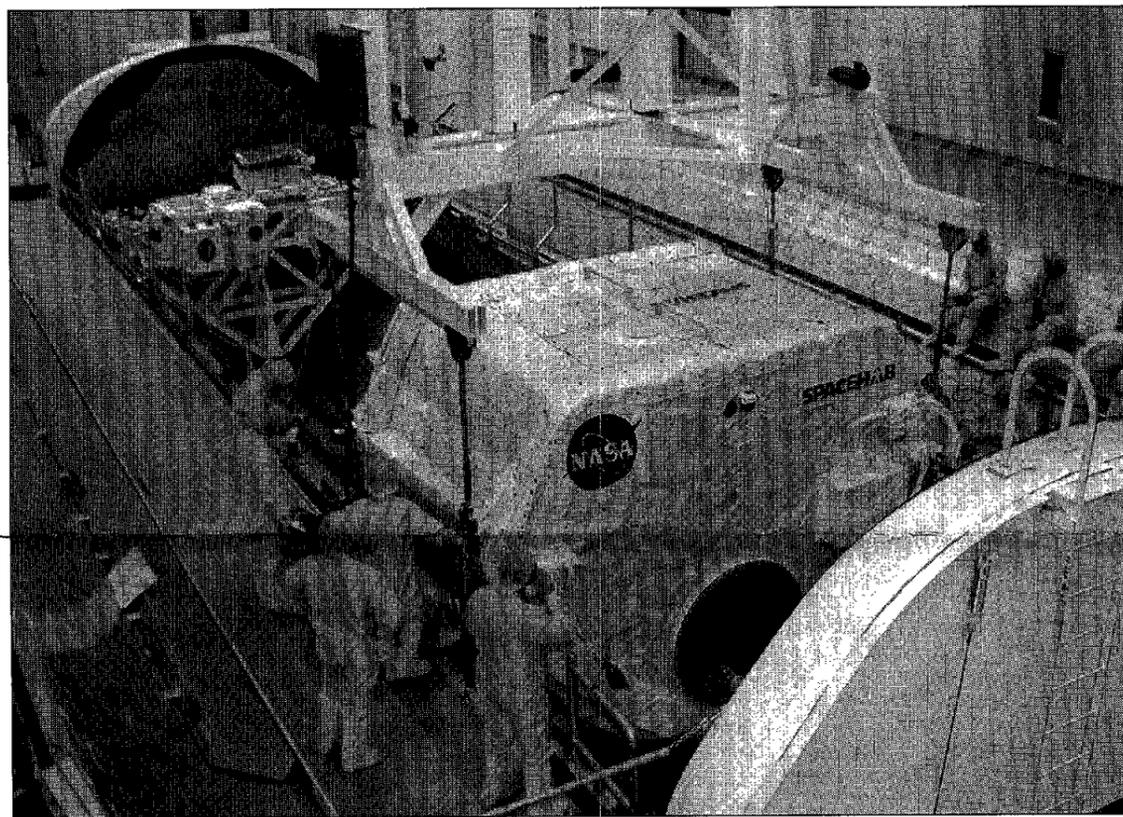
telescope by shuttle astronauts during the December 1993 servicing mission.

"HACE not only will maintain but will greatly enhance HST's superlative imaging capabilities well into the next century," said Weiler. "It will allow astronomers to make even more detailed observations of black holes, quasars and galaxies which formed immediately after the Big Bang, as well as solar system objects."

Plans call for the HACE to be Please see **SATURN**, Page 4



SATURN STORM—This Hubble Space Telescope image of Saturn shows a rare storm that appears as a white arrowhead-shaped feature near the planet's equator. HST is providing new details about the effects of Saturn's prevailing winds on the storm.



STS-63—Kennedy Space Center technicians prepare to transfer the Spacehab-3 module and other experiments on the Hitchhiker crossbay carrier into the payload canister. The payloads were moved from the Operations and Checkout Bldg. to *Discovery's* cargo bay in the orbiter processing facility.

Discovery rolls over, moves to pad next week

Kennedy Space Center employees resumed work Tuesday toward a Feb. 1 launch of STS-63, the first shuttle rendezvous with Russia's Mir

The eight-day mission will feature the first flight of the Charlotte robot inside Spacehab commercial middeck module, making its third flight, and the deployment and retrieval of the Shuttle Pointed Autonomous Research Tool for Astronomy.

Discovery rolled over from the Orbiter Processing Facility to the Vehicle Assembly Bldg. late Wednesday. It will be bolted to its external tank and solid rocket boosters atop the launch platform, then rolled out to Launch Pad 39B

this Wednesday.

Launch tentatively is set for about 11:51 p.m. CST Feb. 1. Shuttle managers plan to meet Jan. 18 for the

flight readiness review, during which an official launch date will be set.

Commander Jim Wetherbee, Pilot Eileen Collins and Mission Specialists Mike Foale, Bernard Harris, Vladimir Titov and Janice Voss will travel to Florida Jan. 18 to check out the 100-ton spaceplane during the Terminal Countdown

Demonstration Test. Meanwhile, *Endeavour* and *Atlantis* are both being serviced in the OPF. *Endeavour* is being prepared for an early March launch on

Please see **COLUMBIA**, Page 4



UARS confirms humans causing Antarctic ozone hole

Three years of data from NASA's Upper Atmosphere Research Satellite have provided conclusive evidence that human-made chlorine in the stratosphere is the cause of the Antarctic ozone hole.

UARS instruments have found chlorofluorocarbons—human-made products used in electronics and refrigeration systems—in the stratosphere. The satellite's global data set also has traced worldwide buildup of stratospheric fluorine gases corresponding to the breakdown of CFCs, according to NASA scientists.

