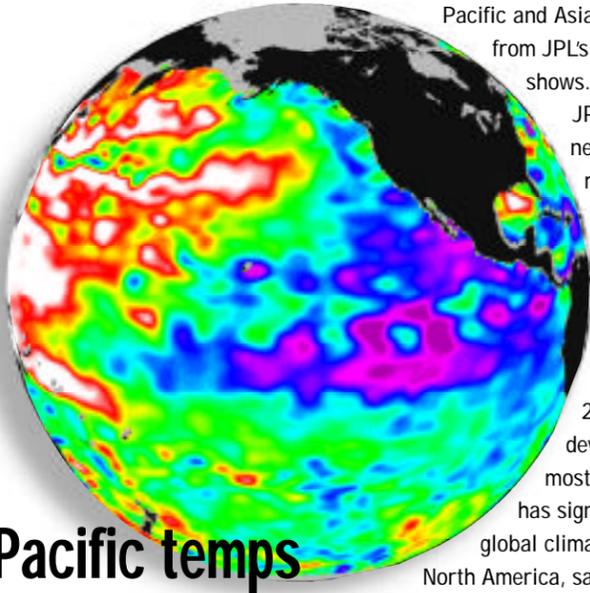


News Briefs 2	Earth Mapping Stretches Out . . . 3
Special Events Calendar 2	Letters, Retirees, Passings 4
Reward & Recognition 2	Classifieds 4

Pacific temps may be part of larger climate pattern

By Diane Ainsworth

The giant horseshoe of warmer water (shown in white) dominating the western and mid-latitude Pacific has higher than normal sea-surface heights of between 8 and 24 centimeters. For the past year, warmer waters have been expanding slowly and are now beginning to dominate the western and north Pacific.



a giant horseshoe pattern of higher than normal sea-surface heights developing over the last year is beginning to dominate the entire western Pacific and Asiatic oceans, new imagery from JPL's TOPEX/Poseidon satellite shows.

JPL scientists studying the new data believe these abnormally warm ocean temperatures, which contrast with a cool La Niña, may be part of a larger, longer-lasting climate pattern.

The latest data, taken Dec. 30, 1999 through Jan. 8, 2000, show that this slower-developing condition covers most of the Pacific Ocean and has significant implications for global climate change, especially over North America, said Dr. William Patzert, an oceanographer at JPL.

"In contrast with the more spectacular but shorter duration El Niño and La Niña events, this multiple-year trend may be part of a decade-long pattern known as the 'Pacific decadal oscillation,'" Patzert said. "The persistence of these abnormally high and low Pacific sea-surface patterns, along with warmer and colder than average ocean temperatures, tells us there is much more than an isolated La Niña occurring in the Pacific Ocean."

Satellite data from the National Oceanic and Atmospheric Administration clearly illustrate the pattern. Sea-surface temperatures, which directly affect the atmosphere on a daily basis, are available online at <http://psbgi1.nesdis.noaa.gov:8080/PSB/EPS/SST/climo.html>, and show the same warm and cool water patterns.

"These warmer and cooler than normal sea-surface temperatures influence our atmosphere every day,

while sea-surface heights are a measure of how much heat is stored in the ocean below," Patzert said.

"When you put these two pieces of the climate puzzle together, they tell us both about what is influencing today's weather and how much heat is being stored in the ocean to fuel future planetary climate events."

The Pacific decadal oscillation waxes and wanes approximately every 20 to 30 years, alternating between its present phase, with a warm horseshoe pattern of higher than normal sea-surface heights connecting the north, west and southern Pacific, in contrast to a cool wedge of lower than normal sea-surface heights in the eastern equatorial Pacific. After that the Pacific switches to the opposite phase, showing a reversal of the warm and cool regions; the horseshoe becomes cool and the wedge warms.

The strength of this climate trend is seen in the current TOPEX/Poseidon satellite image, available at <http://www.jpl.nasa.gov/elNiño>. Sea-surface height is shown relative to normal and reveals cooler water measuring between 8 and 24 centimeters (3 and 9 inches) lower than normal along the coast of Central and South America, and stretching out into the equatorial Pacific. The giant horseshoe of warmer water dominating the western and mid-latitude Pacific has higher than normal sea-surface heights of between 8 and 24 centimeters. For the past year, warmer waters have been expanding slowly and are now beginning to dominate the western and north Pacific.

Although it is too early to definitively label these basin-wide conditions as a strong, multiple-year Pacific decadal oscillation, the current image suggests that simple labels or explanations such as a continuing La Niña/El Niño climate condition could be misleading, Patzert said. In the coming year, scientists using TOPEX/Poseidon data will continue to monitor the development of these conditions and their implications for climate in the next several years.

SRTM launch Jan. 31

JPL's Shuttle Radar Topography Mission is scheduled for launch from Kennedy Space Center Jan. 31 at 9:47 a.m. Pacific time onboard Space Shuttle Endeavour. For a profile, see page 3.

Polar Lander search ends

The Mars Polar Lander flight team has ended attempts to regain communications with the spacecraft.

"The final set of planned commands were sent on Jan. 6 to place the spacecraft in UHF safe mode," said Project Manager Richard Cook. "Since then, we've had a series of relay communications sessions using Mars Global Surveyor to listen for the lander around the clock. These attempts ended (Jan. 17), concluding our attempts to recover the spacecraft."

Mars Global Surveyor continues to perform special targeted observations of the Mars Polar Lander landing site in hopes of imaging the lander or its parachute. No evidence of the spacecraft has been sighted so far and these attempts will continue through early February. The team has started in-depth analysis of terrain hazards within the landing footprint in support of the JPL Mars Polar Lander/Deep Space 2 failure review board.

Galileo finds new evidence for Europa ocean

By Jane Platt



When Galileo swooped past Jupiter's moon Europa earlier this month, it picked up powerful new evidence that a liquid ocean lies beneath Europa's icy crust.

As the spacecraft flew 351 kilometers (218 miles) above the icy moon on Jan. 3, its magnetometer instrument studied changes in the direction of Europa's magnetic field. Galileo's magnetometer observed directional changes consistent with the type that would occur if Europa contained a shell of electrically conducting material, such as a salty, liquid ocean.

"I think these findings tell us that there is indeed a layer of liquid water beneath Europa's surface," said Dr. Margaret Kivelson, a UCLA

researcher and principal investigator for the magnetometer. "I'm cautious by nature, but this new evidence certainly makes the argument for the presence of an ocean far more persuasive."