For many years, scientists have warned that the widespread use of

CFCs in refrigeration, spray cans and foam packaging was responsible for stratospheric ozone loss. The stratospheric ozone layer protects people, animals and plants from too much ultraviolet sunlight. The Antarctic ozone hole is a dramatic example of stratospheric ozone loss, which most scientists believe is a new phenomenon caused by the release of chlorine from human-made chlorofluorocarbons.

In the past few years, some debate has occurred over the origin of ozone-destroying chlorine. Sea spray and volcanic gases have been put forth as possible sources for chlorine reaching the stratosphere.

The UARS data have ended that debate.

"These new results confirm our theories about CFCs," said Dr. Mark Schoeberl, UARS project scientist. "The detection of stratospheric fluorine gases, which are not natural, eliminates the possibility that chlorine from volcanic eruptions or some other natural source is responsible for the ozone hole."

In addition to CFCs, UARS has detected hydrogen fluoride, a product of the chemical breakdown of CFCs, in the stratosphere.

"Hydrogen fluoride has no natural source, it is not produced by volcanic eruptions or salt spray," said Dr.

Anne Douglass, UARS deputy project scientist. "Furthermore, scientists can calculate how much chlorine in the stratosphere is man-made using the hydrogen fluoride data." This calculation shows that almost all of the chlorine in the stratosphere comes from human-made chlorofluorocarbons.

The UARS measurements of chlorofluorocarbons were made with the Cryogenic Limb Array Etalon Spectrometer, operated by Dr. Aiden Roche of Lockheed Palo Alto Research Laboratory. The hydrogen fluoride measurements were made with the Halogen Occultation Experiment, operated by Dr. James

Russell of Langley Research Center.

The UARS data set also has provided a clearer picture of the overall chemistry of the stratosphere. UARS instruments have tracked the levels of chlorine "source" gases (CFCs), intermediate products (chlorine monoxide) and reservoir gases (hydrogen fluoride, hydrogen chloride and chlorine nitrate).

Each year since 1979, the ozone layer thins dramatically over Antarctica. This sudden change in the ozone was first noticed by researchers in Antarctica and soon confirmed by NASA satellites. The unpredicted Antarctic ozone loss

Please see **UARS**, Page 4

Sulfur at impact site holds clues to dinosaur's demise

NASA scientists now believe it was the sulfur-rich atmosphere created in the aftermath of an immense asteroid collision with Earth 65 million years ago that brought about a global freeze and the demise of the dinosaurs.

The impact of this large asteroid hit a geologically unique, sulfur-rich region of the Yucatan Peninsula in Mexico, according to planetary geologist Adriana Ocampo and atmospheric scientist Dr. Kevin Baines, both of the Jet Propulsion Labor-

atory's Earth and Space Sciences Division.

They estimate the impact kicked up billions of tons of sulfur and other materials and was between 10,000 to 50,000 times more powerful than the comet Shoemaker-Levy 9 impact on Jupiter last July.

The researchers and colleagues, Dr. Kevin Pope of Geo Eco Arc Research and Dr. Boris Ivanov of the Russian Academy of Sciences, have co-authored a paper detailing Please see **ASTEROID**, Page 4



Quality meet eyes NASA today

NASA and the American Society for Quality Control, will sponsor a conference on Quality in the Space Industry from 8 a.m.-6 p.m. Feb. 27-28 at South Shore Harbour Resort and Conference Center.

Current issues affecting quality of product and services will be examined by representatives from major space program and defense contracts, NASA Headquarters and field centers, and suppliers to both space and defense industry.

The keynote speaker will be Frederick Gregory, NASA associate

administrator for the Office of Safety and Mission Assurance.

The two-day conference will feature six sessions. Each session will focus on specific areas including, response to the new NASA environment, integrated product teams, ISO 9000 implementation, software issues, quality liaison panel report, and quality management in a changing environment.

Civil servants may register through their organizational training coordinator. For details, call Glen VanZandt at x33069.

JSC

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday-Thursday and 9 a.m.-3 p.m. Friday. For more information, call x35350 or x30990.

Moody Gardens: Discount tickets for two of three different attractions: \$9.50

Space Center Houston: Discount tickets: adult, \$8.75; child (3-11), \$7.10. **Metro tickets:** Passes, books and single tickets available.

Movie discounts: General Cinema, \$4.75; AMC Theater, \$4; Loew's Theater, \$4.75.

Stamps: Book of 20, \$5.80

JSC history: *Suddenly, Tomorrow Came: A History of the Johnson Space Center*, \$11.

JSC

Gilruth Center News

Sign up policy: All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a NASA badge or yellow EAA dependent badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

EAA badges: Dependents and spouses may apply for photo identification badges from 7 a.m.-9 p.m. Monday-Friday; and 8 a.m.-4 p.m. Saturdays. Dependents must be between 16 and 23 years old.

Weight safety: Required course for employees wishing to use the weight room is offered from 8-9:30 p.m. Jan 10 and Jan 26. Pre-registration is required. Cost is \$5.

Defensive driving: Course is offered from 8:15 a.m.-3 p.m. Saturday. Next class is Feb. 11. Cost is \$19.

Aerobics: High/low-impact class meets from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is \$32 for eight weeks.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays.

Aikido: Martial arts class meets from 5-7 p.m. Tuesdays and Wednesdays. Cost is \$25 per month. New classes begin the first of each month.

Tennis league: A fall tennis league may be started if there is sufficient interest. Contact the Gilruth Center at x33345.

Country dancing: Beginners class meets from 7-9 p.m.; advanced class meets from 8:30-10 p.m. Partners are required. For additional information, contact the Gilruth Center at x33345.

Ballroom dancing: Ballroom dancing classes begin Jan 5th. Cost is \$60 per couple. For additional information call the Gilruth Center at x33345.

Fitness program: Health Related Fitness Program new class begins Jan 9, includes a medical examination screening and a 12-week individually prescribed exercise program. For more information, call Larry Wier at x30301.

JSC

JSC

Dates & Data

Today

Cafeteria menu: Special: meat sauce and spaghetti. Total Health: baked potato. Entrees: rainbow trout, liver and onions, beef cannelloni, ham steak, fried cod fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: steamed broccoli, breaded okra, cut corn, black-eyed peas.

Saturday

Bicycle Club: The JSC bicycle club will meet at 8:00 a.m. at Krogers in League City for a 50-mile ride. For additional information call Juliette Wolfer at x38459.

Sunday

Bicycle Club: The JSC bicycle club will meet at 8:00 a.m. at the Bike Barn for a 14- or 35-mile ride. For more information call Juliette Wolfer at x38459.

Monday

Total Health: The first Health Related Fitness course of the year begins Jan. 9. For additional information, call x30301 or x30302.

Bicycle Club: The JSC bicycle club will meet at 7:00 p.m. Jan. 9 at the Clear Lake Park meeting room. For more information call Juliette Wolfer at x38459.

Cafeteria menu: Special: turkey and dressing. Total Health: herb flavored steamed pollock. Entrees: breaded veal outlet, chicken fajitas, steamed pollock, beef, French dip sandwich. Soup: beef and barley. Vegetables: Brussels sprouts, mixed vegetables, egg plant casserole, winter blend vegetables.

Tuesday

Cafeteria menu: Special: pepper steak. Total Health: barbecue chicken. Entrees: baked lasagna, pork

chop and fried rice, turkey a la king, baked chicken, fried cod fish, French dip sandwich. Soup: black bean and rice. Vegetables: breaded squash, steamed spinach, baby carrots, navy beans.

Wednesday

Astronomy seminar: The JSC Astronomy Seminar will meet at noon Jan. 11 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For more information, call Al Jackson at 333-7679.

Toastmasters meet: The Space-land Toastmasters meets at 7 a.m. Jan 11 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Darrell Boyd, x36803.

Bike Club: The JSC bicycle club will meet for a 1.1- and a 1.6-mile loop at 5:30 p.m. Jan. 11 behind the Grumman Bldg. at Ellington field. For more information call Juliette Wolfer at x38459.

Cafeteria menu: Special: Mexican dinner. Total Health: steamed pollock. Entrees: broccoli cheese quiche, spare ribs and sauerkraut, steamed fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: Spanish rice, pinto beans, peas, broccoli.

Thursday

Cafeteria menu: Special: hamburger steak with onion gravy. Total Health: baked potato. Entrees: corned beef, cabbage and new potatoes, chicken and dumplings, meat ravioli, French dip sandwich. Soup: broccoli cheese and rice. Vegetables: navy beans, cabbage, cauliflower, green beans.

Friday

Cafeteria menu: Special: tuna noodle casserole. Total Health: broiled chicken breast. Entrees: dev-

iled crabs, broiled pollock, liver and onions, broiled chicken with peach half, Reuben sandwich. Soup: seafood gumbo. Vegetables: Italian green beans, cauliflower au gratin, steamed rice, vegetable sticks.

Jan. 14

Bicycle Club: The JSC bicycle club will meet at 8:00 a.m. Jan. 14 at the Bike Barn for a 25-, 40- or a 65-mile ride. For more information call Juliette Wolfer at x38459.

Jan. 18

Astronomy seminar: The JSC Astronomy Seminar will meet at noon Jan. 18 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For additional information, call Al Jackson at 333-7679.

Toastmasters meet: The Space-land Toastmasters meets at 7 a.m. Jan 18 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Darrell Boyd, x36803.

Bike Club: The JSC bicycle club will meet for a 1.1- and a 1.6-mile loop at 5:30 p.m. Jan. 18 behind the Grumman Bldg. at Ellington field. For more information call Juliette Wolfer at x38459.

Jan. 21

Career Workshop: A Career Transition Workshop will be held from 9 a.m. to 4 p.m. Jan. 21 in the Bayou Bldg. at University of Houston Clear Lake. Registration deadline is Jan. 18. For additional information call Don Cravey at x30148.

Feb. 1

Golf Association: Sign up for the 1995 golf association league will begin in Feb. To join or for additional information call Baker at x31682, Ramirez at 244-8172, or Lokhovst at x33313.

Swap Shop

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Ads may be run only once. Send ads to Roundup Swap Shop, Code AP2, or deliver them to the deposite box outside Rm. 181 in Bldg. 2. No phone or fax ads accepted.

Property

Rent: Lake Placid mobile home on Guadalupe river, near New Braunfels & Seguin, sleeps 6, winter, \$65/mo + \$350/wkly. 326-3706.

Rent: Room in Clear Lake home, private bath, garage, \$300/mo + 1/2 utilities. 286-8434.

Lease: 1 bedroom condo, Baywind II, Clear Lake, W/D connections, FPL, no pets, unit JAB, \$425/mo + \$425 deposit. Charli, 488-8102.

Sale: 5 acres, cleared, Alvin, TX, located on major highway, \$25.9k. x30737.

Sale: Heritage Park, 3-2-2, new roof, A/C, inside/outside paint, fully landscaped, beautiful spiral staircase leads to loft/gameroom, 2000 sq ft, \$91.5k/obo. Jon, 996-6062.