It appears that the ocean lies beneath the surface somewhere in the outer 100 kilometers (60 miles), the approximate thickness of the ice/water layer, according to Kivelson.

"Jupiter's magnetic field at Europa's position changes direction every 5 1/2 hours," she explained. "This changing magnetic field can drive electrical currents in a conductor, such as an ocean. Those currents produce a field similar to Earth's magnetic field, but with its magnetic north pole—the location toward

which a compass on Europa would point—near Europa's equator and constantly moving."

The new evidence was gathered during a flyby specially planned so that the observed position of Europa's north pole would make it clear whether or not it moves. Data from the flyby showed that its position had moved, thus providing key evidence for the existence of an ocean.

These latest findings are consistent with previous Galileo images and data showing a tortured surface seemingly formed when Europa's surface ice broke and rearranged itself while floating on a sea below. Further theoretical work is under way to analyze the fluid layer and its properties.

Asteroid estimate cut in half

By Jane Platt

Scientists taking a census of large asteroids in our solar system neighborhood have cut their estimate in half. The revised calculation comes from data gathered by the JPL-managed Near-Earth Asteroid Tracking System (NEAT) and published in the Jan. 13 issue of the journal Nature.

"Until now, scientists thought the population of large, near-Earth asteroids was between 1,000 and 2,000," said Dr. David Rabinowitz of Yale University, lead author of the article and a NEAT co-investigator, "but we've downgraded that

figure to between 500 and 1,000 near-Earth asteroids larger than one kilometer (about 0.6 miles) in diameter.

"This newer estimate was made possible by the computerized technology of the NEAT camera," Rabinowitz said. The system began tracking near-Earth asteroids and comets in 1995 with a charge-coupled device camera mounted on a 1-meter (39-inch) Air Force telescope atop Mount Haleakala on Maui, Hawaii.

The new figures may represent good news in the quest to achieve

NASA's stated goal of finding 90 percent of all large, near-Earth asteroids by 2010, according to NEAT project manager Dr. Steven Pravdo of JPL, a co-author of the Nature article.

"Right now we know of 322 large, near-Earth asteroids," Pravdo said. "With our new calculations of between 500 and 1,000 such objects, this 322 figure represents a large chunk."

While stressing that more must be learned about potential hazards from asteroids, Rabinowitz said, "None of the asteroids we've

observed will hit Earth anytime in the near future."

"With this computerized technology, we can find asteroids more easily and count them more accurately," Pravdo said. "It's important to know your observational limits, and with that information, we can develop models for what we are not able to see. This makes our estimates even more accurate."

Additional co-authors on the Nature article are Eleanor Helin of JPL, NEAT principal investigator, and Kenneth Lawrence, also of JPL.

News Briefs

Renfrow named Lab's first CIO

DR. TOM RENFROW has been appointed manager of the Institutional Computing and Information Services Office 170. Concurrently, he was named as JPL's first chief information officer.

Renfrow has worked at JPL since 1978, primarily with information technology. Since 1984 he served as manager of the Planetary Data System and manager of Section 389, Science Data Management and Archiving. For the past year, he worked as the liaison between JPL and Ames Research Center to establish increased infusion of Ames' technologies into JPL flight missions.

Renfrow holds a bachelor's degree from the University of Michigan and a doctorate from Caltech, both in mathematics.

In related news, the ICIS office has been relocated from Building 601 to Building 202-204 on Lab.



Dr. Tom Renfrow

Elachi honored by AIAA

Space and Earth Science Programs Director DR. CHARLES ELACHI, a pioneer in the development and use of spaceborne imaging radar for studies of Earth and other planets, has been awarded the 2000 Dryden Lectureship in Research by the American Institute of Aeronautics and Astronautics (AIAA) in recognition of the importance of his research to the advancement of aeronautics and astronautics.

Elachi received the Dryden award on Jan. 10 at the AIAA's 38th Aerospace Sciences Meeting in Reno, Nev. His lecture on "Space Imaging Radar in Planetary Exploration and Earth Observation" described the variety of scientific studies made possible with spaceborne imaging radar, and provided an overview of present and future potential applications for imaging radar technology.



Dr. Charles Elachi

JPL, Hughes agree to joint venture

JPL and Hughes Space and Communications Company have entered into an agreement to jointly develop and share guidance, navigation and control technology.

Under the strategic alliance signed last month, JPL and Hughes will develop and commercialize technologies related to space applications, especially hardware, software and technical expertise in the area of guidance, navigation and control technology for satellites.

The joint development will initially focus on technologies for microgyroscopes, active pixel sensor use in star trackers, systems on a chip and autonomous systems.

"The JPL/Hughes Space and Communications strategic alliance is an important first step for JPL in creating new ways to work with industry," said MIKE SANDER, Technology and Applications Programs director. "It will combine the resources and expertise of these organizations to develop technology vital to both NASA missions and commercial space."

Caltech Intellectual Property Manager Rich Wolf added, "This strategic alliance should change the way Caltech and JPL interact with industry."

JPL's Commercial Technology and Regional Economic Development Program establishes working relationships between the Laboratory and U.S. firms to transfer technologies and expertise developed for government programs to the private sector.

For more information, go online to <http://stargate.jpl.nasa.gov/development/technology/technology/jpl.html>.

SURF applications due this month

Announcements of opportunity are due this month for the 2000 Summer Undergraduate Research Fellowship (SURF) program, which enables undergraduates from Caltech and around the world to spend 10 weeks during the summer working on research projects with campus and JPL mentors.

"Last summer, 45 students 'surf' at JPL with 30 different mentors," noted DR. MIKE WERNER, a member of the SURF advisory board. "Students are bright, capable and highly motivated, the program is inexpensive and requires a minimum of administrative paperwork."

Prospective JPL mentors are invited to prepare and submit announcements of opportunity—descriptions of their proposed SURF research opportunity—to be posted on the SURF web site. For more information, contact Werner (ext. 4-0146) or advisory board members BILL WHITNEY (4-4410) or ELEANOR HELIN (4-4606) or the Caltech SURF office at (626) 395-2885.

SESPD advisory group formed

A science advisory group has been formed by Elachi to advise SESPD management on issues of interest to the JPL scientific community.

Chaired by DR. MIKE WERNER, the group will meet quarterly. It will provide advice on issues brought to it by SESPD management, bring issues of concern to the attention of SESPD management, and work to improve the quality of life for JPL scientists.

Issues discussed at the group's first meeting last November included guidelines for bid and proposal funding, processes for selection of small projects to be supported in the proposal phase by JPL, and the role of JPL scientists in strategic planning at both the JPL and NASA levels.