Sale: Santa Fe/Alta Loma, Ave. E, 2.5 acres, country environment, mineral rights, front 220' x 495' depth. 337-1311.

Sale: Friendswood, TX, 2.69 acres, utilities available, ready to build, \$49.5k. Howard, x37346.

Sale: Dickinson, Oak Hollow, 4-2-3, 2700 plus square ft, single story, Kustom Kastle, many features, 125' x 200', trees, \$165k. Ernie, 534-3885.

Cars & Trucks

'92 Mazda Miata MX-5, red/black, B-package, 24k mi, ex cond, \$16k/obo. James, x31064 or 334-1766.

'85 Ford Tempo GL, runs well, new tires, \$999. 334-1098.

'77 Chevy Luv pickup, A/C, tool box, 30k mi on new engine, runs great, \$1.1k. Danny, x47184 or 992-3827.

'79 Alfa Romeo Spyder Veloce, 90k mi, Weber conversion, yellow/black, good cond, \$1.9. Mark, x37370.

'85 Porsche 944, black, 5 speed, sunroof, A/C, AM/FM/cass, ex cond, \$4995. x35180 or 326-3706.

'85 Nissan Sentra, 5 speed, A/C, 2 dr, silver/gray, 140k mi, \$1.5k/obo. 332-2571.

'86 Mazda RX7 GXL, leather, A/C, power, sunroof, ex cond, 85k mi, \$4.4k. x36604 or 482-7156.

'86 Mercury Topaz GS, silver, 4 dr, 1 owner, ex cond, PS/PB, tilt, cruise, AM/FM/cassette, 55k mi, \$2,265. Bob, x33149 or 488-7036.

'82 Chevy Chevette, runs great, good work car, \$500/obo. 485-4008.

Cycles

Boy's bike 20", good cond, \$30. Sam 332-3168.

'85 Honda Interceptor 500, VF500F, beautiful cond, garage kept & covered, 7.5k mi, w/helmet & cover, \$1,950. Keith, 484-4349.

Boats & Planes

'86 Celebrity, 19', 230 hp Mer-cruiser I/O, full instrumentation & canvas, recently re-upholstered, fully outfitted, Sportsman trailer, ex cond, \$11,750. Charlie, 488-4412.

Eipper MX Quicksilver ultralight airplane, new propeller & gas tank, newly rebuilt 447 Rotax engine, ex cond. Alan, 333-6557 or 531-9630.

'52 C-35 Bonanza, 3.5k hours TT, 1k hours SMOH, O SPOH, 1FR, speed slope, windshield, hyd prop. Danny, 224-7184 or 992-3827.

Audiovisual & Computers

Infinity SM120 200w 3-way speakers, \$500/pr; Proton D1200 100w/channel power amp & Proton P1100 Preamp, \$350, \$800/all. Chris, 280-4394 or 474-7263.

Nintendo tapes, 2-each Mario Duct Hunt, \$5/each; Jackal, \$10;

Jetman, \$10; Robo Cop, \$10; Nes-Advantage controller for Nintendo, \$10. Sam, 332-3168.

Kenwood xceiver, TM441A, \$375. Bill, x36650 or 554-6242.

Sony car Discman w/car kit & wireless remote, \$200/obo. Thanh, x31464.

Epson computer w/color monitor, 10 functional keyboard, 2-5 1/4" drives, Epson LX-800 NLQ printer, software, manuals, \$200. 992-5161.

Keyboard, K-1000, 76 keys, 179 programs, MIDI with hard case, \$1k. Stephanie, 409-943-4168.

AT & T 6300 PC with keyboard, 640k memory, 2 floppy drives, works fine, \$300/obo; dot matrix printer available. 337-4712.

IBM Clone 486/33, 4 MB memory, 5.25" 7 3.5" floppy drive, 210 MB hard drive, 2400/9600 fax modem, everything works, \$1.5k; dot matrix printer available. 337-4712.

Musical Instruments

Free old piano, needs work. 485-4008.

Pets & Livestock

Chow, full-blood, no papers, male, 12 weeks old, house trained, dog house included, \$75. Nancy, x32962.

Household

Round wood tables, \$150/\$100; 4 wooden chairs, \$80; dark wood end table, \$30; 2 end tables, \$40; tall phone table, \$20; large stuffed yellow chair, \$30; formal table w/leaves & 6 chairs, \$800; deacon's bench, \$30; hutch, \$350; 2-twin headboards w/cabinets, \$30; 55-gal fish tank w/stand, \$200. 282-3570 or 474-3820.

Student desk, hutch & chair, \$325. Bill, x36650 or 554-6242.

Natural wood table and four chairs, table base & chairs solid wood, w/butcher block laminate table top, \$125. Jeff, x31975 or 286-1935.

Sofa/sleeper, tan, \$175; chair & ottoman, tan, \$10; kitchen table & 6

chairs, tan, \$75. Mark, x37370.

Wanted

Want surveillance equipment with camera(s), recorder & associated electronics, color or B/W; small dog house; AM/FM/CD player for car; scanner base unit or portable; 40 channel CB radio w/antenna; portable CD player; portable color television w/6" screen, or smaller, audio/video inputs. 482-8496.

Want 2-Northwest Airline "Fly-Write" coupons. Walt, x47392.

Want non-smoking roommate to share 4-2.5 with carport in Alvin, able to tolerate large outdoor pets, \$350/mo, references required. 244-6121 or 331-3963.

Want jumbo or extra large Pet Porter. Stacy, x48895 or 480-6541.

Want ultimate frisbee players, no experience necessary, will teach you, every Mon 7 Wed, Clear Lake Park, 7:30 - 9:30 p.m. Dan, 282-5239 or 486-1102.

Want low priced school/work car or truck. 271-7011.

Want personnel to join VPSI van-pool departing Meyerland Park & Ride lot at 7:05 a.m. for JSC, van-pool consists of on-site personnel working 8 a.m./4:30 p.m. shift, need 2-3 more. Travis Moebes, x45765 or Don Pipkins, x35346.

Want personnel to join VPSI van-pool, West Loop Park & Ride lot at 6:50 p.m. to NASA/Contractors. Richard Heetderes, x37557 or Ed Rangel, x36124.

Miscellaneous

Computer desk, \$30/obo; sparkling water/juice carbonation unit, \$30/obo; 31 volume Funk & Wagnalls encyclopedia, index & dictionary, \$75/obo. Tony, x47401 or 482-4156.

Fleer 1988, '88 Donruss, '89 Donruss, '90 Donruss, '90 Score, '90 Bowman, '91 Donruss unopened factory sets, \$100 for all 7 sets; 9 1909-1911 Tobacco baseball cards, \$100. Tony, x47401 or 482-4156.

Tropical plants, all in permanent pots, large to small size, various kinds, \$5 and up/neg. Bob, x33149.

Day-timers planner w/zipper notebook, 8.5 x 11 size, desk paper punch, notebook paper punch, fillers thru Sept '95, \$75. Eric, 482-3662.

Rope bracelet, 14k diamond cut, 7" long, 3 mm wide, \$70; 14k twist knot earrings, \$40; telephone answering machine, \$25. Eric, x31917.

Wieder weight bench w/stair stepper, \$150/obo; oak entertainment center, \$35/obo; 3 drawer VCR tape cabinet & 3-3 drawer cassette tape cabinets make offer. 244-6121 or 331-3963.

Car ramps, \$20; car jack stands, \$20; 22" mower w/bag, \$125; large .60 size R/C plane, \$30; small .20 R/C biplane, ready to fly, \$225; king mattress, \$125; large fruit press, \$250; 10-gal fish tank, \$20. 282-3570 or 474-3820.

DP Home Gym, model #15-7200, chest, arm, & leg exercises using elastic weight bands, ex cond, \$75. Stan, x30712.

Motorola cellular phone, \$40. x30737.

Moving boxes, all sizes, 1/2 price, x53954 or 963-0074.

Doghouse, thick plywood & shingle roof, 36W x 36L x 50H, 480; Sharp electronic typewriter, \$50; Hewlett Packard calculator, \$35. Ted, x34116 or 482-8827.

Sears Lifestyler 2808 treadmill, 1.25 hp, 8 mph, auto incline, new \$450 sell \$300/obo. Michelle, x31109 or 474-7263.

Southwest Airline round trip pass anywhere they fly, some holiday restrictions may apply, \$250. Barry, x36325.

Coleman tent, 10' x 12', ex cond, \$65. Tony, x35966.

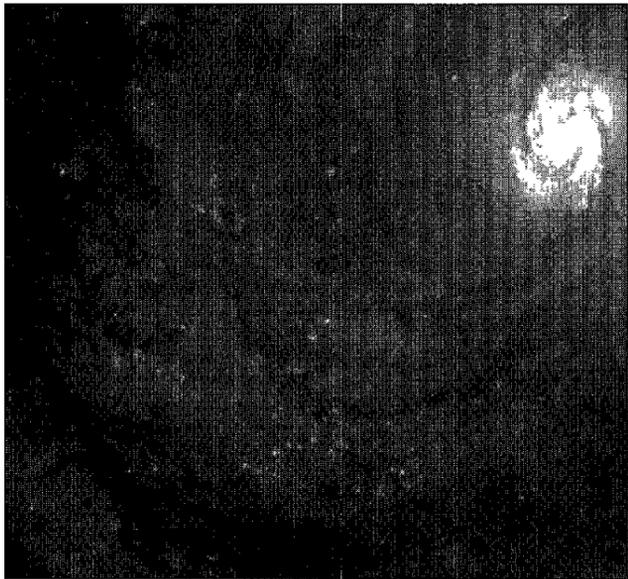
Cross Country skiing exercise machine, \$50. 326-2221.

Bumper, black steel, fits small pickups, ex cond, \$50. 271-7011.

Motorcycle trailer, \$150; intake manifold/carbonator for GM 350, \$50. 332-9105.

January

Images released from the newly refurbished Hubble Space Telescope stirred feelings of pride in the JSC community. Galaxy M100 is one of the brightest members of the Virgo Cluster that is tens of millions of light years away from Earth.



February

Sergei Krikalev (right) was the first Russian cosmonaut to fly on board an American spacecraft. Krikalev works with Ronald Sega on a metabolic experiment during STS-60.



1994 THE YEAR IN PICTURES



April

Jim Lovell stands between Tom Hanks, Ron Howard and a host of Hollywood crew members during a visit to mission control. Howard duplicated mission control for the upcoming movie "Apollo 13." The movie crew spent several months in Houston filming scenes at Ellington field and surrounding areas.



May

Employees and their families braved the Houston heat to have fun at the annual JSC Picnic.