More information about the group is available online at <http://sespd-lib> under "Work Area."

Library orientations offered

The JPL Library is offering orientation sessions every Wednesday at 11:30 a.m. at the reference desk in the main customer service area, Building 111-104.

Sessions last 30 minutes or less. New employees are especially encouraged to attend. No reservations are needed.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meeting at 11:30 a.m. Mondays, Tuesdays, Thursdays (women only) and Fridays. Call Occupational Health Services at ext. 4-3319.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Support Group—Meets the first and third Fridays of the month at noon in Building 111-117. Call employee assistance counselor Cynthia Cooper at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parent Support Group—Meets the third Thursday of the month at noon in Building 167-111. Call Greg Hickey at ext. 4-0776.

Senior Caregivers Support Group—Meets the second and fourth Wednesdays of the month at 6:30 p.m. at the Senior Care Network, 837 S. Fair Oaks Ave., Pasadena, conference room #1. Call (626) 397-3110.

Friday, January 21

Von Kármán Lecture Series—Dr. Don Yeomans, supervisor of the Solar System Dynamics Group and manager of the Near Earth Objects Program Office, will speak at 7 p.m. in The Forum at Pasadena City College, 1570 E. Colorado Blvd. Open to the public.

Saturday, January 22

Caltech Jazz Bands—The annual winter concert will be held at 8 p.m. in Beckman Auditorium. Admission is free. Call (626) 395-4652.

Sunday, January 23

Chamber Music—The Berlin Philharmonic Piano Quartet will perform at 3:30 p.m. in Caltech's Beckman Auditorium. Tickets are \$25, \$21, \$17 and \$13. Call (626) 395-4652.

Monday, January 24

Caltech Ballroom Dance Club—Beginning American Tango will be taught at 7:30 p.m. in Winnett Lounge. Cost: \$30. Call (626) 791-3103.

Wednesday, January 26

Caltech Architectural Tour—The Caltech Women's Club presents this free service, which is open to the public. The tour begins at 11 a.m. and lasts about 1 1/2 hours. Meet at the Athenaeum front hall, 551 S.Hill, Pasadena. Call Susan Lee at (626) 395-6327.

Caltech Ballroom Dance Club—Intermediate International Cha Cha will be taught at 7:30 p.m. in Winnett Lounge. Cost: \$1 per lesson. Call (626) 791-3103.

JPL Golf Club—Meeting at noon in Building 306-302.

JPL Toastmasters Club—Meeting at 5:30 p.m. in the Building 167 conference room. Guests welcome. Call Mary Sue O'Brien at ext. 4-5090.

Thursday, January 27

Social Security—A representative will be available in the Building 167 cafeteria from 9 to 11 a.m. Employees can request a personal earnings and benefits statement and ask general questions.

Friday, January 28

"Crisis in Aerospace"—Aviation Week and Space Technology Rocky Mountain bureau chief William Scott will discuss the magazine's recent series of articles that suggested cracks in the industry's foundations. At 11:30 a.m. in von Kármán Auditorium.

JPL Dance Club—Meeting at noon in Building 300-217.

Travel Film—*Britain's Offshore Islands* will be shown at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$9 and \$7. Call (626) 395-4652.

Saturday, January 29

Eth-Noh-Tec—Ancient Asian folktales, myths and legends are retold using rhythmic dialogue, lively facial expressions reminiscent of Asian mask theater, music and tightly synchronized dance motifs. At 2 p.m. in Beckman Auditorium. Tickets are \$10 for adults, \$5 for children. Call (626) 395-4652.

Tuesday, February 1

JPL Gamers Club—Meeting at noon in Building 301-227.

JPL Genealogy Club—Meeting at noon in Building 301-169.

Wednesday, February 2

Associated Retirees of JPL/Caltech Board—Meeting at 10 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

JPL Bicycle Club—Meeting at noon in the Building 167 cafeteria.

Thursday, February 3

JPL Gun Club—Meeting at noon in Building 183-328.

J.I.T Vendor Fair—JPL Just-In-Time vendors will display their new products, and random drawings for door prizes will be held. From 9 a.m. to 2 p.m. in von Kármán Auditorium.

Quality Assurance Office Briefing—Caltech professor Yu-Chong Tai will discuss new Parylene microelectromechanical systems technology at 11:30 a.m. in the northeast corner of the Building 167 cafeteria. For more information, call Rajeshuni Ramesham at ext. 4-7190.

Friday, February 4

Caltech Women's Club—A welcoming coffee will be held at 9 a.m. at Caltech's Winnett Center, followed by a talk by Romy Wyllie based on her new book on the campus' architectural heritage. Call Missy Jennings at (626) 799-4799.

Staff at the Canberra, Australia Deep Space Communications Complex gather for a ceremony to close down the 34-meter (110-foot) Deep Space Station 42. The antenna's last operation was tracking the Chandra X-ray Observatory on Dec. 22. In right photo are Ian Warren (top) and Barry Unsworth, who were on duty at Tidbinbilla when the antenna was brought online in 1964 and continue to work at the complex.

Down-under antenna decommissioned



Bonus Award winners named

In November and December 1999, JPL management presented Bonus Awards for achievements with Lab-wide impact. These awards were given to individuals for Outstanding Accomplishments and Outstanding Leadership. Currently, JPL managers can monetarily reward employees via merit increases, lump sums, and market adjustments. Now management can give Bonus Awards, which are similar to other recognition programs such as Award for Excellence, where recipients at the

highest level are publicly recognized.

Aside from the Level A Bonus Awards for Lab-wide impact listed below, approximately 500 Bonus Awards were issued for accomplishments with cross-directorate (Level B) and local (Level C) impact. To learn more about the Bonus Award program, visit the Bonus Award web site at <http://hr/compensation/bonusawards.html>.

Outstanding Leadership, Level A Issuing organization 1x: Kim Lievense (184).

Continued on page 4

EARTH MAPPING STRETCHES OUT

SRTM Project Scientist Dr. Mike Kozbrick discusses

JPL's upcoming space shuttle mission

JPL's Shuttle Radar Topography Mission (SRTM), which will produce the most complete and accurate 3D topographic map of Earth ever made, is due for launch from Kennedy Space Center Jan. 31 at 9:47 a.m. Pacific time.

A follow-on to JPL's highly successful Spaceborne Imaging Radar-C/X-Band Synthetic Aperture Radar (SIR-C/X-SAR) mission that flew twice on the space shuttle in 1994, SRTM is sponsored by Department of Defense's National Imagery and Mapping Agency (NIMA). As on SIR-C/X-SAR, the Italian and German space agencies have provided X-band antennas for the mission, which will utilize two radar antennas mounted in the shuttle payload bay and two extended on a 60-meter (200-foot) mast.

Q Why is SRTM considered such a breakthrough mission?

A When we first proposed this to the Department of Defense, the best data set they had was at about 100 meters (330 feet) resolution, and covered about 60 percent of the Earth. Because of cloud cover there were many gaps, particularly in the equatorial regions, and they were having a tough time completing a global map. We knew not only that we could finish the job—our radar can see right through clouds—but also that we could do it at 30 meters (100 feet) resolution and cover 80 percent of the Earth's land mass.

This includes all the land from the tip of South America to northern Canada.

This is like no other mission

I've ever worked on. Usually,

Earth science missions have

relevance to global

warming or some

other science

issue that at

times can be

fairly esoteric.

In this mission, our

data set will have not

only scientific applications in

geology, geophysics, hydrology

and ecology; but will also have

both military and civilian applica-

tions as well. Databases for en-

hanced ground proximity warning

systems for aircraft is a good example.

Much of this is possible because our

data set will consist of digital elevation

maps that are in the language that computers

understand and can easily be used to generate

almost every kind of topographic product.

Q How does SRTM follow on from SIR-C/X-SAR? Is some of the SIR-C/X-SAR hardware is being reused on this mission?

A It's all being re-used. In addition, we've enhanced the hardware set with the mast, second antenna and avionics that will allow us to use interferometry to map elevation in a single pass, which we couldn't do before.

About 80 percent of the hardware has been flown before. Besides the SIR-C/X-SAR instruments, we're using a star tracker and gyros that we inherited from the Astro astronomy payload that flew on the shuttle in 1990 and 1995. Also, a set of nitrogen tanks used for attitude control are inherited from Cassini; both are flight-qualified. The mast and the out-board antenna were manufactured for the mission.

Q How did reusing various hardware elements affect SRTM's cost? How would you compare it to other ways topographic data can be collected?

A NIMA asked its industrial partners how they would do this type of job, and also asked JPL how a free-flying satellite would accomplish it. The consensus was that it would cost up to \$500 million. SRTM, however, will only cost about one-third of that.

Frankly, if the same job were done with a satellite it could achieve better resolution—in the 10- to 20-meter (33 to 66 feet) range—but would take four or five years to develop. SRTM is not only much cheaper, we can do it in a couple of years. Plus we already have the flight-proven hardware from SIR-C, so we were confident the system would work.

Q SRTM's launch has been delayed for several months. Does the change in seasons affect the mission?

A No. Flying over deserts clearly won't be affected, but there might be a slight difference in what we measure over heavily vegetated regions. For example, in winter when the leaves are not on the trees we may sense a slightly lower elevation, but fortunately we're measuring at a resolution such that the seasonal differences probably won't be noticed.

Q How was it determined that this mast would be 60 meters long?

A This concept was invented by Ed Caro of Section 334. The mast was actually developed for the solar arrays on the international space station, which are about 30 meters long.

As we developed the idea we thought we could get data at 75- to 100-meter (245 to 300 feet) resolution, but NIMA challenged us to make it a little better. Our contractor that built the mast, AEC-Able of Goleta, developed an alternate design that can deploy a mast twice the size of the space station's, but in the same size canister. This allowed us to double the resolution.

Q Are there dangers associated with this large a mast? If it didn't retract back into the shuttle payload bay, is there some danger to the crew? Can they release it to orbit?

A There are a number of ways to get the mast back into its canister in the shuttle. It has two drive motors to bring it back in, either of which could do the job by itself. If those don't work, there's a contingency where the crew,

during a spacewalk, could use a motorized tool that resembles an electric drill to crank the mast back in. As a last resort, the canister and mast could be released from the shuttle by setting off explosive bolts that are attached to the main structure, then the shuttle would slowly back away from the mast and leave it in orbit. Obviously we'll try very hard to avoid that!

Q The shuttle crew for SRTM came to JPL several times to train for this mission. How did that work?

A Normally before a shuttle flight the training is done at Johnson Space Center in Houston, but this payload was so complicated that we scheduled at least half a dozen stand-alone simulations here on Lab. While the payload was in the Spacecraft Assembly Facility, we turned on all the electronics and had a phony flight deck set up in Building 300. The astronauts practiced using the tape recorders, going through maintenance procedures, how to fix them if they don't work, and also practiced working with the laptop computers that control the recorders. We went through several days of the mission.

Q SRTM is the only payload on this shuttle mission. Is that unusual?

A It sure is. All of the data we're collecting is recorded onboard, and we'll need about 350 tapes. That will fill up most of the mid-deck lockers on the space shuttle; that, along with the laptops and a few spare recorders we're flying, will use up just about all of the capabilities the orbiter has, including fuel and electricity. So there was really no room for any other payloads.

Q Is the SRTM data processing done here at JPL? In what order are the data analyzed, and how long will that take?

A Almost all of the data processing will be done here. The 350 tapes recording the C-band data will total six terabytes of data, or half the size of the Library of Congress. It will take about a year and a half to two years to process.