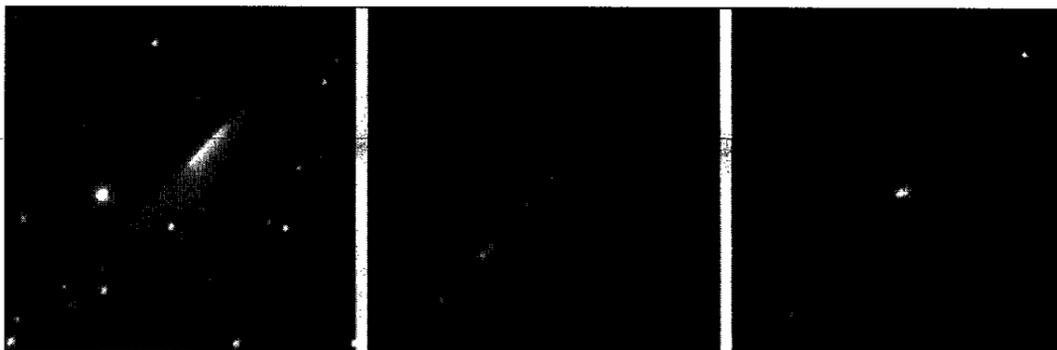
March

Astronauts Norman Thagard and Bonnie Dunbar in cosmonaut space suits by the Soyuz TM simulator in Star City. Thagard and Dunbar are the first US astronauts to train in Russia.



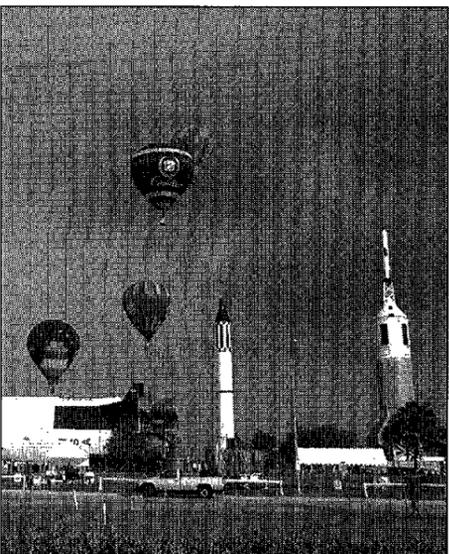
June

JSC employees learn about the new ergonomic computer workstations that are available and were on display at the Health Fair.



July

The comet P/Shoemaker-Levy 9 collides with Jupiter and the Hubble Space Telescope catches the dramatic explosion as the comet breaks up on impact.



August

The second annual "Ballunar Liftoff" drew thousands to Rocket Park. About 50 balloonists completed several runs including a dramatic "glow" in which all of the balloonists ignited their burners at the same time.



September

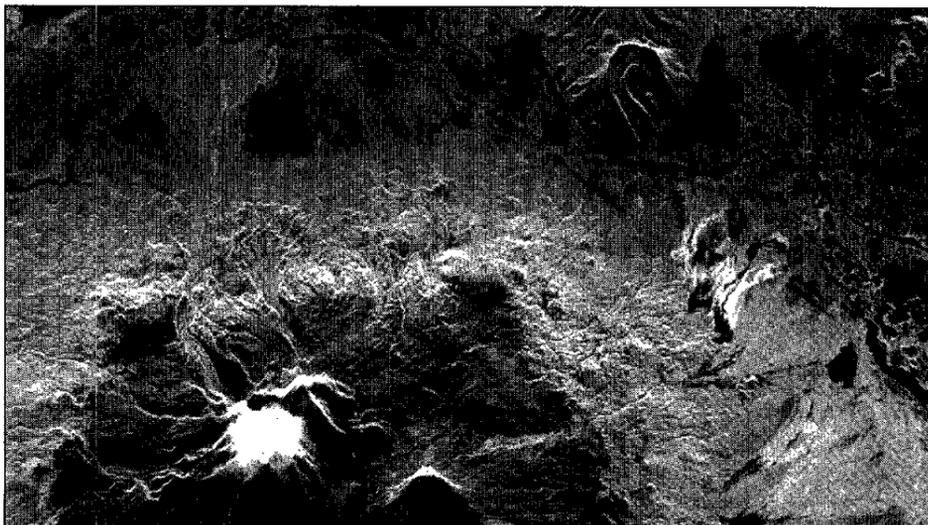
Astronaut Mark Lee tests the new Simplified Aid for EVA Rescue system during STS-64. The SAFER experiment was done 130 nautical miles above Earth. The prototype was built and established requirements for a production version of the SAFER for the station and shuttle programs.

November

Modifications of the T-38 fleet is being done completely in-house. The first production cockpit upgrade on NASA 912 was completed and is very popular with pilots.

October

STS-68 radar image of the Kliuchevskoi volcano in Kamchatka, Russia. The Endeavour crew obtained dramatic video and photo images of this region during the eruption which will assist scientists in analyzing the dynamics of current activity.



December

John Dailey, acting deputy administrator closes the door to the Thermal Altitude Chamber A during his visit.

UARS data measures changes in stratosphere

(Continued from Page 1) gave scientists a challenging puzzle. Aircraft observations in 1987 showed convincingly that the high concentrations of chlorine monoxide over Antarctica were destroying ozone in the lower stratosphere. Most scientists were convinced that a series of chemical reactions involving chlorine monoxide and ozone led to the formation of the ozone hole.

Two questions, however, remained: why was the change in the ozone layer taking place over Antarctica, and what was the source of the chlorine monoxide? Meteor-

ologists long have known that the Antarctic stratosphere can be one of the coldest places on the planet. Air is so cold that wispy clouds can form even in the super-dry stratospheric air. These clouds, called polar stratospheric clouds, form in the dead of winter. Scientists believe that chemical reactions on the surface of the cloud crystals release chlorine from "reservoir" gases, which do not react with ozone. The chlorine reacts quickly with ozone to form chlorine monoxide. This reaction begins the catalytic cycle in which one chlorine atom can ultimately destroy many

ozone molecules, leading to the polar ozone hole.

UARS has measured the winter build up of chlorine monoxide within the south and north polar regions every year since its launch. UARS has found that chlorine monoxide appears suddenly in the stratosphere after the formation of the polar stratospheric clouds. Infrared and microwave sensors on board UARS are able to track stratospheric clouds and the chemical changes they cause.

UARS measurements have confirmed that the chlorine monoxide

can build up to extreme levels in the polar regions after polar stratospheric clouds appear.

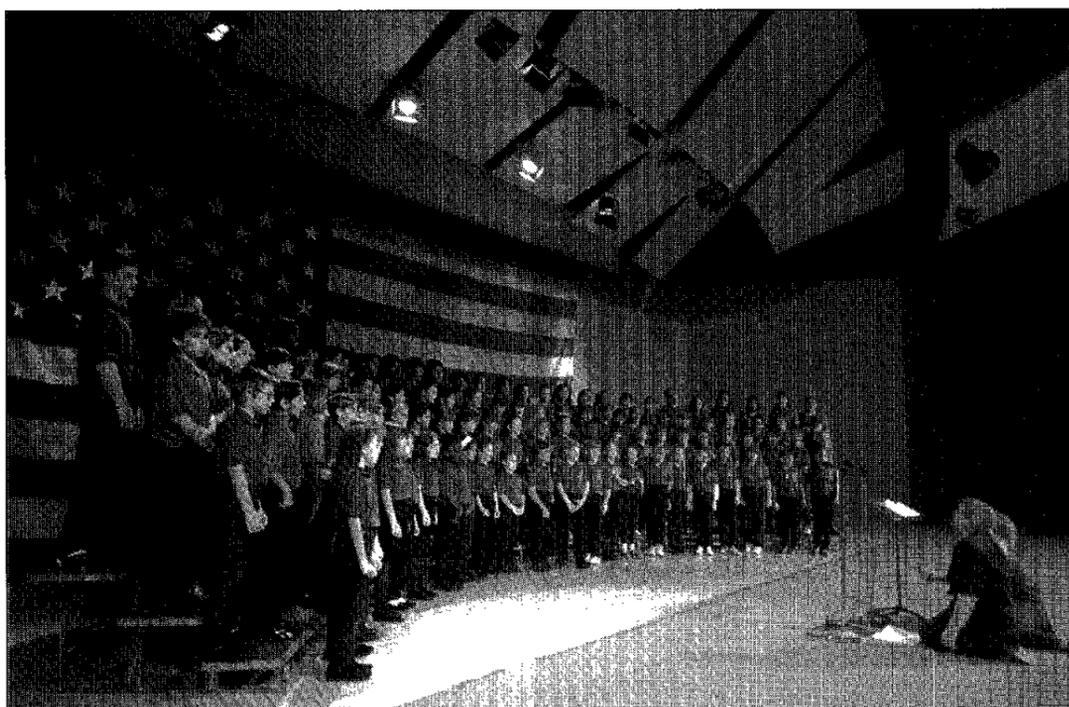
UARS data also have shown that the meteorology of the polar stratosphere prevents the chlorine monoxide from dispersing, thus increasing the ozone loss.

"We are getting daily polar maps of ozone-destroying chemicals," said Douglass. "These measurements are adding tremendously to our knowledge of the stratosphere."

Under international treaties controlling the use of ozone-depleting chemicals, the amounts of CFCs in

the atmosphere no longer are increasing. However, CFCs survive in the atmosphere for many years before being destroyed by ultraviolet light, and the ozone hole is expected to persist at current levels through this decade. (Their stability was one of their biggest assets when they were developed for industrial use in the 1930s.) Unless other conditions change, scientists expect the ozone hole to weaken and disappear in the 21st century.

UARS was the first satellite launched as part of NASA's Mission to Planet Earth



JSC Photo by Andrew Patnesky

CHRISTMAS CHOIR — Music teachers, Ann Steckler and Mary Garms, lead McWhirter Elementary's fourth and fifth grade choir in Teague Auditorium. JSC employees enjoyed a variety of holiday songs.

Asteroid impact site key to devastation

(Continued from Page 1) the global atmospheric impact of this asteroid collision at Chicxulub, Mexico, in the latest issue of Earth and Planetary Science Letters.

"We estimate that this asteroid was between 10 to 20 kilometers (6 to 12 miles) in diameter and its collision on Earth brought about total darkness around the world for about half a year," Ocampo said. "But more importantly, persistent clouds generated by the impact on this geologically distinct region of sulfur-rich materials caused temperatures to plunge globally to near freezing."

"These environmental changes lasted for a decade and subjected organisms all over the world to long-term stresses to which they could not adapt in such a brief time span," Pope added. "Half of the species on Earth became extinct as a result."

The researchers based their work on computer models of the impact and atmospheric effects, studies of the crater geology and extensive fieldwork at a rock quarry located 223 miles south of Chicxulub at Albion Island in Belize. Fragments bearing the unique characteristics of the impact were found in this area.

In studying the sites and modeling the resulting changes in the bio-

sphere, the scientists discovered that it was the specific geological location of the impact in a region that is rich in sulfur materials that created catastrophic climate changes and led to the downfall of the dinosaurs.

"If this asteroid had struck almost any other place on Earth, it wouldn't have generated the tremendous amount of sulfur that was spewed into the atmosphere to create such a devastating, worldwide climate change," Baines said.

The asteroid hurled some 35 billion to 770 billion tons of sulfur high into the atmosphere, along with other materials. The NASA team, in collaboration with Dr. Alfred Fischer of the University of Southern California, recently discovered rocks that landed south of the Chicxulub site in Belize.