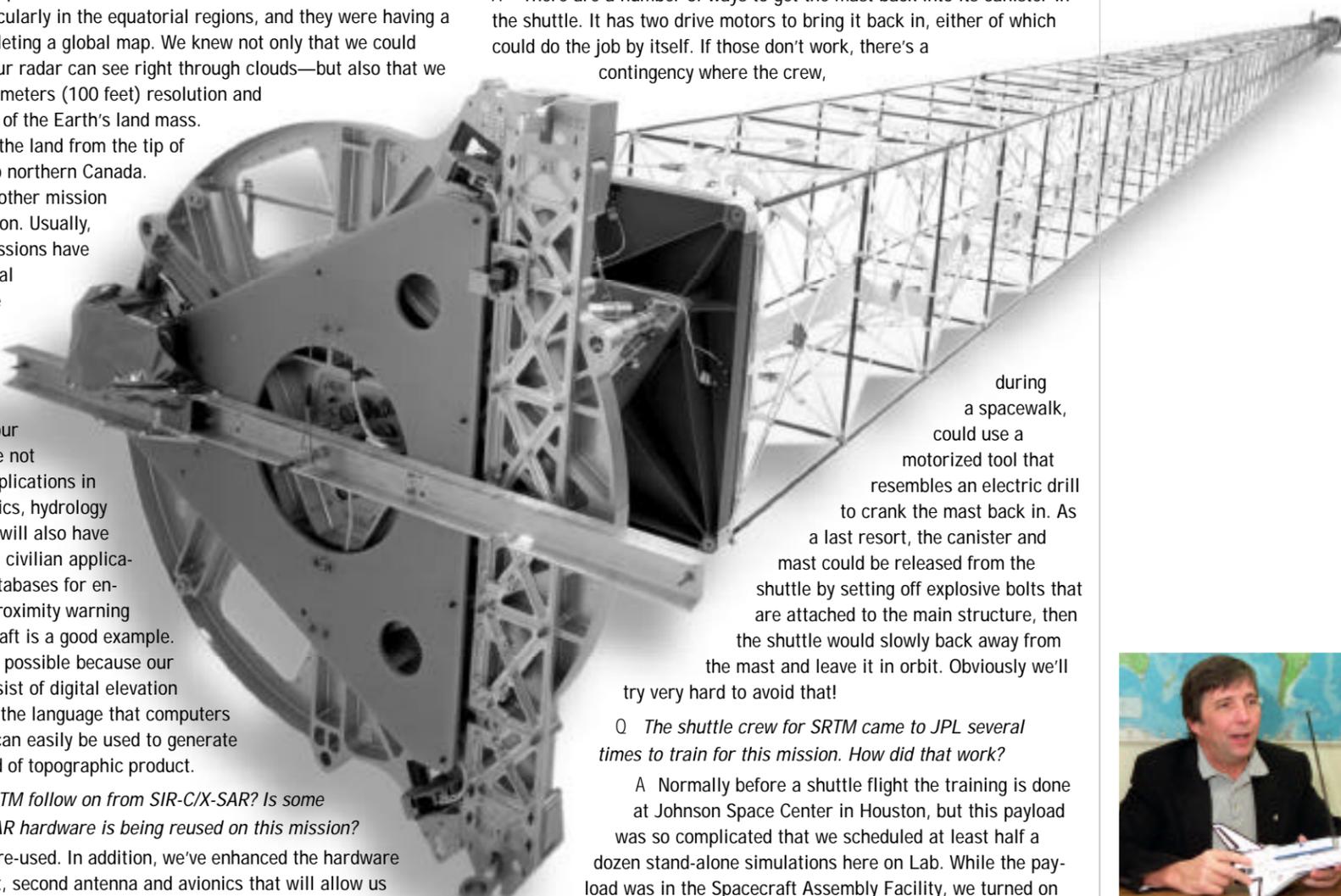
NIMA will distribute data to the military, and the science and civilian communities will receive data through the Earth Resources Observation Systems data center, operated by the U.S. Geological Survey. About 40 principal investigators worldwide will participate.

Since we'll orbit the Earth 159 times, the data will be spread out over the tapes in almost random order. Therefore a major task will be just organizing and queuing the data for processing and mosaicing by geographic region.

Q Is Who else at JPL contributed to SRTM?

A I really give a lot of credit to the radar engineers in Section 334. We have a bunch of bright, creative guys and gals here who like to invent new things, start with a clean piece of paper, design state of the art instruments with cutting-edge technology. But in this case, we wanted them to take a bunch of leftover hardware with 10-year-old technology, and without spending very much money enhance it such that it can measure to the precision of millimeters and arcseconds—and make it work perfectly for 11 days. They did it. I couldn't be more proud of them for stepping up to that challenge.

— Mark Whalen



Bob Brown/JPL Photo

“NIMA asked its industrial partners how they would do this type of job, and also asked JPL how a free-flying satellite would accomplish it. The consensus was that it would cost up to \$500 million. SRTM, however, will only cost about one-third of that.”

*Dr. Mike Kozbrick,
SRTM project scientist*

View this and previous issues of Universe online

<http://universe.jpl.nasa.gov>

Editor

Mark Whalen

Design & Layout

Adriane Jach
Audrey Riethle/
Design Services

Chief Photographer

Bob Brown/Photo Lab

Universe is published every other Friday by the Public Affairs Office of the Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91109.

For change of address, contact your section office (on-Lab personnel) or Xerox Business Services at (626) 844-4102 (for JPL retirees and others).

Notice to Advertisers

No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission.

Ads must be submitted on ad cards, available at the ERC and the Universe office, Bldg. 186-118, or via e-mail to universe@jpl.nasa.gov.

Ads are due at 2 p.m. on the Monday after publication for the following issue.

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

AWARDS *continued from page 2*

Issuing organization 19x: Kathleen Hardcastle (194).

Issuing organization 3x: Michael Janssen (320), William Langer (323), Ed Caro (334), Derrick Nybakken (336), Gary Blackwood (341), Timothy O'Donnell (353), Paul Schenker (354), Daniel Dvorak (367), Sonne Lane (380), Tom Renfrow (389).

Issuing organization 5x: Saverio D'Agostino (506).

Issuing organization 7x: Ken Yamane (252), Charles Lawrence (323), Daniel Coulter (383), James Graf (706), Alfred Zieger (730), Matthew Landano (750), Richard Grammier (751).

Issuing organization 8x: Charles Weisbin (842), Satish Khanna (860).
Issuing organization 9x: Cindy Cornish (253), Robert Rasmussen (341), Reed Wilcox (750), Andrew Downen (900).

Outstanding Accomplishments, Level A

Section 100: Katherine Dumas. Section 109: Gene Vosicky.
Section 194: Michael Chillicki. Section

195: Cyndy Chinn.

Section 210: Donna Yamada. Section 212: Diane Newmark. Section 214: Susan Armstrong. Section 222: Aram Yagubian. Section 230: Kenneth Schmad-er. Section 253: Daniel Graham. Section 255: Stephen Appleford.

Section 300: Mel Roberts. Section 304: Leon Alkalai. Section 311: John Baker, Nancy Leon, Robert Shishko. Section 312: Gregory Garner. Section 313: Robert Kocsis, Kim Leschly, Hoppy Price. Section 323: James Bock, Eugene Serabyn, Mark Allen, Anne Kahle, Ichiro Fukumori. Section 327: Michelle Santee, David Diner. Section 331: Aaron Kiely. Section 333: Daniel Hoppe. Section 334: Yuhsyen Shen, Tsai Wu-Yang, Louise Veilleux. Section 335: James Border, David Meier, Jeff Tien, Brian Wilson. Section 336: Jon Adams, Robert Thomas, Sam Zingales.

Section 340: Julian Blossiu. Section 341: Ralph Basilio, Doug Bernard, Riley Duren, Neville Marzwell. Section 344: Michael Dickerson. Section 345: David Bayard, Andrew Mishkin, Glenn Reeves, Guillermo Rodriguez. Section 346: Ratnakumar Bugga, Thomas George,

Henry LeDuc, Marshall Smart. Section 351: Steve Bednarczyk, Melissa English, Terry Fisher. Section 352: Dennis Kern, Mary Reaves, Terry Scharton, Jeff Umland. Section 354: Yoseph Bar-Cohen, Eric Baumgartner, Pradeep Bhandari, Jiunn Jeng Wu.

Section 360: Robert Miller, Gary Beaner, Claudia DeLuna, Anthony Martin. Section 367: Steve Chien, Sandeep Gulati, Eric Mjolsness. Section 368: Ed Gamble, Nicolas Rouquette. Section 369: Michael Levesque, Thomas McVitti, Michael Tankenson. Section 385: Kenneth Klaasen, Bedabrata Pain, David Redding. Section 388: Jean Lorré,

Justin Maki, John Wright.

Section 500: Steven Cornford. Section 501: Peter Barry, Jerry Sultor. Section 508: Kirk Barrow. Section 514: Richard Brace.

Section 660: Bruce Fischer. Section 665: Steven Wells.

Section 700: David Swenson.

Section 746: Marc Rayman.

Section 755: Tom Duxbury.

Section 762: Johnny Kwok.

Section 786: Moshe Pniel.

Section 843: John Stocky.

Section 900: Richard Mathison.

Section 901: Charles Edwards, Shel Rosell.

Award for Excellence selection committee named

The 2000 selection committee has been named for the Award for Excellence, a cash award program where any JPL employee may submit a nomination. The committee, comprising mostly non-managers from across the Laboratory, includes Alan Stepakoff (Section 171), Leslie Lamb (194), Pearline Johnson

(253), Michael Marcucci (353), Thomas Bickler (387), Yvonne Zieger (500), Sharon Harriman (602), John Ashlock (780), Page Garcia (810) and Julian Breidenthal (905).

For questions about the award, visit the Award for Excellence web site at <http://eis/sec614/reward/excel.htm>.

Retirees

The following employees retired in January: Robert Ebbett, 43 years, Section 313; Bruce Hayes, 38 years, Section 770; Louis Johnson, 34 years, Section 351; Jacqueline Bouck, 26 years, Section 174; John Scheid, 26 years, Section 730; Stephen Layne, 21 years, Section 252; Vita Warren, 13 years, Section 197; Harley Winter, 11 years, Section 351.

Letters

I would like to thank all of our friends and relatives for their tremendous support in the recent passing of my husband, Bill. His daughter, Dianne, and mother, Marie, also thank you. We also thank JPL ERC for the lovely plant.

Kathie Reilly

My family and I would like to express our thanks to my friends and co-workers at JPL for your prayers and kindness during my mother's illness and expressions of sympathy after her death. We also thank the ERC for the beautiful plant.

Andrea Angrum

My family and I are very grateful to our wonderful JPL friends for their prayers and expressions of sympathy upon the passing of my mother. Thanks also to the thoughtful people at the ERC for the beautiful plant.

Richard Key

Thank you to the many friends here at JPL whose thoughtful expressions of sympathy were a comfort to me during my father's illness and after his death. Your kind words were sincerely appreciated. And thank you to the ERC for the beautiful plant.

John Wellman

Classifieds

For Sale

BABY ITEMS, maple cradle incl. sheet & matt., \$40; exersaucer, \$35; bathtub ring, \$5; Play-skool table, \$10; jumper seat, infant car seat, infant snugli & slings, asstd. infant clothes, blankets, shoes, toys, all gd. cond. & reason-ably priced. 626/798-6248.

CAPPUCCINO/LATTE MAKER, Krups Novo Compact, hardly used, black, \$100/obo. 323/724-4365.

CELLULAR TELEPHONE, Nokia 6185, black, leather case, use w/Sprint PCS service, used 2 mo. obtained for \$200, sell \$150/obo. 626/794-2196.

COFFEE TABLE INSERTS (4), leaded glass for end table, 20" x 24" w/14"x18" beveled glass, \$10 each. 626/303-1927.

COMPUTER, Dell 486 w/15" VGA monitor, Okidata printer, uses hard disks, no modem, \$250. 362-3358.

COMPUTER DESK, Sauder w/drk. cherry finish, 35.5 x 19.5 x 29.5"H, keyboard tray, printer shelf, hidden wheels, 1 yr old, exc. cond., bought \$120 new at Staples, sell \$80/obo. 805/388-8524, eves., Trish.

CRIB, natural wood, \$130; 3-in-1 stroller, \$80; double stroller, \$50; single strollers, car seats, bassinette, etc. 626/917-1000, Margarethe.

DOGGIE DOOR, lg., w/patio glass extension, hardly used, \$75. 541-0298.

DRYER, Sears Kenmore electric, heavy duty, 90 series, soft-heat, extra capacity plus, exc. cond.,

pd. \$650, sell \$350. 626/304-2765, after 6 p.m.

FUTON, love-seat sz. (closed), full bed (opened), include. thick burgundy mattr.; bought 6 mo. ago for \$350, but need more room at home, sell \$275/obo. 323/724-4365.

MATTRESS, queen sz., \$60. 541-0298.

MISC, Ethan Allen cherry wood wall-mounted shelf, exc. cond., \$35; vacuum cleaner, canister, Regina, w/attach., fair cond., \$20; steam iron, GE Power Spray, vg cond., \$15; floor lamp, black base & pole, off-white shade, gd cond., \$12; table-top TV/FM radio antenna, RCA, vg cond., \$10. 626/577-8107.

PET ITEMS: new small dog pillows, cedar filled, \$10; new white house-style canary cage, \$30; new finch accessories: cat scratching posts, \$15; assorted used bird cages and dog houses (Igloo). 626/798-6248.

PUPPY, Reindeer Chihuahua, looks like in Taco Bell ad. 980-3015.

REFRIGERATOR, Kenmore, 27 cu. ft., side-by-side, water & ice, \$495. 626/643-9769.

RING, .51 total ct. wt. diamond w/gift box, \$400. 362-3358.

RINGS, 2, ruby & gold, \$75 & \$130; LAMPS, orig. old Huntington Hotel ginger jar, \$50/ea.; STATIONARY BICYCLE, Tunturi Ergometer, \$50; WINDOWS, 14 new, clr douglas fir, var. sizes \$25-\$50 ea. 248-2807.