The boulder deposit in Belize also contained fragments of glass that were created by the melting of rock when the asteroid crashed into Earth, Ocampo said. Spherical fragments, known as "tektites," were scattered and formed as the molten glass flew through the air and cooled. The tektites have been found in other regions near the crater, such as Haiti, Mexico, Texas and Alabama.

The researchers used sophisticated atmospheric models of the sulfur-rich atmosphere of Venus to model their impact scenario.

"Initially, thick sulfur clouds, combined with soot and dust generated by this impact, would have spread worldwide and blocked out the Sun," Baines and Pope said.

"Night-like conditions probably existed all over Earth for at least six months essentially bringing photosynthesis to a halt. Unlike the aftermath of typical impacts, the skies remained murky for at least a decade, due to chemically generated clouds of sulfuric acid high in the stratosphere."

The reflection of sunlight back into space from these high-altitude clouds caused surface temperatures to drop to nearly freezing for many years all over the planet.

"The entire ecosystem of Earth, including plants and animals, was subjected to extreme environmental conditions, which a large number of well-established species, such as the dinosaurs, simply could not cope with," Baines said.

Six months of total darkness and 10 years of global freezing ultimately destroyed the dinosaurs and many other organisms, Pope added.

Space Center Houston appoints new manager

Space Center Houston has a new general manager who brings almost three decades of experience to the job.

Richard Allen, with experience from Six Flags Corp. and U.S. Space and Rocket Center in Huntsville, Ala., replaces Vance Ablott, who retired last August.

Allen will perform double duty as general manager of Space Center Houston and president of the Manned Space Flight Education Foundation, Inc.

"As a result of Richard's successful 27 year background in the attractions industry, the last few in a space related organization with close ties to NASA, we feel he is uniquely qualified to lead Space Center Houston into the future," said John O'Neill, chairman of MSFEFI.

"We know Richard will hit the ground running in mid-January, and we welcome him and his family to the Space Center Houston team," O'Neill added.

Fitness course to begin next month

The next Health-Related Fitness course begins Monday and runs through March 31 at the Gilruth Center. Graduates of the health-related fitness course may attend early morning exercise sessions that also begin Monday.

The JSC fitness staff has designed programs for both beginners and graduates of health related fitness course. The fitness course includes a series of lectures specializing in setting priorities for health practices. A special exercise and

diet program is design for each participant. The course also includes a health risk appraisal, computer assisted exercise log, subscription to a quarterly newsletter, T-shirt, and updates on exercise programs.

The morning exercise group allows graduates to exercise without lectures or deadlines. A fitness professional will be on hand to help update an exercise program or lead warm-ups.

For additional information call the fitness staff at x30301 or x30302.

Saturn storm follows cycle

(Continued from Page 1) installed into the HST instrument bay in place of one of the current instruments. NASA will decide which instrument to replace about two or three years before the 1999 mission. The decision will be based on the health and scientific productivity of the instrument.

Meanwhile, a new image of the ringed planet Saturn shows a rare storm that appears as a white arrowhead-shaped feature near the planet's equator.

The storm is generated by an upwelling of warmer air. The east-west extent of this storm is equal to the diameter of the Earth (about 7,900 miles). The new image shows that the storm's motion and size have changed little since its discovery in September.

The images reveal Saturn's prevailing winds shape a dark "wedge" that

eats into the western (left) side of the bright central cloud. The planet's strongest eastward winds are at the latitude of the wedge.

To the north of this arrowhead-shaped feature, the winds decrease so that the storm center is moving eastward relative to the local flow. The clouds expanding north of the storm are swept westward by the winds at higher latitudes. The strong winds near the latitude of the dark wedge blow over the northern part of the storm, creating a secondary disturbance that generates the faint white clouds to the east (right) of the storm center.

The storm's white clouds are ammonia ice crystals that form when an upward flow of warmer gases shoves its way through Saturn's frigid cloud tops. This current storm is larger than minor storms that have been reported more frequently.

Columbia to carry Spacelab in '96

(Continued from Page 1) the STS-67 ASTRO-2 research flight, and Atlantis for a spring launch on STS-71, the first Mir docking.

In a related development, shuttle managers have decided that Columbia will carry a new multi-disciplinary life and microgravity sciences Spacelab research mission into orbit on STS-78, planned for a mid-1996 launch.

The 16-day flight, carrying a crew of seven, will involve 21 investigations—15 in life sciences and six in microgravity sciences.

The life sciences experiments will continue ongoing studies probing the changes and adaptive mechanisms of living systems including plants, animals and humans under weightless conditions. Human and animal studies are focused on the effects of microgravity on the musculoskeletal system and on sleep and performance.

Life sciences experiments will investigate changes in the musculoskeletal system (bone and muscle deterioration), neurovestibular system (balance disorders), cardiopulmonary (heart and lungs) and regulatory physiology (changes in body chemistry, fluid regulation and immune system).

The microgravity science investigations will focus on protein crystallization, fluid physics and materials science.

In addition, vibration measurement instruments will support these experiments by characterizing in detail the microgravity environment aboard the Spacelab.

Microgravity experiments will include protein crystal growth, electrohydrodynamics, fluids interface studies, high temperature directional solidification of multi-phase materials and solidification with particle pushing and engulfment.

NASA-JSC

Correction

A story in the Dec. 2 issue of Space News Roundup erroneously reported the location of a newly restored wind tunnel at Ames Research Center, and was accompanied by a photograph taken inside a different wind tunnel.

The restored wind tunnel is located in California and replaces the original 12-foot Pressure Wind Tunnel built in 1946. Reconstruction began in 1990 and normal operations will resume in September.

The tunnel is currently going through five phases of testing to ensure all systems are operational. This aerial photo shows just how large the tunnel is compared to an ordinary passenger car.