ROAD BIKE, men's 25" Schwinn Le Tour, vg cond. except leather seat is dried out, \$150/obo. 248-9432, Stan.

SKI EQUIPMENT, K2 CVC competition slalom skis, 165 w/Marker M18 bindings & matching 115cm/46" poles, Nordica Next 87 boots, Nordica ski pants, sz. 30, all for \$125/obo. 626/449-7895.

SKI RACE CAMP certificate at Mammoth, 3 days, incl. 6 hrs. of coaching each day, video analysis, 1-day high performance demos, equip. & tuning session, opportunity to win some equip., choose from Feb. 14-16, March 20-22: \$350 value, sell \$225. 790-1209.

STEREO SPEAKERS, Bose 4.2 everywhere, \$125/pr. 661/255-5645.

TELEVISION, 25" color, does work, may need some repair \$25; ENTERTAINMENT CABINET, fits up to 25" TV & stereo equip., light oak, \$75. 626/334-1535, after 6 p.m.

TREADMILL, Johnson JCM1000 manual, like new, \$150/obo. 626/821-0611, Lori or Steve.

VIDEO GAMES, Nintendo 64 system w/2 controllers, exc. cond., \$150. 909/592-4667.

Vehicles / Accessories

'95 ACURA Legend LS coupe, 2D, black, auto, 104,000 miles, mint cond. leather, sunroof, heated seats, alloy wheels, CD changer, remote keyless entry. \$17,000/obo. 626/584-3204 day, 909/592-0780 eve/weekend.

'94 CHEVY Astro LT mini van, pwr. everything, class 3 hitch, running boards, roof rack, 4 captain's seats + 1 bench seat, CD, super cond. inside/out, 90K mi.; \$12,000/obo. 952-3113, Jeff.

'88 DODGE Aries, 120K mi., 4-dr, a/c, new front struts, runs well, \$1,800/obo. 626/797-6982.

'99 FORD F-150 pickup, red & gray, under 4,000 mi., credit union will finance 100% OAC, \$18,000. 213/249-3243.

'96 FORD Explorer Ltd. 4 x 4, loaded, leather, 32K mi., air ride ctrl., rear a/c, CD changer, phone, traction ctrl., exc. cond., \$15,995. 909/599-3230.

'94 FORD Ranger, V8, camper shell, exc. cond., \$7,500. 790-3854.

'82 FORD F-250, ext. cab, pwr. steering, cruise, a/c, new front end, 351 V8, runs well, rebuilt trans., auto, straight body, shell, off-road tires/rims, \$3,495/obo. 909/983-9500.

HITCH, PullRite 10,000-lb. rated, pulls ball-hitched trailer, no sway, no fishtail, see www.pullrite.com, \$500. 909/945-9636.

'92 HONDA Civic DX, 4-dr., am/fm/cass., auto, a/c, alarm, 55,000 mi., exc. cond. 310/374-0855.

'90 HONDA Civic EX 4-dr., auto, a/c, am/fm/cass, svc. rec., 112,300 mi., \$4,050. 249-8914.

'87 HONDA Civic DX sedan, 4D, 190k mi., rebuilt eng., a/c, runs great, \$2,000/obo. 626/821-0611, Lori or Steve.

'97 JEEP Wrangler Sport, 6-cyl. 4.0, a/c, p/s, twin air bags, stereo, sound bar, CD changer, alarm, heavy duty shocks, 30" wheels, 38k mi., Kelley bb \$19,565, sell \$19,000/obo. 626/356-2998, Matt.

'91 JEEP Cherokee, ltd. edition, 4x4, white ext, tan int, leather seats, 150k mi., am/fm/cass, towing pkg., exc. cond., \$7,500/obo. 909/599-3032.

'91 LEXUS LS 400, loaded, immac., gold ext. pkg. incl. auto climate cont., pwr. strng/windows/drs., telescoping whl., cruise, Nakamichi prem. audio incl. CD audio changer, advanced traction cont., lthr, moonroof, alloy whls, 71K

miles, must sacrfc, \$16,950. 249-9437, eves. '90 MALIBU Skier ski boat, 19', 8-cyl. inboard Mercury eng., prop driven, blue/grey ext, matching int., single-axle trailer, \$7,500/obo. 909/599-3032.

'89 MAZDA MPV van, V6, 7 pass., 147,000 mi., orig. owner, almost new tires/brakes/batt. + more, \$2,800/obo. 626/446-6404, 6-8 p.m.

'92 NISSAN Pathfinder XE, V6, 4 doors, only 50,000 mi., loaded, tinted windows, many other access., complete service records, mint cond., \$11,500/obo. 626/443-9774.

'97 TOYOTA Camry LE, orig. owner, exc. cond., 29k mi., silver-gray, loaded, ABS, pwr. moonrft., elite pkg (wood/gold trim), rs spoiler, alloy whls., prem. sound, alarm/keys entry, \$14,000/obo. 368-0541.

'96 TOYOTA Previa SC, sports pkg., 72K mi., 1 owner, CD changer, 2 moonroofs, \$14,000/obo. 541-0131.

'88 TOYOTA Corolla, 4 dr., auto, a/c, sunroof, gd. running cond., \$3,200. 626/917-1000.

'83 TOYOTA Supra, white w/blue int, 6 cyl., cruise, sunroof, CD, pwr. win/drs, alarm, looks good, runs well, \$1,500/obo. 353-1907.

'97 VOLKSWAGEN Passat GLX sedan, green, 4-dr., auto, a/c, pwr. sun/moonroof, leather seats, CD changer, remote entry ctrl., LoJack, 36k, roomy, exc., \$16,700/obo. 626/793-3723, Kaiti.

'91 VW Jetta, white, 4 dr., auto, Wolfsburg ed., a/c, upgraded Pioneer spkrs, Sony pull-out cass./radio, 149K mi., exc. cond., \$4,000/obo. 714/903-8888.

'76 VW bus, bubble top, camper option, exc. cond., new shocks and window seals, \$4,300. 626/799-2484.

Wanted

COMPUTER PROGRAMMER, advanced, or syst. developer/inventor sought by entrepreneur to produce future Internet concepts: fax bio to 323/935-0057 or call 323/935-8146.

PITZER COLLEGE female grads willing to talk about their experiences to help establish an endowed chair at the college. 909/621-8289, Cassandra.

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.

VOLLEYBALL PLAYERS, coed, all levels of play, Tues. nts., 8-10, Eagle Rock High School, \$3/nt. 956-1744, Barbara.

Free

CAT, home needed for extremely loving, pure-bred sealpoint Siamese, no papers, spayed, all shots, inside cat, fully tested, must be only cat, approx. 2 yrs. old. 626/791-4519, Sherri.

DOG, rescued, beautiful black lab/chow mix, 2-3 yr. old male, trained, healthy, shots; needs loving family, will be a great companion. 661/257-5817.

For Rent

ALTADENA, 3 bd., 2 ba., completely remodeled, hrd./wd. floors in lr, nice yd., updated tiled kitch., tiled baths, mst. ste., fp in lr., \$1,400. 626/794-8517, Art.

ALTADENA house, 3 bd., 1 ba., fenced backyard, 2-car gar., no dogs/smoking, water & gardener pd., \$1,100. 626/791-8113.

ALTADENA, 1-bd. guest house, fenced yd., Florecita area above east lot, laundry, clean & quiet, pets OK w/dep., \$425 + part util. 626/794-6076.

EAST PASADENA house, 2 bd., 1 ba., 1-car gar., lg. fenced yd. w/fruit trees, incl. gardener/water, non-smoker, carpet, drapes, stove, refrig. avail., fireplace, covered patio, avail. Feb. 14. 626/794-3250.

LA CANADA, lovely 5 br., 3 1/2 ba. home w/lg. bonus room, oak shade trees, walk to schools & JPL, \$3,000/mo. 949-786-6548.

LA CRESCENTA house, priv. setting high above Foothill, 2 bd., 1 ba., pool, very quiet, \$1,400 incl. gardener & pool service. 952-6007.

LAS VEGAS, The Lakes: 1-sty house, 2 bd., 2 ba., gard/appl incl. 1-yr. lse, no pets, \$1,000 + dep., see <http://home.pacbell.net/jwmyers3/> houseb.html. 661/254-6134.

MONROVIA, 2 rms., 2 ba., full priv., 12 mi./JPL, no smoking/pets, \$400/ea. 626/358-7728.

MONROVIA condo, 2 bd., 1.5 ba., 2-car gar., cent. AC/heat, full kitchen, washer/dryer, \$850. 626/357-5189.

PASADENA house, NE, nr. Altadena/Eaton Cyn., share w/3 others: 4 bd., ~3,000 sq ft., liv, din, den, kitch, pantry, 2 full ba., mostly furn., 2 friendly dogs, 2-car gar., lg. pool, cent. heat, f/p, refrig, w/d, dish, micrww, TV, off-st. parking, \$412.50 (split \$1,650). 626/398-3192, Gordy,

Eric, Pavel.

PASADENA, 2 bd., 2 ba., apt. to share, 3 mi. to JPL near Old Town, carpet, f/p, c/a, free laundry, carport, non-smoker only, avail. Feb. 8, \$460 + 1/2 util. 626/564-9885, eves.

PASADENA part-time rm., commuter special, 1 bd., 1 ba. in lux. apt. complex, 5 min./JPL, nr. Del Mar & Euclid, pool, Jacz., cla/heat, \$25/nt., 2-nt. min/wk. 626/796-5046.

Real Estate

BIG BEAR, new cabin 2 blocks from lake, 2 bd., 2 ba., mud/laundry rm., \$129,000. 909/585-9026.

PASADENA, immac. 3 bd./2.5 ba. townhome built '98, nr Rose Bowl, 3.5 mi/JPL, gated, 1,440 sq. ft. cent. heat/air, 2-car att. gar., prof. organized closets, tiled fireplace, alarm, dbl glass windows, covered balcony off the master, wood flrs everywhere, Corian counters in

kitch/baths, lg enclosed backyard fully landscaped w/auto sprinklers, palm/fruit trees, fountain, commun. pool/Jacz/basketball court, orig. owner. \$246,000/obo. 626/568-8298.

TEHACHAPI area, new house, 3 bd., 2 ba., LR, DR, custom cent. heat/a/c, 2 1/2 acres fenced, 2-car garage/work area, 2,600 sq. ft., Dutch barn (guest house), lots of oaks/views: OWC, \$155,000. 626/794-5858.

Vacation Rentals

BIG BEAR, 7 mi. from slopes: full kitch., f/p, 2 bd., 1 ba., sleeps 6; reas. rates; 2-nt. min.; no smokers/pets; exc. hiking, biking, fishing nearby. 909/585-9026, Pat & Mary Ann Carroll.

BIG BEAR cabin, quiet wooded area near village, 2 bd., sleeps 8, F/P, TV, VCP, completely furn., \$75/nt. 249-8515.

BIG BEAR LAKE cabin, nr. ski area, lake, shops, village, forest, 2 bd., sleeps up to 6, f/p, TV, VCR, phone, microwave, BBQ & more, JPL disc. from \$65/nt. 909/522-9874.

BIG BEAR LAKEFRONT, lux. townhome, 2 decks, tennis, pool/spa, nr. skiing, beaut. master bd. suite, sleeps 6. 949/786-6548.

CAMBRIA ocean front house, sleeps up to 4, exc. view. 248-8853.

LAKE TAHOE, west shore @ Homewood, close to northern ski areas: Squaw, Alpine Meadows, Homewood, etc.; 3 bd. + loft, 2 ba., slps. 8, linens provided, full kitch. & laundry, TV/VCR, wood stove & wood; 2-day min., JPL disc., \$75 cleaning fee. 626/585-0321, Bob or Nicole.

HAWAII, Maui condo, NW coast, on beach w/ocean vv., 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microw., dishwasher, pool, priv. lanai, slps. 4, 4/15-12/14 rate \$95/nite/2, 12/15-4/14 rate \$110/nite/2, \$10/nite add'l person. 949/348-8047.

MAMMOTH condo, studio + loft, 2 ba., frplac. w/wood, Jacuzzi, sauna, game rm., color TV w/cable & VCR, full kitch. w/microwave, terrace, view, amen. 714/870-1872.

MAMMOTH, Chamonix condo, at lifts 7, 8, 16, 17; walk to Warming Hut, 2 bd., 2 full ba., sleeps 6, fully equip. elec. kitch. w/mcrown. & extras, f/p & wood, color TV, VCR, cable, FM stereo, o/d Jacuzzi, sauna, game, rec. & laundry rms; convenient to shops, lifts; special mid-week rates. 249-8524.

LAS VEGAS condo, 1 block from Strip, close to Flamingo Hilton, 2 bd., 2 ba., fully equipped kitch., TVs, VCR, laundry rm, community pool; Jul-Sep & Nov-Dec rate \$125/nt, all other \$110/nt. 909/592-4667.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, sleeps 6-8, fully